

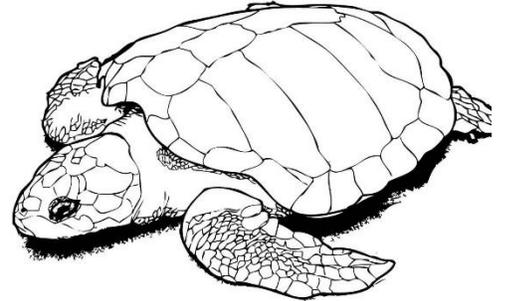
Sea Turtle Population Estimates

Essential Question:

How do sea turtle scientists estimate the number of sea turtles in a population?

Objectives:

Students will collect data through repetitious sampling and learn how mark-recapture experiments lead to population estimates. Computational skills will be used to analyze and model data and calculate a sea turtle population based on data collected.



Materials: (One set per group)

Small container or bowl
Dried beans to represent sea turtles – great northern beans work well—about ½ a cup or 300+/- beans
Plastic tea spoon
Calculator
Pencil
Permanent marker
Data sheet

Key Words:

Carrying Capacity
Ecosystem
Sea Turtle Management
Food Web
Habitat
Natural Resource
Population
Endangered Species
Mark-recapture
Population dynamics

Georgia Performance Standards:

S7CS3. Students will have the computation and estimation skills necessary for analyzing data and following scientific explanations.

S7CS5. Students will use the ideas of system, model, change, and scale in exploring scientific and technological matters.

S7L4. Students will examine the dependence of organisms on one another and their environments.

Procedure:

1. Have students sit in groups of three or four around a table.
2. Pass out pencils, markers, data sheets, calculators, containers with dried beans, and spoons.
3. Have students delegate group members to be **SAMPLER**, **DATA RECORDER**, and **TAGGER(s)**.
4. The **SAMPLER** is responsible for using the spoon as a researcher in the field “surveying” the population. It is important the same people do the sampling and that they do it exactly the same every time.
5. The **SAMPLER** takes an initial sample: one heaping dip with the spoon.
6. The **TAGGER** counts the sample of sea turtles and the **RECORDER** writes that number on the data sheet in the blank for “Number of sea turtles in the initial survey (N)”.
7. The **TAGGER** then marks (“tags”) front flippers of the sea turtles (beans) with a dash or dot that is easily seen. Note: The sea turtles from the initial survey are the only sea turtles that will be marked.

(Teachers may want to take up the permanent pens at this point.)

8. The marked sea turtles are added back to the bowl and mixed with the population of unmarked sea turtles.
9. The **SAMPLER** takes the first sample with tagged sea turtles in the population. This should be done just like the initial sample was done.
10. The **TAGGER** then counts “Sample Number 1” and the **RECORDER** records the total marked (“tagged”) and non-marked (“non-tagged”) number of sea turtles surveyed on the data sheet under “T” (total).
11. The **TAGGER** counts the number of marked (“tagged”) sea turtles in “Sample Number 1” and the **RECORDER** records this under “R” for recapture.
12. For example if Sample Number 1 was 35 sea turtles that would go under “T” and if 3 of the 35 were marked that would go under “R”.
13. Return the sea turtles surveyed in Sample Number 1 to the container and stir the sea turtles to mix them up
14. True science requires numerous repetitions of a test to ensure accuracy. Repeat steps 9 – 12 for Sample Numbers 2, 3, 4, and 5.
15. After all 5 samples the **RECORDER** should use the calculator to calculate the initial survey result to recaptures ratio (N/R) and the Population Estimate (N/R) X T for each sample.
16. Then the five samples are averaged to calculate the Average Population Estimate and record this value on the data sheet.
17. While the **RECORDER** is calculating the Average Population Estimate, the **SAMPLER** and **TAGGER** can count every bean for an Actual Population number to compare to the estimate. The easiest way to do this is to make piles of ten beans and the count the piles.
18. Discuss and answer the following questions:
Why is it important for the sampler to be the same person every time and that the same technique is used every time?
Why is it important for the marks or tags on the sea turtles to be highly visible and easy to see?
How close did you come to the actual number of sea turtles?

Further Thinking:

How do humans affect sea turtle populations?

What are some of the other tools scientist can use to estimate sea turtle populations?



Image: Actual sea turtle flipper tags