

The Arctic fox

– a threatened species in the Scandinavian mountains



THE ARCTIC FOX'S BIOLOGY, POPULATION STATUS AND MEASURES TO PROTECT THE SPECIES



The Arctic fox - a characteristic species of the Scandinavian mountains

The Arctic fox lives far up in the north and is extremely well-adapted to a life in the high mountains and an Arctic climate. Even though there are many Arctic foxes globally, they are rare in Scandinavia. Their numbers here began to decline dramatically in the mid-1800s; despite long efforts to protect the species, this decline has continued into the present day. Changes to rodent life history patterns and a growing population of red fox are the primary reasons for this, but a number of other factors are also involved. The Arctic fox is therefore now a critically endangered species in both Sweden and Norway.

The present-day Arctic fox population is so small that it is entirely dependent on conservation measures for its long-term survival. Understanding of the reasons why the numbers of Arctic fox have declined means that we are able to take the necessary action to begin rebuilding the population. Currently, these actions mainly take place as part of research projects, which makes it possible to evaluate their effects and subsequently improve the methods that are used.

This brochure is published by Felles Fjellrev (which means

“everyone’s Arctic fox”). This is a Norwegian-Swedish project that is working to protect the Arctic fox. It aims to improve the opportunities for the animal to become established in areas between the remaining Arctic fox populations in central Norway and the Swedish county of Jämtland, as well as to create the right conditions for increasing natural dispersal between these populations. Disseminating information about the Arctic fox is an important element of the project.

This brochure is where we have compiled information about the Arctic fox, cross-border management and the latest results from research into the Arctic fox.

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Two colours – same species

The Arctic fox is a cherished mountain animal. It is a cat-sized canine and has two different colour variants.

The Arctic fox is a small carnivore, around half the size of a red fox. Its body is small and compact, and covered with thick fur. It has short legs and little, rounded ears. It rarely weighs more than three or four kilos, but this depends on the individual and the season. The Arctic fox is a member of the Canidae family, just like the red fox, and they both belong to the *Vulpes* genus.

The Arctic fox has two colour variants: white and blue. The white fox is entirely white in the winter, but in the summer it is a brown colour with yellow areas on the body's underside. The blue fox is entirely brown in the summer and turns a steely blue colour in the winter. The colour is hereditary and a litter may have both white and blue pups. The blue colour is dominant in the same way that brown eye colour is dominant over blue in humans. There are more white than blue foxes in the Scandinavian mountains. However, the blue colour dominates in coastal areas, probably because it provides better camouflage and protection from other predators.

The Arctic fox has a distinctive running gait. As it is so small and compact, it bounces across the ground and so is sometimes

known as the hare-footed fox. Its tracks are similar to that of the red fox and it can be difficult to distinguish between them using just their foot prints.



Where do Arctic foxes live?

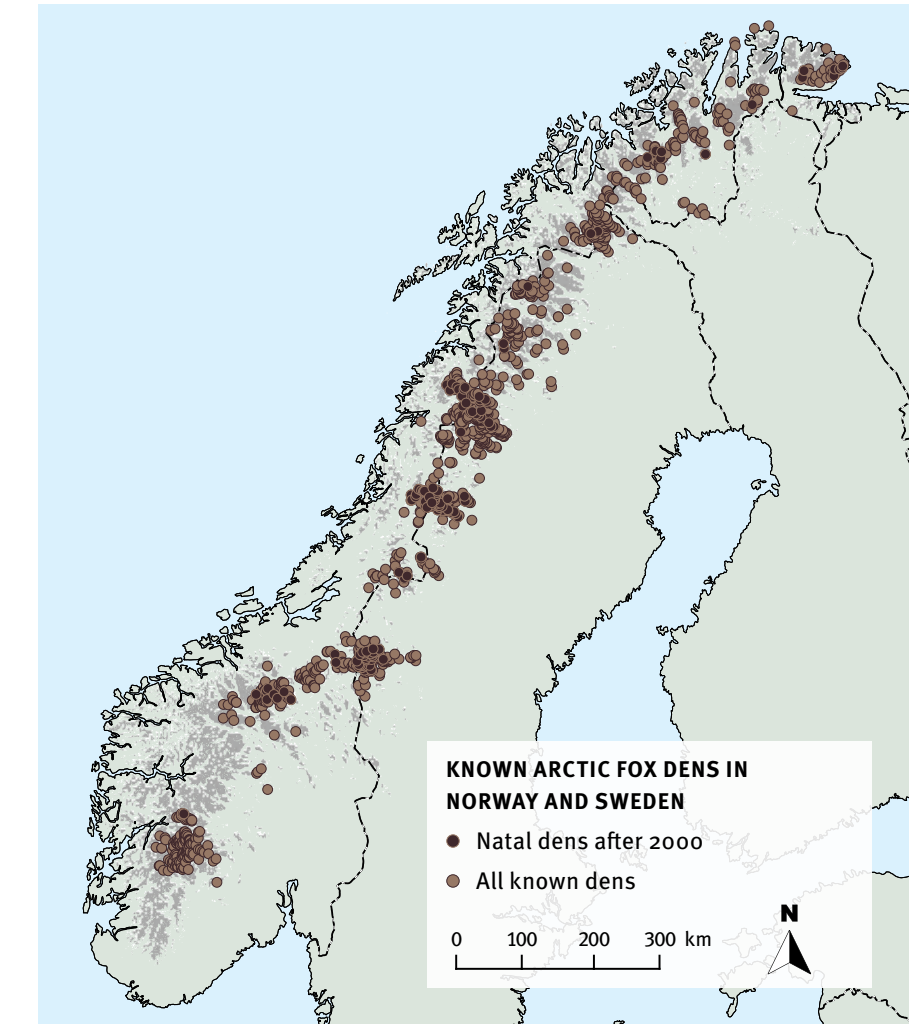
The Arctic fox lives in the far north, in the high mountains and in Arctic coastal areas. The global population is large, but there are only a few left in Scandinavia.



The Arctic fox lives in the tundra in the Arctic areas of the northern hemisphere and has a circumpolar range. There are several hundred thousand Arctic fox in the world, and it is a common species in Siberia, North America and on Greenland and Svalbard.

Scandinavian Arctic foxes are found in the mountains, above the treeline, but there are only a few left. Sweden and Norway have a shared Arctic fox population that is sparsely distributed from the tundra in the north, down along the Scandinavian mountain chain to the south. They are limited to the south by competition from the larger red fox. The red fox is unable to cope with the Arctic climate as well as the Arctic fox, which dominates where the climate is hard and frigid. The Arctic fox used to be found in Finland, but the species is now regarded as extinct there.

The Scandinavian Arctic fox population consists of around 200 adult individuals (2011) in small and somewhat isolated subpopulations, with little migration between the different areas (see map). The remaining subpopulations are found in east Finnmark, inner Troms, Saltfjellet/Södra Arjeplogsfjällen, Børgefjell/Borgafjäll, Sylane/Helags, Dovrefjell and Finse.



Life in a freezer – adaptations to life in the Arctic

The Arctic fox is extremely well-adapted to life in the Arctic. Its body shape, insulating fur and an efficient metabolism reduce energy losses. The Arctic fox can also survive long periods without food, which gives it an advantage over other species.

It is clear from its body shape that the Arctic fox is well-adapted to an Arctic climate and cold conditions. Its short legs and round body mean that the body's area is as small as possible in relation to its weight and volume. This means the Arctic fox can stay warm.

Its winter coat has the best insulating capacity recorded among mammals and in the winter the undersides of its paws are also covered with fur. Its fur means that the Arctic fox can cope with temperatures below -40°C without increasing its metabolism to stay warm. Those that live in extreme Arctic environments can sometimes have to withstand temperatures as low as -70°C .

The Arctic fox also saves energy by having the veins in its legs very close together. The warm blood that flows out into the leg heats up the colder blood that is on the way back. This means the legs have a lower temperature than the rest of the body and heat losses are reduced.

It is also very able to store body fat. In the summer and autumn, the Arctic fox eats everything it can and builds up an insulating



layer of fat and fat reserves that it uses up during the winter. It may also store food and bury what it catches when there is plenty to eat. However, when the winter storms are at their worst, life is still tough for the Arctic fox. Then it lies down in a sheltered place and lets itself be covered by snow, or it digs itself into a snowdrift. A healthy Arctic fox can cope without food for several weeks.

Life as an Arctic fox

The Arctic foxes that live in coastal areas and those that live in mountain and tundra areas are the same species, but they have different survival strategies and are adapted to the environments in which they live. Both the male and female help to defend their territory and raise the cubs.



Coastal fox and lemming fox ecotypes

The Arctic fox is found in two ecotypes, depending on where it lives. The lemming fox is the most common; it lives on the tundra and in alpine regions in Scandinavia, North America and in the north-east of Greenland. Rodents are a keystone species in the ecosystems of these areas and are extremely valuable in the Arctic fox's diet.

The coastal fox lives in the rich coastal areas on Iceland, Svalbard and western Greenland. There are plenty of seabirds, seal carcasses and fish that can feed a stable Arctic fox population. In coastal areas, Arctic foxes have six to eight pups each year, all of which have a good chance of survival as the food supply is stable and predictable.

The lemming fox has an entirely different survival strategy that is linked to the availability of prey. Its favourite foods are lemming and other small rodents, but the numbers of these vary greatly from year to year – you may have heard the expressions ‘lemming year’ or ‘rodent year’. This occurs every three to four

years and this cyclic pattern is reflected in the Arctic fox's reproduction. In peak years, when there is a large number of lemmings and other small rodents, the Arctic fox has many pups. When there is a low number, it instead has no or only a few pups. Even if the Arctic fox prefers to eat lemming, it is a generalist that eats what it finds. However, in the sparse nature of the tundra and mountain areas, there is not enough food to



raise pups when lemming availability is low. The size of the Arctic fox's territory also varies with the amount of available food. In coastal areas, where food supplies are stable, the Arctic fox defends a small territory that may overlap bordering home



ranges. In alpine areas, the Arctic fox has a much larger territory and home ranges do not overlap to the same extent.

Reproduction and survival

Arctic foxes live in pairs. The male and female both help to defend a shared home range and to raise the pups. It has long been thought that these pairs are life-long partners. However, genetic analyses have shown that a male Arctic fox can raise another male's pups in the belief that they are his own, and that pups from the same litter can have different fathers. This type of infidelity is relatively common among animals. It is likely that Arctic foxes live in pairs because raising a litter of pups is very energy-demanding, so it improves the chances of survival. The behaviour is thus inherited. Nor is it unusual for females from the previous year's litter to remain with their parents. When there is plenty of food, these females can help to feed and care for the pups.

Arctic foxes birth their pups in a den and a good den is vital to the pups' survival. It is preferably dug in a sand or gravel bank in a lower area of the mountains; it may have many entrances, at

least ten. The biggest dens can have up to a hundred entrances and have been used for centuries. Food remnants and faeces provide fertiliser, so the dens are often green and verdant compared to the rest of the mountains.

The female is sexually mature in her first year, but whether she breeds or not is dependent on the availability of food. Arctic foxes mate in March–April and the pups are born after 55 days, in May–June. The size of the litter is also dependent on the availability of food. Litters of 10-16 pups are relatively common in years with plenty of rodents, but the average is around six pups per litter. Newly born pups are blind and have thin fur. They stay in the den until they are three to four weeks' old and then take their first shaky steps into an unknown world. The pups are mischievous and, like most mammals, they learn about life through play and physical activity. At 10-12 weeks of age they are brave enough to venture further from the den and to start to explore the world alone. The pups usually leave the den as autumn approaches, when they leave to find their own home range, a partner and a den. Watching Arctic fox pups play outside the den in the wild is a rare experience.



Mortality varies among Arctic fox pups, but some years it can be extremely high. Sometimes all of the pups in a litter die. This is particularly likely to happen if the lemming population collapses early in the summer. An increasing lemming population is a vast source of food for large litters and results in good survival rates. Conversely, few or no pups are born in years with few lemmings.

The Arctic fox in the ecosystem

Small rodents are keystone species in the mountains and the density of many carnivore populations is linked to rodent cycles. In a rodent year, there is plenty of food for everyone, but when the lemming population collapses and they disappear, there is an increased battle for survival.

The importance of small rodents

Lemmings and other small rodents are keystone alpine species. They are eaten by Arctic fox, snowy owl, long-tailed skua, rough-legged buzzard, least weasel, stoat, red fox and a number of other carnivores and birds of prey. There is great competition for food, but during rodent years there is plenty for everyone. A female lemming can breed three to five litters in the spring and early summer, with as many as ten young in each litter. The young reach sexual maturity after three weeks, so the lemming population can double rapidly. If conditions are right, the female can also have litters below the snow cover and become a grandmother and great-grandmother before the snow has melted. The mountains will teem with life. The contrast is great compared to when the lemming population collapses; there is no longer enough food for everyone.

Even if the Arctic fox prefers lemmings, it is a generalist that eats what it finds. Hares, frogs, rock ptarmigan and small birds are all part of its diet – as well as food waste from humans. In the winter, reindeer carcasses can also be an important source of food.

Enemies and competitors

The Arctic fox is a carnivore, but it is also potential prey for larger carnivores. It can be killed by golden eagles and wolverine. However, its worst competitor is the red fox, which is almost twice the size and physically superior. Even if it doesn't kill an Arctic fox, a red fox will ensure that it is chased away. The Arctic fox and red fox don't only compete for food – the red fox will also take over the Arctic fox's den as its own.





Critically endangered – on declining populations and red listing

Extensive hunting in the late 1800s and early 1900s meant that the Arctic fox population went into serious decline. Changes to the life history patterns of small rodents and an expanding red fox population are believed to be the major factors in why the Arctic fox population has not recovered.

Population size 2011

Inventories have shown that in 2011 there were around 80 adult Arctic foxes in Norway and 120 individuals in Sweden. In Finland, there have been no known breeding occasions for Arctic foxes since 1996. Only sporadic observations of six individuals have been reported in recent years.

When is a species red listed and what does it mean?

The Scandinavian Arctic fox is located at the edge of the species’ range and is therefore more sensitive to climate and environmental changes than the Arctic foxes who live in the middle of the range, in the tundra and the Arctic. The Arctic fox is a common species globally, but in Sweden and Norway it is critically endangered and placed on the Red List. This means there is a risk that it will disappear completely from our nature.

Both countries are working to stop the loss of biological diversity. Norway is using its Nature Diversity Act to be able to execute management and conservation measures that ensure

the long-term survival of threatened species. The Arctic fox is one of a number of prioritised species in Norway that has received its own action plan. An equivalent action programme has been established in Sweden, with proposed measures that may increase the Arctic fox’s chances of survival.

Betrayed by its own skin

Just a few hundred years ago, there were probably more than 10,000 Arctic foxes in the Scandinavian mountains. As with the other large carnivores (bear, wolf, lynx and wolverine), the Arctic fox was hunted extensively in the 19th century and in the early 20th century. Its unique fur made it a particularly sought-after animal, as one Arctic fox hide could be worth a year’s wages for an ordinary worker. Those who knew where the dens were could earn money quickly. In the last century, it wasn’t uncommon to dig the Arctic fox pups out of the dens, raise them until they were fully grown and then flay them and sell the hide. Other Arctic foxes were collected in fur farms. This led to a dramatic reduction in its population. Eventually, the Arctic

fox became protected throughout Scandinavia – first in Sweden in 1928, then in Norway in 1930 and finally in Finland in 1940.



Why is the Arctic fox still endangered?

Unlike other carnivores, the number of Arctic foxes has not increased after it was protected. There are a number of reasons for this. Linked factors and major changes in Scandinavia's nature have had an impact. The small size of the population and its scattered distribution is a problem in itself. New research indicates that changes to small rodents' lifecycles and the spread of the red fox into the mountains are two of the most important reasons why the number of Arctic foxes has continued to decline. Climate change and increased human influence on the mountain landscape and ecosystems must be added to these.

A SMALL POPULATION MAKES A BAD SITUATION WORSE

One serious threat to the Arctic fox is that there are too few of them. The Arctic fox population in Scandinavia is now split into small, isolated remnants. As these remnant populations die out, the distance between the remaining populations increases. Small populations are vulnerable to temporary factors and environmental change. Individual events, such

as an adult female being killed by a car, can mean that a population disappears. It is also difficult to find a partner that is not a relative in a small population. There is thus a great risk of inbreeding and we have already seen a 25 per cent reduction in genetic variation among Scandinavia's Arctic foxes. Arctic foxes can travel great distances to find a partner and a home range. They probably orientate themselves with the help of their amazing sense of smell and so manage, incredibly, to find other Arctic foxes. However, most remnant populations have long been so isolated that few or no individuals have travelled between them.

It is worth noting that small populations are also more vulnerable to factors that constitute only minor threats to the survival of larger populations. These could be parasites and diseases, farmed foxes or other disturbances.

THE RODENTS THAT DISAPPEARED

The lemming is very important to the mountains' ecosystem, as it is the basis of several species' survival, including the Arctic fox, along with other carnivores and birds of prey. A rich supply

of lemming results in many large litters of pups. In years with few lemmings, however, few or no pups are born. Because Arctic foxes rarely live longer than five years in the wild, it is the pups that are born during rodent years that are the heart of the population. This means that the Arctic fox is highly vulnerable to changes to the lemming population. In order to understand what happens to the Arctic fox, it is important to understand the secret to the lemming's life cycle. Historically, lemming numbers have peaked every three to five years and then crashed to extremely low levels. The four-year cycle of small rodents is no longer as predictable as it once was; this has become particularly apparent in the past 30 years. The lemming cycle has stopped in some



areas of the mountains and ‘rodent years’ haven’t arrived. This has meant the end of local Arctic fox populations in several known Arctic fox areas in Scandinavia.

The most regular lemming cycles are now found in the middle and inland areas of Scandinavia. In Finnmark the rodent cycle is still fairly noticeable; it has a five-year cycle, with mice as the dominant species. New research indicates that these changes are largely due to a warmer winter climate. Lemmings breed under the snow throughout the winter. As winters have become shorter and wetter, fewer lemmings are born. The mild climate also means that the air space under the snow can disappear, so the lemmings lose their winter home. In turn, when the lemmings disappear, this can result in the Arctic fox and other alpine character species (these are species that are associated with one type of vegetation in a large area) finding it more difficult to survive. However, there is still uncertainty about the result of future climate change. It may perhaps create regional changes that result in relatively cold winters and more regular rodent cycles.

THE ADVANCE OF THE RED FOX

There is a great deal to indicate that the Arctic fox has been exposed to more competition from an expanding red fox population. Scandinavia’s mountains are greatly influenced by the forest ecosystems surrounding them. This is why the Arctic fox’s home range overlaps more with the red fox’s here than in continuous areas of tundra. Because the red fox is larger and not as well adapted to life in extreme winter environments, it finds it more difficult to fill its primary energy needs in the high mountains and on the tundra. A warmer climate and man’s increased use of alpine areas has provided the red fox with more stable access to food. The increasing red fox population also appears to coincide with increased populations of deer and fewer natural enemies in the form of large carnivores. This may have made it easier for the red fox to become established in the mountains, where uncertain food availability previously gave the Arctic fox an advantage. Due to this, the Arctic fox has been pushed up into more marginal mountain areas, while the red fox has taken over the productive, lower areas.



Management and recovery of the Arctic fox population

The Arctic fox in Scandinavia is entirely dependent on conservation measures to be able to return to a viable level.

Why do we need to protect the Arctic fox?

The Arctic fox is a character species that belongs in the Scandinavian mountains. Along with the reindeer and lemming, it was one of the first species to enter Scandinavia after the last ice age. The Arctic fox thus has a natural place in our alpine areas where, over several thousand years, it has adapted to life alongside other species. It is therefore an important part of the mountains' biodiversity. Everyone is agreed that mountain fauna would be much poorer without the Arctic fox.

Following the climate summit in Copenhagen in 2009, the Arctic fox was named an international flagship species for highlighting the effects of climate change. Both Norway and Sweden are signatories to the Convention on Biological Diversity and have therefore promised to protect and preserve threatened species.

Most of the Arctic fox's main habitats are found along the border between Norway and Sweden. In order to succeed in boosting the Arctic fox's chances of survival, it is thus important to cooperate across national boundaries and work closely with the administrative authorities. Knowledge of what has caused the

Arctic fox's decline means that we can take action to strengthen the population again. Many such measures are carried out within research projects, with valuable help from rangers in both Sweden and Norway. This means it is possible to evaluate the action that has been taken and to make improvements.



Monitoring keeps the Arctic fox under observation

It is important that efforts are made in the areas where they will have the most effect, whether they involve controlling red foxes, providing food, or breeding and releasing Arctic foxes to the wild. Different mountain areas require different measures, or combinations of measures. Inventories of the Arctic fox allow us to follow the population's development and changes over a long period of time. This provides knowledge that is valuable in introducing the right measures.



All Arctic fox activity in Scandinavia is registered through annual monitoring. Known dens are investigated for evidence of breeding and to count pups. Faeces, hair or other biological material is gathered for DNA analyses. These analyses can sometimes be used to determine the sex of the individual, as well as the relationships between the individuals. Recurring finds of biological

material from the same individual also provide valuable information about survival and movement, and can also contribute to a clearer picture of how many Arctic foxes live in particular areas. Inventories are also important in evaluating the effects of the conservation measures that are carried out.

Re-establishing extinct or small populations – releasing Arctic fox pups

The Norwegian Arctic fox breeding programme has developed methods for the captive breeding of the Arctic fox and the release of pups into the wild. Sæterfjellet breeding station was built in 2005 in a natural Arctic fox environment in the mountains in Oppdal. The breeding pairs live in separate enclosures, each half the size of a football pitch. Each enclosure has two artificial dens and several rocky cliffs that provide shelter and opportunities for climbing. The foxes are fed with wet food that is used at fox fur-farms, dry dog food and deer that have died naturally.

The breeding station has a capacity of eight Arctic fox pairs.



Every year, 40–60 pups are released into the wild, an important addition to the wild population.

The breeding programme also functions as a buffer against the loss of genetic variation. Breeding pairs are taken as pups from remaining wild populations and reflect the entire genetic variation among the Scandinavian Arctic fox. Planned releases of pups thus contribute to increased gene exchange and counteract genetic isolation.

Each autumn and winter, pups are released in areas where the



Arctic fox is either extinct or few in number. The pups have access to an artificial den and an automatic feeder that they recognise from the breeding station. The fate of the pups is then followed with a microchip reader, DNA from faeces and automatic cameras at these feeders.

Recent results have created optimism. In 2006–2011, 217 pups were born at the station. They were released at Saltfjellet-Junkern in Nordland, Sylane and Dovrefjell in south Trøndelag- Oppdal and in Finse in Hordaland. Around half of the pups

survived their first year, which is many more than predicted. A number of them have already had their own pups. At least seven of the released foxes have travelled to the Swedish mountains and had pups. At least 11 Arctic fox litters with pups in Dovrefjell in 2011 show that it is possible to re-establish Arctic fox populations.

Red fox culls and supplementary feeding of the Arctic fox

In areas where there are already Arctic foxes, measures are taken to improve the chances of their survival. Two primary measures provide good results as regards strengthening established populations – supplementary feeding and red fox culls.

SUPPLEMENTARY FEEDING

Research shows that supplementary feeding during the summer increases the survival of pups, while supplementary feeding in the winter results in more matings and larger litters. However, supplementary feeding attracts red foxes and can thus be counterproductive; it really needs to be combined with culling

red fox. The development of new types of automatic feeders, which are inaccessible to red foxes, may reduce the problem of red foxes also gathering around the feed sites. Research also emphasises that there is little or no effect from half-hearted attempts at supplementary feeding. If the Arctic fox is to receive supplementary feed, it must be done throughout the year and particularly during the hard winter months.



RED FOX CULLS

In Sweden's Helags and Borgafjäll and on the Varanger Peninsula in Norway, attempts have been made to increase the number of Arctic foxes by controlling the red fox. Thus far, this has not resulted in a population increase, but there is a clear rise in Arctic fox activity within the research areas on the Varanger Peninsula. Red fox culls have given the Arctic fox greater access to carcasses that the red fox would otherwise have taken. In Sweden, there is also an increase in the number of breeding pairs; systematic culling of red fox has been combined with supplementary feeding for a number of years. These long-term measures appear to be working well.

When should action be taken?

The effect of all these measures increases when they coincide with good conditions for Norwegian lemmings and other small rodents. It is particularly the years when rodents increase in number that Arctic fox pups have a high rate of survival. It is clear that we must take account of how Arctic foxes that are



dependent on lemmings best respond to conservation measures with the same pattern as the rodent cycles, i.e. 3–5 year cycles. This also entails a quadrupling of the time that future management measures must take when compared to non-cyclic species, where improvements can perhaps be expected every year. This also highlights the need for patience and persistent efforts in all work that aims to help the Arctic fox.

Hopes for the future

Action has already given results. In modern times, 2011 was a record year for the Arctic fox. In total, more than 100 litters were born in Norway and Sweden – this brings new hope for the Arctic fox.

2011 was a peak rodent year and the Arctic fox had plenty of food throughout Scandinavia. This resulted in 66 litters in Sweden and 40 in Norway. At least 20 of these originated from the breeding station in Oppdal – 14 litters in Norway and 6 in Sweden. Such numbers have not been recorded in Scandinavia since the 1960s. This is probably the result of effective conservation measures and, not least, several years with plenty of rodents.

We are one step closer to a viable Arctic fox population in Scandinavia. At the same time, we know that there is a long way to go before achieving a thriving population that is self-supporting. For the long-term survival of the Arctic fox, it is essential to increase the population to around 500 adult individuals, with a natural exchange of individuals between the core populations.

However, there is plenty to indicate that we are on the right path. In the winter of 2012, there was evidence of migrating Arctic foxes between Helags-Sylarna in the east and Dovrefjell in the west. Several previously migrated Arctic foxes have already bred in their new areas. Arctic foxes have also appeared in areas where they had not been seen for several decades.

Norwegian foxes that were released through the breeding programme have become established in Helags and Swedish foxes have migrated west towards Dovrefjell and Hardangervidda. It therefore looks as if the Arctic fox population in these areas has reached a size that means the pups migrate to find available home ranges. We are finally beginning to see Arctic fox activity in mountain areas between their core areas. This gives hope for a positive trend for the Arctic fox in the years ahead.



What can you do to save the Arctic fox?



Clean up after yourself

Take all your rubbish and waste with you when you are in the mountains. You could think you were doing the Arctic fox a favour if you leave your lunch or dinner leftovers, but it has the opposite effect. Leaving waste at cabins and campsites may benefit the red fox.

Report your Arctic fox observations

Every year, we receive reports of Arctic fox sightings and new dens. These are noted and saved as part of the monitoring programmes, as they are important in finding any unknown Arctic fox populations.

If you do see an Arctic fox, enjoy the experience. Show consideration and do not approach any dens. Nor should you follow an Arctic fox if you find any tracks. If an Arctic fox is disturbed at its den it may abandon the area. Do not feed Arctic foxes.

WE ENCOURAGE EVERYONE WHO SEES AN ARCTIC FOX TO REPORT THIS TO THE RELEVANT COUNTRY'S CONTACT PERSON:

» **Norway** – Norsk Institutt for Naturforskning,
nina.eide@nina.no, +47 95 70 43 83

» **Sweden** – Lars Liljemark,
lars.liljemark@lansstyrelsen.se, +46 70 387 70 47

Quick facts about the arctic fox

Diet and population fluctuations

The Arctic fox is a typical omnivore, but in the summer its diet is dominated by small rodents, mainly lemmings. It can eat any type of food in order to survive, but the Arctic foxes in our areas usually require prey of a special quality and quantity for them to succeed in breeding. This means that the Arctic fox population follows the fluctuations in the rodent population in the Scandinavian mountains. A good rodent year results in a huge increase in food for the Arctic fox and results in increased reproduction and larger litters.

Social structure

Arctic fox live in pairs. Both parents take an active role in raising the pups and in the defence of a joint home range. The pups usually leave the den in the autumn. In the beginning, they make short trips away from the den. Later they are brave enough to go further and eventually they establish their own home range. If there is good food availability, females from the previous year’s litter may



remain in the parents’ home range.

Home range

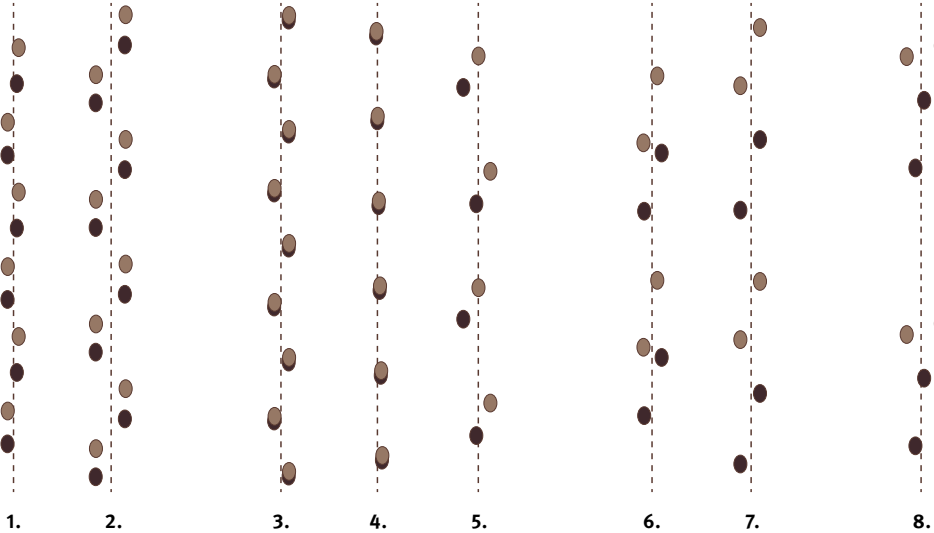
The Arctic fox pair defends a joint home range throughout the year. Its size varies with the availability of food. In rich coastal areas the home range can be 5–15 sq. km., while in the more desolate tundra and alpine environments, it may be up to 60 sq. km. Arctic foxes can travel long distances; migrations of up to 2,000 km have been documented.

Size

- WEIGHT** 2.5–5 kg. The male is usually slightly larger than the female.
- LENGTH** 45–67 cm, excluding the tail, which measures 25–43 cm.

Reproduction

- MATING PERIOD** March–April
- BIRTH** May–June
- LITTER SIZE** 2–16 pups (mean: 6.3)



Gaits

The artic fox and the red fox have the same gaits, which are shown in the above illustrations. The Arctic fox moves forward using a “short gallop” around 70% of the time. The left hind foot (LH) is almost alongside the right front foot (RF). At a fast gallop, the distance between the left hind foot (LH) and right front foot (RF) increases, giving a longer

stride length. A lone Arctic fox almost always moves at a short gallop. When hunting, playing or when with other foxes, other gaits may be used, but never for long periods of time. However, the red fox moves at a relaxed trot about 90% of the time, placing the hind foot on top of the front foot print. In deep snow, both species may use a walking gait. In deep, loose



DARK BROWN: Front foot, 5.5–6 cm
PALE BROWN: Hind foot, 5–5.5 cm
The above illustration is 60% of actual size.

- 1. Walk
- 2. Walk in deep snow
- 3. Slow trot
- 4. Fast trot
- 5. Side trot
- 6. Slow gallop
- 7. Fast gallop
- 8. Mousing

snow or when hunting, both species will also pounce, known as “mousing”. Mousing tracks may sometimes be mistaken for hare tracks, but if you follow these you will soon be able to see the hare’s large hind feet. Tracks should be followed for at least 200–300 metres to determine the gait.

Felles Fjellrev

Felles Fjellrev, which has published this brochure, is partly financed by InterReg/EU through Nordens Gröna Bälte (the Nordic Green Belt). The project covers the mountain areas in north and south Trøndelag on the Norwegian side, and the county of Jämtland in Sweden. One of the most important aims of Felles Fjellrev is to improve the movement of Arctic foxes between the core populations in the Børgefjell/Borgafjäll, Sylane/Helags and Dovrefjell region. One way of doing this is by introducing conservation measures in the mountain areas between these populations. They can thus function as corridors that link together the three core populations. If the measures that are carried out through Felles Fjellrev – monitoring, supplementary feeding and culling red fox – work as intended, there will be a more continuous population of Arctic foxes in this area of the mountains.

EU/InterReg in Norway and Sweden is contributing financially to the project, which ends in 2013. The Norwegian Directorate for Nature Management and the County Administrative Board of Jämtland are the project holders. The Norwegian Institute for

Nature Research (NINA) and the Department of Zoology at Stockholm University are participating in the project's field activities along with staff from Statens naturoppsyn (Norwegian State Nature Monitoring) and the County Administrative Board.

Arctic fox research

The factual information in this brochure comes from a number of different research projects. Several of them are ongoing, while others have been completed. Stockholm University, the County Administrative Board and Finnish authorities have run two EU financed projects. SEFALO, the first in a long line of projects that have worked for, and still work for, the preservation of the Arctic fox, started in 1998. At that time there were just 40 adult Arctic fox individuals in Sweden, so it was obvious something needed to be done. In 2003, the project continued under the name SEFALO+, and Norway also took part. This project ended in 2008, but some of its work is continuing through the County Administrative Board of Jämtland and Stockholm University. The “Overvåkingsprogrammet for fjellrev” (Arctic fox monitoring programme) in Norway has

been run by the Norwegian Institute for Nature Research (NINA) since 2003. NINA also runs the “Avlsprogrammet for fjellrev” (Arctic fox breeding programme) which started in 2000. In 2004, the University of Tromsø started the “Fjellrev i Finnmark” (Arctic fox in Finnmark) project. All the projects have, jointly and individually, provided important knowledge of why the Arctic fox is endangered. In turn, this has provided a good scientific basis for assessing suitable conservation measures.

Mountains areas in which action is being taken to help the Arctic fox

NORWAY:

Varangerhalvøya, Finnmark: active culls of red foxes

Saltfjellet/Rana, Nordland: releasing Arctic foxes, supplementary feeding, sporadic culls of red foxes

Blåfjell/Lierne, Nord-Trøndelag: supplementary feeding, active culls of red foxes

Hestkjølen/Skjækerfjella, Nord Trøndelag: supplementary feeding

Sylane/Kjølifjellet, Sør-Trøndelag: supplementary feeding, active culls of red foxes

Forollhogna, Sør-Trøndelag: supplementary feeding

Knutshø, Sør-Trøndelag: releasing Arctic foxes, supplementary feeding

Dovrefjell, Sør Trøndelag/Oppland: releasing Arctic foxes, supplementary feeding

Finse, Hordaland: releasing Arctic foxes, supplementary feeding, sporadic culls of red foxes

SWEDEN:

Sylarna/Helags, Jämtlands län: active culls of red foxes, supplementary feeding

Skäckerfjällen/Sösjö-Offerdalsfjällen, Jämtlands län: active culls of red foxes, supplementary feeding

Hotagsfjällen, Jämtlands län: active culls of red foxes, supplementary feeding

Borgafjäll/Stekenjokk, Jämtlands och Västerbottens län: active culls of red foxes, supplementary feeding

Vindelfjällen, Västerbottens län: sporadic culls of red foxes, supplementary feeding

Arjeplogsfjällen, Norrbottens län: sporadic culls of red foxes, supplementary feeding

Read more about Arctic foxes

FELLES FJELLREV www.fellesfjellrev.no/Englishsummary.aspx

SEFALO www.zoologi.su.se/research/alopex/homesefalo.htm

IUCN

www.iucnredlist.org/details/899/0

ec.europa.eu/environment/nature/conservation/species/redlist/downloads/European_mammals.pdf

cmsdata.iucn.org/downloads/fact_sheet_red_list_arctic_foxes.pdf





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FOR NATURE MANAGEMENT



Jämtland County
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Stockholm
University



NINA
Norwegian Institute for Nature Research



SØR-TRØNDELAG
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NORD-TRØNDELAG
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