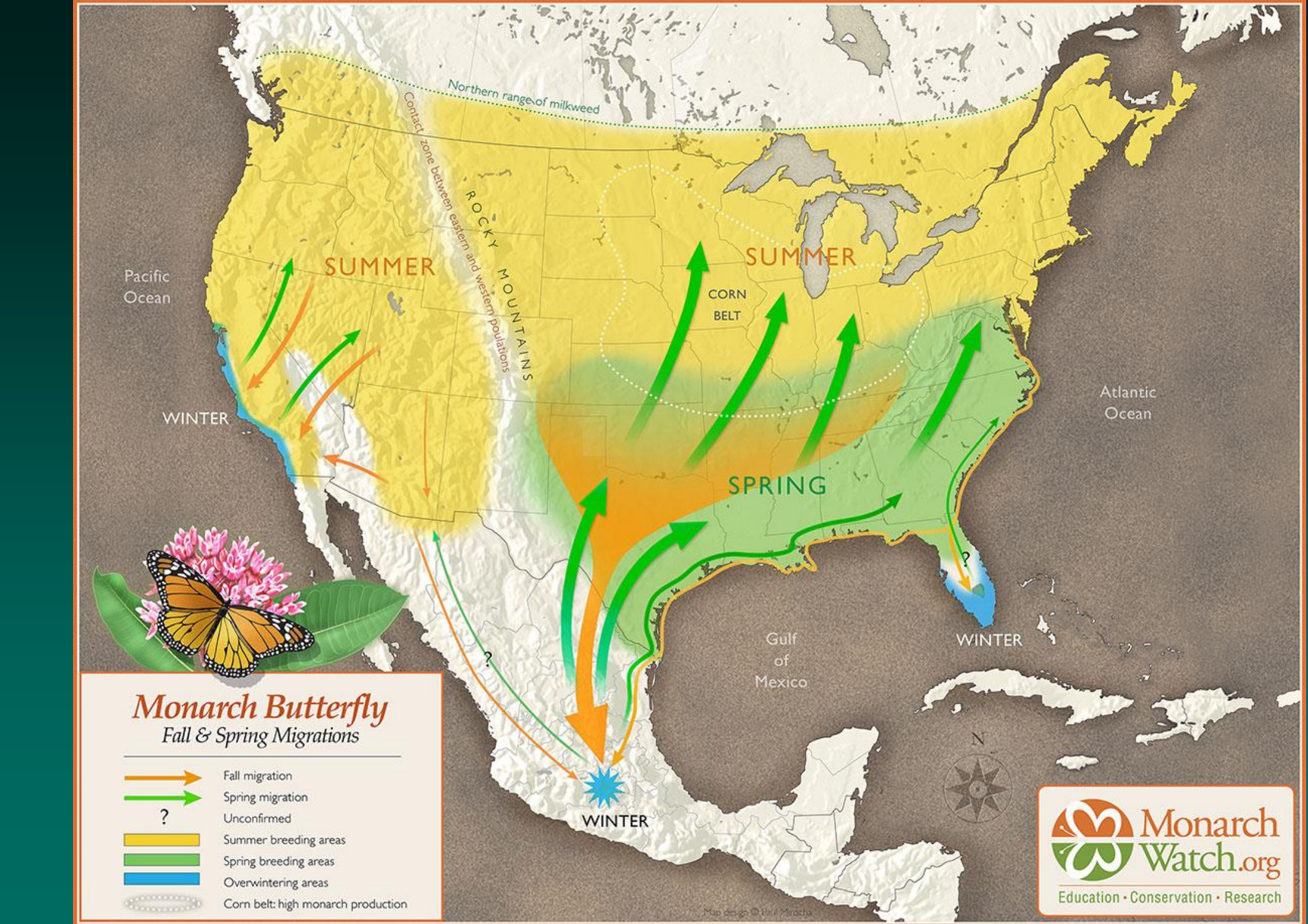
MONARCHWATCH.ORG
Education • Conservation • Research

MONARCHS: STATUS AND TAGGING

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

The data shown are very general and should not be considered definitive since there is a deeper analysis underway.


Northern range of milkweed
Contact zone between eastern and western populations
ROCKY MOUNTAINS
SUMMER
SUMMER
CORN BELT
Pacific Ocean
Atlantic Ocean
WINTER
SPRING
WINTER
WINTER
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
Monarch Watch.org
Education • Conservation • Research

Monarch population development: A stage specific model

Winter in Mexico –Nov – Ap

Spring return through Mexico to Texas Feb-Ap

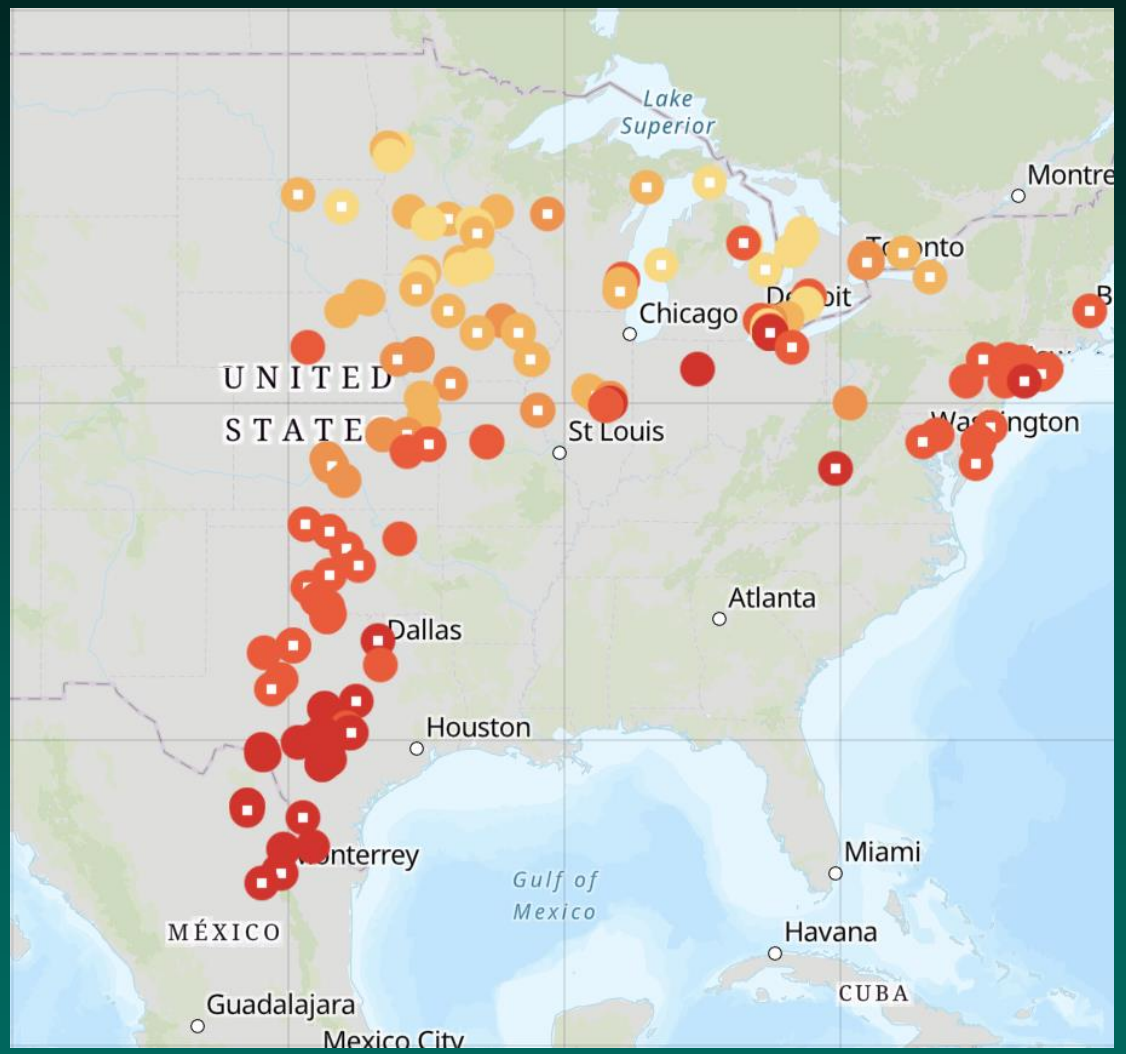
Development first generation South Region Mar –Ap

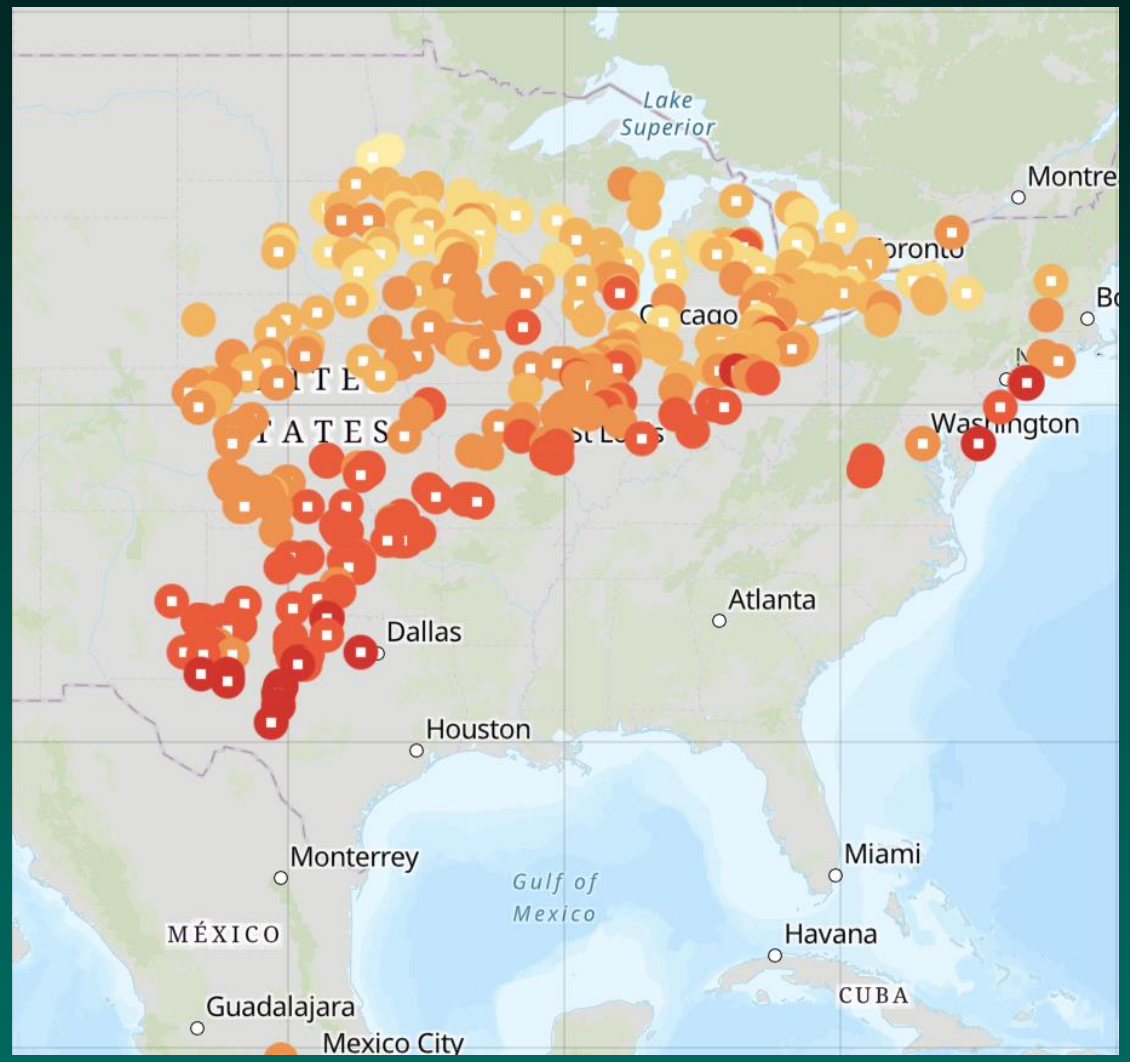
Recolonization northern areas by first generation May – Jn

Summer population growth Jn-Aug

Fall migration Aug-Dec

Fall roosts reported 2017 vs 2018

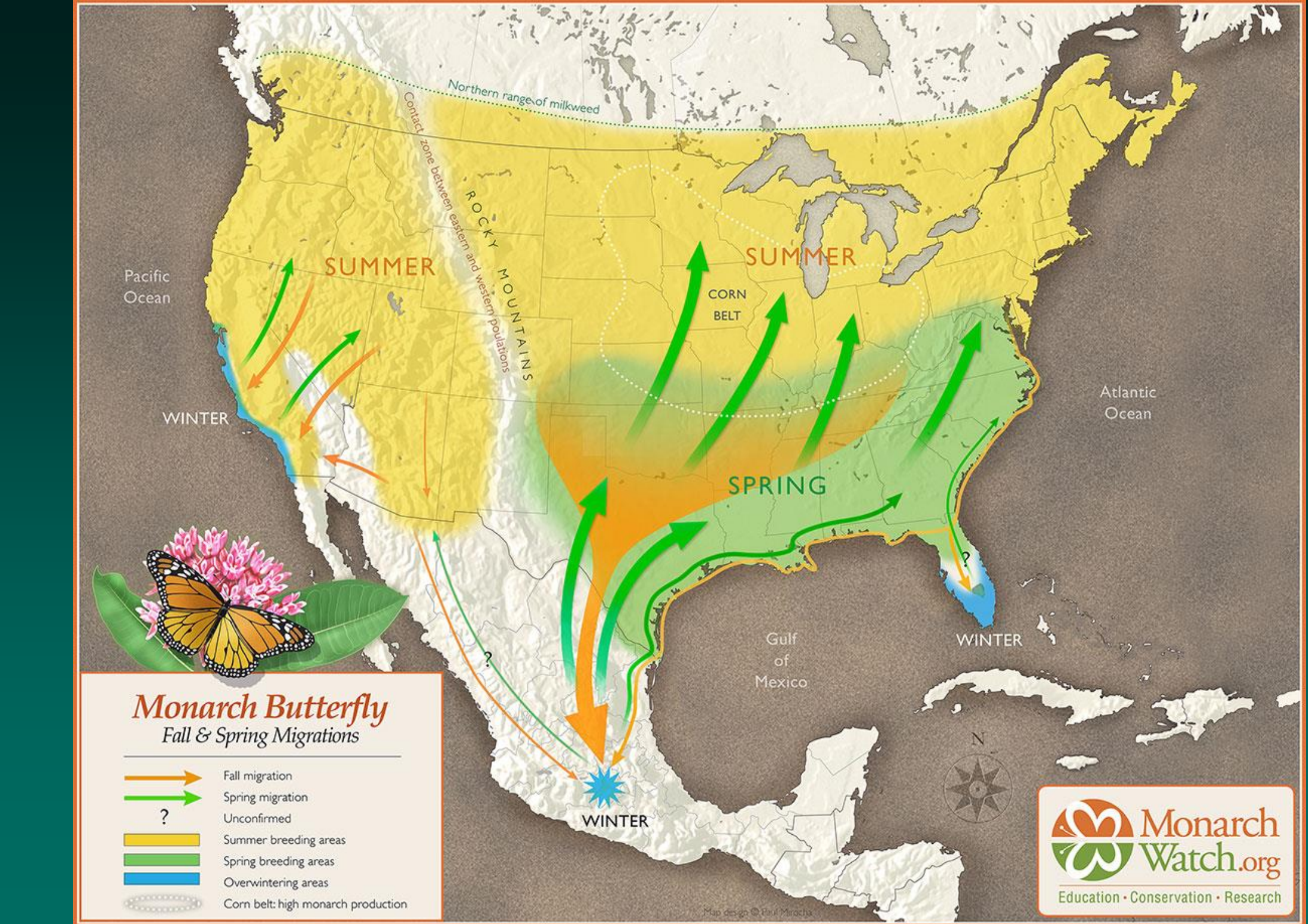




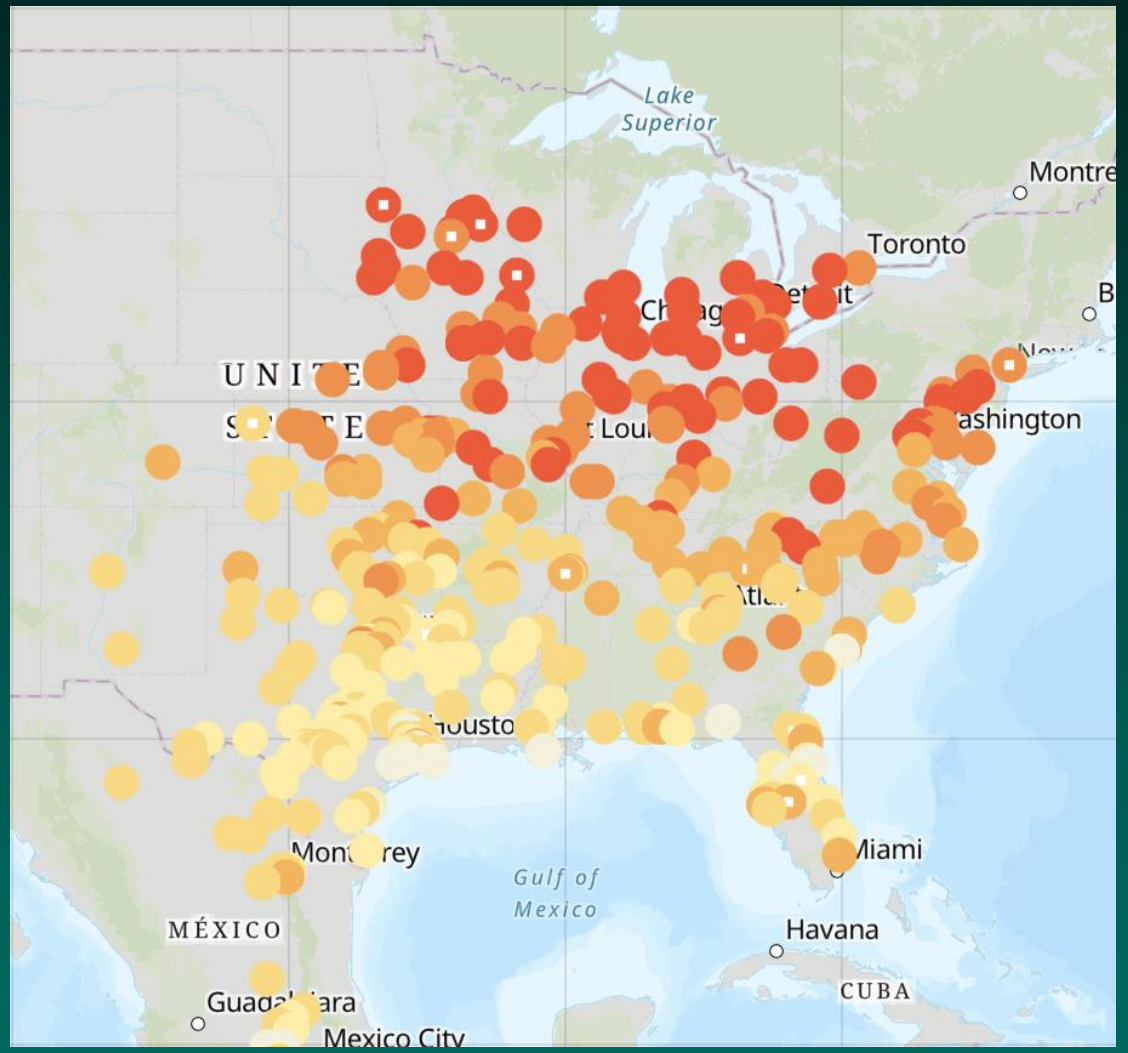
2017 OW= 2.48 hectares

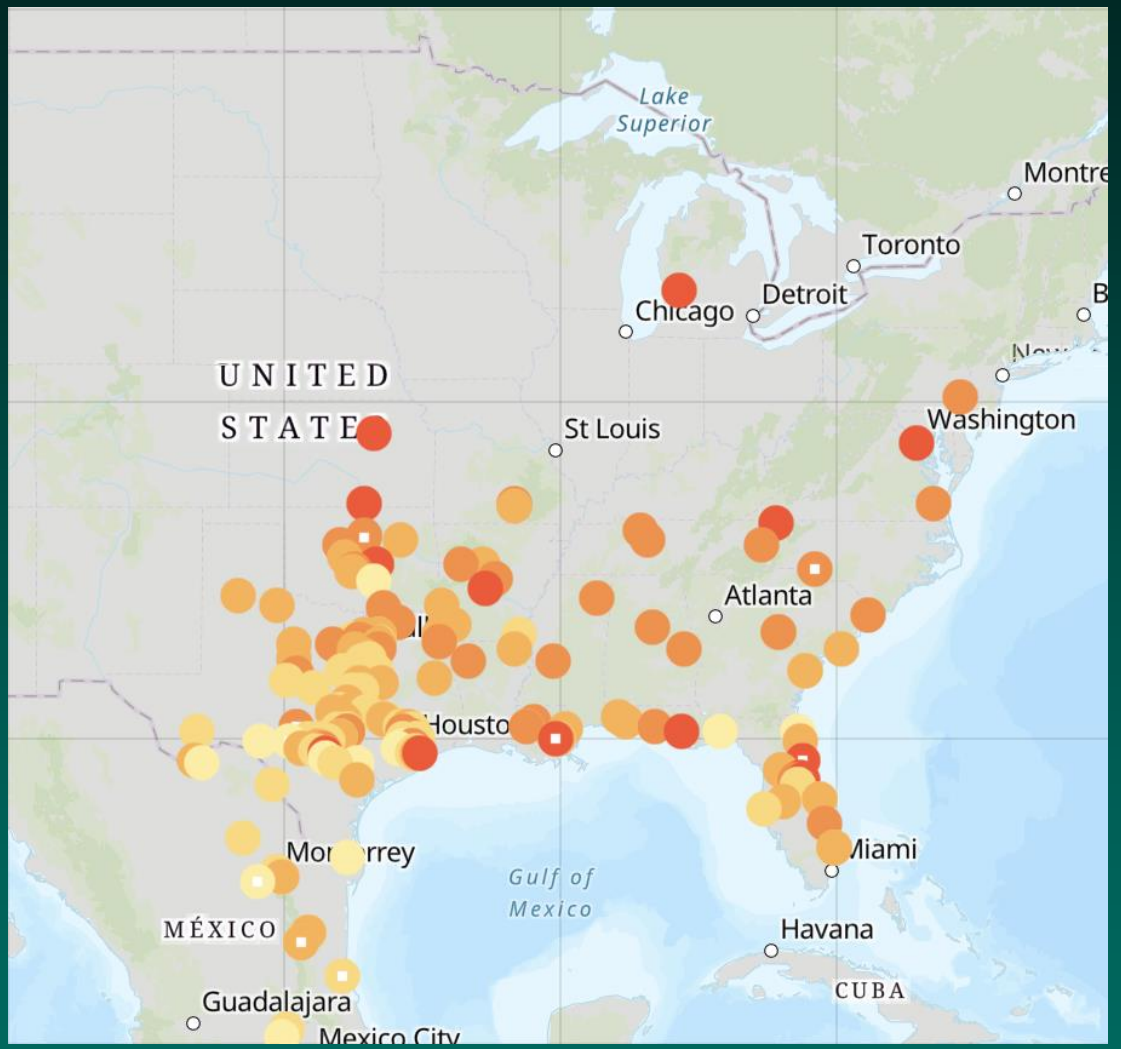
2018 OW = +/-5 hectares

Data from journeynorth.org


Northern range of milkweed
Contact zone between eastern and western populations
ROCKY MOUNTAINS
SUMMER
SUMMER
CORN BELT
Pacific Ocean
Atlantic Ocean
WINTER
SPRING
WINTER
WINTER
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
Monarch Watch.org
Education • Conservation • Research

First sightings of returning migrants 1March - 2 May 2012 vs 2013



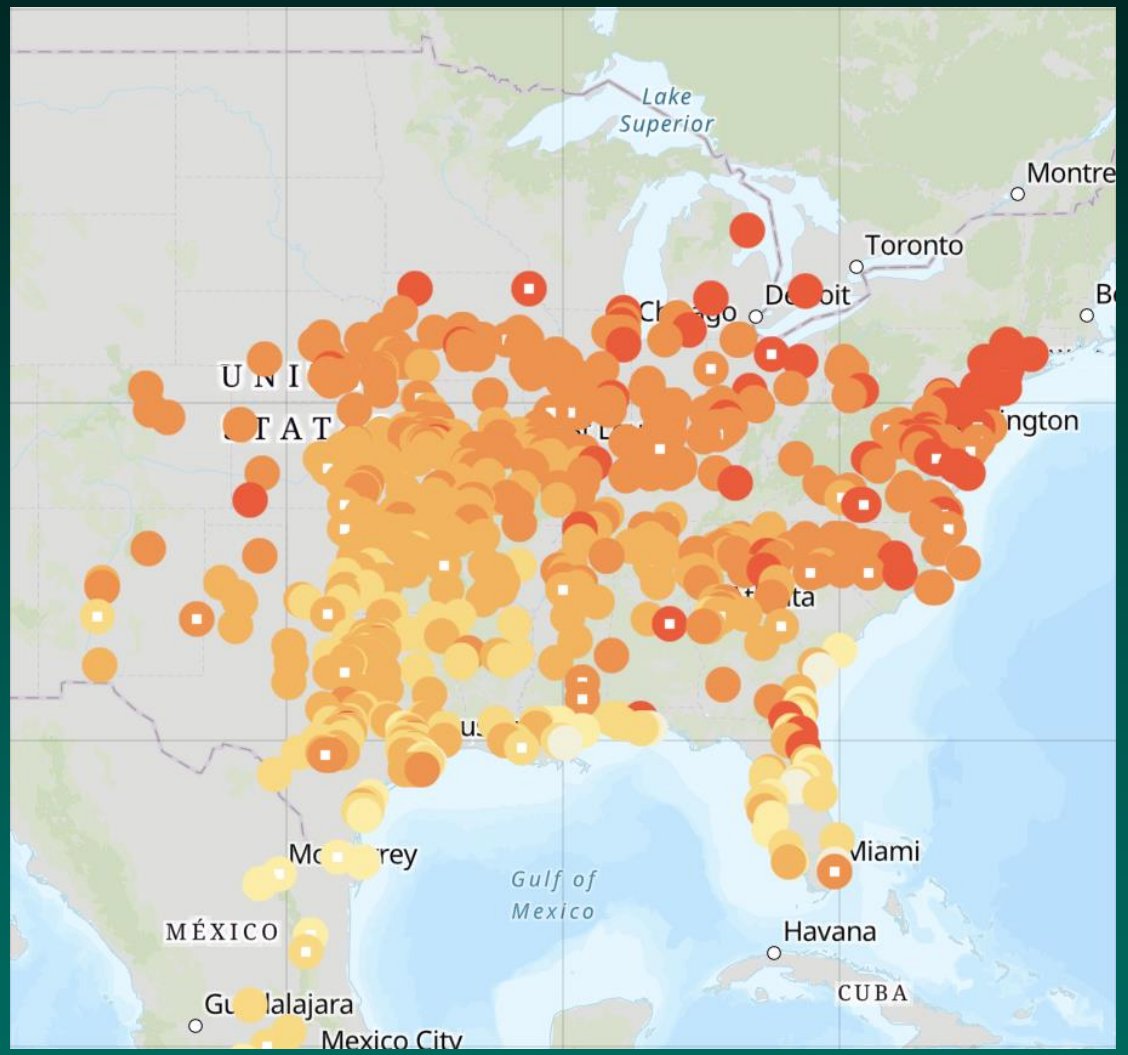


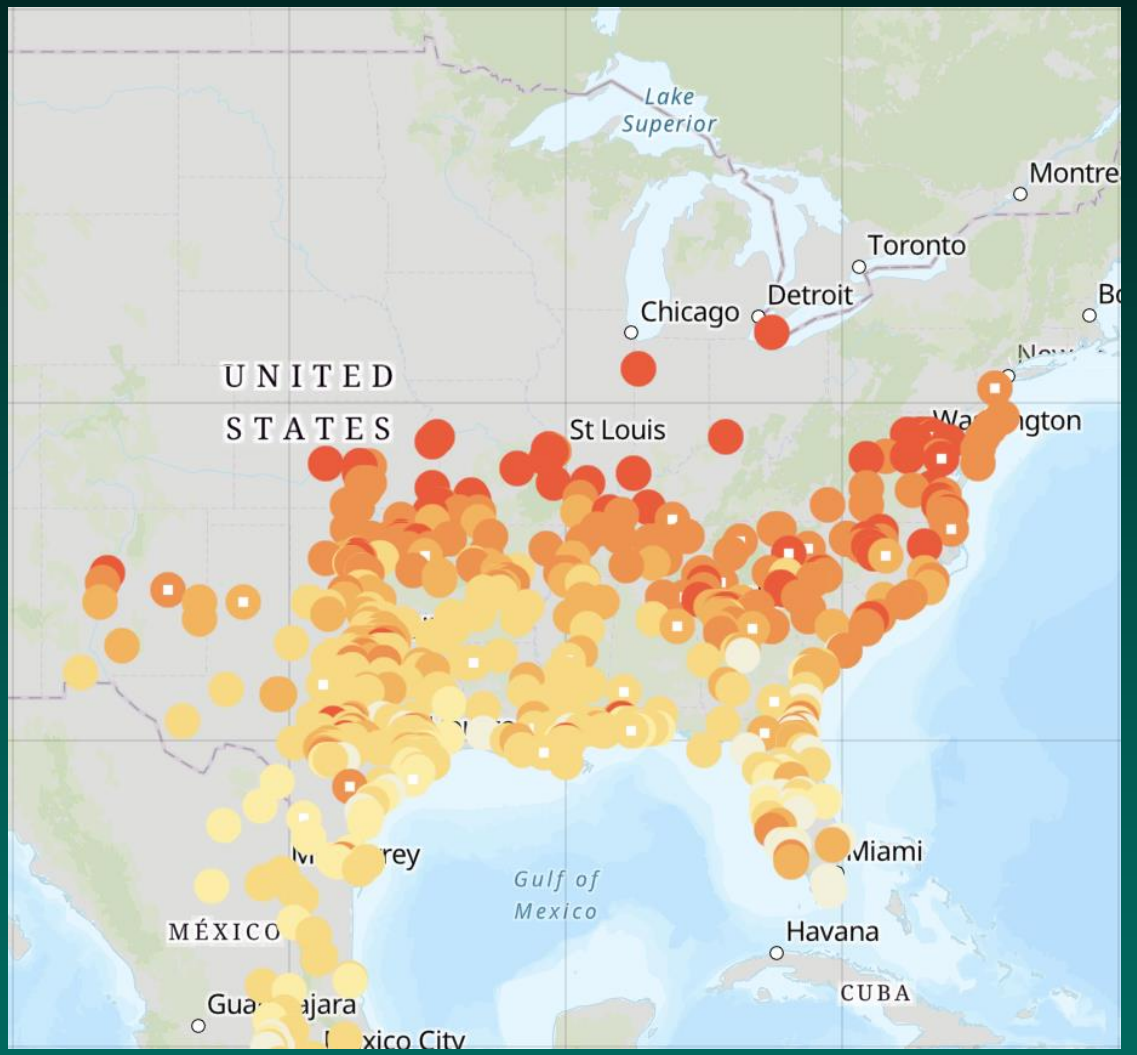
2012 - 1100 sightings OW = 1.19

2013 – 450 sightings OW= 0.67

Data from journeynorth.org

First sightings of returning migrants 1 March – 2May 2017 vs 2018



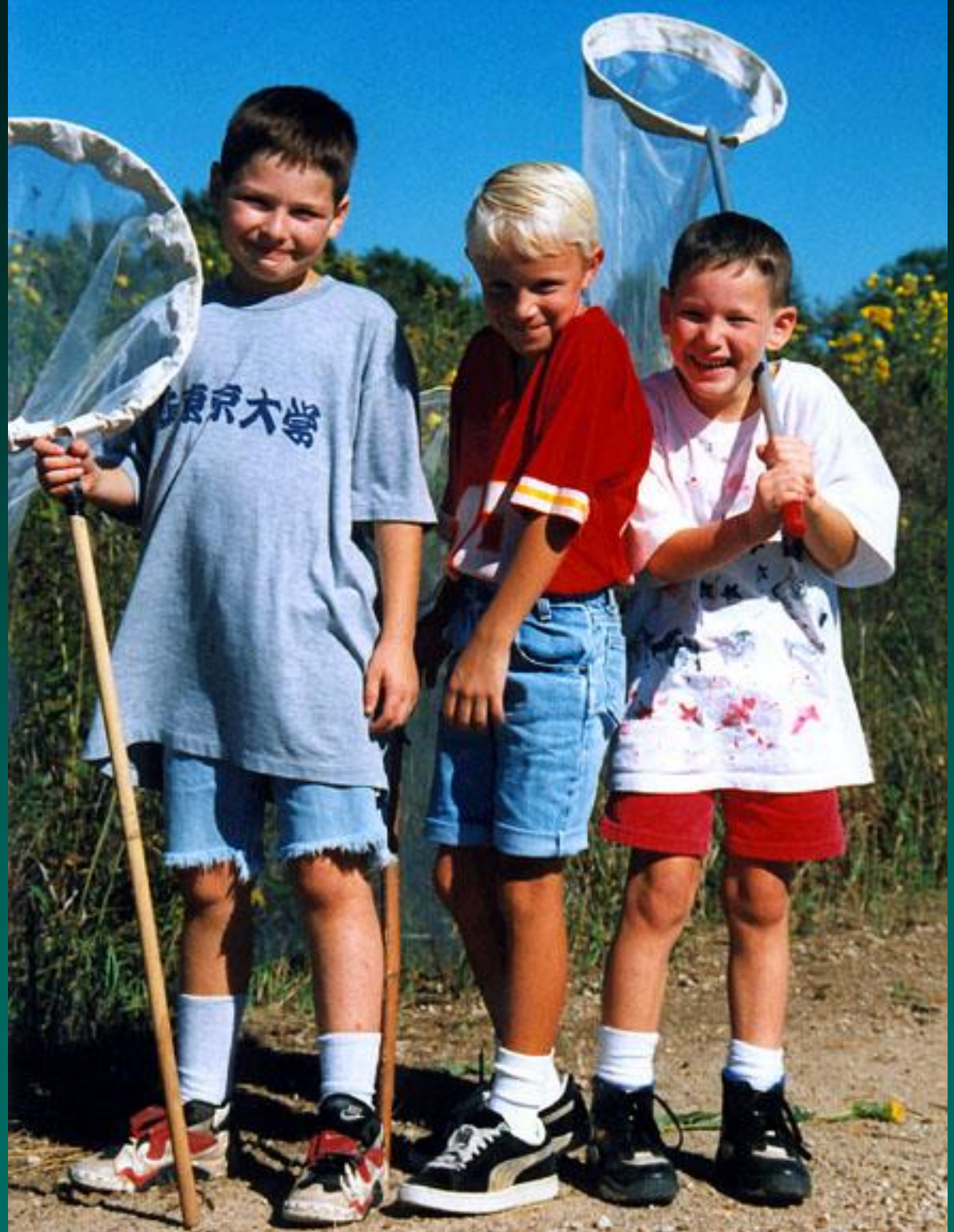


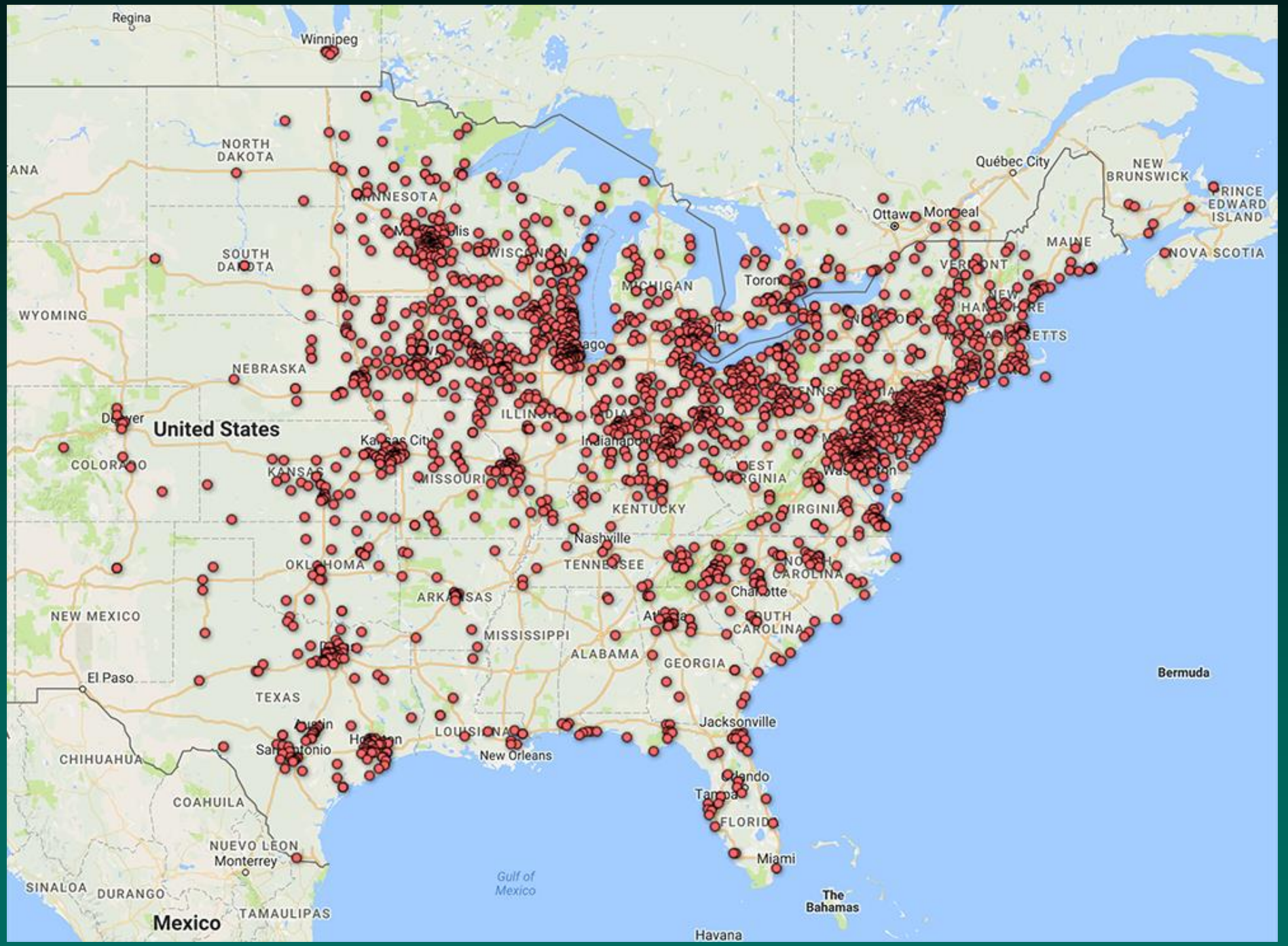
2017 – 1900 sightings OW = 2.48

2018 – 1400 sightings OW = ?

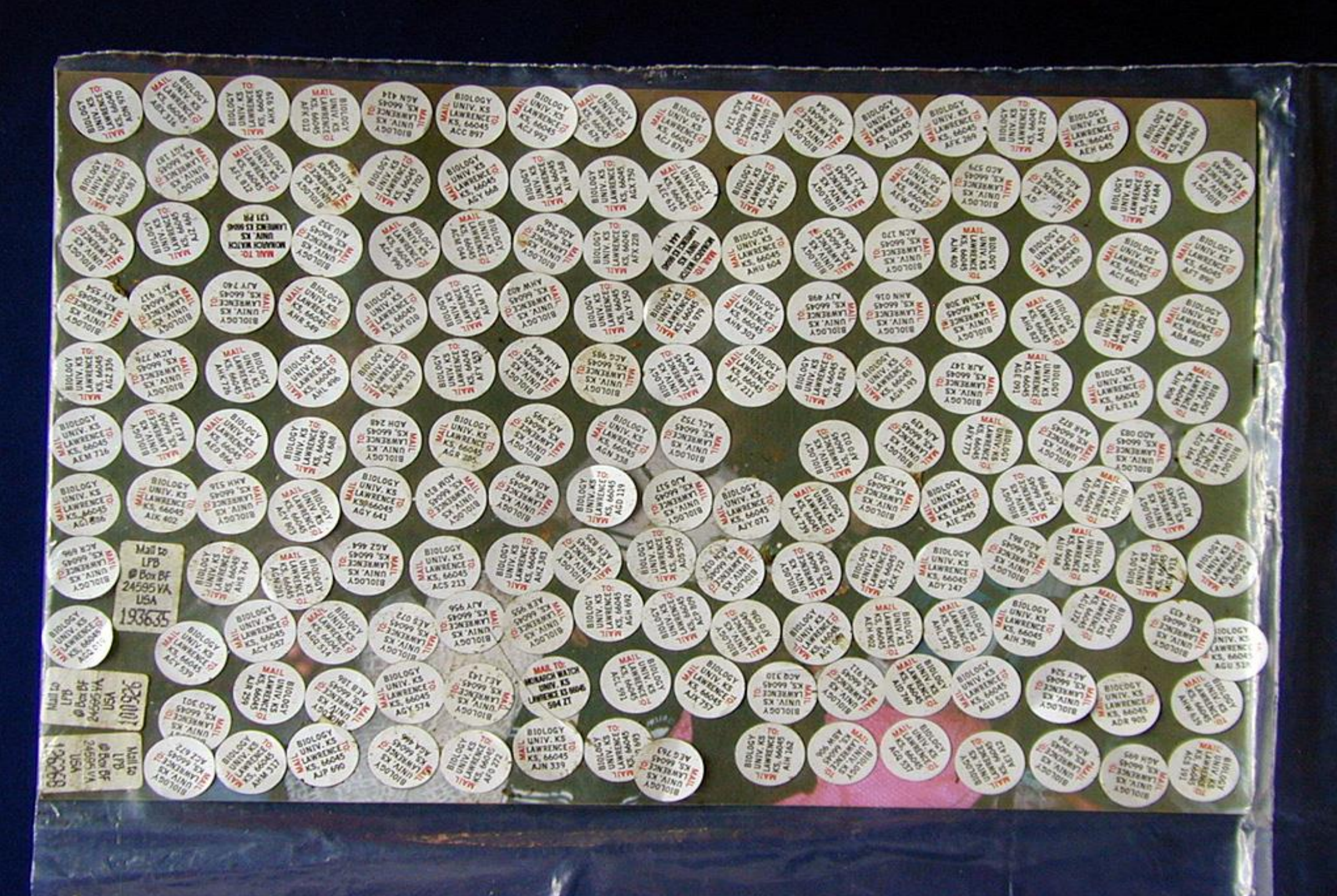
Data from journeynorth.org

TAGGING.EDU
MONARCH WATCH
1-888-TAGGING
SRL 806


東京大学



Distribution of >220,000 monarch tags to >2250 recipients in 2015


MAIL TO:
BIOLOGY
UNIV. KS
LAWRENCE
KS, 66045
Mail to
LPB
@ Box BF
24595 VA
USA
193635
MONARCH WATCH
UNIV. KS
LAWRENCE KS 66045
594 27

SUN ANGLE OR ALTITUDE ANGLE

ANGLE OF THE SUN ABOVE HORIZON AT SOLAR NOON

REACHES PEAK ON 21 JUNE AND THEN DECLINES

RATE OF CHANGE IN SA APPROACHES 0 AT 20N IN DEC

MIGRATION AND SUN ANGLE AT SOLAR NOON

MIGRATION APPEARS TO BEGIN WHEN SA IS 57-56

MIGRATION APPEARS TO END WHEN SA IS 47-46

PEAK OF THE MIGRATION OCCURS WHEN SA IS 49 - 50

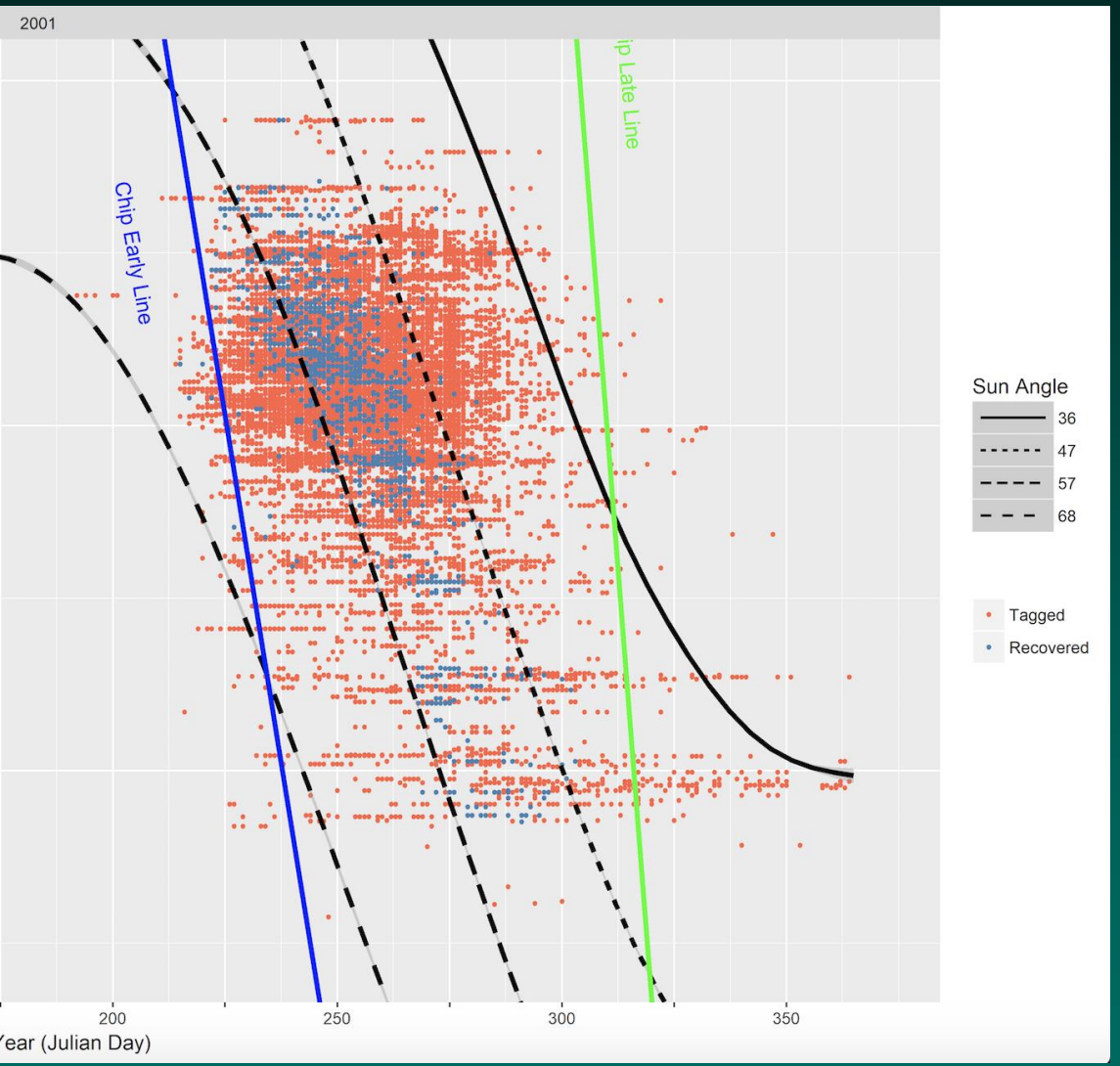
WHEN THINKING ABOUT SA:

REMEMBER HIGH VALUES ARE EARLY IN THE SEASON

AND LOW VALUES ARE LATE IN THE SEASON

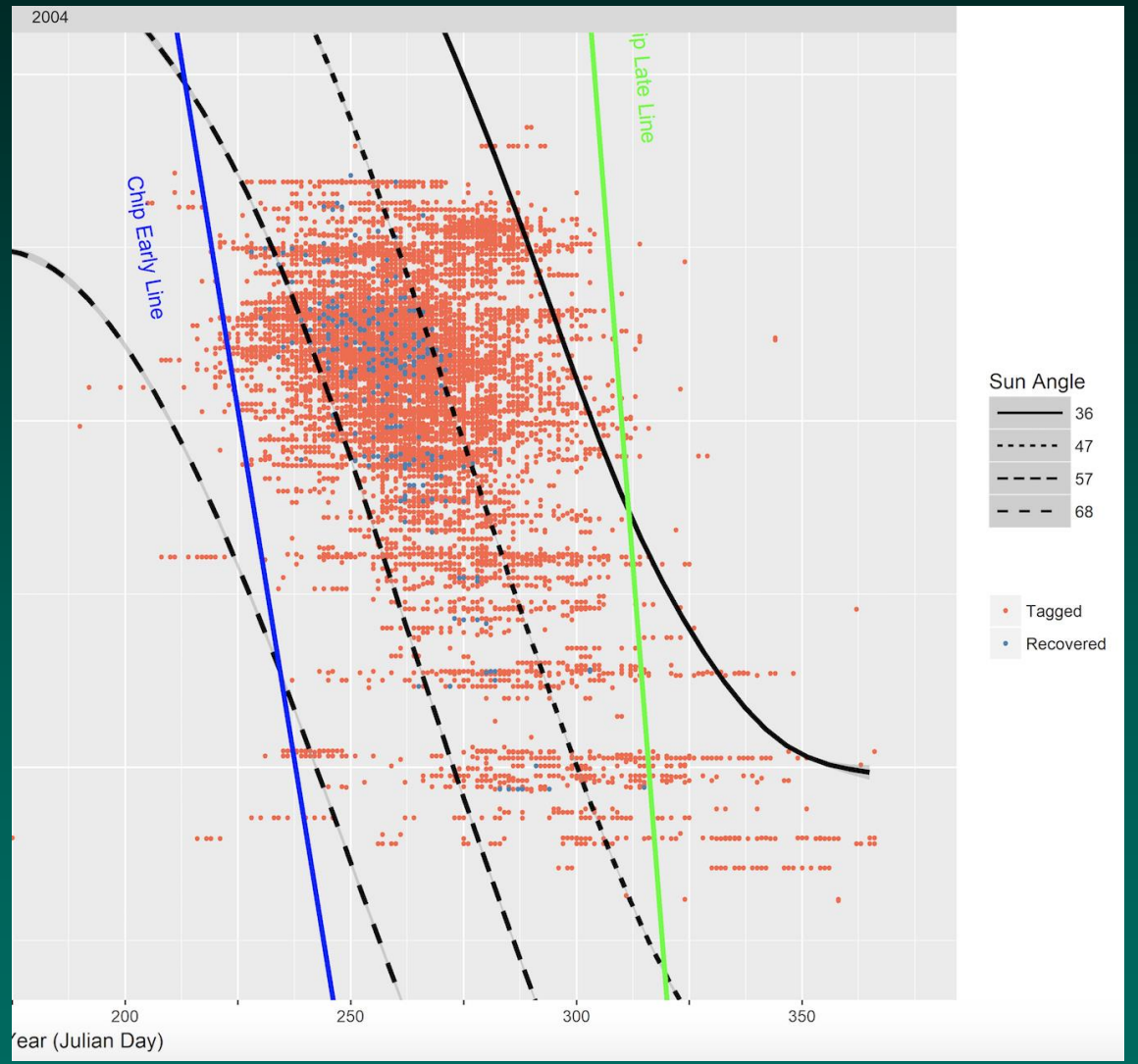
ACROSS MOST LATS, .3 DEGREES SA = 1 DAY

Earliest Migration – SA for 100-90 was 50.8



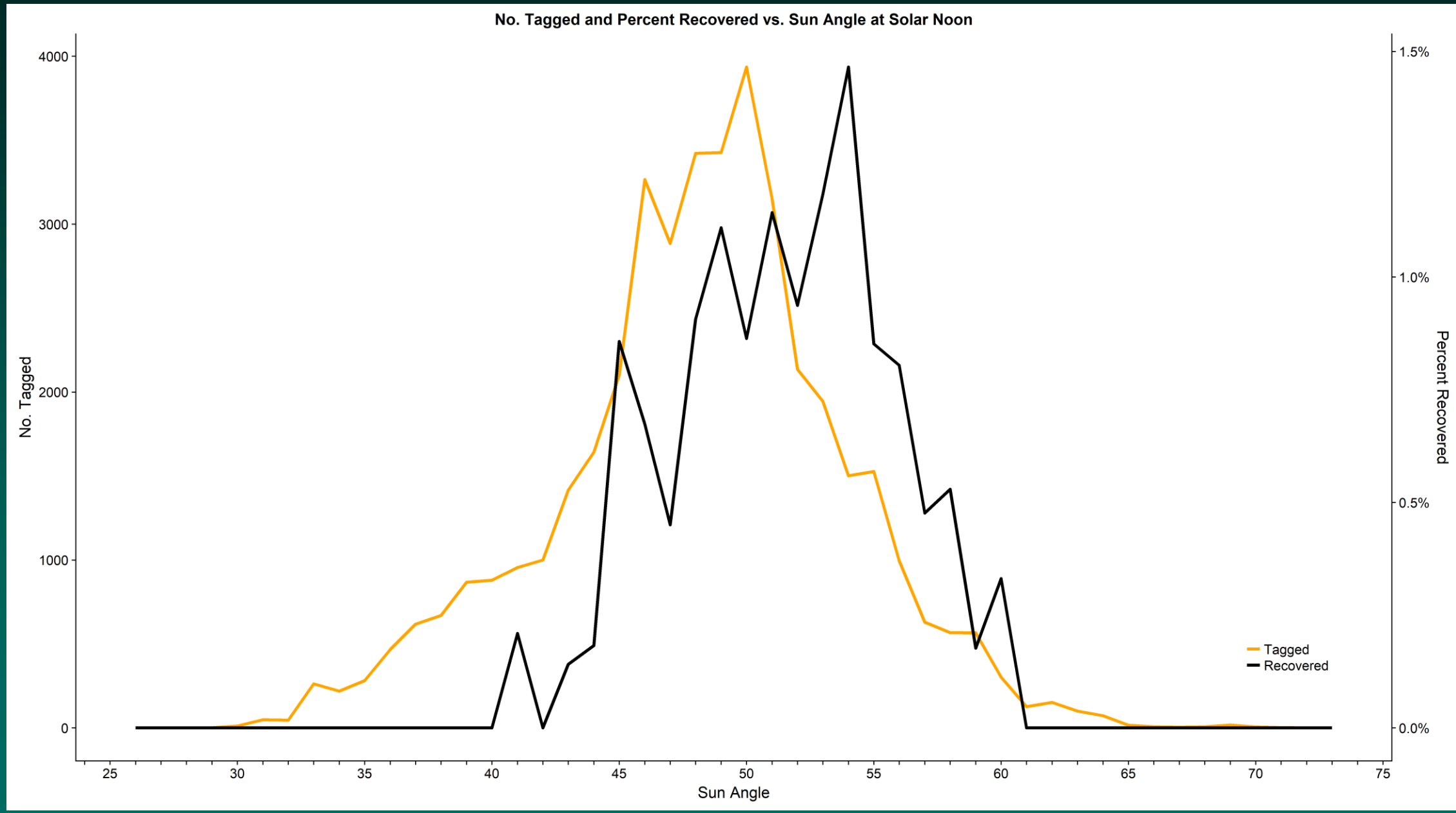
Aug 70.2 (+2.9F) Sept 58.3 (0.5F)

Latest Migration – SA for 100-90 was 47.5

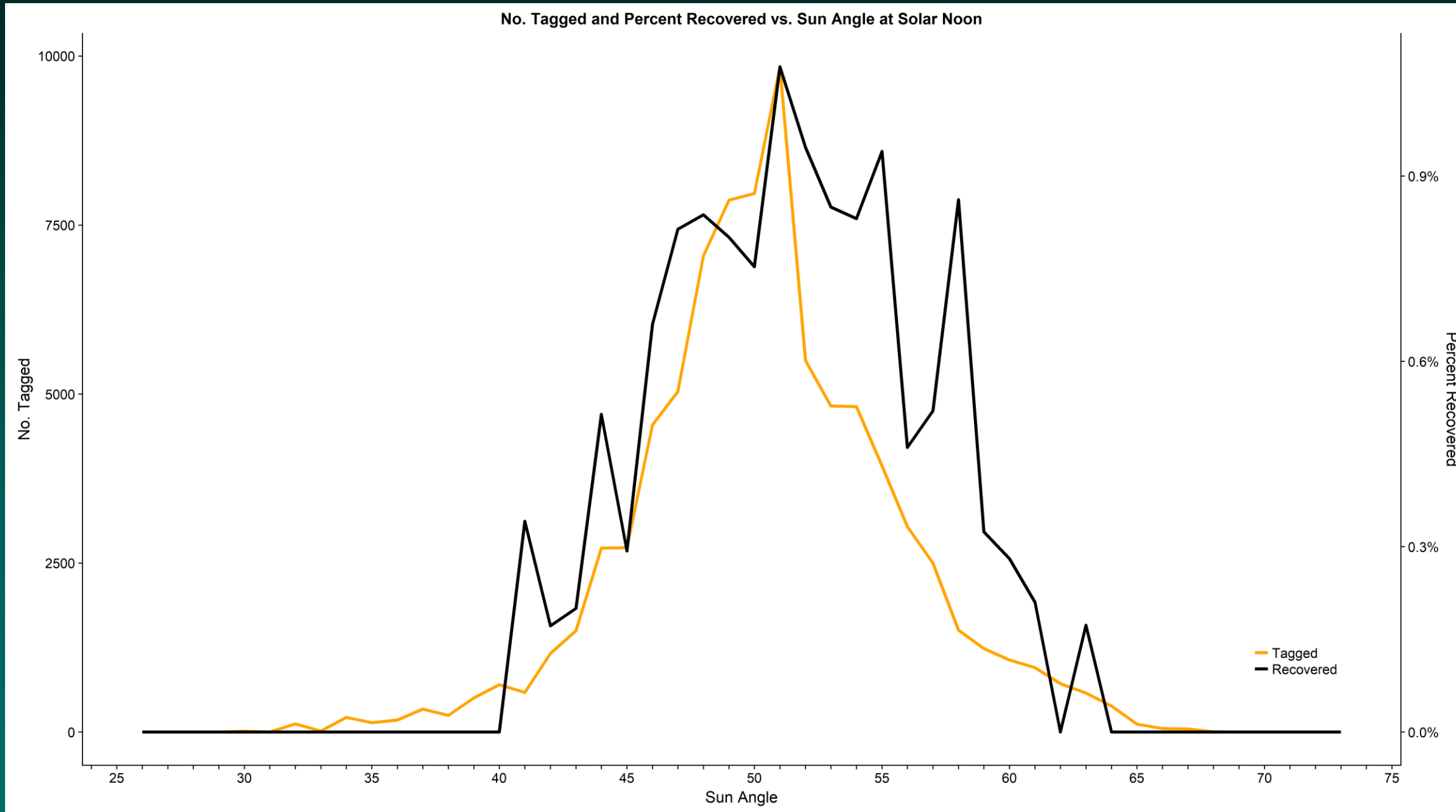


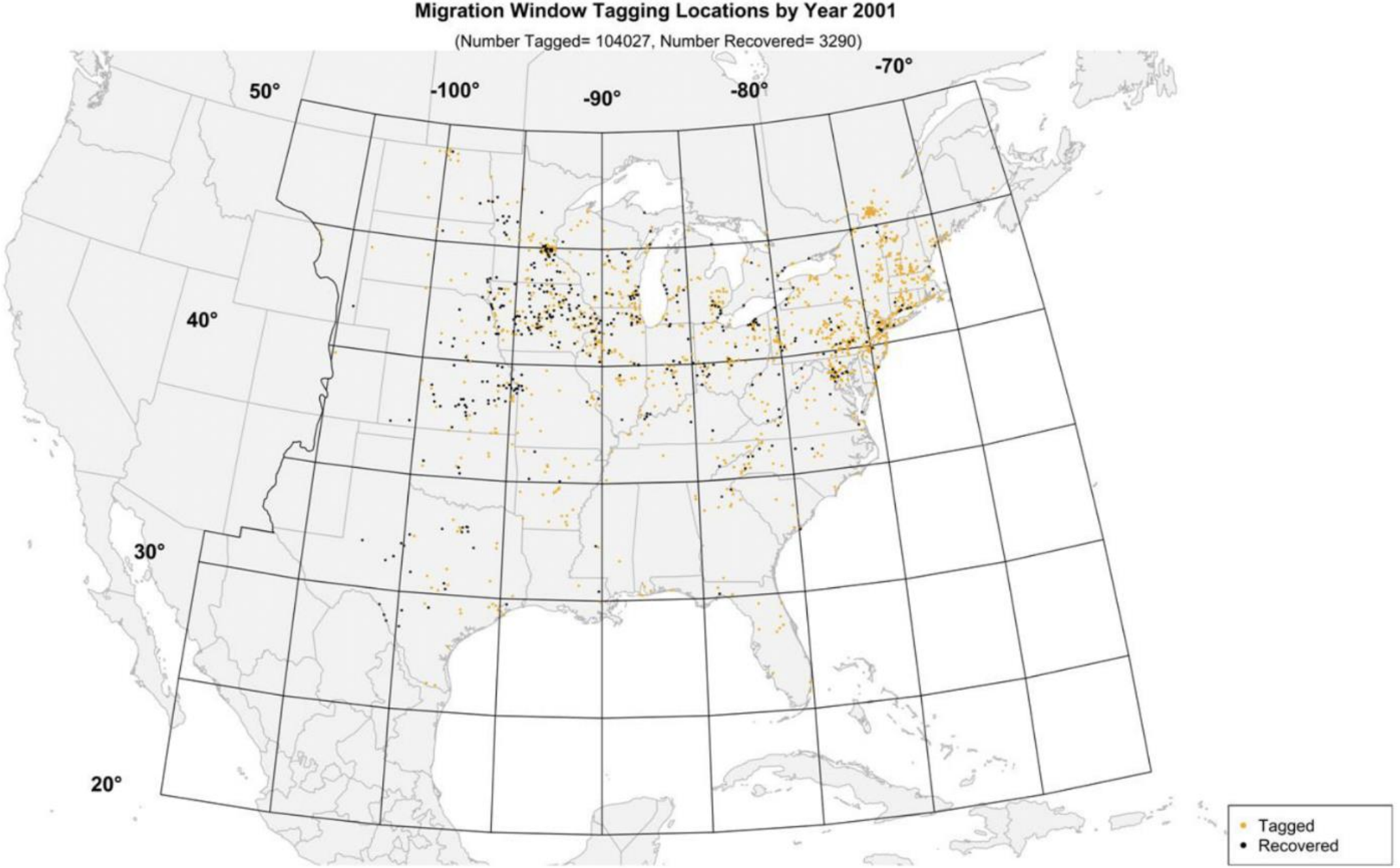
Aug 62.9 (-4.4F) Sept 63.5 (+4.7)

2001


No. Tagged and Percent Recovered vs. Sun Angle at Solar Noon
No. Tagged
Percent Recovered
Sun Angle
0
1000
2000
3000
4000
0.0%
0.5%
1.0%
1.5%
25
30
35
40
45
50
55
60
65
70
75
Tagged
Recovered

2004


No. Tagged and Percent Recovered vs. Sun Angle at Solar Noon
No. Tagged
10000
7500
5000
2500
0
Percent Recovered
0.9%
0.6%
0.3%
0.0%
25
30
35
40
45
50
55
60
65
70
75
Sun Angle
Tagged
Recovered

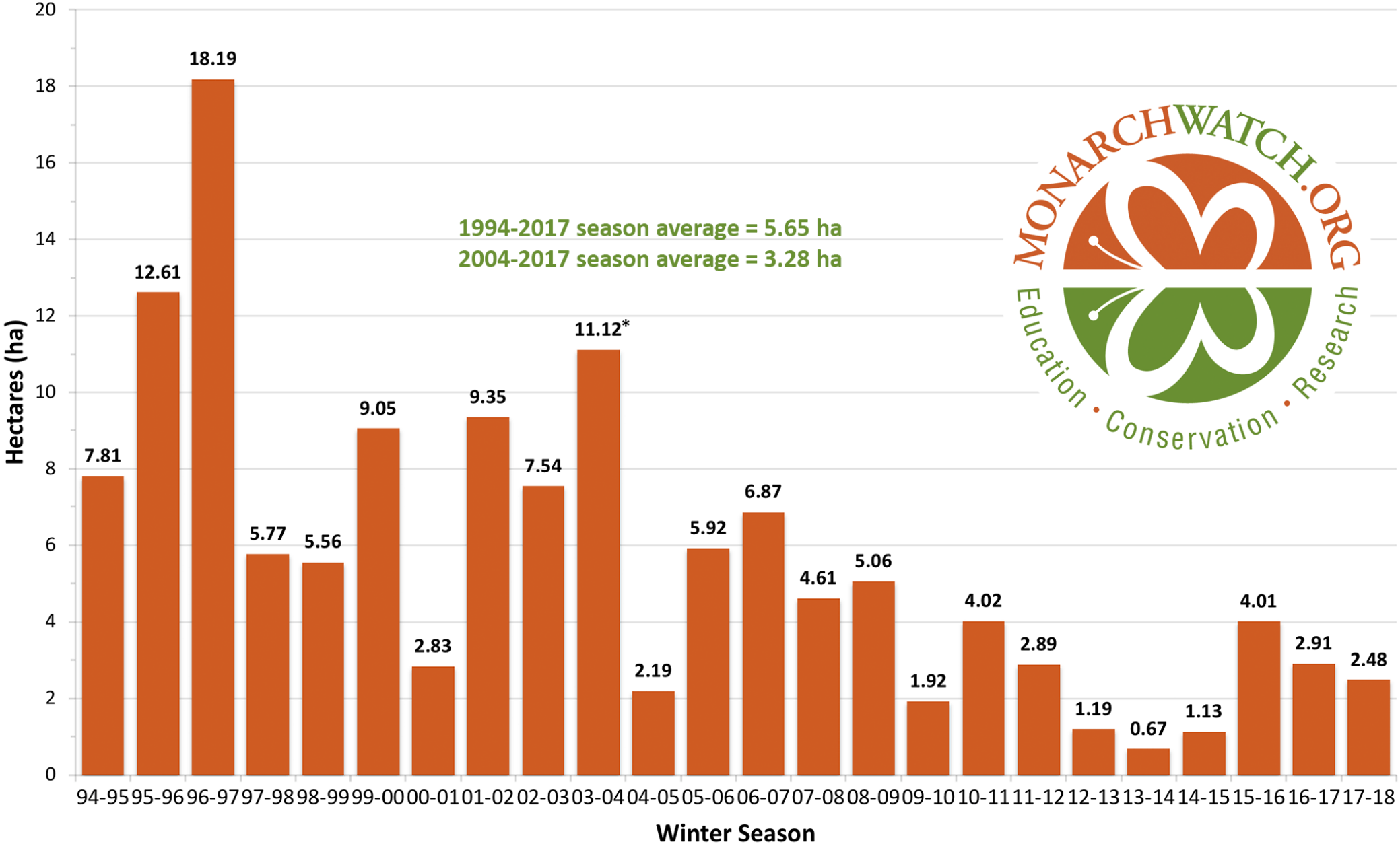

Migration Window Tagging Locations by Year 2001
(Number Tagged= 104027, Number Recovered= 3290)
50°
-100°
-90°
-80°
-70°
40°
30°
20°
Tagged
Recovered

Tagged, recovered & tags/recovery by longitude

	110-100	100-90	90-80	80-65
Tagged	0.012	0.409*	0.251	0.329
Recovered	0.035	0.675	0.194	0.094
Tags/recovery	32.5	60.7	128.7	350

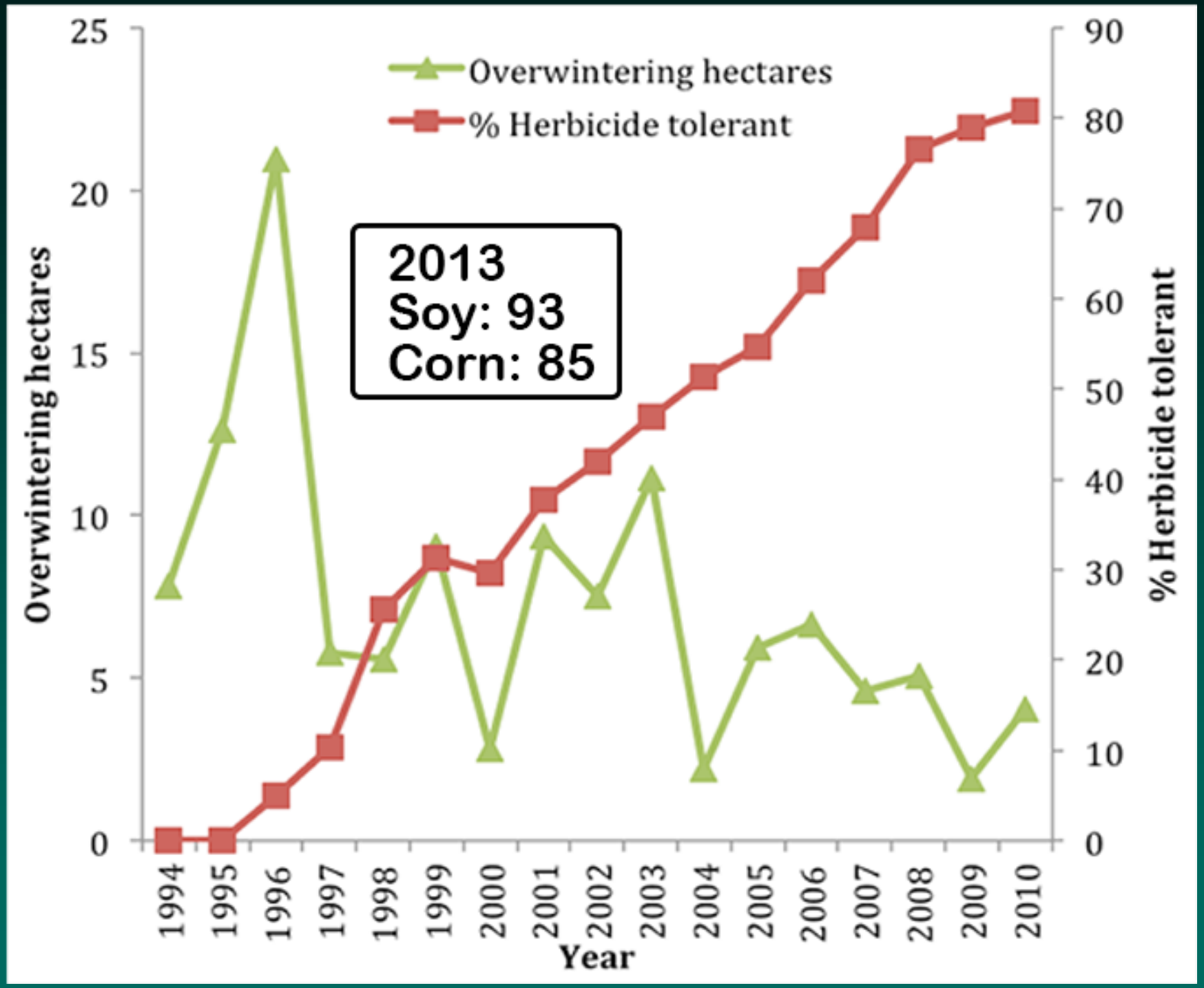
*42.1% of the butterflies tagged accounted for 71% of the recoveries

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.

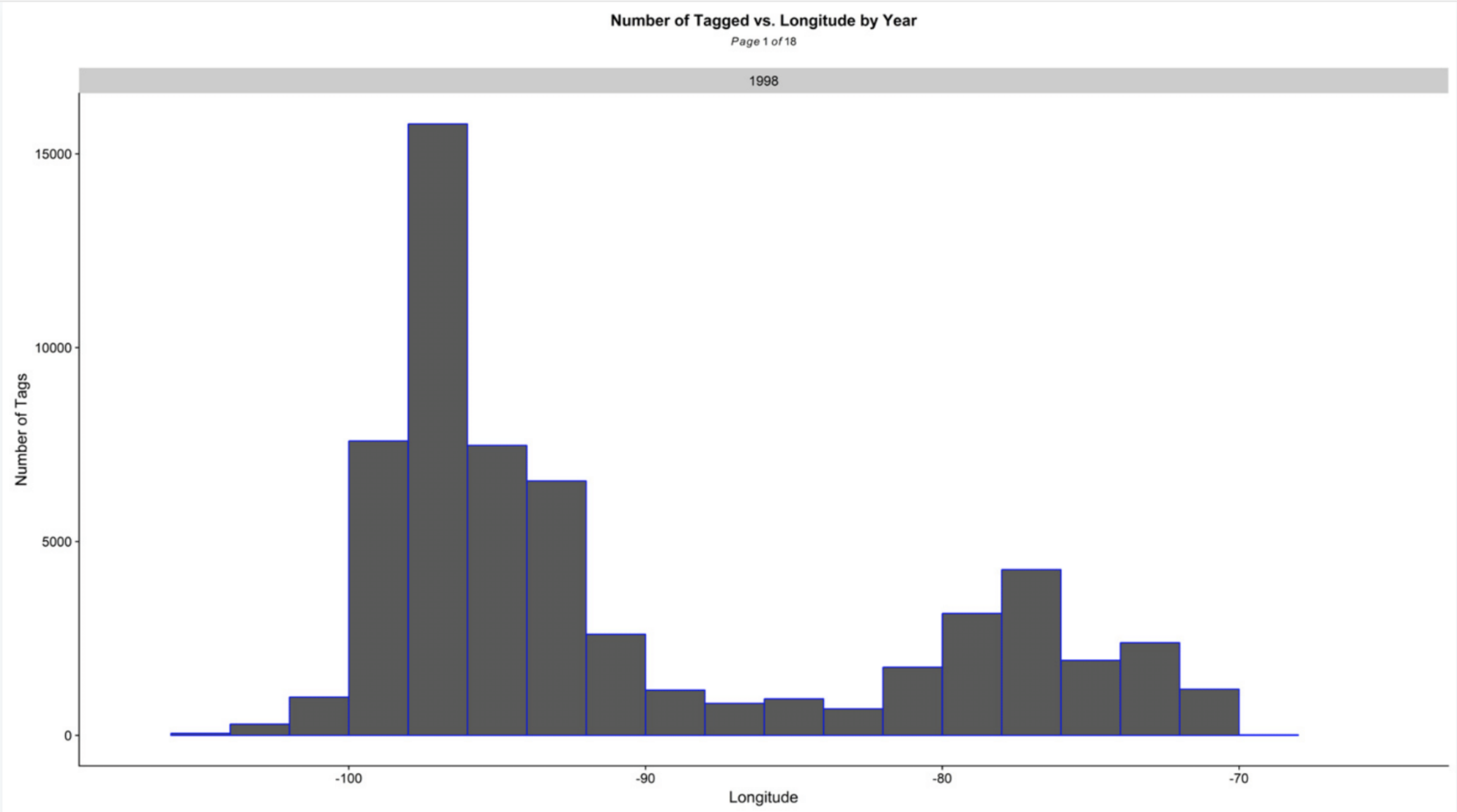
* Represents colony sizes measured in November of 2003 before the colonies consolidated. Measures obtained in January 2004 indicated the population was much smaller, possibly 8-9 hectares. CT


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

Is the loss of habitat in the corn belt reflected in the tagging results?

Number tagged vs longitude 1998

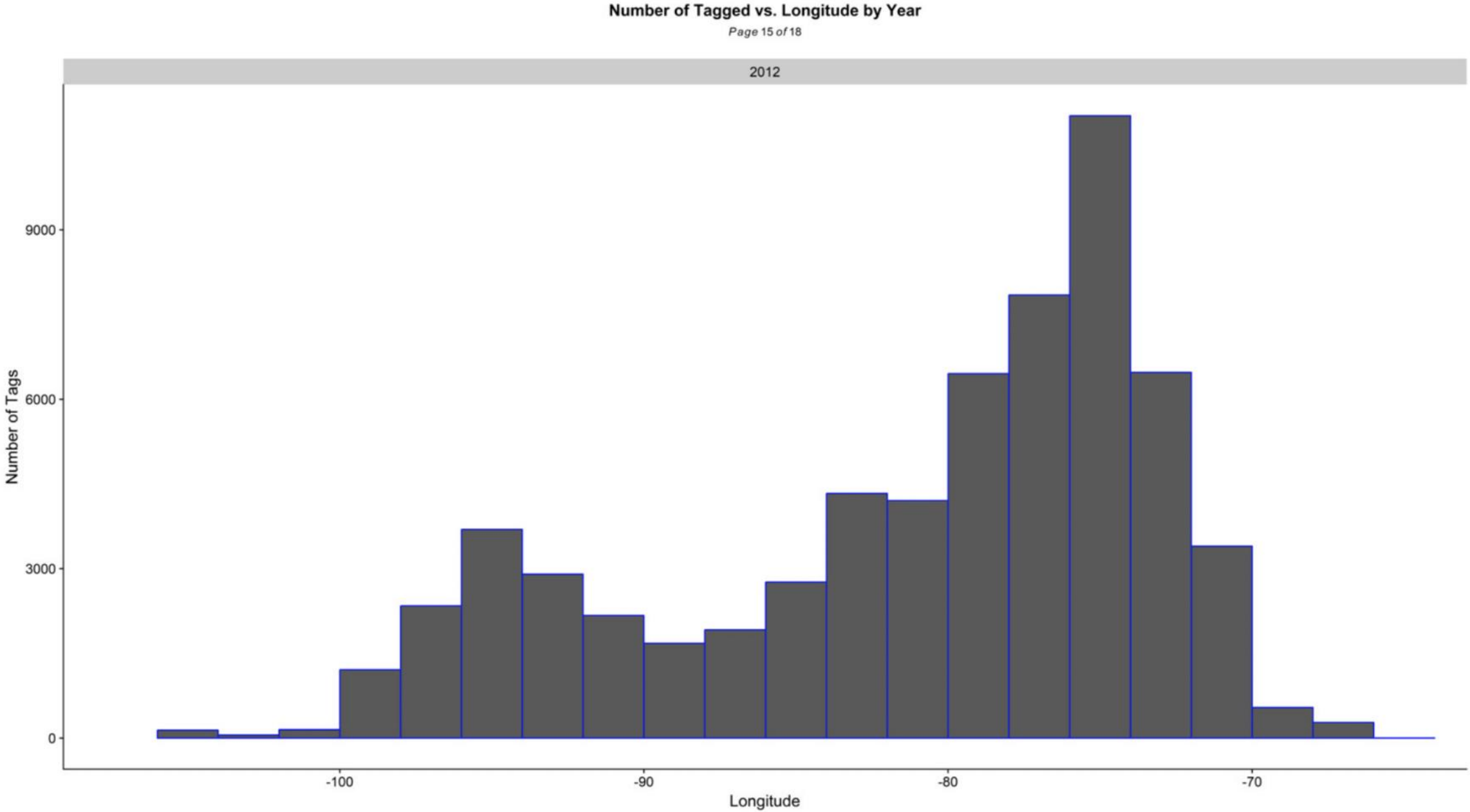
Total tagged 59,698



Recovered % west of 80W = 0.71 % east of 80W =.011 (21.7% total) 4%

Number tagged vs longitude 2012

Total tagged 63,602



Recovered

% west of 80W = 0.64

% east of 80W = 0.16 (56.6%total)

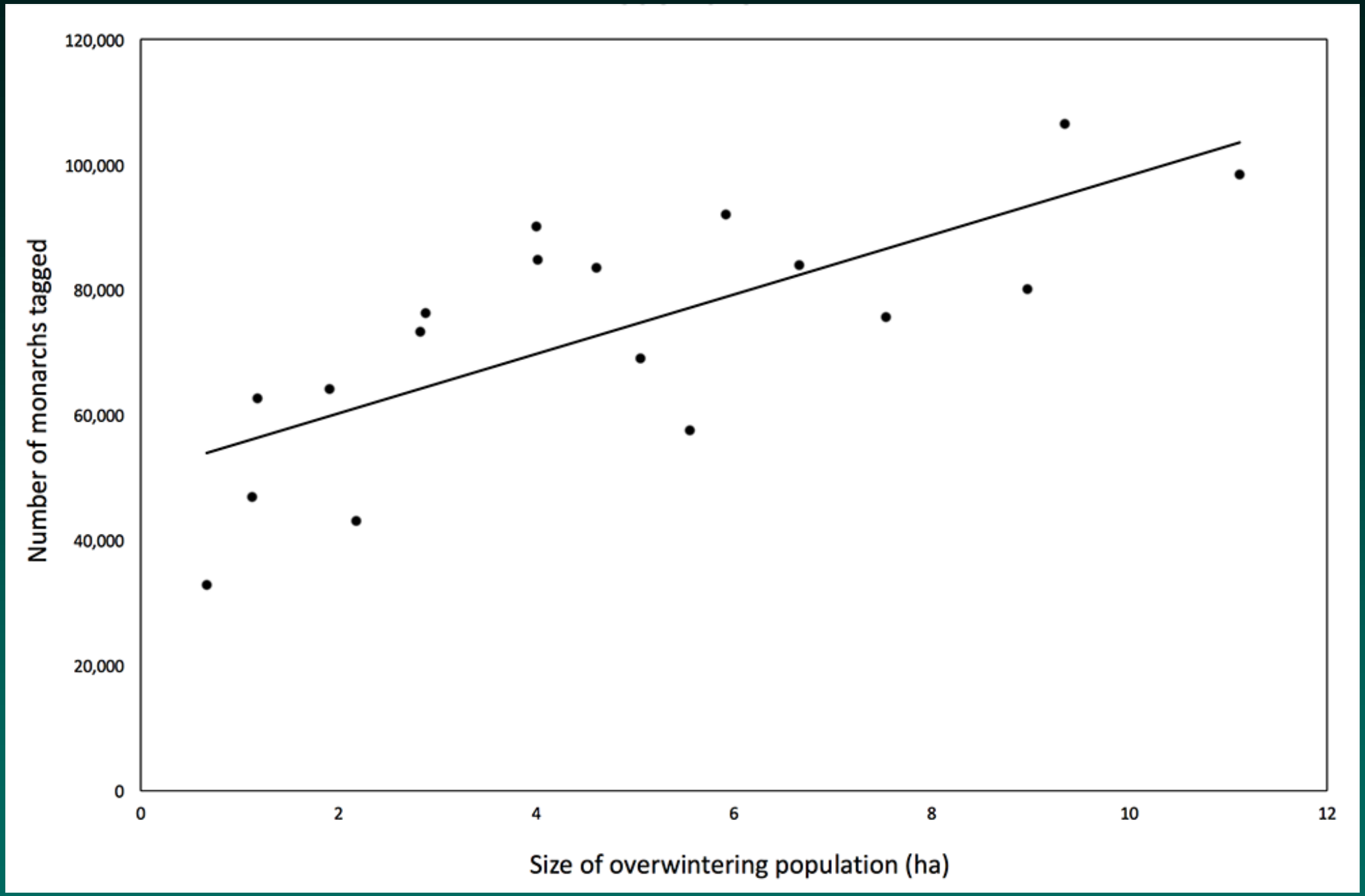
25%

Percentages tagged and recovered +/- 2006

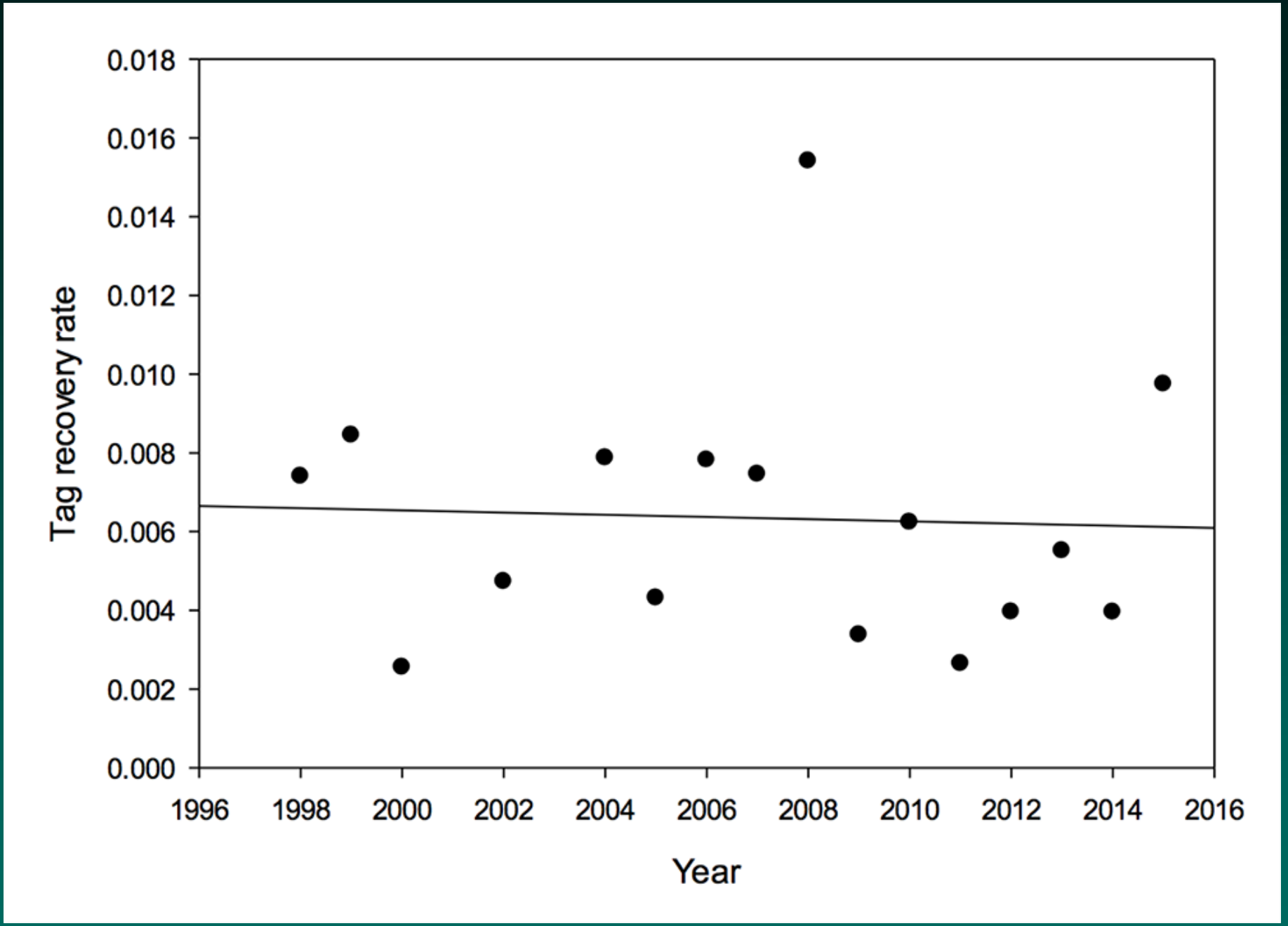
	110W - 80W		80W - 65W	
	Tagged	Recovered	Tagged	Recovered
98-05	74.4	1.01	25.6	0.29
06-15	61.7	0.91	39.3	0.24

Mean # tagged	Years	110W-80W	80W-65W
98-05	78,053	57,428	20,500
06-15	76,109	46,955	29,154

Is the monarch decline due to an increase in mortality during the migration?



Monarchs tagged vs. overwintering population 1998-2015. $R^2 = 0.5476$, $p = 0.0004$



Proportion of tags recovered by year, 1998-2015. $R^2 = 0.002$, $p = 0.87$ (NS)

Acknowledgements

The 1.6 million monarchs that unwillingly allowed themselves to be tagged

The tens of thousands of taggers who tagged monarchs from 1992 to 2018

Jim Lovett, Ann Ryan and numerous other Monarch Watch staff and students

Ralph Grundel, Sam Pecoraro, David Gibo, John Pleasants

MONARCHWATCH.ORG
Education • Conservation • Research