



**MASSACHUSETTS  
FARM TO SCHOOL**

# **The Beecology Project: Citizen Science on Bees and Climate Change**

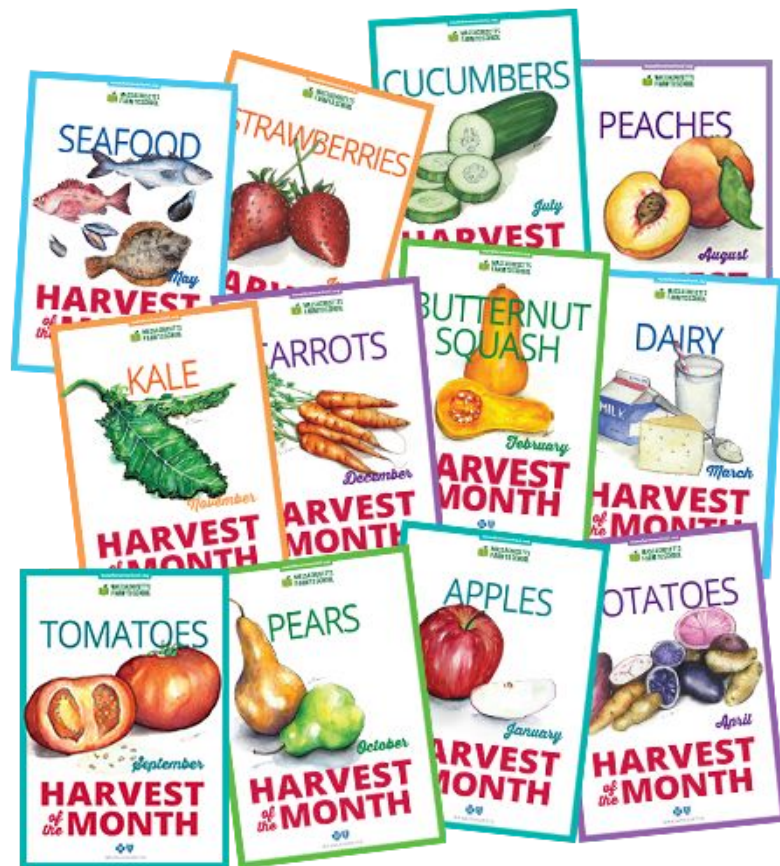
**January 24, 2023**

# MASS. FARM TO SCHOOL OVERVIEW

Mass. Farm to School strengthens local farms and fisheries and promotes healthy communities by increasing local food purchasing and education at schools.

Get involved through our:

- Professional learning opportunities
- Networking
- Policy/Advocacy
- Communications



# Presenters

María Berríos, Science Teacher and  
Science Olympiad Coach, Auburn High  
School

Jen Field, Science Department Chair,  
Nipmuc Regional High School

Bees and other pollinating insects are essential to both our food system and the health of our ecosystem. This virtual workshop will explore the importance of bees to our ecosystem and the threats to bees from climate change and other environmental and human impacts.



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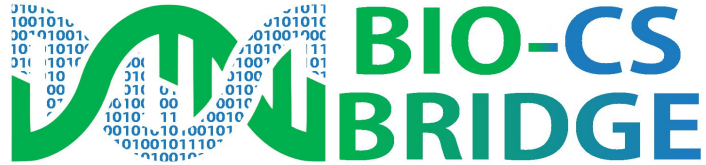
# BIO-CS Bridge

## MA Farm to School & Ag in the Classroom

### Professional Development



**WPI**



# Agenda

- Welcome & Introductions
- Differences between native & non-native pollinators
- Bio-CS Bridge Overview:
  - Genesis and Purpose of Curriculum, Available Tools
  - Scope of Curriculum, Teaching Pedagogy, Student Outcomes, Samples of Curriculum in action
- Biology Intro (Bees 101)
- Using Beecology Website & Citizen Science data collection (web app)
- Starlogo Orientation & Intro to Simbeecology Hypothesis Testing
- Examples of lessons in web design & human Impacts
- Exploration of Curriculum & Questions

# Background: Native vs Non-Native Pollinators



Honey bees are important because they pollinate our crops



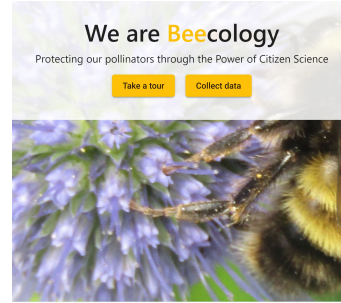
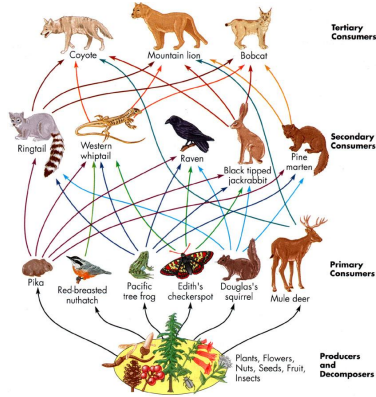
Bumble bees are important because they maintain the biodiversity of our ecosystems



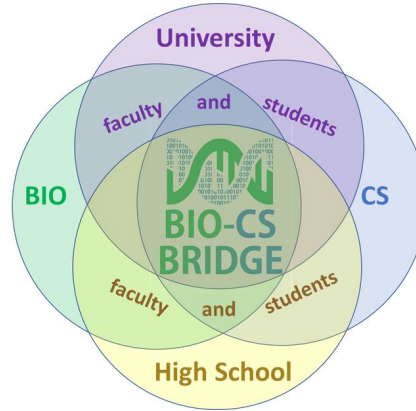
# The Bio-CS Bridge Project: Integrating Science and Computational Thinking in High School Curricula

## Ecological concepts:

- biodiversity
- pollinator decline
- trophic levels



## Research motivation: Protecting our pollinators through Citizen Science



## Pedagogical expertise:

Culmination of university, high school faculty, and students

## Computational concepts:

- abstraction
- iteration
- modeling

# BIO-CS BRIDGE

## BIOLOGY COMPONENTS

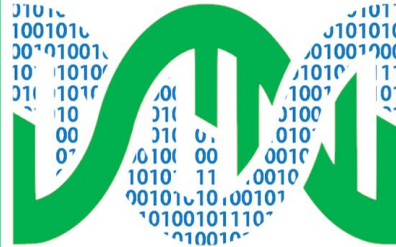
Asking questions  
Defining problems



Carrying out investigations  
Hypothesis testing



Interpreting data



## COMPUTER SCIENCE COMPONENTS

Mobile apps /data gathering



Data Analysis/  
Visualization ← Database  
development



Modelling/simulations

## BRIDGED BIO-CS PERSPECTIVES, APPROACHES, AND ATTITUDES

Explanations/ Solutions/ Evaluation/Argument/Communication



# Biology Intro



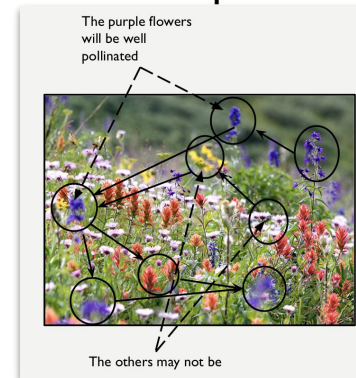
Intro to Biology Units and a more thorough discussion of the Ecological Problem

[Biodiversity](#) - intro to what biodiversity is and why it is important

[Bees 101 ppt](#)

[Life cycle ppt](#) - discussion of importance of lifecycle with respect to survivorship and colony size.

[Bee Behavior Videos](#)



# Using the Beecology Website

The Beecology website is easily incorporated into hypothesis testing and data analysis (tables & graphing)

[Lessons](#)

# Citizen Science and Data Collection

- Citizen Science [Beecology website](#)
- [Web app tutorial](#)
  - Explain [Biodiversity lesson](#) (heat map)
- Activity: [Observing Bee behavior](#)
- Practice taking effective video w/ phone
- Field data gathering and using the Beecology web app to classify bees and flowers

# StarLogo Orientation - Simulations

## StarLogo

- Demo
- Account creation [StarLogo Nova Orientation](#)
- Play with First Simulation
  - [CSLP Unit 1 Lesson 1](#)
  - [Activity: Discover how the Simulation Models the Ecosystem](#)



# Intro to Simbeecology Hypothesis Testing (Biology)

- Hypothesis w/ Simulation Activity
  - Overview of the flow of Bio Lessons in Unit 3
    - [Lesson 1: Simbeecology Introduction](#)
    - [Lesson 2: Simbeecology Part 2](#)
    - [Lesson 3: Simbeecology Hypothesis Testing](#)
- Activity: <https://www.slnova.org/efryder/projects/691627/> [SimBeecology EcoPop1](#) (using starlogo to model how changes in pollinator pops affect ecosystem/keystone species/trophic levels)

# Lesson in Web Design and Human Impact

Lessons in Web Design: HTML, CSS - [Folder: CSLP Unit 3](#)

- Overview of Unit
- View CSLP Unit 1 Lesson 1: [Introduction to Ecology Website Project](#)
- Explore topics from [Biology Topic List & Descriptions](#)
- [Bees and Climate Change](#) / [Human Impacts on the environment](#)

# Student Project Ideas

## Individual:

- Report/mapp invasive species with [IPANE app](#)
- Upload info to Beecology or [iNaturalist](#)
- Create infographics for hallways in school
- Post social media infomercials/videos

## Class/School:

- Research and Create a pollinator garden
- Facilitate the removal of invasive species on campus
- Plant native species/wild areas on campus or in town
- Research and put up birdhouses specifically designed for struggling species

# Exploration, Questions, and Closing

- Curriculum Exploration/Exit ticket/Takeaways
- Questions
- Closing Summary

