Section 4
Vernal Pool Slides

Guide to Vernal Pools

By: Ellie Purinton, Tess Rosenberg, wil Garrison and Pablo Rodriguez

What is a Vernal Pool?

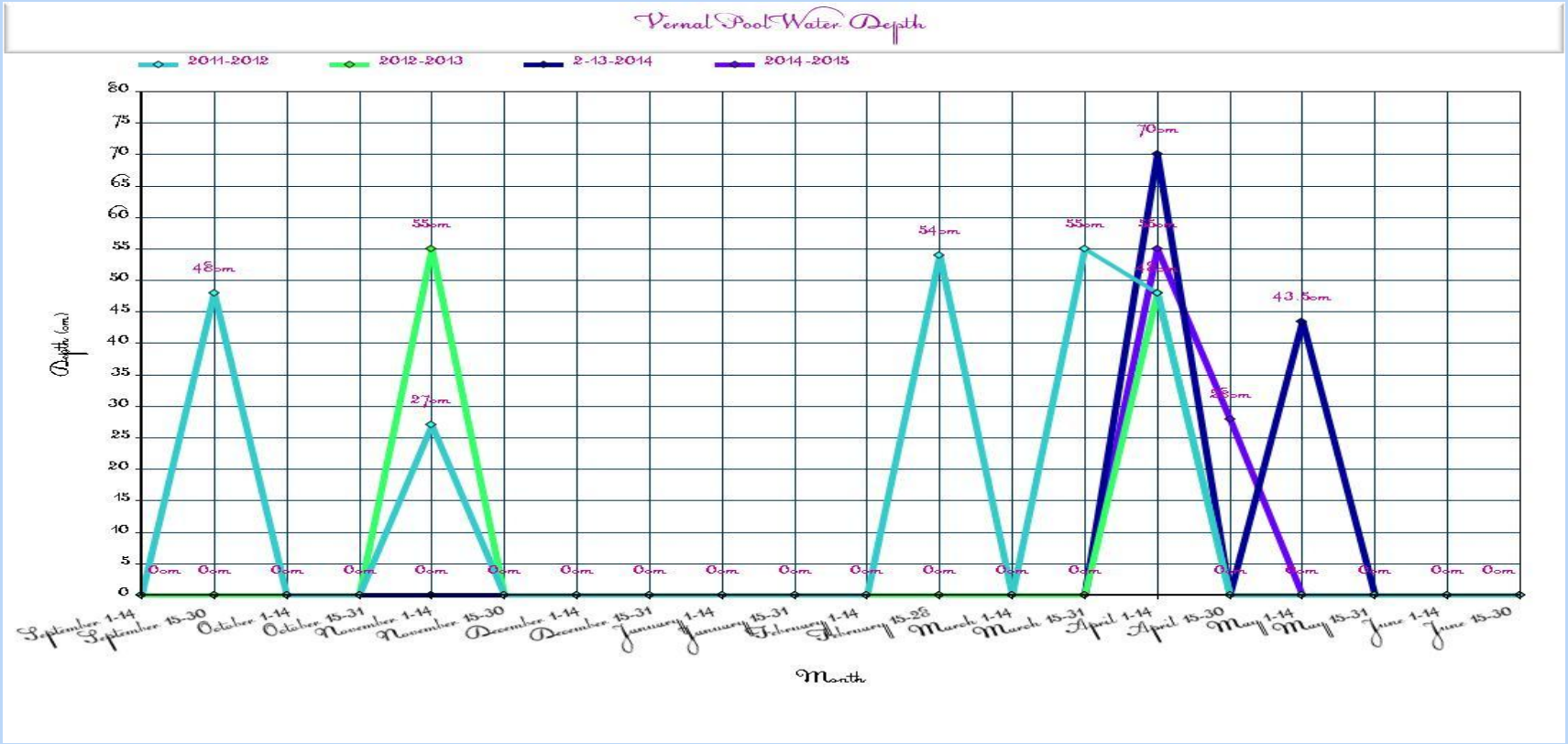
A vernal pool is a seasonal body of water that typically forms in the spring from melting snow and other runoff. It dries out completely in the hotter months of summer, and often refills in the autumn. Vernal pools are filled with insects such as frogs, salamanders, and turtles.

The Vernal Pool in the Fall

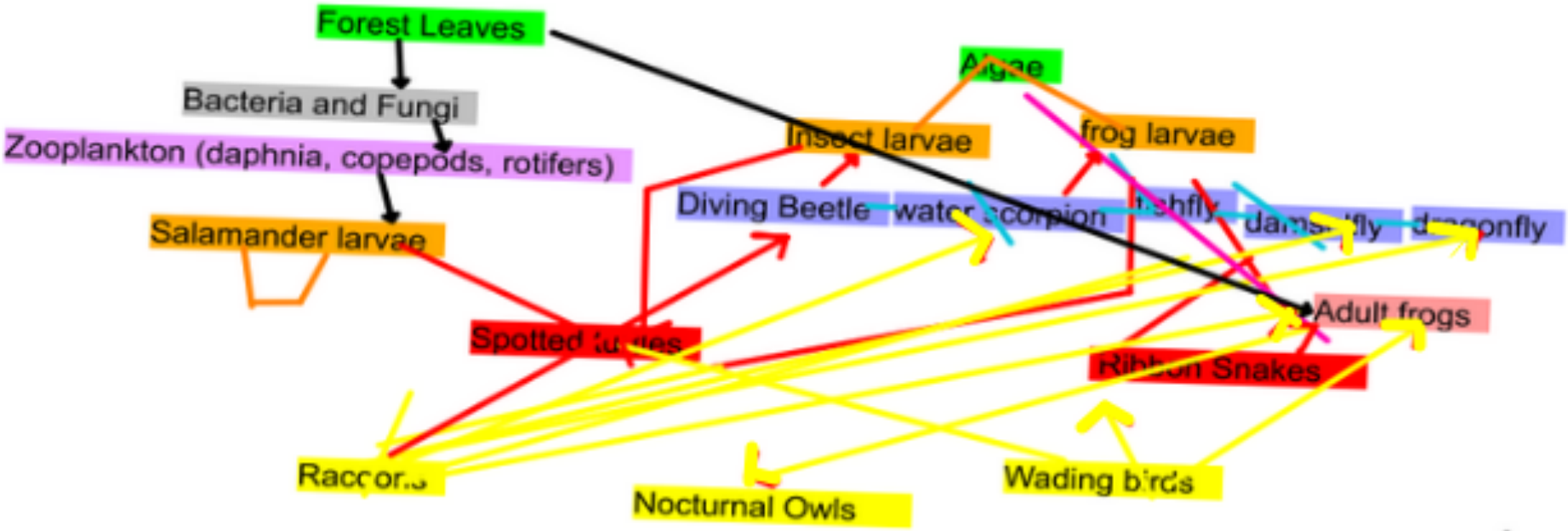
The Vernal Pool in the Winter

https://www.youtube.com/watch?v=8iLAQus9qAo

Graph of Data



Food Web


Forest Leaves
Bacteria and Fungi
Zooplankton (daphnia, copepods, rotifers)
Salamander larvae
Insect larvae
frog larvae
Diving Beetle
Adult frogs
Ribbon Snakes
Nocturnal Owls
Wading birds
dragonfly

Ellie's slide #1

How does climate change affect the vernal pool and the amount of life inside of it?

The question that I researched was "How does climate change affect the life in vernal pools?" I used books and websites to research this question. I found out that climate change affects the migration of animals to vernal pools, the geographical ranges of plants and animals, and can cause some animals to go extinct.

The first thing that I discovered from my research is that climate change affects the migration of animals to vernal pools. Research shows that salamanders migrate when evening rainfall occurs with moderate temperatures over 45 degrees f in the day and 40 degrees f at night. Evidence shows that minimum and maximum temperatures and rainfall amounts are changing. This could affect the migration of the animals to the vernal pools, because when one animal isn't there, it affects the entire food chain.

Not only does climate change affect migration, but it can also change the geographical locations of plants and animals. Geographical ranges have been shifting because of changes in climate. This could be especially bad for species that can only live in certain geographical places.

Another effect of climate change is that it could cause some species to be extinct. Some species that have narrow distribution, a certain vernal pool could be the only place where that animal is found. If the pool is destroyed, the animal could go extinct. For example, in Massachusetts, the Intricate Fairy Shrimp is found only in 10 pools. Also, Spadefoot toads are found at only 40 sites in the entire state. If even only a few pools dried up from warmer temperatures, than that could affect the existence of the species.

Ellie’s slide #2

All of these changes in vernal pools that are caused by climate change affect the life in these habitats very much. Animals such as the salamander start to migrate back to vernal pools in the spring, because rainfall and certain temperatures. If animals didn’t know when to migrate to Vernal Pools because of Climate change, then the absence of this specific animal would completely disrupt the food chain, causing the animal that the missing animal was eaten by to have no food. Also, the animals normally eaten by a missing animal would grow abundant in quantity, causing the levels of the food chain to be either very abundant or very scarce. The life at Vernal Pools in entirely based on “what eats what”, so the change in climate would completely alter and possibly terminate the life at the Vernal Pools. Also, many plants that live near Vernal Pools are restricted in the temperatures in which they can endure. Climate change causes these plants to change locations over time, because they move to where they can live more easily. Animals follow the plants that they eat to where the plants move. This not only disrupts the food chain of Vernal Pools, but also poses a huge issue for plants and animal that are geographically restricted, and can only live in certain environments. Some species that live in Vernal pools are not found in any other environments, and many of these are only found at a few select vernal pools. The change of climate could make these species extinct, because they can only live in those specific environments, and the pools they live at could dry up from climate growing warmer and amount of rainfall decreasing.. Also,because the change in climate causes migration issues and geographical changes of plants and animals, this could disrupt the food chain and also endanger the animals that only live at a few vernal pools.

As you can see, climate change is a major issue for vernal pools, which are important environments in nature. Climate change affects migration, geographical ranges of plants and animals, and could make some species extinct. These changes pose huge threats for these habitats that are home to so many unique animals.

Tess's slide #1

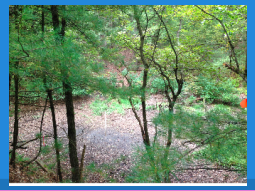
Why are vernal Pools important?

The question that I researched is why are vernal pools important.. I found out many differnet facts about what species do in a vernal pool, How many species rely on vernal pools, and human impacts on vernal pools.

I first, gathered information about what different species do in a vernal pool. A vernal pool is very important to a number of species. They adapt to a very interesting habitat. The activity in the pool is most likely to be organized so every specie gets enough time in the pool, and that every specie maximizes its own chances for survival. Organisms feed on each other, yet lot's of them have to survive the increase of the population. Lots of species use the vernal pool for breeding and feeding, in an area of reduced predation. Some species need to vernal pool to survive, and without it, they would become extinct.

Another topic I researched is that many species rely on the vernal pool. Vernal pools are very important for wildlife because they will need it on a summer day, as well as links in the overland passage that have many amphibians and reptiles.. For species that are wide distribution, vernal pools are essential to the local population. if the pools become dried out or get eliminated, the population of that animal will die out of that area.

Tess's slide #2



For species with a narrow distribution , a specific vernal pool may be the only place on earth that the animal is found. Destruction of only a few pools can jeopardize the existence in some animals. Without Vernal Pool's, lots of species would be in danger, or would die.

The last topic I researched is the human impacts on vernal pools. There has been a major increase in the population, along with building new homes, buildings, and roads. These are all affecting vernal pools, and their species. Pool's have been destroyed to create uplands, as well as road drainage, and detention ponds. Vehicle traffic has also been a big problem for species. Highways with multiple travel lanes and concrete dividers fragment the habitats, prevent migration, range expansion, and restrict gene flow in a population. Irrigation wells lower the water tables, and make the pool's dry out a lot faster. Overuse of fertilizers and pesticides threatens the water quality of pools. And they highly depend on runoff as a water source.

Overall, I believe that Vernal Pools are very important, and we would not know of many species, if vernal pools didn't exist. Although Vernal pools seem like they can be anywhere, they are disappearing quickly,. People should do anything they can to try and help save them.

Pablo’s slide

http://www.dgif.virginia.gov/habitat/vernal-pools-and-salamanders.asp

What is life like in a vernal pool spotted salamanders?

Spotted salamanders are mainly found in vernal pools. They use them to reproduce and lay their eggs. Spotted Salamanders head to vernal pools in the spring to breed early in the year. They produce really thick egg masses in the vernal pools. They contain up to 2000 eggs, but sadly not all of them survive.

At first when there is no water in the pool the female digs a small hole and lays about 120 eggs, after that the female stays to guard her eggs until the pool fills with water. Finally when the pool fills and the water covers the eggs, the eggs should hatch in about 48 hours. When they hatch larvae appears and they spend about 60 to 100 days in in the water before reaching maturation. During those days they start adapting to their habitat and feed on zooplankton and even other smaller larvae.

Will's Slide

http://www.nexuslearning.net/books/holt_env_science/8-2.pdf

Could any of the animals interact with each other?

Plants interact of other organisms for different services. They interact with other plants, with animals, fungi, and microorganisms. These organisms vary in their ability and patterns of history variation due to the traits of both the plant and the animals, and due to the impact of human-induced habitat disturbances. I found that some of these animals interact in many different ways. Sometimes unusual ways like the spotted salamander. The spotted salamander interacts by actually eating other organisms!

Sources

Tess - http://en.wikipedia.org/wiki/Vernal_pool, and A Field Guide to the Animals of the Vernal Pools by Leo P. Kenney and Matthew R. Burne

Ellie - http://www.naturalheritage.state.pa.us/VernalPool_Threats.aspx

The Field Guide to the Animals of Vernal Pools by Leo P. Kenney and Matthew R. Burne

Pablo -http://www.nexuslearning.net/books/holt_env_science/8-2.pdf and

http://www.dgif.virginia.gov/habitat/vernal-pools-and-salamanders.asp

Will - http://www.nexuslearning.net/books/holt_env_science/8-2.pdf

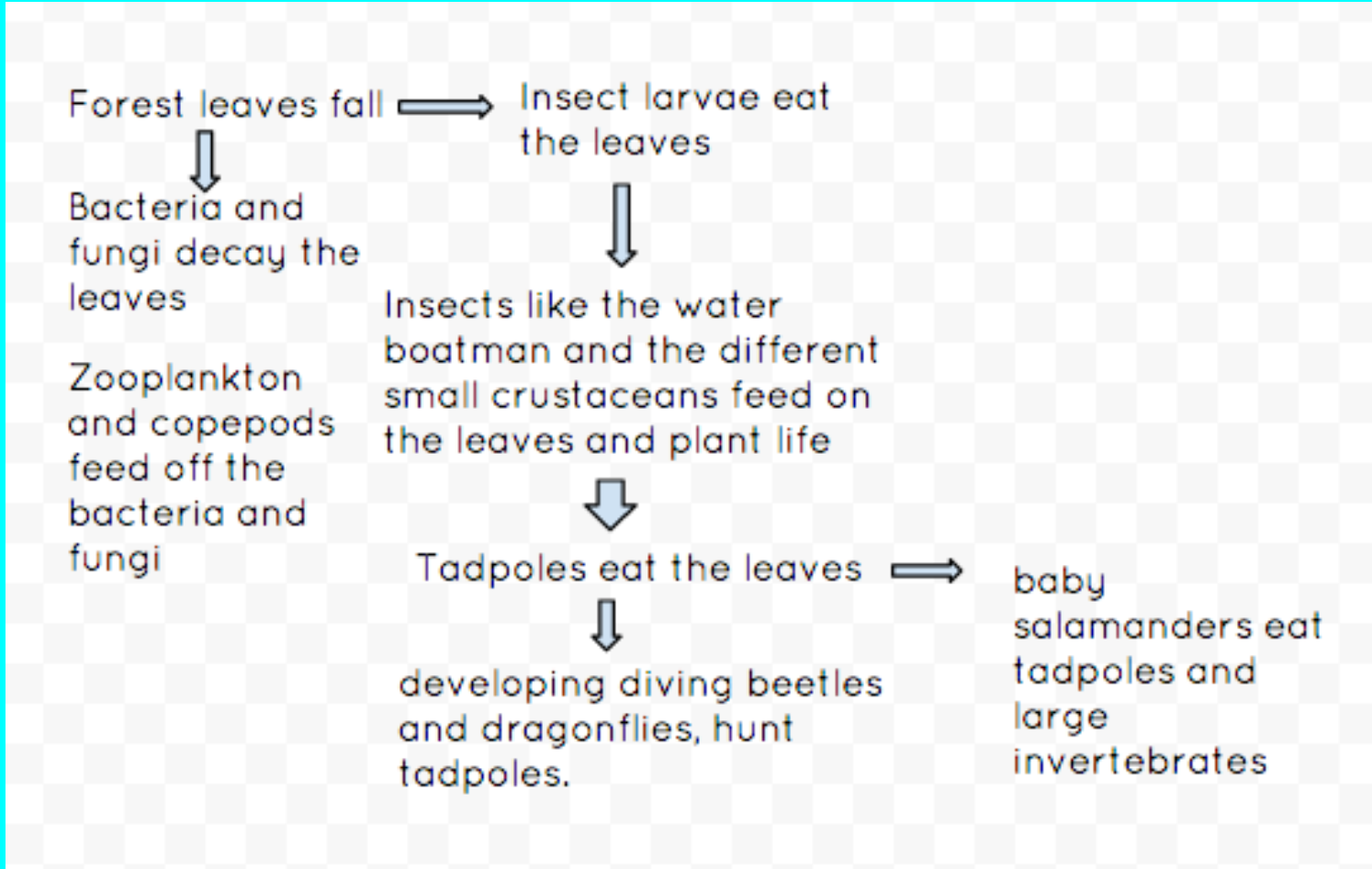
Vernal Pools

By Colleen Boyle, Francesca Giragos and Emily Monte

What Is a Vernal Pool?

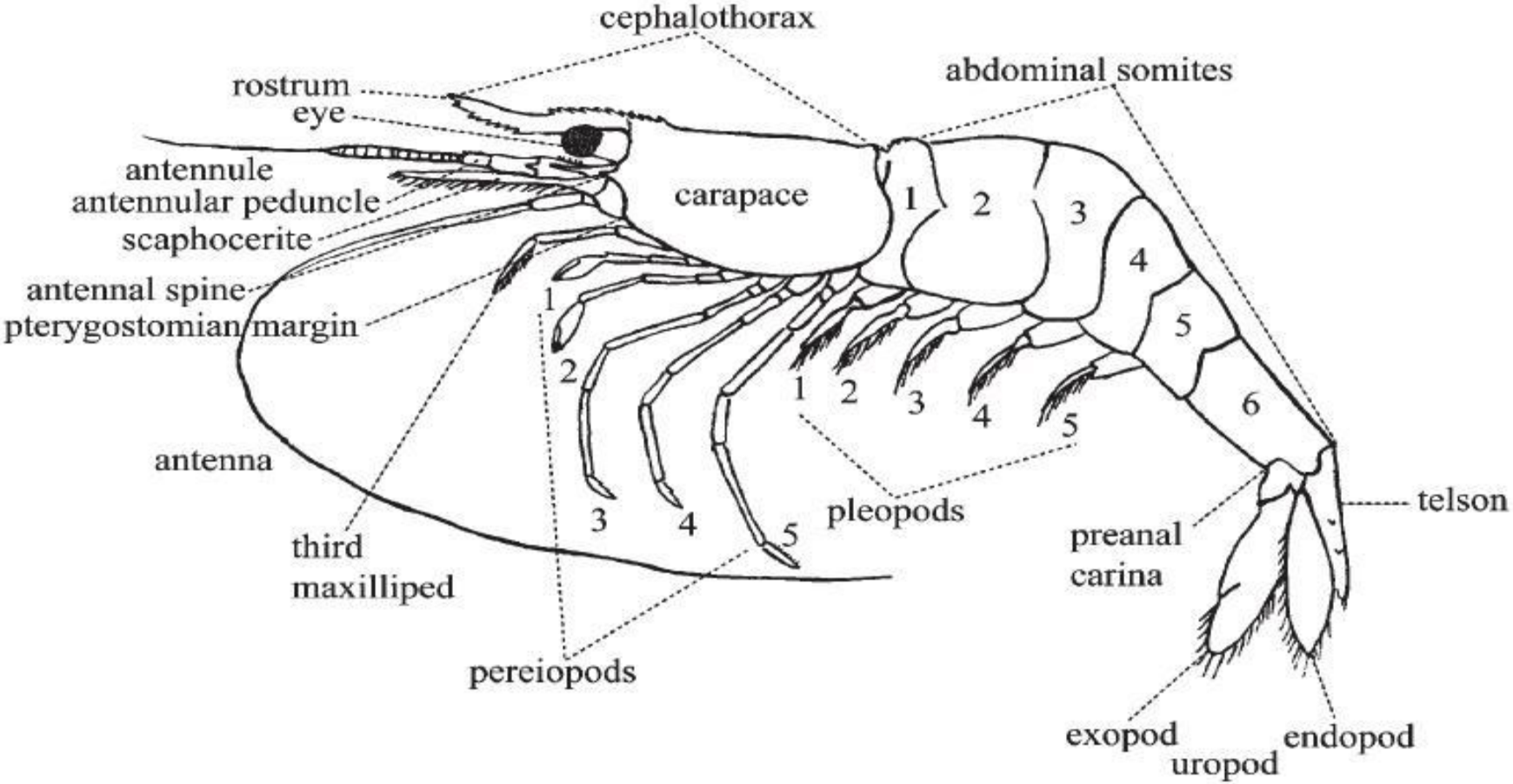
A Vernal pool is a critical habitat to unique wildlife communities. Vernal pools fill with rainwater or melted snow. The Vernal Pool is home to few species of small animals, such as the; wood frog, mole salamander, and fairy shrimp. The wood frog and salamander migrate to the pool annually but the fairy shrimp lives there year round.

Food Web


Forest leaves fall
Insect larvae eat the leaves
Bacteria and fungi decay the leaves
Zooplankton and copepods feed off the bacteria and fungi
Insects like the water boatman and the different small crustaceans feed on the leaves and plant life
Tadpoles eat the leaves
baby salamanders eat tadpoles and large invertebrates
developing diving beetles and dragonflies, hunt tadpoles.

Why are Fairy Shrimp so special? **by Emily**

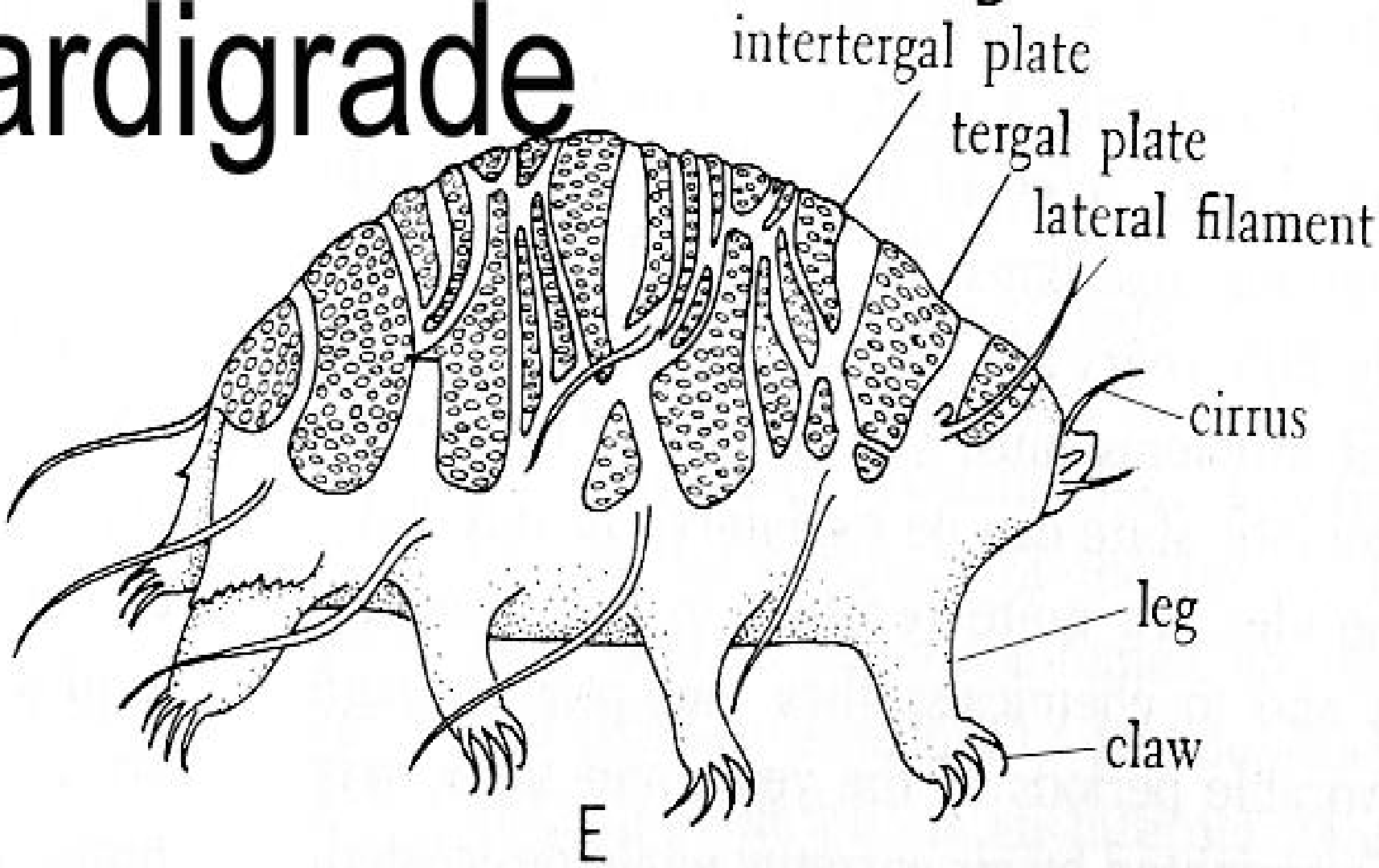
The shrimp act as custodians for the vernal pools. Usually no more than an inch long, the shrimp swim upside down and use their 11 sets of legs to collect algae, bacteria, protozoa and other microorganisms from the surface of the water;The shrimp keep the pools tidy and clean. Long story short, they help out the other vernal pool creatures by keeping the vernal pool clean.


cephalothorax
rostrum
eye
antennule
antennular peduncle
scaphocerite
antennal spine
pterygostomian margin
carapace
abdominal somites
1
2
3
4
5
6
antenna
third
maxilliped
pereiopods
pleopods
preanal
carina
telson
exopod
endopod
uropod

Francesca's Tardigrade children at the vernal pool

I took slides from the Skinny Vernal Pool and the rail tracks next to them. The vernal pool itself had one tardigrade and 3 rotifers. The track also had 1 tardigrade, and no rotifers. I only had one period for research so the experiment isn't all complete. I would love to look into this for further information. I would like to believe that the lack of tardigrades at the pool is because I had a minimal amount of time to actually finish my experiment. Another factor could be the type of moss that is growing near the pool. Perhaps the other organisms that call the pond home eat the tardigrades as part of the food web.

Tardigrade


intertergal plate
tergal plate
lateral filament
cirrus
leg
claw
E

How do the indicator species Interact with each other? By Colleen

What are indicator species?

Indicator Species are the main animals that rely on the vernal pool. The main species are Wood frog, the spotted salamander, and fairy shrimp.

The spotted salamander eats worms, crickets, and spiders and can be known for eating the wood frog larvae (eggs) and sometimes even their own.

The fairy shrimp are very small in size (about .5- 1.5”) and eat bacteria, protozoans, and phytoplankton.

The wood frog eats flies, caterpillars, and worms. Adults can be hunted by racoons and other larger animals.

Resources

- A Field Guide to the Animals of Vernal Pools by: Leo P. Kenney and Matthew R. Burne
- The Vernal Pool
- Ms. FD's microscopes

Vernal Pool!

By: Camille and Mia

What is a vernal pool?

Vernal pool are ephemeral wetlands. Most years the vernal pool is completely dry. The wet dry season prevents fish from living there. The pool fills from precipitation runoff, and and rising groundwater. The pool loses water from evaporation and transpiration.

Ephemeral- Lasting for a very short time.

Transpiration- The evaporation of water from plant leaves.

What happens to a wood frog in the winter?

- In the winter months the wood frogs stays in burrows or under leaves beneath the snow. They do this because they cannot survive in the colder temperatures.

- They also increase their glucose production when the temperatures drop they increase glucose production to high levels which acts like an antifreeze that keeps them from freezing solid.

- they use estivation which is similar to hibernation it is a state an animal goes into due to adverse environmental conditions.

Camille Nedeau

Why is Leaf Litter important?

- The litter leaves are a key point in the food cycle for the creatures in the vernal pool.
- Almost all animals in the pool eat the leaves for their food.
- Salamanders lay their spermatophores on the leaves at the bottom of the pool, so that the ladies can pick them up and get their eggs fertilized.
- Leaf litter is important for protection. The creatures like to hide under them from predators in the food cycle.

Mia Olsen

Resources

Mia:

http://www.dgif.virginia.gov/habitat/vernal-pools-and-salamanders.asp

A field guide to the animals of vernal pools BY: LEO.p KENNY AND MATTHEW r.Burne

Camille: http://www.scientificamerican.com/article/how-do-frogs-survive-wint/

http://www.naturalheritage.state.pa.us/VernalPool&Amphibians.aspx

A field guide to the animals of vernal pools

Vernal Pool

by emma

Vernal Pool: What is it?

Vernal pools last for a very short time, which make them ephemeral. The water comes from rain and snow. A vernal pool is usually dry, this restrains all lot of animals from living there. The vernal pool then evaporates the water. The water can also be evaporated by plant leaves, called transpiration.

How do the ferry shrimp survive when the water dries up?

Before vernal pool dries up, the females make hardy resting eggs, called cysts, which are able to survive the dry season and hatch when the rains come again. This strategy allows the ferry shrimp to avoid some predators which can't survive in such a temporary habitat like the vernal pool.

Sources

Vernal Pool: What is it?

Life In a Vernal Pool Field Guide

How do the ferry shrimp survive when the water dries up?

http://www.nwf.org/wildlife/wildlife-library/invertebrates/vernal-pool-fairy-shrimp.aspx



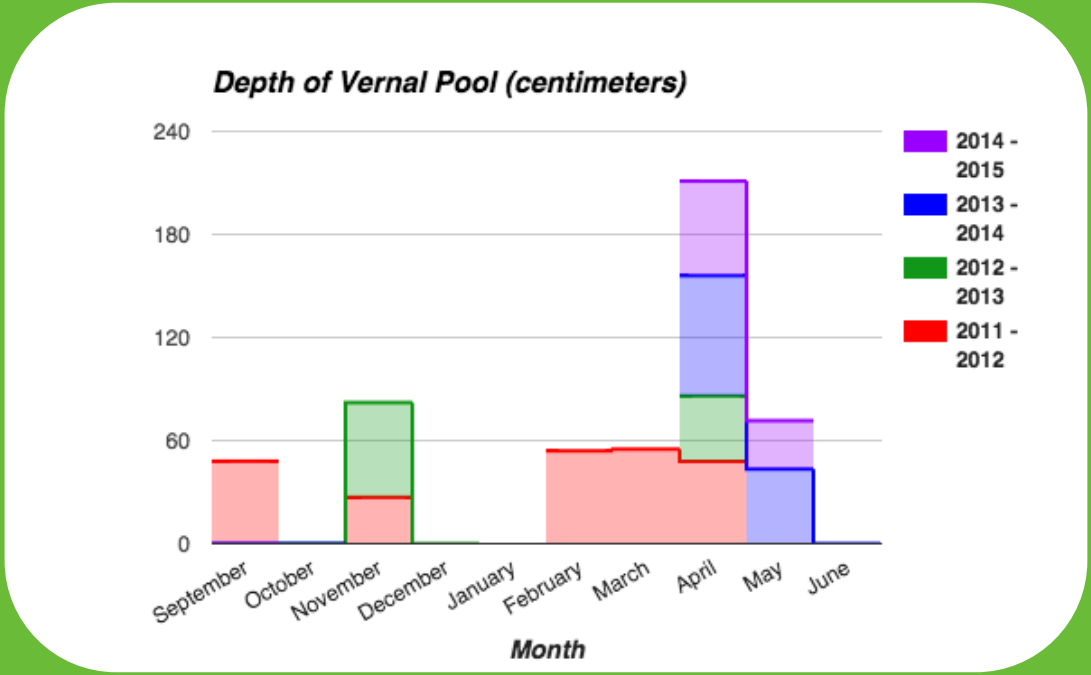
Vernal Pool 2014 - 2015

Kyra Chen, Avery Kirkpatrick, & Clara Hoey

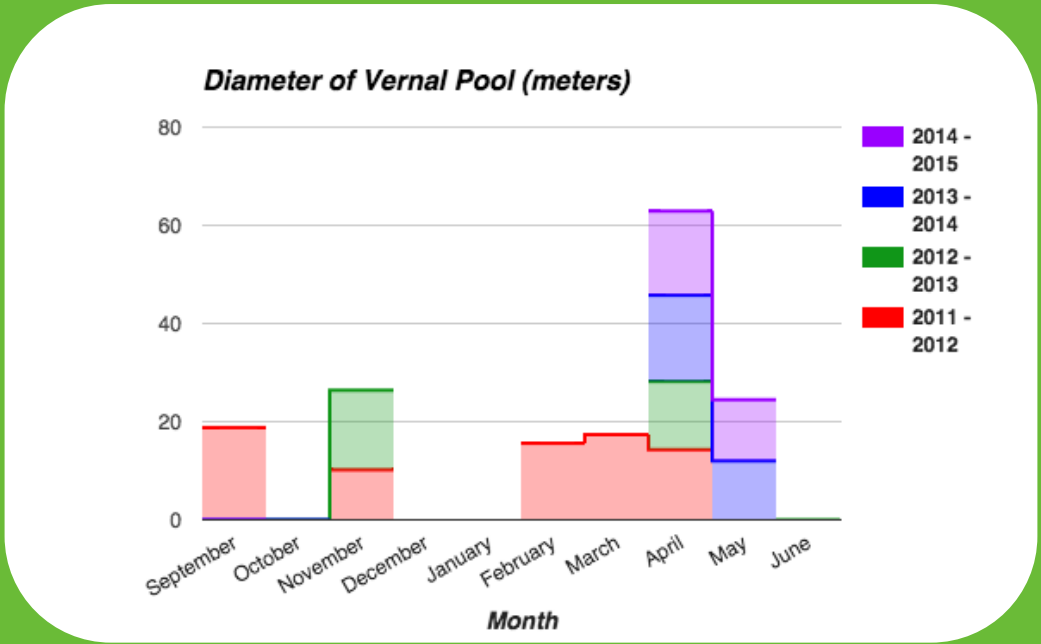
What is a Vernal Pool?

A vernal pool is a small ephemeral (existing for a short period of time) water source that is created from melted snow, precipitation, and groundwater. Nearly every year vernal pools dry out due to evaporation, which makes it so that fish can't live there, but other animals such as frogs, salamanders, fairy shrimp and snakes can. Vernal pools are a home to many forms of life including both plants and animals, some of which couldn't live in anyplace else, like the fairy shrimp. To learn more about this one of a kind wetland, keep reading.

Graph of Depth



Graph of Diameter



Food Web

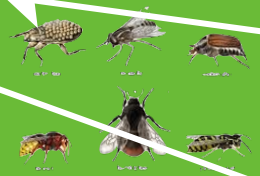
plant and leaves

algae

turtles

Bacteria

fungi



insects

tadpoles

zooplankton

salamanders

adult frogs

How did fairy shrimp appear in the vernal pool?

Inferences

- They could have been swallowed by a bird and landed in the water in its dung
- They could have evolved from parasites
- They could have evolved years ago and each year when the water is gone, there are eggs laid in the mud and when the water returns they hatch

Information from research

- Their eggs need to be dried and re-submerged in water before they hatch, so female fairy shrimp lay their eggs in the water, and once the water drys out, the eggs lay underneath the leaf matter and go through drying and freezing, and once water fills up the pool, they hatch.
- Fairy shrimp have been around for a while and we know that because they have a very long fossil record. The most likely way they got to vernal pools was that they started out in the ocean and freshwater lakes but were forced to move over time because of the radiation of bony fish that started to appear.

Sources

- *http://en.wikipedia.org/wiki/Anostraca*

Avery Kirkpatrick

How do the animals in the vernal pool survive when it is dry?

Inferences

- When the vernal pool is dry, some of the animals might migrate to other wetlands or to the woods nearby
- Some of the water-dwelling animals such as the fairy shrimp might lay eggs that don't need water to develop until they hatch http://www.vernalpool.org/sly_1.htm

Information from research

- Animals such as the spotted salamander and wood frog hibernate during the winter and live in the woods when the vernal pool has dried up; the salamanders only need the pool for breeding purposes in the spring. Similarly, the wood frogs rely upon the vernal pool for their eggs and larvae, but they can survive without it for the rest of the year.
- The fairy shrimp typically breed during the winter and spring, and they lay eggs that can survive the dry periods until the rain comes again.

Clara Hoey

What will happen to the animals if the water in the vernal pool decreased faster than before?

Inferences

- If the water in the vernal pool dries up more quickly than before, the population of the animals that live in the vernal pool will decrease because eggs on the edge of the vernal pool will die when the pool dries up.
- If there is no more water or much less water in the vernal pool, animals nearby that depend on the water will most likely move to other places.

Information from research

- Vernal pools are sensitive wetlands that can are easily disturbed or destroyed by human activity.
- Wood frogs and several other animals prefer vernal pools for their habitat because it can protect their eggs from predators like fish, which won't be found in vernal pools.

Kyra Chen

Photo URls

http://www.ct.gov/deep/cwp/view.asp?a=2720&q=514222&deepNav_GID=1907

http://www.uri.edu/cels/nrs/paton/

http://www.virginiaherpetologicalsociety.com/amphibians/salamanders/spotted-salamander/spotted_salamander.php

http://www.kidzone.ws/lw/frogs/facts-woodfrog.htm

http://cfb.unh.edu/cfbkey/html/Organisms/otherarthropods/GEubranchipus/geubranchipus.html

http://www.vernalpool.org/sly_1.htm

Vernal Pool

By Elizabeth L, Belle V, John G, and Max E

What is a vernal pool? -Belle

Vernal pools are wetlands that fill up every year from rain or melted snow. The cycle of dry to wet prevent fish from residing in the pool permanently. The vernal pool is home to a huge array of life ranging from harmless snakes to frogs and salamanders. Vernal pools are necessary for many species to survive.

Fun Fact:

Vernal means spring!

Max Easterday-Food Web!

Dead leaves fall into the pool. → Bacteria and fungi break down and digest the leave. ↓

The Bacteria and fungi grow and get eaten by plankton. ← Other insects eat the leaves and the plankton. ↓

Tadpoles also eat the leaves and the algae. → Dragon flies, diving beetles and the water scorpion eat the tadpoles. ↓

Salamanders larvae are carnivorous they eat anything its size and smaller. Then the salamander larvae grows, and eats anything that fits in its mouth. ← Turtles and snakes eat the egg masses of the spotted salamander. ↓

Racoons eat a lot of the insects and they also eat frogs and salamanders. → The dead eggs are usually ate by birds or other animals.

Libby’s Question

Which organism is most popular this time of year?

The Wood Frog and Spring Peeper are the most popular this time of year because the snow is leaving and the semi-dry semi-wet season is entering. Wood Frogs migrate to the Vernal Pool this time of year for breeding season. When the females lay eggs they hatch thus creating more Wood Frogs. When the snow melts it creates the perfect habitat for Spring Peepers. When a female lays eggs, she lays up to 800 which is also creates more Spring Peepers. This also takes place around this time of year. These events create a population of frogs this time of year in the Vernal Pool.

How and what do the spotted salamander larvae eat? Belle Venn

The spotted salamander larvae somewhat resemble an axolotl because of their gills. They have feathery gills for taking the oxygen out of the water. They eat small insects, and in some cases will eat other members of the species. Fish, frogs and insects eat the larvae. The spotted salamander larvae are considered as predators.

Spotted Salamander Larvae https://www.flickr.com/photos/briangratwicke/3640281370

What are vernal pool threats?

At the vernal pool the common animals are the wood frog, spotted salamander, and the spring peeper. They all lay eggs during the vernal pool season, but most of the predators are not after the eggs. If the predators are after anything it would be the grown animals. There are lots of predators but the most common ones would be Owls, snakes, turtles, and raccoons.-Jon

Max’s Question

How do the wood frogs survive the winter, and where?

Frogs hibernate over the winter to fight very cold temperature especially around North America. Some fro hibernate underwater or dig a hole in the ground but the wood frog is different. The wood frogs find crevaseas in logs or rocks and go down as far as they can until they find leaves. Their protection inside rocks and logs are not too good, they freeze along with their inhabitants. However the wood frogs do not die because of Antifreeze, a layer under the skin is complete ice. For most of the winter the heart, brain, and lungs completely freeze and shutdown. The frogs will appear dead but they are just frozen, then in the Spring they break through the ice and start the frog life over again.

This is a picture of a wood frog frozen.

Bibliography

http://www.scientificamerican.com/article/how-do-frogs-survive-wint/

http://www.biokids.umich.edu/critters/Ambystoma_maculatum/

http://www.owlpages.com/pictures/species-Strix-varia-4.jpg

http://www.naturenorth.com/spring/creature/woodfrog/images/Wood_Frog_15.jpg

A Field Guide to Vernal Pools- Leo P. Kenny and Matthew R. Burne