Name_____

DATA Nugget

Green crabs: invaders in the Great Marsh

Featured scientist: Alyssa Novak from the Center for Coastal Studies/Boston University

Research Background:

Marshes are areas along the coast that flood with each tide. They are incredibly important habitats. Marshes act as homes to a large number of species. They also protect the coast from erosion during storms and act as a filter for nutrients and pollution. Many species are unique to these habitats and provide crucial support to the marsh. For example, native eelgrass is a type of plant that reduces erosion by holding sediments in place with their roots.

Alyssa holding an invasive green crab, introduced from Europe to the American Atlantic Coast. This crab causes many problems in its new range, including the loss of native eelgrass.

In an effort to help protect and restore marshes, we must understand current-day issues that are affecting their health. The introduction of species that are not originally from the marsh may disrupt the ecosystem and threaten the survival of native species. One species that has recently caused a lot of trouble is the European green crab. This crab species was accidentally carried to the Atlantic coast back in the early 1800s from Europe. Since then, they have become extremely invasive and their numbers have exploded! Compared to native crabs, the green crab digs a lot when it searches for food and shelter. This digging uproots eelgrass and causes its population numbers to fall. In many spots where green crabs have been introduced, marshes are now bare and no more grass can grow.

Invasive Green Crabs caught in trap that has been underwater for 25 hours

Native eelgrass growing in Essex Bay, an area within the Great Marsh

Name_____

The Great Marsh is one of the coastal habitats affected by invasive green crabs. Located on the North Shore of Massachusetts, the Great Marsh is known for being the longest continuous stretch of salt marsh in all of New England. Alyssa is a restoration ecologist who is very concerned with the conservation of the Great Marsh and other important coastal ecosystems. She and other scientists are trying to reduce the effects of non-native species in the Great Marsh.

A major goal for Alyssa is to restore populations of a native eelgrass. Eelgrass does more than just prevent erosion. It also improves water quality, provides food and habitat for native animals, and acts as an indicator of marsh health. Scientists like Alyssa want to know whether planting eelgrass back into the marsh would be successful. If green crabs are responsible for the loss of eelgrass from the marsh, then restorations where green crab numbers are low should be more successful. Alyssa has been measuring green crab populations in different areas by laying out traps for 24 hours. Alyssa has set these traps all around Essex Bay, an area within the Great Marsh. She recorded the total number of green crabs caught at each location (as well as their body size and sex).

Scientific Question: What locations in Essex Bay are most promising for eelgrass restoration, based on the number of invasive green crabs?

Scientific Data:

Use the data below to answer the scientific question:

Location in Essex Bay	Total Catch of Female Crabs*	Total Catch of Male Crabs	Total Number of Green Crabs	Suitability Score**
16	175	39		
17	132	47		
18	535	37		
19	150	10		
20	103	7		
21	98	7		
22	29	5		
23	351	95		
24	186	46		
25	220	77		
26	149	13		
27	160	69		
28	97	42		

**Total Catch was measured by counting how many crabs were found in a single trap after being set in a location for 25 hours (Data collected July 10, 2014)*

***Suitability Score is a measure of how suitable a site is for eelgrass restoration, and is calculated based on the number of invasive Green Crabs found at a site. The more green crabs present, the less suitable the site for eelgrass restoration.*

Name_____

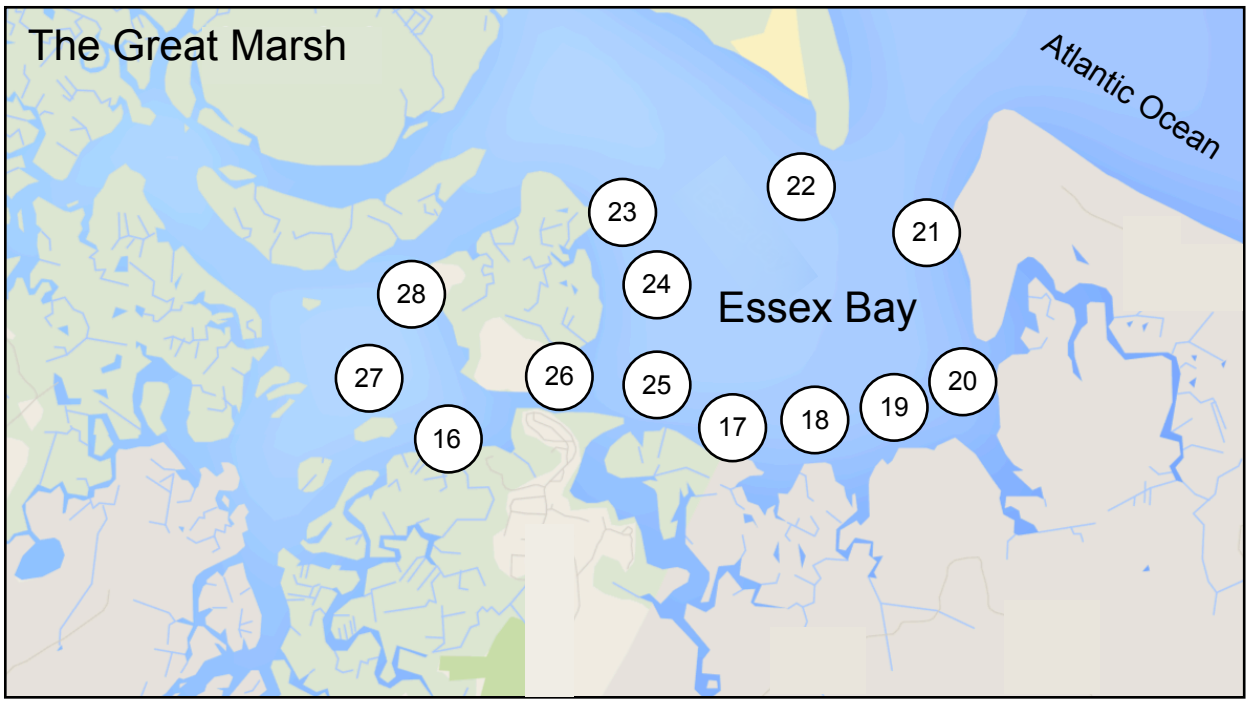
Calculating the Suitability Score: Complete the table and assign a suitability score to each location based on the total number of crabs per trap (Total Catch). A score of 1 indicates that there are many crabs and the site is not very suitable for restoration, while a score of 4 is the best and indicates the site is very suitable for restoration.

Total Catch > 175 crabs = score of 1
100 < Total Catch < 175 crabs = score of 2
50 < Total Catch < 100 crabs = score of 3
Total Catch < 50 crabs = score of 4

Fill in the map below: Identify any trends or differences you notice in the suitability scores on the map. Draw arrows pointing out what you see, and write one sentence describing what you see next to each arrow.

Choose a color for each Suitability Score (1-4) and fill out the key & map

1 = ○ 2 = ○ 3 = ○ 4 = ○



Name_____

Interpret the data:

Make a claim that answers the scientific question.

What evidence was used to write your claim? Reference specific parts of the table or graph.

Explain your reasoning and why the evidence supports your claim. Connect the data back to what you learned about the presence of invasive green crabs and how that affects eelgrass.

Name_____

Your next steps as a scientist:

Science is an ongoing process. What new questions do you think should be investigated?

What hypothesis would you like to test? A hypothesis is a proposed explanation for an observation, which can then be tested with experimentation or other types of studies.

What future data should be collected to test your hypothesis?

Independent variable(s): _____

Dependent variable(s): _____

For each variable, explain why you included it and how it could be measured.