Polar Bear Tracker

Middle/High school

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Transfer Goals:

Students will be able to independently use their learning to:

- Develop an understanding for scientific research and its use to study global phenomena

Essential Questions:

Does polar bear movement tell us anything about climate change?

Standards:

CCSS:
ELA-Literacy
RI.5.1, 2, 3, 4, 5, 6, 7, 8, 9, 10.

NGSS:

3-5-ETS1-1, 3-5-ETS1-2, 3-5-ETS1-3.
5-ESS3-1.

Materials:

- Internet
- Intro guide
- Writing utensil
- PBI Bear Tracker page
- Polar bear population studies
- PBI website
- Handout—Bear Tracker Worksheet

Objectives:

Students will know:

- One way that researchers study polar bear populations

Students will be skilled at:

- Creating investigable questions about polar bear movement on the Hudson Bay
- Describing the movement of polar bears on the Hudson Bay through accurate seasonal data analysis

Students will understand that:

- Polar bear tracking devices play an important role in polar bear research and conservation

Description:

Explore the world of polar bear researchers through the PBI Bear Tracker webpage and the Bear Tracker PowerPoint. Students will understand how polar bears are studied using tracking devices and track bears in real time. Through the inquiry process, create scientifically investigable questions just like real researchers, and learn how we can take action to help polar bears.

Vocabulary:

>8/10^{ths} coverage (sea ice layer): This refers to the sea ice concentration.

Marginal Ice Zone: Ice that forms the boundary between the open ocean and ice-covered seas. It is the most productive and where the Arctic food web primarily exists.

Polar bear subpopulations: The 20 subpopulations of polar bears are determined based on geographic

location.

Satellite collars: Collars that track bears' locations using transmitters to communicate with Global Positioning Satellites (GPS).

Radio Telemetry Tracking: The process of transmitting information from satellite collars.

Sea Ice: Frozen seawater that covers about 12% of the world's oceans.

Duration: 2-3 hours.

This lesson can be split up over a few classes.

Lesson Plan

Engage:

- Begin lessons by creating a large "KWL chart" about bear tracking and sea ice on the front board, providing sticky notes or markers so students can fill in as a class.
    - For example:

What do you **K**now?	What do you **W**ant to know?	What did you **L**earn?

    - Allow time for each student to fill in the "K" and "W" columns and discuss them as a class. Save the "L" column for later

Explore:

- Review the Teaching & Learning Materials | Polar Bears International Powerpoint appropriate for your grade level
- Divide students into pairs or small groups to Have students explore the "Population Studies" page to gain an introduction to how scientists research polar bears through collaring and tracking.
    - Population Studies | Polar Bears International

Explain/ Elaborate:

- Have students explore the features of the PBI Tracker Device using these guided questions.
    - Polar Bears International | Polar Bear Tracker

Questions:

1. Q: What is the name of the geographic region where polar bears are being tracked?

   A: Hudson Bay

2. Q: Where is the Hudson Bay population located on the globe? Name the country and bordering provinces. Click on Map to see names of the country/ states/provinces, or choose Satellite for a different perspective.

   A: Hudson Bay is located in northern Canada, with bordering provinces of Manitoba, Ontario, Quebec, and Nunavut.

3. Q: When were most of the tracking devices put on the bears? Can you think of a reason according to map location that researchers collared them at that time?

   A: November 2021. They are collared in the fall when they are on land or closer to land because it is easier for them to be accessed and found.

4. Q: What details are provided for each polar bear? Click on one of the bears for details.

   A: ID Number, Date Collared, Cubs, Weight, Distance Traveled, and Distance Mapped.

5. Q: Explore two current research projects by clicking "research project" on the map and describe how the tracking devices help each project.

   A: Project, how the tracking devices are incorporated into a project

6. Q: Under the "research projects" view, click on number 14 (New Tracking Device) and explore the new projects by clicking the "explore new projects button" Choose one project and write a summary describing its importance to learning more about polar bear populations

   A: Summary

Evaluate:

- Review answers on the worksheet.
- Review KWL Chart and answer "W" and add to "L". What questions have been answered? What new questions do you have? Challenge the students to explain why a question is scientific and able to be investigated vs. not scientific. What questions can be rewritten into scientific questions?
- In pairs or teams, have students research one of the questions. Create a classroom State of the Polar Bear Conference and have each group present their findings via poster and oral presentation.
- Tech option: Have students create their presentations using computer tools such as Prezi/Google Slides/ PowerPoint.

Extensions

How are polar bears affected by climate change?

Polar bears have evolved for a life on the sea ice on which they rely for reaching their seal prey. Arctic sea ice, however, is rapidly diminishing due to a warming Earth, affecting the entire arctic ecosystem, from copepods to seals to walruses.

For polar bears, sea ice loss means reduced access to food, drop in body condition, lower cub survival rates, increase in drowning, increase in cannibalism, loss of access to denning areas, and a decline in population size. Scientists track polar bears to understand the impact climate change is having on the different polar bear populations. To explore the current population, habitat, and threat information for the world's polar bears and to understand more about current threats to polar bears, watch the following videos:

Inherent Threats to Polar Bears

Dr. Steven Amstrup—Polar Bears in 50 Years

References

- Polar Bears International | Polar Bear Tracker
- Teaching & Learning Materials | Polar Bears International
- Inherent Threats to Polar Bears
- Dr. Steven Amstrup—Polar Bears in 50 Years

Polar Bear Tracker Worksheet

Instructions: Complete each question by using the Polar Bear Tracker webpage. Click the "how to use" button at the bottom of the map to get oriented with the tracker page. (https://polarbearsinternational.org/polar-bear-tracker)

1. What is the geographic region where polar bears are being tracked?

2. Where is the Hudson Bay population located on the globe? Name the country and bordering provinces. Click on Map to see the names of the countries/ states/provinces.

3. When were most of the tracking devices put on the bears? Can you think of a reason according to the map location that researchers collared them at that time?

4. What details are provided for each polar bear? Click on one of the bears for details.

5. Click "research projects" in the "view" bar and Explore two current research projects by clicking "research project" on the map and describe how the tracking devices are used in each project.

6. Under the "research projects" view, click on number 14 (New Tracking Device) and explore the new projects by clicking the "explore new projects button" Choose one project and write a summary describing its importance in learning more about polar bear populations.