



Education and Research: Testing Hypotheses

Lesson Plan—Satellite Tracking

Summary

This activity provides an opportunity for students to use satellite tagging data to answer questions related to open-ocean animals, their habitats and migratory behaviors.

Key Concepts

- Science and technology are closely linked when organisms under investigation are not easily accessible to scientists
- A variety of physical and biological factors are involved in determining the behavior, migratory patterns and activities of pelagic predators

Objectives

Students will be able to:

- **Utilize** a satellite tracking data set to illustrate migratory and behavior patterns of pelagic species
- **Explain** how physical or biological factors influence organism behavior

Materials

- Computers with Internet access
- Satellite tracking data sheet
- Blank charts/maps
- Graph paper

Procedure

1. Have students use the **TOPP** Web site technology section (<http://www.toppcensus.org/web/Background/technology.aspx>), to research information on different satellite tags, their uses and the data they generate. What are the different types of tags currently in use? What kind of animals can be tagged with each type? What types of data can be obtained through satellite research?
2. Have students work in small groups and use the “Web resources” online section to investigate the variety of satellite tagging programs described on the Internet, the animals involved, and the availability of active data.
3. Have each group choose an active, tagged pelagic predator that they will follow over the course of the activity.
 - **WhaleNet** (http://whale.wheelock.edu/whalenet-stuff/stop_cover.html) provides data, maps and information about several active tagged animals, including seals and sea turtles

- The ***Sea Turtle Migration-Tracking Education Program*** (<http://www.cccturtle.org/sat1.htm>) is currently tracking several active turtles (turtles with a * after their name are still transmitting location data)
 - ***NOAA's National Marine Mammal Laboratory*** Web site (<http://nmml.afsc.noaa.gov/AlaskaEcosystems/sslhome/Satellite/satmain.htm>) features interactive maps of tracking data from Steller Sea Lions in Alaska—select a research area and scroll down to find active animals
4. Have students follow the progress of their organism by recording as much information as possible on the *Satellite Tracking data sheet*. Using this information, have students plot the Latitude/Longitude position on a blank map or chart, or by using graphs generated on the Web.
 - ***WhaleNet*** has an assortment of blank Atlantic coast maps available for download at <http://whale.wheelock.edu/whalenet-stuff/MAPSindex/>
 - The ***Sea Turtle Migration-Tracking Education Program*** has some blank tracking maps available from archived animals that can also be used with active animals traveling in the same area (<http://www.cccturtle.org/sat3.htm>)
 5. Once students have created a charted pathway for their organism, have them investigate oceanographic conditions along the path during the time of migration using available satellite data.
 - SeaWiFS satellite data can be accessed from this website - <http://oceancolor.gsfc.nasa.gov/cgi/browse.pl?sen=am>
 - ***NASA's Earth Observatory Data and Images*** site features an easily-navigated bar chart linked to yearly and monthly global data for a variety of variables, listed on the left side of the page (<http://earthobservatory.nasa.gov/Observatory/datasets.html>)
 - ***NOAA's Satellites and Information*** page includes a drop-down menu from which a variety of satellite data can be accessed (<http://www.saa.noaa.gov/cocoon/nsaa/products/welcome>)
 - Select ***100km Sea Surface Temperature*** to access daily global SST maps
 - Select ***14km Sea Surface Temperature*** for North American SST maps generated every 48 hours
 6. Students can then use information regarding their organism's general habitat, feeding habits and reproductive behaviours, along with the oceanographic data to determine why their animal may have migrated along that particular pathway. Was the pathway predictable based on oceanic conditions? Was it a seasonal migration? Did the predator follow a food source? Was the migration the result of a reproductive strategy?
 7. Have groups identify some ways that the information obtained from tracking their predator can be used (i.e., protection, harvesting, environmental assessment, etc.).
 8. Have students compile the information and the conclusions they have drawn into a final project to share with their class. All projects should include a written and oral component, accompanied by appropriate visual aids.

Assessment

- **Performance**—Did student participate in discussion sessions and demonstrate an understanding of the factors that influence behavior patterns? Was student able to successfully access and interpret data? Did student appropriately utilize Web resources to further investigate behaviour patterns?
- **Product**—Did student accurately describe the location and migratory behavior of his/her chosen organism? Did student include information on the life history of his/her animal in order to illustrate connections between environmental factors and behavior? Did student present his/her information in an organized and understandable format?

Satellite Tracking Data Sheet

Name: