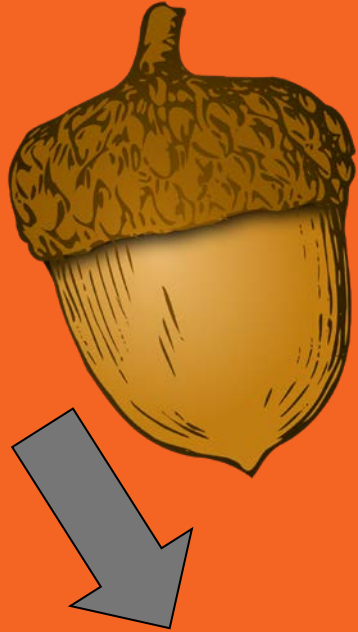


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# Practicing Citizen Science: An Investigation of Schoolyard Resource Availability and Population Dynamics



Joseph Jacquot *Associate Professor of Biology*  
Erin Koren *Pre-service Biology Teacher*  
Jamie Meaney *Pre-service Biology Teacher*

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\*If you have a mobile device download the MI-MAST app or go to <http://www.mimast.org/>



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# Partnership for this project:

Associate Professor Gary Roloff, Department of Fisheries and Wildlife,  
Michigan State University



**MI-MAST**

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**WILDLIFE FOOD TRACKER**

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Thank you to Chris Dobson for helping us envision this idea as a lesson for students and providing feedback on our work.

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# Activity Rationale

- ❖ This inquiry-based activity is intended for middle school science
    - Llewellyn (2004) and Llewellyn (2011)
    - Biology Sciences Curriculum Study (2016)
  - ❖ 5E Learning Cycle focused on: *How does resource availability affect wildlife populations?*
  - ❖ Goal: Lead students to understand the interconnection of organisms in their local ecosystems.
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# NGSS Alignment

- **MS-LS2-1.** Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
- **MS-LS2-3.** Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
- **MS-LS2-4.** Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting concepts
Analyzing and Interpreting data	LS2.A: Interdependent Relationships in Ecosystems	Cause and Effect
Engaging in Argument from Evidence	LS2.B: Cycle of Matter and Energy Transfer in Ecosystems	Energy and Matter
	LS2.C: Ecosystem Dynamics, Functioning, and Resilience	Stability and Change

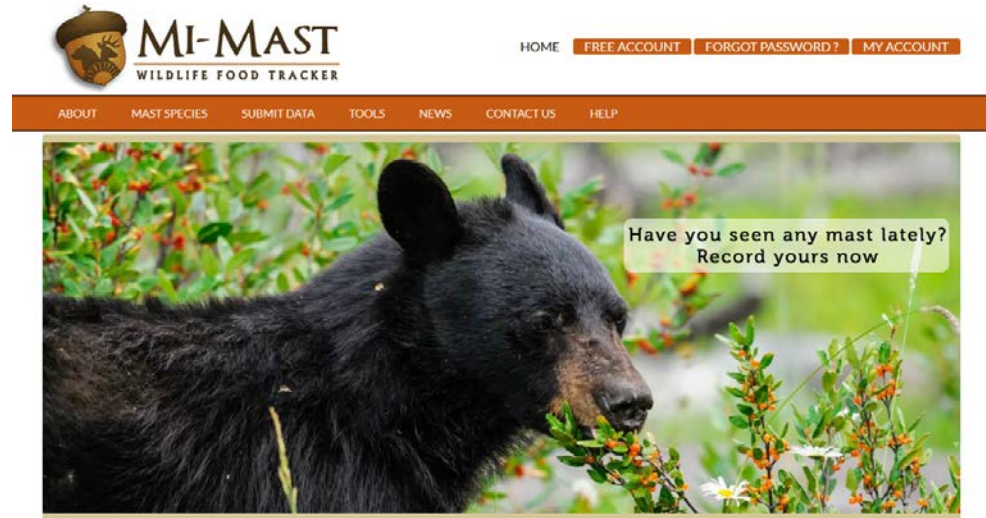
# MI-MAST Program

❖ Gary Roloff heads the program in partnership with:

- MDNR
- Michigan United Conservation Club
- U.S. Fish and Wildlife Service

❖ Program Goal:

- Conserve Michigan wildlife with the help of citizen scientists





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# What is mast?

Mast crops are species that produce a large number of seeds or fruit synchronously at some interval—usually every two or more years.

Masting is an adaptive strategy to increase chances of successful reproduction in the face of seed predation.

The MI-MAST program is looking for long term data on the production cycles of mast producing trees and shrubs around the state and this effort could greatly benefit from the help of teachers, like YOU, who have access to the same mast-producing species annually on or near your school grounds.

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# 1.Engage

## ❖ “Chalk Talk”

- Draw out students prior knowledge of plants and animals in Michigan
- Get students focused on material related to lesson

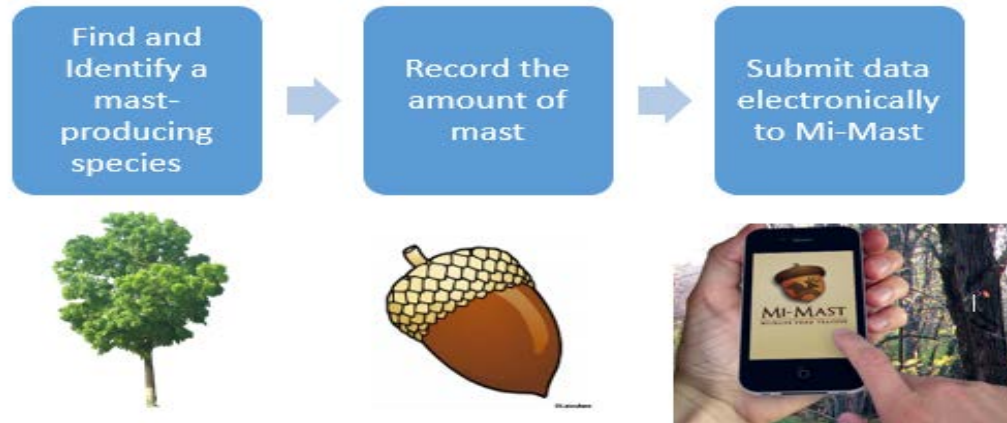
Sample “Chalk Talk” Questions
1.What are your favorite animals in Michigan?
2. What trees would you find locally?
3.What local trees and shrubs produce nuts, acorns, or berries?
4.What sort of wildlife do you think our school grounds could support?
5. Provide students with a list of Michigan animals (e.g., black bear, turkey, grey squirrel, coyote, red fox, white-tailed deer) and ask them what they think the preferred diet of each animal.*



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## 2. Explore

❖ Explore your school's study site







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# Logistical Considerations

- ❖ Mast availability varies seasonally
  - ❖ Scope out your study site beforehand
  - ❖ How will you group students?
  - ❖ Observe best practices for safety and outdoor learning
  - ❖ You will need to record location for each tree/shrub
    - MI-MAST app automatically records location
    - GPS device
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# Time to try your hand at identification!

- ❖ You do NOT have to be a taxonomist to successfully lead your students through this activity.

Thank you to Biology faculty member Tim Evans for the herbarium specimens!

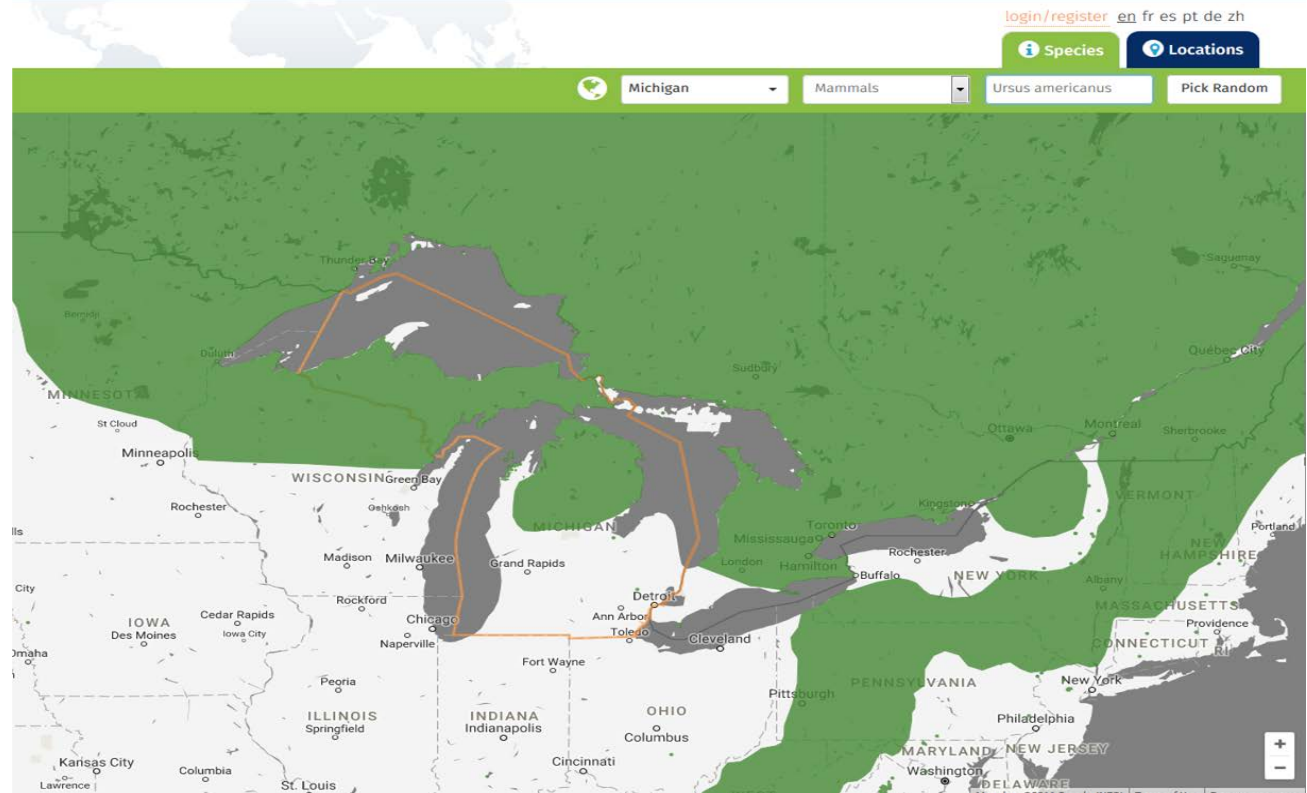
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### 3. Explain

What wildlife  
could our study  
site support?

Based on fact  
sheets?

Based on the Map  
of Life range  
maps?



**Figure 4.** This screenshot from the Map of Life interactive species map depicts what students will see when they enter in the target wildlife in MI-MAST. This example shows the range data for the black bear.



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## 4. Elaborate/ Extend

- ❖ Students will focus on how cycles of mast production impact animal populations.
- ❖ [Nova's "Population Ecology" module](#)
  - Explains what mast is
  - Allows students to discover impact of a mast year on wildlife population fluctuations in a forest
- ❖ View module as a whole class → Follow white-footed mice through the simulation → Discuss how resource fluctuations in this forest influenced the other organisms.

## 5. Evaluate

**Task for students:** Demonstrate understanding of the cause-effect relationship between acorn mast production and mouse population abundance

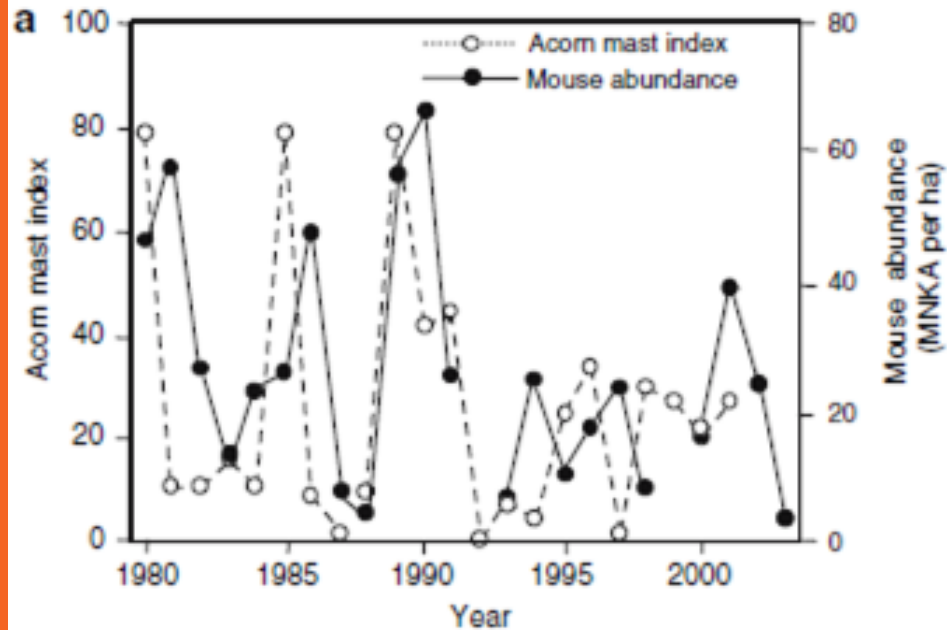


Figure 1 from Clotfelter et al. (2007, p. 497)



# Concluding Thoughts

**This lesson is designed to:**

- **Get your class outdoors**
- **Engage students in authentic citizen science**
- **Be a win-win situation**
  - **Conservation biologists get widespread data**
  - **Teachers can get long-term data to work with and add to year after year.**



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## **Any additional content connections?**

Could you see this activity being applicable to any other scientific content?

Other subject areas or points of interdisciplinary collaboration?

Extensions for older students?

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# Possible Extension

What sorts of long-term extensions might be possible with this data?

Designate trees and shrubs in your MI-MAST data logs that you can continue to track in future years since you'll have known locations already inputted on the site.

Rather than use the figure from Clotfelter et al. (2007) in the evaluate section, you can track and graph mast production cycles specific to your study location.

Get ambitious and partner with a local mammalogist to do live-trapping to measure small populations at your study site.

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**Thank you for your time!**  
**We would be happy to take any questions**  
**or suggestions.**

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