

Saving the Endangered Fennoscandian *Alopex lagopus* SEFALO+

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PROGRESS REPORT
WITH FINANCIAL SUMMARY
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**Anders Angerbjörn¹, Heikki Henttonen², Nina E. Eide³, Arild Landa³, Karin Norén¹,
Tomas Meijer¹**

¹Zoologiska Institutionen, Stockholms Universitet (SU), S-106 91 Stockholm

²Metla –Finnish Forest Research Institute (FFRI), PO Box 18, FIN-01301 Vantaa

³Norwegian Institute for Nature Research (NINA), Tungasletta 2, N-7485 Trondheim

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Introduction

Background

The arctic fox *Alopex lagopus* is threatened with extinction in the European Union and adjacent areas. It is a priority species according to the EC Habitat directive. The main threats are the small population size constrained by low food availability and competition from the larger red fox *Vulpes vulpes*.

The arctic fox is a circumpolar, tundra-living canid. In mainland Europe, it breeds above the tree line in the mountain tundra of Fennoscandia (Sweden, Finland, Norway, the Kola Peninsula). The breeding population reached at least 15 000 individuals in peak years in the mid-19th century. However, it suffered a drastic decline due to over-harvest by the fur industry at the beginning of the 20th century. The population has remained at a low density for over 70 years. Population estimates in 2003 totalled 150 adults, of which approximately 50 were found in Sweden, 50 in Norway, and 10-15 in Finland. From Kola, there were indications of a similar situation, suggesting a population of *ca.* 40 adults. Several factors may have contributed to the non-recovery of the arctic fox:

- Threat 1 Low population size The population is fragmented as large areas within its previous range are empty. Young foxes may therefore have difficulties finding a non-related partner and there is a risk of inbreeding. Further, the small population size implies that even small changes in demographic parameters or pure "accidents" can affect the risk of extinction dramatically.
- Threat 2 Low food availability Arctic fox breeding is strongly dependent on the availability of the main prey, lemmings and voles (*Lemmus sp.*, *Microtus sp.*, *Clethrionomys sp.*). These small rodents generally have a cyclical pattern of abundance with peaks every 3-4 years, followed by population lows (1-2 years.). Arctic foxes can have up to 19 young in peak years, while few or no cubs are born during lows. The rodent peaks failed to appear during the 1980s and 1990s, causing a further decline in the arctic fox population.
- Threat 3 Competition The red fox is a dominant competitor and a predator on arctic fox juveniles. It has increased in numbers above the tree line in the 20th century, taking over dens and excluding the arctic fox from parts of its breeding range.
- Threat 4 Diseases A captive breeding programme in Sweden in the early 1990's failed due to an outbreak of fatal encephalitis. If the disease occurs in the wild population, the effects could be detrimental. Other diseases or parasites could also have serious effects on the population.
- Threat 5 Disturbance Disturbance at dens from hunting dogs in early autumn may cause an early juvenile emigration with subsequent higher juvenile mortality.
- Threat 6 Hybridisation Hybridisation with escaped farmed arctic foxes, which probably are less well adapted to natural habitats, could decrease the fitness of the wild population. Whether or not hybridisation has occurred is unknown, but farmed foxes have been observed in the wild.

Overall objectives

We will use a dynamic management approach to monitor the population and allocate conservation actions in the most efficient way. Since there are few arctic foxes, we will follow and support individuals through den surveys, radio tracking and genetic analyses. Thus, we will have an individual perspective rather than a spatial one with specified target areas.

Actions within the project targets 75% of the population in mainland Europe, totalling 100% of the Community population. The project is mainly aimed at conserving the arctic fox within the EU community. However, these foxes belong to a population where approximately half of the individuals are found in Norway. Therefore, SEFALO+ also intends to monitor the population in Norway.

The actions will increase population viability through increased reproductive output and decreased mortality for the arctic fox.

Specific objectives

- To investigate presence, breeding success and genetic substructure of the arctic fox population in Sweden, Finland and Norway through monitoring (D1, Threat 1). This action is a prerequisite for actions D2-5 and to evaluate the success of the project.
- To evaluate the need for translocation of arctic foxes within or to Fennoscandia (A3, Threat 1).
- To offer supplementary feeding to arctic foxes at inhabited dens in Sweden and Finland (D2, Threat 2) and to control red foxes in surrounding areas (D3, Threat 3).
- To monitor the arctic fox in Sweden and Finland for various diseases and identify the unknown disease causing encephalitis in captive foxes. If needed, to develop a strategy for eradication of diseases in the wild population (D4, Threat 4).
- To decrease disturbance and disseminate information to the public (D5, E1-E7, Threat 5).
- To develop a method to identify escaped farmed foxes in the wild and investigate if hybridisation with wild foxes has occurred (D1, Threat 6).
- To develop a Norwegian action plan for the arctic fox (A2) and local actions plans in Sweden and Finland. To implement the local plans within authorities to safeguard future monitoring and action programme (C1, All threats).

Expected results

- Threat 1 Low population size Knowledge on population size, distribution, inbreeding and Allee effects. Experience from SEFALO indicate that if actions D1-3 and D5 are combined, it is realistic to increase the number of reproducing arctic foxes over 5 years (A2, A3, C1, D1).
- Threat 2 Low food availability Increased number of arctic fox litters, litter size and juvenile survival (C1, D1, D2)
- Threat 3 Competition Reduced competition from breeding red foxes. Increased number of arctic foxes which establish territories and breed; decreased mortality (C1, D1, D3).
- Threat 4 Diseases Identify and screen any new virus to investigate the level of threat. If possible, treat the disease and increase survival (C1, D1, D4)
- Threat 5 Disturbance Reduced disturbance from hunting dogs. Understanding of threats and actions from the public (C1, D1, D5, E1-E7).
- Threat 6 Hybridisation Identify hybrids in the wild and suggest action (C1, D1).

Participating organisations

					
Stockholm University SU	Swedish Environmental Protection Agency SEPA	County Administration Board (CAB) of Jämtland	County Administration Board of Västerbotten	County Administration Board of Norrbotten	Finnish Forest Research Institute FFRI
					
Park and Forestry Service PFS	Norwegian Institute for Nature Research NINA	Swedish University of Agricultural Science SLU	Swedish National Veterinary Institute NVI	Lapplandsafari AB Geunja	Fjällhästen AB
					
Ramundberget Alpina AB	University of Iceland	Fjällräven AB	WWF Sweden	Dogman	EU Life-Nature

Summary

In total, 36 litters were recorded in Scandinavia during the summer 2007 of which 0 in Finland, 24 in Sweden and 15 in Norway. In 2001 and 2004, when the small rodent cycle was in the same increase phase as this year, we had 9 and 28 litters recorded in Scandinavia, respectively, which means that the population has increased strongly during the last six years. However, the population increase has not been similar all over Scandinavia. In the southern mountain areas, Helagsfjällen and Borgafjäll, the actions of feeding and red fox removal have been very efficient. The number of litters in these areas has doubled between each rodent increase year. The Norwegian part of Børgefjell has acted as a control area where no actions have been implemented. There, the number of litters has remained constant in increase years during the project period 2001-2007. In the northern mountain areas, Vindelfjällen and areas in Norrbotten, we have not managed to keep a high intensity of actions. The number of litters in these areas has been stable. The reasons for the large variation in extent of implemented actions between the mountain areas are mainly logistical problems due to the extent of the geographical areas concerned in combination with harsh winter climate. In the northern areas, due to the geographical distances, field workers would have to stay in the field for several days in order to perform field actions which can be achieved in a single day in the southern mountain areas.

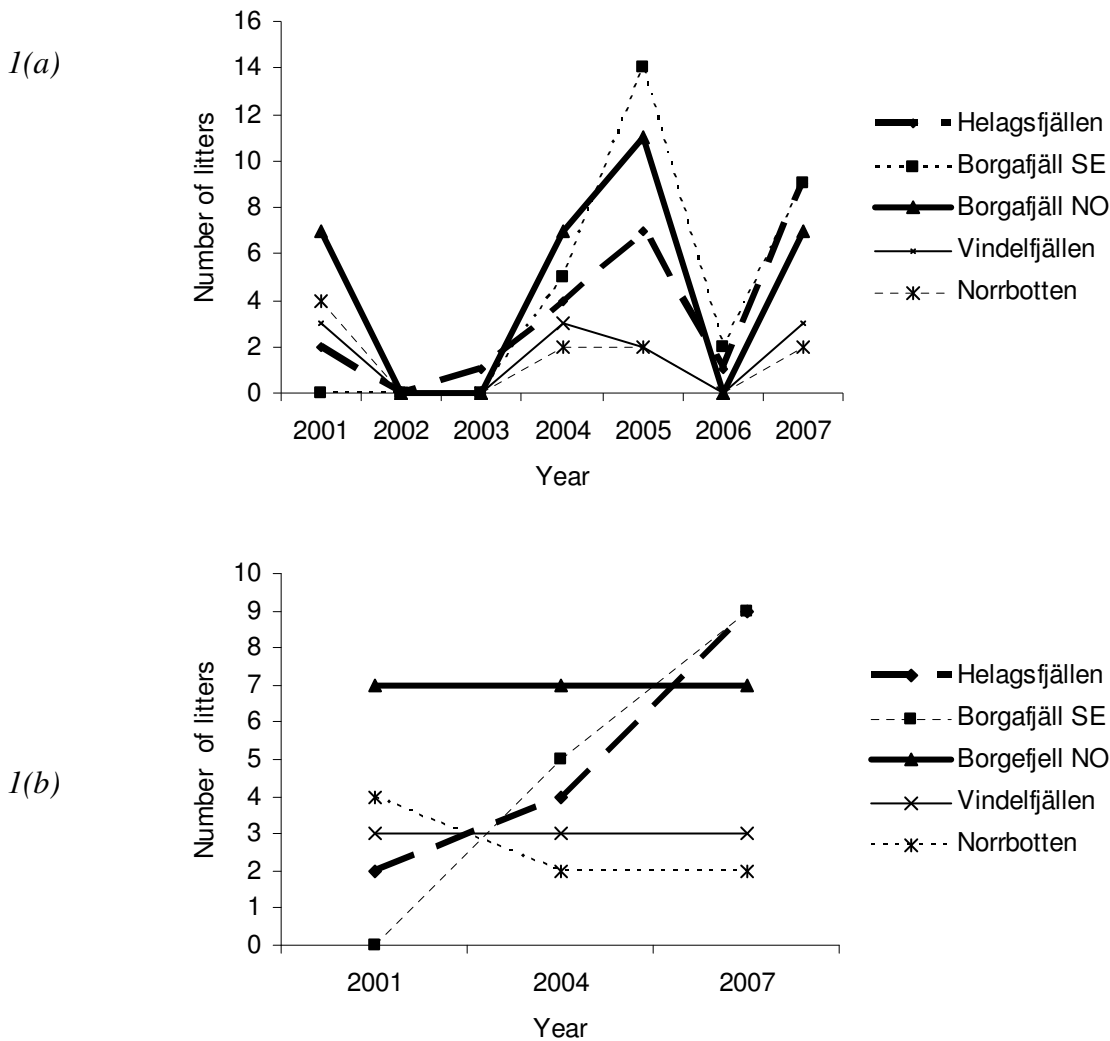


Fig.1 (a) Number of arctic fox litters in each mountain area 2001-2007. Fluctuations in response to the small rodent cycle. (b) Number of arctic fox litters during years with increasing numbers of small rodents.

The differences in population development in relation to implemented actions indicate that efficient actions do have a positive effect on the number of breeding adults. In the Evaluation report of *Vulpes* control (D3), the effects of the actions, red fox hunting and feeding, are evaluated on a local scale, Helagsfjällen. The report looked into areas with feeding in combination with hunting, areas with supplemental feeding only and areas with hunting as the only action. The results show that feeding in combination with hunting does have an additive positive effect on the number of litters. A single action with only feeding or hunting does not have a positive effect on arctic foxes. Feeding without red fox hunting can even have a negative effect on the arctic foxes by attracting red foxes to the area.

The results of the report on the genetic structure of Fennoscandian *Alopex* (D1), submitted 2005, showed that we now have four isolated populations within Fennoscandia, and therefore actions within one population might in a worst case scenario not benefit others. Inbreeding and loss of genetic variation may lead to a decrease in survival and reproductive success. Happily, one male ear-tagged as juvenile in July 2004, Vindelfjällen, was observed in Borgafjäll during this summer. The male had bred with a female born in 2004, Borgafjäll, and gave rise to 14 cubs. This means that there is a good chance that genes from Vindelfjällen will be spread within the Borgafjäll population. This is the first time that movement between the mountain areas has been observed during the 20 years of ear-tagging. The wandering distance between Vindelfjällen and Borgafjäll is about 200 km.

In addition to inbreeding and loss of genetic variation, escaped farmed foxes are a major threat to the wild arctic fox population. This is described in "A report on genetic identification of farm-bred *Alopex*" (D1, completed in September 2004 / June 2005). In order to investigate the situation among the arctic foxes in Sweden, a genetic screening was performed during 2007. Of 290 screened samples, three escaped farmed arctic foxes were identified, all outside the natural breeding areas for arctic foxes in Sweden. A report of this survey is included in this report.

Overall, the project has proceeded to run smoothly according to the original plan, regarding both monitoring and actions.

Main activities

A. Preparatory actions/ management plan preparation The project has received and continuously updated necessary permits (A1, Table1, 3). The Norwegian action plan is finished (A2, Table 2).

C. Non-recurring management The Local Action Plans in Sweden are finished and were attached to the progress report 2006. The Finnish Action Plan is under way and will be attached to the final report.

D. Recurring management All actions have been carried out according to the contract (Table 1).

Monitoring (D1) We surveyed 347 of 614 known dens in Sweden and Finland in winter 2007. In summer, we surveyed 411 of 615 dens in Sweden-Finland and 241 of 776 known dens in Norway (note that 558 of the 738 recorded dens in Norway are confirmed arctic fox den sites). We found 24 arctic fox litters in Sweden and 15. in Norway. There was no reproduction in Finland. In Sweden, 102 cubs and 2 adult females were ear-tagged for later identification. In Norway 5 cubs were ear-tagged.

Feeding (D2) In Sweden and Finland, arctic foxes at 28 dens were fed during the winter and 32 during the summer of 2007, also including several dens without arctic fox litters. The report on the evaluation of feeding will be included in this report.

Red fox control (D3) This action is necessary since the red fox is a dominant competitor and a predator on arctic fox cubs, and because feeding of arctic foxes (D2) may attract red foxes. In winter 2007 we culled a total of 247 red foxes in important arctic fox areas in especially Finland, Jämtland and southern Västerbotten. Red fox control has been carried out with different methods in different areas due to differences in logistics and local attitudes. However, we emphasize that red fox control has been done in total agreement with local authorities and varying interest groups like Sami reindeer herders, grouse hunters and conservation people. The report on the evaluation of red fox culling will be submitted in this report.

Disease (D4) We have found a herpes virus which most probably is the cause of fatal encephalitis in captive arctic foxes. We have done an autopsy and run tests of the general health of a wild arctic fox female and one cub, which was found dead.

Protection of areas around dens with cubs (D5) In 2007, we excluded the area around all breeding dens from ptarmigan hunting.

E. Public awareness and dissemination of results The website has been updated (E1). Information about the arctic fox and SEFALO+ was included in the summer edition of the Fjällräven AB catalogue for outdoor equipment, distributed in six languages (E2, Table 2). Local information addressed to wildlife tourists in the Nature Reserve of Vindelfjällen has been disseminated by local tourist operators on a person to person basis (E3). A course was held about arctic foxes and the ecosystem for tourists in Helagsfjällen. The course was 3 days long and was arranged in cooperation with Swedish ecotourism society. We also organised a seminar for field workers in Helags June 2007 with a focus on legal aspects of animal experiments and ethical issues. All field workers of the summer 2007 have gone through a course in ethical consideration when performing animal experiments organised by SEFALO+. We have had continuous press contacts and SEFALO+ has been featured in papers, radio and television programmes (E6).

F. Overall project operation Overall project operation has run smoothly. The Project leading group has had continuous contacts and produced a General Management Plan (F1, Table 2). The Steering Committee met in November 2003, November 2004, June 2005 and November 2006 (F2). The operating groups in Sweden, Finland and Norway have had meetings and continuous contacts on a person to person level to discuss how to execute actions (F3-F5).

Table 1. Actions June 1 2003 – September 30 2007. x indicates planned actions which have been executed according to the approved contract (form 22), **X** indicates actions executed in addition to the contract (D1-2) or earlier than planned (A1, E5, F2), **N** indicates a planned action which has not been executed (E2).

Action Period	A			C 1	D					E							F					
	1	2	3		1	2	3	4	5	1	2	3	4	5	6	7	1	2	3	4	5	6
2003 Jun-Sep	x				X	X			x	x				x				x	x	x	x	
Dec									x	x	x	x		x				x	x	x	x	x
2004 Jan-Mar					x	x	x	x		x		x	x		x			x		x	x	x
Apr-Jun	X	x			x	x	x	x		x	N	x			x			x		x	x	x
Jul-Sep					x	x		x	x	x		x			x			x		x	x	x
Dec	x				x	x	x	x		x	x		x	x	x			x	x	x	x	x
2005 Jan-Mar	x				x	x	x	x		x		x	x		x			x		x	x	x
Apr-Jun					x	x	x	x		x	x	x		X	x			x	X	x	x	x
Jul-Sep					x	x	x	x	x	x		x			x			x		x	x	x
Dec					x	x	x	x		x	N		x	x	x			x		x	x	x
2006 Jan-Mar	x				x	x	x	x		x		x	x		x			x		x	x	x
Apr-Jun	x				x	x	x	x		x	x	x		X	x			x		x	x	x
Jul-Sep	x			x	x	x	x	x		x		x			x			x		x	x	x
Dec	x				x	x	x	x	x	x		x	x	x	x	x		x	x	x	x	x
2007 Jan-Mar	x				x	x	x	x	x	x		x	x	x		x		x		x	x	x
Apr-Jun	x				x	x	x	x	x	x		x	x	x	x			x		x	x	x
Jul-Sep	x				x	x	x	x	x	x		x	x	x		x		x		x	x	x

Table 2. Deliverable products June 1 2003 – September 30 2007 (approved contract form 23).

Product	Action	Expected date of delivery	Date of Completion
General management plan	F1	December 2003	March 2004 / July 2005
Norwegian action plan	A2	April 2004	September 2003
European information, biannual	E2	November 2003 / May 2004 / November 2004 / May 2005	November 2003 / Not delivered May 2004 / November 2004 / May 2005
A report on genetic identification of farm-bred <i>Alopex</i>	D1	July 2005	September 2004 / June 2005
Local action plans	C1	December 2005	November 2006
A report on the genetic structure of Fennoscandian <i>Alopex</i>	D1	December 2006	December 2005
Evaluation report of <i>Vulpes</i> control	D3	June 2006	December 2007
Evaluation report of feeding programme	D2	June 2006	December 2007
Translocation evaluation report	A3	December 2006	December 2007

Table 3. Project milestones June 1 2003 – September 30 2007 (approved contract form 24).

Milestone	Action	Expected date of delivery	Date of Completion
Obtain permits necessary for actions D1 and D3	A1	September 2003	April 2004
Playground in Ramundberget	E4	December 2003	December 2003
Renew ethical permit for trapping, tagging, radio collaring and blood sampling	A1	December 2004	April 2003
<i>Alopex lagopus</i> seminars	E5	December 2004	November 2004 / June 2005
Renew ethical permit for trapping, tagging, radio collaring and blood sampling	A1	December 2004	April 2004 / October 2004
PhD dissertation on <i>Alopex lagopus</i> genetics	A3, D1	December 2005	December 9, 2005
Local action plans	C1	December 2005	November 2006
<i>Alopex lagopus</i> seminars	E5	December 2005	December 8, 2005/ June 2006

Report of Activities

A. Preparatory actions, elaboration of management plans and/or of action plans

A1 Permits Monitoring (D1) involves visiting arctic fox dens, ear-tagging of juveniles and radio collaring. Blood samples will be taken to screen the population for diseases (D4). Since the arctic fox is legally protected, permits are needed to visit dens, to trap and tag individuals and to take blood samples. Permits are also needed for red fox control (D3), and e.g. in Finland local authorities, Sami reindeer herders, grouse hunters and researchers have together elected the person who can carry a gun in snowmobile. In some cases, the project will also need permits to use snowmobiles and helicopters in otherwise restricted areas.

Actions foreseen in report period Competent authorities and partners who also are competent authorities will issue the permits necessary for the project.

Progress to date The project has received necessary permits. The permit to control red foxes is valid to 2008-12-31. Other permits are renewed each season.

Variations/complications/delays None

A2 Norwegian Action Plan About half of the Fennoscandian arctic fox population is located in Norway. Actions in Norway are therefore vital for the survival of the population. The Norwegian Directorate for Nature Management (NDN) will develop a Norwegian action plan for the conservation of the arctic fox in Norway. The objective is to achieve a more favourable conservation status of the arctic fox.

Actions foreseen in report period None

Progress to date The plan was finished in September 2003. Norway is a third country partner in SEFALO+. The Norwegian input according to the approved contract is therefore limited to monitoring in summer (D1; den surveys, trapping and ear-tagging of arctic foxes). In the action plan, Norway aims to start conservation actions/measures in addition to the Norwegian involvement in SEFALO+ and several research projects. The plan is available on the Internet at

<http://www.dirnat.no/fjellrev>

Variations/complications/delays The Norwegian Directorate for Nature Management (NDN) finance a package of projects to support monitoring and research on the arctic foxes. Several agencies in Norway are involved, but all actions connected to monitoring, trapping and ear tagging under SEFALO+ are coordinated by NINA.

A3 Translocation Evaluation Report The current small population size can lead to inbreeding depression, Allee effects and fragmentation (Threat 1). Translocation of individual arctic foxes, e.g. reciprocal restocking of individuals between subpopulations or introduction of individuals from Russia, could be necessary to eliminate these problems. Monitoring (D1) will provide information on the substructure of the Fennoscandian arctic fox population. Thus, the objective with this action is for Stockholm University and the assistant project leaders to investigate the need for translocation and produce a Translocation Evaluation Report. If translocation is needed, the report will suggest appropriate methods.

Actions foreseen in report period Analyse genetic data received during the project period and produce the translocation report.

Progress to date The translocation report will be included in this report.

Variations/complications/delays The Translocation Evaluation Report was due in December 2006 but is included in this report.

C. Non-recurring management

CI Implementation Conservation actions will be implemented within CABs in Sweden and PFS in Finland to ensure that they have the organisation and experience needed to continue appropriate actions also after the project ends. This is necessary since the present population size is critically low (Threat 1) and the arctic fox will need more time than this project period to recover. Further, the CABs differ in landscape and infra structure, e.g. distances between arctic fox habitat, built-up areas and roads. Thus, local Action Plans will be developed for each county to attain the goals of SEFALO+. The plans will describe local conditions regarding the distribution of arctic fox habitat and clarify how actions can be executed in each area during and after SEFALO+.

Actions foreseen in report period None

Progress to date The work with the Local Action Plans were attached to the progress report 2006. There is also a new National Action Plan under circulation. This describes the actions that will take place after SEFALO+.

Variations/complications/delays None

D. Recurring management

DI Monitoring Monitoring through den surveys will provide information on arctic fox presence and breeding success, food availability for arctic foxes and red fox density. This is necessary to decide when and where actions D2-D3 and D5 will be performed (Threats 2-3, 5). In addition, radio collaring and radio tracking of arctic foxes, ear tagging of juveniles and genetic analyses of faeces will resolve population size, population substructure, survival, migration rates and routes, and identify potential hybrids with farmed foxes. Radio tracking of individual arctic foxes may also be a tool to follow individual arctic foxes and support them with feeding etc. through their lifetime. During trapping and tagging of arctic foxes, it is also possible to take blood samples to screen the wild population for diseases (D4, Threat 4). In Finland and Sweden, monitoring will cover both summer and winter, while only summer surveys will be conducted in Norway related to SEFALO+. Over time, information from monitoring will be used to determine status and viability of the Fennoscandian arctic fox population and to produce the Translocation Evaluation Plan (Threat 1, A3). Genetic analyses will enable us to identify farm fox hybrids in the wild and produce a Report on the genetic structure of Fennoscandian arctic foxes (Threat 1) and a Report on genetic identification of farmed arctic foxes (Threat 6). Finally, monitoring is necessary to evaluate the project.

Actions foreseen in report period The CAB's, PFS and Finnish Forest Research Institute (FFRI) are responsible for summer and winter den surveys, tagging and radio tracking in their areas of their jurisdiction in Sweden and Finland. SU will assist in Sweden when needed. In Norway, NINA is responsible for summer surveys under SEFALO+.

Progress to date

Field work Winter 2006-2007 We surveyed 347 of 614 dens in Sweden and Finland. In total, 38 dens were inhabited by arctic foxes and 19 dens by red foxes (Table 13). Field personnel estimated that there was about 70 arctic foxes through focal observations. However, due to the severe weather conditions in winter 2006-2007, few arctic fox observations were recorded, which affected this estimate.

Field work Summer 2007 (Sweden and Finland) We surveyed 411 of 633 known dens. In Sweden and in Finland, lemming availability increased in all areas, but showed a large variability of abundance (Appendix; Table.16). In Sweden, we found 24 arctic fox litters and 10 red fox litters. The arctic fox litters were located in Helags (10) and Borgafjäll (3+5), Vindelfjällen (3), Arjeplog (2)

(Fig. 1, Appendix; Table. 14). We trapped and tagged 102 cubs and one adult fox. One female in Borgafjäll was equipped with satellite collar. We also found an additional 3 dens during summer. In Finland, lemming availability actually increased during the summer but there was no observations of adult arctic foxes (Fig. 1).

Field work winter and summer 2007 (Norway) We have during monitoring this found 38 new den sites. We have surveyed 241 of 776 known den sites. Lemming abundance was relatively high (in increase face), with the increase coming a little later in the northernmost county. We found 15 arctic fox litters and 9 red fox litters. The arctic foxes were located in Børgefjell (7), Saltfjellet (1), Indre Troms (1), Vest Finnmark (2), Ifjordfjellet (1) and Varangerhalvøya (3). Altogether 109 cubs were recorded at a minimum (see Appendix, table 15). 455 scats were collected for genetic analyses.

Variations/complications/delays Radio tagging was not performed to the extent that was planned. We had problems catching the foxes in September, i.e. when they were large enough to be fitted with a radio collar.

Genetics and subpopulation structure

Deliverable: Hybridisation between wild and farmed Arctic foxes on the Fennoscandian mountain tundra: implications for conservation. One threat to persistence of the Fennoscandian Arctic fox is hybridisation with escaped farm foxes conveying a risk of outbreeding depression through loss of local adaptations. To study the existence of farm fox genotypes among wild Arctic foxes, we analysed variation in the mitochondrial control region and 10 microsatellite loci in samples collected in the wild and compared them to known farm foxes, wild Fennoscandian and Svalbard individuals and museum specimens from Hardangervidda in Norway. We identified the farm fox specific haplotype H9 in 25 samples collected in the wild, of which 19 had been collected on Hardangervidda. Haplotype H9 was not present among the museum specimens from Hardangervidda, suggesting that escaped farm foxes have influenced the genetic structure in this population. Microsatellite analysis on 15 of the free-ranging H9s revealed that they were less differentiated from farm foxes than wild Fennoscandian foxes. According to Bayesian Markov Chain Monte Carlo (MCMC) analyses and population assignment tests, some of the free-ranging H9s were hybrids. Most likely, a minimum of two individuals were hybrids, but our genetic markers did not contain sufficient resolution to conclude the exact number. This study demonstrates the importance of having valid genetic methods for identifying escaped individuals and to monitor for the degree of hybridisation. We recommend that action plans with appropriate measures should be established and that the routines in Scandinavian farms should be revised.

Deliverable: Detection of farm fox genotypes among Swedish arctic foxes? -Genetic screening and action plan (see Appendix: Deliverable). Arctic foxes are farmed in large extent both in Norway and Finland for fur production. This report was initiated by the discovery of free-ranging arctic foxes (*Alopex lagopus*) with a genetic composition alien to the native Fennoscandian arctic foxes in the Hardangervidda area, in southern Norway. Hybridisation between wild and escaped farmed arctic foxes is a threat to the persistence of the wild arctic fox population in Fennoscandia through introduction of diseases, parasites and loss of local adaptations through outbreeding depression. To evaluate the impact of farm fox genotypes in Sweden, 165 faecal samples and 125 tissue samples, mainly from the Swedish mountain range, have been screened genetically to identify escaped farm foxes and possible hybrids. The genetic screening has identified six individuals with farm fox origin in Sweden. Four were identified in areas outside the regular distribution range and one in Abisko, Norrbotten, which is a potential breeding area for wild arctic foxes. However, no farmed or hybrid arctic fox has been detected among wild arctic foxes.

Deliverable: Molecular tracking of arctic fox in a small and isolated population. Master thesis (see Appendix: Deliverable). Management of endangered populations requires comprehensive population parameter data for assessing correct conservation actions. We studied the population size, genetic variation and dispersal of arctic foxes in one of the four populations, Helagsfjällen, mid-Sweden. Faecal samples were genotyped in nine microsatellite loci for individual identification. In total 29 unique individuals were found in 56 analysed faecal samples. For population size estimation, two different methods were used; genetic mark-resight methods and rarefaction equations. A consensus of the different population size methods gave a population size of 37-50 arctic foxes in the Helags area.

Deliverable: Translocation report. In order to decide on, and successfully carry out, a translocation program, three key questions need to be answered. The first question is whether the translocation is likely to have the desired positive effect. The second question is whether a translocation could have any negative effects, such as a loss of local adaptations, disruption of epistasis or exposure to novel diseases. It is, however, quite possible that a translocation could have both positive and negative effects, and in that case it is important to evaluate if the action will have a net benefit or not. If translocation is likely to have a positive effect, the third question is how it should be carried out in practice. These questions are further discussed in the translocation evaluation report that is attached to this progress report.

D2 Feeding Feeding of arctic foxes at inhabited dens is necessary since low food availability causes reproduction to fail (Threat 2). The action will increase the number of breeding attempts, litter sizes and juvenile survival. It might also improve adult survival. It is important to combine feeding with red fox control (D3) since feeding may otherwise attract red foxes with consequent negative effects on the arctic fox. The project leading group will produce an Evaluation Report on this action by June 2006.

Actions foreseen in report period We will feed arctic foxes at inhabited dens during summer and winter in Sweden and Finland. CABs, FFRI and PFS are responsible for the action. SU will analyse monitoring information so that allocation of resources can gain maximum effect (D1).

Progress to date During winter 2006-2007, 38 dens were inhabited by arctic foxes and on 28 of these we had external feeding (Appendix; Table. 13). The aim was to have feeding at all dens inhabited by arctic foxes if it was logistically possible. However, since we have found that feeding attracts red foxes, the feeding action in winter should be combined with red fox control. In areas where this is not possible, no feeding should take place. During summer 2007, we had feeding stations at 32 dens, including some dens where adult foxes used the feeding stations although they failed to reproduce (Appendix; Table. 14).

Variations/complications/delays None

D3 Red fox control Red foxes will be controlled by culling in areas close to recent or previous arctic fox territories in Sweden and Finland. Culling is necessary as the red fox is a dominant competitor and a predator on arctic fox juveniles. Arctic foxes avoid areas with red foxes and do not establish there (Threat 3). Further, feeding (D2) involves a risk that red foxes are attracted to an area and take over arctic fox dens. All hunting will take the utmost caution, as not to cause any disturbance to other wildlife and only a limited number of carefully selected persons are included. The red fox is a common species in Fennoscandian forests and hunting in some selected mountain tundra habitats will not have any detrimental effects on the population as a whole. We expect culling to leave more dens and territories suitable for establishment of arctic foxes, which implies more litters born and

higher juvenile survival due to decreased predation from red foxes. The project leading group will produce an Evaluation Report on this action by June 2006.

Actions foreseen in report period CABs, FFRI and PFS are responsible for performing the culling. SU will analyse monitoring information so that allocation of resources gains maximum effect (D1). Rangers in the CAB's and selected experienced local hunters will perform culling.

Progress to date In winter 2006-2007, a total of 247 red foxes were culled (Appendix; Table. 13) with 186 in Finland, 36 in Jämtland and 25 in Västerbotten. Red fox control has been carried out with different methods due to differences in logistics and local attitudes as reported earlier. In Finland, Jämtland and southern Västerbotten (Borgafjäll) the action works efficiently. In the Evaluation report of *Vulpes* control (D3) the effects of the actions, red fox hunting and feeding, are evaluated on a local scale, Helagsfjällen. The report looked into areas with feeding in combination with hunting, areas with supplemental feeding only and areas with hunting as the only action. The results show that feeding in combination with hunting does have an additive positive effect on the number of litters. A single action with only feeding or hunting does not have a positive effect on arctic foxes. Feeding without red fox hunting can even have a negative effect on the arctic foxes by attracting red foxes to the area.

Variations/complications/delays Regarding the different methods used, hunting with the use of snow mobiles has been efficient. The alternative methods have, however, not reached such levels that any positive effect on arctic foxes could be detected. The report on the evaluation of red fox culling will be submitted with this report.

D4 Disease The main scope and responsibility of SLU and NVI has been to identify a causative agent of a fatal necrotizing encephalitis of arctic foxes within a captive programme and monitor its possible spread in nature. The latter includes wild arctic foxes and other animals. The causative agent has for many years been elusive. Several possible agents have before the start of SEFALO+ been tested negative. One important aim has been to characterize the pathological changes of this fatal necrotizing encephalitis that affected the arctic foxes in the captive program in order to be able to postulate an aetiology and to differentiate the disease from other, previously recognized conditions, to summarize a list of the pathological agents known to have caused disease in arctic foxes in Sweden, for both, arctic foxes in captivity and arctic foxes in the wild, to rule out the already known pathogens as cause of the novel necrotizing encephalitis and to conduct a pathological examination and laboratory testing on all arctic foxes that die in Sweden, and/or on biological samples from arctic foxes, to provide knowledge on health-disease status and presence and significance of various pathogens, such as lung parasites. A Disease Evaluation Report will be produced by December 2007.

Actions foreseen in report period SLU and SVA will continue to work on the identification of the pathogen causing encephalitis and produce evidence for it being the actual cause of disease. Screening of possible viral reservoirs has been initiated. A complete pathological description was conducted in an earlier period and is now published in Journal of Veterinary Diagnostic Investigation. A second paper of the characterization of the found virus has been re-written and shall soon be submitted for publication.

Progress to date As described in earlier reports, we have identified a possible causative agent for the encephalitis of the arctic foxes in captivity. During this year we have screened a number of possible reservoirs of the virus. In addition, a few wild arctic foxes have been tested. This has been possible after our development of a real-time PCR method. We tested initially red foxes (*Vulpes vulpes*), since they partially share the habitat of the arctic foxes. However, all the red foxes tested so far have been negative. As described later we have also tested a few farmed arctic foxes (blue). Also in these, we were unable to show the presence of the virus. Additionally, we tested a small number of wild arctic foxes by real-time PCR. These have also been negative. These analyses will however be repeated during the following period. We have access to another real-time pan herpes method. These two methods will be tested in parallel.

Pathology

Two free-ranging arctic foxes were submitted to SVA for diagnostic post-mortem examination. A thorough disease investigation was conducted on the 2 foxes, including histopathology, parasitology and bacteriology. Samples were also obtained for virological studies at SLU, and for the tissue archives (frozen and fixed tissues)

Variations/complications/delays: None

D5 Protection of areas around dens with cubs Areas around Swedish dens with arctic fox cubs will be excluded from ptarmigan hunting. Ptarmigans are hunted in basically all mountain tundra areas from August 25 until February or March. Excluding areas from hunting is necessary since hunters use unleashed dogs and especially juvenile foxes may be disturbed and leave the area (Threat 5). We expect a resulting increase in juvenile survival.

Actions foreseen in report period The CABs in Sweden will exclude areas around breeding dens from ptarmigan hunting.

Progress to date In 2007, the CABs excluded the areas around all of the breeding dens from ptarmigan hunting. However, in some areas will hunting be allowed from late October again.

Variations/complications/delays None

E. Public awareness and dissemination of results

It is vital that the general public understands why arctic fox conservation is important. Increased awareness of the status and ecology of arctic foxes is necessary to gain local understanding and acceptance for actions such as red fox control (Threat 3, D3) and exclusion of areas from ptarmigan hunting (Threat 5, D5). Each action in this section has defined target groups.

E1 Website – Global information The SEFALO website at <http://go.to/sefalo> contains information about the SEFALO project, arctic fox ecology and conservation issues. The target groups are school children, students and scientists within and outside Europe.

Actions foreseen in report period SU is responsible for keeping the website updated.

Progress to date Our website has been updated and is visited very frequently. There is also a home page about the arctic fox in Norway organised by our colleagues, Prosjekt Fjellreven, with information about SEFALO+ and research efforts in Norway. <http://www.fjellrev.no/>

Variations/complications/delays None

E2 European information Information about the project will be presented on two pages in a catalogue for outdoor equipment. This catalogue is distributed twice a year in Swedish, English, German, Finnish, Norwegian and Danish. For the winter edition of 2005 it was also published in Russian. The edition in 2003 was 100 000 copies, but it is planned to increase to 400 000. The target group is people engaged in outdoor activities.

Actions foreseen in report period SU will provide material to Fjällräven AB which will produce and distribute the catalogue in spring-summer 2008.

Progress to date We have included information about the project in the spring-summer 2008 edition of the catalogue, printed in Swedish, English, German, Norwegian, Danish, Finnish, Dutch and French.

Variations/complications/delays None

E3 Local information addressed to wildlife tourists In the Nature Reserve of Vindelfjällen, Saami tourist operators certificated as eco-tourist companies, Laplandsafari AB-Saami Ecolodge and

Fjällhästen, will reach individual tourists that travel in arctic fox habitat with appropriate information.

Actions foreseen in report period SU is responsible for providing information to these local tourist operators. Lapplandsafari AB-Saami Ecolodge and Fjällhästen are responsible for disseminating information to their guests.

Progress to date Lapplandsafari AB-Saami Ecolodge and Fjällhästen have informed their guests about the project as planned. They have communicated arctic fox biology and SEFALO+ actions during informal contacts with their guests, i.e. about 15 tourist groups each. The project leader has visited both partners and updated them on the current status of the project.

Variations/complications/delays A collaboration with Swedish ecotourism association was performed. A pilot arrangement was performed with sustainable arctic fox tourism in focus. We have visited these partners and updated them with information about the current status of the arctic fox.

E4 Local information addressed to children Ramundberget is a holiday resort with skiing and hiking activities in a mountain area in Jämtland, Sweden. Ramundbergets Alpina AB will build a playground with an arctic fox theme (a fox den, fox statues, etc.) in 2003. Personnel will show children how the arctic foxes live and explain what problems they face. Booklets and toys with information on arctic fox conservation issues will be sold on a non-profit basis.

Actions foreseen in report period Ramundberget have build a playground and distribute information to their guests. SU have provided updated information to Ramundbergets Alpina AB staff through lectures.

Progress to date Personnel at Ramundberget have spread information about arctic foxes during public lectures and informal contacts with tourists. During skiing contests for children, arctic fox puppets are distributed along with information about arctic foxes. The project leader has visited this partner and updated the personnel on the current status of the project. Other SU personnel have been their as well to inform the staff (Appendix; Meetings and presentations).

Variations/complications/delays No complications.

E5 Seminars - Conferences It is important to disseminate results and discuss planned actions within the international scientific community and with NGO's involved in conservation. Thus, we aim for a continuous process of project evaluation. We will arrange a total of 4 seminars with scientists, NGO's and other people with interest in arctic fox conservation. Prof. Pall Hersteinsson from Iceland University, who is officer in the IUCN Arctic Fox Specialist Group, will attend as external consultant. SU will also attend four international scientific conferences to disseminate project results regarding conservation biology.

Actions foreseen in report period

Progress to date A scientific workshop was held at Stockholm university 2006-11-24 with presentations by; Karin Norén, Tomas Meijer and Peter Hellström. Further, 15 presentations open for the public have been performed during the report period (se appendix: Meetings and other activities.)

Variations/complications/delays None

E6 Press contacts We aim to keep continuous contacts with the press and disseminate project results to newspapers, magazines, radio and television.

Actions foreseen in report period All partners are responsible for keeping contacts with the press and disseminate results.

Progress to date The project has been featured in 19 papers,7 television and radio programmes, five popular scientific magazines (Appendix; Media and Publications)

Variations/complications/delays None

E7 Layman's report SU will produce a layman's report at the end of the project period 2008. The report will be available in paper and electronic format, in Swedish and English.

Actions foreseen in report period None

F. Overall project operation

F1 Project leading The leading group will have frequent meetings and discuss co-ordination and how different actions (D1-D6) are implemented within the different countries (F3-F5). The Project leader is responsible for reports and communications with LIFE, for the overall project operation and basic financial administration. The Assistant Project leader is responsible for all actions in Finland while the Operating group leader for Norway is responsible for monitoring in Norway (D1). The Project leading group will present a General Management Plan and detailed plans for the action programme to the Steering Committee by December 2003. Based on the yearly Progress Reports, the Project leading group will present an updated Project Action Plan to the Steering Committee in November each year 2004-2007. The Project leading group will present a Final Report to the Commission by June 2008.

Actions foreseen in report period Have meeting in July 2007, produce reports and communicate with LIFE.

Progress to date The participants of the project leading group have met in Varanger, Norway, and in, Tallinn, Estonia. The group also met during the steering committee meeting in November 2006 Stockholm, Sweden.

Variations/complications/delays None

F2 The Steering Committee The Steering Committee shall supervise the project, meet on a yearly basis and approve an updated project action plan, submitted by the Project leading group each year.

Actions foreseen in report period The Steering Committee will meet in October 2006 to confirm the planned actions and elaborate detailed evaluation routines for the project.

Progress to date The meeting for 2006 was held 24 November in Stockholm, Sweden.

Variations/complications/delays None

F3 The Operating Group in Sweden The Operating group leader in Sweden is responsible for field actions and practical co-ordination.

Actions foreseen in report period The Operating group leader will have continuous contact with all Partners and coordinate the project. There will be meetings with field personnel to discuss the practical aspects of the actions.

Progress to date Project coordination has worked smoothly. The operating group meeting was performed in Ammarnäs, April 2007. Many rangers from all CABs were present and we discussed all parts of the field work.

Variations/complications/delays None

F4 The Operating Group in Finland The Operating group leader in Finland is responsible for field actions and practical co-ordination.

Actions foreseen in report period The Operative group leader will have continuous contact with people engaged in the project in Finland and co-ordinate the project. There will be meetings to discuss the practical aspects of the actions.

Progress to date Project co-ordination has worked smoothly with three internal meetings.

Variations/complications/delays None

F5 The Operating Group in Norway The Operating group leader in Norway is responsible for field actions and practical co-ordination.

Actions foreseen in report period The Operating group leader in Norway will have continuous contact with the group operating the national arctic fox monitoring program on behalf of the Norwegian Directorate for Nature Management (NDN): the Norwegian Nature Inspectorate (SNO) doing the practical work in the field, and the Norwegian Institute for Nature Research (NINA) which gives priorities, coordinates the reported results and runs the national fox database. The actions in SEFALO+ is actions in addition to the national arctic fox monitoring program (which started in 2003 in Norway), and SEFALO+ actions will supplement national monitoring actions by extra monitoring effort in there boarder areas between Norway, Sweden and Finland, to cover areas that are not part of the national monitoring program. To ease actions as trapping and earmarking (D1), the Operating group leader in Norway will have running contact with the coordination field unit in SNO.

Progress to date Project co-ordination has worked smoothly and information between the different agencies involved in arctic fox monitoring is distributed effectively, which great facilitates the trapping and ear-tagging effort in particular. There are priority meetings prior to every breeding season, as well as continual contacts between coordinators in the field during the whole summer. Changes and improvements are discussed at the end of every season. The whole operation group met in Meråker, November 2006.

Variations/complications/delays None

F6 Auditor's report The independent auditor at Stockholm University will make a revision in the last year of the project (2008) in accordance with Article 27 of the Standard Administrative Provisions.

Actions foreseen in report period None

Overall Project Assessment

Overall, the project has run smoothly. The low number of arctic fox litters during 2006 has been followed with high numbers in 2007. In total 39 litters were recorded in Scandinavia during the summer 2007; 0 in Finland, 24 in Sweden and 15 in Norway. The extremely low population density of small mammals/lemmings during 2006, contributed to that year's low number of reproducing foxes. The prey populations increased generally during the spring 2007, however the amplitude of the increase varied greatly between the mountain areas. The high number of litters 2007 indicates a high survival rate of adults between the rodent peaks, which is one of the main goals of the supplemental feeding. In the core area in Swedish Jämtland, southern Västerbotten and Norwegian Borgefjell and Swedish Borgafjäll, as well as Saltfjellet in Norway, adult arctic foxes were observed at the dens during winter. However, there are no signs of a change for the better in Finland, where there have been no reproductions since 1998. Three adult arctic were observed there and we will use remote cameras to investigate if arctic foxes are active in remote areas with low abundance in northern Finland.

Estimated number of arctic foxes: The population size of arctic foxes is best estimated in summers of high lemming availability, most adults are established at dens and it is possible to get a reliable estimate of population size. Arctic foxes use large, conspicuous dens and it is therefore possible to perform surveys of known dens. In the winter it is easy to underestimate the population size since most arctic foxes are not shown on one den and can move long distances. Severe weather conditions during winter are also complicating the fieldwork. During the winter 2005-2006 we performed a

population estimation in Helagsfjällen, using molecular methods. This was performed to control the estimates from the summer. Faecal samples were collected during winter 2006 and were then used in DNA analyses where individual foxes were identified. The DNA analysis in combination with focal observation shows that there were 37-50 arctic foxes in the area, which is considerably higher than the previous estimate of 20 adult foxes.

During the first phase of the project (1998-2002), we saw a continued overall decline in the adult reproducing population in Sweden (Fig. 3). In 2001, there was a lemming peak which covered the entire Swedish mountain tundra. Despite this, only 9 litters were born in Sweden and we estimated that there were 26-34 adults at dens. The next lemming peak was in 2004 and 2005 with 14 and 26 litters respectively in Sweden. Most notably, there seemed to be a positive trend in Jämtland and southern Västerbotten from the winter 2001 and onwards, where we have had both extensive feeding and efficient red fox hunting in the area. Thus, there has been a substantial increase in the arctic fox population of Jämtland and southern Västerbotten from 2 litters in 2001 (Fig. 2) compared to 22 litters in 2005 and 19 in 2007 (Fig. 1). In the summer of 2005, we estimated 70-86 adult arctic foxes at dens in Sweden-Finland, which is the highest numbers since the start of SEFALO in 1998. With intensive actions during the low phase, i.e. 2002, 2003 and 2006, we have thus managed to keep the foxes from 2001 and 2004 alive so they can reproduce successfully during the next lemming peak (2004 and 2007). With the help of combined feeding and red fox culling these animals also produced litters in 2003, 2005 and 2007. However, despite good rodent availability in northern Västerbotten and Norrbotten in 2004 and 2005, arctic foxes did not respond in the same positive way with only 2 litters in each area both in 2005 and 2007.

The population estimates for Norrbotten and Finland are less certain. However, there are no signs of an increase in the population. Generally, it is difficult to execute actions in northern Norrbotten. The reasons are mainly logistical. Areas with arctic foxes are situated longer distances from built-up areas and roads than in Västerbotten and Jämtland. For future management it might be better to concentrate the actions in these large remote areas to smaller sub areas where the actions can be more efficient. In Finland, red fox hunting is highly efficient. However, there is only a small number of arctic foxes there (Fig. 1, 4a, Table 4-9, 11-14) and they have not established at dens which makes feeding difficult. Arctic foxes mainly seem to pass through Finland. There are a number of possible explanations for this. Firstly, there have not been any lemming peaks in the area although the summer of 2006 showed a strong increase in lemming numbers. Secondly, it may be difficult for the small number of arctic foxes in the area to find a partner. Thirdly, it could be that arctic foxes, despite efficient hunting of red foxes, often are disturbed by red foxes as the large number of culled red foxes could indicate that there are more red foxes around in Finland than in e.g. Helags (Table 4, 6, 7, 11-14 Fig. 4b).

Problems during the report period

We have not encountered any great problems during the report period. We have applied a very efficient set of actions in Jämtland, southern Västerbotten and Finland. However, we need to get more efficient actions in northern Västerbotten and Norrbotten. This is especially important since our genetic analyses show a subdivision of arctic foxes into isolated populations.

Financial Summary

Financial Summary

LIFE2003/NAT/S/000073

2003-06-01--2007-09-30

Budget Category	Spent (€)	Spent (% of Budget)	Budget (€)
1. Personnel	€ 1 227 219.87	87%	€ 1 416 363
2. Travel	€ 371 315.93	73%	€ 509 252
3. External assistance	€ 29 691.22	62%	€ 47 759
4. Durable goods	€ 14 187.99	24%	€ 59 398
5. Land purchase	€ 0.00		€ 0
6. Consumable material	€ 97 092.71	45%	€ 217 189
7. Other costs	€ 29 902.04	30%	€ 99 938
8. Overheads	€ 96 065.83	60%	€ 161 118
Totalt	€ 1 865 475.59	74%	€ 2 511 017

Total budget 2003	€ 2 511 017
In kind contribution Dogman	-€ 7 862
New budget	€ 2 503 155

Financial Summary

Revise 2007-03-23

LIFE2003/NAT/S/000073

2003-06-01--2007-09-30

Budget Category	Spent (€)	Spent (% of Budget)	Budget (€)
1. Personnel	€ 1 227 219.87	87%	€ 1 416 363
2. Travel	€ 371 315.93	73%	€ 509 252
3. External assistance	€ 29 691.22	62%	€ 47 759
4. Durable goods	€ 14 187.99	24%	€ 59 398
5. Land purchase	€ 0.00		€ 0
6. Consumable material	€ 97 092.71	46%	€ 209 327
7. Other costs	€ 29 902.04	30%	€ 99 938
8. Overheads	€ 96 065.83	60%	€ 161 118
Totalt	€ 1 865 475.59	75%	€ 2 503 155

Appendix: Tables and Figures

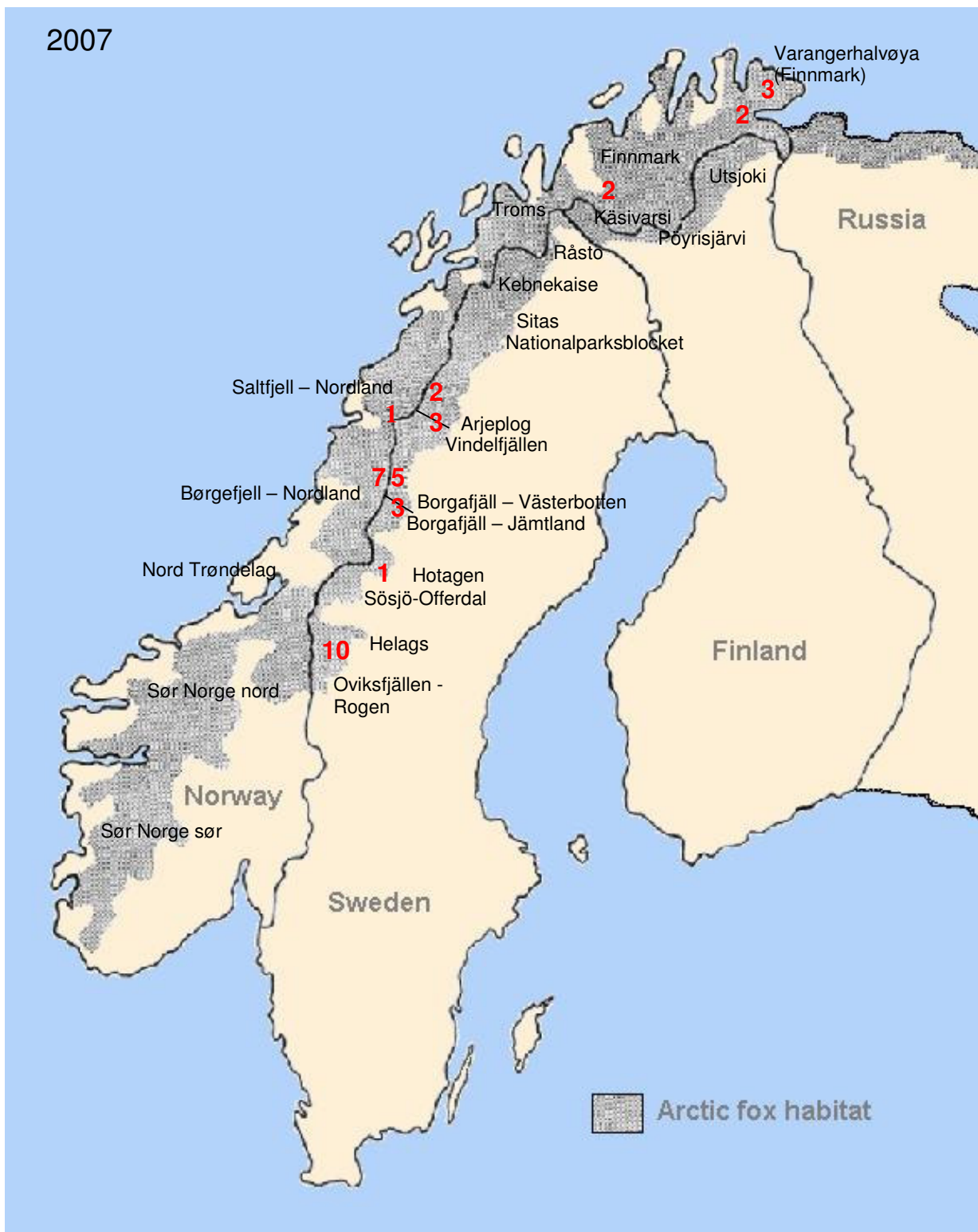


Figure 1. The project area includes area above treeline in Finland, Sweden and Norway. Red numbers show the number of litters 2007 in different areas in Sweden and Norway. *Projektområdet inkluderar områden ovanför trädgränsen i Finland, Sverige och Norge. Röda siffror visar antalet fjällrävskullar i olika svenska och norska fjällområden 2007*

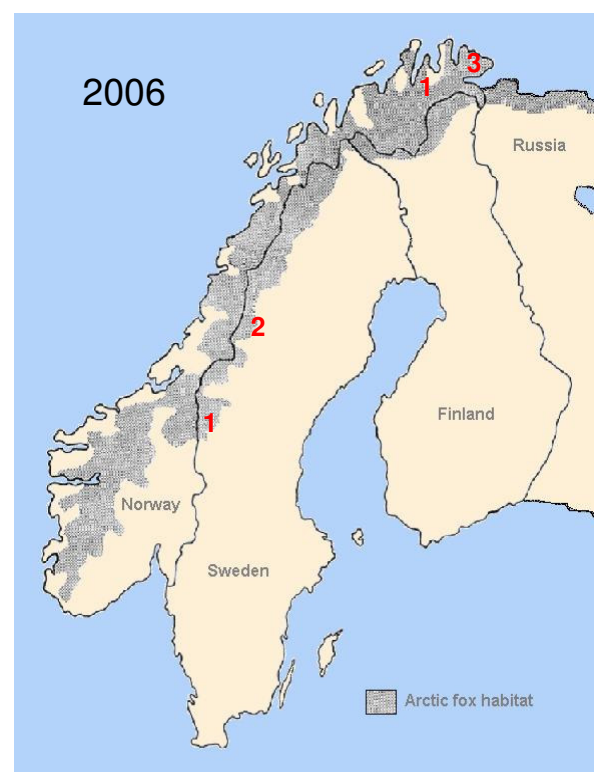
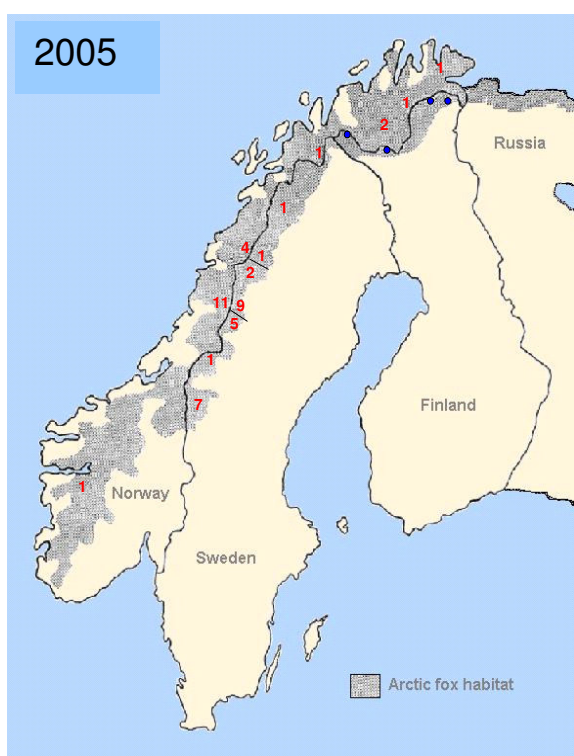
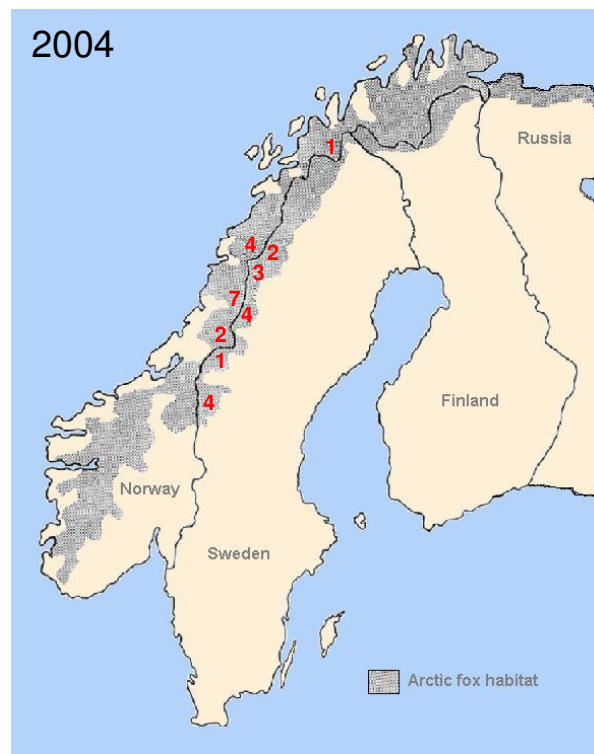
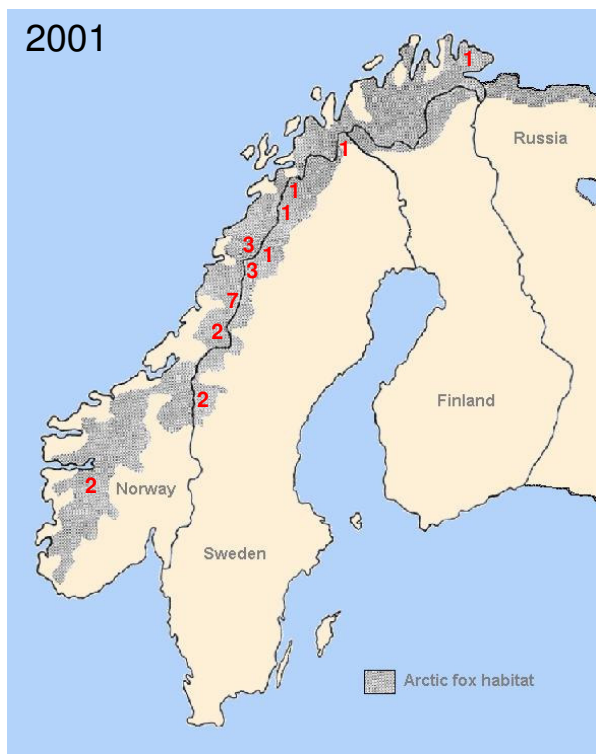


Figure 2. Arctic fox litters in Sweden and Norway in 2001 - 2006.
Fjällrävskullar i Sverige och Norge 2001 - 2006.

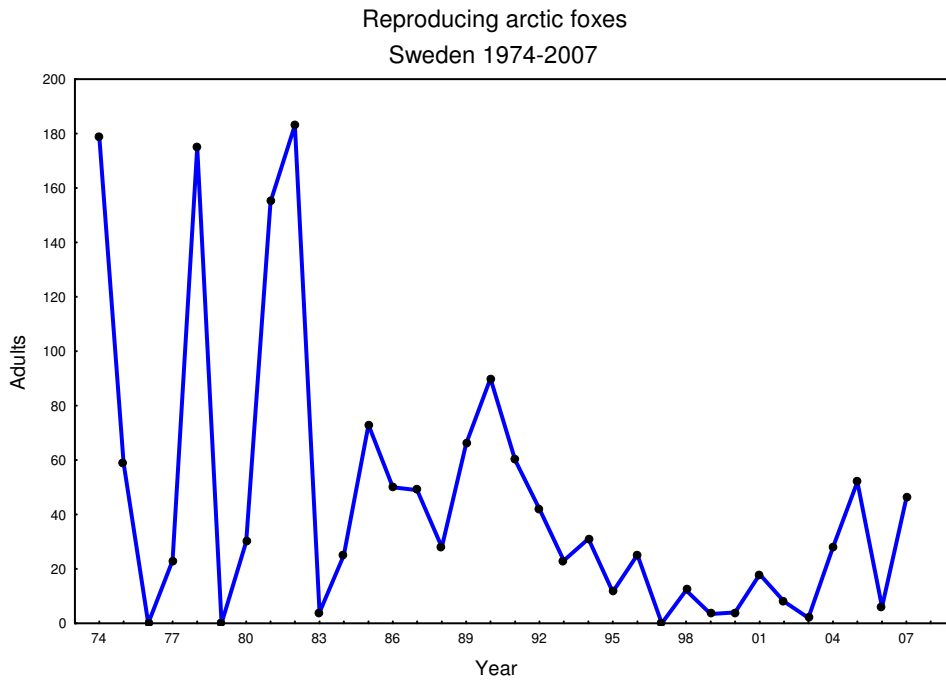


Figure 3. The number of arctic foxes that have reproduced in Sweden in 1974-2005. *Antal fjällrävar som reproducerat sig i Sverige 1974-2007.*

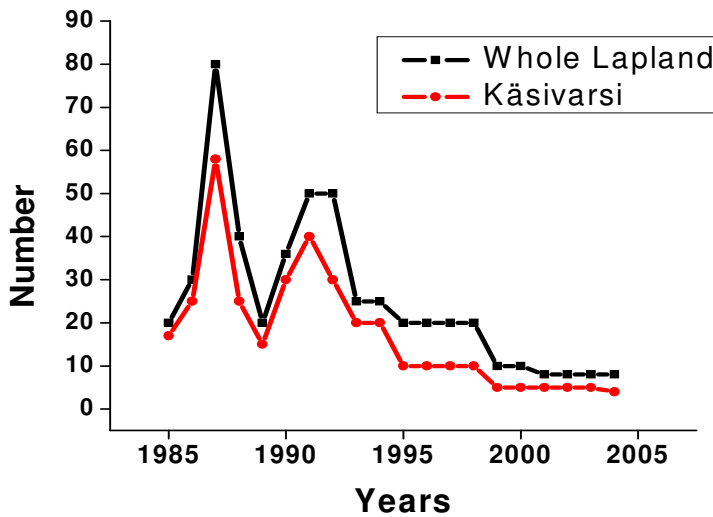


Figure 4a. Estimated numbers of arctic foxes in Käsivarsi and the whole of Finnish Lapland 1985-2004. *Uppskattat antal fjällrävar i Käsivarsi resp. hela finska Lapland 1985-2004.*

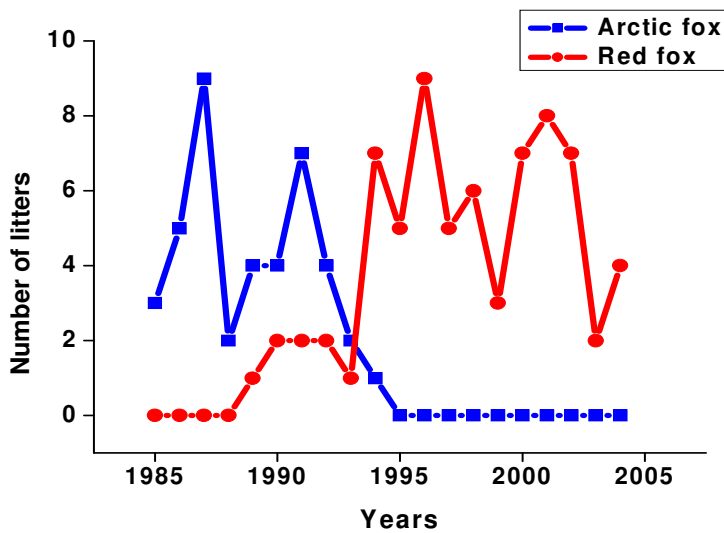


Figure 4b. The number of arctic and red fox litters in Käsivarsi, Finland 1985-2004. *Antal fjäll- och rödrävsullar i Käsivarsi, Finland 1985-2004*

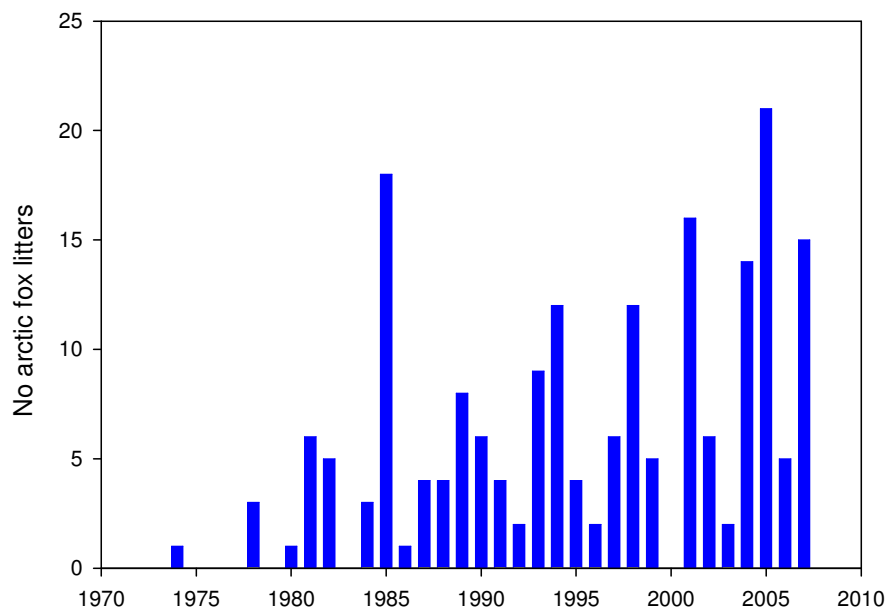


Figure 5. The number of arctic fox litters in Norway in 1988-2006. *Antal fjällrävskullar i Norge 1988-2007.*

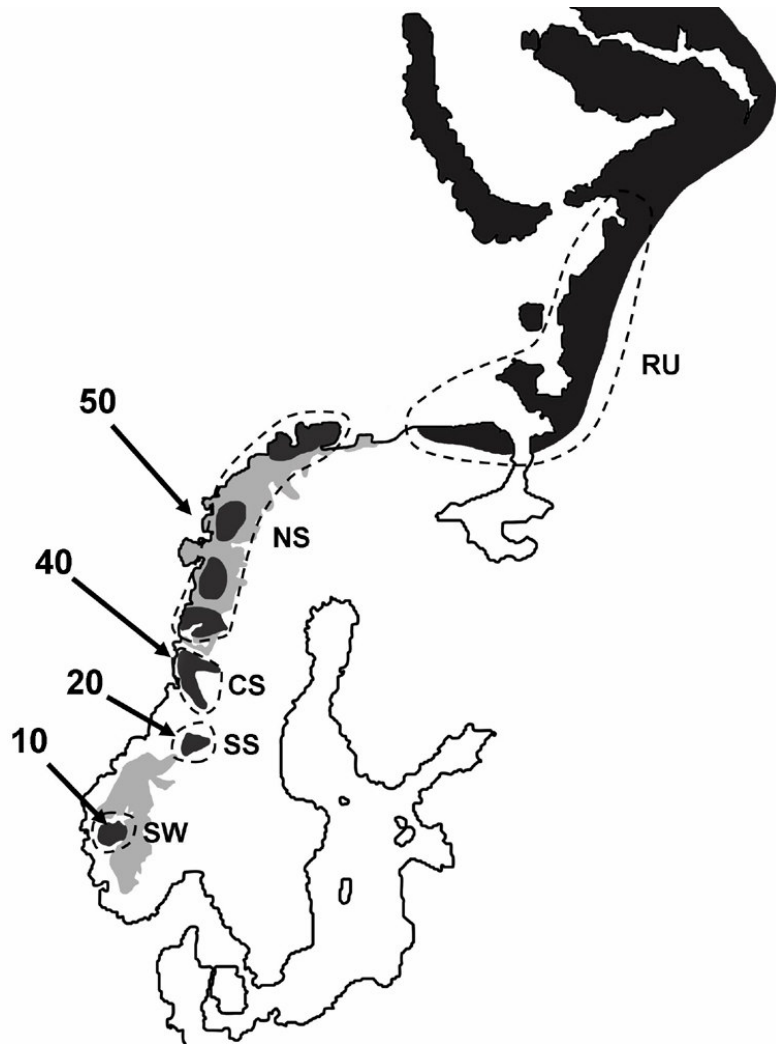


Figure 6. The substructure of arctic foxes in Scandinavia with estimated numbers in each population. RU= Russia, NS= northern Scandinavia, CS= central Scandinavia, SS= southern Scandinavia, SW= southwest Scandinavia. Grey is the area of former arctic fox distribution.

Table 4. Results of monitoring in winter 2002-2003 complementary to SEFALO+ in Sweden and Finland (- = no information). *Resultat av inventeringar vintern 2002-2003, utanför SEFALO+ i Sverige och Finland (- = ingen information).*

Country	Area	Known dens	Monitored dens	Dens with arctic foxes	Estimated no of arctic foxes ¹	Fed dens	Dens with red foxes	Culled red foxes	Organisation responsible for field work
SE - Z	Rogen	1	0	-	-	0	-	0	CAB Jämtland
SE - Z	Helags-Lunndörrsjällen	53	53	2	5-8	5	1	15	CAB Jämtland
SE - Z	Oviksfjällen	4	4	0	0	0	0	0	CAB Jämtland
SE - Z	Sösjö-Offerdalsfjällen	1	1	0	0	0	0	0	CAB Jämtland
SE - Z	Hotagen	5	0	-	-	0	-	0	CAB Jämtland
SE - Z	Borgafjäll – Jämtland	13	13	1	5-6	3	0	4	CAB Jämtland
SE -AC	Borgafjäll – Västerbotten	34	33	6	6-8	2	0	0	CAB Västerbotten
SE -AC	Vindelfjällen, S Storfjället	115	65	1	1	1	1	0	CAB Västerbotten
SE - BD	Arjeplog	35	10	7	7-14	0	0	0	CAB Norrbotten
SE - BD	Nationalparksblocket	43	4	0	0	0	0	0	CAB Norrbotten
SE - BD	Sitas	29	23	0	0	0	0	0	CAB Norrbotten
SE - BD	Kebnekaise	6	2	0	0	0	1	0	CAB Norrbotten
SE - BD	Råsto	55	33	0	0	0	1	0	CAB Norrbotten
FIN	Käsivarsi	65	0	-	-	0	-	21	FFRI
FIN	Pöyrisjärvi	16	14	0	0-1	0	6	22	Metsähallitus
FIN	Utsjoki	106	77	0	5-7	0	28	70	Metsähallitus
TOTAL		581	332	17	29-45	11	38	132	

¹Estimation of the rangers in each area. *Fältpersonalens uppskattning i respektive områden.*

²Red foxes shot from snow mobiles by rangers (Sweden) or selected local people (Finland) with special permissions. *Rödrävar skjutna från skoter av naturbevakare (Sverige) eller av utvalda personer ur lokalbefolkningen (Finland) med specialtillstånd.*

³Red foxes shot by local people according to ordinary hunting legislation rules. *Rödrävar skjutna av lokalbefolkning enligt ordinarie jaktlagstiftning.*

Table 5. Results of monitoring in summer 2003 complementary to SEFALO+ in Sweden and Finland (- = no information). *Resultat av inventeringar sommaren 2003, utanför SEFALO+in Sweden and Finland (- = ingen information).*

Country	Area	Known dens	Monitored dens	Dens with arctic fox litter	Adult arctic foxes at dens ¹	Fed dens	Red fox litters	Organisation responsible for field work
SE - Z	Rogen	1	1	0	0	0	0	CAB Jämtland
SE - Z	Helags	57	57	1	2	1	1	CAB Jämtland
SE - Z	Oviksfjällen	5	5	0	0	0	1	CAB Jämtland
SE - Z	Sösjö-Offerdalsfjällen	1	0	0	0	0	0	CAB Jämtland
SE - Z	Hotagen	5	0	0	0	0	0	CAB Jämtland
SE - Z	Borgafjäll – Jämtland	13	13	0	2	1	0	CAB Jämtland
SE -AC	Borgafjäll – Västerbotten	34	17	0	3-6	0	0	CAB Västerbotten, SU
SE -AC	Vindelfjällen, S Storfjället	115	92	0	2-4	0	0	CAB Västerbotten, SU
SE - BD	Arjeplog	35	3	0	0	0	0	CAB Norrbotten
SE - BD	Nationalparksblocket	43	29	0	1	0	1	CAB Norrbotten, SU
SE - BD	Sitas	29	0	-	-	0	-	CAB Norrbotten
SE - BD	Kebnekaise	6	0	-	-	0	-	CAB Norrbotten
SE - BD	Råsto	55	43	0	0	0	0	CAB Norrbotten
FIN	Käsivarsi	65	61	0	5 ²	0	2	FFRI
FIN	Pöyrisjärvi	16	12	0	0-1 ²	0	0	Metsähallitus
FIN	Utsjoki	106	77	0	5-7 ²	0	2	Metsähallitus
TOTAL		586	410	1	20-28	1	7	

¹Estimation of the rangers in each area . *Fältpersonalens uppskattning i respektive området.*

²Estimated number of arctic foxes in the area (i.e. non-territorial foxes that have not established at dens). *Uppskattat antal fjällrävar i området (d v s icke-territoriella rävar som inte etablerat sig vid lya).*

Table 6. Results of monitoring in winter 2003-2004 in Sweden and Finland (- = no information). *Resultat av inventeringar vintern 2003-2004 i Sverige och Finland (- = ingen information)*

Country	Area	Known dens	Monitored dens	Dens with arctic foxes	Estimated no of arctic foxes ¹	Fed dens	Dens with red foxes	Culled red foxes	Organisation responsible for field work
SE	Rogen	2	2	0	0	0	0	0	CAB Jämtland
SE	Helags-Lunndörrsfjällen	58	55	5	12-15	8	2	8 ^S	CAB Jämtland
SE	Oviksfjällen	5	5	0	0	0	1	0	CAB Jämtland
SE	Sösjö-Offerdalsfjällen	1	0	0	0	0	0	0	CAB Jämtland
SE	Hotagen	5	0	0	0	0	0	0	CAB Jämtland
SE	Borgafjäll – Jämtland	13	10	3	5	5	2	2 ^S	CAB Jämtland
SE	Borgafjäll – Västerbotten	34	34	8	8-11	7	0	16 ^L	CAB Västerbotten
SE	Vindelfjällen, S Storfjället	115	87	6	8-9	0	1	0	CAB Västerbotten
SE	Arjeplog	35	3	1	5-8	0	1	0	CAB Norrbotten
SE	Nationalparksblocket	43	28	2	2	0	0	0	CAB Norrbotten
SE	Sitas	29	18	0	1-2	0	0	4 ^L	CAB Norrbotten
SE	Kebnekaise	6	1	0	0	0	0	0	CAB Norrbotten
SE	Råsto	55	30	4	2-5	1	1	6 ^L	CAB Norrbotten
FIN	Käsivarsi	65	34	0	5	0	1	14 ^S	FFRI
FIN	Pöyrisjärvi	16	15	0	1-2	0	7	42 ^S	Metsähallitus
FIN	Utsjoki	106	89	0	4-8	2	30	105 ^S	Metsähallitus
NO	<i>No monitoring in winter</i>	-	-	-	-	-	-	-	
TOTAL		588	411	29	48-67	23	46	197	

¹Estimation of the rangers in each area. *Fältpersonalens uppskattning i respektive området.*

^SRed foxes shot from snow mobiles by rangers (Sweden) or selected local people (Finland) with special permissions. *Rödrävar skjutna från skoter av naturbevakare (Sverige) eller av utvalda personer ur lokalbefolkningen (Finland) med specialtillstånd.*

^LRed foxes shot by local people according to ordinary hunting legislation rules. *Rödrävar skjutna av lokalbefolkning enligt ordinarie jaktlagstiftning.*

Table 7. Results of monitoring in winter 2004-2005 (- = no information). *Resultat av inventeringar vintern 2004-2005 (- = ingen information)*

¹Estimation of the rangers in each area. *Fältpersonalens uppskattning i respektive områden.*

Country	Area	Known dens	Monitored dens	Dens with arctic foxes	Estimated no of arctic foxes ¹	Fed dens	Dens with red foxes	Culled red foxes	Organisation responsible for field work
SE	Rogen	3	3	0	0	0	0	0	CAB Jämtland
SE	Helags-Lunndörrsfjällen	64	64	8	21-25	9	1	81 ^s +5	CAB Jämtland, SU
SE	Oviksfjällen	5	5	0	0	0	2	0	CAB Jämtland
SE	Sösjö-Offerdalsfjällen	4	4	1	3	0	3	0	CAB Jämtland
SE	Hotagen	5	4	0	0	0	3	0	CAB Jämtland
SE	Borgafjäll – Jämtland	13	9	5	14-17	5	0	6	CAB Jämtland
SE	Borgafjäll – Västerbotten	34	34	10	15	2	1	26	CAB Västerbotten
SE	Vindelfjällen, S Storfjället	115	87	16	14	0	9	6	CABVästerbotten
SE	Arjeplog	35	6	2	5 ≥ 8	-	-	-	CAB Norrbotten
SE	Nationalparksblocket	43	-	-	4 ≥ 6	-	-	-	CAB Norrbotten
SE	Sitas	29	-	-	-	-	-	5	CAB Norrbotten
SE	Kebnekaise	6	2	-	-	-	1	-	CAB Norrbotten
SE	Råsto	55	15	5	3 ≥ 6	2	-	12	CAB Norrbotten
FIN	Käsivarsi	67	35	0	4-6	0	3	0	FFRI
FIN	Pöyrisjärvi	16	14	0	1-2	0	5	47	Metsähallitus
FIN	Paistunturi-Kaldoaivi	114	111	0	6-8	2	25	73	Metsähallitus
	TOTAL	608	393	47	90-110	20	53	279	

^sRed foxes shot from snow mobiles by rangers (Sweden) or selected local people (Finland) with special permissions. *Rödrävar skjutna från skoter av naturbevakare (Sverige) eller av utvalda personer ur lokalbefolkningen (Finland) med specialtillstånd.*

¹Red foxes shot by local people according to ordinary hunting legislation rules. *Rödrävar skjutna av lokalbefolkning enligt ordinarie jaktlagstiftning.*

Table 8. Results of monitoring in summer 2004 (- = no information). *Resultat av inventeringar sommaren 2004 (- = ingen information)*

Country	Area	Known dens	Monitored dens	Dens with arctic fox litter	Adult arctic foxes at dens ¹	Fed dens	Red fox litters	Organisation responsible for field work
SE	Rogen	3	3	0	0	0	0	CAB Jämtland
SE	Helags	58	53	4	8	4	1	CAB Jämtland
SE	Oviksfjällen	5	5	0	0	0	1	CAB Jämtland
SE	Sösjö-Offerdalsfjällen	3	3	1	2	0	0	CAB Jämtland
SE	Hotagen	5	0	0	0	0	0	CAB Jämtland
SE	Borgafjäll – Jämtland	13	10	2	4	5	1	CAB Jämtland
SE	Borgafjäll – Västerbotten	34	34	2	7	3	1	CAB Västerbotten, SU
SE	Vindelfjällen, S Storfjället	115	92	3	6	2	3	CAB Västerbotten, SU
SE	Arjeplog	35	23	2	4-8	5	2	CAB Norrbotten
SE	Nationalparksblocket	43	27	0	1-2	0	4	CAB Norrbotten, SU
SE	Sitas	29	16	0	0	0	0	CAB Norrbotten, SU
SE	Kebnekaise	6	0	-	-	-	-	CAB Norrbotten
SE	Råsto	55	20	0	3-6	1	2	CAB Norrbotten
FIN	Käsivarsi	67	55	0	5 ²	0	4	FFRI
FIN	Pöyrisjärvi	16	14	0	0	0	0	Metsähallitus
FIN	Utsjoki	113	110	0	0	0	0	Metsähallitus
TOTAL Swe-Fin		600	465	14	40-48	20	19	
NO ³	Finnmark	105	61	0	0	-	2	SNO –Fjelltjenesten
NO ³	Troms	39	13	1	1-2	-	0	SNO – Fjelltjenesten
NO ³	Børgefjell – Nordland	32	27	7	11-17	-	0	SNO – Fjelltjenesten
NO ³	Saltfjell – Nordland	46	38	4	5-8	-	0	SNO – Fjelltjenesten
NO ³	Rest of Nordland	6	6	0	0	-	0	SNO – Fjelltjenesten
NO ³	Nord Trøndelag	15	12	2	2-4	-	0	SNO
NO ³	Sør Norge nord	125	58	0	0	-	1	SNO
NO ³	Sør Norge sør	163	51	0	0	-	0	SNO-NINA
TOTAL Norway		531	266	14	19-31	0	3	

¹Estimation of the rangers in each area . *Fältpersonalens uppskattning i respektive områden.*

²Estimated number of arctic foxes in the area (i.e. non-territorial foxes that have not established at dens). *Uppskattat antal fjällrävar i området (d v s icke-territoriella rävar som inte etablerat sig vid lya).*

³These numbers are collected under the Norwegian national arctic fox monitoring program and SEFALO+. *Uppgifter insamlade inom Norges nationella övervakningsprogram för fjällräv och SEFALO+*

Table 9. Results of monitoring in summer 2005 (- = no information). *Resultat av inventeringar sommaren 2005 (- = ingen information)*

¹Estimation of the rangers in each area. *Fältpersonalens uppskattning i respektive områden.*

Country	Area	Known dens	Monitored dens	Dens with arctic fox litter	Adult arctic foxes at dens ¹	Fed dens	Red fox litters	Organisation responsible for field work
SE	Rogen	3	3	0	0	0	0	CAB Jämtland
SE	Helags	65	65	7*	19	9	2	CAB Jämtland, SU
SE	Oviksfjällen	5	5	0	0	0	0	CAB Jämtland
SE	Sösjö-Offerdalsfjällen	4	3	1	1	0	0	CAB Jämtland
SE	Hotagen	7	6	0	0	0	2	CAB Jämtland
SE	Borgafjäll – Jämtland	13	9	5	10	4	0	CAB Jämtland
SE	Borgafjäll – Västerbotten	34	34	9	18	5	0	CAB Västerbotten, SU
SE	Vindelfjällen, S Storfjället	115	92	2	4	0	0	CAB Västerbotten, SU
SE	Arjeplog	40	30	1	2 ≥ 8	0	2	CAB Norrbotten
SE	Nationalparksblocket	47	29	1	4 ≥ 6	1	1	CAB Norrbotten, SU
SE	Sitas	29	13	0	0	0	1	CAB Norrbotten, SU
SE	Kebnekaise	6	2	-	-	-	-	CAB Norrbotten
SE	Råsto	55	22	0	3 ≥ 6	2	3	CAB Norrbotten
FIN	Käsivarsi	67	52	0	0 (4-6 ²)	0	2	FFRI
FIN	Pöyrisjärvi	16	14	0	0 (1-2 ²)	0	0	Metsähallitus
FIN	Paistunturi-Kaldoaivi	116	114	0	0 (4-6 ²)	0	0	Metsähallitus
TOTAL		622	493	26	70-86	21	13	

²Estimated number of arctic foxes in the area (i.e. non-territorial foxes that have not established at dens)

* Two litters at one den

Tabell 10. Results of monitoring in summer 2006 in Norway. *Oversikt over områder og fylke med opplysninger om antall hi i databasen, antall fjellrevhi, antall kontroller utført, antall kontrollerte hi, registrerte ynglinger av fjellrev (dokumenterte og antatte ynglinger), observerte voksne fjellrever, observerte valper, registrerte rødrevynglinger og enhet ansvarlig for registreringene innenfor det enkelte området. Voksne fjellrev angir antall forskjellige individer observert under registreringene (minimums tallet) og antall ved beregning av minimum 2 individer ved hver registrert yngling (maksimums tall). # angir funn av ekskrementer som bekrefter tilstedeværelse av fjellrev i området. Valper angir det antallet valper som er observert på det meste på hiene i området. Results from Eide et al 2006.*

Country	County	Ref.	Area	Known dens	Arctic fox dens	Controls	Monitored dens	Arctic fox litters	Adult AF	Juvenile AF	Red fox litters	Organisation responsible for field work
NO	Finnmark	A	Varangerhalvøya	31	30	30 #	27	3	6	8	2	SNO, Fjelltjenesten
NO	Finnmark	B	Ifjordfjellet	24	23	20	12	1	2	3	0	SNO, Fjelltjenesten
NO	Finnmark	C	Anarjohka	5	5	2	2	0	0	0	0	SNO, Fjelltjenesten
NO	Finnmark	D	Porsanger vest	34	32	6	5	0	0	0	0	SNO, Fjelltjenesten
NO	Finnmark-Troms	E	Reisa nord	27	27	22 #	16	1	2	2	0	SNO, Fjelltjenesten
NO	Troms	F	Reisa sør	17	17	10	6	0	2	0	0	SNO, Fjelltjenesten
NO	Troms	G	Indre Troms	23	23	18 #	8	0	3	0	0	SNO, Fjelltjenesten
NO	Nordland	H	Sitas	3	3	1	1	0	0	0	0	SNO, Fjelltjenesten
NO	Nordland	I	Saltfjellet	51	48	58 #	38	0	2	0	0	SNO, Fjelltjenesten
NO	Nordland	J	Artfjellet	3	3	3	3	0	0	0	0	SNO, Fjelltjenesten
NO	Nordland	K	Børgfjell	34	34	31	24	0	3	0	0	SNO, Fjelltjenesten
NO	Nord-Trøndelag	L	Hestkjølen	16	7	11	5	0	0	0	0	SNO
NO	Nord-Trøndelag	M	Blåfjellet	24	10	12	6	0	0	0	0	SNO
NO	Nord-Trøndelag	N	Skjækerfjellet	7	3	2	2	0	0	0	0	SNO
NO	Sør-Norge Nord	P	Kjølifjellet/Sylane	47	27	47	31	0	0	0	0	SNO
NO	Sør-Norge Nord	Q	Forollhogna	27	26	0	0	0	0	0	0	SNO
NO	Sør-Norge Nord	R	Knutshø	32	21	14	13	0	0	0	1	SNO
NO	Sør-Norge Nord	S	Trollheimen	4	4	0	0	0	0	0	0	SNO
NO	Sør-Norge Nord	T	Snøhetta	58	36	14	13	0	0	0	0	SNO
NO	Sør-Norge Nord	U	Ottadalen nord	12	6	0	0	0	0	0	0	SNO
NO	Sør-Norge Nord	V	Rondane	3	3	0	0	0	0	0	0	SNO
NO	Sør-Norge Nord	W	Valdres	1	1	0	0	0	0	0	0	SNO
NO	Sør-Norge Sør	X	Finse	29	25	8	8	0	0	0	0	NINA
NO	Sør-Norge Sør	Y	Hardangervidda	220	139	17	17	0	0	0	0	SNO
NO	Sør-Norge	-	Diverse områder *	6	2	2	2	0	0	0	0	SNO
TOTAL				738	553	328	239	5	20	13	3	

* Hi i Sør-Norge utenfor de spesifiserte fjellområder, samlet i "diverse områder"

Table 11. Results of monitoring in winter 2005-2006 (- = no information). *Resultat av inventeringar vintern 2005-2006 (- = ingen information)*

¹Estimation of the rangers in each area. *Fältpersonalens uppskattning i respektive områden.*

Country	Area	Known dens	Monitored dens	Dens with arctic foxes	Estimated no of arctic foxes ¹	Fed dens	Dens with red foxes	Culled red foxes	Organisation responsible for field work
SE	Rogen	3	2	0	0	0	0	0	CAB Jämtland
SE	Helags-Lunndörssjällen	66	65	8	40	20	0	48	CAB Jämtland, SU
SE	Oviksfjällen	5	5	0	0	0	0	0	CAB Jämtland
SE	Sösjö-Offerdalsfjällen	4	4	0	1	0	0	0	CAB Jämtland
SE	Hotagen	7	0	0	0	0	0	0	CAB Jämtland
SE	Borgafjäll - Jämtland	11	11	6	10-17	5	0	6	CAB Jämtland
SE	Borgafjäll - Västerbotten	34	30	3	10-17	7	1	21	CAB Västerbotten
SE	Vindelfjällen, S Storfjället	115	80	2	4-6	2	3	3	CAB Västerbotten
SE	Arjeplog	40	3	3	2 ≥ 5	0	-	0	CAB Norrbotten
SE	Nationalparks-blocket	47	4	0	2 ≥ 5	0	-	1	CAB Norrbotten
SE	Sitas	23	4	0	1 ≥ 2	0	-	0	CAB Norrbotten
SE	Kebnekaise	6	0	-	-	-	-	0	CAB Norrbotten
SE	Råsto	55	28	1	2 ≥ 5	-	1	0	CAB Norrbotten
FIN	Käsivarsi	67	37	0	4-6	0	3	0	FFRI
FIN	Pöyrisjärvi	16	16	0	0-2	0	4	29	Metsähallitus
FIN	Utsjoki	115	115	0	0-4	2	19	68	Metsähallitus
TOTAL		614	404	23	76-110	36	31	176	

⁵Red foxes shot from snow mobiles by rangers (Sweden) or selected local people (Finland) with special permissions. *Rödrävar skjutna från skoter av naturbevakare (Sverige) eller av utvalda personer ur lokalbefolkningen (Finland) med specialtillstånd.*

⁴Red foxes shot by local people according to ordinary hunting legislation rules. *Rödrävar skjutna av lokalbefolkning enligt ordinarie jaktlagstiftning.*

Table 12. Results of monitoring in summer 2006 (- = no information). *Resultat av inventeringar sommaren 2006 (- = ingen information)*

Country	Area	Known dens	Monitored dens	Dens with arctic fox litter	Adult arctic foxes at dens ¹	Fed dens	Red fox litters	Organisation responsible for field work
SE	Rogen	3	2	0	0	0	0	SU
SE	Helags-Lunndörrsfjällen	66	58	1	8-10	11	0	SU
SE	Oviksfjällen	5	4	0	0	0	0	SU
SE	Sösjö-Offerdalsfjällen	4	3	0	0	0	0	SU
SE	Hotagen	7	4	0	0	0	0	SU
SE	Borgafjäll - Jämtland	11	11	2	8	5	0	CAB Jämtland
SE	Borgafjäll - Västerbotten	34	32	0	4	3	1	CAB Västerbotten, SU
SE	Vindelfjällen, S Storfjället	115	92	0	2 ≥ 5	2	0	CAB Västerbotten, SU
SE	Arjeplog	45	29	0	2 ≥ 5	0	-	CAB Norrbotten
SE	Nationalparksblocket	48	38	0	2 ≥ 5	0	1	CAB Norrbotten, SU
SE	Sitas	29	20	0	1 ≥ 2	0	-	CAB Norrbotten, SU
SE	Kebnekaise	7	1	-	-	0	-	CAB Norrbotten
SE	Råsto	55	6	0	2 ≥ 5	0	1	CAB Norrbotten
FIN	Käsivarsi	67	52	0	0	?	?	FFRI
FIN	Pöyrisjärvi	16	15	0	0	0	0	Metsähallitus
FIN	Utsjoki	117	116	0	0	0	4	Metsähallitus
TOTAL Swe-Fin		631	489	3	17-34	21	7	

¹Estimation of the rangers in each area . *Fältpersonalens uppskattning i respektive områden.*

²Estimated number of arctic foxes in the area (i.e. non-territorial foxes that have not established at dens). *Uppskattat antal fjällrävar i området (d v s icke-territoriella rävar som inte etablerat sig vid lya).*

³These numbers are collected under the Norwegian national arctic fox monitoring program and SEFALO+. *Uppgifter insamlade inom Norges nationella övervakningsprogram för fjällräv och SEFALO+*

Table 13. Results of monitoring in winter 2006-2007 (- = no information). *Resultat av inventeringar vintern 2006-2007 (- = ingen information)*

¹Estimation of the rangers in each area. *Fältpersonalens uppskattning i respektive områden.*

Country	Area	Known dens	Monitored dens	Dens with arctic foxes	Estimated no of arctic foxes ¹	Fed dens	Dens with red foxes	Culled red foxes	Organisation responsible for field work
SE	Rogen	3	3	0	0	0	0	0	CAB Jämtland
SE	Helags-Lunndörrsfjällen	68	61	10	20	10	0	36	CAB Jämtland, SU
SE	Oviksfjällen	5	3	0	0	0	0	0	CAB Jämtland
SE	Sösjö-Offerdalsfjällen	4	3	0	0	0	0	0	CAB Jämtland
SE	Hotagen	7	0	0	0	0	0	0	CAB Jämtland
SE	Borgafjäll - Jämtland	11	11	5	15	4	0	0	CAB Jämtland
SE	Borgafjäll - Västerbotten	34	21	5	4-6	5	2	14	CAB Västerbotten
SE	Vindelfjällen, S Storfjället	115	61	5-6	-	0	1	11	CAB Västerbotten
SE	Arjeplog	45	16	9	5-10	8	0	0	CAB Norrbotten
SE	Nationalparks-blocket	48	3	1	2-5	0	0	0	CAB Norrbotten
SE	Sitas	29	13	0	1-2	0	0	0	CAB Norrbotten
SE	Kebnekaise	7	0	0	0	0	0	0	CAB Norrbotten
SE	Råsto	49	20	2	2-5	0	0	0	CAB Norrbotten
FIN	Käsivarsi	67							FFRI
FIN	Pöyrisjärvi	16	16	0	0-2	0	2	50	Metsähallitus
FIN	Utsjoki	117	116	0	0-4	1	14	136	Metsähallitus
TOTAL		614	347	38	69	28	19	247	

^sRed foxes shot from snow mobiles by rangers (Sweden) or selected local people (Finland) with special permissions. *Rödrävar skjutna från skoter av naturbevakare (Sverige) eller av utvalda personer ur lokalbefolkningen (Finland) med specialtillstånd.*

^LRed foxes shot by local people according to ordinary hunting legislation rules. *Rödrävar skjutna av lokalbefolkning enligt ordinarie jaktlagstiftning.*

Table 14. Results of monitoring in summer 2007 (- = no information). *Resultat av inventeringar sommaren 2007 (- = ingen information)*

Country	Area	Known dens	Monitored dens	Dens with arctic fox litter	Adult arctic foxes at dens ¹	Fed dens	Red fox litters	Organisation responsible for field work
SE	Rogen	3	2	0	0	0	0	SU
SE	Helags-Lunndörrsfjällen	68	60	10*	20	9	0	SU
SE	Oviksfjällen	5	5	0	0	0	0	SU
SE	Sösjö-Offerdalsfjällen	4	4	1	2	0	0	SU
SE	Hotagen	7	3	0	0	0	0	SU
SE	Borgafjäll - Jämtland	11	11	3	6	4	0	CAB Jämtland
SE	Borgafjäll - Västerbotten	34	13	5	11	5	0	CAB Västerbotten, SU
SE	Vindelfjällen, S Storfjället	115	96	3	6	3	0	CAB Västerbotten, SU
SE	Arjeplog	46	20	2	10	11	0	CAB Norrbotten
SE	Nationalparksblocket	48	31	0	2-5	0	4	CAB Norrbotten, SU
SE	Sitas	29	10	0	1-2	0	0	CAB Norrbotten, SU
SE	Kebnekaise	7	0	0	0	0	-	CAB Norrbotten
SE	Råsto	49	16	0	2-5	0	1	CAB Norrbotten
FIN	Käsivarsi	67	-	-	-	-	-	FFRI
FIN	Pöyrisjärvi	16	16	0	0	0	0	Metsähallitus
FIN	Utsjoki	124	124	0	0	0	5	Metsähallitus
TOTAL Swe-Fin		633	411	24*	67	32	10	

¹Estimation of the rangers in each area. *Fältpersonalens uppskattning i respektive områden.*

²Estimated number of arctic foxes in the area (i.e. non-territorial foxes that have not established at dens). *Uppskattat antal fjällrävar i området (d v s icke-territoriella rävar som inte etablerat sig vid lya).*

³These numbers are collected under the Norwegian national arctic fox monitoring program and SEFALO+. *Uppgifter insamlade inom Norges nationella övervakningsprogram för fjällräv och SEFALO+ * two litters at one den.*

Tabell 15. Results of winter and summer monitoring in Norway 2007. *Oversikt over områder og fylke med opplysninger om antall hi i databasen, antall fjellrevhi, antall kontroller utført, antall kontrollerte hi, registrerte ynglinger av fjellrev (dokumenterte og antatte ynglinger), observerte voksne fjellrever, observerte valper, registrerte rødrevynglinger og enhet ansvarlig for registreringene innenfor det enkelte området. Voksne fjellrev angir antall forskjellige individer observert under registreringene (minimums tallet) og antall ved beregning av minimum 2 individer ved hver registrert yngling (maksimums tall). # angir funn av ekskrementer som bekrefter tilstedeværelse av fjellrev i området. Valper angir det antallet valper som er observert på det meste på hiene i området. Results from Eide et al 2007.*

Fylke	Ref.	Fjellområde	Totalt		2007							
			Kjente hi	Fjellrevhi	Ant. kont. vinter	Ant. kont. sommer	Antall hi kontrollert	Fjellrev yngling	Voksne fjellrev	Valper fjellrev	Rødrev yngling	Fjellrev vinter
Finnmark	A	Varangerhalvøya	32	30	11	30	29	3	6	13	0	4
Finnmark	B	lfjordfjellet	28	26	11	18	18	1	1	9	0	0
Finnmark	C	Anarjohka	5	5	1	1	2	0	0	0	0	0
Finnmark	D	Porsanger vest	35	33	0	3	3	0	0	0	2 (1)	0
Finnmark-Troms	E	Reisa nord	28	27	7	23	18	2	3	19	1 (1)	1
Troms	F	Reisa sør	17	17	6	11	11	0	0	0	2 (2)	0
Troms	G	Indre Troms	23	23	9	14	13	1	2	5	0	1
Nordland	H	Sitas	3	3	1	1	2	0	0	0	0	0
Nordland	I	Saltfjellet	52	49	44	49	50	1	14	9	3 (2)	2
Nordland	J	Artfjellet	3	3	0	0	0	0	0	0	0	0
Nordland	K	Børgefjell	38	35	27	55	30	8 (1)	3	57	3 (3)	5
Nord-Trøndelag	L	Hestkjølen	16	7	7	6	6	0	0	0	0	0
Nord-Trøndelag	M	Blåfjellet	27	10	5	10	6	0	0	0	0	1
Nord-Trøndelag	N	Skjækerfjellet	7	3	0	0	0	0	0	0	0	0
Sør-Norge Nord	P	Kjøllifjellet/Sylane	50	29	18	17	23	0	0	0	1 (1)	0
Sør-Norge Nord	Q	Forollhogna	27	26	0	0	0	0	0	0	0	0
Sør-Norge Nord	R	Knutshø	38	24	2	13	12	0	0	0	1	0
Sør-Norge Nord	S	Trollheimen	4	4	0	0	0	0	0	0	0	0
Sør-Norge Nord	T	Snøhetta	59	36	5	27	23	0	0	0	2 (1)	0
Sør-Norge Nord	U	Ottadalen nord	12	6	0	0	0	0	0	0	0	0
Sør-Norge Nord	V	Rondane	3	3	0	0	0	0	0	0	0	0
Sør-Norge Nord	W	Valdres	1	1	0	0	0	0	0	0	0	0
Sør-Norge Sør	X	Finse	27	25	5	16	16	0	0	0	0	1
Sør-Norge Sør	Y	Hardangervidda	229	144	0	89	92	0	0	0	2	0
Sør-Norge	-	Diverse områder *	7	2	0	1	1	0	0	0	0	0

* Hi i Sør-Norge utenfor de spesifiserte fjellområder, samlet i "diverse områder"

Table 16. Lemming and vole availability in different areas (no. caught/100 trapnights during snap trapping). Lemming is the main prey of arctic foxes in most areas, while different vole species are an alternative prey.

Lämmel- och sorktillgång i olika områden (antal fångade/100 fällnätter vid fällfångst). Lämmel är fjällrävens viktigaste bytesdjur i de flesta områdena, medan sork är ett alternativt bytesdjur.

¹Selective trapping method renders more captures than systematic trapping. *Selektiv fångstmetod ger generellt fler fångster än systematisk fångst.*

2003

Country	Area	Trapping method	Lemming <i>Lemmus lemmus</i>	Vole <i>Microtus & Clethrionomys</i>	TOTAL
SE	Helags	Systematic	0.14	0.56	0.70
SE	Vindelfjällen	Systematic	0.14	0.69	0.83
SE	Nationalparksblocket	Systematic	0	0	0
SE	Sitas	Systematic	0	0	0

2004

Country	Area	Trapping method	Lemming <i>Lemmus lemmus</i>	Vole <i>Microtus & Clethrionomys</i>	TOTAL
SE	Helags	Systematic	0	1.67	1.67
SE	Borgafjäll	Systematic	4.03	3.19	7.22
SE	Vindelfjällen	Systematic	0.50	0.92	1.42
SE	Arjeplog	Systematic	0	0.42	0.42
SE	Nationalparksblocket	Systematic	0.10	3.02	3.12
SE	Sitas	Systematic	0	3.54	3.54
SE	Pältsa –Råstojaure	Selective			6.00 ¹
FIN	Käsivarsi	Selective			2.00 ¹

2005

Country	Area	Trapping method	Lemming <i>Lemmus lemmus</i>	Vole <i>Microtus & Clethrionomys</i>	TOTAL
SE	Helags	Systematic	0	3.19	3.21
SE	Borgafjäll	Systematic	0	0.07	0.07
SE	Vindelfjällen	Systematic	0	0	0
SE	Nationalparksblocket	Systematic	0.42	0.21	0.63
SE	Sitas	Systematic	0.52	1.98	2.50
SE	Pältsa –Råstojaure	Selective			2.00 ¹
FIN	Käsivarsi	Selective			2.00 ¹

2006

Country	Area	Trapping method	Lemming <i>Lemmus lemmus</i>	Vole <i>Microtus & Clethrionomys</i>	TOTAL
SE	Helags	Systematic	0	0,17	0,17
SE	Borgafjäll	Systematic	0	0	0
SE	Vindelfjällen	Systematic	0,33	0	0,33
SE	Arjeplog	Systematic	-	-	-
SE	Nationalparksblocket	Systematic	0	0,05	0,05
SE	Sitas	Systematic	0,31	0,10	0,41
SE	Pältsa –Råstojaure	Selective			
FIN	Käsivarsi	Selective			

2007

Country	Area	Trapping method	Lemming <i>Lemmus lemmus</i>	Vole <i>Microtus & Clethrionomys</i>	TOTAL
SE	Helags	Systematic	1,88	27,90	29,79
SE	Borgafjäll	Systematic	0,12	0,12	0,24
SE	Vindelfjällen	Systematic	0,56	0,1	0,65
SE	Arjeplog	Systematic	-	-	-
SE	Nationalparksblocket	Systematic	1,39	4,07	4,51
SE	Sitas	Systematic	0	0	0
SE	Pältsa –Råstojaure	Selective	-	-	-
FIN	Käsivarsi	Selective	-	-	-

Appendix: Media and Publications

20061101 – 20070931

Radio and Television

- 2006-11-06 SR Jämtland "Fler fjällrävar i Helags än tidigare känt" [More arctic foxes in Helags, than previous known, Interview with Tomas Meijer]
- 2006-12-21 Radio Inari, Finland: Intervju om fjällrävssituationen, kadaverkamera, lämmlar, osv. [interview with Matti Mela about arctic foxes, lemmings and the situation today]
- 2007-01-25 Radio Lidingö "Klimathot och fjällräv" [climate change and arctic foxes, Interview with Anders Angerbjörn]
- 2007-03-22 SR P1 vetenskapsradion "Rävrymlingar från farmer hotar vild fjällräv" [Escapers from fur farms threaten the wild arctic fox population, Interview with Karin Norén]
- 2007-07-17 SR P1 Vetenskapsradion "Lyckad säsong för fjällräven" [Successful season for arctic foxes]
- 2007-07-31 SR P1 Vetenskaps radion "Gott år för fjällräven, intervju med Lars Back"[Good year for the arctic foxes, interview with ranger Lars Back]
- 2007-01-22 Intervjun Same TV om fjällrävssituationen och fjällrävsprojekt [Interview with Matti Mela in sami radio about the arctic fox project]

Newspapers

- 2006-11-09 Aftonbladet "Nu dör fjällräven" [The Arctic fox is dying]
- 2006-12-15 Östersundsposten "Kapsyljakt gav pengar till fjällrävar" [Hunt for caps gave money for conservation of arctic foxes]
- 2006-12-17 Aftenposten "Tragsik å skyte Finse-revene" [Tragic to kill the Finse-foxes]
- 2006-12-18 Aftenposten "Uekte fjellrever vil bli skutt" [False arctic foxes will be shot]
- 2007-04-17 The New York times "In arctic foxes, clues to effects of shrinking habitat"
- 2007-04-20 Östersundsposten "På Sylarna vägrar man svälta räv" [In Sylarna, they refuse to starve foxes]
- 2007-04-20 Östersundsposten "Snart chartras resor till fjällrävens rike" [Soon, there will be travels to the land of arctic foxes]
- 2007-04-20 Östersundsposten "Så skall fjällräven överleva" [the way the arctic fox will survive]
- 2007-05-01 Bo på Lantgård "Fjällräven" [The arctic fox]
- 2007-07-19 Länstidningen "Sorkår lyckokast för projekt fjällräv" [Rodent year, good for the arctic fox project]
- 2007-07-26 Östersundsposten " Deras jobb är att rädda fjällräven – I deras händer dog en hona" [Their work is to save the arctic foxes, in their hands died a female]
- 2007-07-27 Östersundsposten "Viktigt jobb att rädda rävar" [Important work to save the arctic fox]
- 2007-07-27 Östersundsposten "Rutinerna vid märkning av fjällrävar skall ses över" [The routines will be controlled]
- 2007-07-30 Dagens Nyheter "Sorkfälla tog renens liv" [Rodent trap killed reindeer]
- 2007-08-02 Västerbotten kuriren "Fördubbling av antalet fjällrävar" [The number of foxes are doubled]
- 2007-08-02 Östersundsposten "Fjällräven dog av blödning i levern" [The arctic fox died of liver rupture]
- 2007-08-13 Västerbottens kuriren "Glädje när ovanligt många fjällrävsvalpar föds" [Many arctic fox litters are born]
- 2007-08-14 Dagens Nyheter "Stora valpkullar ger hopp för fjällrävarna" [Large litters give hope to arctic foxes]
- 2007-08-12 Dagens Nyheter "Mickelinas värld. Fjällräven har fått en egen värld" [The world of Mickelina, the arctic fox gets it's own arena]
- 2007-09-01 Utemagasinet nr 7 2007 "Fjällräven ökar" [The arctic fox population increases]

Webpages

- 2007-04-17 SVT "Fjällräven kommer från Sibirien"[The arctic fox originates from Siberia]
2007-08-02 SVT "Fördubbling av antalet fjällrävar" [The number of arctic foxes has doubled]
2007-04-10 Nature online "Arctic fox failed to move north at end of ice age"
2007-04-10 elmundo.es "El zorro ártico no huyó al norte para sobrevivir al final de la era glacial"
2007-04-17 ABC.es "Los científicos temen una falta de reacción de los animales al cambio climático"
2007-04-17 medio ambiente "Algunos animales se extinguirán porque no serán capaces de reaccionar ante el cambio climático"
2007-04-17 National Geographic "Arctic fox may be left behind by warming, Study suggest"

Popular scientific papers

- Din skog Framåt för fjällrävar [Better for the arctic foxes] Dins skog 3/2007.
Jiborn P. Fjällräven- en unik spetsprodukt [The arctic fox- a product for ecotourism] Safari 3/2007
Karin Norén Ännu ett hot mot Skandinaviska fjällrävar – Gener från pälsfarmer [Another threat for the Scandinavian arctic foxes – Genes from fur farms] Våra rovdjur1/2007
Mats Ericsson "Fjällrävens läge alltmer utsatt i Skandinavien" [The situation for the arctic fox is critical] Våra rovdjur 1/2007
Natura 2000 Natura 2000's role in combating the impact of climate change. 22/2007

Publications from the beneficiary, Partners and Co-financiers

- Angerbjörn A, Hellström P, Meijer T, Dalén L, Eide E.N, Norén K. 2007. The conservation of Fennoscandian arctic foxes: the effects of supplemental feeding and red fox hunting. Report from the SEFALO+ project.
Dalén L, Nyström V, Valdiosera C, Germonpre M, Sablin M, Turner E, Angerbjörn A, Arsuaga JL, Götherstrom A. 2007. Ancient DNA reveals lack of postglacial habitat tracking in the arctic fox. PNAS 104: 6726-6729
Dalén L, Angerbjörn A. 2007. Translocation Evaluation Report SEFALO+.
Fjällräven AB Katalog vår/sommar 2007. Rapport från projekt fjällräv. Brochure in Swedish, English, German, norwegian, Danish, Finnish, Dutch and French.
Fjällräven Classic Magazin (in German) 2007. Fjällbewohner; Polarfuchsforscherin Karin Norén.
Geffen E, Waidyaratne S, Dalen L, Angerbjörn A, Vila C, Hersteinsson P, Fuglei E, White PA, Goltsman M, Kapel CMO, Wyne RK. 2007. Sea ice occurrence predicts genetic isolation in the Arctic fox Mol. Ecology 16: 4241-4255.
Berg A-L, Gavier-Widén D, Nilsson K, Widén F, Berg M, Gregorius S, Ågren E, Erlandsson M & Mörner T. 2007. Necrotizing encephalitis of unknown cause in fennoscandian arctic foxes (*Alopex lagopus*). J Vet Diagn Invest 19:113-117.
Henttonen H, Mela M, Niemimaa J, Kaikusalo A. 2007. Naalikannan tilanne ja suojele Suomessa ja Fennoskandiassa. Suomen riista 53: 15-24
Norén K, Kvaloy K, Nyström V, Landa A, Dalén L, Eide E. N., Ostbye E, Henttonen H, Angerbjörn A. 2007 Hybridisation between wild and farmed Arctic foxes on the Fennoscandian mountain tundra: implications for conservation (manuscript)
Meijer T. 2006 Molecular tracking in a small and isolated arctic fox population. Master thesis 2006:15. Department of Zoology, Stockholm University.
Meijer T, Norén K, Angerbjörn A. 2007. Detection of farm fox genotypes among Swedish arctic foxes? - Genetic screening and action plan. Report for the Swedish Environmental Protection Agency.
Metsähallitus (Internet) 2007. Fjällrävssituationen i Fennoskandia. För internetsidor av (hotade djurarter).

Metsähallitus (Internet) 2007. Fjällrävssituationen i Finland och norddelar av Norge och Sverige 2007.

Puistoväki –tidning (publ. av Metsähallitus,) 2007. Fjällrävssituationen i Finland och i andra nordiska länder i slutet av Fjällrävs Life.

Appendix: Meetings and other activities

Presentations

- 2006-11-14 ”Tiltak og resultat i Sverige 2005/06”, Professor Anders Angerbjörn, Skandinaviskt fjellrevsseminar Tevetunet fjellstue, Meråker [Actions and results in Sweden. Scandinavian arctic fox seminar]
- 2006-11-24 Master thesis presentation; “Molecular tracking in a small and isolated arctic fox population”, Tomas Meijer, Department of Zoology, Stockholm University.
- 2006-12-13 Fjällräven – ”Vårt mest hotade rovdjur” [The arctic fox – Our most endangered carnivore], Karin Norén och Peter Hellström, Ramundbereget fjällanläggning, Jämtland. [
- 2006-12-14 ”Fjällräven – Vårt mest hotade rovdjur” [The arctic fox – Our most endangered carnivore], Karin Norén and Peter Hellström, Funäsdalens skola, Jämtland.
- 2007-04-15 “Conservation of the arctic fox”, Tomas Meijer, Sylarna mountain station, Jämtland.
- 2007-04-18 “Sub arctic predator ecology”, Tomas Meijer, Sylarna mountain station, Jämtland.
- 2007-04-20 “The future for the arctic fox; conservation and ecology”, Tomas Meijer, Sylarna mountain station, Jämtland.
- 2007-06-04 ”Svensk fjällräv – läget just nu” [Arctic foxes in Sweden, the situation today], Tomas Meijer, Vauldalen Hotell, Norway.
- 2007-06-04 ”Fjällräv i Helagsområdet” [Arctic foxes in Helagsfjällen], Lars Liljemark, Vauldalen Hotell, Norway.
- 2007-06-04 ”Verdens første fjellrevs-arrangement”, informasjon og erfaringer ved guide Tomas Meijer/SEFALO, og Maria Kjellstrøm/Svenska Ekoturismeforeningen”, [Ecotourism and arctic foxes], Tomas Meijer, Vauldalen Hotell, Norway.
- 2007-08-17 ”Ved et gammelt fjellrevhi nærme havet – nå okkupert av rødrev”, Anders Angerbjörn Varanger, Norway.
- 2007-08-17 ”Fjällrävarna i Helags området” [Arctic foxes in Helagsfjällen, situation], Lars Liljemark, Varanger, Norway.
- 2007-09-05 ”Fauna i förändring: fjällräv (SEFALO+), rödräv” [Fauna in change: arctic foxes and red foxes], Bodil Elmhagen, Svensk djurparks konferans. Järvsö, Sweden.
- 2007-09-30 ”Fjällräven- en lokal resurs?” [The arctic fox, a local resource?], Tomas Meijer, Åre Höstmarknad, Jämtland.
- 2007-09-31 Fjällräven- en lokal resurs?” [The arctic fox, a local resource?], Tomas Meijer, Åre Höstmarknad, Jämtland.

Meetings

- 2006-11-15 Meeting for Operating group Norway, Meråker, Norway.
- 2006-11-24 Workshop at Stockholm university. Presentations by;
Karin Norén – Farmed arctic foxes, a threat to wild ones?
Tomas Meijer – Molecular tracking of arctic foxes
Peter Hellström – Ecological effects of red fox removals

- 2006-11-24 Steering Committee meeting for the SEFALO+ project, Stockholm University.
- 2006-12-11 Det årliga fjällrävsmötet för lokala människor och samarbetsgrupper i Enontekiö
[yerly congress for field workers in Enontekiö, Finland]
- 2006-12-12 Det årliga fjällrävsmötet för lokala människor och samarbetsgrupper i Utsjoki
[yerly congress for field workers in Utsjoki, Finland]
- 2007-04-15(-17) Operating group Sweden. Meeting with rangers at the county board of
Jämtland, Västerbotten and Norrbotten. Ammarnäs, Västerbotten.
- 2007-06-17 Operating group Sweden. Workshop for field workers. Helags Fjällstation, Sweden.
Seminars about field methods and ethical aspect by Anders Angerbjörn, Karin Norén
and Peter Hellström.
- 2007-06-30 Meeting with Maria Kjellström (Natures best) and Tomas Meijer, Järpen, Sweden.
- 2007-08-17-(20) Njllaseminaret på Varangerhalvøya 17-19 august 2007, Projekt Fjellrev, Norge.