

Author: Nancy Hummel	Subject/Topic: Threatened Species/Graphing Exercise
Grade Level: High School	

Lesson Summary:
 Students will read and graph data in NYSED Regents style about the Common tern which has difficulty in nesting areas with a number of threats.

Objectives:
 Students will read and interpret content about the Common Tern. Students will graph population data for the Common Tern populations in Ohio and New York from 1960's to 1997. Students will develop ideas to protect Common tern nesting sites.

Assessment:
 Students will graph the Common tern populations from Ohio and New York from 1967 to 1997. Students will respond to questions based upon the results the graph of the populations. Students will make proposals concerning preservation of Common tern nesting sites.

Learning Standards: New York State Core Curriculum/ The Living Environment

Living Environment: Standard 1:
 Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate, to pose questions, seek answers, and develop solutions.

Key Idea 1: The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing and creative process.

Performance Indicator 1.1: Elaborate on basic scientific and personal explanations of natural phenomena, and develop extended visual models and mathematical formulations to represent ones thinking.

Key Idea 3: The observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into natural phenomena.

Living Environment Standard 4: Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science.

Key Idea 1: Living things are both similar to and different from each other and from nonliving things.

Performance Indicator 1.1: Explain how diversity of populations within ecosystems relates to the stability of ecosystems.

Key Idea 6: Plants and animals depend on each other and their physical environment.

Performance Indicator 6.1: Explain factors that limit growth of individuals and populations.

Key Idea 7: Human decisions and activities have had a profound impact on the physical and living environment.

Performance Indicator 7.1: Describe the range of interrelationships of humans with the living and nonliving environment.

Performance Indicator 7.2: Explain the impact of technological development and growth in the human population on the living and nonliving environment.

Lesson Activities

Preparation/Materials Needed:

1. Give students Common Tern graphing practice worksheet to read, either as a group or as individuals. Discuss the issues presented as threats to the Common Tern.
2. This activity takes about 20-30 minutes for students to complete, depending upon the amount of time spent in directions, discussion and answer completion.
3. Students can explain their ideas for helping to protect the Common Tern nesting sites and population in a classroom discussion.

Procedure:

1. Have student read the graphing exercise readings about the threats to the Common Tern.
2. Have students graph both the Ohio and New York Common Tern population data on the same graph following the directions for graphing as written.
3. Students will interpret graph to answer the discussion questions and developing ideas for preservation of Common Tern nesting sites.

Graphing Practice/The Common Tern Population Name _____
Conservation Graphing Period _____



The common tern is a native waterbird of North America which lives along coastal and inland aquatic ecosystems. Terns eat small fish which they catch by diving into water. They will also eat small insects and crustaceans, like crayfish (Birdweb, 2010). They nest on low lying rocks and beaches, which can make their nests and young vulnerable to predators and environmental problems.

When tern young are in their nests located near water, floods and storm driven waves may kill them. However, it is more common for human disturbance, predators or nesting competitors to cut the number of young which survive to adulthood. Humans often disturb the nests by driving on top of or walking through the nesting sites. Vandalism of eggs, nests and young has also been found. Herring gulls are the most frequent predator of common tern babies, but mink have been seen taking young from the nests. Sometimes, birds, like the protected cormorant, compete for the same nesting sites. The cormorants form large groups and leave large amounts of fecal matter. Both the numbers of cormorants and the change in the ground surface often results in common terns moving away. Evidence of Great Horned owl predation has been found in the St. Lawrence River ecosystem. (United States Fish and Wildlife Service, Ecological Services, 2003)



Cormorant with pike



Herring gull



Mink with fish in mouth

Below are the population numbers of common tern from 1960 to 1997 in both New York and Ohio.

Year Common Tern Census Taken/ New York	Number of Nesting Pairs
1960	3200
1982	1000
1995	1600
1997	1923

Year Common Tern Census Taken/ Ohio	Number of Nesting Pairs
1960	1500
1967	5000
1970	1000
1995	100
1997	119

Using the information on the data tables for both the New York and Ohio common tern populations from 1960 to 1997, construct an appropriate line graphs following the directions below:

1. Mark appropriate scale of each axis.
2. Plot the data for each point on the grid.
3. Surround each point for New York common tern population with a circle.
4. Surround each point for Ohio common tern population with a triangle.

6. Compared to New York's 1997 common tern population, Ohio's 1997 common tern population was:

- (1) greater
- (2) the same
- (3) less

7. Based on the reading and your knowledge of biology, explain why the common tern population might have declined so much from 1970 to 1990 in Ohio.

8. Based on your reading and your knowledge of biology, what could scientists do to keep the larger birds, like herring gulls and cormorants, away from the common tern nests?

9. Based on your reading and your knowledge of biology, what do you consider the greatest threat to the common tern population?

Sources:

Birdweb, Common Tern, 2010.

Retrieved from:

http://www.birdweb.org/birdweb/bird_details.aspx?id=215

United States Fish and Wildlife Service, Ecological Services: Common Tern, 2010.

Retrieved from:

http://www.fws.gov/midwest/eco_serv/soc/birds/cote-sa03.html