

Long-term EU funding to support forest reindeer conservation



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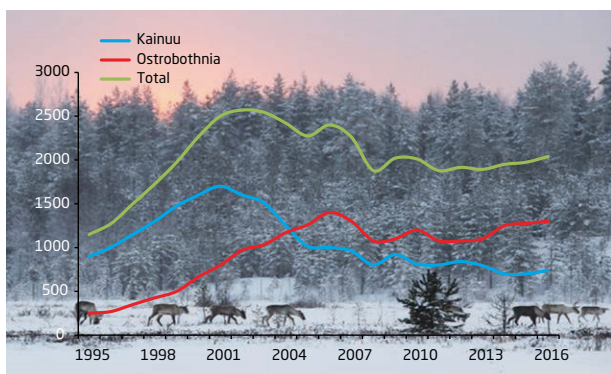
Status of wild population in Finland

Finland is the only EU country with a free-ranging population of forest reindeer. Once common in Fennoscandia, forest reindeer were hunted to extinction in Finland in the early 1900 (*Bisi and Härkönen 2007, Blomqvist 2015*). Today three different sub-populations exist in Finland: in the eastern parts of the country (Kainuu) as a result of natural dispersal from the Russian areas of Karelia after the Second World War; in Ostrobothnia in central Finland (Suomenselkä) originating from individuals successfully translocated from Kainuu 30 years ago; a small splinter population of not more than 30 to 40 heads originating from individuals released from Ähtäri Zoo in 1988-1993.

Currently the species is listed in Annex II of the Habitats Directive and its conservation status was assessed as “unfavourable-inadequate” in the most recent Article 17. In the Finnish 2010 Red Data List, forest reindeer is listed as “Near Threatened” (NT).

Forest reindeer have been carefully monitored by means of aerial counts. The eastern population in Kainuu expanded from 700 animals in 1992 to a peak of 1700 in 2001, while the translocated population in central Finland increased from 160 individuals to 800 over the same period. The annual growth was remarkably high in the 1990s, at ten percent in Kainuu and 20 per cent in central Finland. This positive trend has, however, levelled off, particularly in Kainuu, where the population has actually been falling since 2003 (Figure 1). The decline in Kainuu has continued, and in 2016, no more than 750 reindeer were

Fig 1. Development of wild population of forest reindeer in Finland 1995-2016



found in the region. The species’ current stronghold therefore is in Ostrobothnia, where the latest monitoring counted 1300 animals. The released population in the Ähtäri area has never exceeded 40 individuals, and recent monitoring shows that it has stagnated to a level of 20 to 30 individuals.

Recovery plan

To halt the population decline, reintroductions will be undertaken in two Finnish Natura2000 areas in western Finland, south of the species’ present distribution range. The release sites

Fig 2. Current distribution and planned reintroduction sites for forest reindeer in Finland

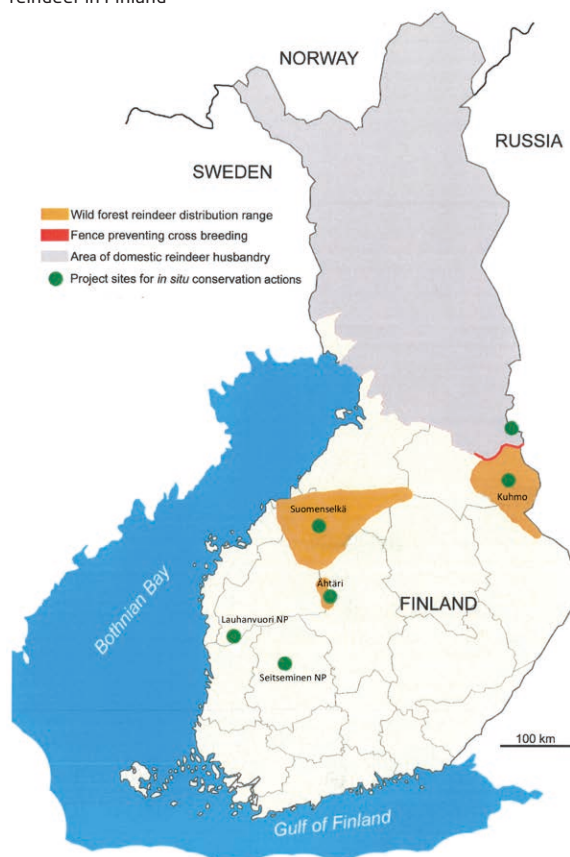
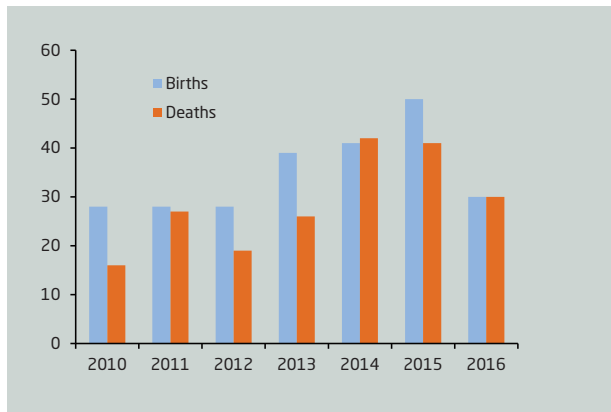


Fig 3. Number of births/deaths 2010-2016

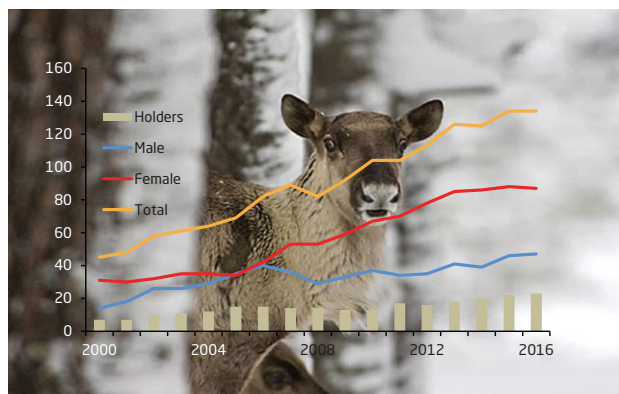


in two national parks, Seitsemien and Lauhanvuori, have been carefully chosen to secure the species' characteristic bi-annual migrations in autumn and spring.

The reintroductions form part of a larger, seven-year EU LIFE project, the costs of which are calculated at €5.16 million. Sixty per cent of this sum will be funded by the EU, while the remaining €1,32 million will be covered mainly by the Ministry of Forestry & Agriculture and the Ministry of Environment in Finland together with the Finnish Hunters' Association and a large number of project partners. Experiences from the reintroductions in the 1970s and 1980s, will be drawn upon.

The two target areas were inhabited by forest reindeer 150 years ago and are situated 60km apart (Figure 2), so it is hoped the reintroduced sub-populations will merge. A breeding pool with 10 to 15 animals of wild origin mixed with captive-born individuals will be established in 15 hectare breeding enclosures in the two Natura2000 sites. Additional restockings with captive-bred individuals will be undertaken in the Ähtäri-Karstula-Soini region to improve the viability of the current population in the area. In the past year, four pairs were transferred from the zoos in Ranua, Helsinki and Nordens Ark to a temporary facility in Ähtäri Zoo. Here they were introduced to five females from

Fig 4. Captive development 2000-2016



Ähtäri's own stock. After breeding, some of the wild-caught individuals will be incorporated into the captive back-up population to improve the gene diversity that has been lost during four decades in captivity.

In addition to the reintroduction and restocking attempts – which without doubt are the most spectacular part of the LIFE project – existing fences and barrier structures built to prevent

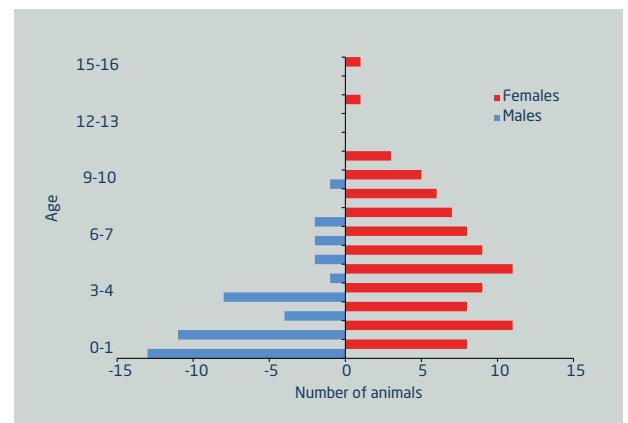
cross-breeding between forest- and semi-domestic reindeer in eastern Finland will be improved. To facilitate field censuses and better understand mortality rates, more than 100 animals will be fitted with GPS collars. Measures to reduce road mortality and poaching will be intensified. In the final phase of the project, the species' Action Plan from 2007 will be updated.

Development of the captive population

Although the number of forest reindeer remained stable in 2016, the total of captive-bred animals has exceeded the number of deceased individuals in recent years (Figure 3), and the captive population has grown at an average rate of five per cent per year. At the close of 2016, it stood at 134 animals (47.87) in 23 European institutions.

Thirty calves (18.11.1) were born during the year, 30 per cent of which did not survive (Table 1). As shown in Figure 3, the number of calves born was significantly lower than in the

Fig 5. Age distribution of captive population 2016



previous year, when the total was 50 (Blomqvist 2016). This was due on breeding failure among three main holders which have usually produced several calves each year. Not all requests for new animals could therefore be fulfilled and some zoos have had to wait until 2017 to receive the animals they are looking for. In addition to the nine (5.3.1) calves that died, the population lost 21 (12.9) sub-adult/adult animals.

Table 1 shows that 22 transfers were made in 2016. One new holder, Slottskogen in Gothenburg, Sweden, joined the programme and received four animals from Nordens Ark (Hunnebostrand), Järvsö and Berne. For 2017, Wuppertal Zoo decided to exchange its semi-domestic reindeer, *Rangifer tarandus sp.*, for *Rangifer t. fennicus* and join the programme. Individuals recommended for transfer in 2017 are shown in Table 2, although additional recommendations will most certainly be made as new situations arise or spaces become available. Two holders, Magdeburg and Opelzoo in Kronberg, keep bachelor herds of forest reindeer and provide a valuable input to the programme by improving the population's skewed sex ratio in favour of females. It is hoped that more participants will follow the example of these two zoos and keep bachelor forest reindeer herds. The development of the *ex situ* population since the beginning of the century is illustrated in Figure 4, with the age distribution of the current population shown in Figure 5.

A veterinary adviser was attached to the programme in 2016 when Sanna Sainmaa from Helsinki Zoo offered her expertise to assist in veterinary aspects. Sanna Sainmaa can be reached directly at: Sanna.Sainmaa@hcl.fi

Table 1. Changes in captive forest reindeer population 2016. New participant marked with*

Participant	1.1.2016	Born	DNS	In	Out	Total deaths	1.1.2017
Ahtari/FIN	6.9	-	-	1.1 Helsinki 0.3 Hunnebostrand	1.0 Helsinki 1.0 Hunnebostrand	-	5.13
Arnhem/NL	1.6	2.1.1	0.0.1	1.0 Kerkrade	1.0 Kerkrade 1.0 Magdeburg	0.1.1	2.6
Berlin Zoo/D	1.5	-	-	-	-	-	1.5
Bern/CH	2.3	-	-	-	1.0 Kronberg		
					0.1 Gothenburg	-	1.2
Gothenburg/S*	-	-	-	0.1 Bern 0.2 Jarvso 1.0 Hunnebostrand	-	-	1.3
Helsinki/FIN	1.5	2.0	-	1.0 Ahtari	1.1 Ahtari	0.1	3.3
Hunnebostrand/S	4.7	1.3	0.1	1.0 Ahtari	0.3 Ahtari		
					1.0 Gothenburg	3.2	2.5
Järvsö/S	2.6	2.2	-	-	0.2 Gothenburg	-	4.6
Kerkrade/NL	1.8	1.2	0.1	1.0 Arnhem	1.0 Arnhem	0.2	2.8
Kerzhensk/RUS	2.2	1.0	-	4.1 Moscow	-	1.1	6.2
Kingussie/UK	0.3	1.0	1.0	-	-	1.1	0.2
Kronberg/D	3.0	-	-	1.0 Bern	-	1.0	3.0
Liberec/CZ	0.2	-	-	1.0 Magdeburg	-	-	1.2
Lycksele/S	3.4	-	-	-	-	2.0	1.4
Magdeburg/D	3.0	-	-	1.0 Arnhem	1.0 Liberec	1.0	2.0
Moscow/RUS	8.6	2.0	1.0	-	4.1 Kerzhensk	1.1	5.4
Pleugueneuc/F	1.3	-	-	-	-	-	1.3
Plock/POL	1.1	-	-	0.1 Prague	-	0.1	1.1
Prague/CZ	1.4	2.1	2.0	-	0.1 Plock	2.0	1.4
Ranua/FIN	2.5	0.1	-	-	-	1.1	1.5
Riga/LAT	2.4	2.1	0.1	-	-	1.1	3.4
Rotterdam/NL	1.3	1.0	1.0	-	-	2.0	0.3
Salzburg/AUT	1.2	1.0	-	-	-	1.0	1.2
Total	46.88	18.11.1	5.3.1	13.9	13.9	17.12.1	47.87
(in 23 institutions)	(134)	(30)	(9)	(22)	(22)	(30)	(134)

Challenges and concerns

Figure 6 shows that the population descends from only eight individuals. Due to variable breeding success among the 4.4 founders, their representation is highly skewed and the genetic diversity is similar to what theoretically could be achieved with three animals randomly caught from the wild ($F_{ge}=3.2$). No potential founders exist in the population. The gene diversity

is 0.84 and the mean inbreeding stands at 0.127 (Table 3). The mean kinship value (MK) in Europe has been increasing slowly from 0.154 in 2011 and stood at 0.156 at the end of the year. A level of close relationship between the animals therefore exists in the population, making it extremely difficult to find unrelated animals for further pairings.

Table 2. Transfer recommendations for 2017

Location	Sex	Stbk#	Born	Dest.
Arnhem	0.1	586	5/12/2016	Wuppertal
Arnhem	0.1	490	5/14/2014	Kingussie
Arnhem	1.0	591	5/22/2016	Kingussie
Järvsö	1.0	565	6/2/2015	Rotterdam
Salzburg	1.0	604	5/30/2016	Kronberg
Kerkrade	1.0	602	5/20/2016	Wuppertal
Prague	0.1	608	5/30/2016	Wuppertal
Kronberg	1.0	557	5/26/2015	Salzburg
Hunnebostrand	0.1	590	5/18/2016	Wuppertal

Fig 6. Founder contribution in ESB population 2016

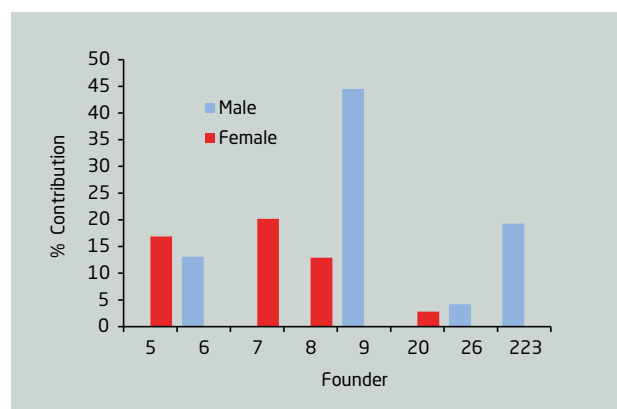


Table 3. Genetic and demographic summary of captive population 2016

	Current	Potential
Number of founders	4.4	-
Number of descendants	47.87	
Gene diversity (GD)	0.8439	0.913
Mean kinship (MK)	0.1561	
Founder genome equivalents (Fge)	3.2	5.75
Mean breeding coefficient (F)	0.127	
Generation length in years (T)	5.72	
Percent population change/year (λ)	1.07	
Population size (N)	134	
Effective population size (Ne)	33.6	
Ne/N	0.25	

Objectives

The main objective of the LIFE project is to improve the conservation status of free-ranging forest reindeer by expanding their distribution westwards via new reintroductions, and to strengthen the small population in the Ähtäri area by restocking with captive bred individuals. Through these efforts, the project

will hopefully also contribute to the implementation of tourism, recreation and hunting policies in the new reintroduction sites. Forest reindeer have already been employed as tourist attractions in areas of high abundance, and it is hoped that planned reintroductions will increase the attractiveness of the Natura2000 sites. Reintroductions are also planned for Sweden and experience from Finland will be useful in developing strategies to expand the range of forest reindeer in taiga zones of Europe. Migrations of wild-caught individuals into the captive stock will improve the quality of the back-up population. EAZA zoos interested in supporting the recovery programme for forest reindeer are asked to contact the ESB keeper for further details.

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