



Northwestern Hawaiian Islands Exploration

Seals, Corals and Dollars

Focus

Ecological relationships and management of Hawaiian monk seals and precious corals.

GRADE LEVEL

9-12 (Biology)

FOCUS QUESTION

What actions should be taken to manage monk seals and precious coral resources in the Northwestern Hawaiian Islands?

LEARNING OBJECTIVES

Students will be able to describe the ecological relationships between Hawaiian monk seals and deep-water precious corals.

Students will be able to describe and explain at least two different viewpoints on how monk seals and precious coral resources should be managed in the Northwestern Hawaiian Islands.

Students will be able to list at least four reasons that Hawaiian monk seals are endangered.

Students will be able to describe a management strategy for monk seals and precious coral resources, and explain the rationale for this strategy.

ADDITIONAL INFORMATION FOR TEACHERS OF DEAF STUDENTS

In addition to the words listed as key words, the following words should be part of the vocabulary list.

Atoll
Nautical
SCUBA

Exploration

ROV

Coral

Endemic

Indigenous

Alien

Species

Endangered

Management

There are no formal signs in American Sign Language for any of the key words and many are difficult to lipread. Having the vocabulary list on the board as a reference during the lesson will be extremely helpful. It would be very helpful to copy the vocabulary list and hand it out to the students to read after the lesson to reinforce what was covered during class. Introduce and discuss "endemic," "indigenous," "alien species," "endangered," and "management" prior to the activity. Also copy and hand out Items a-g in Step #3. This will be helpful to the students prior to them preparing a report, as they will need to clearly understand what is expected of them.

MATERIALS

- Internet access, or copies of pages from
 - a. <http://leahi.kcc.hawaii.edu/~et/wlcurric/seals.html>
 - b. www.oar.noaa.gov/spotlite/archive/spot_corals.html
 - c. www.soest.hawaii.edu/HURL/precious_corals.html
 - d. www.planet-hawaii.com/environment/199wtch.htm
 - e. <http://www.greenhawaii.org/kelly/articles/2001/Gold.html>
 - f. http://swfsc.nmfs.noaa.gov/western_pacific_fishery_manageme.htm

AUDIO/VISUAL MATERIALS

None

TEACHING TIME

One 45-minute class period, plus time for research and report preparation (may be done as homework)

SEATING ARRANGEMENT

Classroom-style, or groups of four students

MAXIMUM NUMBER OF STUDENTS

24

KEY WORDS

Hawaiian monk seal

Precious coral

Endemic

Indigenous

Alien species

Endangered

Sustainable harvest

BACKGROUND INFORMATION

Nearly 70% of all coral reefs in U.S. waters are found around the Northwestern Hawaiian Islands, a chain of small islands and atolls that stretches for more than 1,000 nautical miles (nm) northwest of the main Hawaiian Islands. While scientists have studied shallow portions of the area for many years, almost nothing is known about deeper ocean habitats below the range of SCUBA divers. Only a few explorations have been made with deep-diving submersibles and remotely-operated vehicles (ROVs), and these have led to the discovery of new species and species previously unreported in Hawaiian waters. The possibility of discovering new species has commercial importance as well as scientific interest, since some of these species may produce materials of importance to medicine or industry. The Northwestern Hawaiian Islands are regularly visited by Hawaiian monk seals, one of only two species of monk seals remaining in the world (the Caribbean monk seal was declared extinct in 1994). Waters around the Northwestern

Islands may be an important feeding area for the seals, which appear to feed on fishes that find shelter among colonies of deep-water corals. These corals are also of interest, because they include several species that are commercially valuable for jewelry. The 2002 Ocean Exploration Expedition to the Northwestern Hawaiian Islands included studies of ecological relationships between monk seals and the deep-sea environments of the Northwestern Islands, as well as mapping the previously unexplored deep-sea regions around the islands, investigations of deepwater fishes, and exploration of deepwater habitats.

This activity focuses on management issues posed by an endangered species (Hawaiian monk seals) that depend to an unknown extent upon deep-water habitats provided by a commercially valuable species (precious corals).

LEARNING PROCEDURE

1. Introduce the location of the Northwestern Hawaiian Islands, and point out some of the features that make this area important (discussed above).
2. Direct each student group to prepare a report based on one of the following web pages containing information about monk seals and/or precious corals (be sure students take note of the date their pages were posted):
 - a. <http://leahi.kcc.hawaii.edu/~et/wlcurric/seals.html>
 - b. www.oar.noaa.gov/spotlite/archive/spot_corals.html
 - c. www.soest.hawaii.edu/HURL/precious_corals.html
 - d. www.planet-hawaii.com/environment/199wtch.htm
 - e. <http://www.greenhawaii.org/kelly/articles/2001/Gold.html>
 - f. http://swfsc.nmfs.noaa.gov/western_pacific_fishery_management.htm

(Note: sites (c) and (f) are quite short, but contain links to other sites with more in-depth information)
3. Have each group present their report in the order given above. Lead a discussion of these reports, including the following:

- What is the distinction between endemic, indigenous, and alien species?
- What are the feeding and habitat preferences of Hawaiian monk seals?
- Why are Hawaiian monk seals endangered?
- Why are precious corals important (Students should identify commercial importance as well as the role of these corals in natural ecosystems)?
- What groups have expressed views about the need to manage precious corals, and how do these views differ? (Students should distinguish between management objectives directed toward a sustainable harvest of precious corals and objectives directed toward maintaining the corals as a key habitat element for an endangered species)?
- What options should be considered in developing management plans for monk seals and precious corals in the Northwestern Hawaiian Islands? (Students should recognize that the interests of commercial exploitation and conservation are in potential conflict here, and that options range from “Do nothing” to “Ban all human interaction with these species;” resource managers generally try to balance desired uses within the overall principle that no species should be driven to extinction)
- What formal management measures have been taken to address concerns about monk seals and precious corals? Are these measures sufficient?

THE BRIDGE CONNECTION

www.vims.edu/bridge/pacific.html

THE “ME” CONNECTION

Have students write a short essay on why endangered species should (or should not) be protected, and how this is of personal importance to their own lives.

CONNECTIONS TO OTHER SUBJECTS

English/Language Arts, Social Studies

EVALUATION

Develop a grading rubric that includes performance on the group research and report (Step #2) and participation in the overall discussion (Step #3). Alternatively, following the oral reports in Step #3, you may want to have students prepare individual written responses to the questions prior to discussing these questions with the entire class.

EXTENSIONS

Visit <http://www.radiojerry.com/frigate/> for an “up close and personal” account of life on French Frigate Shoals and encounters with monk seals.

RESOURCES

<http://oceanexplorer.noaa.gov> – NOAA’s Ocean Exploration Web site

<http://leahi.kcc.hawaii.edu/~et/wlcurric/seals.html> – Background information on monk seals

www.oar.noaa.gov/spotlite/archive/spot_corals.html – Article on precious corals

www.soest.hawaii.edu/HURL/precious_corals.html – Article on managing precious corals and monk seals

www.planet-hawaii.com/environment/199wtch.htm – Ecological relationship between monk seals and precious corals

<http://www.greenhawaii.org/kelly/articles/2001/Gold.html> – Article on the “new Hawaiian gold rush”

http://swfsc.nmfs.noaa.gov/western_pacific_fishery_manage.htm – Press release on management measures adopted by the Western Pacific Fishery Management Council

<http://www.radiojerry.com/frigate> – Personal account of life on French Frigate Shoals and another perspective on the impact of human activities on local marine life

NATIONAL SCIENCE EDUCATION STANDARDS

Content Standard A: Science As Inquiry

- Abilities necessary to do scientific inquiry
- Understanding about scientific inquiry

Content Standard C: Life Science

- Interdependence of organisms

Content Standard F: Science in Personal and Social Perspectives

- Natural resources

FOR MORE INFORMATION

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<http://oceanexplorer.noaa.gov>