

# HUNTINGTON BEACH

## STATE PARK

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Huntington Beach State Park offers a wide variety of nature-based and history-based educational opportunities to its visitors. Its diverse habitats include beach, sand dunes, salt marsh, freshwater marsh, brackish marsh, maritime forest, rock jetty and maritime grasslands. Many of these habitats exist in close proximity to each other, leading to an exceptional abundance of wildlife habitat. Most of these habitats are also easily accessible to the public for nature study and wildlife viewing. In fact, Huntington Beach is considered by many birders to be the best site for bird watching in South Carolina.

The park's Education Center contains an exhibit hall featuring a touch tank, several aquariums, a number of live animal exhibits (including a baby alligator), and a variety of interactive exhibits. The Education Center also contains a classroom with a number of compound and dissecting microscopes, audio-visual equipment, a wet lab with a dozen aquariums and a variety of living and preserved marine organisms,

and the "Eco Lab" with a plankton farm and biotope aquariums representing the different wetland habitats of the park.

Huntington Beach is also the site of the historic "Atalaya" castle. The former winter home and studio of noted American sculptress Anna Hyatt Huntington and her husband, Archer Milton Huntington. Atalaya is also listed as a National Historic Landmark.

### Directions

From Murrells Inlet: Drive 3 miles south on Hwy 17. Park entrance is on the left.

From Georgetown: Drive 20 miles north on Hwy 17. Park entrance is on the right.

### Reservations and Program Information

For reservations, contact:

Mike Walker

Interpretive Ranger

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Photos by Brian Gomsak

Huntington Beach



# Huntington Beach: *Pre-Site*

*Content Area:*  
Science & Math

*Grade Level:*  
7

*Time to Complete:*  
45 minutes

*Title of Program:*  
Fiddling with Estimating Populations

## South Carolina State Standards Addressed

### Science

#### Standard

7-4 The student will demonstrate an understanding of how organisms interact with and respond to the biotic and abiotic components of their environment.

#### Indicators

7-4.1 Summarize the characteristics of the levels of organization within ecosystems (including populations, communities, habitats, niches, and biomes).

7-4.3 Explain the interaction among changes in the environment due to natural hazards (including landslides, wildfires, and floods), changes in populations, and limiting factors (including climate and the availability of food and water, space, and shelter).

## Lesson Description

The following activity was designed for teachers to introduce the organism, the fiddler crab, and to show how individuals and therefore populations fit into an ecosystem. The students will find out the average number of individuals in a given area.

## Focus Questions

What is a population?

*(It is made up of all individuals of a particular species that occur together at a given place and time.)*

What makes up an ecosystem?

*(Animal populations interact with one another as well as with their environment to form an ecosystem.)*

Why do scientists use the metric system?

*(They use it as a way to standardize measurements by having one basic measurement system.)*

## Culmination Assessment

See post-site activities.

## Materials and Equipment

- One "X" Colony sheet for each group
- Scissors and cardboard for cutting out the sample plot squares.
- Matching vocabulary handout
- Lecture material

## Teacher Preparation

Complete steps in "Plan your Discovery" and complete the pre-site activity prior to the field trip (an on-site visit with a naturalist at the park can be arranged to go over the activity if desired).



## Procedure

### Background Information

The instructor should describe the fiddler crab's physical characteristics, where and how it lives, some of its habits, and how it fits into the larger ecosystem. The following paragraphs may be helpful in this discussion. Students who have visited a salt marsh may be familiar with the fiddler crab and may have comments for the class.

The fiddler crab (*Uca*) lives in large colonies in the mud-flat areas of the salt marsh. It belongs to the phylum Arthropoda—the same as spiders and insects. Biologists estimate herds of 1 million fiddler crabs per acre. They are approximately 1 inch in diameter (2.54 cm). The male is larger than the female and has one greatly enlarged claw which is usually located on the right side. Males use this claw primarily to attract females to their burrows for mating. It may also be used as a weapon and to scare off other males. If it gets torn off by a rival male or a predator, the smaller left claw will develop into a new large claw. A new small claw grows from the old stub. Crabs have hard shells that do not grow with them. Therefore, they periodically have to make new soft shells underneath the old hard shell. The hard shell then breaks open along the back and the crab pulls itself free. It will then inflate this soft shell with seawater and harden it by extracting minerals from the seawater. This process is known as molting.

A fiddler crab eats with its small claw. It spoons up marsh mud and filters it for detritus. Detritus is composed of rotting *Spartina* grass and the fungus and bacteria decomposing it. Fiddler crabs live in burrows that they dig in the mud. Each fiddler crab has its own burrow which serves several purposes. The crabs use the burrows for mating. Fiddlers also use them for protection during incoming tides from predators such as birds and blue crabs. The fiddler

crabs scurry into their burrows very quickly when they sense danger. Once inside, the crabs plug the entrance to the burrow with little pellets of mud, making an effective hiding place.

A population is made up of all individuals of a species that occur together at a given place and time. Several animal populations interact with one another and their environment, forming an ecosystem. Many of these interactions can be determined and discussed. The role, or niche, that fiddler crabs play in an ecosystem is determined by looking at their place in the food web.

The major source of energy for most ecosystems is sunlight. The sunlight that enters an ecosystem is used by producers through photosynthesis. An example of this is the marsh grass, *Spartina*, which grows throughout the salt marsh. *Spartina* uses sunlight to make energy, and in turn provides energy for something else. When this marsh grass dies, the fiddler crabs can then consume this detritus (dead stuff), which supports a large population of fiddler crabs. Many animals including blue crabs, fish, wading birds, raccoons, and more eat fiddler crabs. Fiddler crabs have an important niche to fill in the salt marsh ecosystem.

Food is not an unlimited resource however. There is only so much food to support an ecosystem. A population can only grow as big as the resources around it will allow. This is referred to as the carrying capacity, or maximum number of animals that can live in an area. There are other factors which contribute to limiting a population—the availability of water, space, and shelter. Other abiotic factors can contribute as well, such as availability of light, air, and water, range of temperature, salinity, water pressure, and soil composition. Humans can have a negative impact on the environment, such as pollution which then contributes to a reduced carrying capacity.



## Activity

1. Divide the students into groups of four.
2. Each group should cut out one square plot from the cardboard (for example: a 2 in. x 2 in. plot or 4 in.<sup>2</sup> ).
3. Pass out one "X" Colony sheet to each group. Each "X" represents one individual in a population in the measured area (3 m. x 4 m.).
4. Each student randomly throws the square onto the colony sheet and outlines it where it falls. There should be 4 squares drawn on the page. Some may overlap.
5. Count the X's in each outlined square and divide by the # of square plots drawn on the page (4). This will give the students the average number of X's per square meter.
6. The students now need to find out the size of the area our "X" colony lives in. Multiply the length by the width (4 m. x 3 m.). Multiply the average number of individuals by the area. This will give you the total estimate of the X's.
7. Last, count each "individual" on the "X" colony sheet to see how close the estimate is to the ACTUAL number of "individuals."

## Notes

To simplify calculations, the measurement of meters will be used, although the students are measuring out the plots in inches. A 2 in. x 2 in. plot will be considered as a 1m x 1m plot.



# Activity - Matching



## Key Words:

- Carrying Capacity
- Abiotic
- Niche
- Salinity
- Bacteria
- Molt
- Centimeter
- Detritus
- Species

## Match words with their definitions:

- \_\_\_\_\_ to shed an old shell
- \_\_\_\_\_ maximum number of animals that can survive in a habitat
- \_\_\_\_\_ non-living factors such as water, space and shelter
- \_\_\_\_\_ a single kind of plant or animal
- \_\_\_\_\_ a unit of the metric system
- \_\_\_\_\_ amount of salt dissolved in seawater
- \_\_\_\_\_ earliest life-form, single-celled
- \_\_\_\_\_ the role a species plays in its environment
- \_\_\_\_\_ dead organisms or organic matter

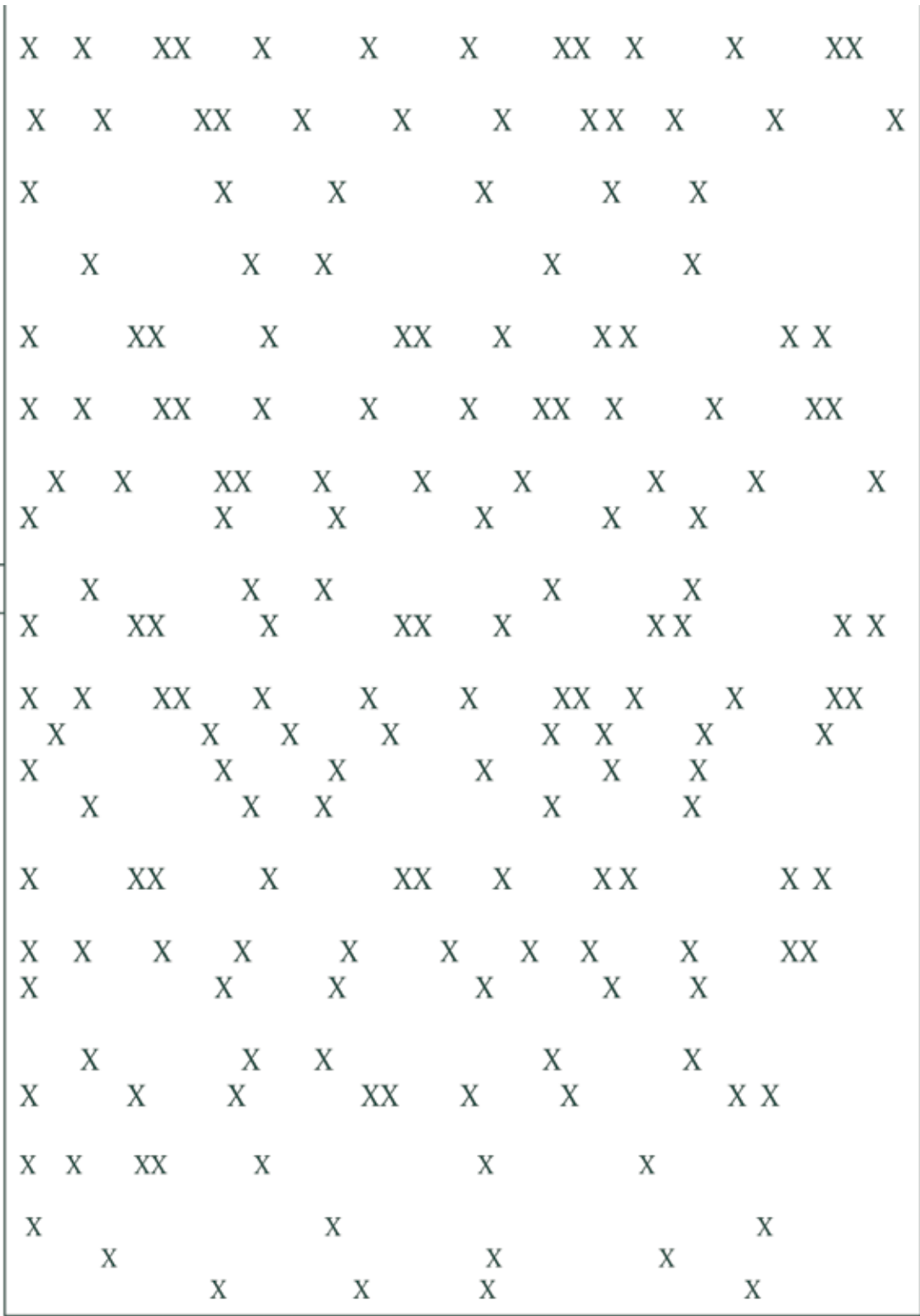
Huntington Beach: Pre-Site



# “X” Colony

COPY ME!

Huntington Beach: Pre-Site



4 m

3 m



# Huntington Beach: *On-Site*

*Content Area:*  
Science & Math

*Grade Level:*  
7

*Time to Complete:*  
2 hours

*Title of Program:*  
Fiddling with Estimating Populations

## Lesson Description

This program was designed for students to gain hands-on experience at setting up an experiment, gathering and arranging data, and discussing the significance of the results.

## Focus Questions

1. Are all of the region counts close to the average? If not, why?
2. Do you think that the estimate of the total colony is close to the actual number?
3. What types of populations would scientists rather estimate than count? Why? (*Populations that exist in great quantities would be good ones to estimate because it would be unrealistic to count each individual.*)

## Culminating Assessment

See post-site activities.

## Materials/Resources

### To be supplied by park:

- meter stick
- string
- sticks for corner posts
- 1-meter square frame
- clipboards
- data sheets

### To be supplied by class:

- shoes (no flip-flops or sandals)
- clothes that can get wet and muddy
- notebooks
- pencils

## Teacher Preparation

Read lesson activities completely and contact Huntington Beach State Park with any concerns or modifications. Implement pre-site activities several days before the scheduled program. Plan adequate time

## South Carolina State Standards Addressed

### Science

#### Standard

7-4 The student will demonstrate an understanding of how organisms interact with and respond to the biotic and abiotic components of their environment.

#### Indicators

7-4.1 Summarize the characteristics of the levels of organization within ecosystems (including populations, communities, habitats, niches, and biomes).

7-4.3 Explain the interaction among changes in the environment due to natural hazards (including landslides, wildfires, and floods), changes in populations, and limiting factors (including climate and the availability of food and water, space, and shelter).



for post-site activities in order to reinforce topics discussed in the program.

## Procedure

A. Arrive at park on time. Pay your program fee at the booth and get directions to the Education Center. Bathroom facilities are at the North or South parking lots. Use these before coming to the Education Center.

### B. Data Gathering:

1. Visit the salt marsh mud-flats at low tide and locate a large colony of fiddler crabs. (Interpreter will review pre-visit materials)
2. Divide into groups just as you did in the pre-site program and hand out data sheets.
3. Measure the total area of the crab colony in square meters (pre-marked).  $\text{Area} = \text{length} \times \text{width}$
4. Use the 1 meter<sup>2</sup> frame to designate a region within the colony for each of the students to observe.
5. Count the number of crab burrows in each region and record it on your data sheet.
6. Draw the location of your plot on the larger map of the total colony area. Show where the 1 meter<sup>2</sup> regions are located (teacher will help with this).

### C. Arrangement of Data

1. Move class to the Education Center classroom. We will follow the same procedure as the pre-site activity to estimate total populations.
2. Determine the average number of burrows per square meter by adding all of the burrows counted and dividing that number by the number of regions observed. Remember, each region is a square meter.
3. Estimate the TOTAL population of the area by taking the average number of burrows per square meter and

multiplying it by the TOTAL area.

4. Draw a graph showing the total count of burrows per region and the average number of burrows per region.



# Field Data Sheet



Your Quadrat # \_\_

Size of Sample Area: (length X width) = meters<sup>2</sup>

Number of Burrows in your quadrat:

Draw sample area and note location of where your sample was taken:  
(For reference include: boardwalk, vegetation, shoreline, and wrack line)

Record the number of burrows for each quadrat:

1		6	
2		7	
3		8	
4		9	
5		10	

Total # of burrows:

Average # of burrows:

Estimate of Population for Sample Area:

Huntington Beach: On-Site



# Huntington Beach: *Post-site*

*Content Area:*  
Science & Math

*Grade Level:*  
7

*Time to Complete:*  
60 minutes

*Title of Program:*  
Fiddling with Estimating Populations

## Lesson Description

The following classroom activity was designed to reinforce the material covered in the field trip and for teachers to assess the knowledge gained from being out in the field at Huntington Beach State Park.

## Focus Questions

1. What interactions were observed in the salt marsh that would contribute to an ecosystem? (*crabs feeding, interaction between individuals, birds feeding on crabs, etc.*)
2. How do you fit into the food chain? Ask students what food we get from the salt marsh. (*We, as consumers, eat a lot of things that exist in the salt marsh such as blue crabs, oysters, shrimp and fish that have in turn fed on smaller organisms, producers or even detritus.*)

## Teacher Preparation

Complete steps in "Plan your Discovery," pre-site and on-site activities and return the post-site materials with your evaluation form.

## Procedure

Set up your own experiment:

Have students estimate the population of something else. See if the students can implement the proper procedure when setting up an experiment the second time. Plots, of course, do not have to be as large as 1m x 1m—a ruler could be used this time. Students can stay in their same groups if desired.

Possible ideas for what to estimate:

- Blades of grass
- Trees
- Flowers

## South Carolina State Standards Addressed

Science

Standard

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In the classroom, scatter items of a known quantity on the floor and estimate:

- Pencils
- Beans
- Pennies

### References

Ballantine, Todd. Tideland Treasure. Columbia, SC. University of South Carolina Press, 1991.

Huntington Beach: Post-Site

