

# Melting Arctic Ice and its Possible Impacts on Humans

Tom Tomaganuk, Kim Tomaganuk, Harry Bill,  
Rhea Kaganak, Helen George

Max Rotenberry and Mary Cook

[mrotenberry@loweryukon.org](mailto:mrotenberry@loweryukon.org)

Disclaimer: This paper was written as part of the Alaska Ocean Sciences Bowl High School competition. The conclusions in this report are solely those of the student authors.

# Melting Arctic Ice and its Possible Impacts on Humans

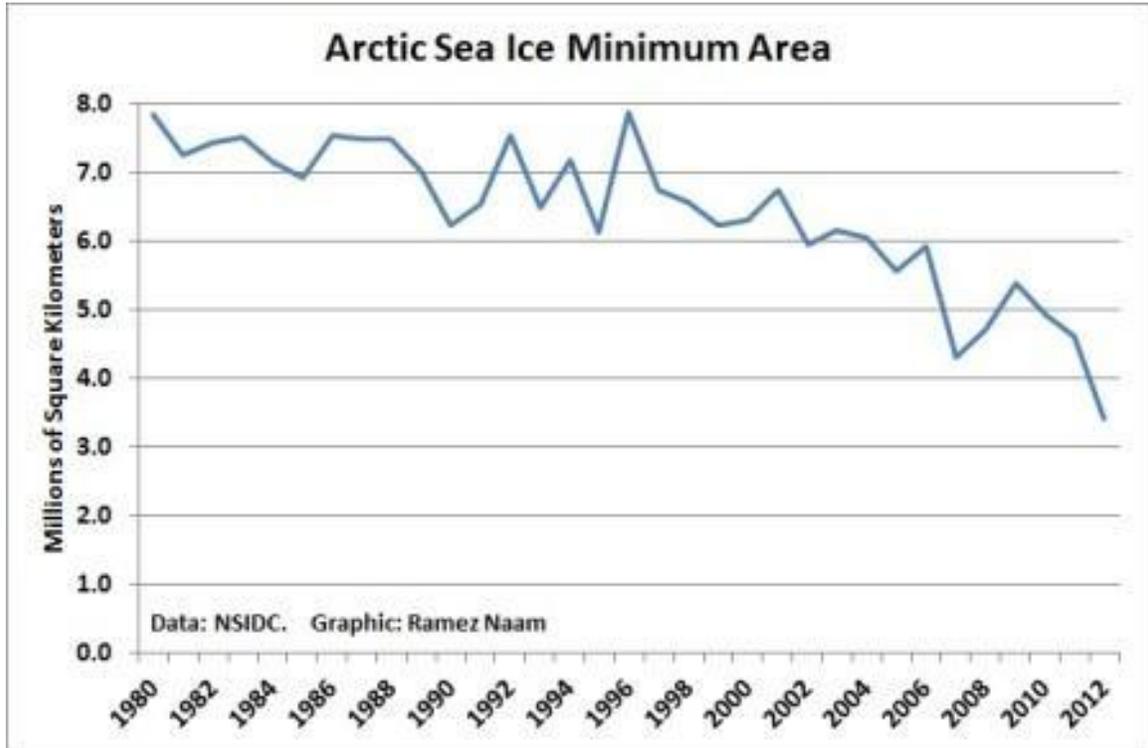
## Abstract:

How does the reduction of Arctic Sea ice directly impact the habitat of human beings? In this paper, we discuss the myriad ways that the Arctic sea ice could potentially harm human beings by reducing certain animal habitats that are used for subsistence. We also discuss how the opening of Northern Sea Route could be both harmful and beneficial to humans in the long run. Overall, the Arctic Sea ice plays a vital role in preserving certain ways of life for both humans and animals.

The melting of the Arctic sea ice is a dire problem for not only the human race, but also many species found in the animal kingdom. The melting of this Arctic sea ice will most likely lead to further climate change. This is a problem because climate change affects almost everything important to humans, like plants, animals, the weather, and commerce.

All these things, in turn, affect our food supplies. But the melting sea ice may have some benefits, too. For example, some animals may benefit from the opened waterways. The melting ice will affect transportation in the Arctic regions, in particular commercial transportation. Many countries are already vying for position in rights to Arctic shipping lanes when the big melt happens. Global weather patterns are affected by the seawater temperature and ocean current flow patterns. Since humans are dependent upon the animals and plants for food and the waterways for commercial ventures, we have selected humans as our organism impacted by the melting Arctic Sea Ice.

A huge question is how much is the ice expected to melt in the next 50 years? Until recently most ice models predicted that the summertime ice cover would remain until the end of 2100. But looking at the graph below, the trend indicates that we may see an end to the summer ice by 2030 (Naam, 2012).



Ramez Naam sites in his article that this data is also supported in a report by Muyin Wang of the University of Washington and James Overland at the National Oceanographic and Atmospheric Administration who predicted a nearly ice free Arctic around 2030. According to Naam, “All the sea ice loss, including that before satellite observation occurred, has happened since the start of the industrial revolution, and the beginning of human emissions of carbon dioxide and other greenhouse gases on a massive scale” (2012). In the last 40 years, the Arctic temperatures rose about 1.9 degrees Celsius or 3.5 degrees Fahrenheit. This increase in heat has caused the arctic ice to melt faster than any of the previous 1400 years (Naam, 2012).

The present condition of humans and their relationship with the sea ice is one that is ever changing. People of the North are seeing some shifts in their weather patterns in

Alaska. Some Alaska Natives in Scammon Bay have expressed that they feel the changing weather patterns are affecting the fish population in a negative way. In the Lower Yukon Region, moose have moved into the area over the last 35 years. Is this caused by climate change or is it simply a natural movement due to population increase consistent with better food supplies?

Arctic ice is home to many diverse animals. Due to the arctic ice melting, their homes are now in danger. Animals that depend upon the ice also play a vital role for people. The walrus and the seal use arctic sea ice for breeding. The polar bears use these ice for hunting and resting. As for other animals, they use the ice for shelter, molting and breeding. The sea ice helps them survive. Without ice, they are without shelter, and without the shelter they are in danger of losing a significant amount of their population (National Snow and Ice Data Center).

Seals have many uses for the ice. The seals almost never leave the ice pack. They create open breathing holes for the whole winter for surfacing after being under ice. “They make lairs under snow mounds to protect their newborn pups from the weather and predators” (Krajick, 2001). So, without the ice, the population would decrease. Which means less food for people to eat. This would affect the food source of many Alaska natives, and it could affect humans as they might lose another valuable animal to the ecosystem.

Polar bears are in trouble. They are in trouble as the ice melts, and since the ice is their habitat they will lose food. If there is no sea ice, then there will be less seals for the polar bears to hunt and find sustenance. Without their main source of food, and their population will decline.

The lessening of polar bears will have unpredicted consequences. If the polar bear population were gone, the population of the seal would go up. But as this essay said before, the seals' home is in danger. A predator that is lost in an ecosystem can have some serious effects. As a predator species die out, population of prey will go up.

The melting ice affects fish by letting them move freely from sub-Arctic to the Arctic. Species of fish, where they were not before, start showing up to different locations. The following report and table provides further information:

“Overall, Coad and Reist (2004) listed 189 marine fish species comprised of 115 genera in 48 families of marine and anadromous fishes in Canadian Arctic marine waters (including Hudson Bay, which is not included here). Coad and Reist (2004) reported 41 species new to the Canadian Arctic marine fish fauna since previous synopses (McAllister 1990, Coad et al. 1995), including 13 species not previously reported from Canadian waters.”

Region	Species prior to 2012 <sup>2</sup>			Species newly added	Totals as of 2012 <sup>4</sup>
	Marine species	Anadromous & freshwater species <sup>1</sup>	Total		
Beaufort Sea (Canadian	52	20	72	12 <sup>3</sup>	84

sector)					
Archipelago	68	13	81	0	81
Baffin Bay & Davis Strait	104	5	109	No data	109

**Table 1.** Overview of the number of fish species in Canadian Arctic waters.

Notes: 1. Anadromous fishes enter coastal marine waters and may extend offshore into pelagic marine waters; some freshwater species enter freshened estuaries and waters in marine locations. 2. Total of marine and anadromous/freshwater counts. 3. Species added in 2012 surveys (see text). 4. Counts for Hudson and James bays are not included (see Coad and Reist 2004).

(Christiansen, 2013)

If this keeps happening, there will be a huge abundance in fish. This means that a new food source will be introduced. This abundance will increase fisheries' money. So this affect of the ice loss on fish is a good one. Also this table states that fish species will be appearing to where in previously uninhabited areas. This can be seen as a problem or a fortune. The problem will be a fight on who gets to eat the fish, and the fortune, as stated before, will be money or food.

Melting ice let seals not have a resting, molting and birthing place. The melting ice causes the polar bears to have no home or hunting grounds. The melting ice will cause their populations decline. If the seals are low, Alaskan natives might have to move to another animal to hunt. The polar bears help keep their ecosystem in balance. If the polar bears are gone, we won't know what will happen.

The fish are getting the better end. They gain more habitats. They won't lose any. So the fish species will thrive with new food. This will affect us in a good way, too. We have an animal that will help fisheries', and help people based on where they're going. Like the fish going into Canada, they get a food source they can rely on.

The affects of the animal will definitely affect us human beings. The affects are good or bad based on where a person lives, but for the animal's sake, it will hurt their population. The lessening seals will hurt the natives of Alaska, the declining population of the polar bears would hurt their ecosystem, although, the spreading of fish would help people. Nevertheless, these are drastic affects.

The most recent episode of melting Arctic sea ice is beginning to affect the Northern Sea Route. The entire route lies in Arctic waters and parts are free of ice for only two months per year (Wikipedia). Northern Sea Route trade traffic surged in 2012 to around one million tons of various kinds of cargoes, with petroleum products constituting the largest group. The Northern Sea Route was opened by receding ice in 2005 but was closed by 2007. The amount of polar ice had receded to 2005 levels last ice blockage of the Northern Sea Route in the Laptev Sea had melted (Wikipedia). The Beluga Fraternity and the Beluga Foresight were the first non-Russian commercial vessels to complete this journey, but not without Russian assistance. In 2011, 18 ships have made the now mostly ice-free transit. In 2013, 72 commercial ships made the transit (Wikipedia).

In 2012, the 288-meter Liquefied Natural Gas (LNG) carrier "Ob River" became the first ship of its kind to transit the Northern Sea Route. It was expected to sail back to Asia in November with a full load of liquefied natural gas. 46 ships sailed the entire length from Europe to East Asia during 2012 (Wikipedia). On July 19, 2013, the

administrators of the Northern Sea Route granted permission to 204 ships to sail during the season. On July 15, 2013 was 1.06 million square kilometers (409,000 square miles). Summer 2012 Arctic sea ice volume reached its low. 400 ships were expected to transit the Russian portion of the route during 2013 season, up from about 40 during 2012 (Wikipedia).

Positive aspects of shipping on an ice-free Northern Sea Route would be reduced number of days at sea and a 50% reduction of the vessel's fuel usage. Cost savings for fuel may appear as a driver to explore the Northern Sea Route for commercial transits, and not necessarily reduced lead-time. The Northern Sea Route allows economies of scale compared to coastal route alternatives, with vessel draught and beam limitation (Wikipedia). Increased knowledge about environmental benefits and costs for both the Northern Sea route and Suez Route will probably be important factors in this respect. In August 2012, Russian media source reported that 85% of vessels transiting the Northern Sea Route in 2011 were carrying gas or oil, and 80% were high-capacity tankers (Wikipedia). In September 2012 Inuit Circumpolar Chair Jimmy Stott's said that "there is concern that increased shipping could adversely affect indigenous hunting of marine animals. Also concerning is the lack of infrastructure on the Western Alaska coast to deal with a spill or a wrecked vessel" (Wikipedia).

A study shows that global warming is opening up a first-time chance to go through the Northern Sea Route, which could be big in savings and money for shippers. The earliest that the sea routes would be taken right over the North Pole through the Northern Sea Route would be likely in the 2040's or the 2050's. It takes almost 19 days to complete the Northern Sea Route, traveling through the North Pole would take almost

14.6 days (Rice, 2013). Five countries the US, Canada, Russia, Denmark, and Norway, currently run most of the Arctic Ocean. “Ships need updated charts with precise and accurate measurements” (Rice, 2013). Said Captain Doug Baird. Warming in the atmosphere and ocean is causing the Arctic to shrink and thin, the past three decades the Arctic sea lost around 3.5 to 4.1 cent, this is unprecedented before. The benefits according to the Times include more tourism. The tourism in Greenland, Norway, Alaska, and Canada has increased rapidly. Grey and Killer whales will benefit from the melting ice. If the Arctic ice ships could use less fuel to trade with the trading partners and we could drill more holes to find oil (Donald, 2014).

But these effects can have a silver lining. I think if we can build more breeding grounds for the marine mammals that need them and try and keep the Northern Passage Route open, it would be a good thing for marine mammals and us to trade and get more resources. I believe that it will help the world with more resources and get a stockpile of more stores, school supplies, better equipment for hospitals, money, and maybe better sporting funds. Vacation cruises will be at its finest and they can sight-see for whales more often, meaning tourism will be at its highest. Scientists would be able to find lots of new stuff right under the ice.

A couple of negatives aspects are the threat to polar bears and the loss of Inuit hunting traditions. Another downside is that marine mammals could find their breeding season disrupted as the Northern Sea Route would be being used extensively.

Even more negatives for the Northern Sea Route begins with how the climate will be affected. Countries will fight over parts over the Arctic sea ice, marine mammals environments will be at stake due to no ice, and it will affect the way the animals live in

their habitat. Natives, who hunt in the ocean, will have to find secondary sources to eat, because some of the marine mammals could die out from no ice. Another reason is polar bears would be highly threatened because they use the ice to hunt the other animals for survival. It is highly likely that they will become more endangered, but they will not go extinct. Seals would be a big factor in this because their breeding grounds are on ice, if the ice happens to go out they will have to find a new way to breed, sleep, and play with out the ice. It will be worrisome to allies who own part of the Arctic like Canada and the US. Without the sea it will bring more carbon dioxide into the atmosphere in the world.

Climate is defined as “the composite or generally prevailing weather conditions of a region, as temperature, air pressure, humidity, precipitation, sunshine, cloudiness, and winds, throughout the year, averaged over a series of years” (Dictionary.com). The climate is changing, even though it is happening very slowly. According to the World Wildlife Fund, “climate change is faster and more severe than in most of the rest of the world. The Arctic ice is warming at a rate of almost twice the global average” (World Wildlife Fund).

Different elements affect climate change. Most scientists believe it is mostly due to human-related activities, like burning fossil fuels. However, it can also be due to the “albedo” affect. This is when snow and ice melts. After the snow and ice melts, what lies dark water and bare rock is revealed. This dark water and bare rock absorb the sun’s energy and makes the surroundings even warmer. The warmed surroundings melt the snow and ice that is around it, and this, in turn, reveals more water and rock. (National Snow and Ice Data Center) (Krajick, 2001).

Climate change affects everything living in a region. It even changes the make up of the entire ecosystem. It alters life cycles for plants and animals. Plants, animals and people will have to adapt to the changing climate. Also every plant and animal plays a role in their region, so if one species dies out or becomes extinct, due to the climate change, it will affect many others.

In conclusion, the Arctic sea ice is incredibly important for the survival of humanity as well as animals. Without the Arctic sea ice, the daily dynamic would change drastically for a lot of the Native Alaskans living in coastal areas. A lot of Alaska Natives depend on the sea ice for subsistence hunting in order to feed their families. The entire ecosystem gets thrown out of balance when the sea ice begins to melt, and it will eventually affect humans outside of Alaska or the northern region of the globe. Even though the melting Arctic sea ice would open up new shipping lanes in that allowed goods to be carried through the Arctic at a much faster rate, is it truly worth the cost? Should we not be doing everything we can as human beings to stop this climate shift and preserve the ice in the Arctic Regions? Truly, many lives depend on how robust the Arctic sea ice remains, and all those who rejoice at the thought of a faster shipping lane do not fully understand the implication of a melting Arctic.

## Works Cited

Christiansen, J. e. (2013, December 6). *Arctic Report Card*. Retrieved November 13, 2014, from Marine Fishes of the Arctic:

[www.arctic.noaa.gov/reportcard/marine\\_fish.html](http://www.arctic.noaa.gov/reportcard/marine_fish.html)

*Dictionary.com*. (n.d.). Retrieved November 26, 2014, from

[www.dictionary.reference.com](http://www.dictionary.reference.com)

Donald, R. (2014, March 28). *The Carbon Brief*. Retrieved November 11, 2014, from Arctic sea ice melt: a story of winners and losers, IPCC scientist says:

<http://www.carbonbrief.org/blog/2014/03/arctic-sea-ice-melt-a-story-of-winners-and-losers,-ipcc-scientist-says/>

*Environmental Protection Agency*. (2014, August 28). Retrieved November 20, 2014, from A Student's Guide to Global Climate Change:

[www.epa.gov/climatechange/kids/impacts/effects/ecosystems.html](http://www.epa.gov/climatechange/kids/impacts/effects/ecosystems.html)

Krajick, K. (2001). Arctic Life, On Thin Ice. *Science*, 291 (5503), 424-425.

Naam, R. (2012 йил 21-September). *Guest Blog*. Retrieved 2014 йил 13-November from Scientific American: [http://blogs.scientificamerican.com/guest-](http://blogs.scientificamerican.com/guest-blog/2012/09/21/arctic-sea-ice-what-why-and-what-next/)

[blog/2012/09/21/arctic-sea-ice-what-why-and-what-next/](http://blogs.scientificamerican.com/guest-blog/2012/09/21/arctic-sea-ice-what-why-and-what-next/)

*National Snow and Ice Data Center*. (n.d.). Retrieved November 26, 2014, from All About Climatology and Meteorology: [www.nsidc.org/cryosphere/arctic-meteorology/climate\\_change.html](http://www.nsidc.org/cryosphere/arctic-meteorology/climate_change.html)

*National Snow and Ice Data Center.* (n.d.). Retrieved October 30, 2014, from All

About Sea Ice:

<http://nsidc.org/cryosphere/seaice/environment/mammals.html>

Rice, D. (2013, March 13). *USA Today*. Retrieved November 11, 2014, from Global

Warming Could Help Arctic Shipping:

<http://www.usatoday.com/story/weather/2013/03/04/climate-change-arctic-shipping-lanes-global-warming/1962685/>

*Wikipedia.* (n.d.). Retrieved November 6, 2014, from Northern Sea Route:

[http://en.wikipedia.org/wiki/Northern\\_Sea\\_Route](http://en.wikipedia.org/wiki/Northern_Sea_Route)

*World Wildlife Fund.* (n.d.). Retrieved November 26, 2014, from Arctic Climate

Change:

[www.wwf.panda.org/what\\_we\\_do/where\\_we\\_work/arctic/what\\_we\\_do/climate](http://www.wwf.panda.org/what_we_do/where_we_work/arctic/what_we_do/climate)