

You, me, and mountain ash: Developing a phenological species interaction study

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Introduction



The migration of birds, budding of leaves or fruit, and arrival of plant pollinators—the timing of such events across the seasons and over the years is known as phenology. One of the ways climate change can impact species is by altering the timing of such phenomena. Observations of phenological events by researchers and volunteers help document changes in these, and other, life-history events. However, changing climate may not affect all interdependent organisms to the same degree, which may lead to ecological mismatches—fruit ripening before birds migrate through an area, for example. At Schoodic Institute and on Mount Desert Island, we have developed a monitoring program to look for changes in American mountain ash (*Sorbus americana*) phenology as well as phenology of the organisms that rely on the mountain ash—specifically birds and insects. We are looking to answer the question “How are species interactions affected by climate-related changes in phenology?” Collecting data for this project relies heavily on volunteer observations, thus we must consider observer variability in the analysis of the data. In this poster we present the Species Interactions project and methodology—specifically the methodology used to compare variability among observers.

Methods

Volunteers

Connected phenology: Mountain Ash, Bird, Insect interactions

Step 1: Observation site and observation information

Tree ID: _____ Date: _____ Temperature: _____ Time: _____ Your Initials: _____

Step 2: Observe Birds

Count all birds feeding at the Mountain Ash tree for each species listed below record the number of individual birds you see doing the activity

Species	Feeding	Feeding on buds	Feeding on fruit	Feeding on seed
Chickadee	○	○	○	○
American robin	○	○	○	○
Red-eyed vireo	○	○	○	○
Unidentified	○	○	○	○
Other: _____	○	○	○	○

Step 3: Observe the tree

For the Mountain Ash tree in front of you record the range of number of each phenophase you see

Phenophase	Count
Flowers or flower buds	○
Fruit	○
Ripe Fruit	○

Step 4: Observe insects

Count all insects feeding on the Mountain Ash tree for each species listed below record the number of individual insects you see doing the activity

Species	Feeding	Feeding on buds	Feeding on fruit	Feeding on seed
Chickadee	○	○	○	○
American robin	○	○	○	○
Red-eyed vireo	○	○	○	○
Unidentified	○	○	○	○
Other: _____	○	○	○	○

Step 5: Data sheet drop off instructions

Drop off instructions: Drop your completed data sheet in the box below

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Behind the Scenes

- Selecting the sites
 - 3 sites, 3 trees at each site
 - Staff convenience
 - Variability in tree exposure
- Pictures
 - Time-lapse photos
 - Bud/Inflorescence over time
 - Insect/Birds/Plant anomalies
- Data Management
 - Online data entry form
 - Data uploaded to Google Spreadsheet
 - Data can be exported to Excel for analysis
- HOBO



- Temperature logger
- Locations:
 - Rockefeller Front Yard (RFY) 1, 2, 3
 - Commons (COM) 1
 - Gate House (GH) 2

Data

Cohort Participation

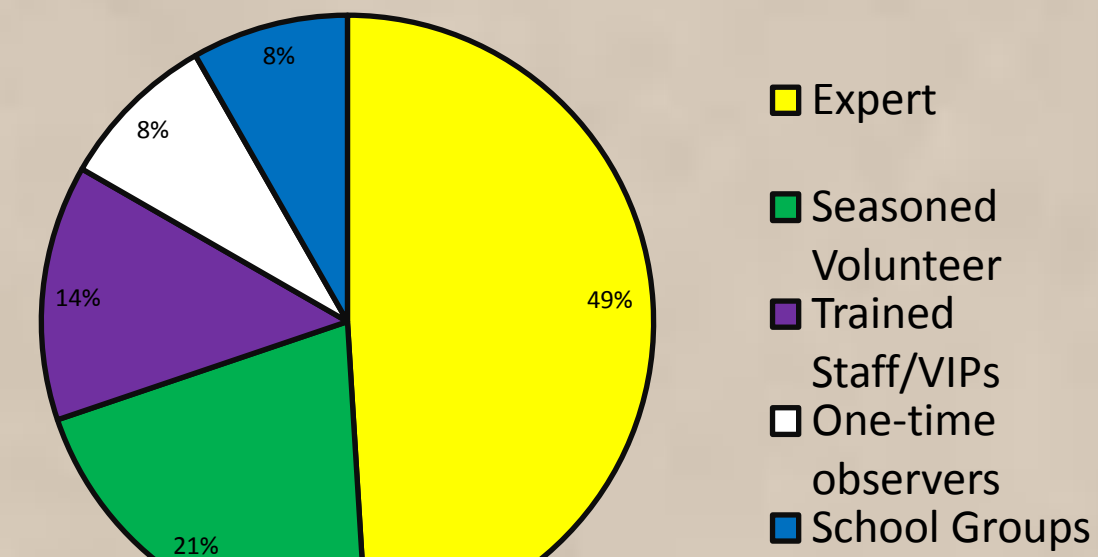


Figure 1. A representation of the total data collected (1126) by the five cohorts at Schoodic Institute and on Mount Desert Island from June 4, 2014 to September 15, 2014.

	RFY 1	COM 1	HQ 1
Breaking Leaf Buds	April 28	April 28	Observations not yet started on MDI
Flowers or Flower Buds	May 21	May 21	June 4 (start of MDI observations)
Open Flowers	June 24	June 24	June 4 (start of MDI observations)
Fruits	July 8	July 8	June 17
Ripe Fruits	August 25	August 29	June 17

Figure 2. 2014 growing season from March to September for RFY 1, COM 1, and Headquarters (HQ) 1

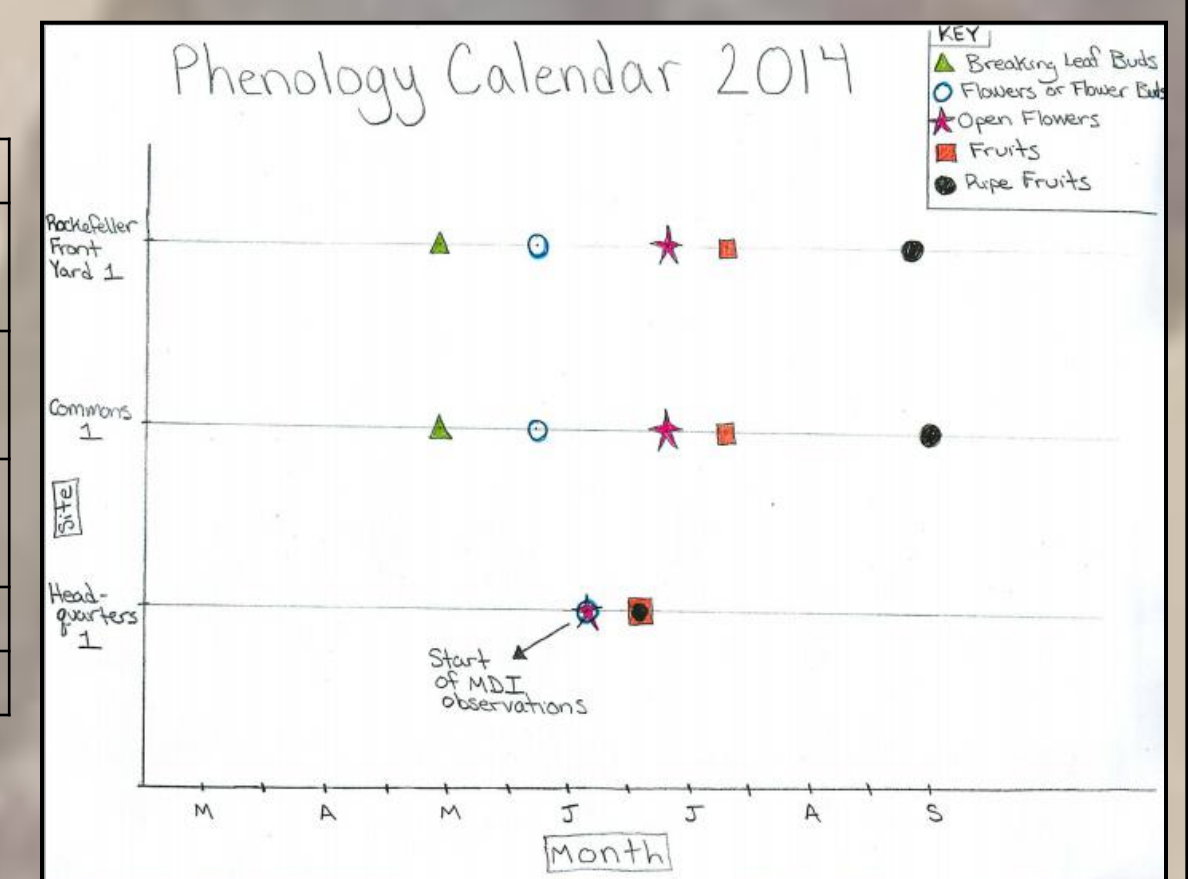


Fig 3-6. Insects (left to right) GH 1 (AP), COM 1 (AP), COM 2 (KO), GH 2 (AP)

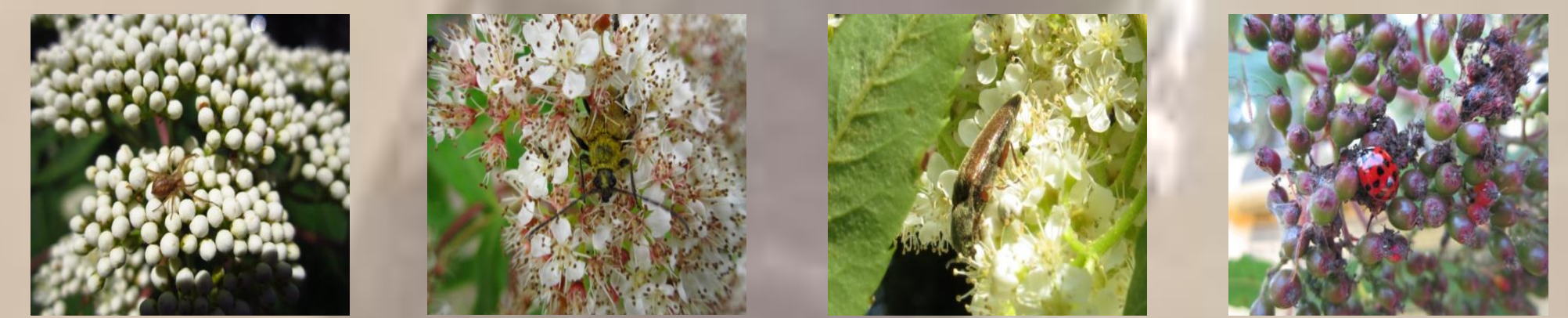


Fig 7-10. Plant Gate House 1 inflorescence over time (AP/IC)



Fig 11-14. Bird (left to right) COM 1, COM 2, COM 2, COM 2 (KL)

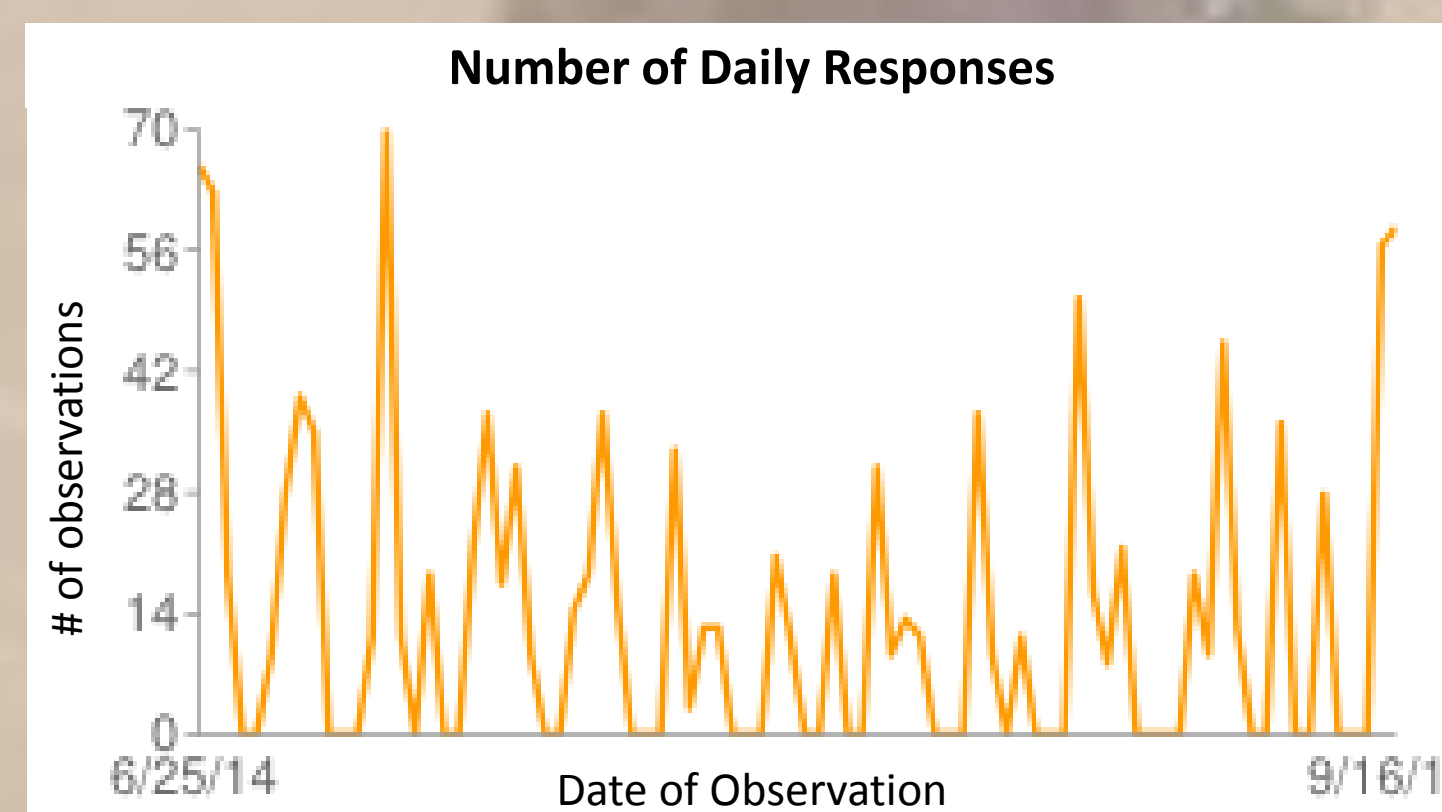
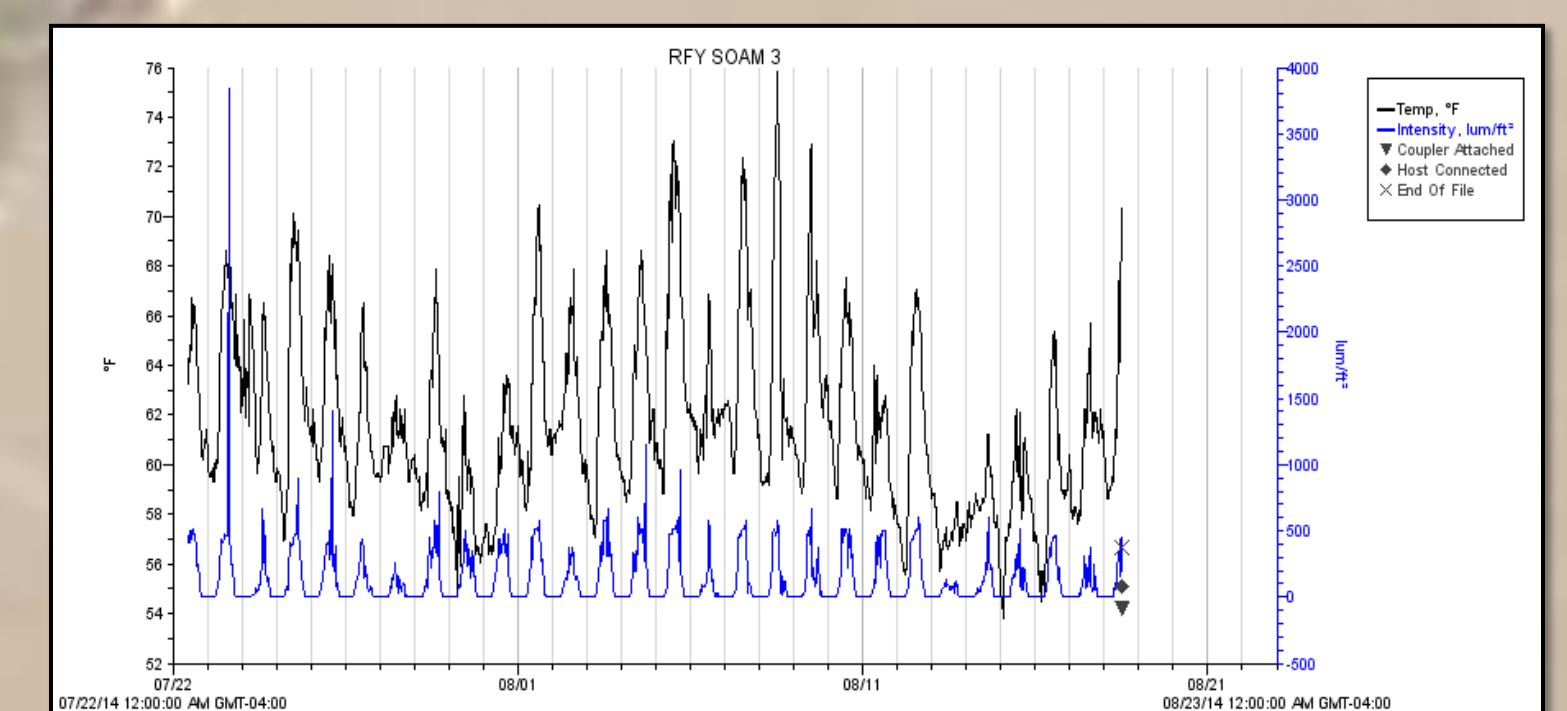


Figure 15. The total number of daily responses done by the five different cohorts

Figure 16. The temperature and light intensity data collection from the HOBO RFY_SOAM_3. From July 22, 2014 to August 18, 2014



Discussion

- Number/Consistency of observations (Fig. 15)
 - We would like a minimum on number of observations
 - Mini-Blitz's: Many observers performing observations on same day/same tree (better for observer comparison purposes)
- Filling out the data sheet properly
 - Insect section
 - Alterations to be made in future

Acknowledgments

Support for this project comes from Schoodic Institute, Friends of Acadia, National Park Service, National Phenology Network, and University of Massachusetts. We also appreciate the contributions of 100 plus volunteers.

- Cohorts of volunteers
 - Experts
 - Staff and VIPs
 - Seasoned Volunteers
 - School Groups
 - One-Time Observers
- Training
 - 1 hour session led by experts
 - Detailed instructions on back of data form
- Drop Box
 - Where volunteers can drop off forms
 - Regularly checked by phenology technicians



•Signage in Trees

