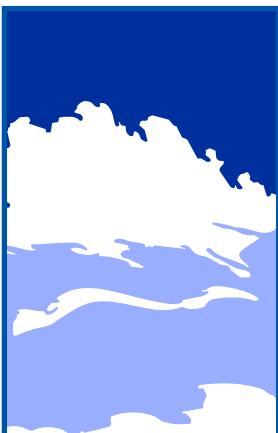




# Cool Crabs



## Grade Level

4<sup>th</sup> - 8<sup>th</sup>

## Objectives

\* To be able to define ectotherm and endotherm.

\* To be able to describe how ectothermic animals regulate their body temperature.

\* To develop skills in reading a thermometer.

\* To be able to examine field collected data and identify trends.

## N.C. Standard Course of Study

Grade 4  
(4.L.1.1, 4.L.1.2,  
4.L.1.3, 4.L.1.4)

Grade 5  
(5.L.2.2)

Grade 6  
(6.L.2.2, 6.L.2.3)

## **Overview:**

Students will examine how ectothermic animals, such as ghost crabs, regulate their body temperature by moving to different environments.

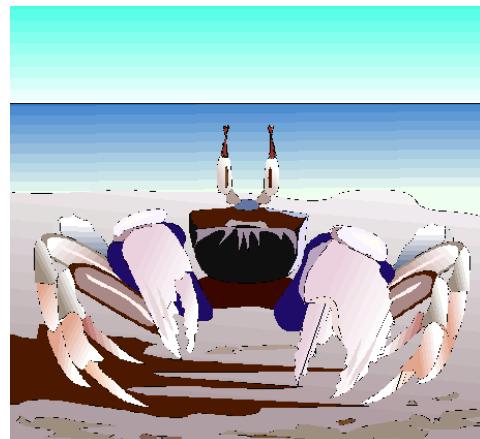
## **Materials:**

- Ghost crab cut-outs (laminated or on thick paper/foam core)
- Thermometers (attached to crab cut-out)
- Cool Crabs data sheets (these could be laminated and used repeatedly with wet or dry erase markers)
- Pencils
- Clipboards
- Masking tape
- Small metal survey flags or wooden stakes

## **Background:**

Animals that must expend energy to keep their body temperature within a narrow range are called endotherms. Endotherms include most birds and all mammals. Animals that have limited control of their body temperature and must use the environment and their behaviors to regulate their body temperature are called ectotherms. This group includes marine invertebrates, amphibians, lizards, snakes and most fish. Although ectothermic animals can survive at a greater range of temperatures, they have an optimal range in which they function most effectively.

Ectothermic animals have a variety of ways they control their body temperature. Lizards, for example, often bask in the sun to warm up. Other ectothermic animals, like insects, move between sunny and shady areas.



## **Activity:**

Before beginning this activity, it is a good idea to teach your students how to read a thermometer correctly. If your thermometer has both Fahrenheit and Celsius scales it is less confusing for students if you cover one scale with masking tape. Prior to using your thermometers you should check their accuracy and discard those that have a significantly different temperature than the others.

To make the ghost crab, cut out the oval crab shape then glue on foam-core or thick poster board. If regular paper is used, laminating may be needed to make the cut-outs sturdier.

### **Part 1: Crab habitat temperatures**

This activity works best on a warm sunny day. Begin by establishing ten crab stations at different locations from the dune to the beach (you can simulate this in your schoolyard, choosing a variety of shady/cool stations and sunny/warm stations). At each station place a metal flag or wooden stake with a number on it. Explain to the students that their crab is leaving the maritime forest and heading for the edge of the water. Instruct teams of 2 or 3 students to take their crab to each station, set the crab down and leave it for 30 seconds. At the end of the time period, record the temperature on the crab on the Cool Crab data sheet. After each team has had a chance to record temperatures at each of the ten stations, have the class examine their data for patterns.

1. Which was the hottest station?
2. Which was the coolest station?
3. Did the temperature vary at any one station?

### **Part 2: Crab survival**

Calculate the average estimated temperature for the total area (depending on the age of the students, this may be a task you do ahead of time). Add and subtract several (1-2) degrees to the average temperature to establish the optimal range of the body temperatures for your crab population. Have each team place tape on the thermometer so that only this narrow range is visible.

The goal of this part of the activity is for each team to keep their crab alive by moving it around to keep it from getting too hot or too cold. If the temperature moves outside the taped area then the crab dies.

When the teacher gives the signal, the crab must move to a different marked station and stay for one minute. The team that keeps their crab alive the longest “wins” the game. Instruct students that they cannot move the crab once the minute countdown begins.

## **Discussion questions:**

1. Which strategies were successful in keeping the crabs alive?  
*Alternating cool areas with warm areas*
2. What new problems would the crab have to cope with if it entered the water?  
*Crabs would have different problems with temperature regulation as well as a different set of predators.*
3. How does your body react if you get too hot? Too cold?  
*Some answers here can include shivers, sweats, and in extreme cases hypothermia and heat strokes.*

## **Extension:**

1. Investigate ways that endothermic animals regulate their body temperature. How do dogs and cats keep cool?
2. Study other ectothermic animals to see how they survive in their habitat.
3. What other factors limit a crab's survival in their habitat?
4. Compare ghost crabs to other crab species (blue crabs, spider crabs, stone crabs, hermit crabs).

## **Vocabulary:**

- thermoregulation
- ectotherm
- Celsius
- endotherm
- Fahrenheit
- habitat

## **References:**

Freeman, S. 2005. Biological Science (2<sup>nd</sup> Ed.). Prentice Hall, Upper Saddle River, NJ. 1283 pgs. (ISBN: 0-13-140941-7)

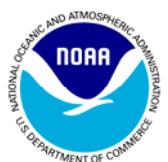
## **National Science Standards:**

- |                          |  |
|--------------------------|--|
| <i>Content Standards</i> | <i>Science as inquiry. [1-4 &amp; 5-8]</i>                         |
|                          | <i>Physical science [1-4 &amp; 5-8]</i>                            |
|                          | <i>Life Science [1-4 &amp; 5-8]</i>                                |
|                          | <i>Science in personal and social perspectives [1-4 &amp; 5-8]</i> |

## Ocean Literacy Principles:

*Essential Principle #5      The ocean supports a great diversity of life and ecosystem.  
(Fundamental Concept – d, f)*

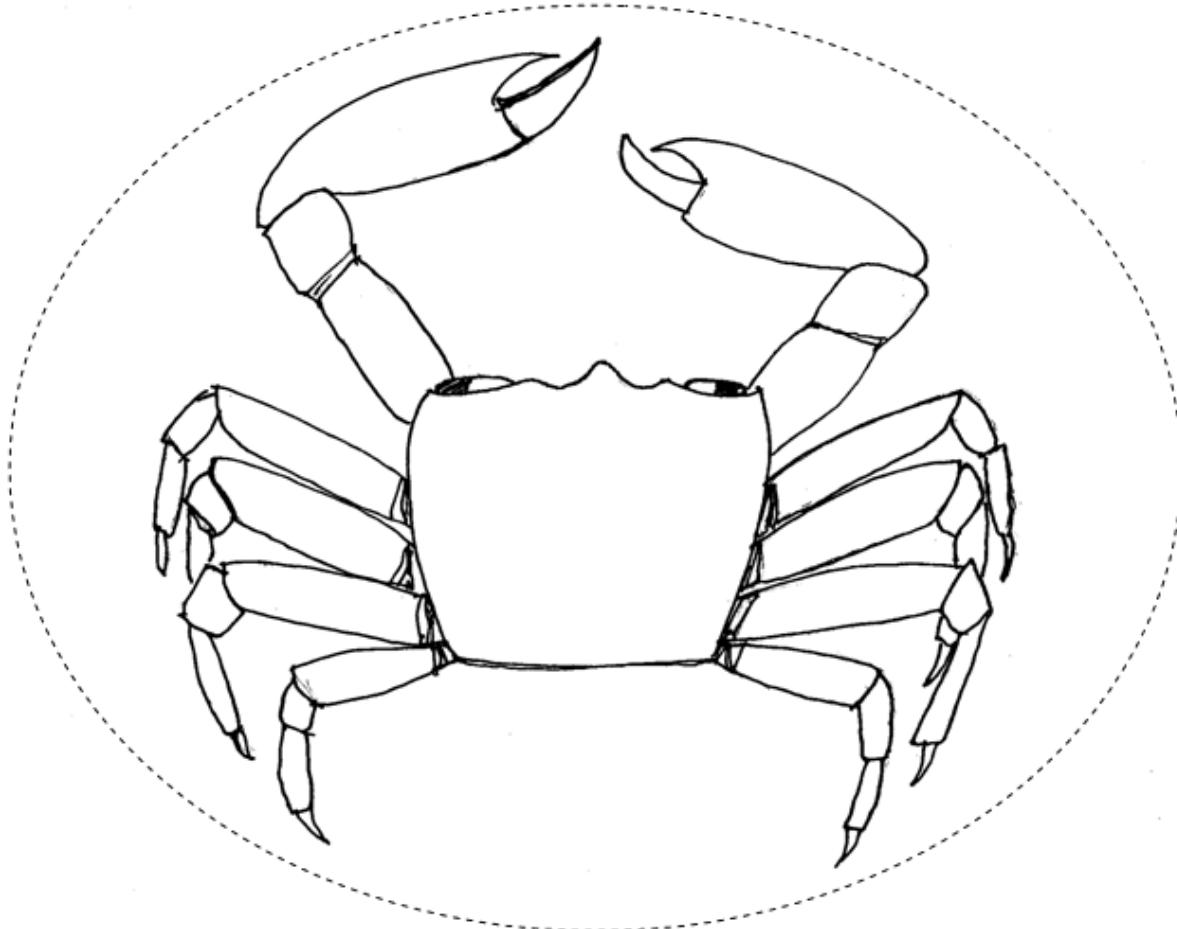
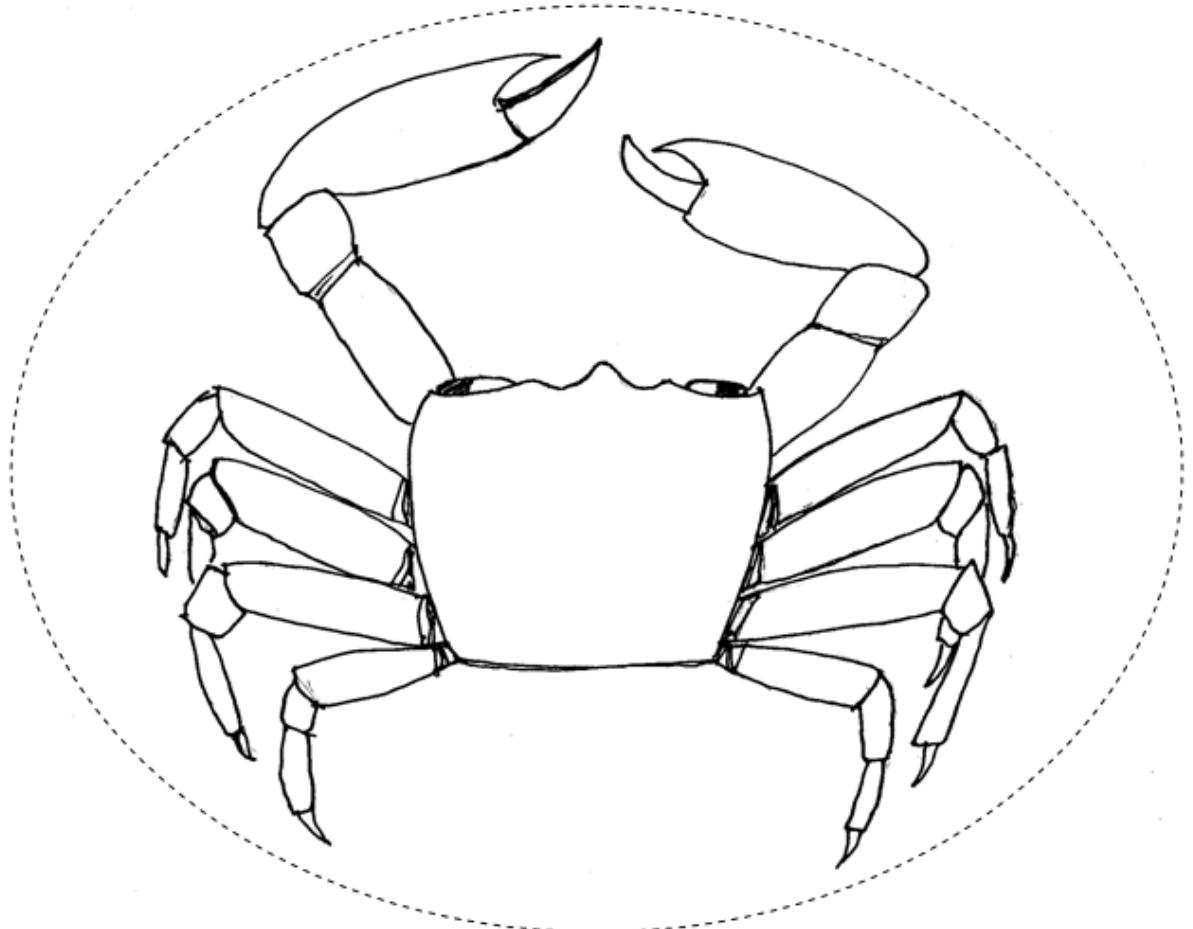
The North Carolina National Estuarine Research Reserve is a cooperative program between the North Carolina Department of Environment and Natural Resources, Division of Coastal Management and the National Oceanic and Atmospheric Administration.

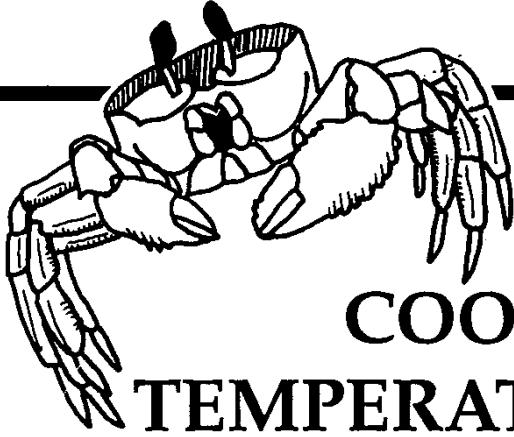


Printed on recycled paper.  
Publication date: June 2008

[www.nccoastalreserve.net](http://www.nccoastalreserve.net)







## COOL CRABS TEMPERATURE RECORD

station

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