POLAR TREC
Learning Resources

Details

Completion Time: More than a week

Permission: Download, Share, and Remix

Winter Sampling Polar Projects

Materials

- Materials will vary depending on project selected.

Overview
Students chose a research project, from one of seven suggested projects, to complete in class with a partner. Upon completion they will present their information to the class.

Objectives
Students will present a scientifically accurate project on a topic related to the PolarTREC Winter Sampling expedition.

Lesson Preparation
Introduce students to the PolarTREC website (www.polartreccom). Any expedition could be selected and project topics modified, however this lesson relates primarily to the Winter Sampling expedition (http://www.polartrec.com/expeditions/winter-sampling).

Procedure
Provide instructions to the students: Students chose one of the Polar Projects to complete in class with a partner. Upon completion they will present their information to the class. The presentation should be neat, colorful, pleasing to the eye and be scientifically accurate. Include pictures and document your resources.

Using the Internet, books, periodicals, videos, etc. students will explore topics related to the Winter Sampling expedition. Students will utilize their resources and research to explain the key questions in their project. These explanations should be written in their own words and will also be presented orally to the class.

Project One: Comparative Study of Temperate Deciduous Forest Biome and the Arctic
Compare our biome with the Arctic! Create a tri-fold presentation that will include:
• Climate of each biome including temperature and

rainfall information
• At least 5 plants and 5 animals from each biome
• At least 3 plant and animal adaptations from each biome
• Map with the locations labeled
• T chart showing at least 5 similarities and 5 differences
• Explanation of how humans adapt
• Pictures and Resources

Project Two: Copepods
Explore the zooplankton teacher Chantell Rose will be searching for and sampling in the Arctic (http://www.polartrec.com/expeditions/winter-sampling)
• Explain what a copepod is
• Label the body parts of a copepod and explain the functions of those parts
• Describe copepod behaviors; feeding, mating
• Draw, label, and explain a simple food chain involving copepods and explain why copepods are important to the ecosystem
• Explain what makes the *Calanus* species unique
• Explain some potential threats/hazards to the species
• Pictures and Resources

Project Three: "Deadliest Catch"
Explore the world of commercial fishing and examine it's impact on the Arctic ecosystem!
• Describe commercial fishing in the Arctic – where does it occur? In the Beaufort, Bering and Chukchi Seas?
• Explain what is caught, how much is caught, and when fishing and crab season is open
• Describe the impact on the Arctic ecosystem
• Explain the role copepods have on the commercial fishing industry
• Include charts and maps of commercial fishing information
• Pictures and Resources

Project Four: US Coast Guard Cutter Healy
Explore the ship that teacher Chantell Rose will call home for six weeks! (http://www.polartrec.com/expeditions/winter-sampling)
• Describe the characteristics and capabilities of the USCG Cutter Healy
• Explain scientific areas of study for the expedition including biological oceanography, chemical oceanography, physical oceanography, bathymetry, ecology
• Explain scientific tools to be used on the expedition: CDT, plankton nets, Nisken bottles, Video Plankton recorder and fluorometers
• Include a glossary of ship terms
• Include a proposed map of sampling stations
• Pictures and Resources

Project Five: An Arctic Winter

Learning Resources

Research what makes an Arctic winter unique (http://www.polartrec.com/expeditions/winter-sampling)
• Explain why the Arctic experiences 24 hours of darkness – explain why the length of daylight hours changes so much more drastically than in Ohio.
• Explain the Aurora borealis...the Northern Lights...what are they, when do they occur, why and how do they happen?
• Define the Arctic circle – include a map – label Seward, AK, Dutch Harbor and the Beaufort, Bering and Chukchi Seas
• Identify temperature and snowfall information
• Explain Arctic gear and travel for native populations...how do they stay warm and get around?
• Explain how the Arctic winter impacts the ecosystem and native people
• Pictures and Resources

Project Six: Global Climate Change
What do copepods have to do with global climate change?
• Explain global climate change
• Identify data that supports global climate change and name leading scientists and researchers
• Explain why polar regions are of particular interest
• Explain the impact of human behaviors on global climate change
• Pictures and Resources

Project Seven: Physical Oceanography
• Explain the process of the formation of sea ice
• Differentiate the freezing temperature of seawater from that of freshwater
• Differentiate the density of seawater from that of freshwater
• Include a map of the Bering, Beaufort and Chukchi Seas
• Pictures and Resources

Extension
Students have the opportunity to elaborate on their learning by participating in the PolarTREC expedition, reading daily journals, posting questions in the Ask the Team section, etc.

Assessment
Student projects and presentations will be assessed using a rubric/scoresheet.

Credits
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National Science Education Standards (NSES):

Content Standards, Grades 5-8

Content Standard A: Science As Inquiry
b. Understandings about scientific inquiry

Content Standard C: Life Science
a. Structure and function in living systems
d. Populations and ecosystems
e. Diversity and adaptations of organisms

Content Standard E: Science and Technology
a. Abilities of technological design

Content Standard F: Science In Personal and Social Perspectives
b. Populations, resources, and environments
e. Science and technology in society

Content Standards, Grades 9-12

Content Standard A: Science As Inquiry
b. Understandings about scientific inquiry

Content Standard C: Life Science
d. Interdependence of organisms
e. Matter, energy, and organization in living systems

Content Standard D: Earth and Space Science
b. Geochemical cycles

Content Standard E: Science and Technology
a. Abilities of technological design

Content Standard F: Science In Personal and Social Perspectives
d. Environmental quality
f. Science and technology in local, national, and global challenges

Content Standard G: History and Nature of Science
a. Science as a human endeavor