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Climate Change: Polar Bears and Arctic Food Webs

Based on what you've learned from the readings, interview and video in this section, answer the following questions.

1. Why do polar bears need sea ice? What is their prey? Describe the connection between sea ice and polar bear feeding.

> Polar bears need ice because they eat fat-dense prey, which is found in cold, icy environments. The bears store the fat so that they can use that energy during the warmer summer months, which are getting longer as the clmate warms up.

2. In what two ways is Arctic sea ice changing that is detrimental to polar bear populations?

> (1) Because of the warming climate, winter is getting shorter and summer longer, making it harder for polar bears to find enough food during the winter to be able to store fat and use that energy for the summer.
>
> (2) This shifting in priorities to survive is causing polar bears to behave differently, such as a decline in mating bceause of conserving energy. This is leading to a population decrease.

3. In the audio interview, what does Dr. Steven Amstrup, Chief Scientist for Polar Bears International, compare sea ice platforms to in terms of polar bear feeding?

> Dr. Steven Armstrub compares to the sea ice platforms as the polar bears giant dinner plates, as the land food is not sufficient for the bears. Seals primarily reside on the sea ice platforms.

4. What is the result of longer and longer sea ice absence in terms of polar bears from areas like Baffin Bay?

> This will result in bears that are more food deprived, change diet, as well as the bears having to survive in a habitat that is changing, causing a struggle for survival.

5. What are polar bears feeding on instead of their typical diet? In what ways is this dietary substitute not nutritionally adequate for the polar bears?

> The bears are hunting in land beyond the ice searching for food. Here they are hunting caribou and bird eggs. While this is preventing them from going extinct, it is making it difficult for the bears to sustain their fat requirements that they were receiving from marine prey. Hunting terrestial prey also forces the bears to exert more energy, burning more fat, decreasing their fat reserves for the summer.

6. Describe what the term "trophic cascade" means.

Trophic cascades is the indirect control of top predators on their prey. Changes in the op of the food chain work their way down. This leads to larger numbers of primary producers in a given food chain.

7. If polar bear populations continue to decline as predicted due to melting sea ice, propose a potential trophic cascade that may result. Accompany your description of this change with a food chain diagram and follow potential changes in the food chain all the way to the primary producer level. You can use the food web diagram in the “Climate Change: Arctic Food Web” page of this module to help you.

If the populations of polar bears continue to decrease, this may increase the populations of vegetation through the artic region. I'll do my best to illustrate below.

(Normal polar bear pop.)

| polar bears|3C

|_____seals_____|2C

|_____small fish_____|1C

|_____vegetation_____| 1P

===>

(decreased polar bear pop.)

|p.b.| 3C

|_____seals_____|2C

|_____small fish_____|1C

|_____vegetation_____|1P