For The Teacher

SSWIMS: Presents Plankton

Lesson Objectives: The program provides students with an integrated biology/physics unit on plankton aligned with National and California State Content Standards.

SSWIMS Overview

The SSWIMS program is based on the concept that science disciplines – physics, chemistry, biology, mathematics, and earth and space science – are all inter-related. They can be better understood by elementary and secondary school teachers and students when they are woven into an integrated standards-based curriculum using a common theme. An environmental theme provides a compelling reason for students to develop a sense of stewardship about their natural world, particularly when these connections are fostered in asystematic and comprehensive way. Students everywhere are fascinated with the ocean and its inhabitants, and the marine environment provides an effective integrative theme.

Plankton as an Appropriate Standards Topic

Inside this packet are activities designed for educators on all levels to show what you can accomplish using plankton as a vehicle in education. By using these lessons educators can meet content standards (national or state). Students can learn about the physics, chemistry and biology of the ocean by using “plankton” as a common theme. Because Los Angeles is located on the coast of the Pacific Ocean, this program presents oceanic plankton, but the information also applies to freshwater plankton.

Plankton was chosen as a vehicle for a number of reasons. First, plankton are abundant in almost all bodies of water on Earth, both freshwater and marine. Plankton are a basis for almost all aquatic food webs, yet most students do not know much about these important organisms. Second, a study of plankton enables the teacher to discuss animal and plant processes and to integrate this information through the common theme of an oceanic food web. Third, understanding plankton and their

place within the food webs of the Earth will not only increase the student's awareness of ecology but also increase the student's understanding of the importance of preserving the health of our freshwater and marine environments.

On the following pages you will find content standards that can be met using the activities and information found in this packet and on the accompanying television broadcast.

The activities are selections from the award-winning FOR SEA curriculum, with teachers' guides and CD-ROMS available for grades 1-12.

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National Science Content Standards

Category	Content Standard	Relevant concept
Unifying concepts and processes in science	Systems, order and organization	Plankton are divided into two groups: phytoplankton and zooplankton
Science as inquiry		
Physical Science	Properties and changes of properties in matter Motion and forces Transfer of energy	Microscopic plankton do not swim against the current but drift in the current Phytoplankton float near the surface using special adaptations so they can photosynthesize and reproduce
Life Science	Structure and function in living systems Reproduction and heredity Diversity and adaptations of organisms	Some zooplankton are the larval forms of invertebrates and fishes Phytoplankton float near the surface using special adaptations so they can photosynthesize and reproduce

California Science Content Standards

Category	Middle School Content Standards	Relevant Activity
Unifying concepts and processes in science	Systems, order and organization	Background information and classification systems and its application to plankton
	Evidence, models and explanation	Plankton tow Design and Construct a Plankter
	Constancy, change and measurement	Design and Construct a Plankter
	Evolution and equilibrium	Baleen Strains Design and Construct a Plankter
	Form and function	
Science as inquiry	Abilities necessary to do scientific inquiry	Design and Construct a Plankter Baleen Strains
	Understandings about scientific inquiry	Design and Construct a Plankter Baleen Strains
Physical science	Properties and changes of properties in matter	
	Motions and forces	Design and Construct a Plankter Baleen Strains
	Transfer of energy	
Life science	Structure and function in living systems	Background information Baleen Strains Design and Construct a Plankter
	Reproduction and heredity	Background information
	Regulation and behavior	Background information Design and Construct a Plankter
	Populations and ecosystems	Background information
	Diversity and adaptations of organisms	Background information Design and Construct a Plankter
Science in personal and social perspective	Personal health	
	Populations, resources and environments	Background information Baleen Strains
	Natural hazards	
	Risks and benefits	

SSWIMS References

Books

Deboyd L. Smith & Kevin B. Johnson. 1996. *A guide to Marine Coastal Plankton and Marine Invertebrate Larvae*, 2nd edition. Kendall Hunt, Dubuque, Iowa. ISBN 0-7872-2113-9

Irby, Bobby, N., Malcom K. McEwen, Shelia A. Brown, and Elizabeth M. Meek. 1984. Man and the Gulf of Mexico. Diversity of Marine Plants. University Press of Mississippi, Jackson, Mississippi. ISBN 0-87805-204-6

Kolb, J. ã 2000 For Sea Institute of Marine Science, Indianola, Washington.

Sir Alister Hardy. 1970. The open sea: Its natural history. Part 1: The world of plankton. Houghton Mifflin, Boston.
Out of print, but a classic and readable book. Excellent illustrations.

Web sites

http://www.coexploration.org/bbsr/classroombats/html/lesson_plans.html
Bermuda Atlantic Time Series Study (BATS) lesson plans
"... links to lesson plans created by scientists and teachers ... designed to employ BATS oceanographic data to promote inquiry-based learning in grade 5-12 classrooms, ... linked to the appropriate topics in the National Science Education content standards."
Click on the "PlanktonTow" link for photos and text about various planktonic organisms.

http://www.chesapeakebay.net/info/plankton.cfm
Chesapeake Bay Program
Excellent general information about plankton and definitions of related terms; links to other sites emphasizing information about the Chesapeake Bay ecosystem

http://www.uni-oldenburg.de/zoomorphology/Biology.html
"Biology of Copepods"
In-depth information and illustrations of this important group of crustaceans, both planktonic and benthic, marine and freshwater.

http://faculty.washington.edu/cemills/
home page of Dr. Claudia Mills, a scientist whose specialty is gelatinous zooplankton such as jellyfish; lovely photographs and informative text, excellent links to other plankton web sites