

The Arctic fox in Scandinavia – yesterday, today and tomorrow.

The biology of the Arctic fox

The Arctic fox is a small fox that is found in Arctic and subarctic areas around the northern hemisphere – in Siberia, North America, Greenland, Svalbard and Iceland. The Arctic fox in Scandinavia live on the edge of the species' most important range.

The winter coat of the Arctic fox has the highest recorded insulation capacity of all mammals; it can cope with temperatures below -40°C without increasing its metabolism. In the most extreme Arctic environments it can live in temperatures that sometimes fall as low as -70°C .

With a normal weight of about 3–5 kg, an Arctic fox is about half the size of its relative, the red fox. The Arctic fox has two colour variations, called *white fox* and *blue fox* according to the colour of its winter coat. The white fox has a winter coat that is entirely white, but during the summer its changes to grey-brown on the head, back and legs. Its belly, sides and the underneath of the muzzle are a lighter, yellow-white shade. The blue fox is a solid dark brown to blue-black throughout the year. A female can have pups of both colour variations in the same litter, but the white variety is dominant in Scandinavia.



Arctic fox (white fox) in its winter coat.

Photo (captive): Mats Ericson / taigaphoto.se



The Arctic fox is an opportunist that eats what it finds, not least carcasses and the remains of other predators' kills, but living on others' leftovers is not enough. Arctic foxes that live in coastal Arctic areas generally survive on birds and bird eggs, as well as what they can find in the form of carrion and other edible items. Those that live in areas with polar bears tend to follow the bears' tracks to steal the remains of the bears' seal hunts. The availability of food for these foxes is relatively similar from year to year, which is reflected in the size of their litters being about the same every year.

In the Scandinavian mountains, small rodents, primarily the Norway lemming, are the single most important food source for the foxes. The small rodent population is extremely cyclic, with peaks that normally occur every 3-5 years. Scandinavia's Arctic foxes have thus developed a strategy that means that they produce large litters, sometimes with almost 20 pups, in years with many small rodents. In years with the fewest rodents, they often do not manage to reproduce at all and most of the pups that are born die at a very young age. The survival of Scandinavia's Arctic foxes is thus dependent on the survival of pups that are born during peak rodent years, so they can live through one or more low years and reproduce during the next peak.

Scandinavian Arctic foxes dig their dens in sand hills and sometimes in holes between rocks, but they are almost always above the treeline and are often close to streams. A single den may be used by several generations and have more than 100 entrances. The female gives birth to the pups in late May-early June, following a gestation period that lasts 51-54 days. The male and female both help to feed and raise the pups.

The Arctic fox colonised Scandinavia after the Ice Age

The Arctic fox colonised Scandinavia sometime after the last glacial period. However, material from archaeological digs has shown that the Arctic fox was found in Scandinavia long before this. The first finds have been dated at 36,000 years old. Finds also indicate that the arctic fox may have been rare and perhaps even temporarily absent during the warm period that occurred 9,000-5,000 years ago. However, for the last 5,000 years, this little fox has been part of Scandinavia's fauna and has left behind a large number of finds that date from 5,000 years ago until to the present day (Frafjord & Hufthammer 1994).

Naturally, it is difficult to estimate the size of the Arctic fox population that once existed in Scandinavia. The number of dens in the mountains is a clear indication that the Arctic fox was once considerably more common than it is now. The location of the dens also shows that the Arctic fox was previously spread over large areas of the mountains.

Still common in the Scandinavian mountains in the 19th century

Comparisons have been made with Siberia in an attempt to estimate the Arctic fox population in the 19th century. The assumption has been that the current Arctic fox density in Siberia could be comparable to that in Scandinavia, at least for some of the 1800s. In this case, the Swedish population alone would have consisted of around 4,000 individuals (Angerbjörn et al. 1999). If it is assumed that the population in Norway was around the same size, the Arctic fox population in Scandinavia during some of the 1800s could have comprised around 8,000 individuals. During good rodent years there may have been up to 15,000 Arctic fox. (Angerbjörn et al., 2008 Projekt Fjällräv SEFALO+, Layman's report).



Information about the number of shot or captured Arctic fox in the 19th century and the first decades of the 20th century, in Norway and in Sweden, also shows that it was once a common species in the Scandinavian mountains. The *Handlingsplan for Fjellrev i Norge 2003* (2003 Action Plan for Arctic Fox in Norway) states that in 1880-1881, four hunters trapped almost 400 Arctic fox on Varangerhalvøya. Previous estimates have shown that around 2,000 Arctic fox were trapped in Norway every year from 1879-1922 (Collet 1912). There is similar information from the Swedish side of the border. There is no doubt that the Arctic fox, at the end of the 1800s and in the early 1900s, made a mark on the fauna of the Scandinavian mountains.

The hunt for Arctic fox hides

The Arctic fox was still relatively common in both the Norwegian and Swedish mountains up until the start of the 1900s. At the end of the 1800s and in the first decades of the 1900s, it was hunted extensively due to sharp increases in the price of its hide (Lönnberg 1927, Zetterberg 1945).

In the 1870s, Arctic fox hides increased in value; the price was then 50 öre. Twenty years later that price had risen to 8 krona and, at the start of the 20th century, it was up at 10-15 krona. Prices then sank, before once again rising to record levels. In 1925 the price for a white Arctic fox hide had reached 200 krona and, for a good quality blue Arctic fox hide, you could pay 500 krona, occasionally up to 1,000 krona (Zetterberg 1945, *Två Fredlösa*). This was a great deal of money at that time, so highly skilled hunters could rapidly earn several years' worth of wages by hunting Arctic fox. The Arctic fox population declined dramatically as a result of this large-scale hunting.

When the Arctic fox was given protected status – 1928 in Sweden, 1930 in Norway and 1940 in Finland – it was already endangered throughout the Scandinavian mountains and in Finland. It may be that this protection was given too late, when the Arctic fox population in Scandinavia had already been hunted to such low levels that it then found it difficult to recover.

In a publication titled *Fjällrävstammen i Sverige 1926* (The Arctic Fox Population in Sweden, 1926; Kungliga svenska Vetenskapsakademiens skrifter i naturskyddsärenden, 1927) Einar Lönnberg describes the situation for the Arctic fox in Sweden, two years before it received protected status: “...it is clear that the Arctic fox population is already extinct in extremely large areas of its former range and that a similar fate threatens it in a number of other places where it is still found”. Unfortunately, the situation was similar for the Arctic fox in Norway (Høst 1935).

After receiving protected status

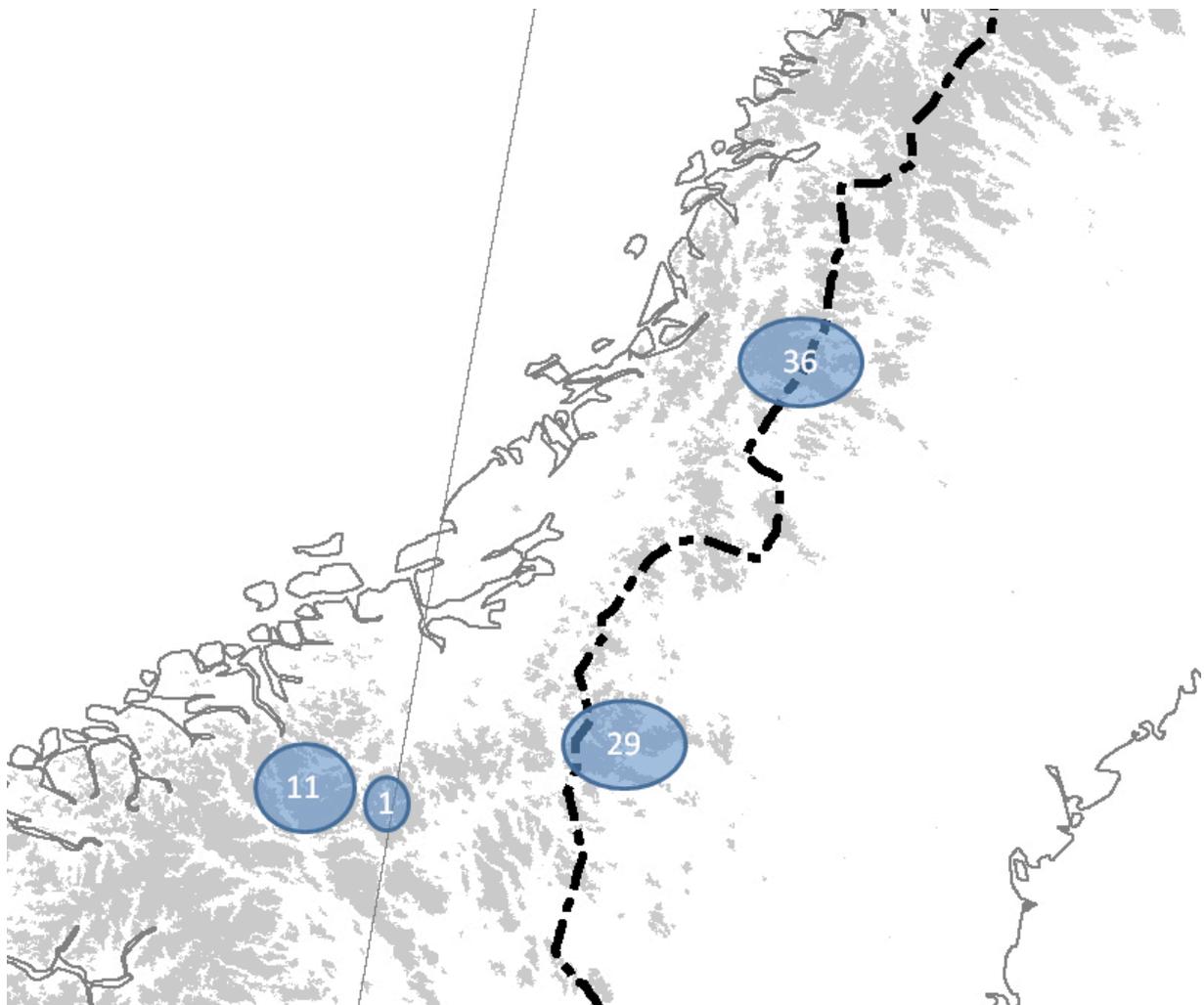
Extensive hunting of the Arctic fox meant that the population in the Scandinavian mountains was reduced to extremely low levels. It is probable that, when it was given protected status, the population was so small that it then had great difficulty surviving the periods of low food availability that follow good rodent years.

After receiving protected status, it is fairly accurate to say that the Arctic fox was forgotten. It was only in the 1970s that there was a serious upswing in interest in the Scandinavian Arctic fox – which was then an endangered species in both Norway and Sweden. Surveys were made of the location of Arctic fox dens in the Scandinavian mountains. In association with these surveys,

inventories began to show that pups were being born and to investigate how the Arctic fox managed to breed and raise its young in different years.

The number of Arctic fox pairs that birth pups varies greatly from year to year, which is a normal variation due to varying availability of food in the form of lemmings and other small rodents. This is thus natural and not a cause for concern, but the problem for the Arctic fox is that the total number of individuals, throughout Scandinavia, is too small. When the Arctic fox is also only found in small, isolated populations, with relatively little opportunity for natural migration between them, the situation becomes even more serious for this little fox.

The figure below shows the number of Arctic fox litters born in 2011 in Felles Fjellrev's core areas and in the areas bordering these core areas, primarily in North and South Trøndelag in Norway and the county of Jämtland in Sweden. One of Felles Fjellrev's most important targets is to use a range of measures to make it easier for the Arctic fox to become re-established in the mountains between these core areas, so creating a larger continuous area with an Arctic fox population.





Threatened – but there is still hope

The Scandinavian mountains are now home to a small remnant of an Arctic fox population that was once considerably larger; it is not certain how many Arctic fox there are today. A 2008 report from Projekt Fjällräv in Sweden states that the Scandinavian population was then just over 200 adult individuals, of which around 140 were in Sweden and around 75 in Norway (Angerbjörn et al. 2008, Projekt Fjällräv SEFALO+, Layman's report). Another 2008 report, from NINA, stated that there were no more than 50 adult Arctic fox in Norway, which were part of a total Fennoscandic Arctic fox population of around 120 adult individuals (Eide et al. 2008, NINA Report 389, Fjellrev i Norge 2008).

Unfortunately, the situation for the Arctic fox in Finland is extremely grim. So far this century there have been no established breeding occasions and so the Arctic fox must now, sadly, be regarded as extinct in Finland (Angerbjörn et al. 2008, Projekt Fjällräv SEFALO+, Layman's report).

The Arctic fox in Scandinavia is thus critically endangered and is probably our most threatened large mammal. No one knows how long it will remain in the Scandinavian mountains, but there is hope.

Efforts to improve and eventually secure the survival of the Arctic fox in Scandinavia have been made in some areas since the end of the 1990s. Measures such as surveying dens, annual inventories and checks on the number of litters, supplementary feeding and reducing the numbers of competing red fox in some mountain areas, have had positive results. A breeding station has been established in Norway, where Arctic fox are bred and then introduced into suitable habitats. On the whole, there are opportunities to help the Arctic fox to survive in the Scandinavian mountains.

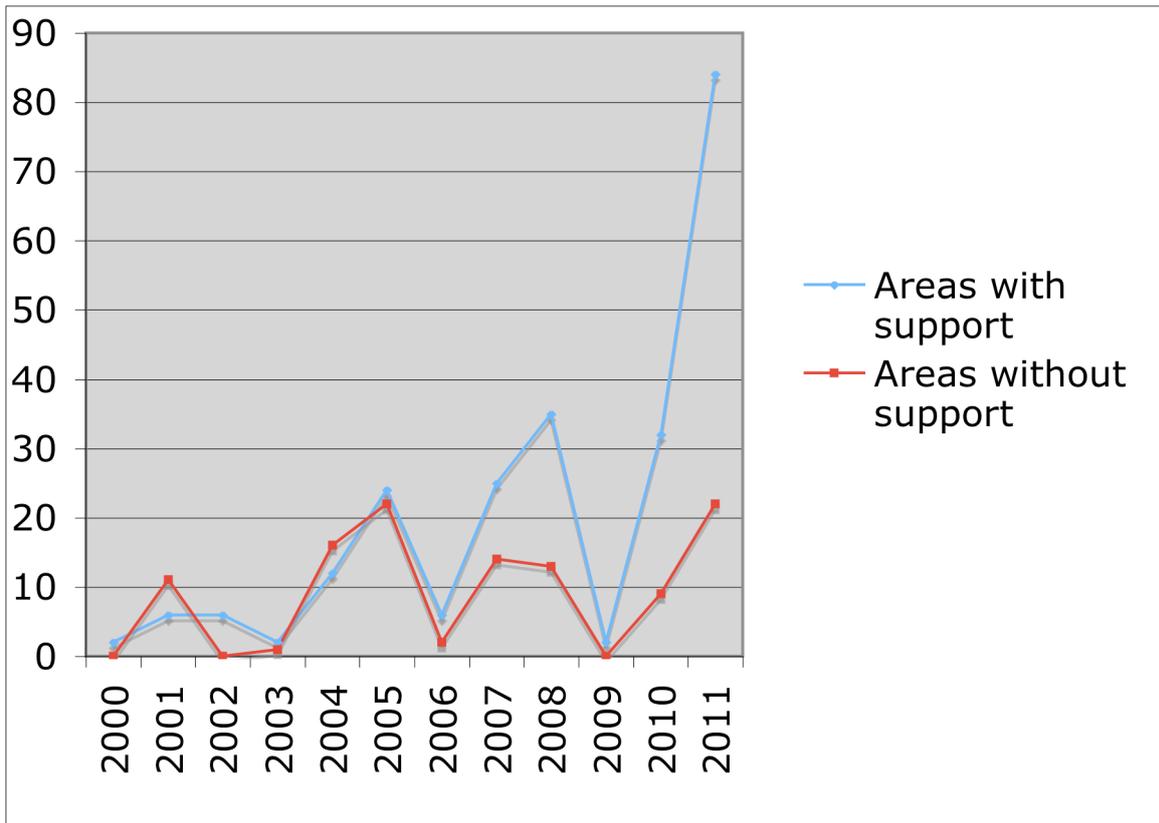
The EU/InterReg Felles Fjellrev project has taken up the baton

The InterReg Felles Fjellrev project is a preservation project for the Arctic fox that is 50% funded by the EU. It is owned by the Norwegian Directorate for Nature Management and the County Administrative Board of Jämtland, and is now working with continuing measures to help the Arctic fox in Trøndelag and Jämtland. The project is conducted in close cooperation with the Norwegian Institute for Nature Research (NINA) and the Department of Zoology at Stockholm University.

One overall target is to use supporting measures to benefit the Arctic fox in “stepping stone” areas, i.e. mountain areas that lie between the Arctic fox's three core areas in Trøndelag and the county of Jämtland: Helags/Sylarna, Børgefjell/Borgafjäll and Dovrefjell. The hope is that this will help the Arctic fox to spread over considerably larger areas than at present.

More litters born in areas where the Arctic fox receives active support

The development of the Arctic fox population in Norway and Sweden is shown in the below diagram, which shows the number of litters that were born in Scandinavia in 2000-2011. It demonstrates that the areas in which supporting measures are provided are home to Arctic foxes that can breed during good rodent years. However, in areas where no support measures were carried out, few or no pups were born, even during good rodent years – there were quite simply too few Arctic foxes.



Trøndelag and the county of Jämtland are Scandinavia's best areas for the Arctic fox

In 2011, 48 litters were born within the areas in which Felles Fjellrev is active: Trøndelag in Norway and the county of Jämtland in Sweden. This means that around 45 per cent of all known Arctic fox litters in Scandinavia that year were in the small mountain area where Felles Fjellrev is active. This is probably the result of several years of extensive support combined with recurrent good rodent years in the 2000s.

Litters were born in other areas where the Arctic fox is still found, even in areas where no supporting measures are carried out, but during a rodent year that was as good as the one in 2011, there should have been significantly more Arctic fox litters in other areas of the Scandinavian mountains.

However, the Arctic fox population in Scandinavia, as it appears today, consists of a small number of surviving core populations. Between these core populations are a number of other areas where there were once Arctic fox, but which now are entirely without a population that can benefit from good rodent years. Some of these intervening areas are Stepping Stone areas, in which the Felles Fjellrev project aims to help the Arctic fox become re-established.



If you would like to know more about the Arctic fox and the Felles Fjellrev project, you are welcome to get in touch with me, Mats Ericson, Project Manager for Felles Fjellrev.

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