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Differences of Herpetofauna Around Unity: On Campus and in the Woods

Introduction:

The hypothesis is there will be more species of herps on the trails near unity college rather than on-campus near the dorms. From a study, there was more abundance of frogs found near a trail rather than off-trail (Rudolf, Donnelly 2009). From the paper, it was found that there was more abundance near the path than in the woods. In another study, it talked about the effects of clearcutting and amphibians. Another study also talks about how forest management is a limiting factor of frogs near forest edges (Demaynadier, Malcolm 1998) It said that amphibians are not found near open canopy areas (Patrick, et al. 2006). On the other hand near the campus, there are several roads and this has a lot of cars and people walking by it. A study talks about that there is a decline of amphibians near the roads (Fahrig, et al. 2007). This will make it harder to find frogs near a road. And frogs are good at reducing mosquitoes because they eat them. A study talks about what they do help reduce the number of mosquitos in the environment but they do not reduce the amount of disease (Raghavendra, et al. 2008).

Amphibians are the first vertebrates to leave the water and go on land. They gained certain adaptations such as limbs and lungs. They lay eggs and are usually R selected animals. They need a moist environment to breed so they are not found in

desserts. They are also not found in marine places because they are prone to desiccation to the salt. They rely on freshwater and damp places. Amphibians are important to the ecosystems because they control the pest. They are herbivores and or omnivores. They are prey for secondary consumers. Amphibians are very sensitive to disturbances in the habitat. They are disturbed by pesticides, ecosystem stresses, and other various anthropogenic activities. So they are a great indicator of a healthy ecosystem.

Reptiles evolved from amphibians about 315 million years ago. They are distinguished with different skin and egg covering that eliminates water loss. This is one of the greatest advantages reported have developed. With these adaptations, they are able to live on dry land, in which they would come to dominate. These dominators were the dinosaurs. Now species and abundance are declining. They live everywhere on Earth except polar seas and tundras.

Methods:

The location, Unity College ME was used to collect data on amphibians and reptiles. Two locations on Unity College were used. The first is on campus, which included the area around the residential halls and paths. The second is the yellow trail which is a looping trail. The area was walked on the trails slowly and went on both sides of the trails to maximize any movement in the leaves. The leaves were disturbed with feet swaying to encourage frogs to jump out. Not many frogs were found in the beginning. To collect more data all herps were added to the search. A pattern was

noticed that flipping rocks and logs yielded salamanders. Since reptiles need to bask, areas in direct sun and rocky spots were checked. The trail path was the only place searching for consistency. Once a species was found, it was identified and recorded in a data table. A picture was taken to identify the species later. Greg LeClair, the president of the herpetology club also aided in confirming species identification.

The data was analyzed using the Shannon-Weaver Diversity Index to find the species richness, evenness and diversity index for on the trail and on campus. The total species richness for on the trails and for on-campus was used to create a percent of each species present.

Results:

The species richness for in the woods was 5. The species richness for on campus is 4. The evenness for in the woods was 0.36. The evenness for on-campus was 0.50. The Shannon-Weaver Diversity Index in the woods was 0.58. The Shannon-Weaver Diversity Index on campus was 1.15.

For the total amount of animals found: on the trail, the Garter Snake (*Thamnophis*) made up 5%, Spring Peepers (*Pseudacris crucifer*) 10%, Green Frog 5%, Eastern Redback (*Plethodon cinereus*) 40%, Northern Two-lined (*Eurycea bislineata*) 5%, Yellow-Spotted Salamander (*Ambystoma maculatum*) 0%, Blue-Spotted 0%, Eastern Newt (*Notophthalmus viridescens*) 0%. For on-campus Garter Snake (*Thamnophis*) made up 0%, Spring Peeper (*Pseudacris crucifer*) 20%, Green Frog (*Rana clamitans)* 0%, Eastern Redback (*Plethodon cinereus*) 0%, Northern Two-lined

(*Eurycea bislineata*) 0%, Yellow Spotted (*Ambystoma maculatum*) 5%, Blue-Spotted (*Ambystoma laterale*) 5%, and Eastern Newt (*Notophthalmus viridescens*) 5%. There were 13 individuals found on the trail. There was a total of 7 individuals found on campus.

On trail species percentages

Garter Snake	Spring Peeper	Green Frog	Eastern Redback	Northern Two-lined	Yellow-Spotted	Blue-Spotted	Eastern Newt
5%	10%	5%	40%	5%	0%	0%	0%

On-campus species percentages

Garter Snake	Spring Peeper	Green Frog	Eastern Redback	Northern Two-lined	Yellow-Spotted	Blue-Spotted	Eastern Newt
0%	20%	0%	0%	0%	5%	5%	5%

Figure 1: This table represents the total percentages of species found.

Unity yellow looping Trail

	Total
Eastern Redback *Plethodon cinereus*	8

Garter Snake *Thamnophis*	1
Northern Two-Lined Salamander *Eurycea bislineata*	1
Spring Peeper *Pseudacris crucifer*	2
Green Frog *Rana clamitans*	1
Total found	13

On-Campus

	Total
Spring Peeper *Pseudacris crucifer*	4
Yellow Spotted Salamander *Ambystoma maculatum*	1
Eastern Newt *Notophthalmus viridescens*	1

Blue Spotted Salamander *Ambystoma laterale*	1
Total found	7

Figure 2: Breakdown of species counted.

Discussion:

The species richness for in the woods was 5. The species richness for on campus is 4 meaning it was less rich than in the woods. More species were found in the woods than on campus. The evenness for in the woods was 0.36 meaning it was not very even. The evenness for on-campus was 0.50 meaning it was more even than off-campus. The Shannon-Weaver Diversity Index in the woods was 0.58 meaning it was not very heterogeneous. The Shannon-Weaver Diversity Index on campus was 1.15 meaning it was more heterogeneous than off-campus. This data supports the hypothesis because more species were found and with more abundance of animals.

All the species found are usual for this range. Luckily no introduced species were found, this means there is less competition for the native species. Amphibians and reptiles need all the edge they can get. As expected the Eastern Redback(Bondi, Beier 2016), as seen in Figures 1 and 2, was the most abundant around Unity. The Two-Lined Salamander was logically only found in the woods because they do not stay far from vernal pools. On-campus is too disturbed for their breeding grounds. There may have been a few reptiles found because the temperature was dropping and there was more cloud cover. The only reptile found was the Garter Snake and it was found early on in

the project when the temperatures were relatively high. Since the mole salamanders, the Yellow Spotted Salamander and the Blue Spotted Salamander were found on campus, as seen in Figures 1 and 2, this could mean they do not mind disturbed areas as long as there is soil for them (Phillips, Sexton 1989). Both were found in the grassy/dirt area by Unity 2.

Having amphibians on the trails in the forest is a good sign of a healthy ecosystem. Amphibians are sensitive to disturbances. Since they are present on the trails, one can assume that the forest is not disturbed. The forest does not have any evidence of pesticides or habitat loss. So it was a suitable habitat for amphibians such as frogs and salamanders. It was most beneficial to salamanders since they were the most common species found on the trail. The reptile such as the snake was rarely seen. It was seen slithering in the leaves but stopped moving when we passed by it. It was hard to see it until we almost stepped on it. It took off then we could see it, we tried to take a picture to identify it. Instead, it stopped and curled up in a coil shape and hissed to warn us that it would bite. At this time we took the picture and found that it was a garter snake.

One interesting thing found during one of the expeditions through the trails was the green frog. It was found under a large rock and it was the size of a human's palm. We assume that it was under the rock for protection or sleeping. Another reason could be it was getting heat from the rock while hiding. Larger rocks retain heat for a longer time. The rock was in the sun so the rock would heat up. Frogs are ectotherms so they get the heat from the surrounding. Since it was under the rock it was retaining the heat

from the rock. This is a smart adaptation because it's retaining its heat while staying away from the surface to be preyed on (Gibbs 1998). This differed from the spring peepers because they were all found in the grass.

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