UNIVERSITY OF MINNESOTA EXTENSION

# Driven to Discover: Citizen Science in the Classroom


**KATIE-LYN BUNNEY**

PROGRAM COORDINATOR

UNIVERSITY OF MN MONARCH LAB

# What is Driven to Discover?

Builds on citizen science to engage students in the full process of scientific research

GOAL: Building science skills and science identity

# Driven to Discover Model

**Building Science Skills**

- Species identification
- Species natural history

**Contributing to Citizen Science**

- Following protocols
- Asking questions based on observations

**Conducting Investigations**

- Developing testable questions
- Implementing the full process of science

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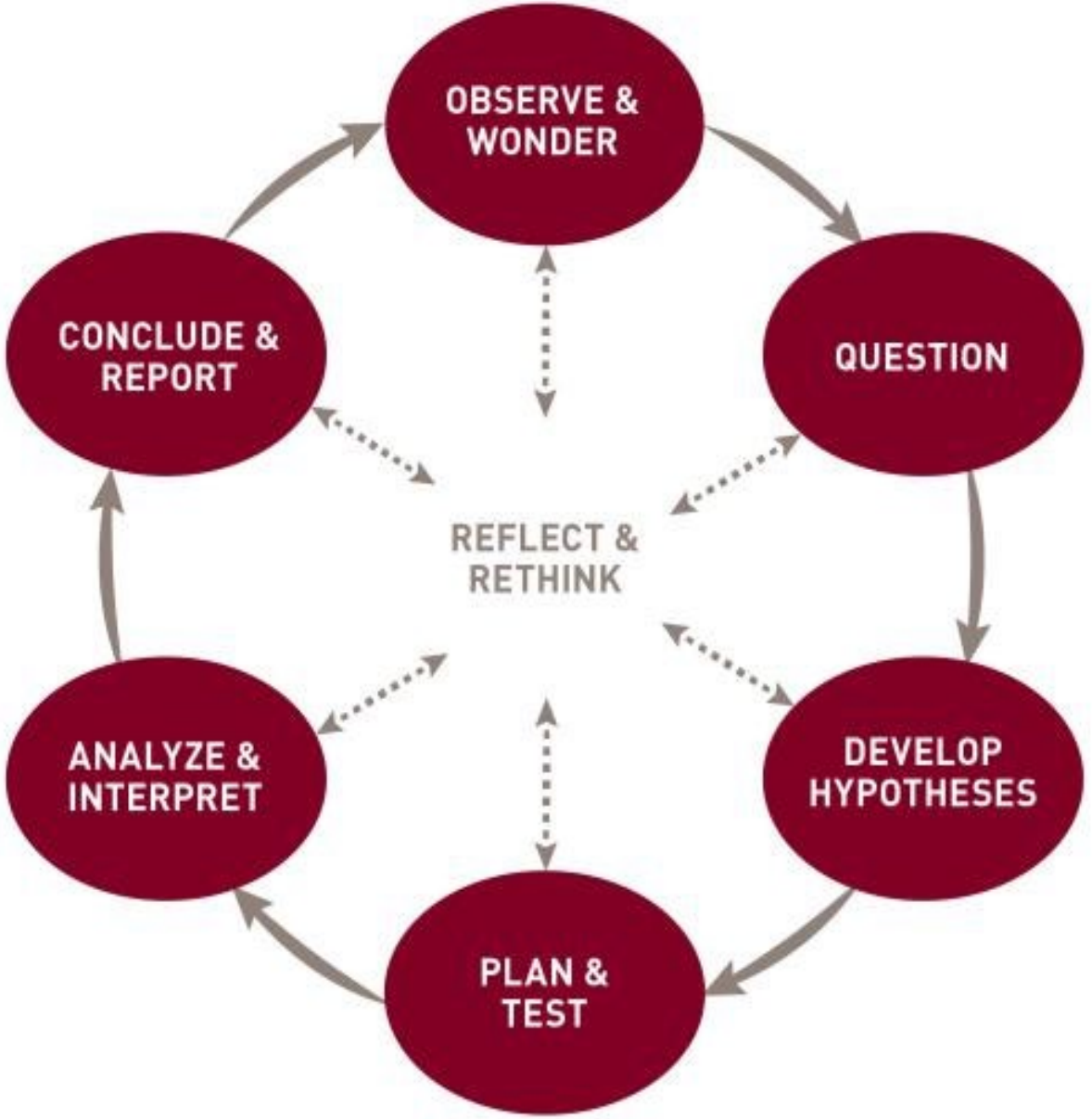
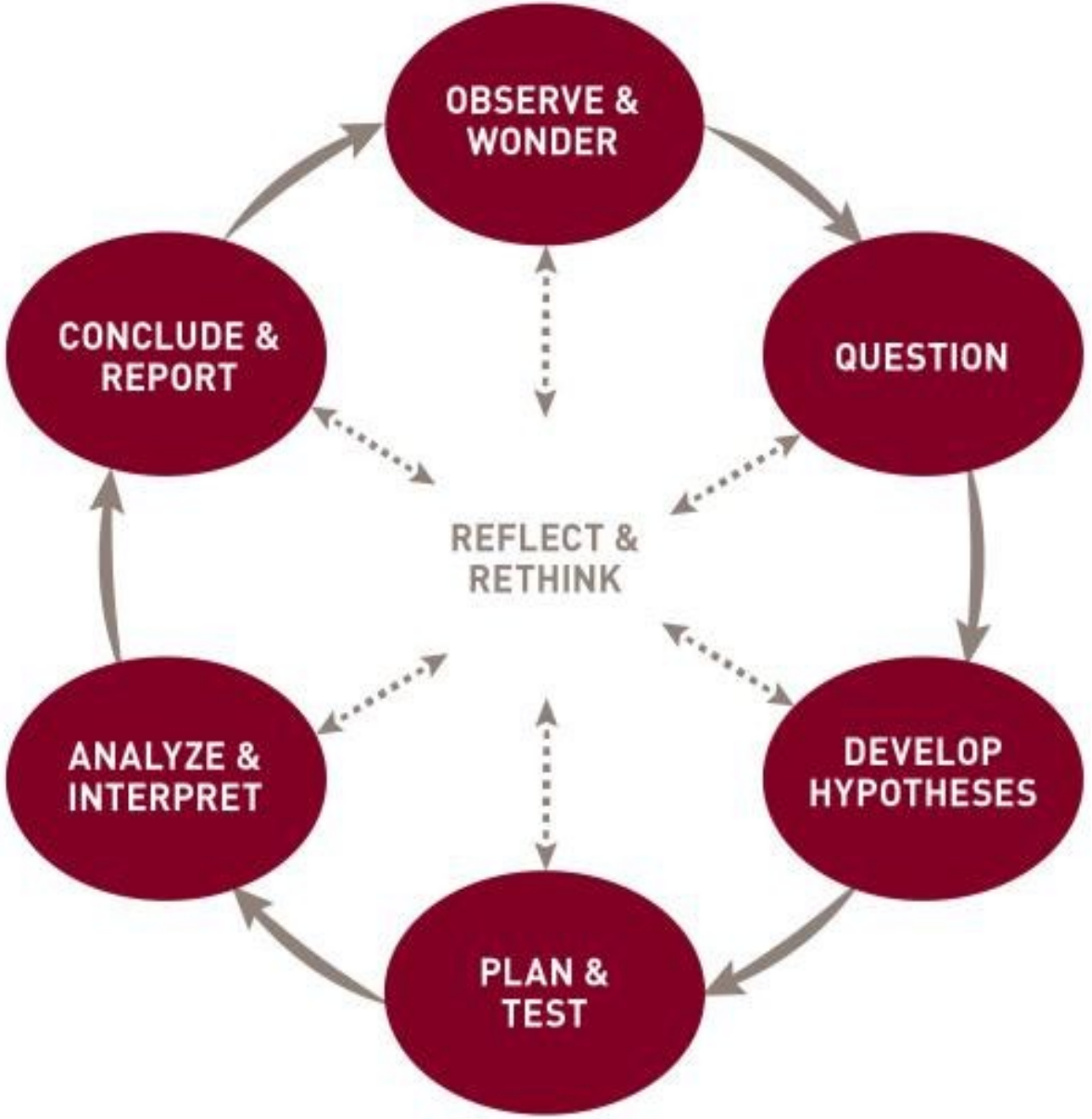
# The Process of Science



# The Process of Science



# AUDIENCE/PARTICIPANTS

- Middle and High School Teachers
- 3 major school districts

# CURRICULUM

# NATIONAL PHENOLOGY NETWORK – NATURE'S NOTEBOOK

## Trees and Shrubs *Deciduous (with pollen)*

nature's notebook

**Directions:** Fill in the date and time in the top rows and circle the appropriate letter in the column below.
**y** (phenophase is occurring); **n** (phenophase is not occurring); **?** (not certain if the phenophase is occurring).
Do not circle anything if you did not check for the phenophase. In the adjacent blank, write in the appropriate measure of intensity or abundance for this phenophase.

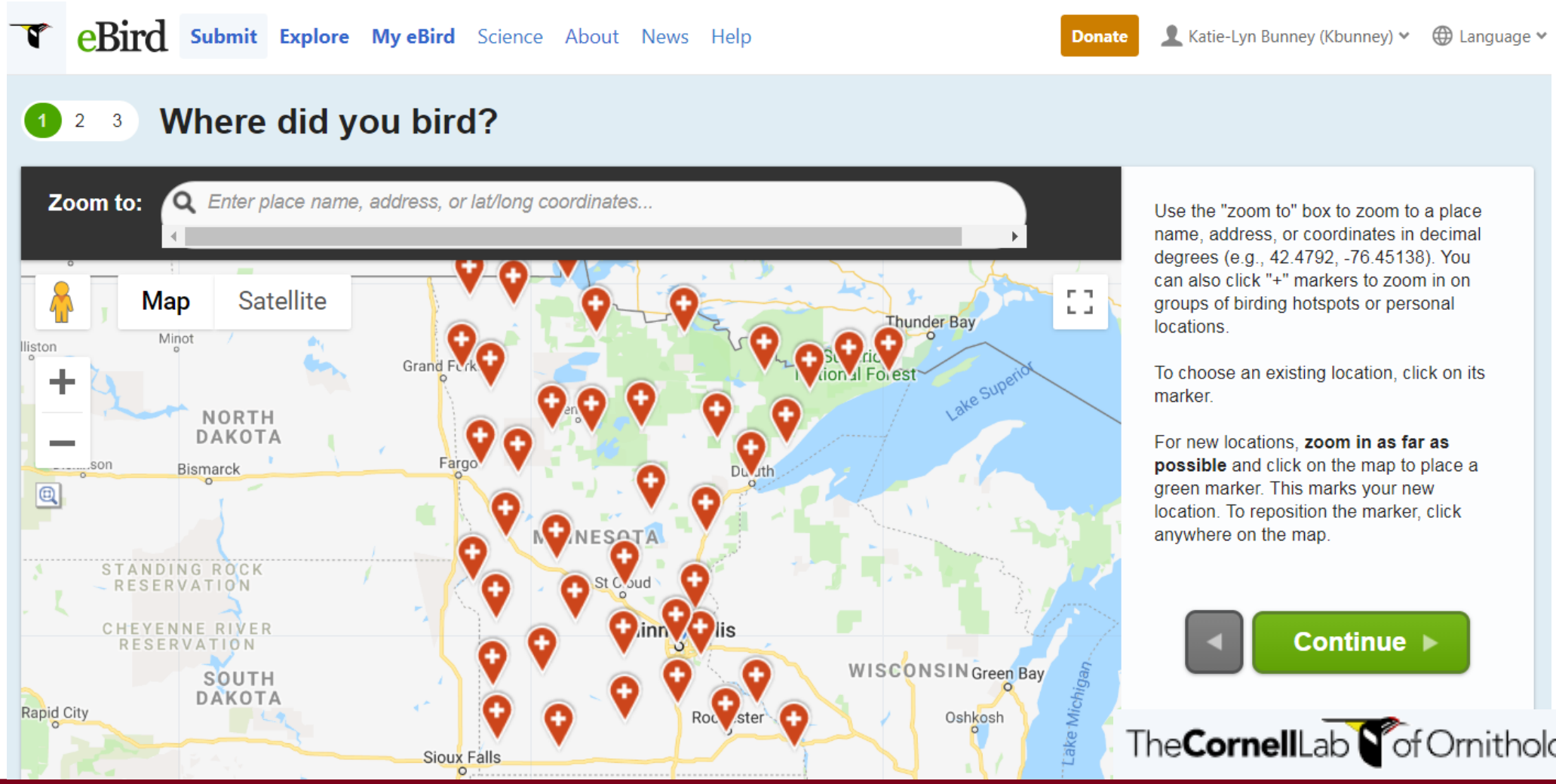
**Species:** Acer Plantae
**Common Name:** red maple
**Nickname:** _____
**Site:** _____
**Year:** _____
**Observer:** _____

| | Date: | Date: | Date: | Date: | Date: | Date: | Date: | Date: |
|---|---|---|---|---|---|---|---|---|
| **Do you see...** | Time: | Time: | Time: | Time: | Time: | Time: | Time: | Time: |
| Breaking leaf buds | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ |
| Leaves | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ |
| Increasing leaf size | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ |
| Colored leaves | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ |
| Falling leaves | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ |
| Flowers or flower buds | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ |
| Open flowers | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ |
| Pollen release | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ |
| Fruits | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ |
| Ripe fruits | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ |
| Recent fruit or seed drop | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ | y n ? ____ |
| Check when data entered online: | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Comments: | | | | | | | | |

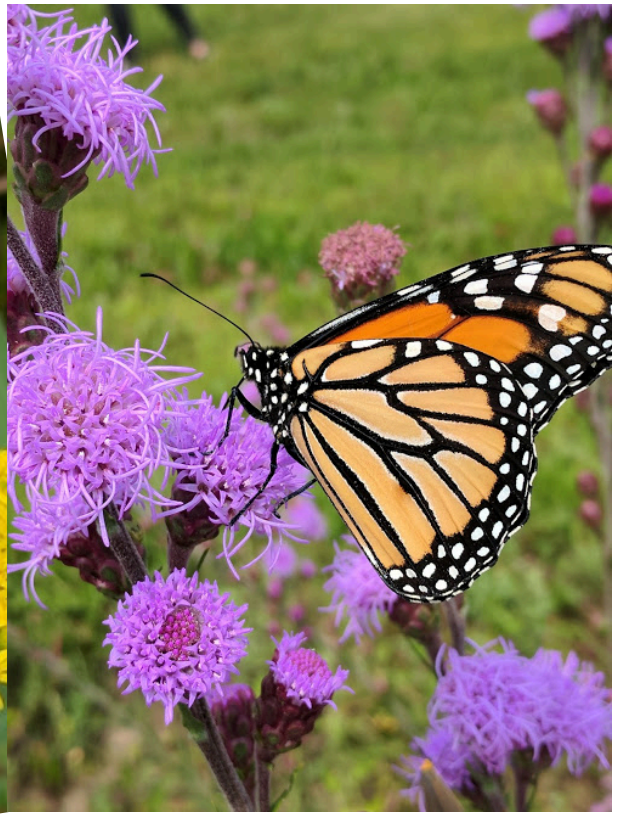
10 year anniversary nature's notebook

USA npn National Phenology Network 10 Year Anniversary

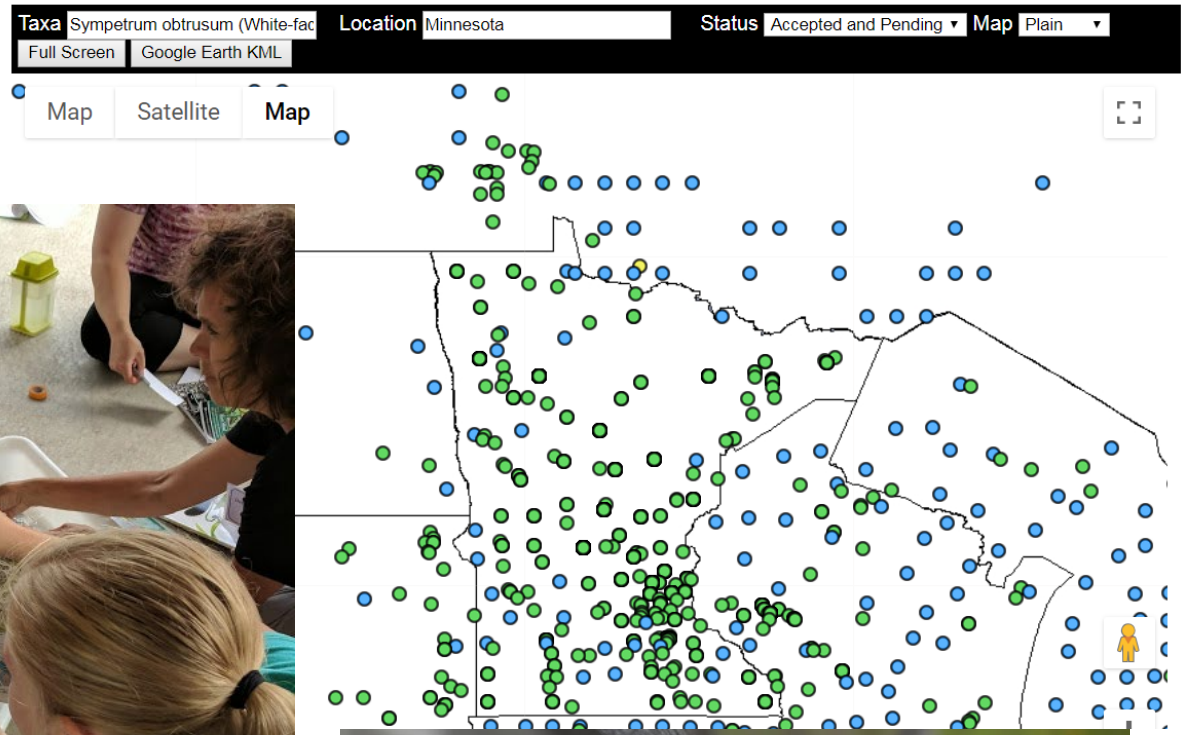
# EBIRD



# THE GREAT SUNFLOWER PROJECT

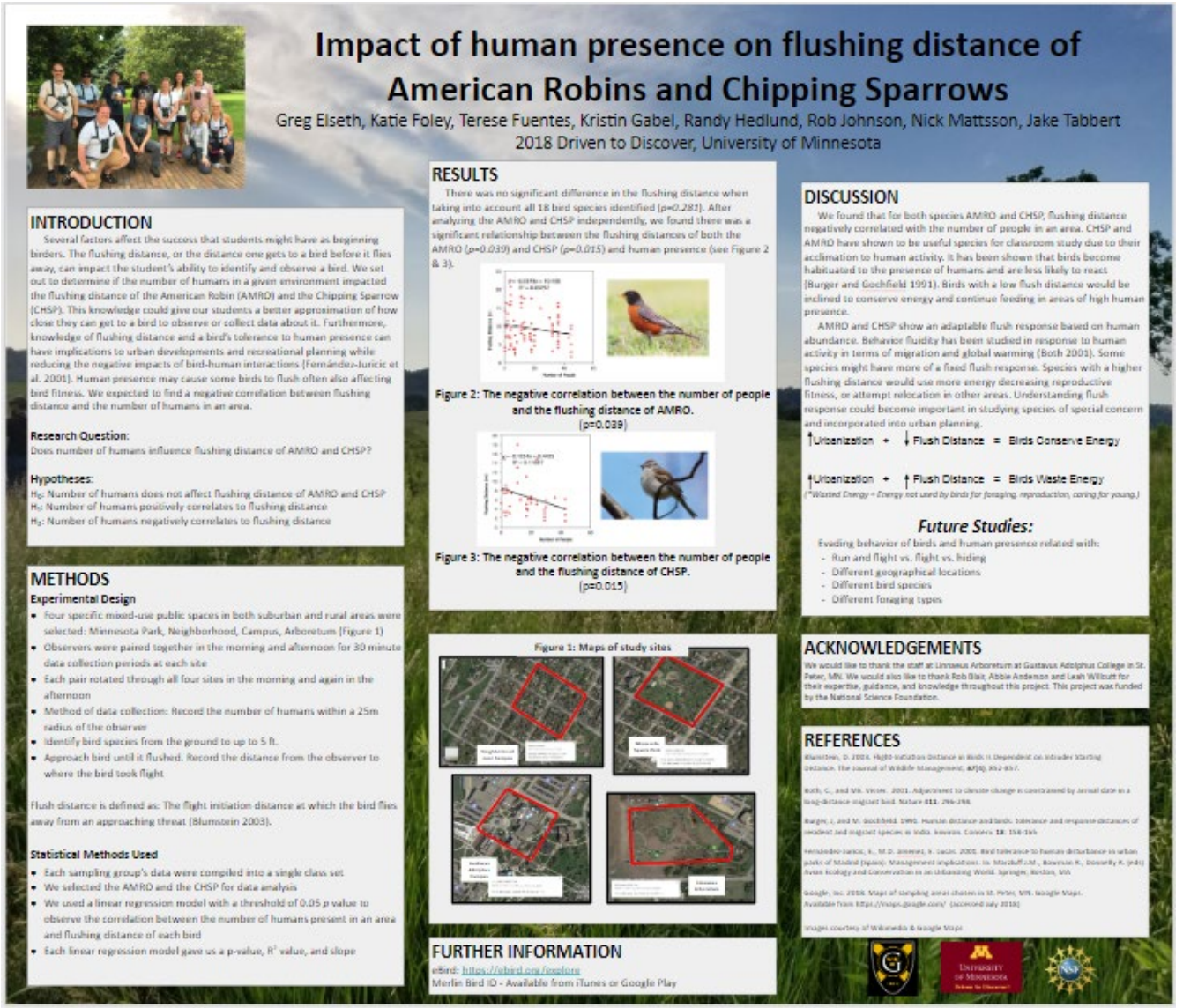


# ODONATA CENTRAL




# WEEK 1

# WEEK 2



## Impact of human presence on flushing distance of American Robins and Chipping Sparrows

Greg Elseth, Katie Foley, Terese Fuentes, Kristin Gabel, Randy Hedlund, Rob Johnson, Nick Mattsson, Jake Tabbert
2018 Driven to Discover, University of Minnesota

### INTRODUCTION

Several factors affect the success that students might have as beginning birders. The flushing distance, or the distance one gets to a bird before it flies away, can impact the student's ability to identify and observe a bird. We set out to determine if the number of humans in a given environment impacted the flushing distance of the American Robin (AMRO) and the Chipping Sparrow (CHSP). This knowledge could give our students a better approximation of how close they can get to a bird to observe or collect data about it. Furthermore, knowledge of flushing distance and a bird's tolerance to human presence can have implications to urban developments and recreational planning while reducing the negative impacts of bird-human interactions (Fernández-Juricic et al. 2001). Human presence may cause some birds to flush often also affecting bird fitness. We expected to find a negative correlation between flushing distance and the number of humans in an area.

**Research Question:**
Does number of humans influence flushing distance of AMRO and CHSP?

**Hypotheses:**
$H_0$: Number of humans does not affect flushing distance of AMRO and CHSP
$H_0$: Number of humans positively correlates to flushing distance
$H_1$: Number of humans negatively correlates to flushing distance

### METHODS

**Experimental Design**

- Four specific mixed-use public spaces in both suburban and rural areas were selected: Minnesota Park, Neighborhood, Campus, Arboretum (Figure 1)
- Observers were paired together in the morning and afternoon for 30 minute data collection periods at each site
- Each pair rotated through all four sites in the morning and again in the afternoon
- Method of data collection: Record the number of humans within a 25m radius of the observer
- Identify bird species from the ground to up to 5 ft.
- Approach bird until it flushed. Record the distance from the observer to where the bird took flight

Flush distance is defined as: The flight initiation distance at which the bird flies away from an approaching threat (Blumstein 2003).

**Statistical Methods Used**

- Each sampling group's data were compiled into a single class set
- We selected the AMRO and the CHSP for data analysis
- We used a linear regression model with a threshold of 0.05 p value to observe the correlation between the number of humans present in an area and flushing distance of each bird
- Each linear regression model gave us a p-value, $R^2$ value, and slope

### RESULTS

There was no significant difference in the flushing distance when taking into account all 18 bird species identified ($p=0.281$). After analyzing the AMRO and CHSP independently, we found there was a significant relationship between the flushing distances of both the AMRO ($p=0.039$) and CHSP ($p=0.015$) and human presence (see Figure 2 & 3).

Figure 2: The negative correlation between the number of people and the flushing distance of AMRO. ($p=0.039$)

Figure 3: The negative correlation between the number of people and the flushing distance of CHSP. ($p=0.015$)

Figure 1: Maps of study sites

### FURTHER INFORMATION

eBird: https://ebird.org/home
Merlin Bird ID - Available from iTunes or Google Play

### DISCUSSION

We found that for both species AMRO and CHSP, flushing distance negatively correlated with the number of people in an area. CHSP and AMRO have shown to be useful species for classroom study due to their acclimation to human activity. It has been shown that birds become habituated to the presence of humans and are less likely to react (Burger and Gochfield 1991). Birds with a low flush distance would be inclined to conserve energy and continue feeding in areas of high human presence.

AMRO and CHSP show an adaptable flush response based on human abundance. Behavior fluidity has been studied in response to human activity in terms of migration and global warming (Both 2001). Some species might have more of a fixed flush response. Species with a higher flushing distance would use more energy decreasing reproductive fitness, or attempt relocation in other areas. Understanding flush response could become important in studying species of special concern and incorporated into urban planning.

↑Urbanization → ↓Flush Distance = Birds Conserve Energy

↑Urbanization → ↑Flush Distance = Birds Waste Energy
(*Wasted Energy = Energy not used by birds for foraging, reproduction, caring for young.)

***Future Studies:***

Evading behavior of birds and human presence related with:

- Run and flight vs. flight vs. hiding
- Different geographical locations
- Different bird species
- Different foraging types

### ACKNOWLEDGEMENTS

We would like to thank the staff at Linnaeus Arboretum at Gustavus Adolphus College in St. Peter, MN. We would also like to thank Rob Blair, Abbie Anderson and Leah Wilbutt for their expertise, guidance, and knowledge throughout this project. This project was funded by the National Science Foundation.

### REFERENCES

Blumstein, D. 2003. Flight-initiation Distance in Birds is Dependent on Intruder Starting Distance. The Journal of Wildlife Management. 67(3): 852-857.

Both, C., and Me. Visser. 2001. Adjustment to climate change is constrained by arrival date in a long-distance migrant bird. Nature 411: 296-298.

Burger, J. and M. Gochfeld. 1991. Human distance and birds: tolerance and response distances of resident and migrant species in India. Environ. Conserv. 18: 158-165.

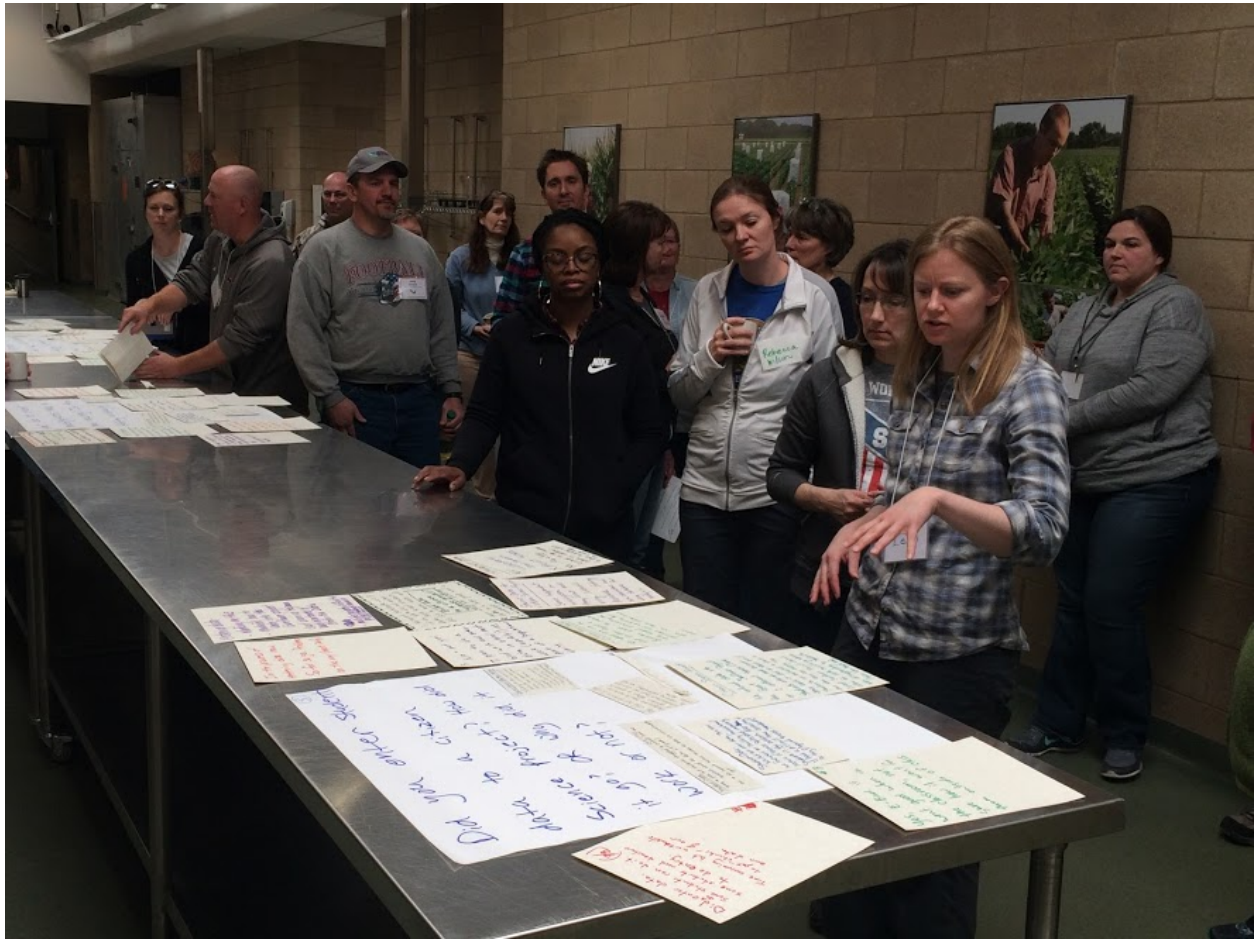
Fernández-Juricic, E., M.D. Jimenez, K. Lucas. 2001. Bird tolerance to human disturbance in urban parks of Madrid (Spain): Management implications. In: Marzluff J.M., Bowman R., Donnelly R. (eds) Avian Ecology and Conservation in an Urbanizing World. Springer, Boston, MA

Google, Inc. 2018. Maps of sampling areas chosen in St. Peter, MN. Google Maps. Available from https://maps.google.com/ (accessed July 2018)

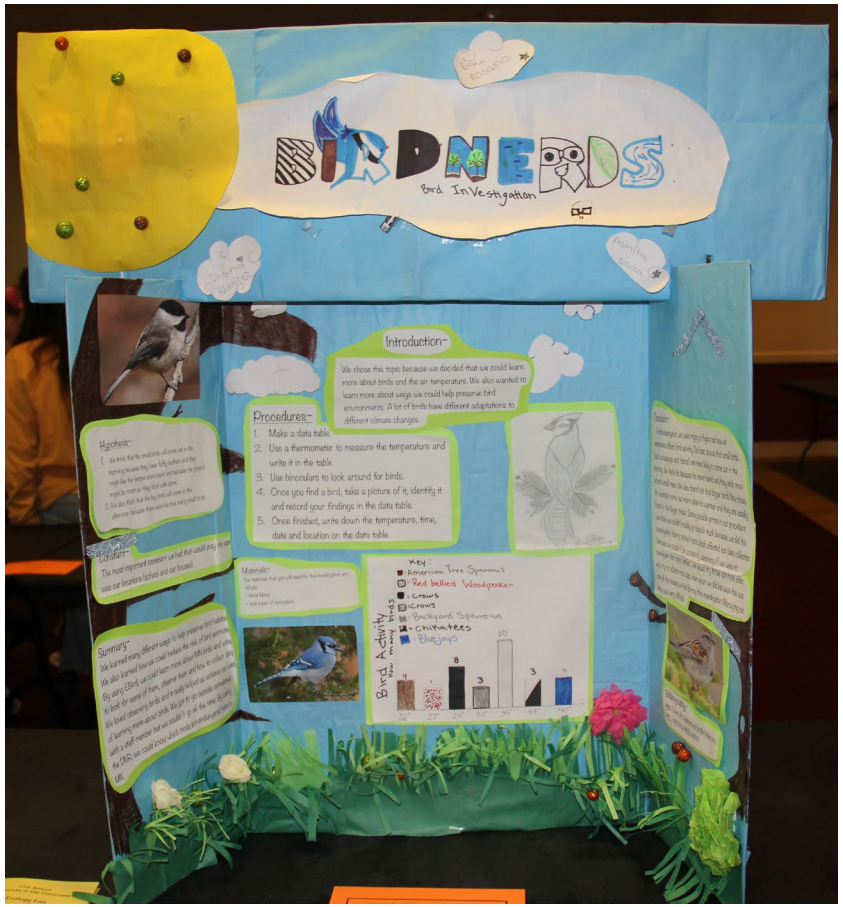
Images courtesy of Wikimedia & Google Maps

# SMALL GROUPS

# SATURDAY FOLLOW-UPS



# SHOWCASING STUDENT WORK (ECOLOGY FAIR)

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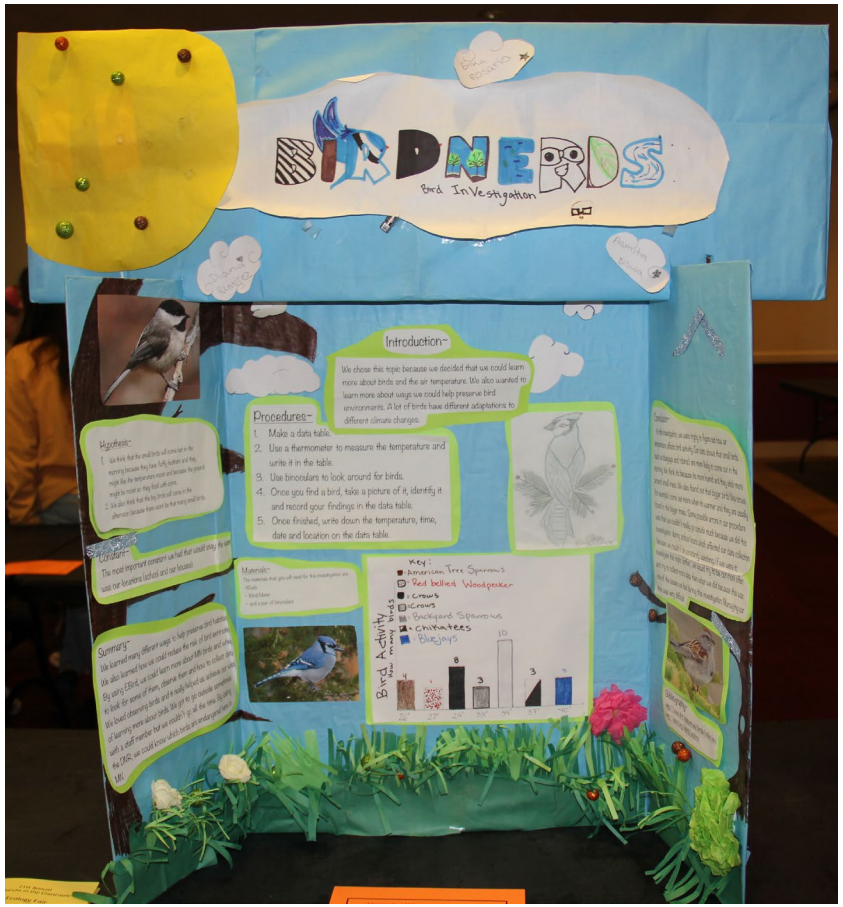




# Acknowledgements

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Photo: Ken Epstein

***To find out more, email Lisa Curtis at curtisl@umn.edu***

***Go to:***

*https://extension.umn.edu/citizen-science/driven-discover*