

Florida Key Deer Population Study

Overview

Students will be engaged by a video showing the Florida Key deer and how they are threatened. Students will then carry out Internet research to discover more about the deer. They will apply animal census techniques in a simulation using beans designed to show the difficulties biologists face in determining the size of a population. The activity will close with a discussion of how the deer can be helped to survive.

Objectives

Students will be able to:

- Collect, organize by table, and examine census data in a simulation
- Estimate the size of the population in the simulation
- Make predictions based on the collection of census simulation data
- Make journal entries to justify conclusions reached in the simulation

Common Core Standards--Develop abilities necessary to engage in scientific inquiry and understandings about scientific inquiry

Statistics and Probability:

Develop understanding of statistical variability 6.SP

Use random sampling to draw inferences about a population 7.5

Ecosystems

Analyze the interdependence of living organisms within their environments

Understand the impact of human activities on the environment

Speaking and Listening

Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher led) with diverse partners.

Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.

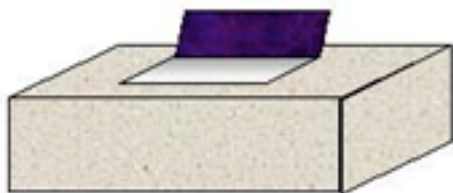
Essential Standard 6.TT.1 Use technology and other resources for the purpose of accessing, organizing, and sharing information

Essential Standard 7.G.1 Geography and Environmental literacy -- Understand how geography, demographic trends, and environmental conditions shape modern societies and regions.

Prep for Teachers

Prepare the forest boxes. If you are using clear plastic shoeboxes, cover the sides with dark construction paper or contact paper so students cannot see inside. Cover the inside bottoms with the green wrapping paper to represent forest floor vegetation. Place 4 red kidney beans, 3 pink beans, 3 pinto beans, and 6 lentils into each box. Cover the top with dark construction paper or contact paper except for a 4" x 4" clear window covered by a flap of wax paper, which is covered by a flap of dark construction paper.

Your box will look something like this:



Use the blank key (see Student Materials) to prepare an animal key for each group. Use white school glue to paste a red kidney bean in the "adult" box, a pink bean in the "juvenile" box, a pinto bean in the "fawn" box, and a lentil in the "other animal" box.

Copy enough student handouts for each student or team. Cut out Student Role Cards (see Student Materials).

Cue the videotape. Bookmark the Web sites you will be using in the lesson. Load the plug-ins needed for the Web sites (Real Audio and QuickTime, Real, or Windows Media).

When using media, focus students for media interaction with a specific task to complete and/or information to identify during or after viewing of video or interaction with Web sites.

Introductory Activity

Step 1:

Tell students they are going to be scientists whose responsibility it is to record Florida Key deer populations. Tell the students the name of the lesson. Elicit from the students the ways in which scientists work. (Scientists work in a systematic way, collaborate, make predictions or hypotheses, test, etc.).

Step 2:

Cue the video

<http://www.youtube.com/watch?v=TXyYXLxgtnc>

Interactive map of National Key Deer Refuge

<https://floridakeys.micromaps.com/m/view.php?id=286279>

Focus students for media interaction by asking them to determine where Florida Key deer are found and how they are in danger.

Step 3:

Tell students they we need to get a better idea of where the Florida Keys are located. Have students go to Google Earth and type in "Watson Boulevard, Big Pine Key, Florida . (If you type in National Key Deer Refuge the destination will be marked in the center of refuge territory which happens to be in the water!) But Watson Boulevard will take you to the center of refuge territory on land. Clicking on photo icons will provide photos of Key deer and will also provide a feel for the deer's habitat.

Focus students for media interaction by asking them to describe in their journals where the Florida Key deer refuge is in relation to the rest of the U.S. To find this, they should use the zoom out (magnifying glass with a "-") feature until they can see the entire United States. Allow for group sharing. (The Florida Keys are to the south and west of the Florida peninsula).

Ask students if they know what a national wildlife refuge is. Some facts are:

- The National Wildlife Refuges are a national network of lands and waters for the conservation and management of fish, wildlife, and plant resources and their habitats
- The U.S. Fish and Wildlife Service is the principal Federal agency for conserving, protecting, and enhancing fish, wildlife, plants, and their habitats.
- They manage the 93-million-acre National Wildlife Refuge System with more than 530 individual refuges, wetlands, and special management areas -- and their 100th anniversary will be in 2003.

Step 4:

Tell students they are now going to learn more about the Florida Key deer. Focus students for media interaction by asking them to list the significant differences between Florida Key deer and other deer, and to describe what other adaptations Key deer might have to live in this area. Tell students that they will now share everything they know about the Florida Key deer using the think-pair-share-square technique as described in step 5. Advise them they will first work alone, then in pairs, then in "squares" of four.

Step 5:

Hand out the KWL Organizer (see Student Resource Materials). Have students write all they know about Florida Key deer behavior and ecology in the "K" column and what they would like to know in the "W" column. Some possible questions to help students with as you circulate around the room are:

- How big are the deer?
- What do they eat?
- Where do they live? How many are there?

Now have students form pairs to share what they know and what they want to know. Have them answer as many of each other's questions as possible and add to their charts. Have pairs come together to form teams of four. Again, have students share what they know and what they want to know. Have them answer as many of each other's questions as possible and add to their charts. Students will stay in these teams of four for the remainder of the lesson.

Learning Activities

Step 1: Internet Research

Web Sites for Small Group Work:

A: History of Saving Key Deer

<https://www.youtube.com/watch?v=nNucY2aDiRs>

B: Big Pine Key and Key Deer

<http://www.floridakeys.com/lowerkeys/keydeer.htm>

History of the Key Deer on the islands

C: U.S. Fish and Wildlife Service

<http://nationalkeydeer.fws.gov//index.html>

This site contains important and interesting facts on the U.S. Fish and Wildlife Service National Key Deer National Wildlife Refuge.

D: Survival Issues of Key Deer

<https://www.youtube.com/watch?v=r6GX7tZiPFk>

E: The Florida Keys & Key West Guide

<http://myfwc.com/wildlifehabitats/profiles/mammals/land/key-deer/>

Focuses on why feeding Florida Key deer is harmful to them.

F: What's Killing the Key Deer

<http://bit.ly/2ceMORV>

Description of controversies, habitat, other threatened species, climate, etc.

G. (If needed) <http://bit.ly/2cFBX5T> Saving the Diminutive Deer of the Florida Keys

Remind students to note resource dates when possible. Discuss how statistics may have changed overtime and follow up discussion as appropriate.

Let students know they are beginning their research. Assign one Web site (A through F), to each team of four. Focus students for media interaction by asking them to spend fifteen minutes on Internet research in their assigned Web site to determine if their K's are correct and to try to answer as many W's as possible from their KWL organizers. Ask them to add any new facts to their "L" column. Allow the students fifteen minutes for their Web exploration. When fifteen minutes are up, bring the class together again to share. Students should make the necessary corrections and additions to their organizers during the sharing. Some important facts about Key deer that students might include are:

- They are a subspecies of the white-tailed deer.
- They inhabit Big Pine Key and various surrounding Keys and are found nowhere else in the world.
- They are the smallest of all white-tailed deer, with a shoulder height of 24-32 inches.
- There were only 50 animals left in the 1940s due to hunting and habitat destruction.
- The population has increased and stabilized to about 300 deer since 1957, when the national Key deer refuge was established. (Note to teacher: Update this population number to the most recent data found.)
- Fawns are born April through June.
- They feed on native plants such as mangrove.
- Fresh water is essential for their survival.
- Feeding them is harmful for many reasons and is prohibited by federal law.

Step 2:

Write the following focus question on the board, "How do scientists count deer?" Give students two minutes to share their ideas about this question with their team partners and add new ideas in their journals. If there is disagreement, ask students to try to come to consensus. Give teams ten minutes to report out to the whole class. Accept all answers. Explain or reinforce that animal populations are difficult to estimate. Tell students they are now ready to begin their work counting deer populations.

Step 3:

Have students come together again in their teams of four. Let students know they will begin to conduct a census of an animal population with their teammates. Hand out Student Role Cards (see Student Materials) to each team and assign roles (Materials Manager, Researcher, Tracker, and Communicator).

Have students read aloud their roles to their teammates. Explain to students that they will each be observing and recording the number of deer sighted on four different days. Explain that there will be adult males (stags), adult females (does), juvenile deer, and young (fawns). There may also be other, smaller animals in the forest. Ask the materials managers to get one forest box and one key each. Ask teammates to describe to each other the characteristics of each type of bean representing a deer or forest animal. This will enable them to recognize the beans during the brief census. Tell them to keep the flaps closed until you tell them.

Step 4:

Tell researchers to shake each box and place it on a level surface. When you give the researchers the start signal, they are to open both flaps. The first student in the team is to be poised to look into the box to make an observation. When the flap is opened, the observer is to count what he or she sees, and the researchers are to close the flaps when you give the stop signal. Give the start signal, time for three seconds, and give the stop signal. Have the observer record what he or she saw on his or her recording sheet.

Repeat this process for the other three members of the team, beginning with the shaking of the forest box. The box is shaken each time to simulate the movement of deer throughout their range.

Step 5:

Ask students to record in their journals the difficulties they had in counting. Allow time for sharing. Ask them to describe how real deer move and what problems they might have in counting them. (They move around, you can't tell if you've counted one before, they might be hiding in areas you can't see, you can't always tell what kind of deer you are counting or if it's a deer at all.) If it hasn't been offered, ask whether one observation is enough. (No, because they are always on the move.)

Step 6:

Let the students know they will be making three more observations. Allow for a transition to the next day. (Lights off/on, have students put their heads down for ten seconds, etc.) Explain that it is Day Two and ask students to follow the same procedure: shake the forest, lift both flaps on the signal, time them, close flaps on the signal, and record in their tables. Allow each member of the team to make an observation.

Again allow for a "day" to pass. Now it's Day Three, and it's raining. Ask students to follow the same procedure, but this time lift only the top flap so they have to count through the wax paper. Have them record results in their tables.

Again allow for a "day" to pass. Now it's the final, fourth day. Ask students to follow the same procedure as in Days One and Two: shake the forest, lift both flaps on the signal, count, close flaps on the signal, and record in their tables.

Ask students to record in their journals the difficulties they had in counting on Days Two, Three, and Four. Was a rainy day any more difficult? Allow time for sharing.

Culminating Activity

Step 7:

Ask students to predict the total number of adult, juvenile, and young deer based on their observations. Have students record their reasoning in their journals. Students can use any process to estimate the population as long as they can clearly explain their thinking. Allow time for sharing. Allow students to open the top of their forest boxes to see the actual population of beans. Ask students to evaluate their predictions in light of the real population. Allow time for reaction and discussion. If you need to guide the discussion, you can ask the following questions: What surprised you about the real population?

- Can you compare and contrast your prediction with the real population?
- How did the teams' predictions vary?

Students will realize that their predictions are way off. Guide them during this discussion to see that these are the same difficulties and frustrations real biologists face.

Step 8:

"How do you think people in the Keys can help the deer survive?"

***See the author notes in the back of *Island Sting* by Bonnie J. Doerr for recent improvements in the Key deer's environment that help their survival.** (People can control their pets, drive safely and slowly, refrain from cutting down native plants, and cooperate with the U.S. Wildlife Management to keep habitat for deer to roam freely.) Ask students what they would do. Allow debate.

Extension

TECHNOLOGY

Have students create a three-column table with word processing software (e.g., Word) to compare and contrast the difference between sunny day versus rainy day observations (see example below). Have them draw conclusions.

	Observation	Sunny Day	Rainy Day
	Number of Deer		
	Ease in seeing deer		

Extension: Essential Standard Geography and Environmental literacy 7.G.1. Climate change threatens wildlife population in Florida Keys and around the world

Cue 2010 U.S Fish and Wildlife Service video. Focus students for media interaction by asking them to note:

1. How is climate change affecting our nation's fish and wildlife species now ?
2. How will climate change impact our society in terms of food, jobs, and recreation?
3. Consider how these changes may affect the Florida Key deer.

<https://www.youtube.com/watch?v=bOajXr60t0A>

Florida Key Deer Population Study Lesson plan adapted from: "Hi, Deer! Estimating the Size of the Florida Key Deer Population by Census Simulation" by Master Teacher Thomas Beard Trocco.

Student Resource Materials:

Student Activity Steps

Introductory Activity:

- Step 1. Discuss the ways in which scientists work.
 - Step 2. Answer the Focus for Media Interaction question after viewing a video.

 - Step 4. Use the KWL Organizer to record what you know and what you would like to know about deer behavior and ecology.
 - Step 5. Add to and/or change your ideas after you confer with other students.
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Learning Activities:

- Step 1. Spend 15 minutes with your team in Internet research to determine if your K's are correct and to try to answer as many W's as possible. Make the necessary corrections to your organizers during the sharing.
 - Step 2. Think-Team-Share: How do scientists count a deer population? Work individually for 2 minutes and write in your journals what you know. Share your ideas with your teammates and add new ideas in your journal. If there is disagreement, try to come to consensus.
 - Step 3. Read your role aloud to your teammates. Managers get a box and animal key. Study and discuss the key. Make sure you know what each type of bean represents.
 - Step 4. The following is done 4 times, once for each team member. Researchers shake the box. When you are given the start signal, researchers open both flaps, the first student records what he or she sees, and the researcher closes the flaps when given the stop signal. Record what you saw on your recording sheet.
 - Step 5. Record in your journals the difficulties you had in counting. Answer Focus for Media Interaction question.
 - Step 6. When Day Two comes, follow the same Step 5 procedure. Record results in your table. Day Three is a rainy day. Follow almost the same Step 5 procedure, but this time lift only the top flap so you have to count through the wax paper. Record results in your table. When Day Four comes, follow the same Step 5 procedure. Record results in your table. Record in your journals the difficulties you had in counting on Days Two, Three, and Four. Was a rainy day any more difficult?
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Culminating Activity/Assessment:

- Step 8. Predict the total number of adult, juvenile, and young deer based on your observations. Record your reasoning in your journals.
- Step 9. Answer the Focus for Media Interaction question. Revise your KWL Organizer if necessary.

Extensions: **Technology** - Compare observations on sunny and rainy days
Geography - View video and respond to questions.

Deer Census Key

Type of Bean	What IT Represents
	Adult deer: can be males (stags) or females (does)
	Juvenile deer
	Baby deer (fawns)
	Other forest animals (squirrels, raccoons, porcupines, foxes, pheasant, etc.)

Deer Census Recording Sheet

Name: _____

Teammates: _____

Date: _____

Type of Deer	Day			
	1	2	3	4
Adult deer sighted				
Juvenile deer sighted				
Fawns sighted				
Other animals sighted				

Student Role Cards	
<p>Materials Manager</p> <p>The Materials Manager's job is to pick up, distribute, and return all materials* to their proper place.</p> <p>*In this activity, the forest boxes and keys.</p>	<p>Researcher</p> <p>The Researcher's job is to help* the Scientist find resources.</p> <p>*In this activity, shake the forest boxes to simulate deer movement and open the flaps.</p>
<p>Communicator</p> <p>The Communicator's job is to visit other communicators to ask for help when needed.</p>	<p>Tracker</p> <p>The Tracker's job is to help the team follow the steps.*</p> <p>*In this activity, read aloud from the student steps and make sure all steps are followed in the correct order.</p>

KWL Organizer: Florida Key Deer

K

What you already **KNOW**

W

What you **WANT** to know

L

What you have **LEARNED**