

Young Environmental Leaders Program- Green Crab Survey

Advanced

Overview

In this field lesson, students conduct a Green Crab survey. At an intertidal zone at low tide, they will make observations and measurements of green crabs and the types of substrate they find. Students will follow a protocol and practice properly filling out data sheets.

Concepts

- Green crab surveys are done to get information on the extent of the green crab invasion. The data can be used to compare to other species populations, to show a size distribution of the population, to show changes in population over time with other surveys of the same area, to determine which habitats the crabs prefer, and to help answer many other questions.
- In order for the data to be usable, a protocol (a procedure or method) must be followed. The protocol the Department of Marine Resources uses for green crab surveys is to set up 2 transects each at upper, mid, and lower intertidal areas, and throw 5-10 quadrats randomly along each transect. At each quadrat, they thoroughly examine the surface of the sediments turning over shells and rocks to see if any crabs scurry out, noting the number of crabs they find in the quadrat. Then they dig the contents of the quadrat with a clam hoe or spade down to about 4-inches, adding any crabs they find to the total. They measure and record the length of each crab, and record the sex of each crab. They also note the type of sediment: cobble, pebble, gravel, sand, silt (has organic matter), or clay(usually black).

Classroom Preparation

- On the day before the activity, tell students to dress in clothes that can get dirty!

Materials

- 10-20 meter transects (1 per group)
- rulers (1 per group)
- 25cm quadrats (15)
- Boots
- Spades (1 per group)
- Buckets (1 per group)
- Clipboards/ Data sheets
- Pencils

Learning Experiences for 2 Hour Session

Experience	Time
Get materials, travel to site	20 Minutes
Intro to Survey and how to fill out data sheets	10 Minutes
Divide into groups of 3, assign roles: Diggers, measurers, recorders	10 Minutes
Green Crab Survey	50 Minutes
Discussion	10 Minutes
Return to School, clean up	20 Minutes

Introduction to Green Crabs and Survey Procedure (10 Minutes)

1. Green crabs are considered **invasive**, because they evolved and adapted to a different ecosystem (North and Black Seas) which had natural checks in place to keep their population in balance. They were transported to North America in ballast water, and in this new ecosystem they outcompete local crab and bird species for food such as marine worms and small crustaceans. They also prey on and compete with clams, oysters, mussels, snails, and other crabs. They reproduce rapidly (females can reproduce multiple times a year whereas rock crabs reproduce once a year), and their larvae can travel up to 5 miles a day on currents, contributing to the spread up the coast.
2. Green crabs destroy eelgrass by cutting the plants at the **meristem**, the base of the stem where growth occurs, and by feeding on and uprooting the plants.
3. Green Crab Surveys are one way to determine the approximate population and density of green crabs in the intertidal zone of this site.
4. Demonstrate procedure, including how to measure and identify the sex of the green crabs. Measure across the widest part of the carapace. The females have rounded sides to their “tail flaps” which are on the underside of the crab, while males have triangular, more pointy tail flaps. See <http://www.mikedelaney.org/CrabPhotos.html> for photos.
5. Demonstrate how to fill out the data sheet.

Student Activity: Green Crab Survey (60 Minutes)

1. Provide Materials and data sheets, assign groups and roles.
2. Each group of three students works on a different transect.
3. The digger throws the quadrat along the transect and collects surface crabs in bucket, while the recorder records sediment type.
4. That student digs a four inch hole inside the quadrat and adds crabs to bucket.
5. Another student measures and sexes the crabs, and the third records the data. After measuring a crab, return it to the hole.
6. The sediment and other organisms are returned to the hole.
7. Repeat 5-10 times per transect. Roles may be rotated at each throw.



If there is time:

Discuss Feeder Types in Tidal Flat ecosystem (10 Minutes)

1. Main producers are phytoplankton brought in by the tide and currents.
2. Mud flats act as sinks for energy and nutrients. Detritus carried by tide and currents settle here.
3. Feeding types include filter feeders which feed on suspended plankton, deposit feeders which extract algae, fungi, bacteria from bottom sediments, predators, and scavengers.

Discussing Organism's Niches

4. Discuss the niches (total role in the ecosystem, like a job description) of some of the other organisms found in the survey.

Collect Data Sheets/ Clean Up/Return to Classroom (20 Min.)

ALTERATION:

(PERMIT REQUIRED FROM DMR) If this has to be done at high tide, you can try some other methods, such as setting traps out 24 hours before (for a full tide cycle), or using a seine net, traversing transect lines. Students will need wetsuits for these methods. Collect the same data about what was caught in the traps and in the nets. A great protocol for the trapping method is at the Green Crab Watch website: http://greencrab.nisbase.org/docs/2013_Crab_monitoring_protocol.pdf

EXTENSION

Use the data collected to create a frequency plot to show size distribution among the population. (See Data Literacy lesson.)