



## Fire Ants, Crazy Ants & Zombie Ants

<b>Lesson Plan for Grades: 8</b> <b>Length of Lesson: 45 minutes</b>
<b>Authored by:</b> UT Environmental Science Institute <b>Date created:</b> 11/27/18
<b>Subject area/course:</b> <ul style="list-style-type: none"><li>• Biology</li></ul>
<b>Materials:</b> <ul style="list-style-type: none"><li>• Large Post-It Poster</li><li>• Markers</li></ul>
<b>TEKS/SEs:</b> <b>§112.20. Science, Grade 8, Adopted 2017.</b> (11) Organisms and environments. The student knows that interdependence occurs among living systems and the environment and that human activities can affect these systems. The student is expected to: (A) investigate how organisms and populations in an ecosystem depend on and may compete for biotic factors such as food and abiotic factors such as quantity of light, water, range of temperatures, or soil composition
<b>Lesson objective(s):</b> <ul style="list-style-type: none"><li>• Students will be able to identify how certain species are competing for limiting factors.</li><li>• Students will be able to predict how the introduction of a new species may impact existing populations.</li></ul>
<b>Differentiation strategies to meet diverse learner needs:</b> <ul style="list-style-type: none"><li>• The teacher should ask students whether they prefer to read or watch videos to learn about concepts; then have students learn in their preferred learning style. However, the teacher may assign students certain methods to improve their skills. For example, if a student prefers reading, teachers may have them watch a video and take notes to improve their listening skills.</li><li>• ELL students and students with learning disabilities should have multiple forms of instruction including visual and written instruction sheets as well as a verbal instruction and demonstration.</li><li>• The teacher should include captions for videos to aid students in processing information and audio.</li></ul>
<b>ENGAGEMENT (10 minutes)</b> <ul style="list-style-type: none"><li>• Begin class with a short anecdote about an invasive species<ul style="list-style-type: none"><li>○ <a href="http://www.abc.net.au/science/articles/2009/04/08/2538860.htm">http://www.abc.net.au/science/articles/2009/04/08/2538860.htm</a></li><li>○ How much the students read can be left up to the teacher's discretion. The more the student reads, the less they will discover in the hands-on activity.<ul style="list-style-type: none"><li>▪ How were the rabbits introduced to Australia? <i>Brought by humans and became a pest when they were released for hunting.</i></li><li>▪ What happened when they got there? <i>They multiplied in number</i></li><li>▪ How did the population swell to such a large number? <i>No natural predators in new environment, conditions for breeding year-round</i></li><li>▪ Why is it an "ecological nightmare?" <i>They eat all the native bush, compete with native animals for food and shelter</i></li><li>▪ How did the Australian government seek to control the population of rabbits? <i>Poisoned the bunnies, then introduced two different viruses</i></li></ul></li></ul></li></ul>



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- A video is another option:
  - [https://www.youtube.com/watch?v=RLuC\\_Aytna8](https://www.youtube.com/watch?v=RLuC_Aytna8)
    - What happens when exotic pets are released in places they're not supposed to be?  
*They multiply uncontrollably because of lack of natural predators and outcompete native species.*
  - [https://www.youtube.com/watch?v=R\\_ViOLgvsuY](https://www.youtube.com/watch?v=R_ViOLgvsuY)
    - Pablo Escobar wanted to create his own private zoo. Are hippos native to Colombia? What ended up happening to the ones that he imported?  
*Hippos are not native to Colombia. While other animals were shipped off to other zoos, the hippos were left as is and they multiplied. The animals have moved from the original site, some to hundreds of miles away.*
    - How did the population multiply so drastically?  
*There is not much to keep their population at bay. They have no natural predators or competitors. In Africa, droughts keep the population from growing to much, but these droughts do not occur in Colombia.*
    - Why does this matter?  
*Invasive species are a threat to biodiversity. Because hippos are not native to Colombia, the locals have no fear of them. It is common knowledge in hippos' native habitat of Africa that they are vicious animals but Colombians do not have the lived experience to know to stray very far from them.*
    - How did they seek to control the population of hippos?  
*Barriers, male castration, hunting*

#### EXPLORATION (15 minutes)

- Cover safety with the students- no running, no pushing, etc.
- Teacher should emphasize that honesty is of utmost importance, as being dishonest about not having “died” would distort the data.
- The teacher should indicate that the following activity is a simulation of a real-life occurrence. The following can be explained before or after the simulation: Fire ants from South America traveled aboard an agricultural ship to North America, where they spread. In an infested area, fire ants dominate and make up 90% of the ants, beating out the native population. Scientists have tried to control this using phorid flies. Ants give off a pheromone when they find food and the phorid flies find them from this and attack, so native ants can get the food. For additional exploration encourage them to watch Dr. Plowes’ talk “Fire Ants, Crazy Ants and Zombie Ants”.
- Plot population size on a large post-it poster so that students can see how the introduction of new species affects the size of the native ant population. Number the rounds and highlight where new species are introduced. For example:

	Round	Native Ant Population
	1	
Invasive Ant Intro	2	
	3	
Phorid Fly Intro	4	

- The big idea of this exercise is that resources are limited and that invasive species pose a particular challenge to this because they compete with native species for resources.



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#### RULES:

1. Split the class into 4 groups. One group is the native ant species, one is the invasive fire ant, one group is the phorid fly, and one group is resources. In a class of 25, this will be roughly 10 native ants, 5 invasive ants, 3 phorid flies, 7 resources.
2. Round one begins with native ants and resources only.
3. Since there are 10 native ants and only 7 resources, ask students to predict what will happen.
4. On “go” students should walk to find a resource by tagging them within 30 seconds. If native ants do not find a resource, they die and become a resource. Tagged resources become native ants.
5. This can be repeated one more round or move on.
6. In the next round, invasive ants should be introduced. Invasive ants, like native ants, need to find a resource to live.
7. Have students predict what will happen.
8. On “go” students should walk to find a resource by tagging them within 30 seconds. If ants do not find a resource, they die and become a resource. Tagged resources become the same ant as the student who tagged them.
9. This can be repeated one more round or move on.
10. In the next round, phorid flies should be introduced.
11. Have students predict what will happen.
12. On “go” students should walk to find a resource by tagging them within 30 seconds. If an **INVASIVE** ant is touched by a phorid fly, it dies and becomes a resource. Phorid flies can tag as many invasive ants as possible in the allotted 30 seconds, given that they are walking.

Rules can be changed at the discretion of the teacher. For example, if there are very few invasive ants in step 10, a restriction can be put on phorid flies to wait 5 seconds after each tag to tag again.

#### Summary of roles:

Native Ants: tag a resource. If fail, die and become a resource. If successful, resource becomes a native ant.

Invasive Ants: tag a resource. If fail, die and become a resource. If successful, resource becomes an invasive ant.

Phorid Flies: tag an invasive ant. If successful, invasive ant dies and becomes a resource.

#### EXPLANATION (15 minutes)

- Ask students to predict what a graph of this simulation would look like. Students should label the X axis with time or rounds and indicate where the invasive species and the biological control is introduced.
- Show the data and have the students graph the points on graphing paper.
- Have students discuss the trends in the data as groups. What happened to the native ant population before and after the invasive species was introduced? What happened to the native ant population after the phorid fly was introduced? What does this have to with the invasive ants?
- Probe for explanation in answer to these questions.
- After considering and discussing these questions, the teacher should select students to come up to the doc cam to explain their findings.
- What is the relationship between phorid flies and fire ants?  
*Parasitism- fire ants die as a result of the phorid fly's actions*

#### ELABORATION (5 minutes)

- Question for discussion: What are some other things that could be used to control an invasive species?  
*viruses, disease, poison, home destruction*



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- What vocabulary will be introduced and how will it connect to students' observations? Carrying capacity, limiting factors, limited resources will be introduced to connect that the ecosystem can only support a limited number of individuals and that invasive species pose a problem for this.
- This can be connected to our daily lives as we, like other species, are subject to certain limitations on population growth. This will pose a problem in the coming years as the world population is projected to reach more than 9 billion by 2050, and we need to find ways to meet the demand for food.
- This can also be connected to the Great Famine in Ireland, in which potato blight and the resulting decrease in the availability of food severely limited carrying capacity and led to a million deaths from starvation.
- Possible career connections: Farming, where the use of advanced agricultural technology will allow us to increase carrying capacity and help meet food demands. Biology with an interest in conservation.

#### **EVALUATION (throughout entire lesson)**

- Teacher should ask probing questions throughout the lesson to gauge student understanding and use the feedback formatively to adjust instruction.
- At the end of the lesson, the teacher can issue an exit ticket as a summative assessment.

#### **SOURCES AND RESOURCES**

- **Dr. Rob Plowes' *Hot Science – Cool Talks #115*, "Fire Ants, Crazy Ants & Zombie Ants",** <http://www.esi.utexas.edu/talk/fire-ants-crazy-ants-zombie-ants/>
- **ABC Science**, <http://www.abc.net.au/science/articles/2009/04/08/2538860.htm>



### Fire Ants, Crazy Ants & Zombie Ants

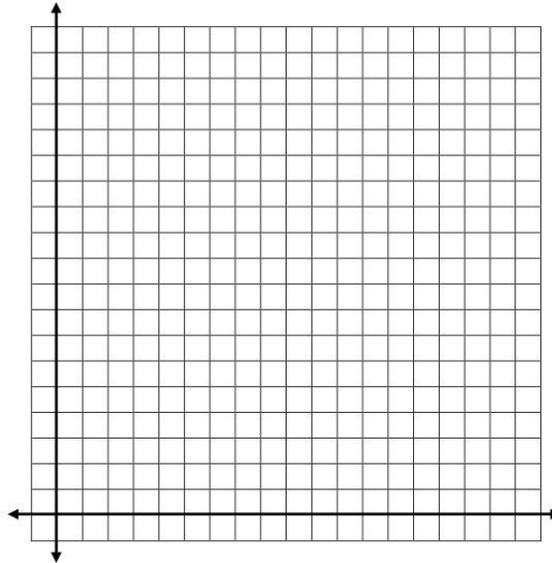
**STUDENT HANDOUT:**

Name \_\_\_\_\_  
Period \_\_\_\_ Date \_\_\_\_\_

**Invasive Species and Limiting Factors**

Record and graph the population of native ants over time. Label the axes and indicate where new species were introduced.

Round	Population
1	
2	
3	
4	
5	
6	



1. What happens when a new species is introduced to an ecosystem? Why?
2. What happens when a parasite/predator of an invasive species, also known as a biological control, is introduced?
3. Why do invasive species pose a problem in the first place?
4. Why can't both the native ant species and the invasive ant species keep growing in number?
5. A population of trees, like the ants, cannot grow infinitely large. Why not?
6. What are some examples of limiting factors (anything that can limit a population's growth)?



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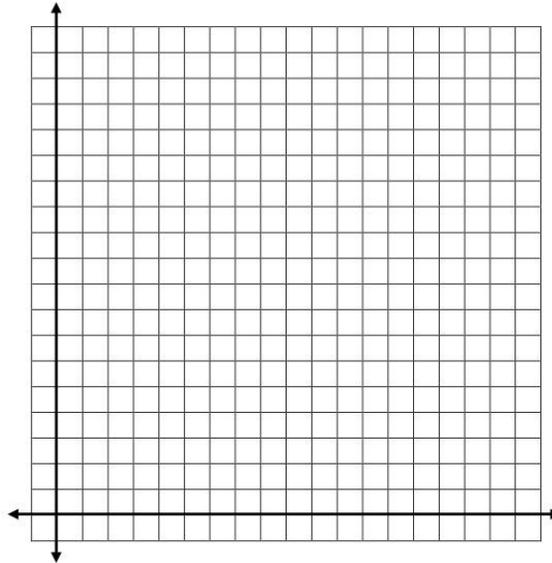
#### TEACHER HANDOUT:

Name \_\_\_\_\_  
Period \_\_\_\_ Date \_\_\_\_\_

#### Invasive Species and Limiting Factors

Record and graph the population of native ants over time. Label the axes and indicate where new species were introduced.

Round	Population
1	
2	
3	
4	
5	
6	



1. What happens when a new species is introduced to an ecosystem? Why?  
They compete for resources and the population of the species that had been there first declines drastically.
2. What happens when a parasite/predator of an invasive species, also known as a biological control, is introduced?  
They kill the invasive species, helping to control the population. This also allows the native species to regenerate.
3. Why do invasive species pose a problem in the first place?  
They compete with native species for resources and since they commonly don't have natural predators in the new area, will multiply very quickly.
4. Why can't both the native ant species and the invasive ant species keep growing in number?  
There are limited resources. This means that only a certain number of organisms can be supported by an ecosystem at once.
5. A population of trees, like the ants, cannot grow infinitely large. Why not?  
Trees compete with other plants for resources such as water, soil, and nutrients.
6. What are some examples of limiting factors (anything that can limit a population's growth)?  
Water, food, disease, predation, natural disasters, shelter, oxygen.