

Schoolyard Investigation: Fire Ants

Background: Students who have taken early biology classes are aware that new species of any kind can have a major affect on the local ecosystem. A prime example is the cane toads that were introduced to Australia. They have wreaked havoc on vertebrates and invertebrate; the next step is to focus the students' attention on something that is invading their own environment, their backyards/schoolyard.



The students have firsthand experience with this invasive species, when the seasons change in Florida we have weeks where it rains non-stop and my room begins to flood. As the water raises the non-native red imported fire ants move into the classroom. We have to move desks and have even at times been forced to move classrooms as the student begin to get bit by these insects.

As the occurrence of these ants increase the need to understand how these invasive insects affect the native population of vertebrates and macro-invertebrates also increases.



Learning goals:

The Sunshine State Standard SC.912.L.17.8 states that grades 9-12 ecology students need to be able to recognize the consequences of the loss of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native

species. SC.912.N.1.2: Describe and explain what characterizes science and its methods. SC.912.N.1.3: Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.

Materials: available to groups of students (4)

Resource and reference books; websites

* Student field books for recording information

*Berlese funnels for finding life in leaf litter

*alcohol

*Plastic bags

*tweezers

*dissecting microscope

*Petri dishes

*graphing paper

*keys of organisms that might be found

Introductory Questions:

* Are there different types (species) of ants?

*What causes ants to move away from the colony?

* What do ants eat?

* Do ants have an effect on the organisms that live around it?

Student Generated Inquiry Questions:

* Are native ants and red imported fire ants (RIFA) able to cohabitate?

* What kind of effect do RIFAs have on native organisms?

*What organisms' are present in the company of RIFA?

* What organisms' are not present in the company of RIFA?

*Do those that are displaced just move or do they die out do to competition?

Sample Hypothesis and Prediction:

Hypothesis: RIFAs have a negative effect on the local, native populations of macro-invertebrates.

Prediction: If RIFAs have a negative effect on native macro-invertebrates then there will be fewer native macro-invertebrates in an area with RIFAs than in an area where there are no RIFAs present.

Procedure:

Pre-Investigation:

After Inquiry based questions are discussed I will take the student to the area directly outside my classroom. I will ask them to observe...look for different types of organisms present in the area where red fire ants are present. After a few minutes I will take them to an area where there are no red fire ants and ask them to do the same. Then we will go back to the classroom and discuss their observations...leading to student (open-ended) questions.

We will also discuss the organisms found...plant and animal alike. What they looked like, how they think they live and so on. They will be introduced into a key that helps them to key out the organisms that they encountered.

From here they will be directed to a hypothesis of whether fire ants have a negative affect on the population of organisms around them and then a prediction.

Experimental Procedures:

Set up: Students will count off in order to place them in their groups. When they get into their groups they will be instructed on how to build their Berlese funnel. The mesh will be layered...reason being that our soil is sand...we have very little areas where leaf litter is present...this includes grass. In order to trap the organisms we are after we will need to filter ALL samples collected.

Directions for use at sampling sites:

1. Half the groups will collect samples (as much as they can fit into a zip lock bag) from areas were fire ants are present and the other half will collect from fire ant free areas.

* I will have a measuring tape in a grid system laid out (to indicate north, south, east and west...as well as distance from the colony)

* They will start near the colony of ants and move away...if possible

2. They will place their samples in the funnel and set under heat/light source. These will sit under the lamp for about 24 hours.

3. As they are collecting their samples they will also be asked to observe other small vertebrates that are around (small birds, lizards, mice, ect.)

This could take anywhere from one to two days.

Analyzing Data: The students will use dissecting microscopes to aid them in identifying the organisms collected the prior day. They will sift through the larger material that was not allowed to pass through the mesh netting. They will also pour the alcohol solution into Petri dishes and scan for micro-invertebrates there. They will use the keys given to them to identify the organisms found. Each species will have their own collecting jar to be placed in, labeled, number of species collected, and where they were found. They will also be asked to make other observations of what types of vertebrates are in the area and number (rough).

When they have types of species and numbers of each they will be asked to present this information by using graphs. Graphs are a large part of the FCAT and this allows for extra practice.

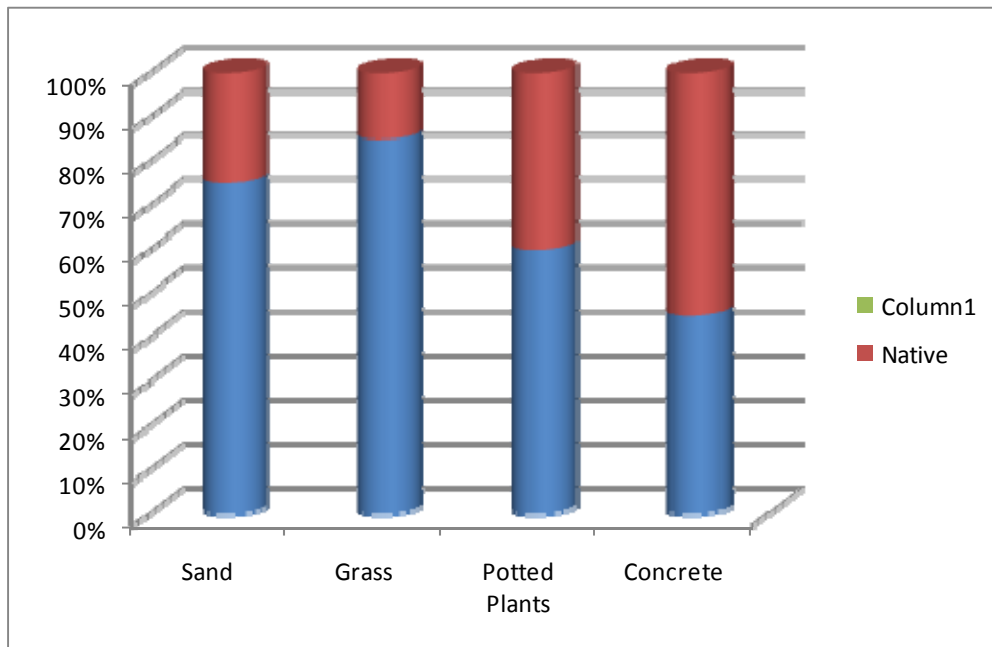
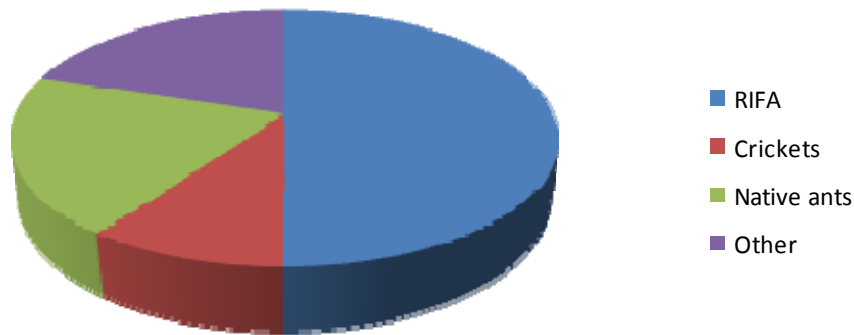
Cross-Curriculum:

Each group member will be asked to draw and label one organism they collected (no duplicates). This will be an artistic activity. I will make it known that I don't want an exact illustration of the organisms but that I want them to draw them in such a way that the organisms' key characteristics are more pronounced than their other structures. I do not want a literal interpretation of the insect.

Example: Springtail...I don't care whether the student was able to correctly draw all the body segments. What I would be looking for is the tail...whether they choose to over exaggerate it or draw in a pole vault representing the function of the tail.

After they have collected all of their data and drawn their pictures they will be asked to present their data/drawings. Linking their prediction/hypothesis to their results. They can present in a number of ways...they may use large sheets of white paper, make handouts, or they may present it in a PowerPoint setup.

A Comparison of Invasive Red Fire Ants



Resources:

www.oiee.oxford.emory.edu

mississippiantomologicalmuseum.org.msstate.edu/collecting.preparation.methods/Berlesefunnel.htm

FireAnt.net

Budget:

The budget could vary from costing nothing so possibly \$50. Will depend on how much of the material I can have the kids collect and bring in and what's available in the science

department store room.