

Polar bears: on their way to extinction

Polar bear or *Ursus Maritimus* (Latin and means sea bear) is a special kind of a bear that lives on sea ice cover around the Arctic.



Polar bears are the largest living land dwelling carnivores in the world. They only live on meat, unlike other bears. Seal is approximately 90% of the polar bears diet. Polar bears are really good swimmers, but swim slowly. They can run very fast but get tired easily, and if they are being chased they like to get in the sea because they can swim there for days. They can be under water for about 2 minutes. They do not catch prey while swimming, but instead block the exit ways for the seals in the water or waits in the sea and then jumps out of the water and catches his prey, the third method is that he waits near a air hole in the ice and waits for the seal to come up for air. They are white so they have the perfect camouflage in the snow. (Derocher, A. E., Lunn, N. J. and Stirling, I. 2004)



It is thought the Arctic is declining at a rate about 9% every decade. (Derocher A.E, Lunn, N.J., Stirling, I. 2004)

Global warming, oil and gas exploration, pollution and overhunting threaten the polar bears existence. Global warming is however the most serious risk to them. We can say the polar bear is the “poster” animal for global warming. (Derocher A.E, Lunn, N.J., Stirling, I. 2004)

A research was made to answer this question: Can we expect arctic life to evolve and adapt to rapidly changing climate conditions.

This question is important for the reason that this may be the only chance for those animals to survive extinction, as this is their main threat, habitat loss.

There are some difficulties in answering that question. They are:

“Arctic life” is a huge concept that has to be narrowed down. In this research they focused on the physiology and behavior off the species.

“Quickly” Intuitively is easier to understand then time because time is not the best in standard deviations per generation. Intuitively can be easier to compare to the rate of climate change.

“New climatic conditions” They focus on the heat changes that have been happening in the past years in the Arctic and how much it will continue in the next decades.

Research was from potential contribution of evolution by natural selection to the current response of populations to climate change. The focus was mainly on spring phenology of population. The reason is because it is easy to document across a wide range of species and highly responsive to climate change. (Berteaux D, Reale D, McAdam A G, Boutin S. 2004)

The species studied were American red squirrels in Canada. This species has experienced a 2°C increase in spring temperature over the last 27 years and less downfall. The primary food source has increased significantly and lifetime marturition date of the female squirrels has advanced ca. 18 days. (Berteaux D, Reale D, McAdam A G, Boutin S. 2004)

They followed 664 females and 325 males throughout their lifetime.

First they looked at the breeding time of same females over several years. The general approach was to determine the magnitude of the response of individuals to change in environmental conditions within their lifetime. They then estimated the combined additive effect of all an individuals genes for marturition date using restricted maximum likely hood. The result showed that phenotypic is the main reason for the marturition date but 13 % due to evolution.(Berteaux D, Reale D, McAdam A G, Boutin S. 2004)

What is responsible for these changes with the red squirrels still remains unknown. It is suspected that the different fitness of females according to their reproductive phenology is most likely due to food availability and quality influencing their weaning success. Other reasons have yet to be discovered. (Berteaux D, Reale D, McAdam AG, Boutin S. 2004)

The conclusion is that evolution can indeed help the arctic life, even in a short time. This is very good. But to know for sure which species will evolve fast enough we can not know because of lack of data on the quantitative genetics of many species, the species that have advantage are those with high genetic variability and short generation time make specific predictions difficult and what will play a big role is contingency so predictions about the evolution of species are very limited. (Berteaux D, Reale D, McAdam AG, Boutin S. 2004)

During summer they do not eat much as they prefer to hunt their favorite food, seals, on the ice so they wait for the ocean to freeze. This time is getting longer due to global warming the sea is freezing later and melting sooner in the springtime. Researches on in the Arctic have shown evidence of large variation in body size and reproductive output over a short period of time.

Female polar bears show fidelity to a certain lair area, most on land a few km from the coast. As the ice melts this distance is going to become longer and it will be more and more difficult for pregnant females to reach their lair.

The polar bear is a top predator so they are exposed to a large amount of poisonous chemicals in their food. Many of those chemicals are not used anymore but they stay in the environment for many years. The chemicals are dumped into the environment and get transferred to colder climates with wind and sea current. They enter the food chain and smaller animals eat larger animals the chemicals multiply and so the polar bear as a top predator has the biggest amount of chemicals in their body. These chemicals can cause damaged fetuses, premature maturation, cancer, liver damage, and sterility to name a few. (Bentzen TW, Follman EH, Amstrup SC, York GS, Woller MJ, Muir DCG, O'Hara TM. 2008)

Oil is also a big threat. More than 2.5 million tons of oil goes to the sea every year. This affects the bear's fur. The oil sets into the fur so it takes the bear more energy to keep warm. That means more calorie intake and bears have limited access to food for a long time of the year and that time is just getting longer. (Bentzen TW, Follman EH, Amstrup SC, York GS, Woller MJ, Muir DCG, O'Hara TM. 2008)

Polar bears are often seen swimming hundreds of km from their real habitat. In Iceland alone we have had 3 cases in the past 2 years where a polar bear is swimming over 300 km before finding land, Iceland. Sadly every one of them was killed, as Iceland does not have equipment for animals of that kind. Or anywhere they can live as they don't get along with humans or more the humans don't get along with them.

Sadly as the polar bear has a long genetic time and a very specialized nature it is unlikely that they can evolve and survive if the sea ice disappears.

References:

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Bentzen TW, Follman EH, Amstrup SC, York GS, Woller MJ, Muir DCG, O'Hara TM. 2008. Dietary biomagnification of organochlorine contaminants in Alaskan polar bears. *Canadian Journal of Zoology* 86(3):177-191.

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