

## **Alaskan Animal Population**

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### **Introduction**

Alaska has been severely impacted by global warming. As the largest state in the United States, it is made up of rainforests, tundra, glaciers, forests, and more. Each of these areas comes with its own reaction to the changing climates.

Alaska's temperatures are rising which is causing the permafrost boundary to shift north. There has been a loss of protective sea ice, which has led to coastal erosion. The fish and animals that live in these areas are experiencing population changes, and that is where I would like to focus.

While studying Alaskan Animal Population changes, students will learn about global warming and the climate changes that have taken place because of it. Students will then focus on Alaska and the impact global warming has had on the climate of various areas in Alaska. Further, students will learn about the animals that populate these areas in Alaska, and examine how the populations have changed over the course of time. Finally, students will look at the impact climate change has had on local animal populations.

### **Demographics**

Anna P. Mote is an elementary school in the suburbs of Wilmington. There are approximately 600 students enrolled, and 70% of them are Hispanic/Latino. 54% of the students are English language learners, and 90% come from low income households. While the state and district suspension rates are 13%, only 5% of the students at Mote have been suspended.<sup>i</sup>

I am the technology teacher at Mote. I see all students for 50 minutes a week as part of the students' related arts rotation. For this unit, I will focus on the 5<sup>th</sup> graders. There are 4 classes of 5<sup>th</sup> graders, approximately 90 students, who will be completing this unit.

The fifth grade students have had five years of technology instruction and are digitally literate. They know how to use the Microsoft Office products such as Word, Power Point and Excel. They have some background in research skills, but still struggle with conducting effective searches.

## **Background**

### Global Warming

In 2006, the film “An Inconvenient Truth,” premiered at the Sundance Film Festival. The film was about Al Gore and his presentation about Global Warming.<sup>ii</sup> While the science community had been studying this issue for many years, it was now a topic that everyone was talking about. There has been great debate since that screening about the validity of the claims made by Al Gore and other scientists. Some still believe that climate change is a hoax and there has been global cooling instead of warming.<sup>iii</sup> However, we have a great deal of evidence that climate change is in fact a reality.

The Greenhouse Effect is not a new concept. In the 1800’s, scientists began to understand that the reason the earth stays warm enough to support life is due, in part, to the combination of carbon dioxide and water vapor in the atmosphere.<sup>iv</sup> In the early 1900’s, scientists discovered that levels of CO<sub>2</sub> fluctuated with volcanic activity. Further, they found that coal burning produced similar results. In the 1930’s, they predicted that with growing populations and energy use, there would be noticeable changes in our atmosphere by 2000.

According to the Environmental Protection Agency (EPA), the average temperature has risen 1.4 degrees Fahrenheit since 1880. While this seems like a very small amount over the course of such a long time, it can cause significant changes. In the past, a two degree drop lead to a mini ice age, and 20,000 years ago, the earth saw a five degree drop and then North America was covered in ice.<sup>v</sup>

This increase in temperature has resulted in serious changes in our environment. The National Snow and Ice Data Center has stated that we now have real evidence of the global impact of the climate change.<sup>vi</sup> According to NASA, an intergovernmental panel on climate change found that climate change will have significant and growing impact.<sup>vii</sup> (NASA n.d.) An increase in heat waves, heavy downpours, droughts and insect infestations are just some of the events that can be attributed to this climate change. These effects are already evident and promise to get worse.

### Alaska

While we see these changes all around the world, Alaska is especially vulnerable to climate change. Over the past 50 years, Alaska has seen more pronounced effects of climate change than any other area in the United States. Alaska has warmed at twice the rate of the rest of the U.S.<sup>viii</sup> Many ecosystems are threatened.

Most glaciers are shrinking and retreating. More and more glacial water is being dumped into our oceans, which means more land is uncovered by ice, disrupting nature.<sup>ix</sup>

This, in turn, means that the sun's warmth is being absorbed by the soil rather than being reflected by the ice cover. Other threats include increased storm intensity, warming oceans and streams, and changing precipitation patterns.

The warming of the ground presents one of the most challenging issues: melting permafrost. Permafrost is the frozen ground that covers most of Alaska year round. The infrastructure built in Alaska, such as the Alaskan pipeline, depends on the permafrost to support it. With Alaska's temperatures rising so quickly, the permafrost is thawing quickly. When it thaws, it releases huge amounts of greenhouse gases, which then warms the atmosphere even more.<sup>x</sup>

Loss of permafrost is causing damage to roads, buildings and airport runways. Houses are suffering damage that either requires expensive repairs or forces families to move. Even trees are having trouble with the softer earth. The trees are either growing sideways or falling down completely.

These changing environmental patterns are causing changes in species distributions and outbreaks of insects. They are causing habitat issues for animals that live on and around the glaciers, the animals that live on the land that is being flooded, and the fish in these areas. Ponds and wetlands have experienced reductions up to 88% in the last 50 years. Spruce, cedar, and birch trees are dying due to illness and forest fires. Insects that could not survive in Alaska due to the cold temperatures now have access to these plants, carrying diseases that kill the trees, adding fuel to the fires.

Wikipedia lists 112 different kinds of mammals that live in Alaska.<sup>xi</sup> It seems as though the animals that are struggling with the changes in their environment the most are those that live in and around the water and glaciers. Walrus populations have been reduced significantly.<sup>xii</sup> These mammals depend on sea ice to survive, and they are having to swim further and further to find it. With limited usable area, they are hauling themselves out of the water in huge, compact gatherings. This requires the walruses to compete for space and food, as well as putting calves in danger from stampedes.<sup>xiii</sup> Polar bears, seals, sea otters and many more mammals have also seen their numbers dwindle.

## Animals of Alaska

### *Walruses*

Walruses are giant marine mammals that are very social animals. They like to swim in close proximity to one another, and when they are on shore, they tend to be in very close proximity to each other, often to the point of touching one another.<sup>xiv</sup>

Walruses come out of the water to rest and warm up. They can "haul up" on sea ice or land. As sea ice is lost, more and more "haul outs" are occurring on land. Large

gatherings are being reported in record numbers. This is a problem because when a disturbance is detected, walruses often stampede back to the water. Calves are being trampled. The loss of calves is growing and with a low birth rate the population does not recover quickly.<sup>xv</sup>

### *Polar Bears*

Polar bears are large, strong bears. They live in the arctic regions of the northern hemisphere and are primarily carnivores. They sometimes live on land, but their primary habitat is on sea ice. They have developed webbed feet that prevent the ice from cracking under their enormous weight, and for this reason, they are considered marine mammals.<sup>xvi</sup>

As sea ice disappears, polar bears are losing their habitat. In fact, polar bears were the first vertebrates to be classified as endangered due to climate change. As sea ice disappears for longer periods during the summer, the polar bear hunting season becomes shorter. If they cannot hunt for long enough periods, polar bears will starve.<sup>xvii</sup>

One study suggests that some polar bears in Canada are hybridizing by mating with brown bears.<sup>xviii</sup> If this were to happen, it could result in the loss of a “pure” polar bear species. However, a loss such as this might take thousands of years.

### *Arctic Fox*

The arctic fox lives in the two coldest areas of the world, the tundra and sea ice. It has thick fur, a compact body and short legs and ears. These all combine to help it thrive in these coldest regions by reducing heat loss through the extremities. They survive on a diet almost entirely of lemmings and arctic voles.<sup>xix</sup>

The arctic fox is so finely tuned to its environment that it is extremely susceptible to even slight changes in the climate. As sea ice shrinks, the lemming population shrinks, leaving a smaller food source for this fox. And as temperatures warm, more red fox move into this area and compete for the lemmings that are there. Also, as the tundra is warming up, the vegetation is changing from moss and lichen to shrubs and trees. The white of the fox’s fur then works against it as it is now framed against the greens and browns of the new vegetation.<sup>xx</sup>

### *Sea Otter*

Sea otters are the smallest marine mammals in North America. They are found in the waters of the central and northern Pacific Ocean. They are social animals that like to stay in gender groups; females and pups tend to stay together away from the groups of males. They spend almost their entire life swimming in the water, but will occasionally come on land.<sup>xxi</sup>

Climate change doesn't have a direct impact on the habitat of the sea otter, but rather as sea otters move, they change the environment they inhabit. Sea otters eat up to 25% of their body weight in abalone, clams, crabs, mussels, shrimp and sea urchins. Eating these helps improve the conditions for the kelp in those areas. As sea otters move to find water temperatures that they like, the kelp conditions deteriorate in the areas they leave. The sea urchins eat the kelp that would otherwise support other marine life.<sup>xxii</sup>

### *Seals*

There are many types of Arctic and Antarctic seals that rely on sea ice for survival. Most seals live their entire lives near the ice pack. They give birth and raise their pups in the ice pack. They create lairs in the snow pack to protect their pups. A reduction in sea ice reduces the availability of these habitats for the seals.<sup>xxiii</sup>

However, the biggest threat to seals comes from people. Many people believe that seals are a threat to commercial fisheries. This leads to seals being shot to protect the fishermen's livelihood. Unfortunately, many countries do not have laws protecting the seals from this practice.<sup>xxiv</sup>

### **Rationale**

I see the students at Anna P. Mote Elementary School only one time per week. It is often challenging for students to complete research projects because of this fact. Additionally, the continuity of the project is frequently interfered with by assemblies, field trips and other school activities. Working on a project for six sessions means six weeks in the technology lab.

While six sessions is not a long time for a unit, the total time extends for more than half of a marking period. Students seem to get bored with a topic when we linger too long. The question becomes, do we cover a topic thoroughly, or do we skim the surface and give the students a taste of the topic which they can continue to work on with other teachers?

When I find teachers, homerooms or librarians, who are willing to work with me, I introduce topics and students then work on them in other places, as well. This allows all the materials to be introduced by me during technology class, and then the research to be completed at other times during the week. Otherwise, I introduce the topics as succinctly as possible and then allow the students to do as much as possible in the given time. Either way, climate change is important for our students to understand.

Elementary students are developing habits that they will keep with them for the rest of their lives. If we teach them how their choices are affecting the world, they are more likely to make choices that will benefit the climate.

## Description of Unit

Students will be working on this project for approximately 6 weeks. Students come to the technology lab as part of their specials rotation. I work with each class for 50 minutes per week.

Students will work on several technology skills while working through this unit. They will be using research skills to search for information on the animals they choose and the habitats of those animals. They will be using Microsoft Publisher to create an infographic about the effects of climate change on their animals. Students will then present their infographics to their classmates.

## Teaching Strategies

Students will use research skills to learn about the animals in Alaska and the effects that climate change has had on the animals. Pebble Go is a subscription based website that provides basic background information on many subjects, including animals. Students will start on Pebble Go, learn basic facts about animals that live in Alaska, and choose the animal they wish to study.

Students will then use a variety of search engines such as Fact Monster, Kids Click and Google to find information on how climate has changed the habitats of the animals they are studying. When students have collected the necessary information, they will create a brochure to teach others of the effects of global warming on the habitats of the animal they are studying. Students will share these brochures with the other students in their class.

## Lesson 1

Length – two sessions, 50 minutes each

Session 1: To start the unit, I will show my students a video; “Climate Change Basics.” (U.S. Environmental Protection Agency 2014) This video presents an overview of climate change and greenhouse gases in less than three minutes. Students will begin a vocabulary list (appendix A) for the words we will be learning in this unit.

Students will then explore three websites to answer basic questions about climate change. (Appendix B) (Environmental Protection Agency n.d.), (Cool the Earth 2014), (Will Steger Foundation n.d.)

<http://www.epa.gov/climatestudents/>

<http://www.cooltheearth.org/pages/resources/climate-101>  
<http://classroom.willstegerfoundation.org/>

At the end of the session, students will share their findings and compare causes and effects of global warming.

Session 2: We will begin this session by watching “Frozen Planet – Vanishing Arctic Ice Cap.” (Attenborough 2011) It is a 2 minute clip about the effect of climate change on the Arctic Ice Cap. We will review last week’s findings on why this change may be occurring. Students will examine changes in the glaciers using web resources. We will come back together as a whole group and discuss how the changes in the glaciers may affect the animals that live there.

## **Lesson 2**

Length – two sessions, 50 minutes each

Appendix C is a list of Alaskan animals from which to choose. Students will choose an animal. Each student will complete the summary of the animal he or she chose on appendix C. Using websites such as Pebble Go, Fact Monster and Kids Click, students will research the habitat of the animals they have chosen. They will complete appendix D on the effects of changing climate on its habitat.

## **Lesson 3**

Length – two sessions, 50 minutes each

Students will create an infographic on the effects of climate change on chosen animals. Using Microsoft Publisher, they will persuade others to change their habits so we can save animals’ habitats. Using the research they completed for Appendices C and D, they will show how the climate has changed and how that change has impacted the habitats of Alaskan animals. Students will then present their infographics to their classmates.

### **Common Core Standards Addressed:**

#### **CCSS.ELA-LITERACY.CCRA.R.1**

Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

**CCSS.ELA-LITERACY.CCRA.R.7**

Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.<sup>1</sup>

**CCSS.ELA-LITERACY.CCRA.R.8**

Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.

**CCSS.ELA-LITERACY.CCRA.W.2**

Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

**CCSS.ELA-LITERACY.CCRA.W.6**

Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

**CCSS.ELA-LITERACY.CCRA.W.7**

Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.

**CCSS.ELA-LITERACY.CCRA.W.8**

Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.

**CCSS.ELA-LITERACY.CCRA.W.9**

Draw evidence from literary or informational texts to support analysis, reflection, and research.

## Appendix A

## Vocabulary List

Vocabulary	Definition
Word	

## **Appendix B**

### **Climate Change**

Name \_\_\_\_\_ Date \_\_\_\_\_

1. What is Global Warming?

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2. What are some changes that have taken place because of Global Warming?

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3. Why are we experiencing Global Warming?

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4. What can we do to fix this problem?

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## **APPENDIX C**

**Animals to choose from. Complete the description section of the animal you choose**

<b>Name of Animal</b>	<b>Description</b>
<b>Polar Bears</b>	
<b>Walrus</b>	
<b>Arctic Fox</b>	
<b>Sea Otters</b>	

<b>Bearded Seal</b>	
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**Appendix D**

Name \_\_\_\_\_ Date \_\_\_\_\_

Name of Animal \_\_\_\_\_

Where does this animal live? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

What has happened to this area due to global warming?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

How has the changed the population of this animal?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

What can we do to change this issue?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## **Appendix E**

### **Vocabulary List**

**Ice Cap**

**Glacier**

**Arctic**

**Sea Ice**

**Global Warming**

**Climate**

**Population**

**Permafrost**

**Habitat**

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*Frozen Planet - On Thin Ice*. Directed by Venessa Berlowitz. Performed by David & Baldwin, Alec Attenborough. 2011. A BBC nature documentary about the impact humans and global warming are having on the poles. Students don't have personal knowledge of the poles, and this builds a good foundation.

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## Notes

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<sup>xvi</sup> National Wildlife Federation; Polar Bears. n.d. <http://www.nwf.org/wildlife/wildlife-library/mammals/polar-bear.aspx>

<sup>xvii</sup> Ibid

<sup>xviii</sup> The Canadian Press. "Climate Change Could Turn Polar Bears Brown." *CBC News: World*. March 15, 2013. <http://www.cbc.ca/news/world/climate-change-could-turn-polar-bears-brown-study-says-1.1320965>

<sup>xxix</sup> Center for Biological Diversity. "The Arctic Fox." *Center for Biological Diversity: The Arctic Meltdown*. n.d.  
[http://www.biologicaldiversity.org/programs/climate\\_law\\_institute/the\\_arctic\\_meltdown/slideshow\\_text/arctic\\_fox.html](http://www.biologicaldiversity.org/programs/climate_law_institute/the_arctic_meltdown/slideshow_text/arctic_fox.html)

<sup>xx</sup> Ibid

<sup>xxi</sup> "Sea Otters, Enhydra lutris." *Marine Bio*. n.d. <http://marinebio.org/species.asp?id=157>

<sup>xxii</sup> Ecological Society of America. *Science Daily*. August 11, 2014.  
<http://www.sciencedaily.com/releases/2014/08/140811180326.htm>

<sup>xxiii</sup> "Wildlife: Seals." *National Snow and Ice Data Center: All About Sea Ice*. n.d.  
[http://nsidc.org/cryosphere/seaice/environment/mammals\\_seals.html](http://nsidc.org/cryosphere/seaice/environment/mammals_seals.html)

<sup>xxiv</sup> "Harbor Seals, Phoca vitulina." *Marine Bio*. n.d.  
<http://marinebio.org/species.asp?id=158>

<b>Curriculum Unit Title</b>	Alaskan Animal Populations	Stella Evans
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**KEY LEARNING, ENDURING UNDERSTANDING, ETC.**

Students will understand that climate change is changing the environment in Alaska. This is impacting the animal populations in Alaska.

**ESSENTIAL QUESTION(S) for the UNIT**

How is Climate change affecting animal populations in Alaska?

**CONCEPT A**

Global Warming

**ESSENTIAL QUESTIONS A**

What is global warming?

**CONCEPT B**

Changing Environment

**ESSENTIAL QUESTIONS B**

How is global warming changing the environment of Alaska?

**CONCEPT C**

Population Change

**ESSENTIAL QUESTIONS C**

How is global warming impacting the animal populations in Alaska?

**VOCABULARY A**

Global Warming

**VOCABULARY B**

Population

**VOCABULARY C**

Permafrost