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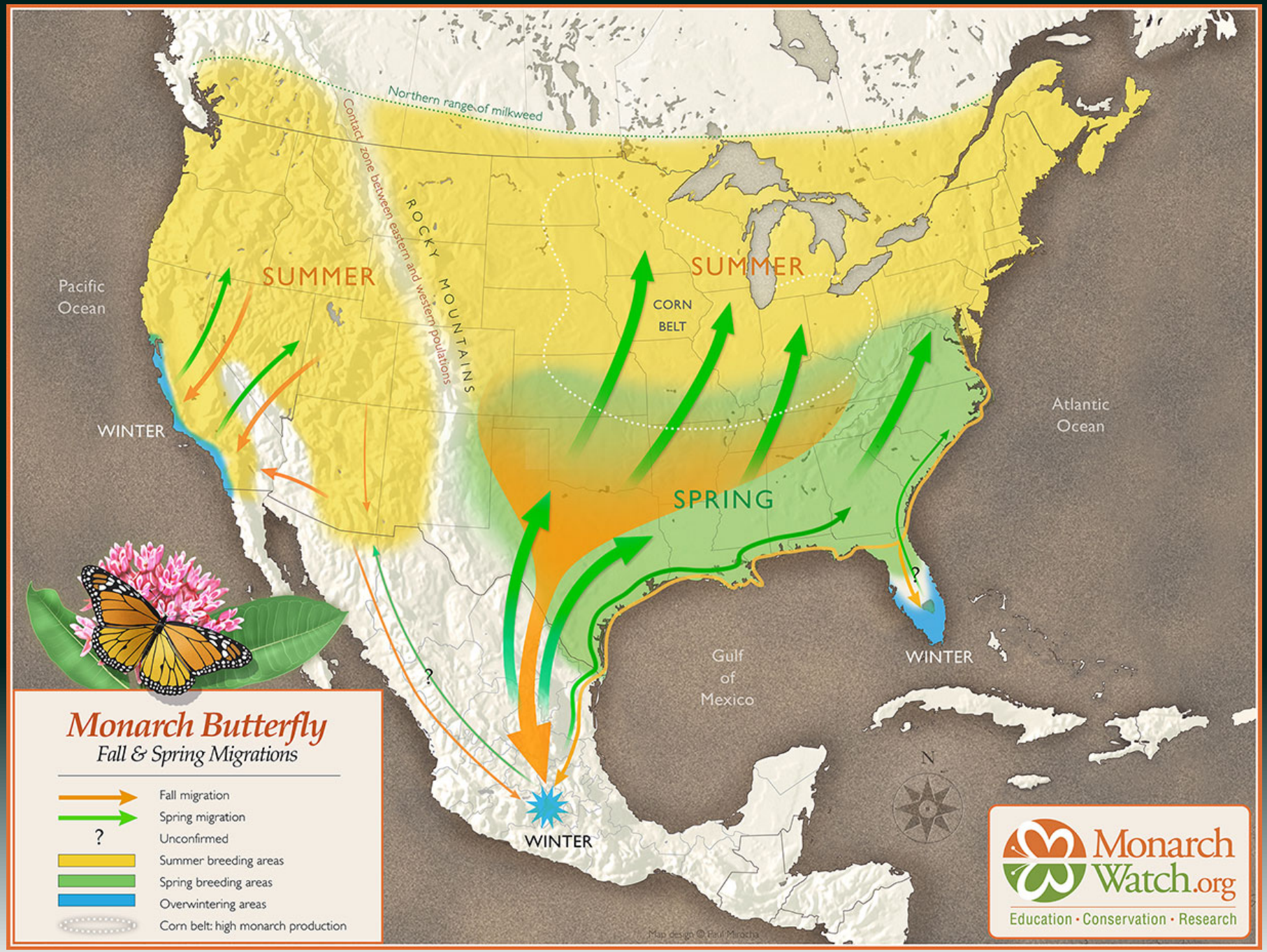
MONARCH CONSERVATION: ALL HANDS ON DECK

ORLEY R. “CHIP” TAYLOR
DIRECTOR
MONARCH WATCH
UNIVERSITY OF KANSAS
LAWRENCE, KS


Northern range of milkweed
Contact zone between eastern and western populations
ROCKY MOUNTAINS
SUMMER
SUMMER
CORN BELT
SPRING
WINTER
WINTER
WINTER
Pacific Ocean
Atlantic Ocean
Gulf of Mexico
?
?
N
Monarch Butterfly
Fall & Spring Migrations
Fall migration
Spring migration
Unconfirmed
Summer breeding areas
Spring breeding areas
Overwintering areas
Corn belt: high monarch production
Map design © Paul Mirocha
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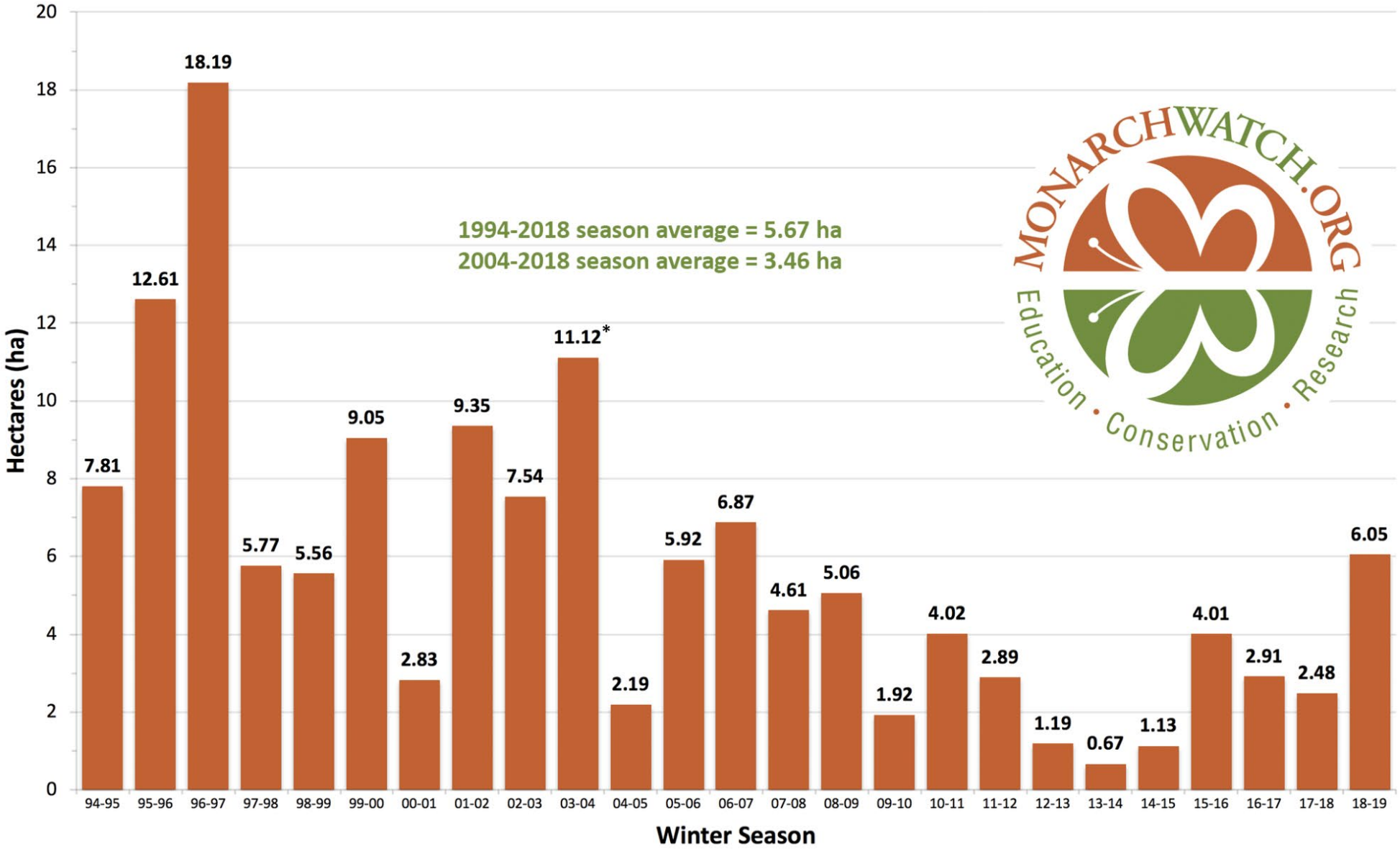
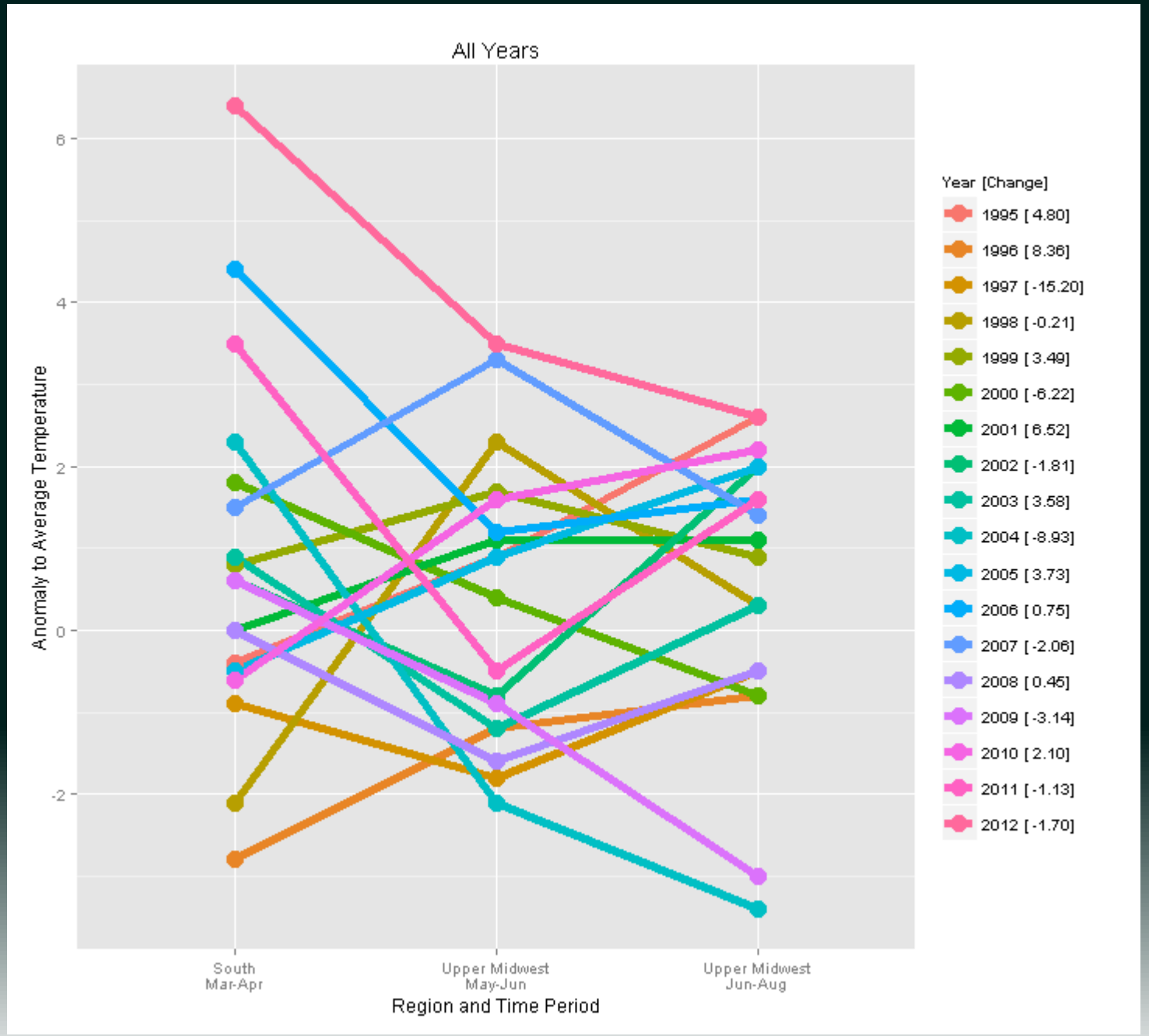
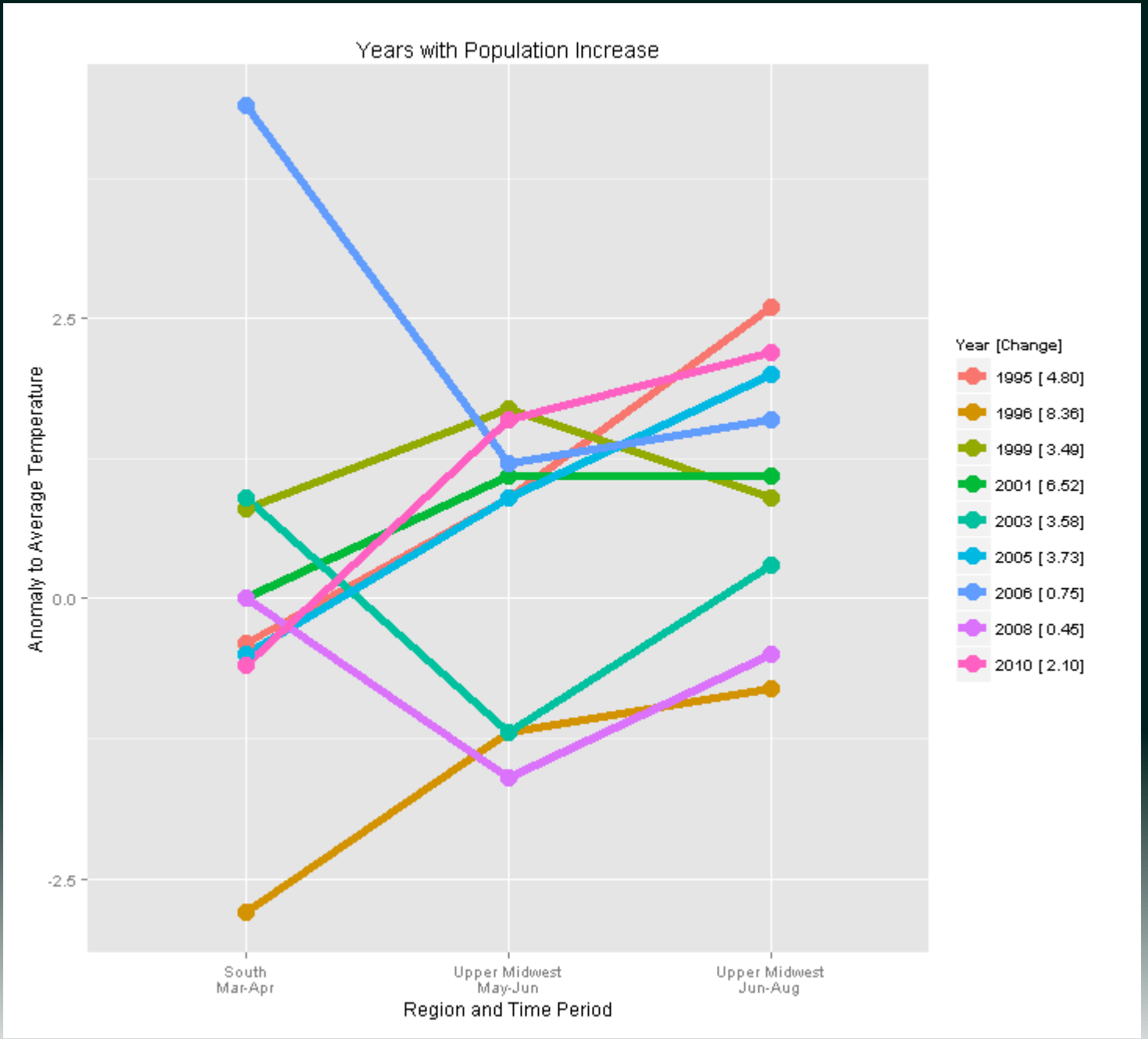
Total Area Occupied by Monarch Colonies at Overwintering Sites in Mexico



Data for 1994-2003 collected by personnel of the Monarch Butterfly Biosphere Reserve (MBBR) of the National Commission of Natural Protected Areas (CONANP) in Mexico. Data for 2004-2017 collected by World Wildlife Fund Mexico in coordination with the Directorate of the MBBR.

* Represents colony sizes measured in November of 2003 before the colonies consolidated. Measures obtained in January 2004 indicated the population was much smaller, possibly 8-9 hectares. CT


All Years
Anomaly to Average Temperature
6
4
2
0
-2
South
Mar-Apr
Upper Midwest
May-Jun
Upper Midwest
Jun-Aug
Region and Time Period
Year [Change]
1995 [4.80]
1996 [8.36]
1997 [-15.20]
1998 [-0.21]
1999 [3.49]
2000 [-6.22]
2001 [6.52]
2002 [-1.81]
2003 [3.58]
2004 [-8.93]
2005 [3.73]
2006 [0.75]
2007 [-2.06]
2008 [0.45]
2009 [-3.14]
2010 [2.10]
2011 [-1.13]
2012 [-1.70]


Years with Population Increase
Anomaly to Average Temperature
2.5
0.0
-2.5
South
Mar-Apr
Upper Midwest
May-Jun
Upper Midwest
Jun-Aug
Region and Time Period
Year [Change]
1995 [4.80]
1996 [8.36]
1999 [3.49]
2001 [6.52]
2003 [3.58]
2005 [3.73]
2006 [0.75]
2008 [0.45]
2010 [2.10]

Population Development in 2018 - Summary

Timing – TX arrived on time and in good numbers

March temperatures in TX +5.4F, but cold in NTX and OK

Egg laying largely limited to TX in March and April

Large number of first generation monarchs moved N May - early June

May temperatures +6.7 enabled recolonization N of 40N 11-30 May

Summer temperatures +2F in Upper Midwest in June and July+August

Bottom line – nearly optimal conditions for population growth

Texas – March Temperatures

>1.9 F above average 11/19 years since 2000 Mean = +2.6 F

>1.9 F above average 25/108 years 1895-2000

Projected mean as of 2040-2050 = +6F

Monarch numbers have declined 8/10 yrs with temps >1.9 F

Monarchs numbers increased 4/4 yrs with temps <1.5

Habitat Loss

Grassland losses + CRP conversion to cropland – 1 million acres/year

Development from 90 W-105 W and 48N to 26N - +/- 1 million acres/year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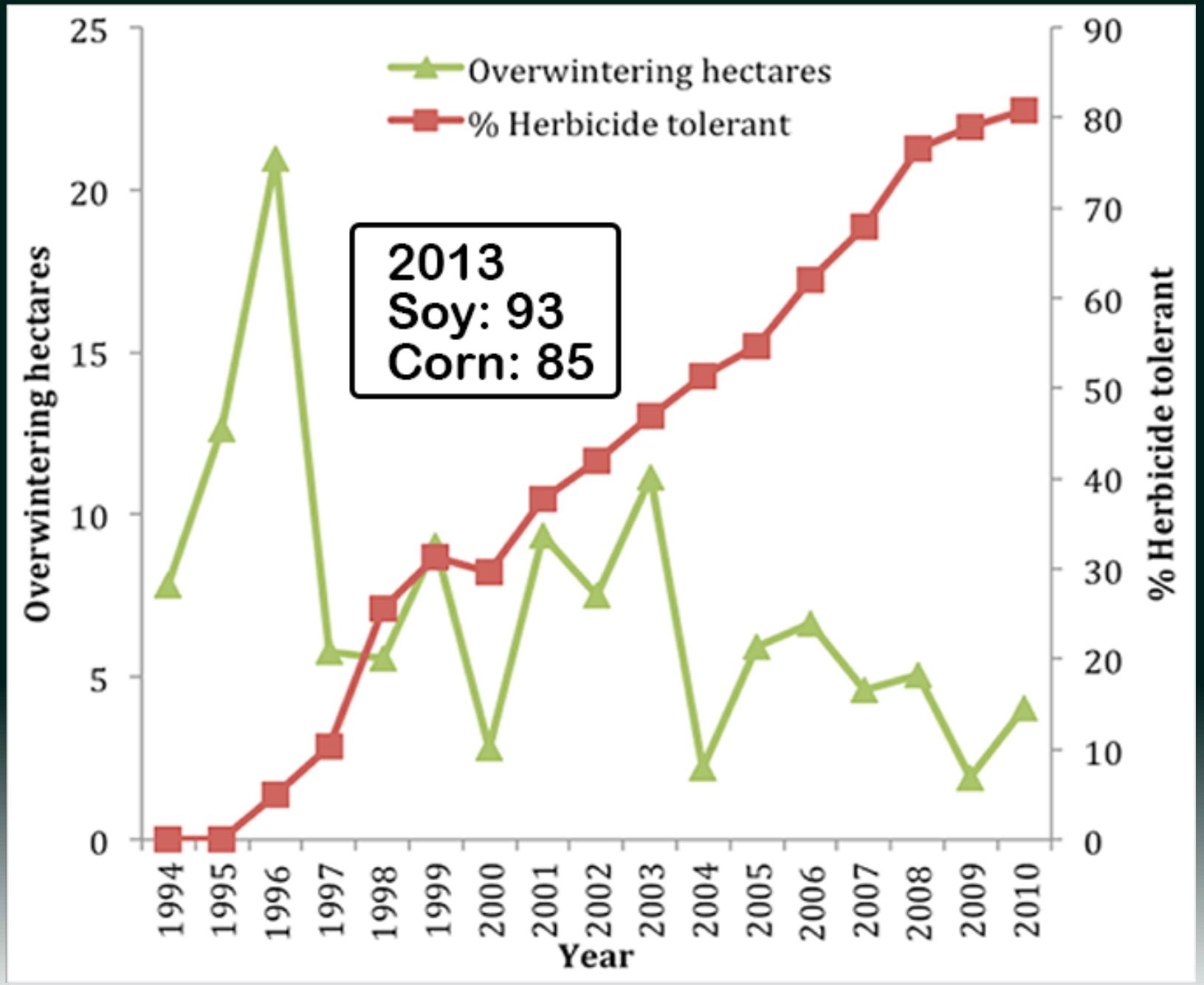
WHY ARE MONARCHS DECLINING?

- GMOs - glyphosate tolerant corn and soy
- Economics associated with Biofuels
- Conversion of rangeland and grasslands to croplands for biofuels
- Development –1.24 million acres/year
- Intensive agriculture – reduced field margins
- Management of marginal lands – herbicides
- Insecticides – mosquito control
- Degradation of overwintering habitats in Mexico
- Unfavorable conditions during breeding season


Overwintering hectares
% Herbicide tolerant
2013
Soy: 93
Corn: 85
Overwintering hectares
% Herbicide tolerant
Year
0
5
10
15
20
25
0
10
20
30
40
50
60
70
80
90
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010

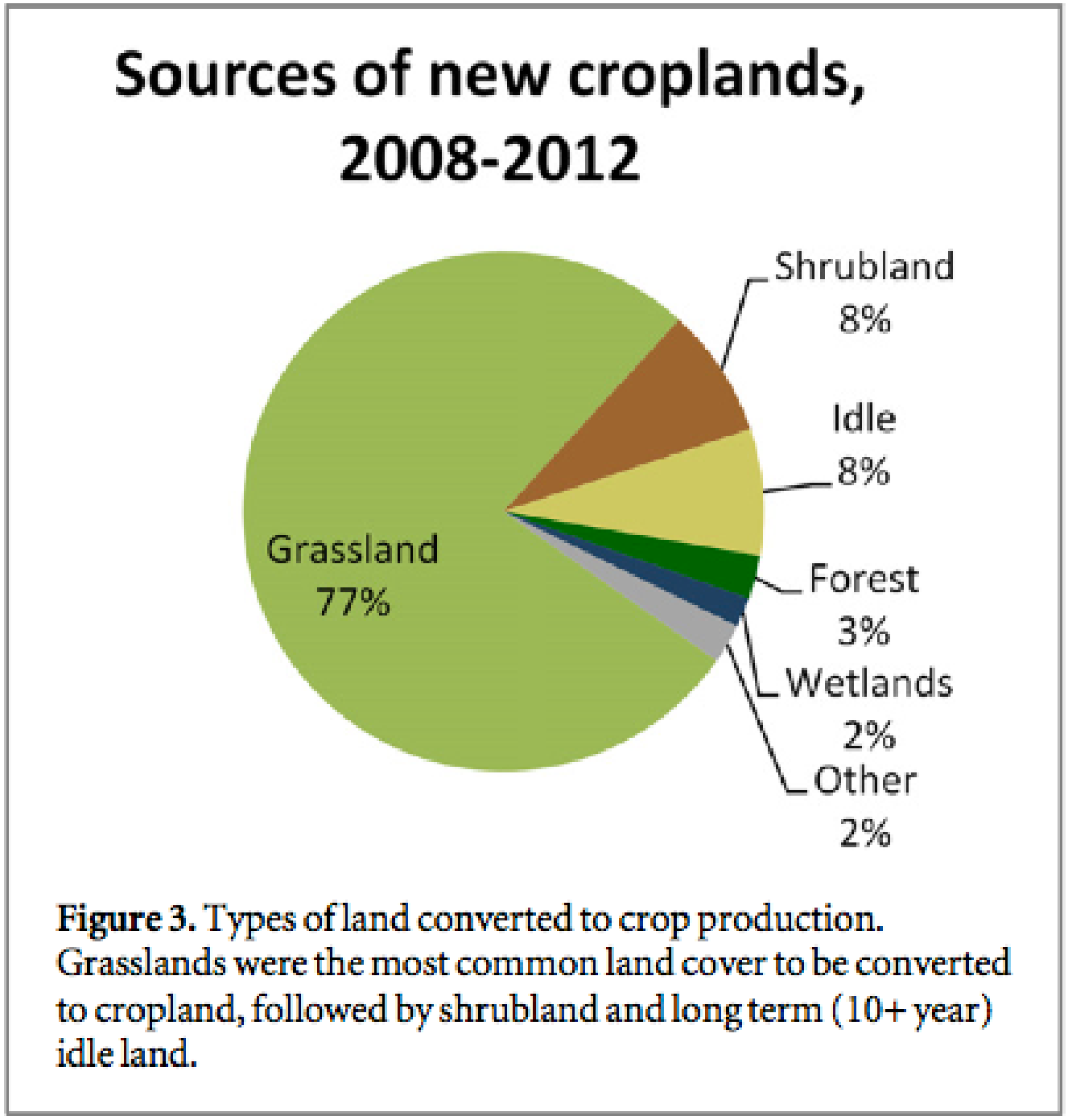
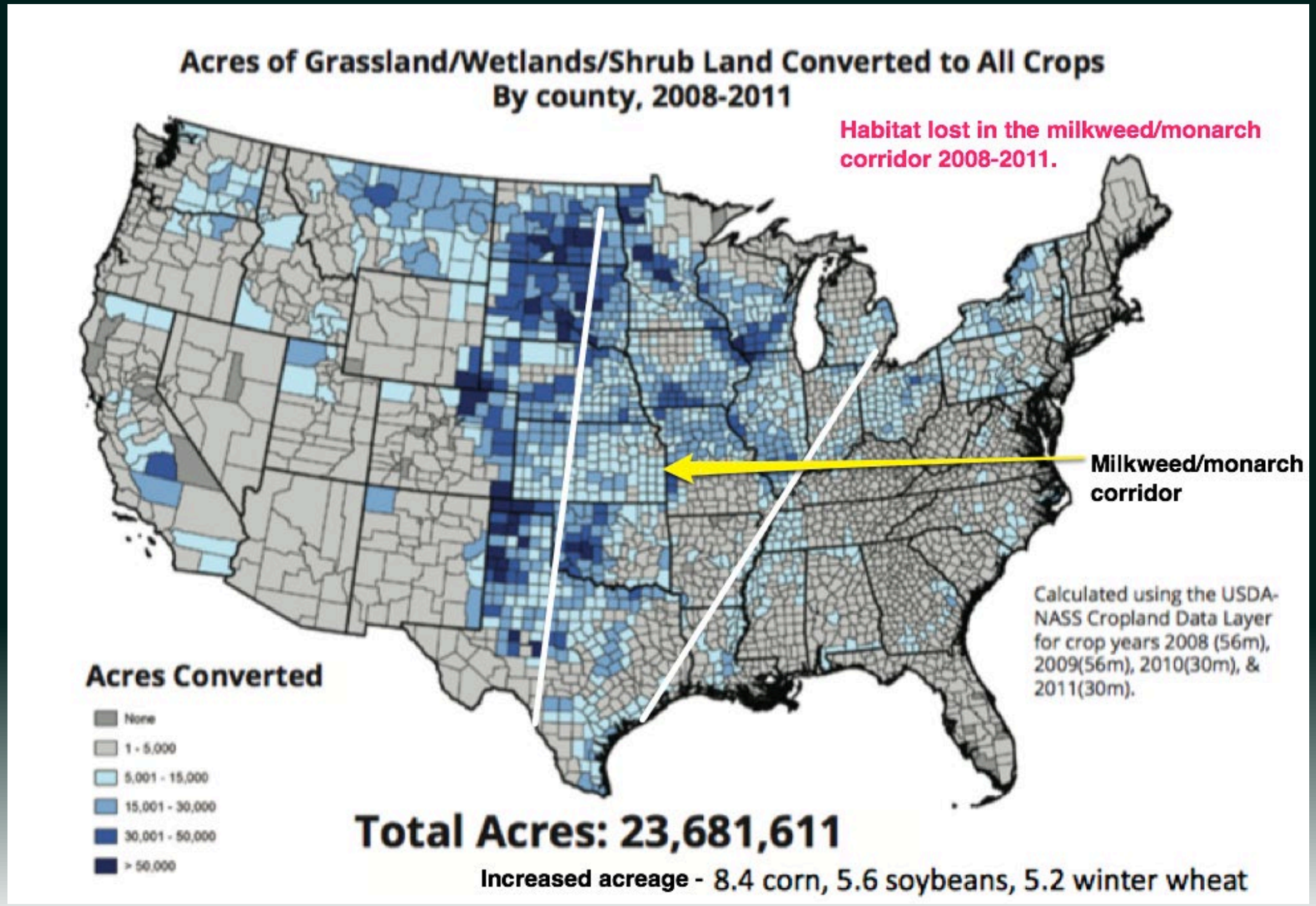


Figure 3. Types of land converted to crop production. Grasslands were the most common land cover to be converted to cropland, followed by shrubland and long term (10+ year) idle land.

Lark, et al 2015


Acres of Grassland/Wetlands/Shrub Land Converted to All Crops
By county, 2008-2011
Habitat lost in the milkweed/monarch corridor 2008-2011.
Milkweed/monarch corridor
Calculated using the USDA-NASS Cropland Data Layer for crop years 2008 (56m), 2009(56m), 2010(30m), & 2011(30m).
Acres Converted
None
1 - 5,000
5,001 - 15,000
15,001 - 30,000
30,001 - 50,000
> 50,000
Total Acres: 23,681,611
Increased acreage - 8.4 corn, 5.6 soybeans, 5.2 winter wheat

Loss of Monarch Habitat
HT Crops and Biofuel Initiative

Year	Corn & Soy Acreage	Event
1996	143.5 million	First HT Crops
2006	153 million	Before Ethanol
2007	158 million	Ethanol Mandate
2012	169 million	Conversion Continues 2013
2013	174.4 million	Conversion Continues
2014	29.5 million C&S in 2013 than 1996.	

Habitat conversion 2008-2012 24 million = Indiana

Total habitat lost +/- 167 million = Texas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Root Systems of Native Plants

Diagram referenced from the “Conservation Research Institute”

Eastern Shawnee Tribal Land Wyandotte, Oklahoma Milkweed planting layout

Site preparation for habitat island: Eastern Shawnee

Straw mulch is used to retain moisture and reduce competition from other plants.

Proof of concept


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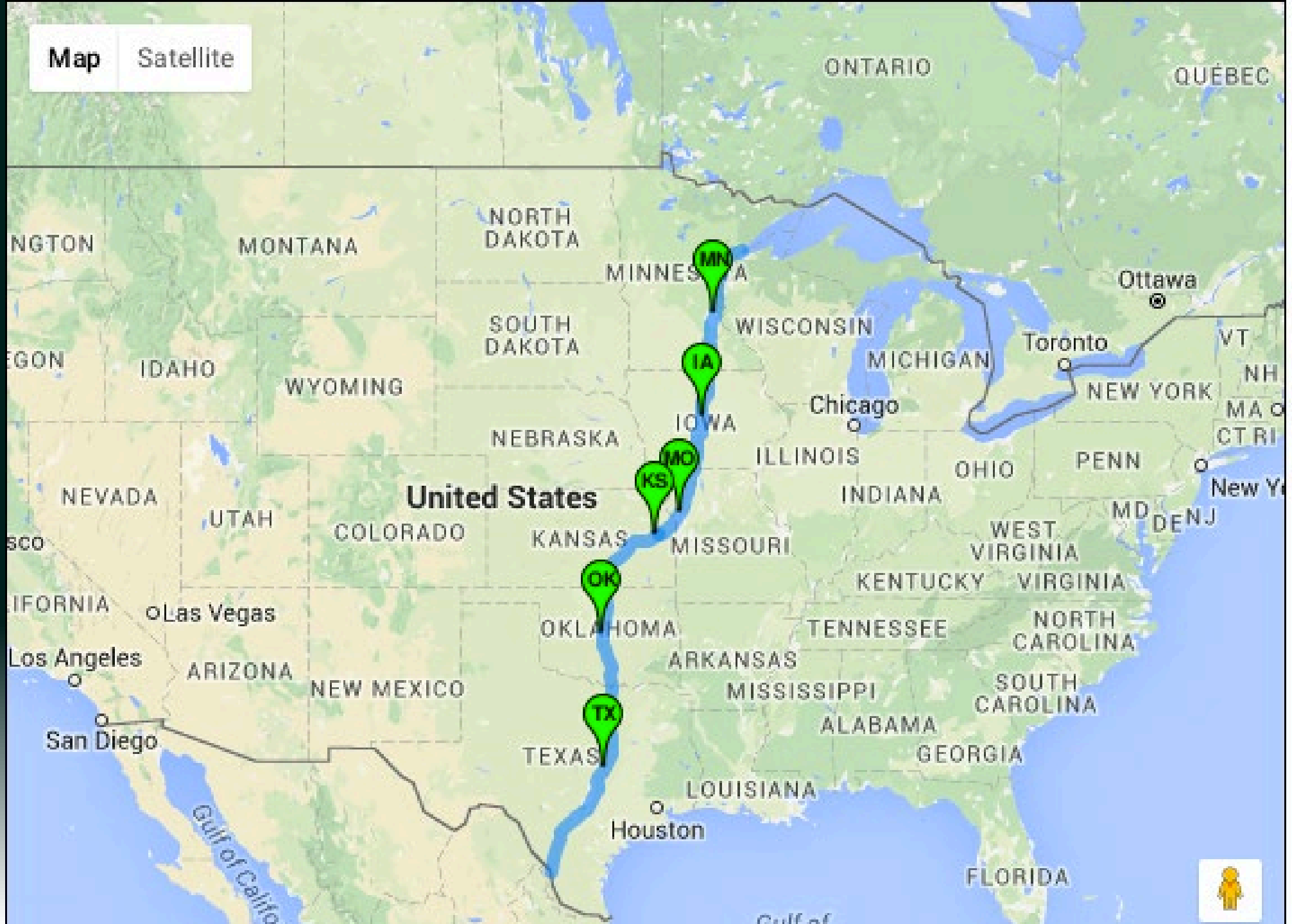
Monarch Watch Blog
Creating a Monarch Highway
Tuesday, December 1st, 2015 at 4:22 am
by Chip Taylor

- **A PROPOSAL TO CREATE A MONARCH HIGHWAY**
  Restoration of milkweeds and nectar sources for monarchs and pollinators along I-35

- https://monarchwatch.org/blog/2015/12/01/creating-a-monarch-highway/


Map
Satellite
ONTARIO
QUEBEC
MONTANA
NORTH DAKOTA
MINNESOTA
MN
SOUTH DAKOTA
WISCONSIN
MICHIGAN
Ottawa
Toronto
IDAHO
WYOMING
IA
NEW YORK
Chicago
NEBRASKA
IOWA
ILLINOIS
MO
KS
OHIO
PENN
NEVADA
United States
UTAH
COLORADO
KANSAS
MISSOURI
INDIANA
WEST VIRGINIA
KENTUCKY
VIRGINIA
OK
Las Vegas
OKLAHOMA
TENNESSEE
NORTH CAROLINA
Los Angeles
ARIZONA
NEW MEXICO
ARKANSAS
MISSISSIPPI
SOUTH CAROLINA
TX
San Diego
TEXAS
ALABAMA
GEORGIA
LOUISIANA
Houston
FLORIDA

I 35 Rest Stop
nr. Guthrie, OK

http://www.stihlusa.com/products/augers-and-drills/planting-auger/bt45ead/

Augers can be rented or purchased and are highly recommended for large scale projects

I 35 Rest Stop
nr. Guthrie, OK

I 35 Rest Stop
nr. Guthrie, OK

Side oats gramma

Blue gramma

Proof of concept

Creating “The Monarch Highway” will strongly communicate the need to maintain the integrity of the system that supports monarchs, pollinators and other species sharing these habitats.

Monarch Highway
Official sign
1 35 Eastern KS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MONARCH WAYSTATION
This site provides milkweeds, nectar sources, and shelter needed to sustain monarch butterflies as they migrate through North America.
Certified and registered by Monarch Watch as an official Monarch Waystation.
CREATE, CONSERVE, & PROTECT MONARCH HABITATS
WWW.MONARCHWATCH.ORG

MONARCH WAYSTATION PROGRAM

- Monarch Waystations – Started 2005

  How many – 22,667 registered, >45,000 created

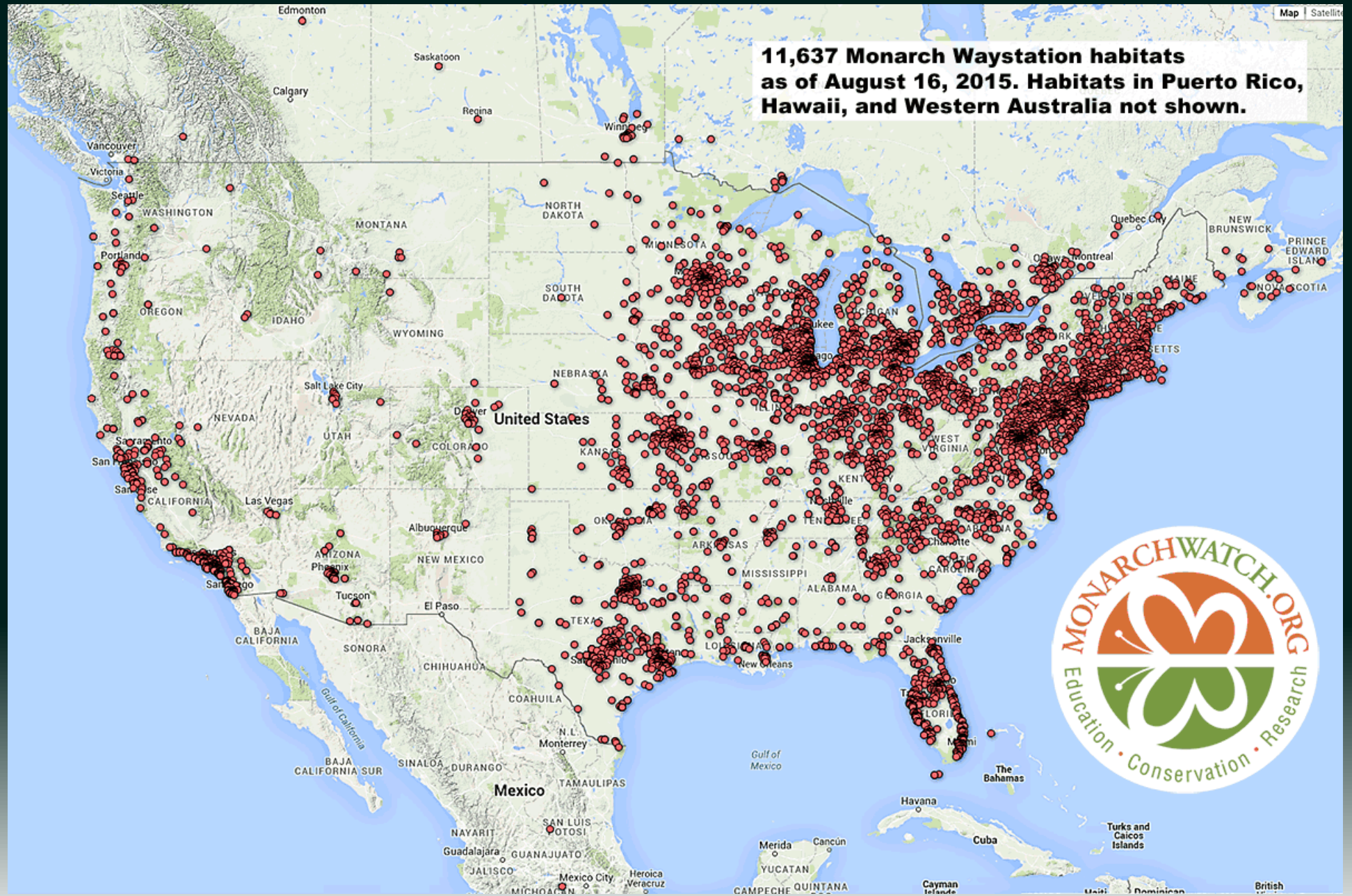
  Home – 55%, School - 11%, Park - 8%, Farm - 5%, Other 20%

  Domestic - 49 states, DC, Puerto Rico, Virgin Islands – 21,789

  TX - 1,890, IL - 1,740, MI - 1,667, CA - 1,469, OH - 1,152,

  VA - 1,113, PA - 1,041, FL – 973, WI – 939, MO – 744,

  International - 9 Canadian Provinces –864, Mexico 6, Four others


11,637 Monarch Waystation habitats as of August 16, 2015. Habitats in Puerto Rico, Hawaii, and Western Australia not shown.
Map
Satellite
Edmonton
Saskatoon
Calgary
Regina
Winnipeg
Vancouver
Victoria
Seattle
WASHINGTON
MONTANA
NORTH DAKOTA
MINNESOTA
Quebec City
NEW BRUNSWICK
PRINCE EDWARD ISLAND
NOVA SCOTIA
Portland
OREGON
IDAHO
SOUTH DAKOTA
WYOMING
NEBRASKA
Salt Lake City
Denver
United States
NEVADA
UTAH
COLORADO
KANSAS
WEST VIRGINIA
KENTUCKY
CALIFORNIA
Las Vegas
Albuquerque
ARIZONA
Phoenix
NEW MEXICO
ARKANSAS
MISSISSIPPI
ALABAMA
GEORGIA
Tucson
El Paso
TEXAS
Jacksonville
BAJA CALIFORNIA
SONORA
CHIHUAHUA
New Orleans
COAHUILA
Gulf of California
N.L.
Monterrey
Gulf of Mexico
The Bahamas
BAJA CALIFORNIA SUR
SINALOA
DURANGO
Mexico
TAMAULIPAS
Havana
SAN LUIS POTOSI
NAYARIT
Merida
Cancún
Cuba
Turks and Caicos Islands
Guadalajara
GUANAJUATO
YUCATAN
JALISCO
Mexico City
Heroica Veracruz
CAMPECHE
QUINTANA
Cayman Islands
British
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Monarch Garden

Nature's Great Migratory Wonder

Each fall monarchs migrate to central Mexico where they overwinter in large clusters on trees in the mountains. They return in the spring with the females laying eggs on milkweeds, the only plants on which monarch larvae will feed. At the end of summer, after 3-4 generations, the migration starts again.

Monarchs, like bees, beetles and flies, have four life stages: egg, larva (caterpillar), pupa (chrysalis) and adult (butterfly).

While caterpillars need milkweeds to feed on, the adults need nectar for water and energy. To create habitats for monarchs it's necessary to grow both milkweeds and nectar plants such as asters, coneflowers and joe pye weed.

Did you know?

- A fully-grown monarch caterpillar can weigh 2000 times more than when it first hatched from the egg.
- Monarchs that fly to Mexico and return in the spring can live up to 9 months.
- It takes at least two months for monarchs to fly from the north to the overwintering areas in Mexico. The overwintering sites were not known to science until 1975.
- Monarch populations are declining due to the loss of milkweed habitats. To maintain the magnificent monarch migration, planting milkweeds needs to become a priority.


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BRING BACK THE
MONARCHS


ASCLEPIAS INCARNATA

A typical plug from a 50 cell restoration tray.


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MONARCH BUTTERFLY RECOVERY PLAN

CAPACITY ISSUES

1) Increase production of milkweed, forb and grass seeds for restoration projects
2) Development of regional seed mixes
3) Identification of potential restoration sites
4) Development of outreach to educate landholders
5) Boots on the ground
6) $$$$$$$$$$$$$$$$$$$$$$$$$

IMPLEMENTATION

Implementation will require

1) a management plan
2) marketing and outreach
3) landscapes suitable for enhancement
4) development of collaborations and partnerships
5) communications with Federal, State and local authorities
6) engagement of the agriculture sector and the supporting industries
7) ROW restoration of native plants

OUTCOME

Short term goal/outcome

Offset annual loss +/-2 million acres of monarch habitat

Long term goal/outcome

Add 1.4 billion additional milkweed stems to produce average overwintering populations of 6 hectares

Sustainability – continuous maintenance and restoration

VISION

The monarch migration can be saved if there is commitment to:

1) offset annual losses of habitat by planting milkweeds and nectar plants in areas from which they have been extirpated

2) develop the capacity to plant milkweeds over a diverse array of landscapes within the corridor

MULTIPLIER EFFECT

- We need immediate successes that will have a multiplier effect such as educational programs in communities, Waystations in public places, successful restoration sites, demonstration sites for pollinators and monarchs, school gardens, milkweed plant and seed giveaways. etc. Many of these things are being done. It's the scale of these efforts that needs to increase.


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ENGANGERED SPECIES ACT AND MONARCHS

Petition (Listing) - A formal request, with the support of adequate biological data, suggesting that a species, with the support of adequate biological data, be listed, reclassified, or delisted, or that critical habitat be revised for a listed species.

Listing - The formal process through which the Service adds species to the Federal List of Endangered and Threatened Wildlife and Plants.

Listing priority - A number from 1 to 12 indicating the relative urgency for listing plants or animals as threatened or endangered.

Endangered - The classification provided to an animal or plant in danger of extinction within the foreseeable future throughout all or a significant portion of its range.

Threatened - The term “threatened species” means any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Species of concern - "Species of concern" is an informal term that refers to those species which might be In need of concentrated conservation actions. Such conservation actions vary depending on the health of the populations and degree and types of threats. Species of concern receive no legal protection.

Candidate Conservation Agreement with Assurances

Definition. A **Candidate Conservation Agreement** is a formal **agreement** between the Service and one or more parties to address the **conservation** needs of proposed or **candidate** species, or species likely to become **candidates**, before they become listed as endangered or threatened.


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“Monarch butterfly populations are declining due to loss of habitat. To assure a future for monarchs, conservation and restoration of milkweeds needs to become a national priority.”

Chip Taylor, Director, Monarch Watch