HARVARD FOREST
Established 1907 Long Term Ecological Research Site since 1988

HARVARD UNIVERSITY

# Harvard LTER Schoolyard Program

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

Title: Life in a Wicked Big Puddle

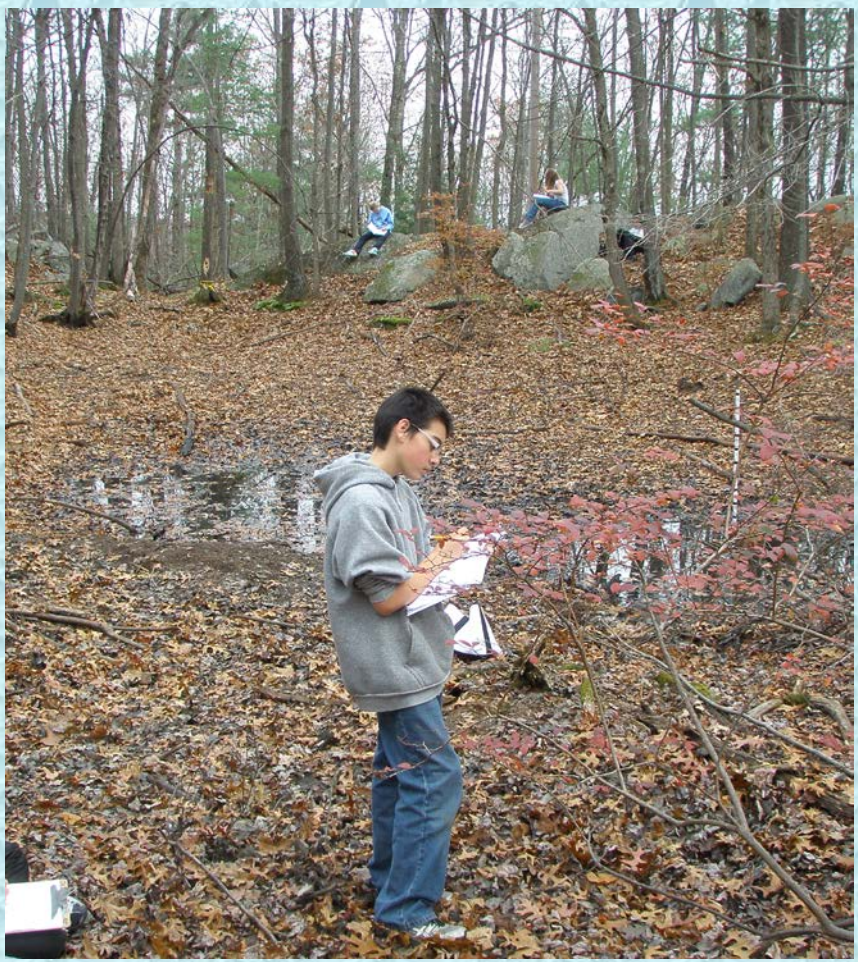
| | |
|---|---|
| Project: | Vernal Pool |
| Teacher: | Judy Gibson |
| School: | Francis W. Parker Charter School |
| Level: | Middle School |
| Date: | April 9, 2015 |

# Life in a Wicked Big Puddle

Incorporating our local vernal pool into middle school science/math teaching at the Francis W Parker Charter School

# The pool: fall and spring

# Students journaling in the fall and sampling in the spring



**Unit Essential Question:**

# Why live in a wicked big puddle?

**Goals:**

- To understand some of the physical factors that impact life in a vernal pool.
- To understand how these factors may change over time
- To make detailed observations of two organisms found in the pool
- To make inferences based on observations and research as to how these organisms are connected in the food web.
- To make predictions as to how a change in the physical state of the pool might impact the food web

# Flow of unit

- Field trips- one of fall and at least 3 in spring incorporating journaling and collecting samples
- Watch slide show from Vernal Pool Association
- Closer examination of samples back in the classroom
- Developing food webs
- Looking at physical data of pool and past photos
- Math: introduction to bivariate graphing using temperature, depth, diameter and rainfall data
- Predicting this year's state of the pool based on data and observations

# Some quiet (almost) journaling

# Looking at the critters

- In class bucket labs
- Slide show from Vernal Pool Association
- First sampling trip- three net sweep and recording different types of organisms
- Potential math lesson on probability
- Second sampling trip- use three net sweep then pick organisms to bring back to classroom. Longer hunt for critters if time allows

# Equipment for a sampling trip

# Hunting for critters

# Closer examination of organisms back in the classroom

- Draw one organism in detail by eye using field guides to identify and label

3. Observe your sample:
   a. Use the naked eye and record your observations.
   b. Use a magnifier to get an *advantage* over your previous observation. Record your observations showing *more* details. (Try to identify what you found using the field guide.)

INFORMATON ON MIDGE LARVA:

•has a compound that gives it its red colbration a helps them capture oxygen allowing the urva to survie it low oxygen vels. ex vernal pools drying.

•herbivores but can be preditors.

Eats: decaying leaves, algae & nicro-invertebrates.

Predators: Dragon Fly nymphs, predacious diving beetles salamander larvae and other vernal preditors.

After 2-7 weeks as larva they change into pupae nd then into adult midges.

Adult midge lives for only a few days.

A red worm, possibly a Chironomid MIDGE LARVA.

COLOR: RED
LENGTH: 1cm
OTHER FACT: 4 legs two on front two on back

Moves in two ways:

Scooching Forward by scrunching its body like an inch worm. and by...

...wriggling in a seemingly random sequence when startled or shaken.

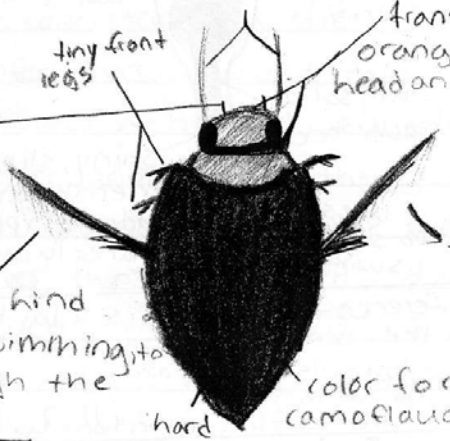
also rolls into a tight ball when touched or moved from tray to tray.

Usually stays rolled up for 3-4 seconds.

- Use microscopes to draw second enlarged view

4. Choose 1 organism to describe in detail.
   a. Hold a ruler next to the organism and make measurements.
   b. Sketch in detail, use color, identify using field guide or other resources.
   c. Can you infer how the organism uses various body parts or in what sort of habitat it may live?

## Water Scavenger Beetle




Actual Size:

.4"

1/4 of an inch

Inference:

moves by rowing with hind legs in water to go forward

while it swam through petri dish it stopped when next to a leaf because it felt safe; hidden

Inference - the beetle has a hard shell to protect it from getting crushed by rocks when it's scavenging for food.

Shells like that are like the exoskeleton of other land insects to protect them from getting crushed. You can pinch and squeeze them and they won't die, you have to pierce the shell with something sharp. That way, they can squeeze under rocks to get food safely.

- Choose second organism from a different phyla and draw either from specimen or from field guides or pictures

Collect a sample to bring back to the classroom

3. Observe your sample:

a. Use the **naked eye** and record your observations. Try to identify what you found using the field guide. Create a detailed sketch and use as much of the box below as possible.

Naked eye view:

*Include on all drawings:*

- Title
- Labels
- Body Parts
- Notes
- Texture
- Size
- Shape
- Color
- 3 "I wonder" questions

Mosquito Pupa
(not drawn to scale)

Ears
head
eye
eye
tail (has little fibers)

When the mosquito pupa hears something, it starts moving.

The mosquito pupa moves around by doing little "front flips"

It is about 2 cm. big

looks kind of see through

I'm guessing it's texture is kind of bumpy

You can't really see it from the front, but the mosquito pupa has a kind of curved shape

The mosquito pupa is kind of brown-ish.

I wonder why the pupa has a sort of 'angry face'?

I wonder what kind of metamorphosis the mosquito goes through?

I wonder why the pupa has a see-through stomach?

# Who eats who?

- Using cards of different vernal pool organisms students build food webs, spreading out across the whole table, everyone participating in placing the cards……..


MUSKRAT
RACCOON
SKUNK
HERON
SPOTTED TURTLE
BACTERIA · FUNGI

# Who eats who? continued….

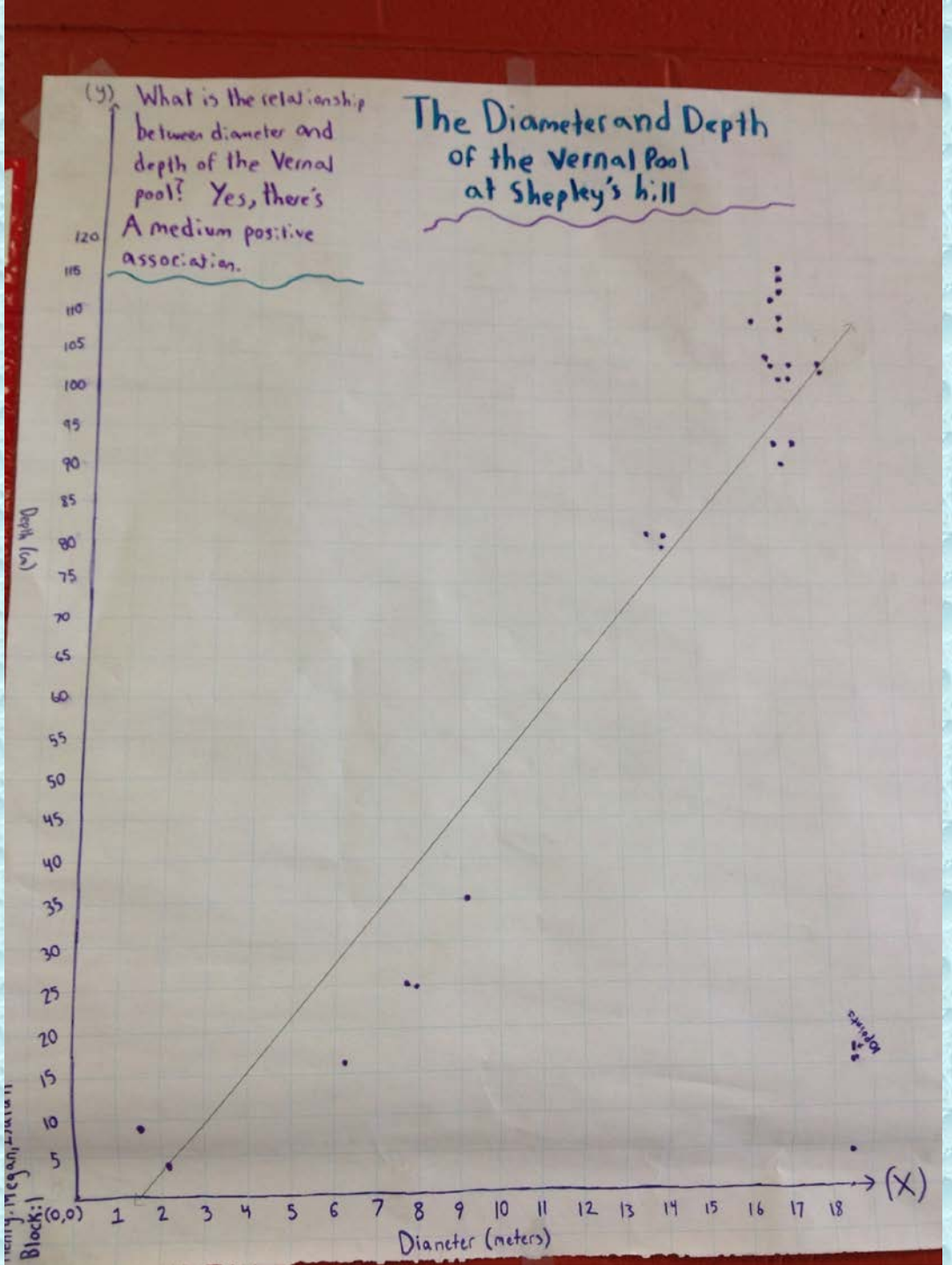
- In the process students build an understanding of the predator –prey relationships between different vernal pool organisms. They also see how complex the food web can get.
- Then, in groups, students develop food webs with their chosen organisms
- Portfolio assessment based on observational drawings and understanding of food web

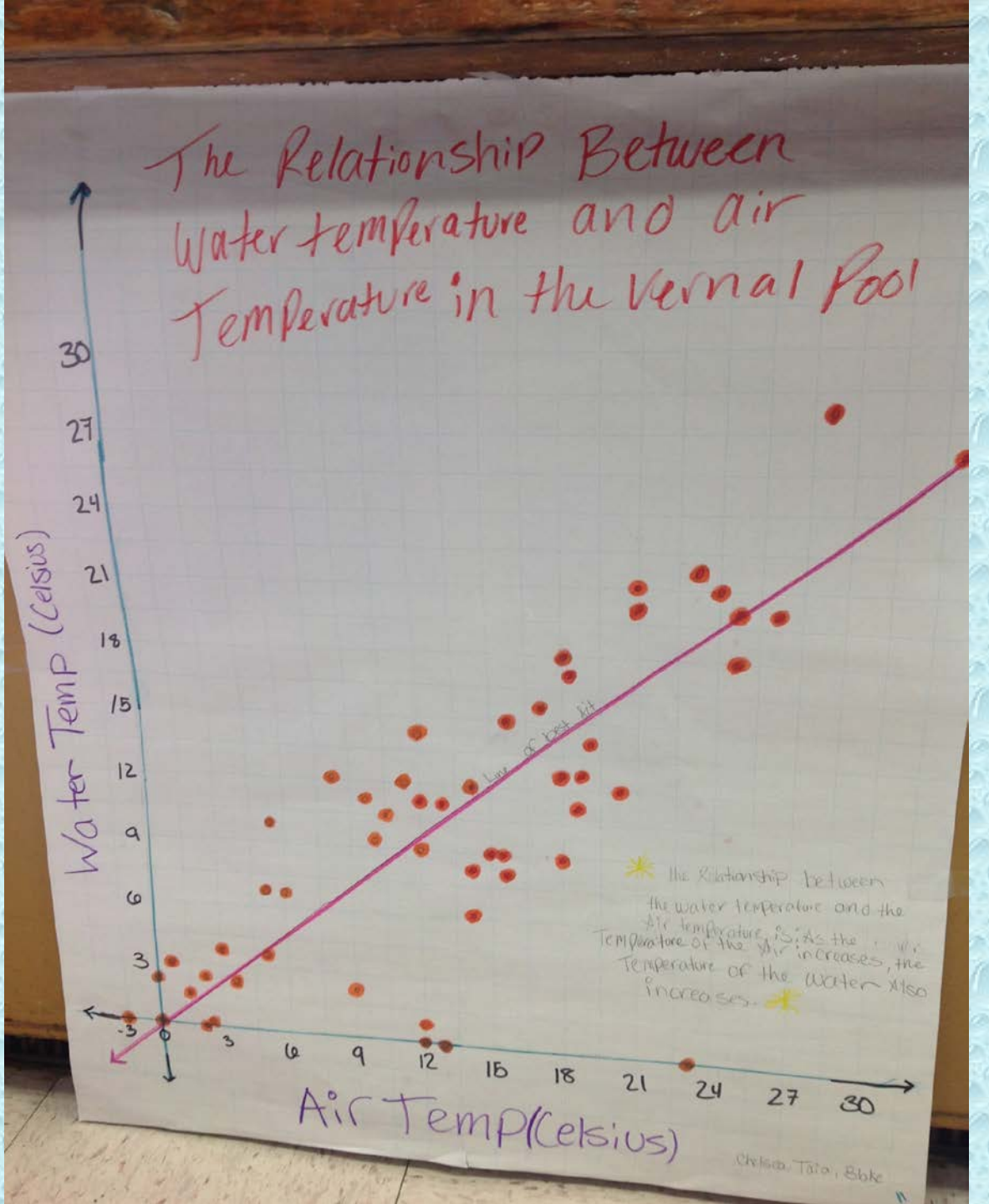
# Follow up opportunities for research, discussion and writing

- How does the pool's changing physical state impact life of organisms?
- What are the different types of life cycles?
- How do  organisms adapt to changing pool environment?
- How is the food web impacted by changing environment?
- How might the changing climate impact life in a wicked big puddle?

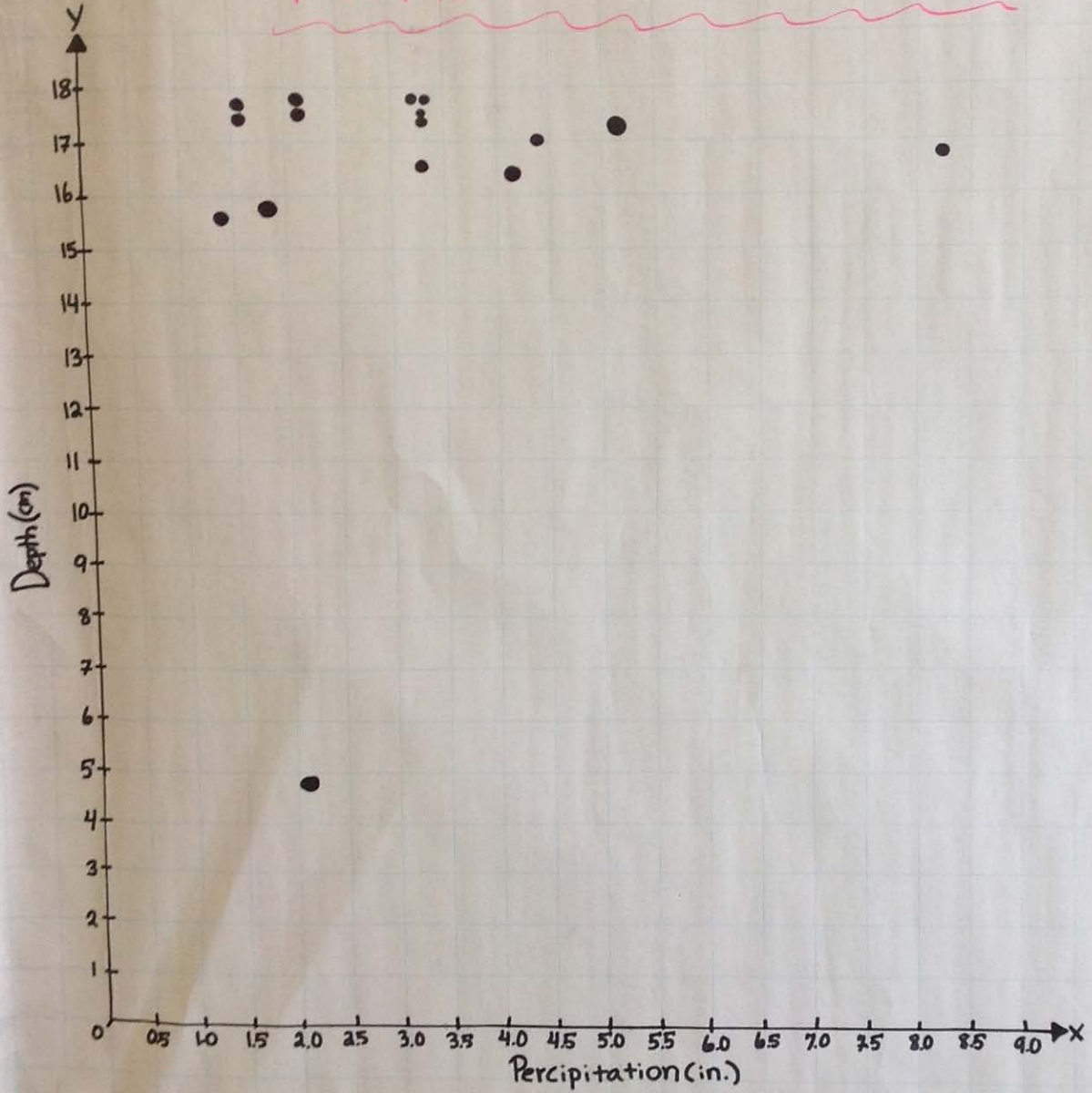
# Let’s not forget math……

Using the pool data to do bivariate graphing


The Diameter and Depth of the Vernal Pool at Shepley's hill
What is the relationship between diameter and depth of the Vernal pool? Yes, there's A medium positive association.
(y)
(X)
Depth (cm)
Diameter (meters)
(0,0)
120
115
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
Outliers
Block: 1


The Relationship Between Water temperature and air Temperature in the Vernal Pool
Water Temp (Celsius)
30
27
24
21
18
15
12
9
6
3
-3
0
3
6
9
12
15
18
21
24
27
30
Air Temp (Celsius)
Line of best fit
* the Relationship between the water temperature and the Air temperature is: As the Temperature of the air increases, the Temperature of the water also increases. *
Chelsea, Tara, Blake

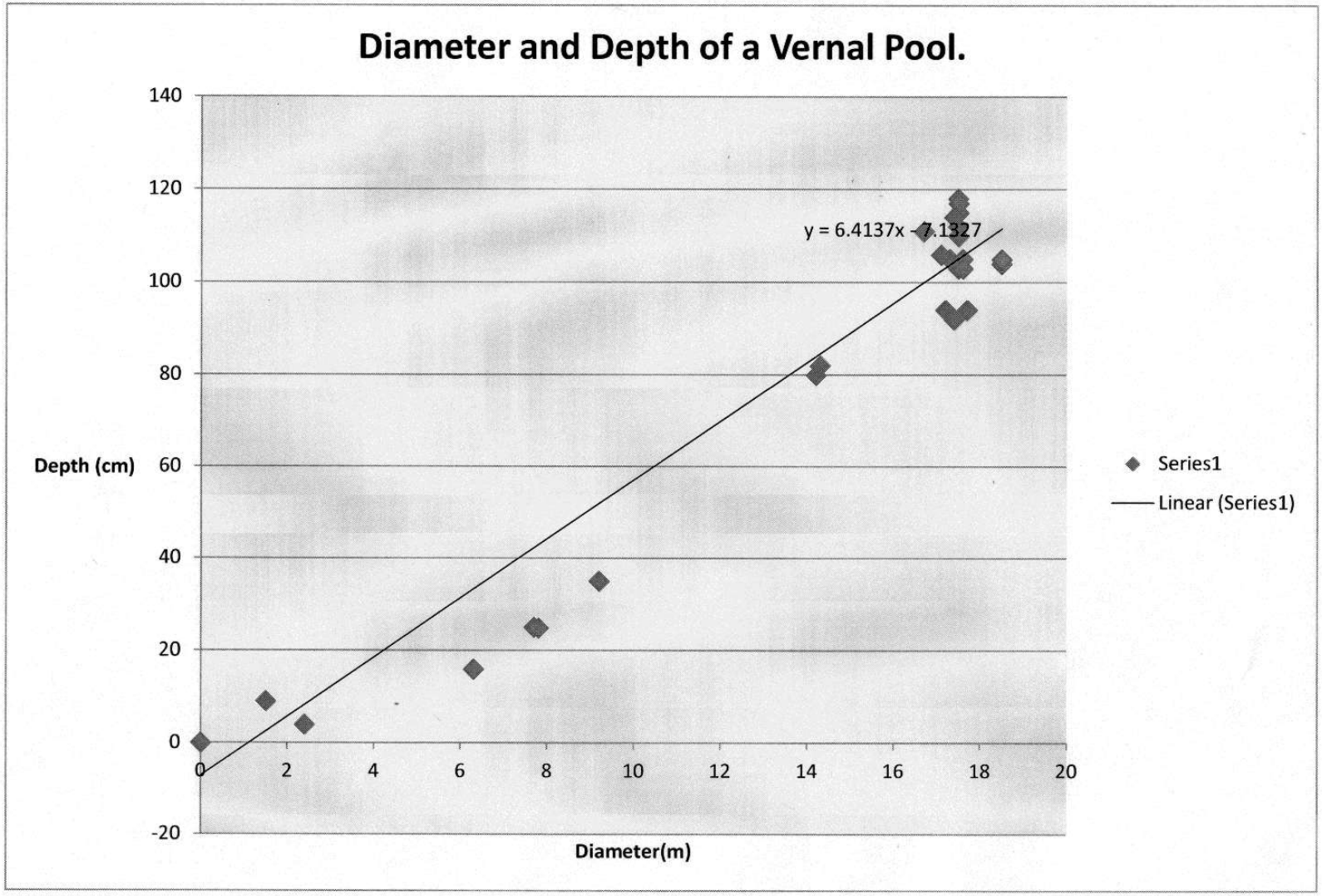
# Vernal Pool Data



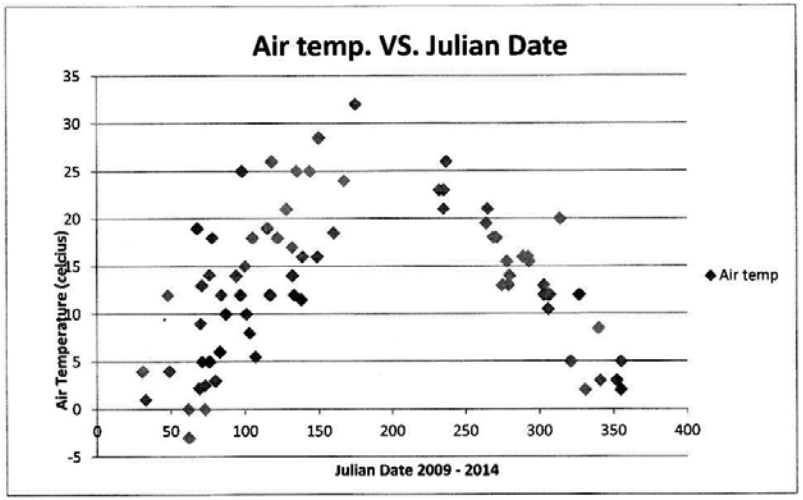

What is the relationship between Percipitation and depth in the vernal Pool on Shepley's hill?

There is no relationship between percipitation and depth in the vernal pool. The reason why is because the water that Creates the depth of the water comes snow melt.

Some students learned to graph bivariate data using Excel……..




Ellery Shea
Amanda Wilson




| Julian date | Air temp |
|---|---|
| 264 | 19.5 |
| 293 | 15.5 |
| 303 | 13 |
| 306 | 10.5 |
| 314 | 20 |
| 49 | 4 |
| 70 | 9 |
| 71 | 5 |
| 78 | 18 |
| 84 | 12 |
| 98 | 25 |
| 105 | 18 |
| 144 | 25 |
| 167 | 24 |
| 280 | 14 |
| 289 | 16 |
| 331 | 2 |
| 48 | 12 |

Delaney + Olivia

# After school vernal pool group

# Winter visits

# More ambitious projects: mapping the pool

# Sampling and documenting presence of critters throughout the year