Mom & Me:
A Polar Bear Survival Story

5th - 8th Grade

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Transfer Goals:

Students will be able to independently use their learning to...

- Analyze cause and effect relationships to develop sequenced predictions about natural phenomena
- Gather information from a source to complete a task

Essential Questions:

How is sea ice related to polar bear populations?

Standards:

Next Generation Science Standards:
MS-LS2-1

Common Core State Standards Connections:
ELA/Literacy -
RI.5.1,2,3,5,7,9
RST.6-8.1
RST.6-8.7

Materials:

For Activity 1:

- All About Polar Bears Powerpoint
- Copies of *Mom and Me: A Polar Bear Crossword Puzzle*
- Computers with Internet access (or copies of mini-posters)
- Pencils and erasers

For Activity 2:

- Copies of *Graph A (Break-up Dates 1979-2020)*
- Copies of Graph B *(Lone Female Body Mass, 1980-2020)*
- Copies of *Polar Bear Ecoregions Map* (optional)

Objectives:

Students will know...

- Why sea ice plays an important role in polar bear population health

Students will be skilled at...

- Collecting information from a provided source to complete a task
- Accurately Interpreting data from a graph

Students will understand that...

- Polar bear populations and sea ice formation have a cause and effect relationship
- Climate change is changing sea ice formation

Description:

Through independent research, group work, and class discussion about the natural history of a polar bear, students will recognize the connection between polar bear survival and sea ice. This lesson contains several activities.

Vocabulary:

*Review Polar Bear Crossword Puzzle

Duration:

This lesson contains several activities:

- *PowerPoint:* 15 minutes
- *Activities 1 and 2:* Two 50-minute class periods

Lesson Plan

Activity 1:

- Have students watch the *All About Polar Bears* PowerPoint appropriate to their grade level for an engaging introduction to the polar bear world. (https://polarbearsinternational.org/education-center/teaching-and-learning-materials/).
- Give each student a copy of *Mom and Me: A Polar Bear Crossword Puzzle*. Have students explore the Polar Bears International website. The Polar Bear Facts and FAQ page is a good place to start (https://polarbearsinternational.org/polar-bear-facts/),(https://polarbearsinternational.org/faq/).

Activity 2:

- Look at Graph A, Break-Up Dates 1979-2020. As a group, ask students to make observations and share what they notice in Graph A.
    - For this section, We suggest having students independently at first and then transition to a pair and share to answer the questions below. You may also choose to finish with a class discussion.
      **With younger students that have not had experience interpreting graphs, this might be a good opportunity to work in a class discussion style.*
        1. In 1980, estimate when did the ice begin to break up? (Answer: June 30)
        2. In 2005, when did the ice begin to break up? (Answer: June 18th)
        3. Is the ice breaking up sooner or later each year? (Answer: Sooner)
        4. What do you think may be causing the ice to break up earlier each year?
        5. List several ways this earlier ice break-up negatively affects polar bears. (Answers:)
            - Polar bears hunt ringed seals from the sea ice. Earlier break-up means less hunting time.
            - Less hunting time means bears cannot gain the weight they need

for their winter fast.
    - Weight gain for females is essential because they are hunting both for themselves and their cubs.
    - Earlier ice break-up means bears are losing their habitat and coming ashore earlier, potentially creating a human/wildlife conflict.
- Look at Graph B: Female Polar Bear Body Mass, 1980-2020. This graph shows a steady decline in average female polar bear body mass and weight. We suggest having students work in small groups to answer the questions below for this section. You may then choose to finish with a class discussion.
  **With younger students that have not had experience interpreting graphs, this might be a good opportunity to work in a class discussion style.*
    1. What was the average weight of a female polar bear in 1980? (Answer: 300kg)
    2. What was the average weight of a female polar bear in 2005? (Answer: 225kg)
    3. How much lighter were polar bears in 2005 than in 1980? (Answer: 75kg)
    4. What negative effect does lighter body mass have on a polar bear? (Answer:)
        - Less weight gain for females makes it harder to reproduce and nurse cubs. This leads to the birth of fewer cubs and a lower survival rate.
        - Low cub survival leads to a decline in the polar bear population.
        - Lower body weight and fat reserves make traveling back to the ice difficult for mother bears after emerging from their dens. They have less stored energy to walk long distances and less energy to hunt and kill seals for themselves and their cubs.
        - Thin and hungry bears are tempted to seek food in settlements causing potential harm to humans, property, and themselves.
- Come back together as a group. Write “So What” on the whiteboard and ask students to compare both graphs by writing an “if-then” statement on the board.
    - An answer example could be “if ___, then___”
        - If Earlier ice breaks up, then less hunting time for polar bears
        - Less hunting time = less weight gain
        - Less weight gain = Less body mass
        - Lower body mass = lower reproduction rates
        - Less reproduction rate = lower cub survival
        - Lower cub survival = decreased population

  **If students have trouble jumping right into this exercise, you might consider writing partial if, then statements for the class to fill in. ie, “If _____, then polar bears have less time to hunt”.*
- Allow students to take 5 minutes to independently consider why this might be

happening and allow time to share
- As a class, introduce climate change as the cause for this. Show the "when will polar bear populations collapse: the answer is up to us" video (https://youtu.be/I7Z1H4pUfIQ)
- Review the "explore our solutions" handout and provide time for each student to discuss actions they can take to help their community take action.
- Provide time for class discussion about positive, community-centered, climate solutions while completing their Flat Nanuk sheet

Extension:

- Providing time for immediate climate action may ease anxiety, or stress about climate change and its effects on polar bears and humans. Something as quick as turning the lights off in the classroom for an hour, and encouraging them to talk about that action, can empower students in feeling like they have input in their classroom and larger community. You can also offer other solutions like planting a classroom window garden or working together to clean up the schoolyard.
- For more involved solutions, see the Energy Island lesson in the "Paws Up for Polar Bears" 5th grade unit: https://polarbearsinternational.org/education-center/units-lessons/paws-up-for-polar-bears-unit-plan/

Adaptation:

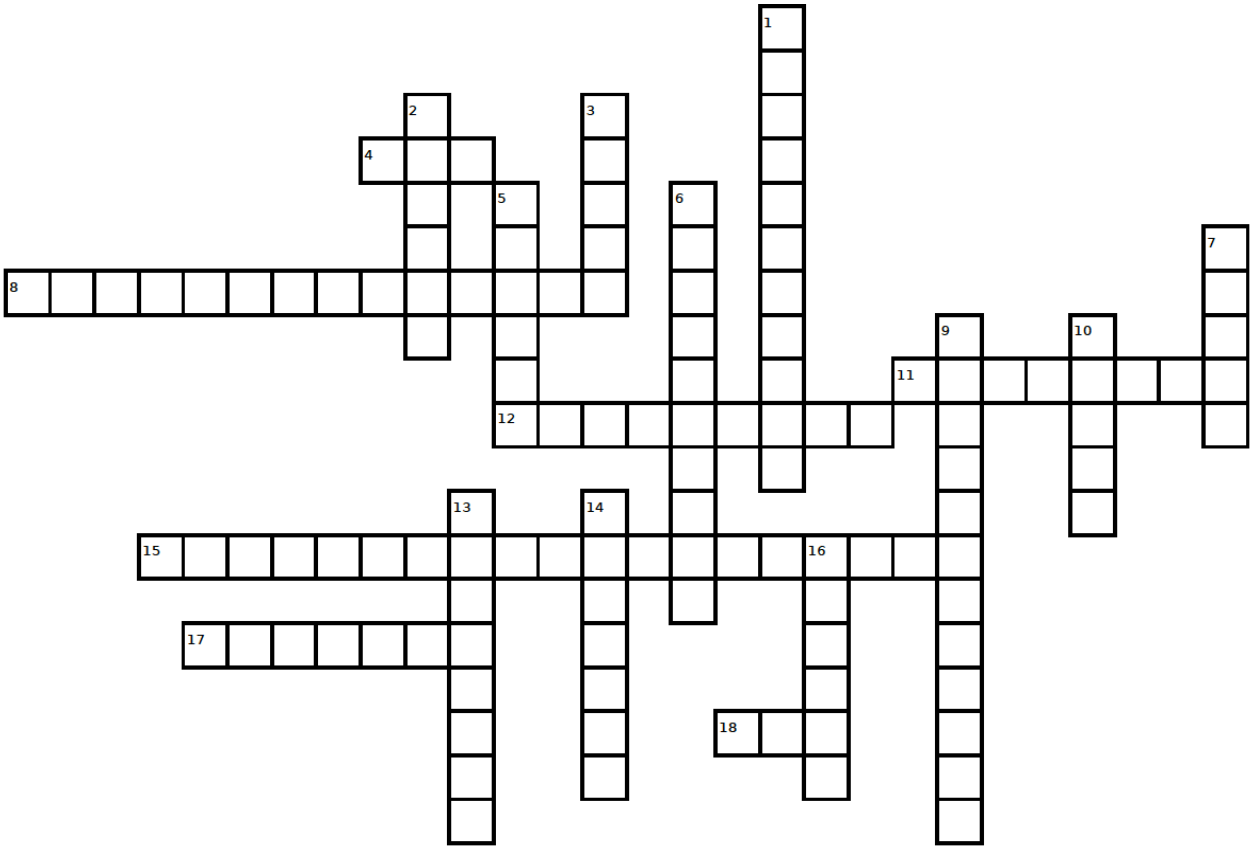
- If students are new at interpreting graphs, this lesson could be used or paired with another lesson to introduce graph reading skills
- This lesson can be done as a class discussion with abbreviated questions for younger students.

References

- All about Polar Bears PowerPoint: https://polarbearsinternational.org/education-center/teaching-and-learning-materials/
- Polar Bears International Website: FAQ https://polarbearsinternational.org/faq/
- Youtube Video "When will polar bear populations collapse: The answer is up to us": https://youtu.be/I7Z1H4pUfIQ
- Explore Our Solutions Handout: https://downloads.ctfassets.net/i04syw39vv9p/2PLxXi79wlqP7moFT7ehZX/c3b1835c442282908b560f71566854a6/YouthSolutionsPiece_2022.pdf
- Flat Nanuk Handout https://assets.ctfassets.net/i04syw39vv9p/6lLAgZp2rCtf2Y1JrkKOZ9/4da353882b96cabaf31b269987d06935/flat_nanuk.pdf

Polar Bear Crossword Puzzle

Using the clues below, write the answers directly into the crossword puzzle boxes.



Down:

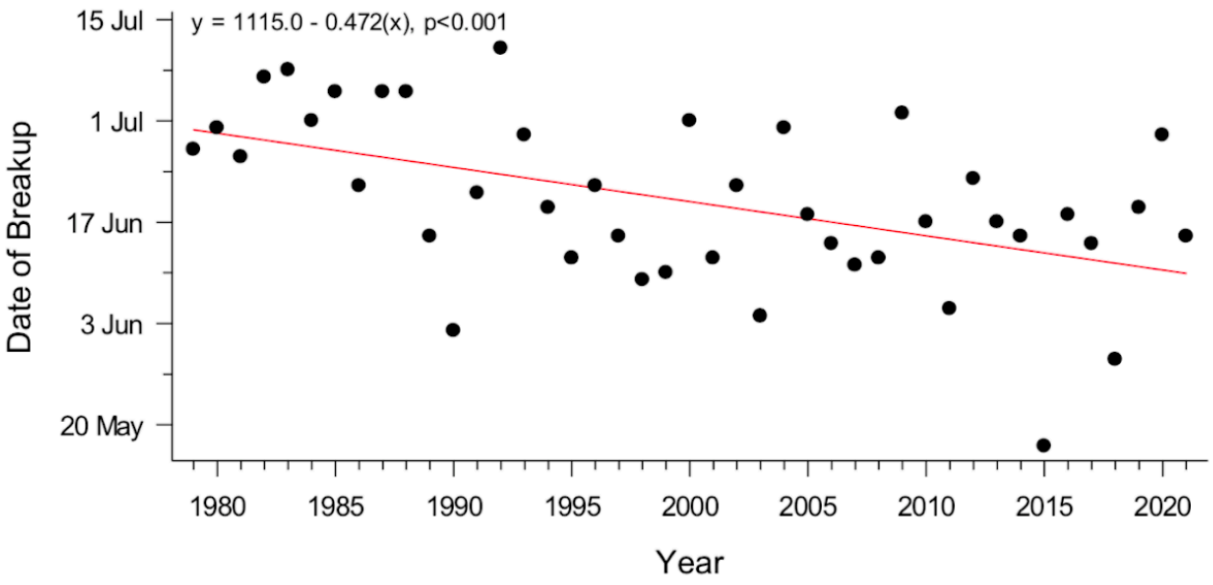
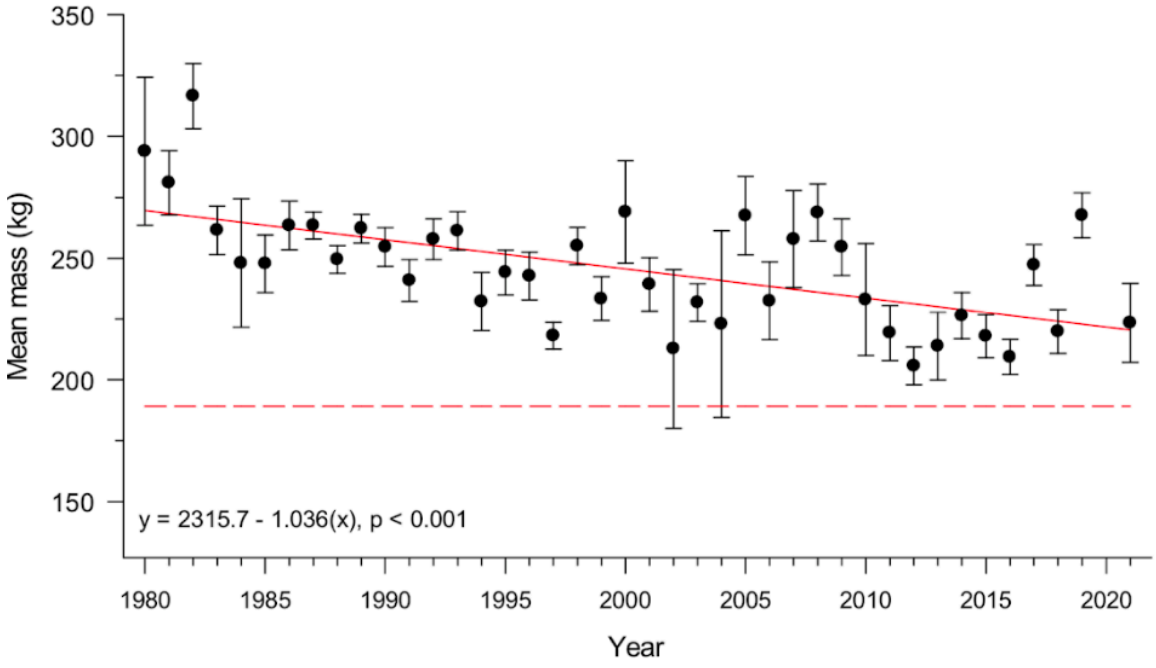
1. Polar bears' favorite food (2 words).
2. The number of months a polar bear cub nurses.
3. Openings in the sea ice.
5. The polar bear's only enemy.
6. A mother bear does not ___ while she is denning (3 words).
7. Months (#) a female polar bear stays in her den to give birth.
9. A snow cave where cubs are born (2 words).
10. The color of a polar bear's skin.
13. The number of different bear populations in the Arctic.
14. Polar bears do not have this but they eat it.
16. Polar bears live an average of 15-18 years old, but biologists have tagged bears around this age.

Across:

4. Number of cubs a polar bear mom typically has.
8. The Latin species name for "polar bear" (2 words).
11. Small bumps that keep polar bears from slipping on ice.
12. What polar bears are called after they leave their mothers between the age of 2 to 2-½ years old.
15. Used in reproduction to time the birth of cubs during the most favorable conditions for survival (2 words).
17. A flat sheet of ice floating in the sea (2 words).
18. Polar bears need a thick layer of this to keep warm and survive when food is scarce.

POLAR BEARS INTERNATIONAL

Graph A: Break-Up Dates Per Year



Graph B: Female Polar Bear Body Mass