



Graphing Plover Data

Objective: Students explore piping plover data and create graphs.

NGSS Connection: MS-LS1-4, MS-LS1-5, MS-LS2-1, MS-LS2-4, HS-LS2-1, HS-LS2-2, HS-LS2-7, HS-LS4-5, HS-ESS3-3, HS-ESS3-4

Grades: 6, 7, 8, 9, 10, 11, 12

Time: 60 minutes (+)

Background: Piping plovers are small coastal birds. They are legally protected in New Hampshire, but their small population and limited habitat along New Hampshire's coastline means that they have to be closely monitored by biologists. Piping plovers nest on coastal beaches above the high tide line, in sparsely vegetated dunes.

Piping plover nests are simple scrapes in the sand that may contain pieces of broken shell fragments. Piping plovers lay up to four eggs in one nest each year. Both the male and female take turns incubating the eggs and both parents help watch over the young chicks after hatching. Chicks are precocial at birth meaning they have feathers and can walk and feed themselves within hours of hatching. Chicks are considered fledged at approximately 25 days of age when they can first fly. Adults may re-nest a second time in the same breeding season if the initial nest attempt fails. Three nesting attempts in one breeding season have occasionally been documented as well. Piping plovers forage for marine worms, crustaceans and insects in the sand and in the wrack (seaweed) that wash ashore.

This graphing activity can be done with graph paper and pencil, or this activity can be done using excel spreadsheets or other computer graphing program.

Materials Needed: graph paper and/or excel spreadsheet (to create graphs), piping plover data (<https://wildlife.state.nh.us/nongame/project-plover.html>)

Activity:

1. Have students read the information and watch the video on this website to learn about the piping plover. <https://wildlife.state.nh.us/nongame/project-plover.html>
2. Review the table at the bottom of the webpage and go over definitions for nesting pairs, chicks hatched, chicks fledged, and productivity. Discuss threats to piping plovers and ask students why they think that not all chicks fledge every year (ie. predators, loss of habitat, storms, etc).
3. Have students create a bar graph of nesting pairs (y axis) over time (x axis). Depending on the grade and familiarity with graphing techniques, some students may need more background information on graphs.
4. As students are working with the data and creating their graphs, they are likely to come up with questions that they might want to explore with a new graph. For example, as the number of nesting pairs increases, does the number of chicks fledged also increase in that same year? Graphing multiple variables on the same graph can help you visually see this information side by



side. **Extension:** Explore NOAA's past weather data to investigate if weather events during the summer might have impacted these coastal birds.

5. Productivity is determined by the number of chicks fledged divided by the number of nesting pairs. Create a line graph showing productivity (y axis) over time (x axis). Has New Hampshire's piping plover productivity increased over time (if using excel, create a trend line).
6. Pose this series of questions to students:
 1. Using the averages at the bottom of the data table, how many chicks will likely fledge if there are 40 hatched chicks from 10 nests? What would the productivity be in this scenario?
 2. Create your own data: If biologists had a goal of averaging a 2.00 productivity for 5 years, what might the dataset look like?
 3. One limiting factor with New Hampshire's piping plover population is habitat. Ask students to look up how much coastline is available in New Hampshire. If the maximum space and food resources available limits our piping plover population to 15 nests, what might the number of hatches or fledges look like to meet a 2.00 productivity?
Extension: Look up the piping plover numbers for other states and discuss the different threats and available resources between New Hampshire and states that have more habitat.
7. Wrap-Up: Ask students what threats impact piping plover productivity and what things can be done to help them (Ten Things You Can Do To Help Protect Piping Plovers: <https://wildlife.state.nh.us/nongame/documents/plover-top-10.pdf>)

Extension: July and August are the best time to see piping plovers, but different birds can be observed throughout the year. Take a seacoast bird-watching trip. Don't forget your binoculars and bird books. Bird identification apps on your phone are also a great resource in the field. How many different species can you identify? While you are on your field trip, spend some time observing how people interact with plants and animals in this environment. In what ways do people impact the natural world - both positively and negatively?

Assessment: Students should be able to read and understand a table of data, be able to create a bar or line graph (hand-drawn or using computer program), and understand how to determine the productivity number.