

Lesson Plan:

Invasive Species and Population Growth

Questions to be Answered:

1. What is population growth?
2. What factors affect population growth?
3. What is an invasive species?
4. How can invasive species affect population growth of native species in the same community?

Presentation only:

- The main presentation consists of slides 1-15. It should take one 50- minute class period; though this may vary depending on the amount of discussion created by the discussion questions (should you incorporate them).
- The scripted presentation can be downloaded from www.protectingusnow.org.
 - Be sure to go over the text ahead of time, tweaking it as you need to for your audience. In addition, all 3 activities are included in the presentation, so be sure to remove the ones you do not wish to do.
 - You do not have to include the references slides in your presentation.
- Standards Covered:
 - National Science Education Life Science Standards Grades 5-8:
 - The number of organisms an ecosystem can support depends on the resources available and abiotic factors, such as quantity of light and water, range of temperatures, and soil composition. Given adequate biotic and abiotic resources and no disease or predators, populations (including humans) increase at rapid rates. Lack of resources and other factors, such as predation and climate, limit the growth of populations in specific niches in the ecosystem.
 - Sunshine state standards SC.7.L.17.3:
 - Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites.
 - The focus of this presentation is how invasive species can affect the population growth of a native species through disease (or disease transmission), competition, and predation.
 - The text provided at the bottom of the slide is meant to aid the presenter. It is not meant to be read verbatim. Please feel free to go into more detail or less detail as needed.
 - In addition, feel free to rearrange the slides, change the text on the slides, and even use different regional examples.

Student Activities:

Activity #1 – Manipulating the Carrying Capacity:

- The presentation of activity #1 consists of slides 16-18. It should take fifteen minutes to go over these slides.
 - This introduces the activity and walks the students through the handout “Manipulating the Carrying Capacity”.
- This is a long term project that lasts 4 weeks.
- The initial set-up of this experiment should take thirty minutes.
- The students will need 30 minutes of class time to take the additional data.
- Discussion and graphing of the results should take one 50-minute class period.

Teacher preparation for Activity #1:

- The scripted presentation can be downloaded from www.protectingusnow.org.
 - Be sure to go over the text ahead of time, tweaking it as you need to for your audience. In addition, all three activities are included in the presentation, so be sure to remove the ones you do not wish to do.
- Download student handout “Manipulating the Carrying Capacity” from www.protectingusnow.org.
 - Make as many copies as you have students.

Materials for Activity #1:

- You will need fifteen 10oz. plastic colored cups (not clear), ten sandwich containers, five petri dish lids, construction paper, lab tape (or masking tape), markers, fertilizer mix, access to a window or a light source with a bulb made for growing plants, three gallons of spring water, magnifying glasses, rulers, and duckweed (*Lemna minor*).
 - You can order *Lemna minor* online or you can go to an aquatic plant nursery or aquarium store and see if they will donate some to your class. You can also go to a pond and get it yourself.
 - Mix one liter of spring water with two teaspoons of fertilizer mix to make the “nutrient water”. Be sure to label it.
 - You can build a light bank with a shop light and two grow plant bulbs. Ideas for how to build one can be found [here](#).

Directions for Activity #1:

- Students need to be placed into five groups.
- They will collect data for their plants twice a week for four weeks and record it in the handout.
- After four weeks, the students will share their data and graph it in their handout. Then they will estimate the carrying capacity for each group’s graph.
- Students will then answer the questions at the end of the handout.

Additional Standards Covered:

- National Science Education Inquiry Standards Grades 5-8:
 - Different kinds of questions suggest different kinds of scientific investigations. Some investigations involve observing and describing objects, organisms, or events; some involve collecting specimens; some involve experiments; some

involve seeking more information; some involve discovery of new objects and phenomena; and some involve making models.

- Mathematics is important in all aspects of scientific inquiry.
- Science advances through legitimate skepticism. Asking questions and querying other scientists' explanations is part of scientific inquiry. Scientists evaluate the explanations proposed by other scientists by examining evidence, comparing evidence, identifying faulty reasoning, pointing out statements that go beyond the evidence, and suggesting alternative explanations for the same observations.
- Sunshine state standard SC.7.N.1.1:
 - Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
- Sunshine state standard SC.7.N.1.2:
 - Differentiate replication (by others) from repetition (multiple trials).
- Sunshine state standard SC.7.N.1.4:
 - Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.

Activity #2 – Estimating the Carrying Capacity:

- The presentation for activity #2 consists of slide 19. It should take about 5 minutes to go through.
 - This introduces the activity and walks the students through the handout “Estimating the Carrying Capacity”.

Teacher preparation for Activity #1:

- The scripted presentation can be downloaded from www.protectingusnow.org.
 - Be sure to go over the text ahead of time, tweaking it as you need to for your audience. In addition, all 3 activities are included in the presentation, so be sure to remove the ones you do not wish to do.
- Download student handout “Estimating the Carrying Capacity” from www.protectingusnow.org.
 - Make as many copies as you have students.

Materials for Activity #1:

- You will need several 10in X 10in boxes, three bags of kidney beans, rulers, the grid, and plastic cups for this activity.
 - Assemble the boxes, sealing the bottom of the box, but removing the flaps for the top of the box.
 - Print as many grids as you have boxes (grid can be downloaded from www.protectingusnow.org). Glue the grids to the bottom of the boxes.
 - The grid measures 10in X 10in, so you will need to use a printer that can print the grid to actual size (such as a poster printer). If your school does not have one, a print shop can help you out.

Directions for Activity #1:

- Separate the students into groups of two or three.
- Give each group a box, a half a bag of kidney beans, a ruler, and a plastic cup. Have them complete the worksheet.

Additional Standards Covered:

- Math standards can be applied to this activity.

Activity #3 – Computer Lab:

- The presentation for activity #3 consists of slide 20. It should take about five minutes to go through.
- This activity should only take one 50-minute class period though you can also assign it for homework.

Teacher preparation for Activity #1:

- The scripted presentation can be downloaded from www.protectingusnow.org.
 - Be sure to go over the text ahead of time, tweaking it as you need to for your audience. In addition, all 3 activities are included in the presentation, so be sure to remove the ones you do not wish to do.
- In addition, be sure to reserve the computer lab.
 - You will need to check that your school does not have the site blocked.
 - You will also need to make sure that the appropriate Flash plug-in is downloaded on the computers you intend to use. You may need to contact your IT person for help with this if it requires an administrator’s password to download free software from the web.
- Create an account for accessing the module.
 - You can also access the log in page directly from [here](#).
 - You need to create a username and password. An email asking you to confirm the account will be sent within a few minutes. Be sure to confirm the account so that you and your students can complete the module.
- Normally, students would need to have their own email address so that they can create an account to take the module and the associated quiz. If your students have their own school email, then have them create their own account.
- If your school does not offer email to the students, they can use your username and password for the activity.
 - Multiple students can use the same username and password at the same time.
 - However, they will not be able to take the associated quiz. Instead, you can use student handout “Invasive Species and Population Growth Exploration”.

Materials for Activity #1:

- The students will need access to a computer (with internet) for this activity.
 - The link to the module can be found at www.protectingusnow.org, under K-12 Lesson Plans. Choose “Click to take the e-learning module”.
 - You can also access the log in page directly from [here](#).
 - The module title is “Invasive Species and Population Growth – grade 7”.
 - Have the students log in either using your username and password or their own.

Directions for Activity #1:

- Follow the directions given in the module.
- If the students are using your login, have them fill out student handout “Invasive Species and Population Growth Exploration” as they go through the module.
 - This can be turned in for credit at the end of the module.
- If the students are using their own login, have them follow the directions given in the module. When the student is ready to take the quiz, click EXIT from the module, then choose the “Take Module Quiz” icon which is located next to the module icon.

- If the student scores 70% or better on the 10 question quiz, they can download a certificate of completion, print it, and turn it in to you for a grade.
 - They can take the quiz multiple times if they need to.
 - If there is a problem printing off the certificate of completion, you can always have the students print the screen showing their test score.
 - In addition, you can contact Stephanie Stocks at sstocks@ufl.edu if there are any other technical difficulties.

Additional Standards Covered:

- Technology standards can be applied to this activity.