

# Long Term Monitoring Phenology in McDowell Sonoran Preserve

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# Phenology, A Short Introduction

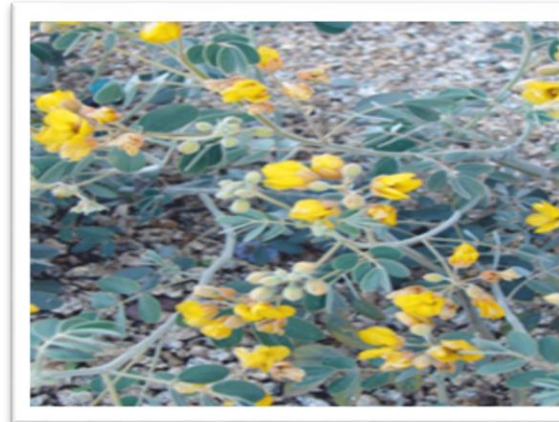
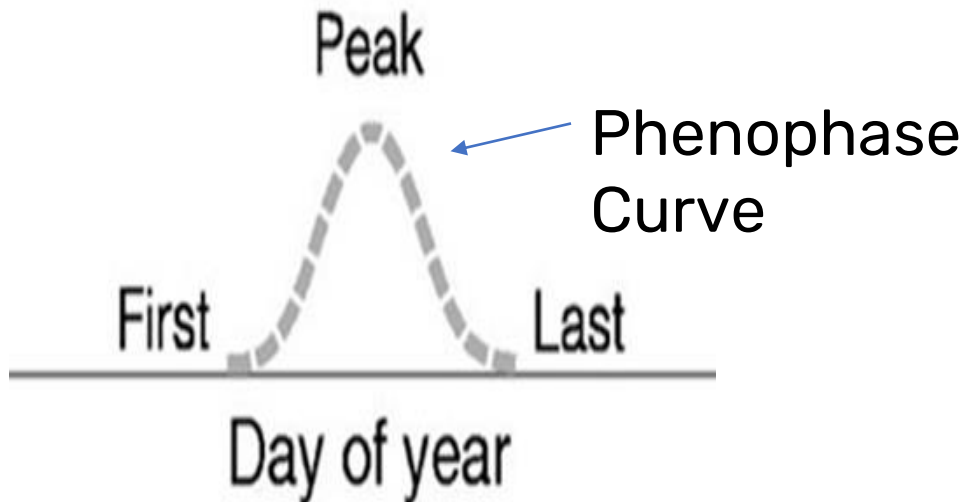
Phenology: The study of how plants and animals react to seasonal and long-term changes by tracking phenophases.

Phenophase:  
An observable stage or phase in the annual life cycle of a plant or animal that can be defined by a start and end point.



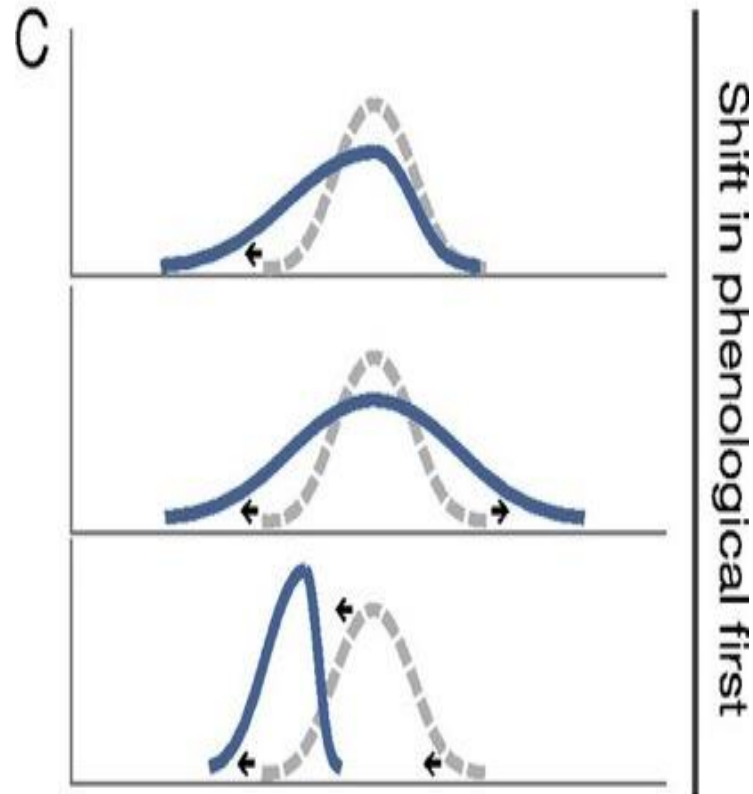
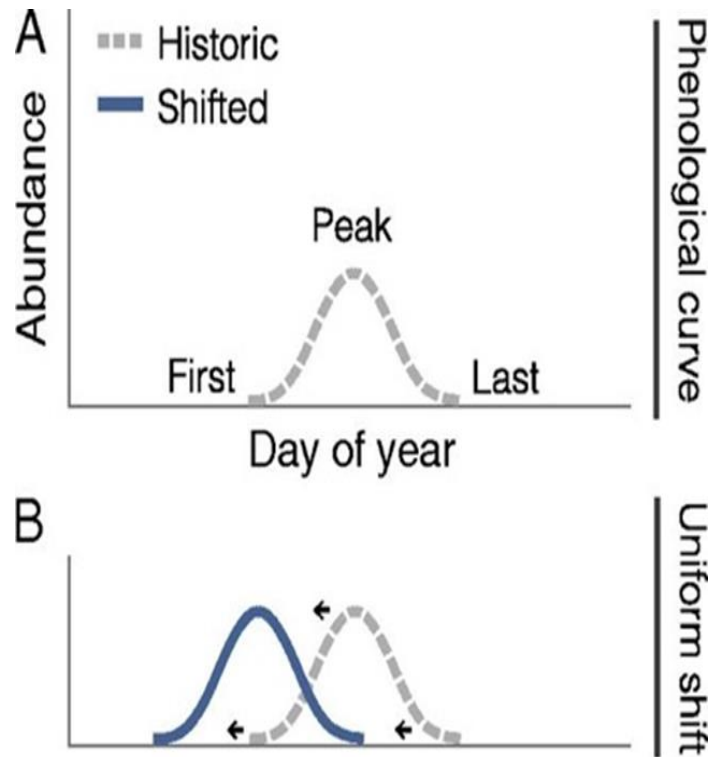
# How is Phenology Measured?

- Observe first and last day of phenophase
- Record abundance to find the phenophase peak
- Compare trends over multiple years





# Phenophase Shifts



## Examples

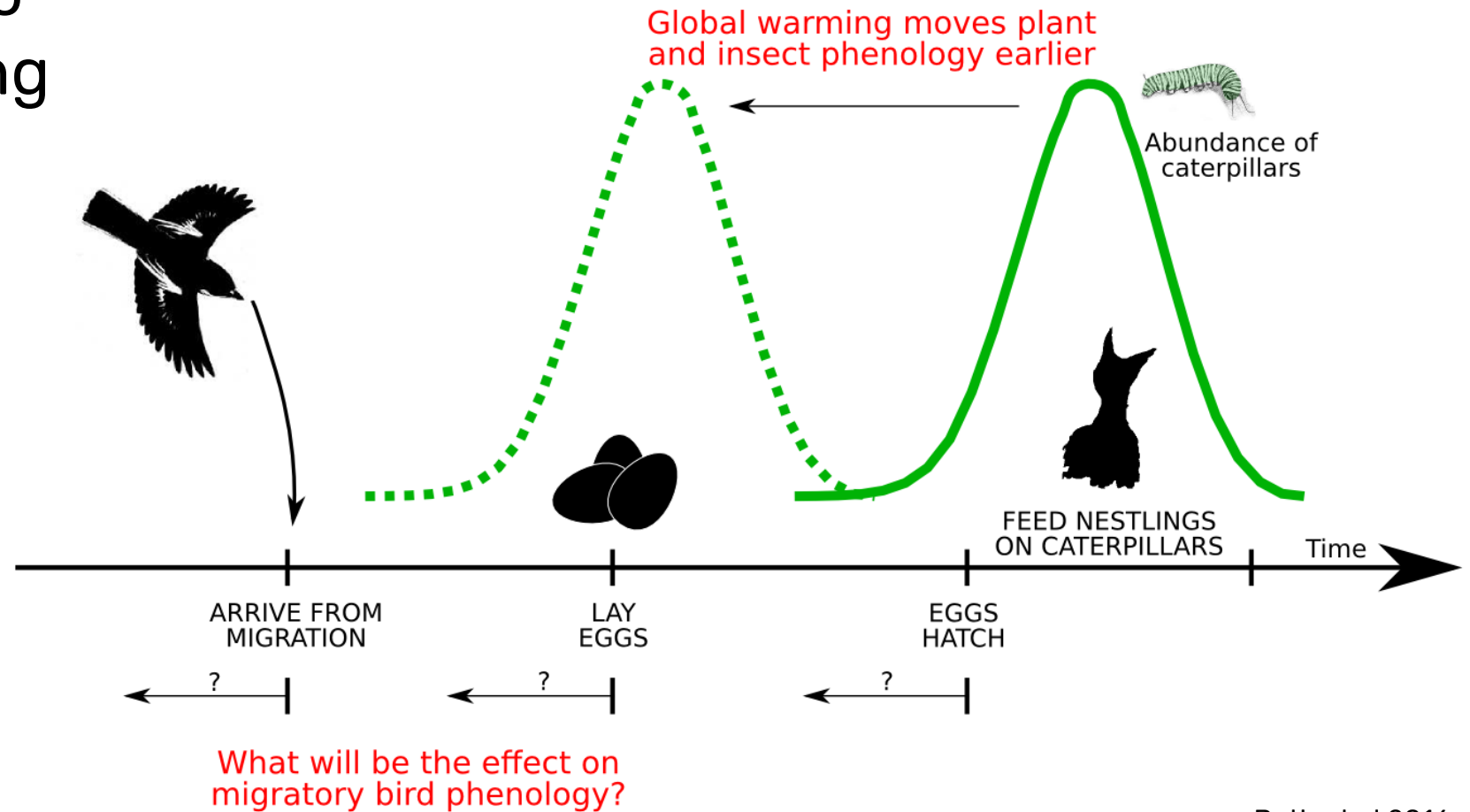
Earlier leaf-out of trees

Earlier flowering

Earlier arrival of  
migratory birds and  
butterflies

# Phenophase Mismatches

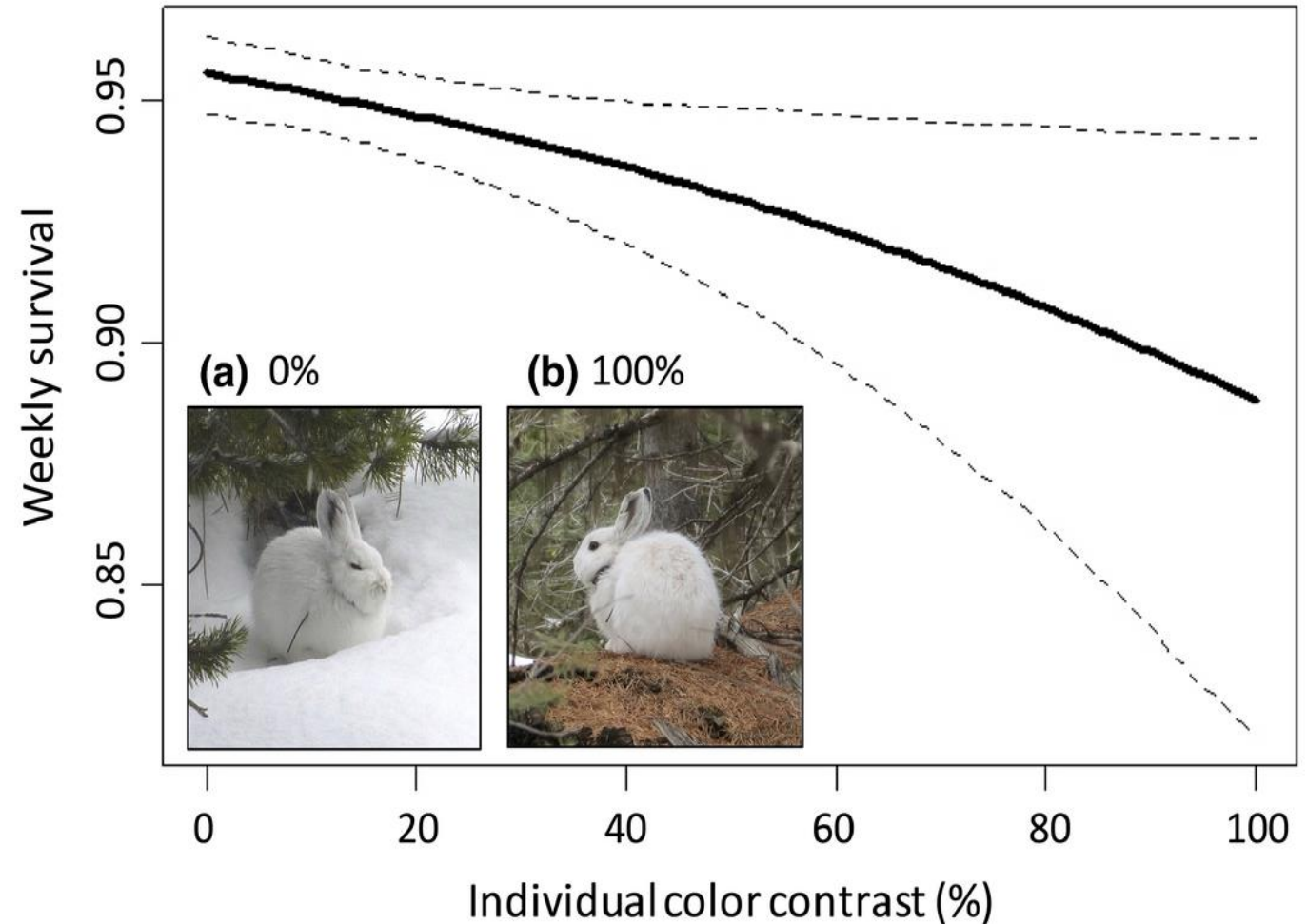
Phenophases of two species not changing at the same rate.



Both et al 2016

# Phenophase Mismatches

Phenophase of a single species, Snowshoe Hare, out of sync with its surroundings.



Zimova et al 2016

# Our Objectives

1. Establish a baseline of plant phenology in McDowell Sonoran Preserve. Estimated to take 3 to 5 years of twice weekly monitoring.
2. Determine if the plant phenology is shifting. Estimated to take an additional 3 to 5 years of twice weekly monitoring.
3. Determine if there is plant/pollinator mismatching in the Preserve.





# Study Sites

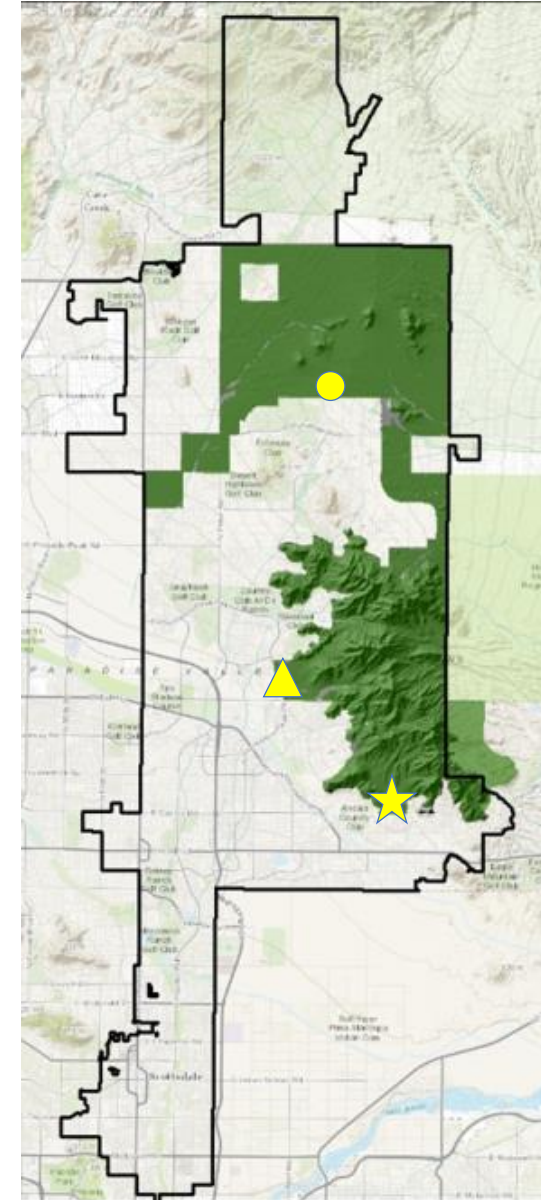
## ● Brown's Ranch



## ▲ Gateway



## ★ Lost Dog Wash



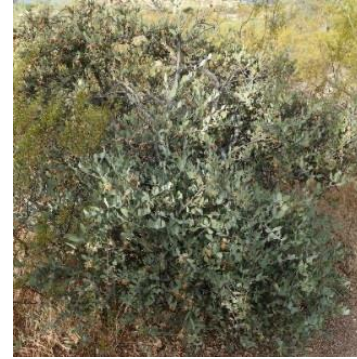
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# Monitoring Species

## ● Brown's Ranch

- Buckhorn cholla
- Jojoba
- Saguaro
- Soaptree yucca
- Velvet mesquite
- Desert senna

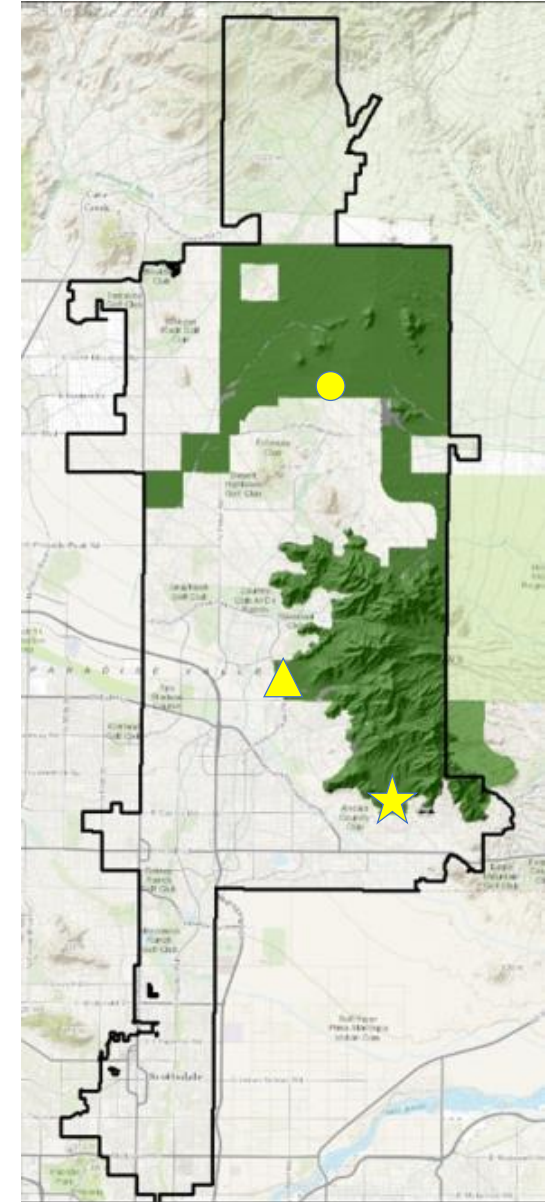


## ▲ Gateway

- Buckhorn cholla
- Jojoba
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## ★ Lost Dog Wash

- Buckhorn cholla
- Jojoba
- Saguaro



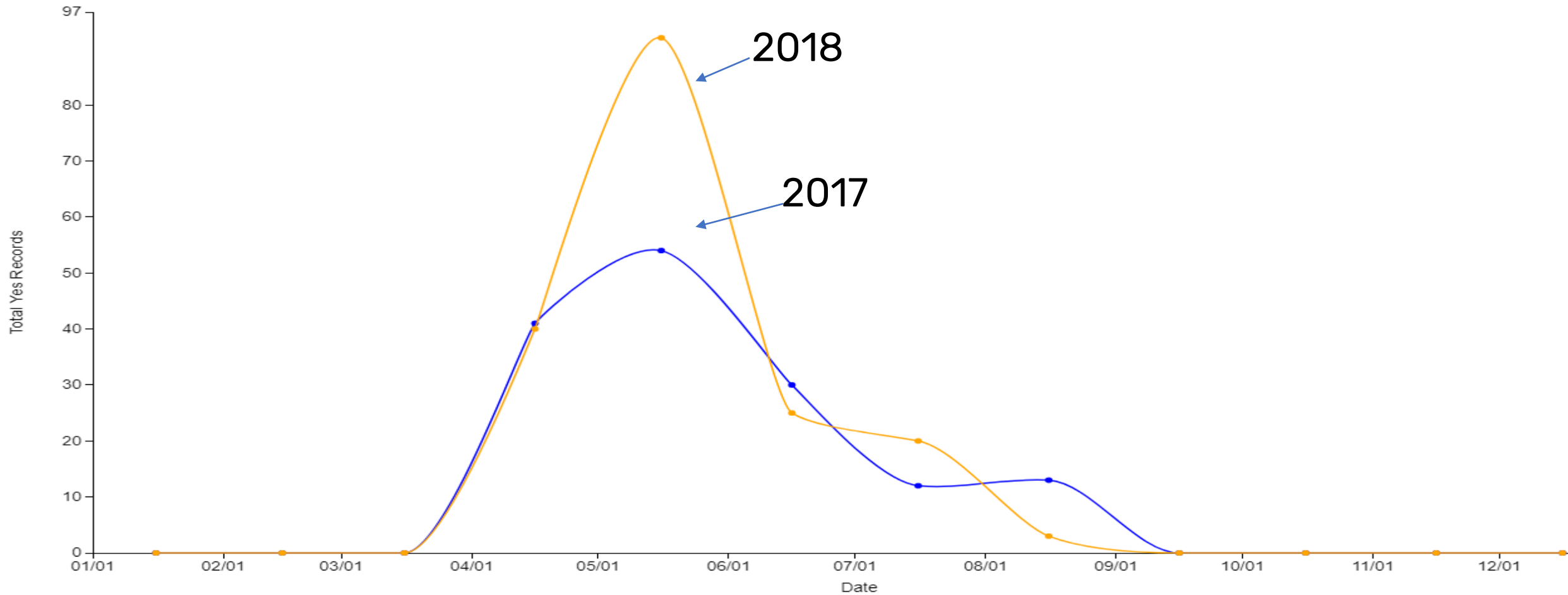
# Preliminary Results

- We have completed 2 years of baseline data collection.
- Volunteers have made more than 45,800 observations.
- The following slides compare phenocurves for 2017–2018.



# Saguaro

## Flowers or flower buds

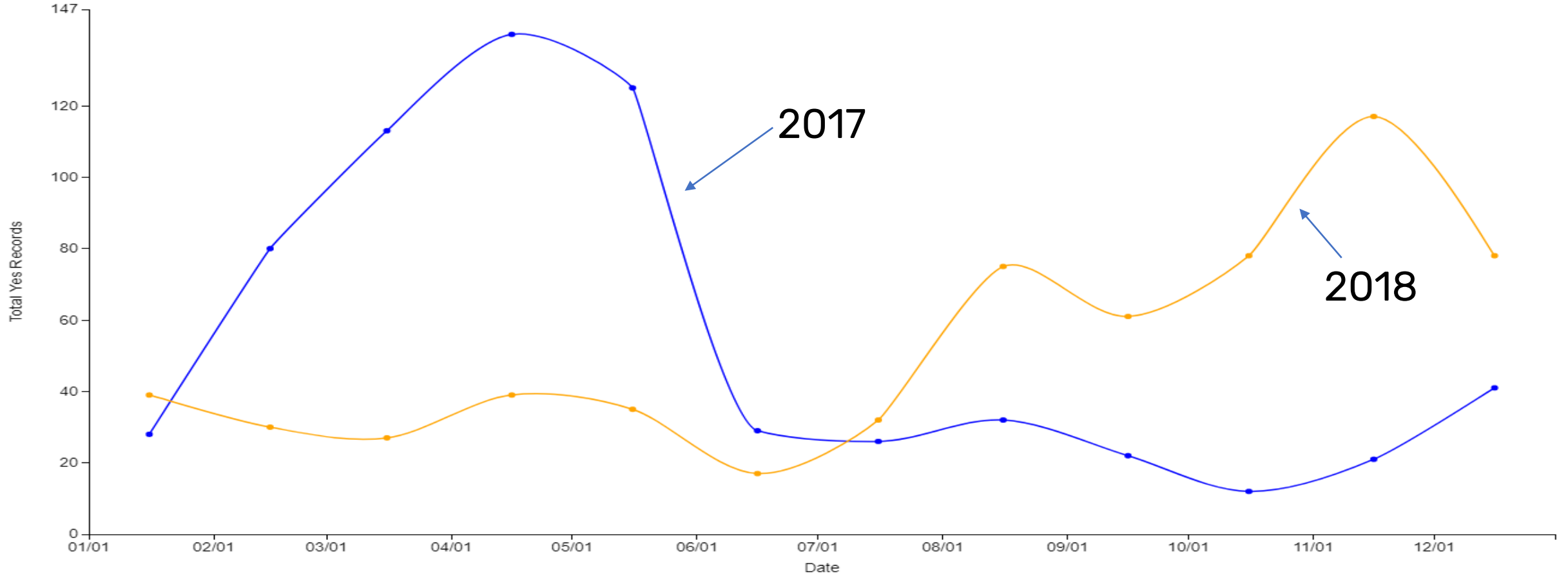


USA National Phenology Network, [www.usanpn.org](http://www.usanpn.org)



# Jojoba

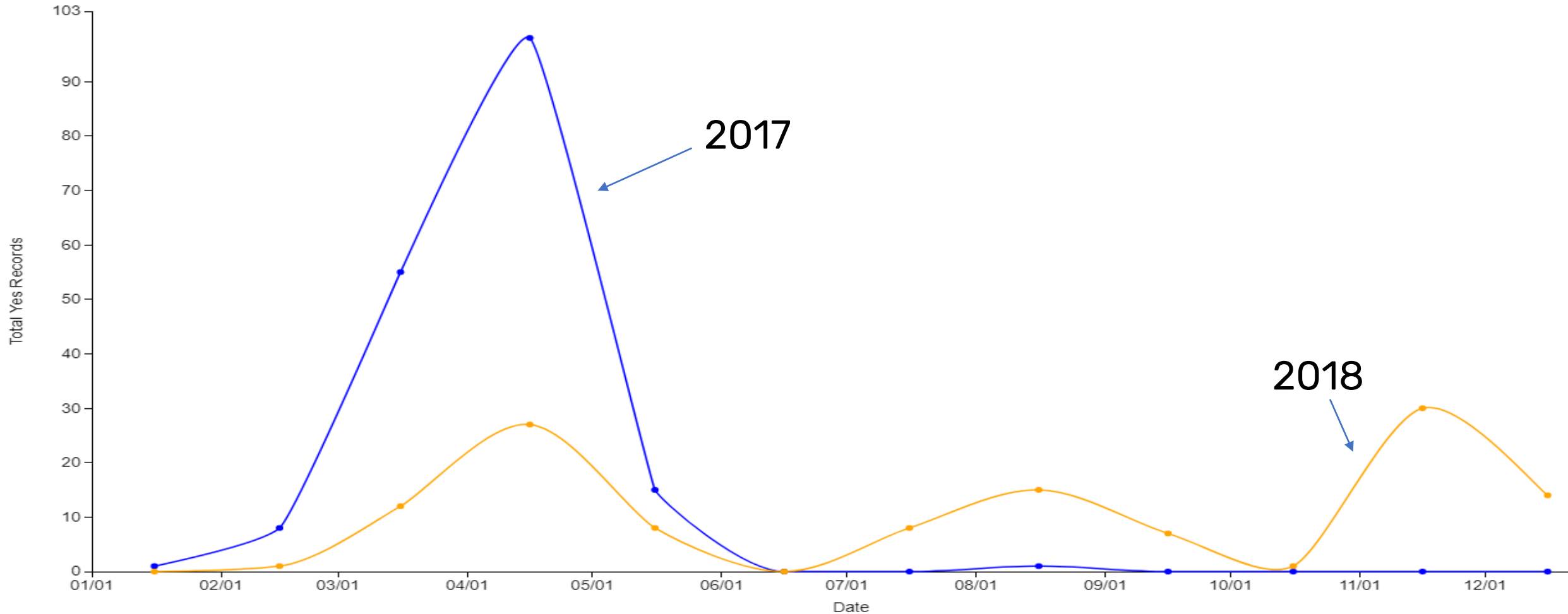
## Young leaves



USA National Phenology Network, [www.usanpn.org](http://www.usanpn.org)

# Buckhorn Cholla

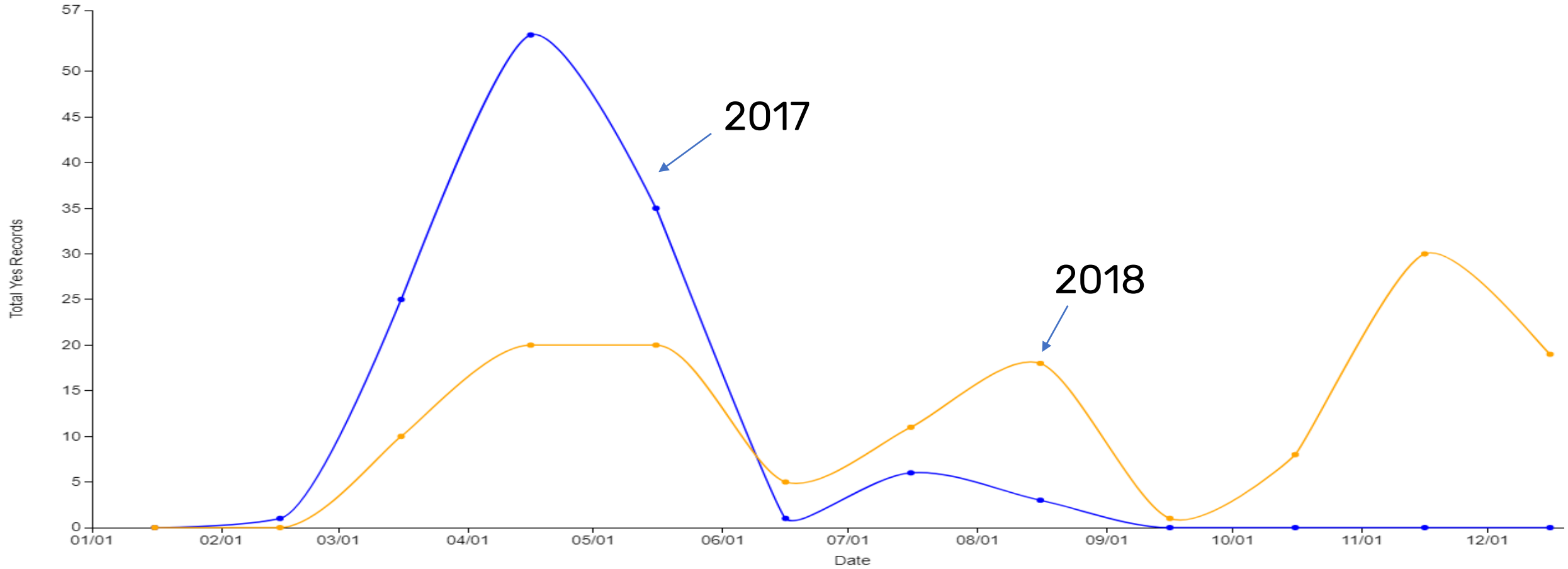
## Flowers or flower buds



US National Phenology Network

# Velvet Mesquite

## Young leaves

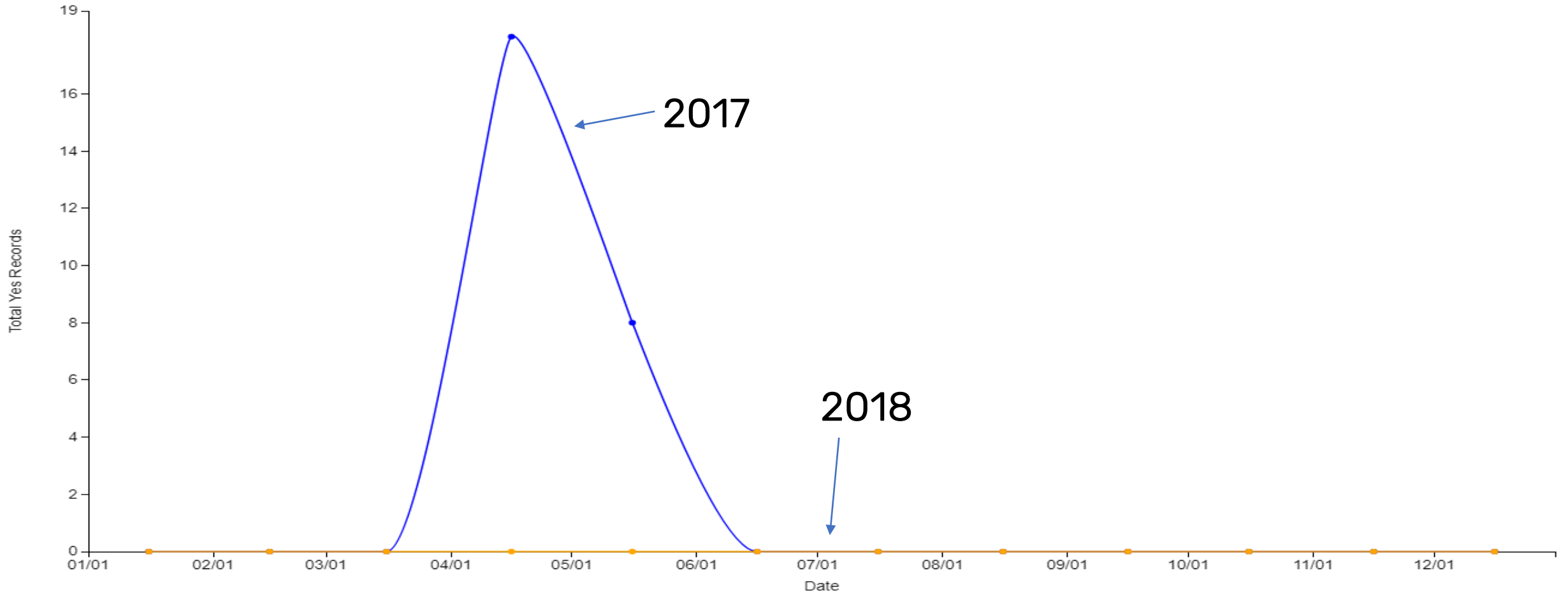


USA National Phenology Network, [www.usanpn.org](http://www.usanpn.org)



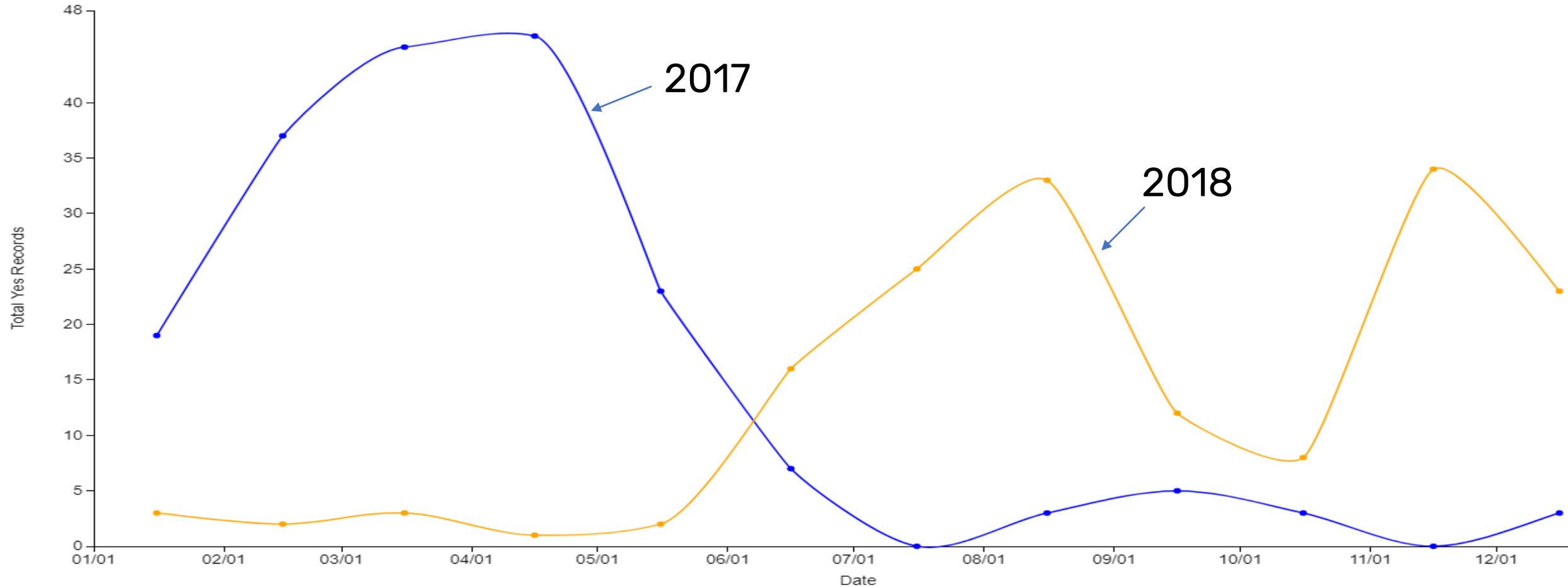
# Yucca

## Flowers or flower buds



# Desert Senna

Initial growth



USA National Phenology Network, [www.usanpn.org](http://www.usanpn.org)

# What Does This Mean?

Too soon to tell, but off to a good start!

- Trained and dedicated observers
- Accomplishing twice weekly observing target

But we have a lot of work to do!





# Next Steps

Continue monitoring

Continue engaging new stewards

Begin monitoring white-winged dove



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# New for 2019!

White-winged dove  
(*Zenaida asiatica*) added  
in 2019

Migratory

Symbiotic relationship  
with saguaro

Monitoring for phenologic  
mismatch



# Acknowledgments





# Congratulations to All the Participants

