Hydrology and Phenology Studies at Mass Audubon's Drumlin Farm Wildlife Sanctuary

The Development of the Ecological Monitoring Program at Drumlin Farm

Sally Farrow and Erin Pitkin
MassAudubon's Drumlin Farm Wildlife Sanctuary
Natural History Conference March 24, 2016
Harvard Forest Workshop
March 31, 2016
Sue Beede

Topics

1. Why study hydrology and phenology.
2. Update of the hydrology and phenology program at Drumlin Farm
3. Questions and Challenges
4. Science and Engineering practices
5. Climate Change, the water cycle and the importance of wetland biodiversity
6. The Development of protocols for people of all abilities

Yellow Spotted Salamander and Wood Frog ODPVP March 2016

Yellow spotted salamander

Wood frog eggs

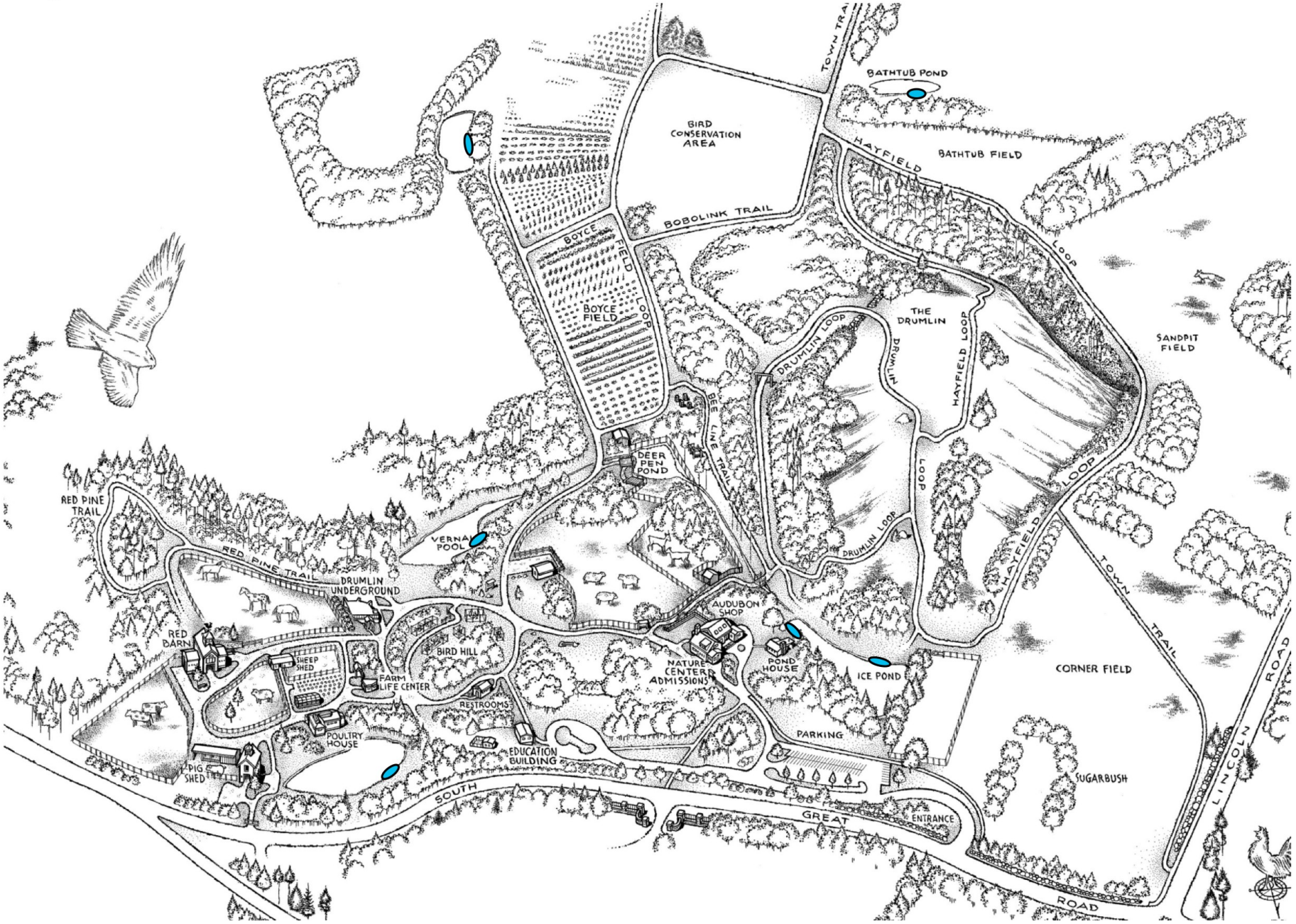
Blue Spotted Salamander and Fairy Shrimp Drumlin Farm

Blue spotted salamander Ed Center Lawn

Fairy shrimp ODPVP

Harvard Forest Long Term Ecological Research Project

Ponding Sites



Drumlin’s Ponding Ponds

Ice Pond

Poultry Pond

More Drumlin Ponds

Bathtub Pond

Preschool Pond

Drumlin’s Vernal Pools

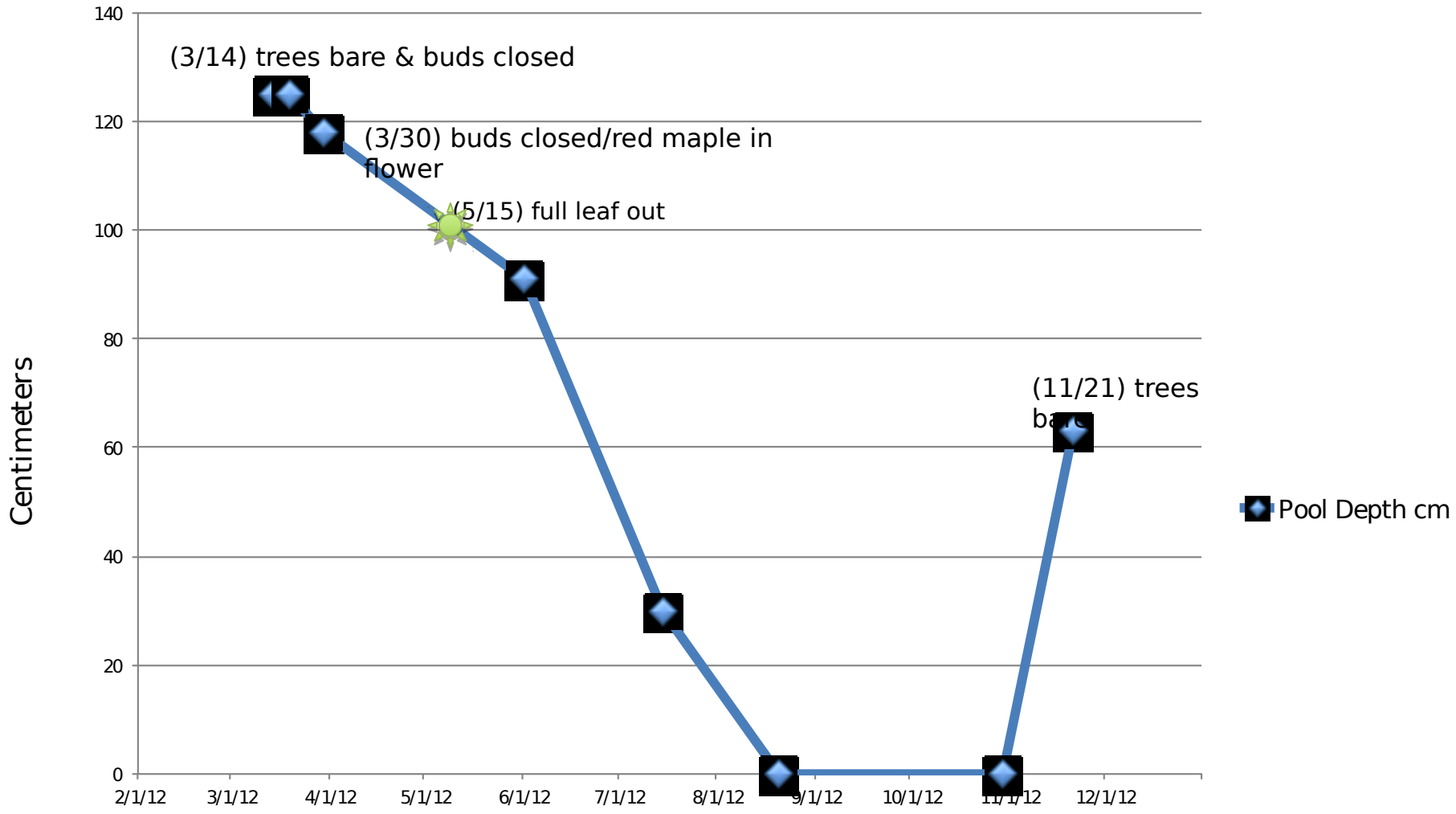
Old Deer Pen Vernal Pool

Boyce “Pond” (a true vernal pool)

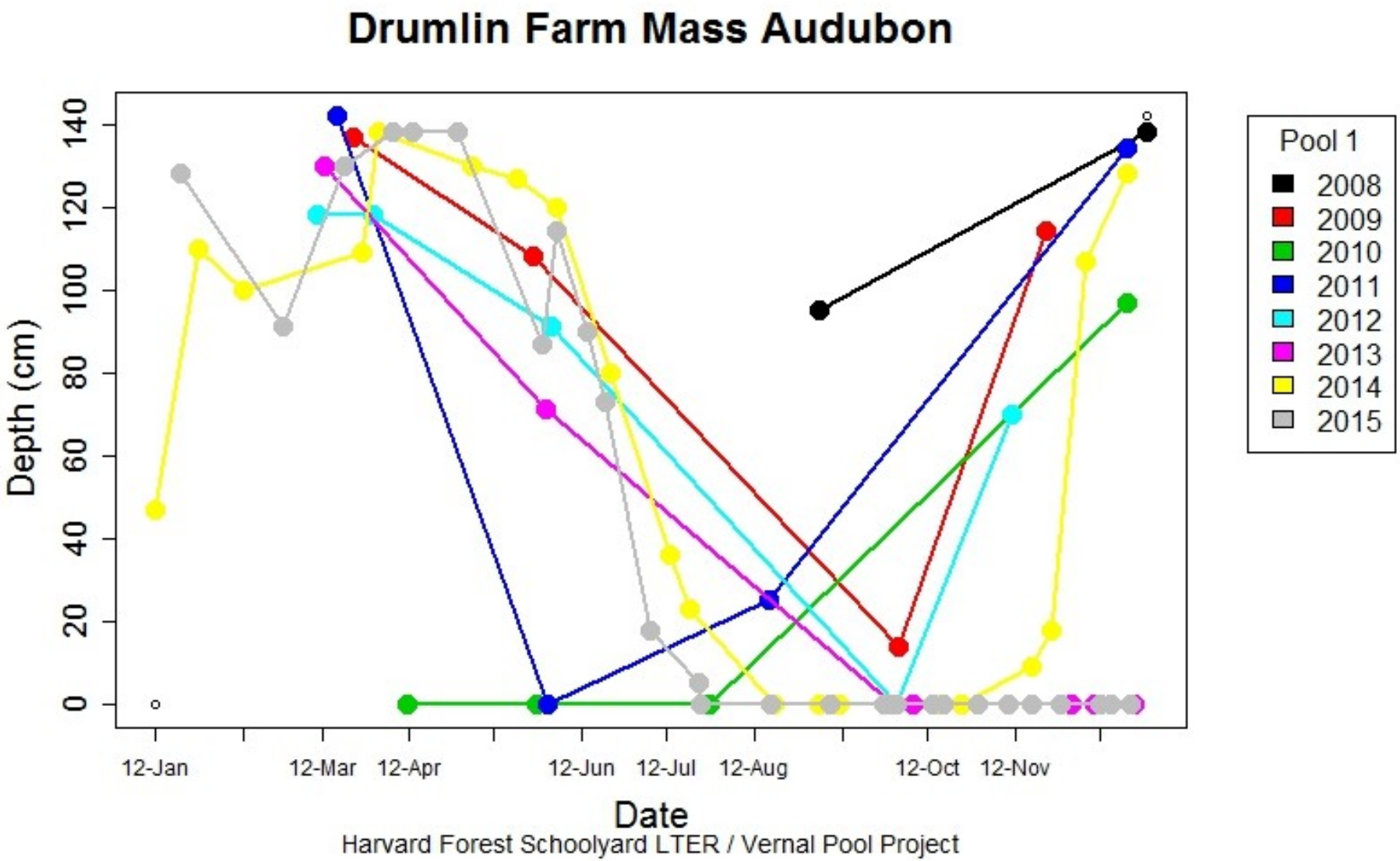
Drumlin’s Vernal Pools

Shopping Cart Vernal Pool

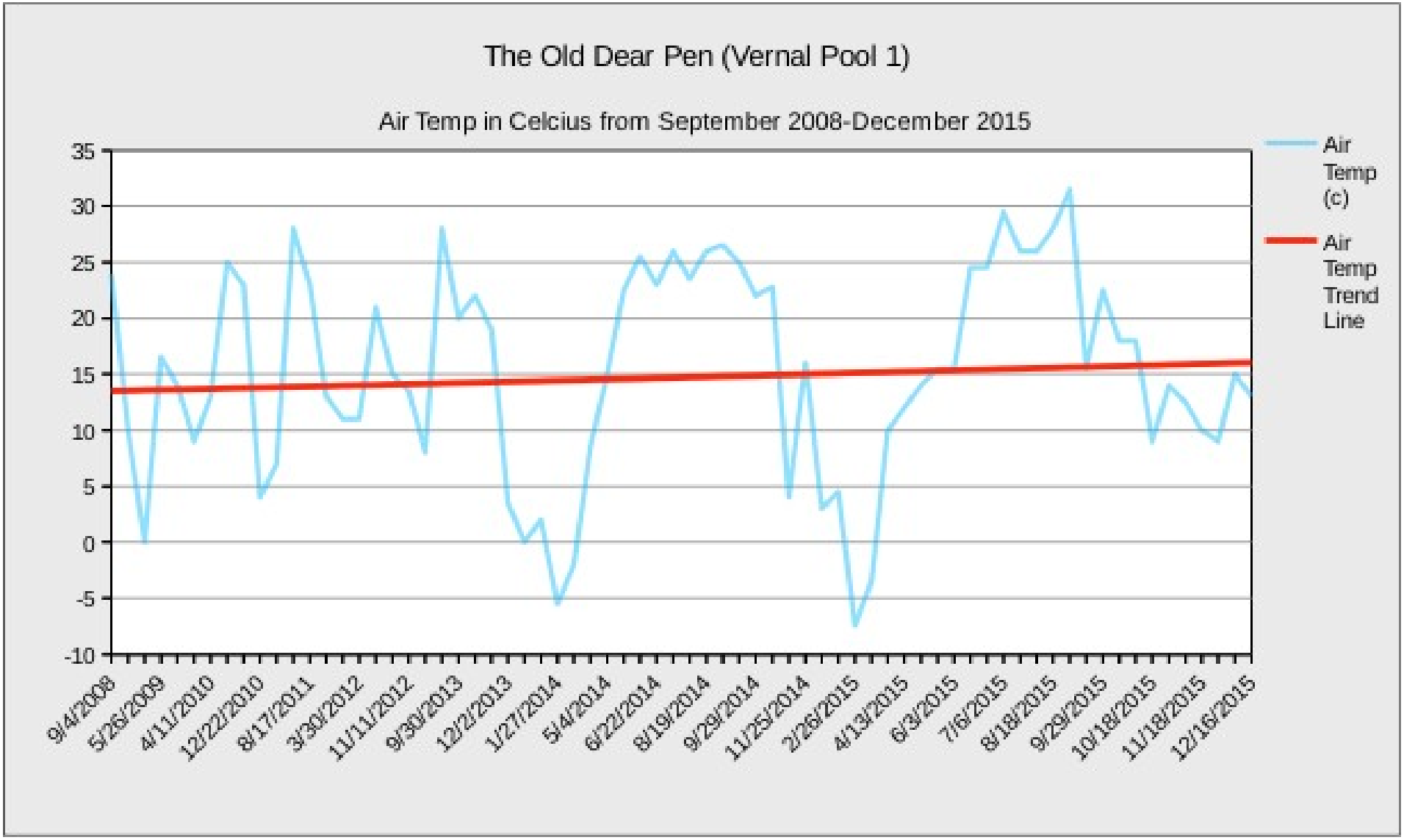
Old Deer Pen Vernal Pool Depth - 2012



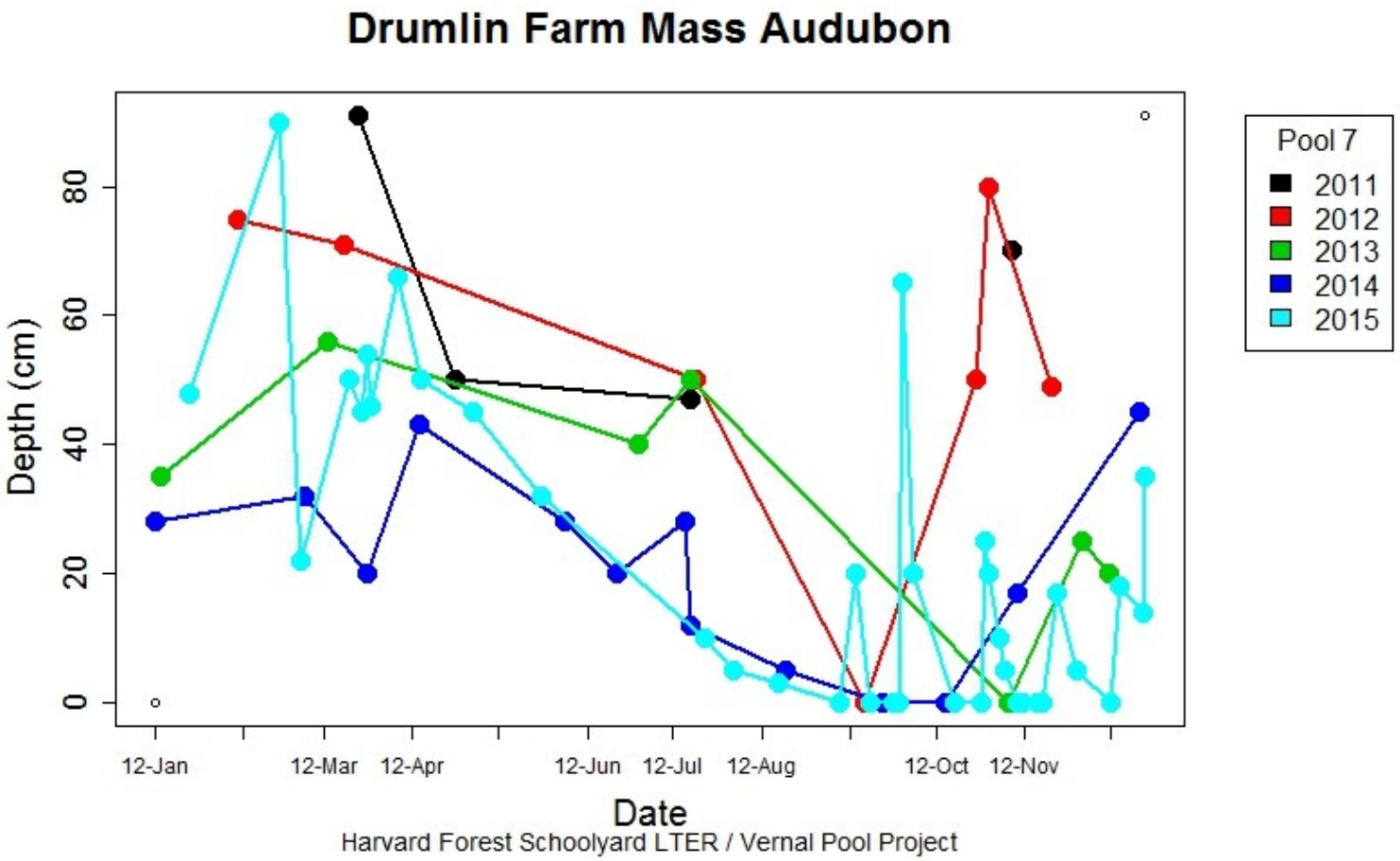
Old Deer Pen Vernal Pool Water Depth 2008-



Old Deer Pen Vernal Pool



Preschool Pond Depth 2011-2015



Sugar Maple at Drumlin Farm

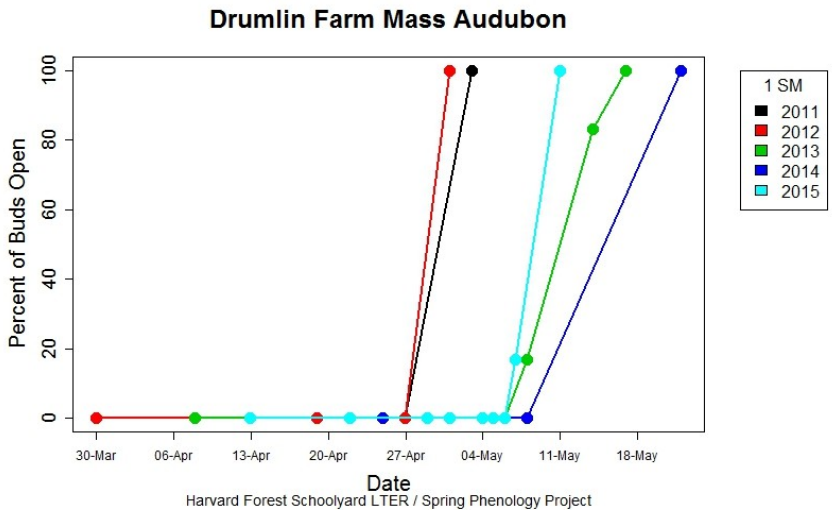
Bud Burst

Fall Leaf Drop

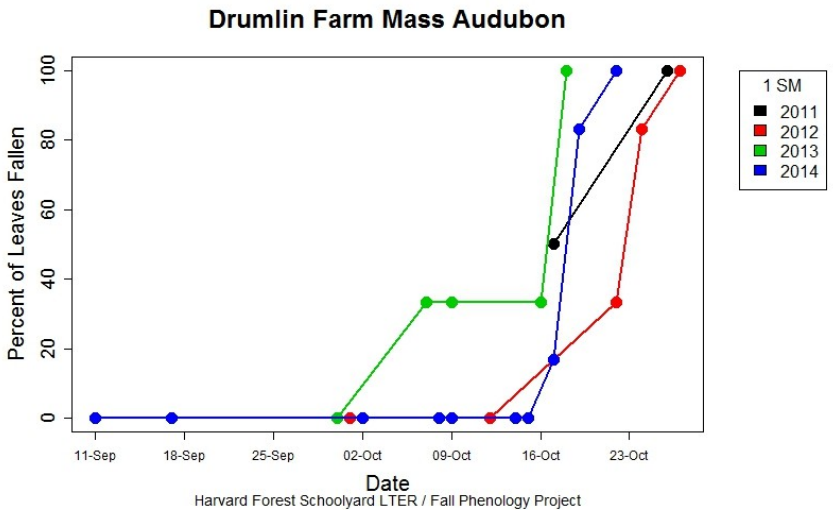
Bud Burst Sugar Maple Drumlin Farm Spring 2015

Bud Burst and Leaf Drop Sugar Maple Drumlin Farm

Bud Burst



Leaf Drop



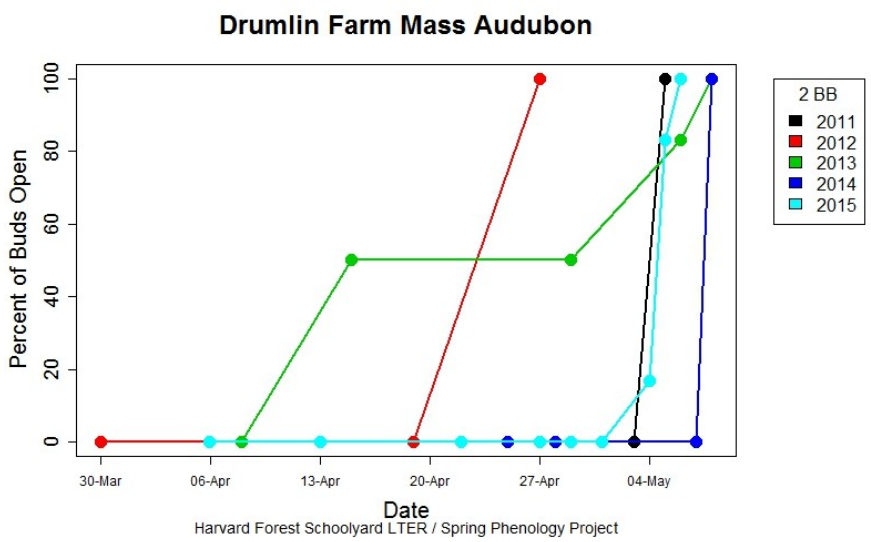
Black Birch Drumlin Farm

Bud burst 2015

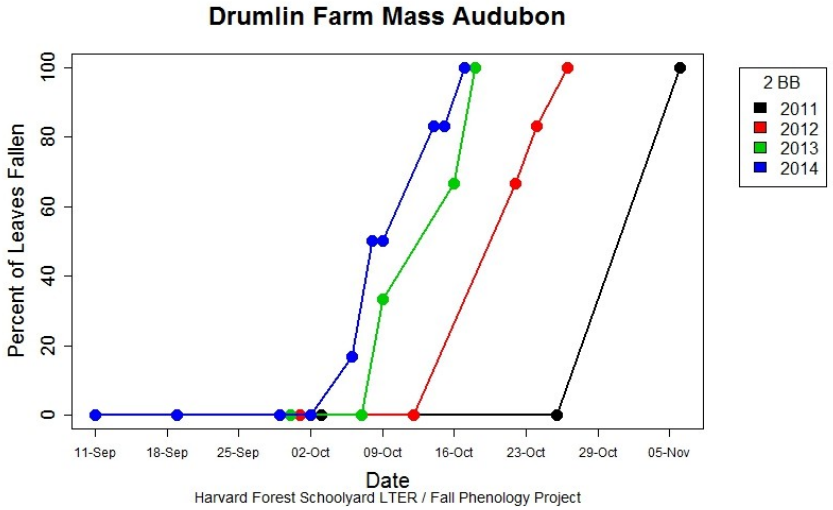
Fall Leaf Drop

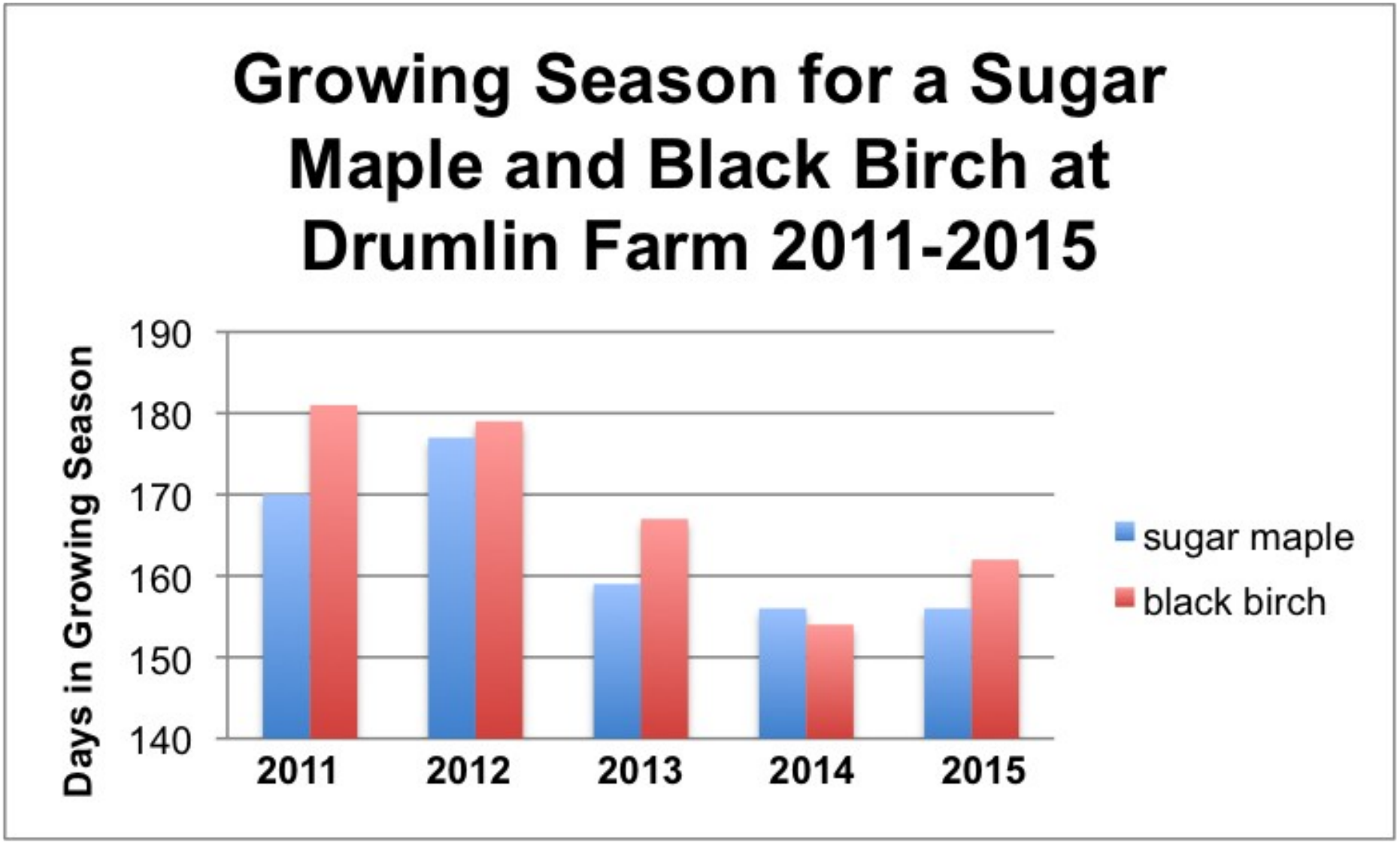
Bud Burst and Leaf Drop
Black Birch Drumlin Farm

Spring Bud Burst



Fall Leaf Drop




Growing Season for a Sugar Maple and Black Birch at Drumlin Farm 2011-2015
Days in Growing Season
190
180
170
160
150
140
2011
2012
2013
2014
2015
sugar maple
black birch

Collection of pond data at Drumlin Farm

Students observe, measure and record:

- air and water temperatures
- weather and leaf cover
- pond depth using marked poles
- name & number of macroinvertebrates

Pond_____ Date_____ TN_____

Air Temp _____ Water Temp _____ Pole Depth _____

School / Class _____

Circle appropriate responses below.

Cloud cover:

Sunny / Partly sunny / Cloudy / Scattered showers / Raining

Tree Canopy:

Open (no trees near pond) / Partial coverage (some trees near pond) / Completely covered (trees overhang completely)

Leaf Cover:

Closed buds / Open buds / Open flowers / Partial leaf out / Full Leaves open

Bottom Substrate (can circle more than one)**:**

Sand or gravel / Whole leaves / Decayed leaf bits / Mud / Silt

Notes / Questions

_____

_____

_____

_____

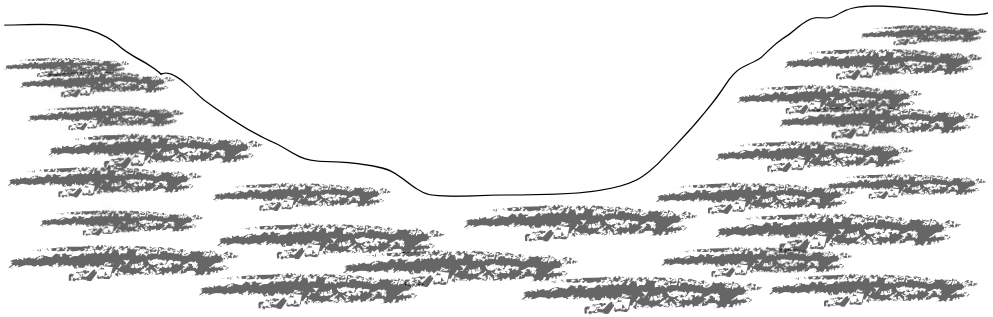
_____

_____

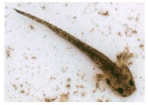
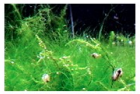
_____

_____

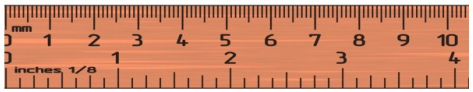
Pond Profile



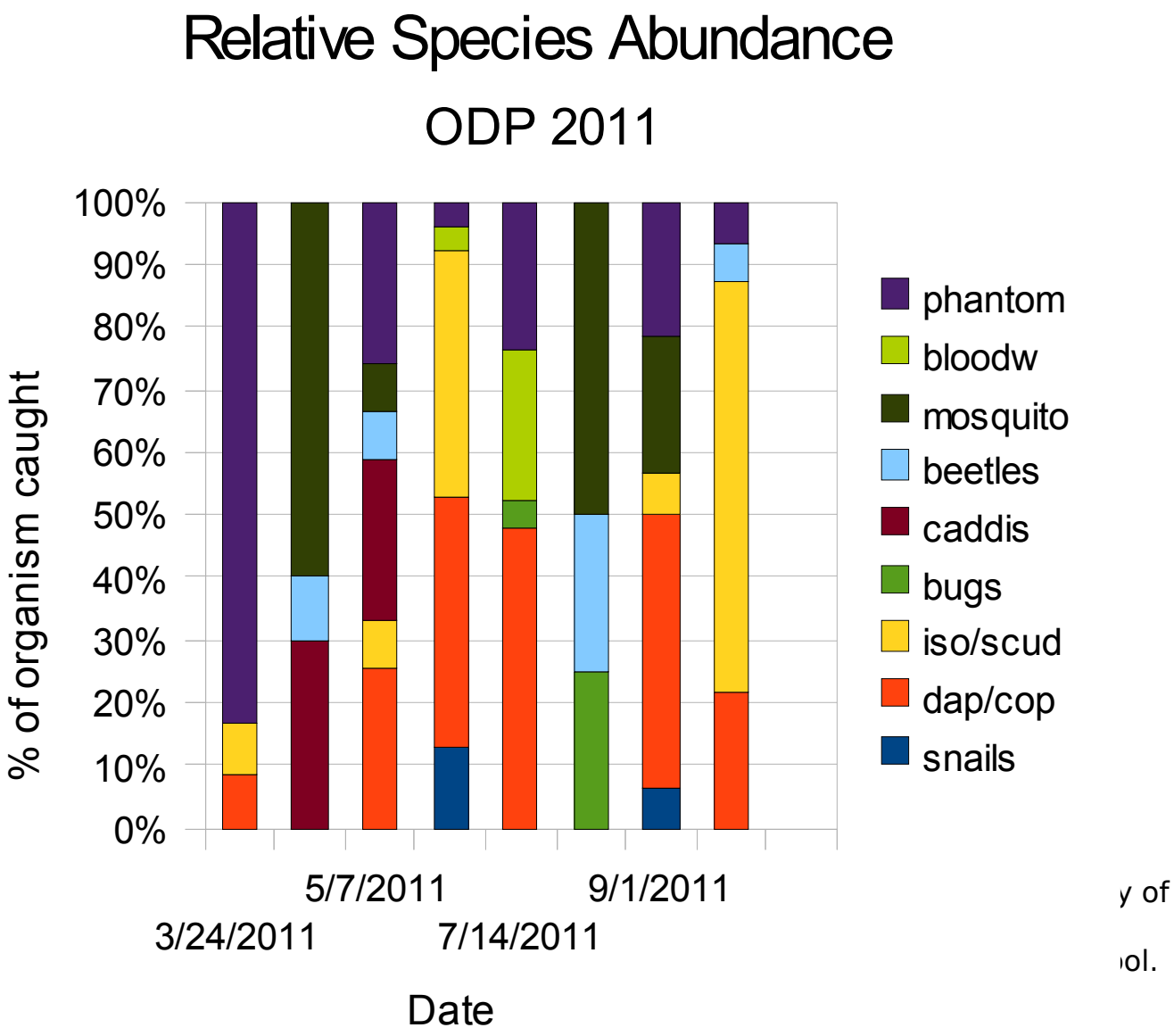
Data key: 1-4 = few, 5-15 = some, >15 = many

Organism	Comments	Organism	Comments	Organism	Comments	Organism	Comments
Leech – up to 2" 		Dragonfly nymph – up to 2" 		Caddisfly larva – 0.5-1.5" 		Polliwog 	
Snails – 0.5-1" 		Damselfly nymph – up to 1.5" 		Predaceous diving beetle  0.5-1.5" 0.5-1"		Salamander – 3-8" 	
Daphnia – 0.1" 		Water boatman –<1" 		Mosquito larva – 0.5" 		Salamander polliwog 	
Copepod – 0.1" 		Backswimmer –<1" 		Bloodworm –<0.5" 		Turtle – varies; 3-20" 	
Water pill bug –Isopod up to 1" 		Water strider – 1" 		Phantom midge – 0.5" 		Algae 	
Scud – Amphipod 0.5" 		Water scorpion – 3" 		Frog – varies; 1-8" 		Duckweed 	

Comment suggestions: unusual numbers – high or low; size; where found in the pond; unusual color or structure; life stage, etc



Old Deer Pen Vernal Pool 2011



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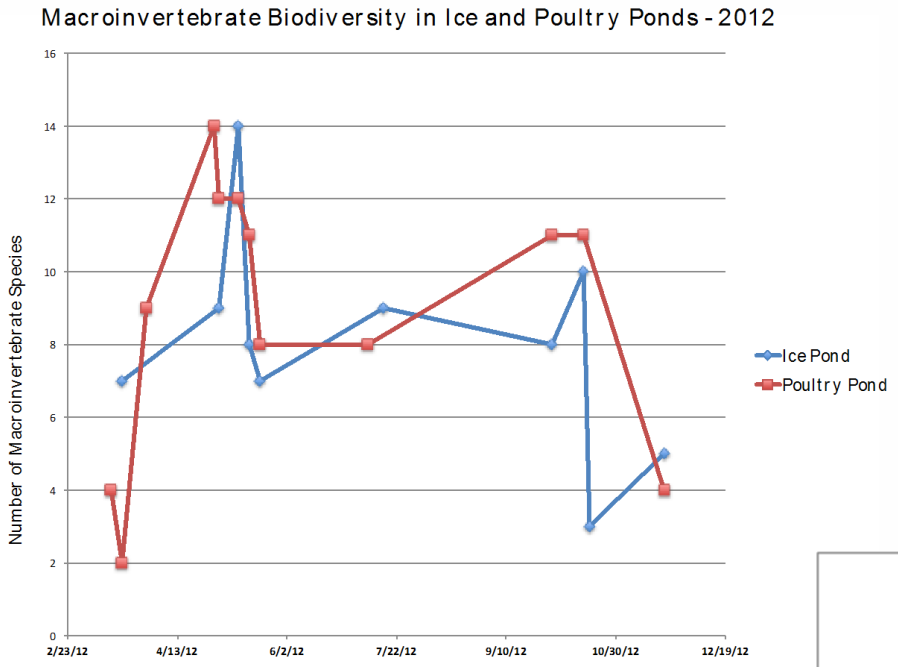
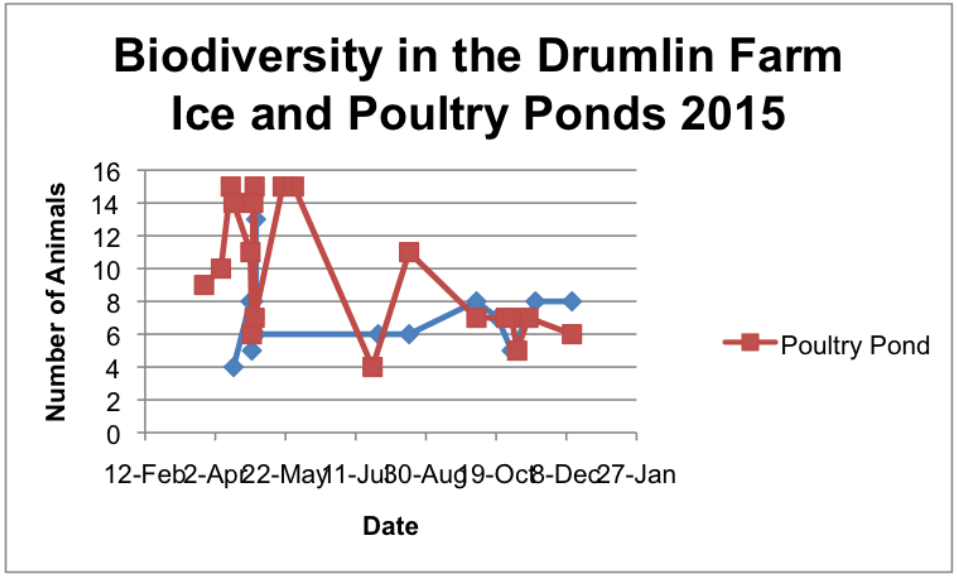
Biodiversity of Drumlin Farm Ponds





CCHS Pathways Students at Deer Pen Pond

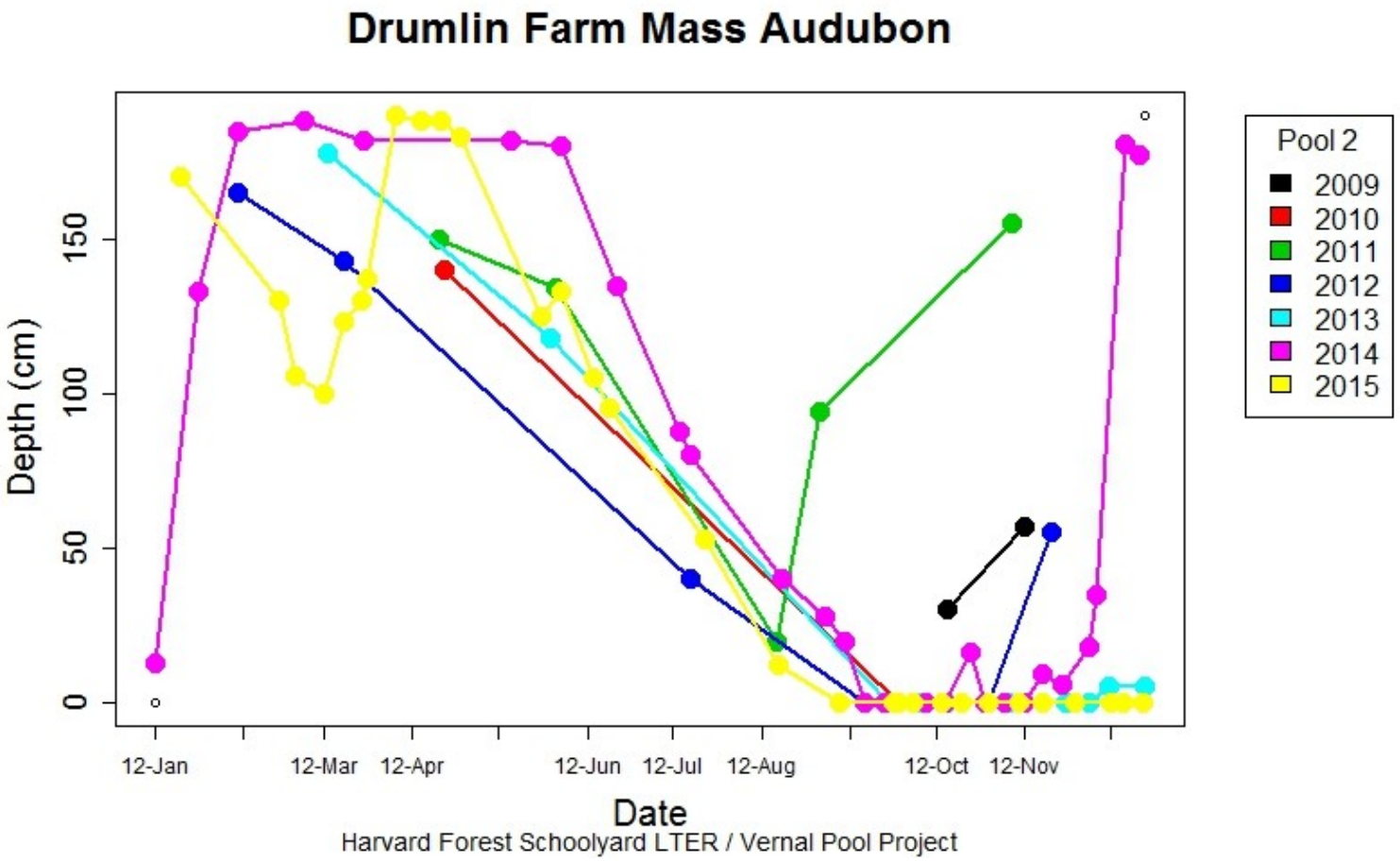
CCHS Pathways Students checking for Bud Burst 2015

CCHS Pathways Students monitoring Boyce Pond

CCHS Students

Boyce Pond

Boyce Pond Water Depth 2009-2015

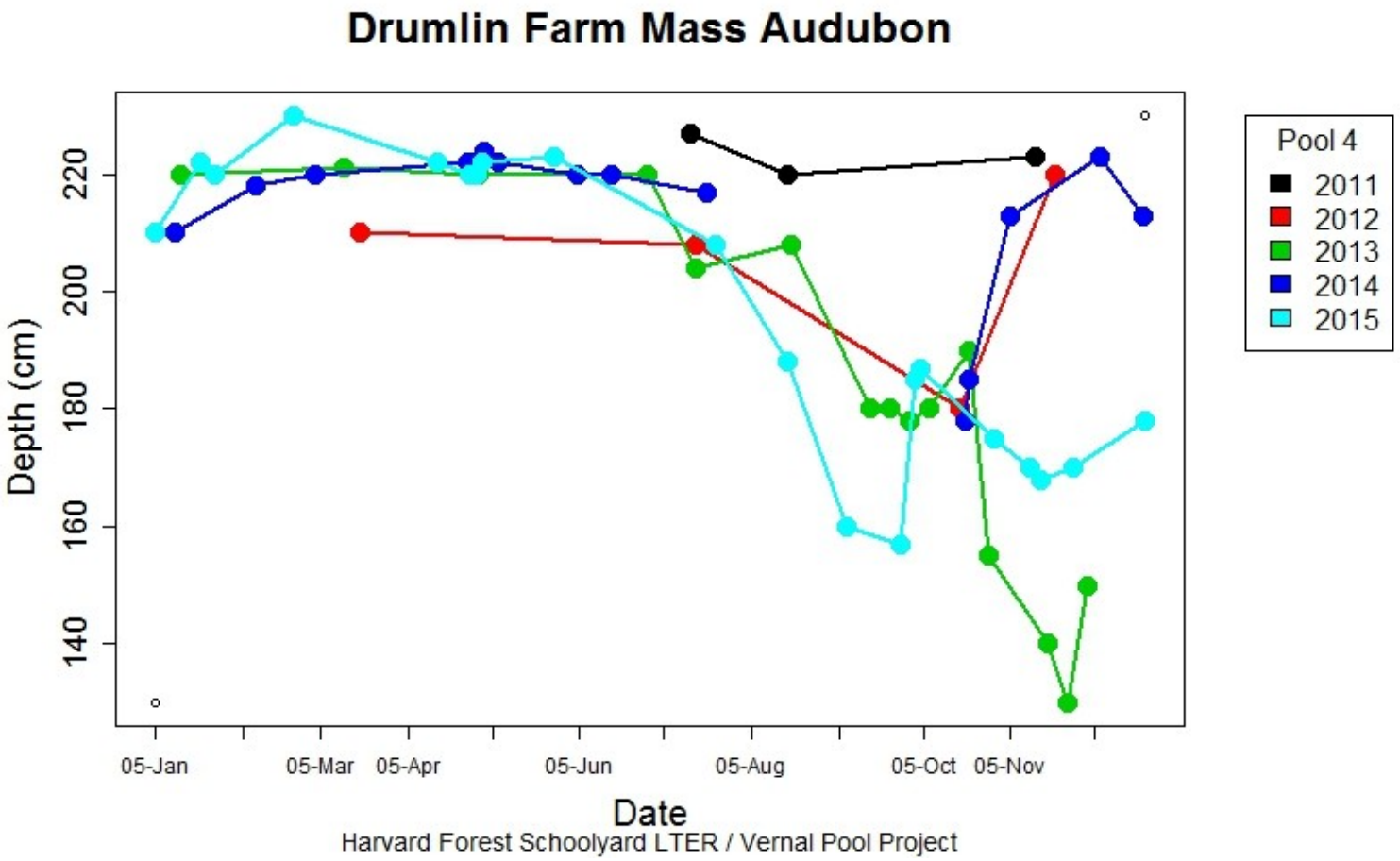


ABODP Students Monitoring Ice Pond Drumlin Farm 2016

ABODP Students

Ice Pond

Ice Pond Water Depth 2011-2015



COTTING SCHOOL
1893
Schola Spei
A not-for-profit Massachusetts Corporation

HMEA
REACH OUT FOR INDEPENDENCE

LEAF
Leaders in Environmental Access For All
at Drumlin Farm Wildlife Sanctuary
Mass Audubon

LINCOLN-SUDBURY REGIONAL SCHOOL DISTRICT
L
S
WADSWORTH
1954

ACTON-BOXBOROUGH
AB
REGIONAL HIGH SCHOOL

Vocational Internships and Eco-Monitoring Over View

Project Manager
- Equipment Management
- Daily Task Over- site

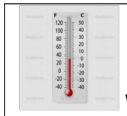
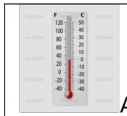
Hydrologist
- Water Temperature
- Pole Depth

Phenologist
- Bud Count
- Tree Canopy Assessment

Meteorologist
- Air Temperature
- Weather Assessment

ECO-MONITORING VISUAL GUIDES

EQUIPMENT CHECK IN/OUT SHEET

Equipment	Check Out	Check In
 Clip Boards		
 Data Sheets		
 Water Thermometer		
 Air Thermometer		
 Binoculars		

DAILY TASK CHECK LIST

Daily Tasks	Check Off
 Water Temperature	
 Air Temperature	
 Pole Depth	
 Weather	
 Tree Canopy	
 Leaf Cover	
 Bud Count	

ECO-MONITORING VISUAL GUIDES

FIELD NOTES

Daily Field Notes

Date: Pond:

Initials:

Please Check All that Apply

CLOUD COVER/ WEATHER:


Sunny


Partly Cloudy


Cloudy


Rain


Snow

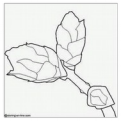
TREE CANOPY OVER POND:


Open
(no trees)


Partial Coverage
(some trees)


Completely Covered
(trees overhanging)

LEAF COVER:


Closed Buds


Open Buds


Open Flowers

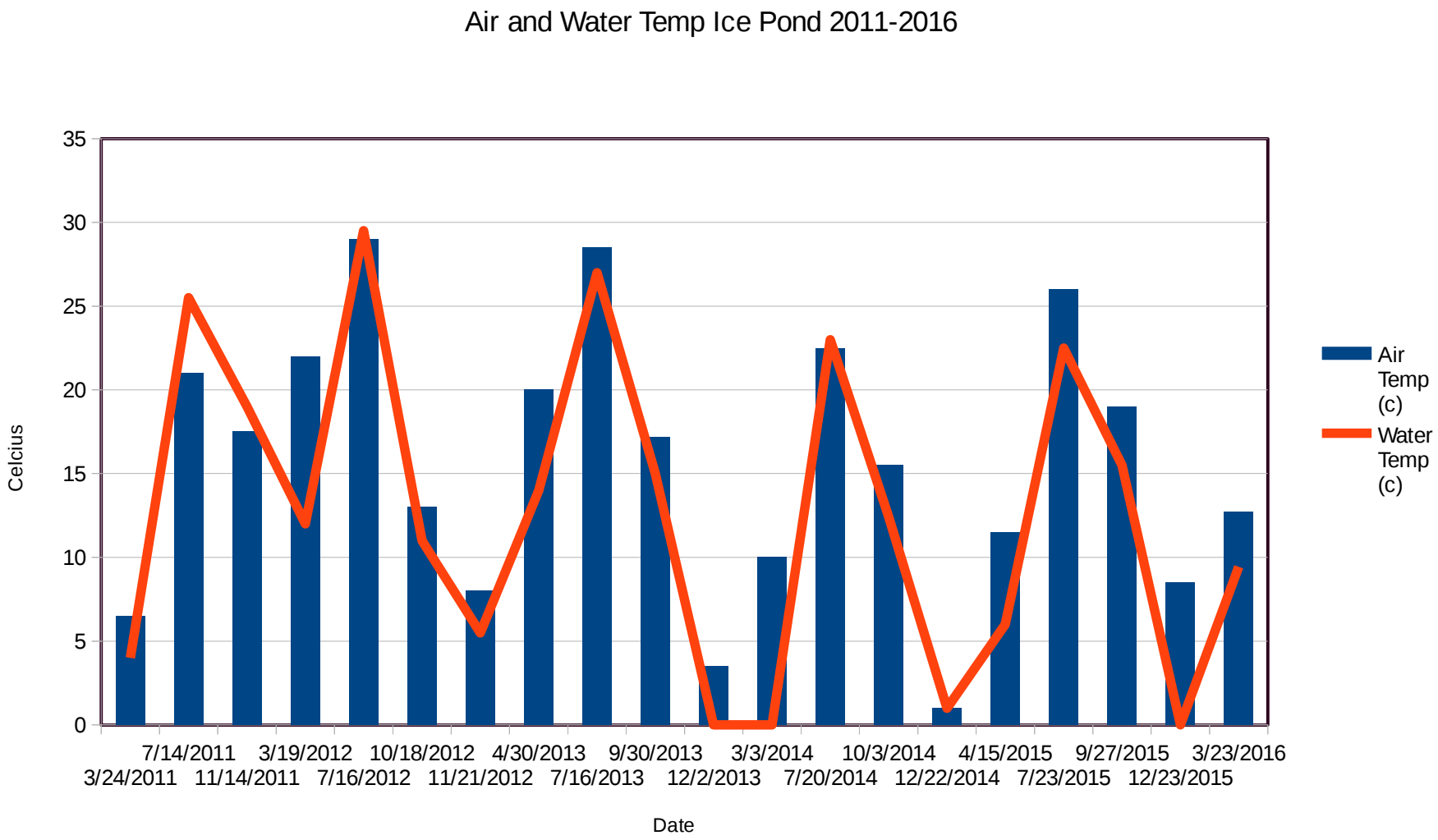

Partial Leaf Out


Full Leaves Out

COMPILED DATA SHEET

Date/Time	Air Temp (C)	Water Temp (C)	Pole Depth (cm)	Cloud Cover	Tree Canopy	Leaf Cover	#of Leaves	#of Buds

Simplifying Data



The End