



Harvard LTER Schoolyard Program

Teacher Developed Lessons and Documents that integrate
Harvard Forest Schoolyard Ecology Themes into curriculum.

- Lesson Title: *Phenology and Student Scientists*
- Teacher/Author: Katherine Bennett
- School: J.R. Briggs Elementary School,
Ashburnham
- Level: Grade 5
- Date: August, 2011

Phenology and Student Scientists



Katherine Bennett

JR Briggs Elementary School
Ashburnham- Westminster
Regional School District



Phenology is the study of recurring lifecycle events influenced by seasonal environmental changes, and classic examples include flowering by plants and migration by animals.

Citizen / Student Science

Learn

Project FeederWatch

Embrace the winter. Count feeder birds for science!

Participate

**Cray
watch**



FIREFLY WATCH



Appreciate

BE A BEETLE BUSTER

Understand



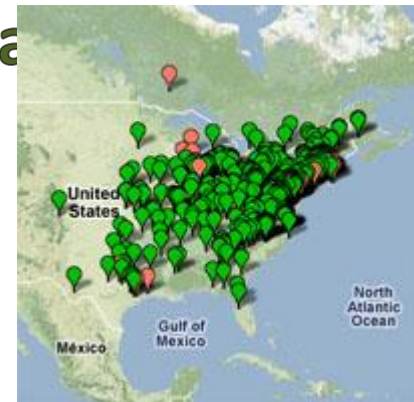
Students Meaningful Interactive



A Scientific community



Share areas



A Valuable Partnership - Bringing the Harvard Forest into the Schoolyard

Buds, Leaves, and Global Warming Dr. John O'Keefe

How long is the
growing season in our
schoolyard?
How is the length of
the season related to
climate?



Woolly Bully : Hemlock Trees and the Invasive Species, The Hemlock Woolly Adelgid

Dr. David Orwig

Will the Hemlock Woolly Adelgid destroy our
hemlock trees forever?
How will our forest change if the hemlock
disappears?



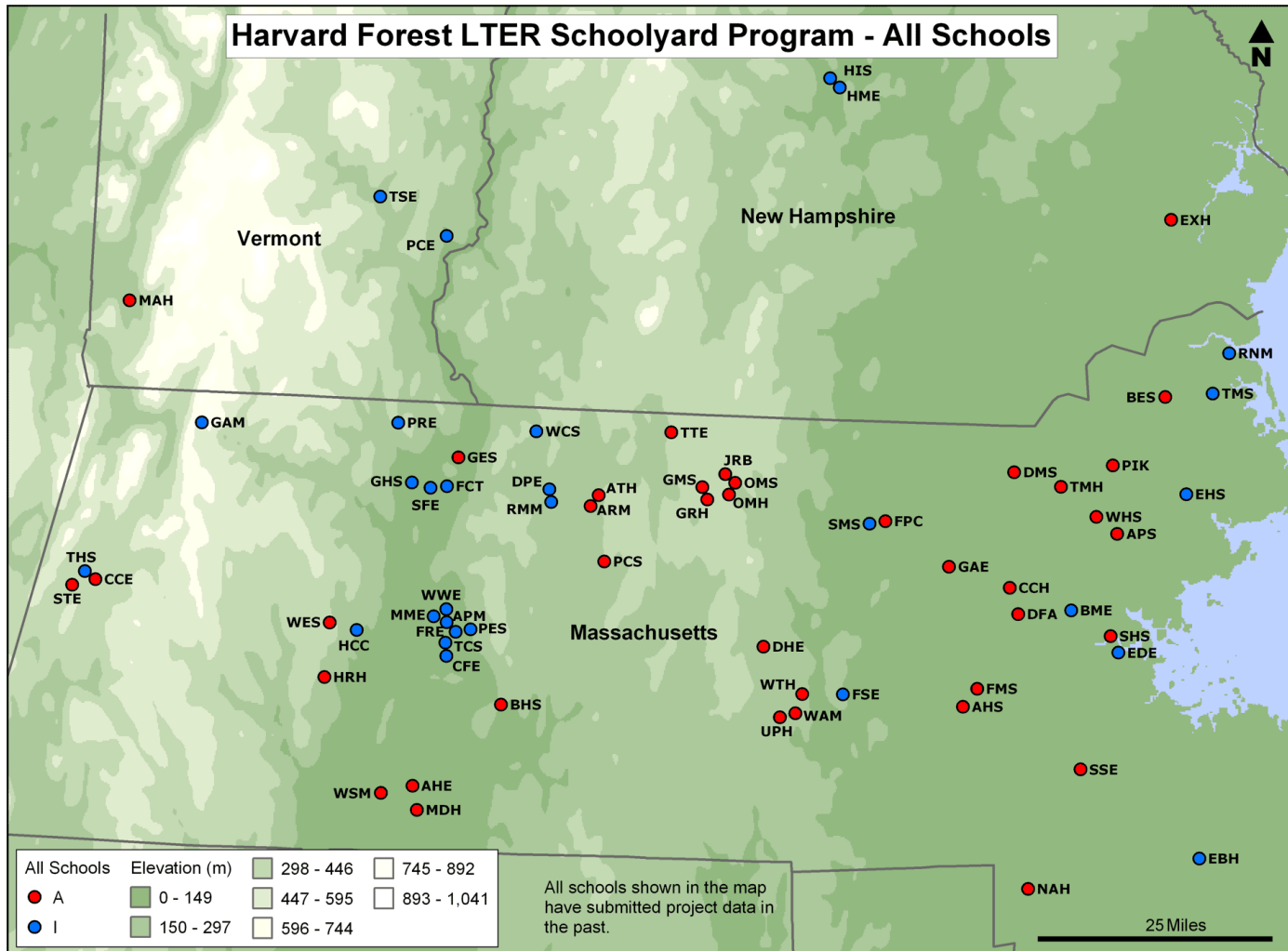
Water in the Landscape: Vernal Pools and Streams Dr. Betsy Colburn

What seasonal changes take
place in vernal pools and
streams?
What do these changes tell
us?

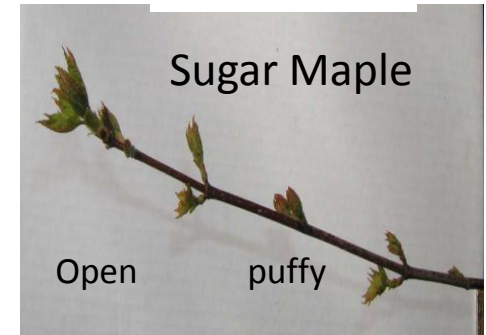
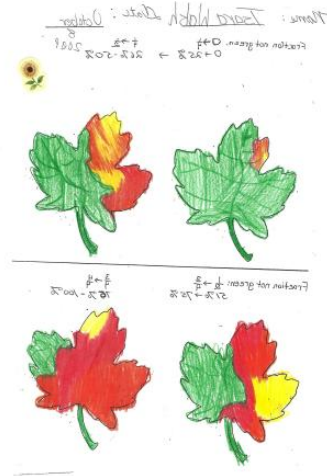


Pam Snow
Schoolyard
Coordinator

Harvard Forest LTER Schoolyard Program - All Schools



Is our growing season changing in relation to climate change?



Harvard Forest LTER Schoolyard Program
Book, Leaves and Global Warming

Student Data Sheet - Spring
Amount of leaves in the canopy

Name: _____ Date: _____
Tree Species: _____ Branch ID: _____

1. Put a check mark in the correct column below to show the shape of each bud.

	Ball	Ball	Ball	Ball	Ball
Closed: Ball is closed and tight.					
Part: Ball is visible or opening slightly.					
Open: Ball is open and fully visible.					

2. How many buds were observed in all? Of them, how many were Closed? Part? Open?

3. Look for the open bud with the largest ball. Measure the ball length to centimeters.

4. Field notes:
Temperature (degrees Celsius): _____
Humidity (%): _____
Cloud cover: _____
Other observations and notes: _____

Teacher Note: Please combine data from all branches on the same tree to create one data set for submission to Harvard Forest.



Harvard Forest Schoolyard Program
Book, Leaves, and Global Warming

Autumn Student Data Sheet
December 2007

Name: _____ Date: _____
Teacher: _____ School: _____

Tree Number: _____ Branch letter: _____ Please observe leaves only once a beginning of season.

Tree Species:	Leaf 1	Leaf 2	Leaf 3	Leaf 4	Leaf 5	Leaf 6
Leaf Length (cm):						
Leaf Width (cm):						

Put a check mark in the correct column below to show Leaf Color and Leaf Drop

Leaf #	Fraction Percent of Leaf Color (most green)	Leaf Drop
1-25	100% Green	1-25
26-50	75% Green	26-50
51-75	50% Green	51-75
76-100	25% Green	76-100
101-125	0% Green	101-125
126-150	0% Green	126-150
151-175	0% Green	151-175
176-200	0% Green	176-200
201-225	0% Green	201-225
226-250	0% Green	226-250
251-275	0% Green	251-275
276-300	0% Green	276-300
301-325	0% Green	301-325
326-350	0% Green	326-350
351-375	0% Green	351-375
376-400	0% Green	376-400
401-425	0% Green	401-425
426-450	0% Green	426-450
451-475	0% Green	451-475
476-500	0% Green	476-500
501-525	0% Green	501-525
526-550	0% Green	526-550
551-575	0% Green	551-575
576-600	0% Green	576-600
601-625	0% Green	601-625
626-650	0% Green	626-650
651-675	0% Green	651-675
676-700	0% Green	676-700
701-725	0% Green	701-725
726-750	0% Green	726-750
751-775	0% Green	751-775
776-800	0% Green	776-800
801-825	0% Green	801-825
826-850	0% Green	826-850
851-875	0% Green	851-875
876-900	0% Green	876-900
901-925	0% Green	901-925
926-950	0% Green	926-950
951-975	0% Green	951-975
976-1000	0% Green	976-1000

Total number of study leaves observed per branch _____
Total number of leaves fallen _____

Teacher note: Remember that the branch total above must be added with branch totals from all branches on the same tree to get the total number of leaves dropped per tree to submit to Harvard Forest to post online.

Optional Field Notes: _____
Weather Notes: _____
Animal Plant notes: _____

Harvard LTER Schoolyard Program

http://harvardforest.fas.harvard.edu/museum/data/sy001/sy001.html

sy001f-jrb (Read-Only) - v

	A	B	C	D	E	F	G	H	I
	School	Teacher	Date	Julian	TreedID	Species	Ltotal	Lfallen	Tcolor
1	JRB	Bennett	9/22/2008	266	21 RO		4	0	1
2	JRB	Bennett	9/22/2008	266	22 RO		4	0	1
3	JRB	Bennett	9/22/2008	266	23 BB		12	0	1
4	JRB	Bennett	9/22/2008	266	24 TA		11	1	1
5	JRB	Bennett	9/22/2008	266	25 GB		9	1	1
6	JRB	Bennett	9/22/2008	266	26 RM		12	0	1
7	JRB	Bennett	9/29/2008	273	21 RO		4	0	1
8	JRB	Bennett	9/29/2008	273	22 RO		4	0	2
9	JRB	Bennett	9/29/2008	273	23 BB		12	0	1
10	JRB	Bennett	9/29/2008	273	24 TA		11	1	1
11	JRB	Bennett	9/29/2008	273	25 GB		9	1	1
12	JRB	Bennett	9/29/2008	273	26 RM		12	0	1
13	JRB	Bennett	10/6/2008	280	21 RO		4	0	3
14	JRB	Bennett	10/6/2008	280	22 RO		4	0	4
15	JRB	Bennett	10/6/2008	280	23 BB		12	2	1
16	JRB	Bennett	10/6/2008	280	24 TA		11	2	2
17	JRB	Bennett	10/6/2008	280	25 GB		9	1	2
18	JRB	Bennett	10/6/2008	280	26 RM		12	0	2

Ready

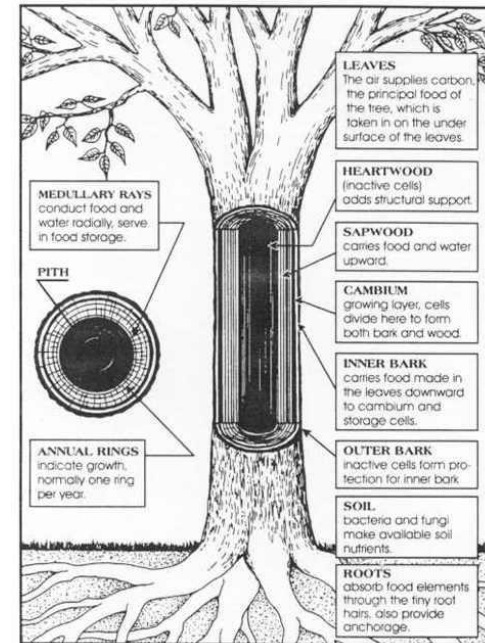
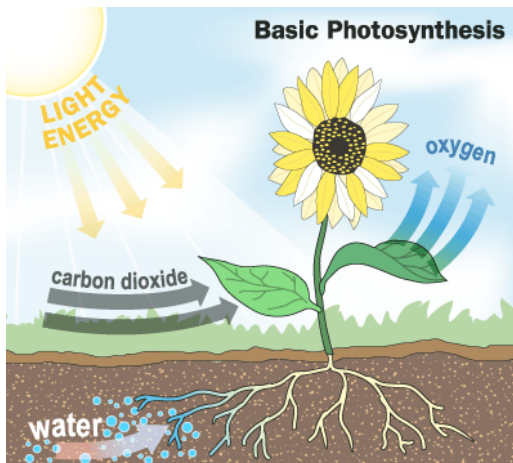
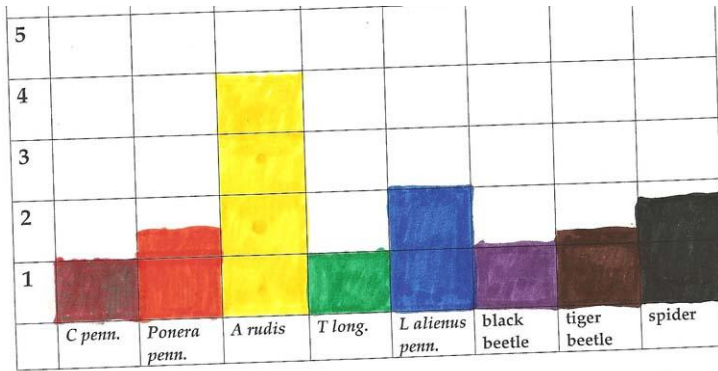


DIAGRAM SHOWING FUNCTIONS OF DIFFERENT PARTS OF A TREE.
Courtesy of the *New Tree Experts Manual* by Richard R. Penska



What other natural events are linked to phenolgy?



Ant Sampling Probability Lesson



Measuring, averaging, and graphing snow depths on the nature trail



Graphing Plot Inventories



Measuring DBH



Ants

Ants Ants Ants
 They live beneath the plants
 They live in large colonies
 In many countries
 They have a thorax, abdomen, and head
 Some are black and some are red
 They communicate
 At a great rate

In a little ant egg is an embryo
 That will soon grow
 The maxillae do the chopping
 While the little legs do their walking
 That's all I have to say
 So goodbye for today

