European Studbook for Forest Reindeer, *Rangifer tarandus fennicus*, 2017

Leif Blomqvist

NORDENS ARK

Acknowledgements

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Recovery plans for forest reindeer in the EU and the 2017 status for the species in European zoo collections

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1. Forest reindeer in the EU

Finland is the only EU country with wild populations of forest reindeer, Rangifer tarandus fennicus. Once common in Fennoscandia, the species was hunted to extinction in Finland in early 1900. However, three sub-populations, currently exist in the country: one in the Kainuu area in eastern Finland, where a population has been established after natural dispersal from the Soviet Union following World War II; another in the Suomenselkä region in central Finland, originating from a successful reintroduction using on-site captive breeding by individuals translocated from Kainuu almost 40 years ago *(Blomqvist & Richardson 2012; Blomqvist 2015)*; and a third small population descended from three males and fourteen females released from Ähtäri Zoo in 1988-1995, Figure 1.

The Finnish population has been monitored through aerial censuses at regular intervals. The eastern population in Kainuu expanded from 700 animals in 1992 and peaked at 1.700 heads in 2001, while the reintroduced population in central Finland increased from 160 to 800 individuals over the same period *(Blomqvist 2015)*. After 2003, the steady expansion levelled off at around 1.000 individuals in the Suomenselkä region, in Kainuu the population decreased to the alarming low level of 700 in 2015. However, in the recent censuses, moderate signs of recovery have been observed. The current stronghold of forest reindeer therefore lies in central Finland, where the 2018 winter survey estimated the population at

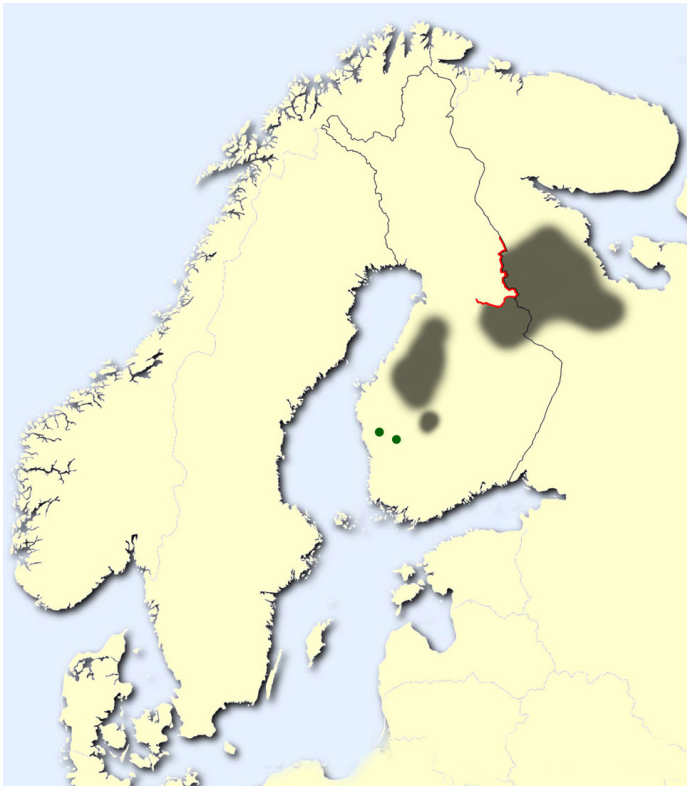


Figure 1. Global distribution of forest reindeer (dark grey). The western occurrence range host 1.500 animals, whereas the sub-population in eastern Finland included 750 heads. The green dots illustrate the two reintroduction sites mentioned in the text and the red line a fence separating wild- and domestic reindeer.

slightly less than 1.500 animals, 18 per cent of which were calves. The 2017 estimates for Kainuu were 750 individuals. The small reintroduced population in the Ähtäri region has never exceeded 40 individuals, and surveys undertaken during the two last years revealed that the sub-population has stagnated at a level of some 20 animals with only two calves observed (Figure 2). The species is listed in Annex II of the Habitat Directive and its conservation status was recently assessed as "unfavourable-inadequate" in Finland. According to the latest IUCN Red List, the species was reassessed in 2015, and globally reindeer were re-categorized as Vulnerable (VU). The Red List does not give a separate threat classification for the different reindeer taxa, but given the forest reindeer's current population and its fluctuations, it is reasonable to consider *fennicus* as Endangered *(Gunn 2016)*.

2. LIFE-project for reintroductions in Finland

To counteract the ongoing decline, additional ex situ breeding facilities and new reintroductions are planned in two Natura 2000 areas in the southwestern parts of Finland. As wolf predation is one of the potential reasons for the species' decline in eastern Finland, reintroductions to the southwestern parts of the country, where predation risks are significantly lower, have been suggested (Ministry of Agriculture and Forestry 2007; Kojola et al 2009).

The selected reintroduction sites are located south of the species' present distribution range, where forest reindeer roamed 200 years ago. Two national parks, Seitseminen and Lauhanvuori, both of which have lower predator densities than eastern Finland and occupy suitable habitats, have been chosen as new reintroduction sites. Seitseminen National Park which was founded in 1982 and expanded to 45 km2 in 1987, is surrounded by large, state-owned forests, and is considered an excellent reintroduction site for forest reindeer. Likewise, the 53 km2 Lauhanvuori National Park was chosen particularly because of its suitable habitat. The national parks are located 60 km apart (Figure 1), and it is hoped that the two reintroduced populations will merge and in the future blend together with the core population in the Suomenselkä region (Blomqvist et al. 2018, in press).

The budget of the LIFE project is 5.16 million €, 60 per cent of which will be funded by the EU. National funding will come from the Ministry of Agriculture and Forestry, the Ministry of the Environment, the Finnish Hunters' Association, plus a number of additional collaborating partners. The reintroduction costs are estimated at one million €, while the main funding is allocated towards habitat restorations, studies on habitat requirements and landscape utilization of the released animals. The project will restore several hundred hectares of drained peatlands to forest reindeer habitat, compile instructions on good practices for the species' habitat management in privately owned commercial forests, update the existing management plan, and assess human-caused disturbances and mortality. Communication concerning the species' conservation and management to the public is considered of prime importance and this is where EAZA zoos can play a central role.

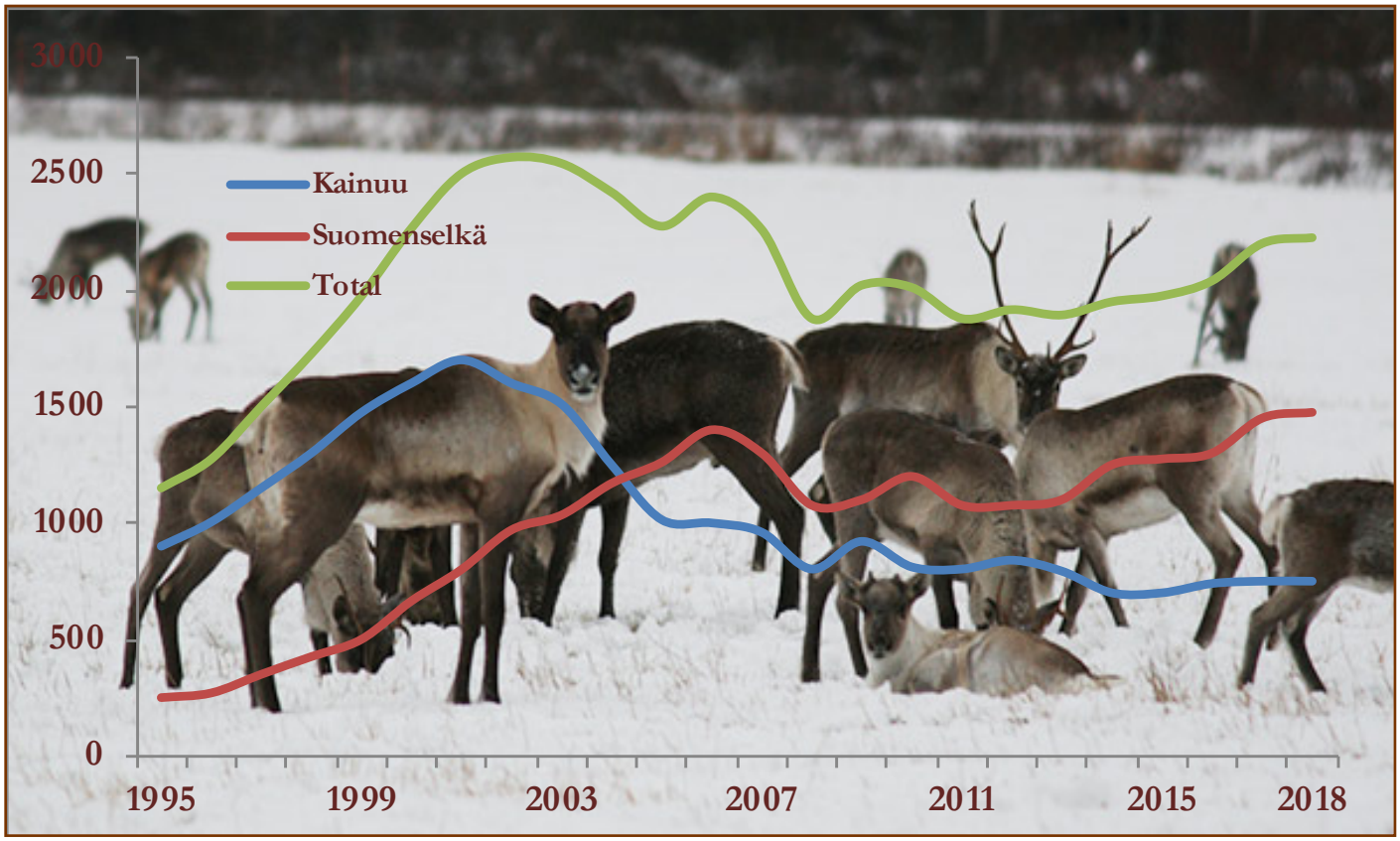


Figure 2. Fluctuations of wild forest reindeer populations in Finland 1995 – 2018

3. *Ex situ* breeding pool established

Two enclosures, 14 and 31 hectares size, were built in the two national parks in 2017 for breeding purposes, and captive-bred animals have been mixed with wild-caught individuals from eastern Finland. During the first rut in late 2017, both enclosures were inhabited by 1.5 animals. Breeding is planned for 2018-2021, with the first offspring releases starting in 2019. Both enclosures are designed to maintain a breeding pool of 10 to 15 heads each. The animals are managed daily, and the enclosure perimeters are equipped with an fence component (Figure 3) to eliminate predatory losses.

The establishment of a breeding pool has been prepared in advance and animals born in captivity have been selected from the European studbook population. To reduce expensive transport and quarantine costs, animals have been selected from four regional EAZA zoos (Ähtäri, Helsinki, Ranua, and Nordens Ark). Ähtäri Zoo has played a significant role, not only by donating animals for the project, but also by acting as a temporary storage location for animals until they are translocated to their final breeding/acclimatization enclosures in the national parks. To facilitate this, a five hectare enclosure with three separate sections was built in Ähtäri in 2017.

In late 2017, 2.1 animals were captured in eastern Finland and incorporated into the ESB-population. Four young females from Nordens Ark and Ranua were transferred to the Seitseminen enclosure together with a wild-caught pair, while the second wild-caught stag was placed at Lauhanvuori where it was accompanied by five captive-bred females and a young male. Notably, three females originating from Nordens Ark had been mated by a captive-born male in Ähtäri prior to their transfer, and the wild-caught female at Seitseminen was most probably pregnant when captured in November. Hence, the breeding enclosures in the national parks are currently inhabited by one male and five females, and two males and five females, respectively (Table 1). All animals except the male calf in Lauhanvuori are of reproductive age.

The project will hopefully provide substantial conservation benefits for the unfavourable population status of forest reindeer in the EU. These reintroduction attempts are intended to contribute to a significant expansion of the present population in the future. The selected reintroduction sites are located in areas previously inhabited by wild forest reindeer, and if conservation attempts are successful, the new areas could serve as future core areas for forest reindeer to disperse from, helping it reclaim its historical range in southwestern Finland.

4. Studbook established for captive forest reindeer in 2001

In 2001, the captive population of forest reindeer was upgraded to an ESB *(Blomqvist 2001)* which had a significant positive impact on the species' future management in captivity. As long as the taxon was maintained in only a few institutions, the captive population had only moderate possibilities for expansion, population growth started to accelerate when the programme was formalised (Figure 4). The goal of the breeding programme is to contribute to the species' conservation by maintaining a demographically robust population that is genetically representative of the species' wild

Figure 3. The two acclimatization/breeding enclosures in the national parks are equipped with a strengthened game fence and chargers to eliminate carnivore losses. Photo: Milla Niemi

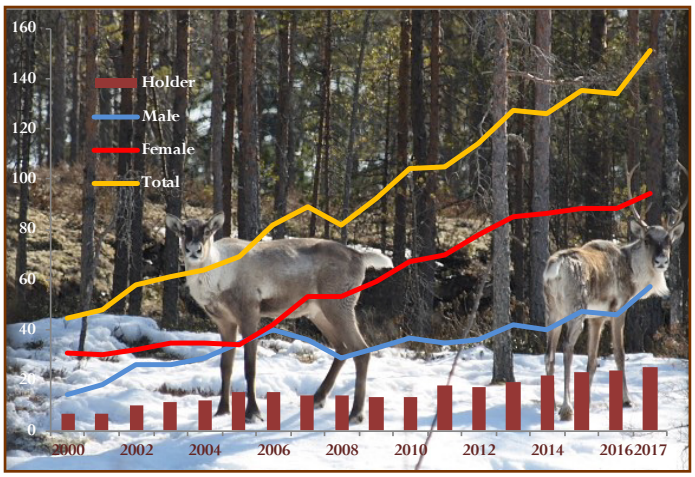


Figure 4. Development of captive population 2000 – 2017

counterparts, and to sustain these characteristics for the future. The captive stock can therefore serve as a backup population to be used to supply individuals for reintroduction programmes, but also indirectly to contribute to forest reindeer conservation through education and raising public awareness regarding the biology and conservation of this unique taxon.

5. Changes in the captive population during 2017

An analysis of the population shows that the population has grown at an annual rate of six per cent after 2010 (Figure 4). As the number of births has increased and mortality has been reduced, the expansion of the captive population can to a significant degree be attributed to improved husbandry and management techniques. Husbandry guidelines for forest reindeer were published by the studbook keeper in 2015 *(Blomqvist 2015)*.

In 2017, the captive stock increased by 17 individuals and stood at 57.94 animals compared to the 47.87 in the previous year (not 47.88 as earlier reported) *(Blomqvist 2017)*. The most significant event in 2017 was the arrival of 2.1 wild-caught animals (Figure 5). As the animals were caught in November, and the rut usually starts in early October *(Kojola 1986)*, the wild-caught hind had most probably been mated prior to captured.

Figure 5. Experts from the Natural Resources Institute Finland, assisted by employees from the zoos in Helsinki and Ähtäri, captured two stags and a female in eastern Finland in November 2017. Photo: Petri Timonen

The wild-caught animals were transferred to the two new enclosures in southwestern Finland where they were mixed with captive-bred animals. Although the majority of the animals maintained in these enclosures will be used for reintroduction, the animals are included in the ESB-population until they are released. As it is intended for some calves born to the new founders to be translocated between the acclimatization enclosures and the rest of the ex situ population, this will significantly improve the ESB stock and prevent further loss of genetic diversity. The current level of relatedness between the living captive animals makes it impossible to establish further fully unrelated pairings. Models have suggested that it is possible to retain fairly high levels of gene diversity even in small populations, if there is the periodic addition of new founders *(Leus et al. 2011)*.

During the year, 39 births (18.20.1) were recorded (Table 1), 23 per cent of which failed to survive before they reached the age of six months. In addition to the calves which failed to survive, five adult/subadult stags and 11 hinds were also lost during 2017. Despite the expansion of the population, the request for females still exceeds their availability, and some zoos have to wait one more year before they can obtain the animals they require. The main reason for these delays is that all females born in key Finnish zoos had been reserved for the ongoing Finnish reintroduction Life-project *(Blomqvist 2016; Blomqvist & Mykrä 2017; Blomqvist 2017)* and transferred to the acclimatization pens in the designated national parks in southwestern Finland. In addition to the three wild-caught animals that were transferred to the new breeding centres, nine males and 12 females were also moved to new locations during the year. At the close of 2017, the captive population numbered 57.94 (151) individuals distributed over 25 European collections (Table 1). The living animals are listed in Section 9 according to the locations where they were housed on 1.1.2018.

The earlier planned establishment of a breeding herd in Wuppertal Zoo *(Blomqvist 2017)* was postponed and no new participants, except the two national parks, joined the breeding programme in 2017. For the forthcoming year, Magdeburg has stated that they will stop keeping forest reindeer whereas Han-sur-Lesse and Augsburg have showed their willingness to establish bachelor herds in 2018.

6. Maintaining gene diversity fundamental for long-term survival in captivity

Genetic diversity (GD) is a prerequisite for all species' evolution and adaptation. Isolated populations, whether they exist in the wild or in captivity, lose part of their GD with each successive generation. As calves have been born and previous generations have passed away, gene diversity has decreased over time. The speed of loss depends partly on the population size, but also on the time that has elapsed *(Gilpin and Soulé 1986)*. Small and isolated populations, as in this programme, lose GD

more rapidly than large ones and inbreeding accumulates faster in small populations. The extent of genetic variation is therefore linked to the number of individuals in the population. Genetic drift is also larger in populations where breeding is restricted to a few individuals as opposed to populations where each individual has a chance to reproduce.

The rate at which inbreeding increases and gene diversity is lost can be illustrated the **effective population size (Ne)**. The smaller the effective population size, the more gene diversity will be lost and so Ne is therefore a measure of the effectiveness of the population's genetic robustness. When dominant stags monopolize breeding of multiple hinds, they will not only create a distortion of the sex ratio, but also a depression of the effective population size. The ratio of the effective population size to the **actual population size (N)** is greatest where the number of reproducing animals is high, the sex ratio of breeding animals is equal, and the life-time family sizes of reproducing animals are equal.

In the wild the ratio of Ne/N is close to 0.1 (*Frankham 1995*). In captivity, however, it is possible to decide which individuals and how many are allowed to breed and with whom. Captive populations therefore have a Ne/N ratio that is larger than in the wild, often ranging from 0.2 to 0.4 (*Mace 1986*). The European studbook database for forest reindeer, maintained in the software SPARKS (2012) and analyzed with the software *Population Management 2000* (*Pollak et al. 2007*), shows Ne/N ratios for three time periods (2000, 2011 and 2017). Table 2 shows that the Ne/N ratio has increased from 0.16 at the turn of the century to 0.30 in 2017, thus falling within the range referred to by Mace (1986). The effective population size of 46 animals, presented in Table 2, represents 30 per cent of the actual population size of 151 animals.

To increase the Ne, as many animals as possible should have the opportunity to breed. Although females represent the main reproductive unit in the population, the genomes of both sexes are equally important. From a conservation perspective, a minority of males participating in breeding is a cause for concern. In species with a harem breeding structure, i.e. only one male mating with multiple females, the establishment of bachelor herds where stags can be temporarily maintained until the are moved into a breeding situation elsewhere is beneficial for the breeding programme. Additional holders are therefore

Participant	Status 1.1.2017	Born	DNS	In	Out	Total Deaths	Status 1.1.2018
Ahtari/FIN	5.13	3.3	1.1	2.0 Helsinki	0.2 Seitseminen 1.5 Lauhanvuori	1.2	8.7
Arnhem/NL	2.6	1.2	1.0	-	1.0 Kingussie	1.0	1.8
Berlin Zoo/D	1.5	-	-	1.0 Hunnebostrand	-	1.0	1.5
Bern/CH	1.2	0.0.1	0.0.1	-		0.1.1	1.1
Gothenburg/S	1.3	-	-	-	-	-	1.3
Helsinki/FIN	3.3	1.2	-	-	2.0 Ahtari	-	2.5
Hunnebostrand/S	2.5	1.1	0.1	-	1.0 Berlin Zoo	0.3	2.3
Jarvso/S	4.6	2.1	-	-	1.0 Rotterdam 0.2 Plock	2.1	3.4
Kerkrade/NL	2.8	1.1	1.0	-	1.0 Liberec	1.1	1.8
Kerzhensk/RUS	6.2	1.0	-	-	-	-	7.2
Kingussie/UK	0.2	-	-	1.0 Arnhem 0.1 Prague	-	0.1	1.2
Kronberg/D	3.0	-	-	1.0 Salzburg	1.0 Salzburg	-	3.0
*Lauhanvuori Nat.Park/FIN**	-	-	-	*1.5 Ahtari* *1.0 wild*	-	-	*2.5*
Liberec/CZ	1.2	-	-	1.0 Kerkrade	-	1.0	1.2
Lycksele/S	1.4	2.2	-	-	-	0.2	3.4
Magdeburg/D	2.0	-	-	-	-	-	2.0
Moscow/RUS	4.5*	1.3	-	-	-	-	5.8
Pleugueneuc/F	1.3	1.1	1.0	-	-	1.0	1.4
Plock/POL	1.1	-	-	0.2 Järvsö	-	-	1.3
Prague/CZ	1.4	2.1	0.1	-	0.1 Kingussie	0.1	3.3
Ranua/FIN	1.5	2.1	-	-	0.2 Seitseminen	-	3.4
Riga/LAT	3.4	0.1	0.1	-	-	1.1	2.4
Rotterdam/NL	0.3	-	-	1.0 Järvsö	-	0.1	1.2
Salzburg/AUT	1.2	0.1	-	1.0 Kronberg	1.0 Kronberg	0.1	1.2
*Seitseminen Nat.Park/FIN**	-	-	-	*0.2 Ahtari* *0.2 Ranua* *1.1 wild*	-	-	*1.5*
Total (in 25 institutions)	46.88** (134)	18.20.1 (39)	4.4.1 (9)	11.13 (24)	9.12 (21)	9.15.1 (25)	57.94 (151)

Table 1. Changes in captive forest reindeer population 2017. New participant marked in yellow.
** Earlier informed as 5.4 ** Earlier informed as 47.87*

	2000	2011	2017	Potential
Population size (N)	45	105	151	
Effective population size (Ne)	7.11	35.74	45.94	
Ne/N	0.16	0.34	0.30	
N of founders	7	8	8	3 (2.1)
Gene diversity (GD)	0.848	0.846	0.845	0.943
Inbreeding (F)	0.156	0.111	0.128	
Annual growth rate (λ)	1.04	1.07	1.08	
Mean kinship (MK)	0.152	0.154	0.155	
Founder genome equivalents (Fge)	3.28	3.24	3.22	8.72

Table 2. Overview of demographic and genetic parameters of ESB population for three time-periods (2000-2011-2017).

encouraged to keep backup groups of stags.

The more founders a population descends from, the greater the prospects are for future generations. Table 3 shows that 20 wild-born animals have entered the captive population, but also that eight of them died without producing any calves. Nine founders have therefore bred although only eight of them have left descendants in the living population (Figure 6). The reason is that studbook # 16, in Ranua, delivered only one calf that never reproduced. The genome of # 16 has therefore been lost from the current stock. The remaining three potential founders are the two males and one female that were recently brought in from the wild and placed in the new, national park-based breeding centres.

Maintaining gene diversity is the prime goal in species conservation. Through the arrival of three potential founders in 2017, simulations with PM2000 indicate that if these animals breed successfully, the gene diversity can theoretically be increased from the current level of 0.84 to 0.94, thus corresponding to the same amount of GD found in nine unrelated wild individuals (Table 2).

The number of founders needed for a programme depends on the purpose of the programme, but in general one can conclude that the more founders, the better. A minimum of 20 founders have been accepted as a reasonable sample size to capture a sufficient amount of the gene diversity of the wild population (*Foose & Ballou 1988; Leus et al. 2011*). As illustrated in Figure 6, the founder contributions among the living descendants is

	Males	Females	Unknown	Total
Total registered	309	322	23	654
Wild-born	9	11	0	20
Captive-born	300	311	23	634
Alive 1.1.2018	57	94	0	151
Wild-born	2	1	0	3
Captive-born	55	93	0	148
Total number breeding animals	62	150	0	212
Wild-born	4	5	0	9
Captive-born	58	145	0	203
Breeding animals alive 1.1.2018	15	49	0	64
Wild-born	0	0	0	0
Captive-born	15	49	0	64

Table 3. Extracted data from studbook 1.1.2018.

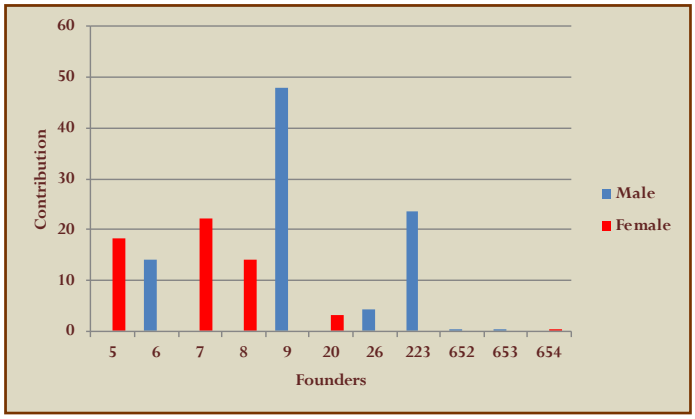


Figure 6. Founder contribution in ex situ population 2017

currently uneven with two founders (stbk. # 20 & stbk. # 26) only marginally contributing to the gene pool of the living descendants. For that reason, quite a few more than 20 founders might be necessary to capture and maintain a sufficient amount of GD. Based on the positive influence the new potential founders would have on the gene composition of the current population, provided that they breed, one can conclude that periodic supplementation of wild-born individuals quickly improves the genetic composition and prevents loss of gene diversity (*Lees & Wilcken 2013*).

7. Challenges for the breeding programme

Because of random genetic processes, 16 per cent of the gene diversity has been lost during the decades that the species has been maintained in captivity. Today's population of 151 animals displays the same amount of gene diversity one finds in only three randomly caught individuals from the wild. Another important parameter determined by the genetic analyses of the population, is the average **inbreeding coefficient** (**F**). Although the level of inbreeding has decreased from 0.16 to 0.13 since 2000, the **mean kinship** value (**MK**) has increased from 0.152 to 0.155 during the same period (Table 2). The close relationship between the living animals makes it impossible to establish unrelated animals for further pairings. Incorporation of a small number of wild-caught animals on a regular basis and breeding recommendations based on the principle of minimizing MK, combined with limited inbreeding, is hoped to keep GD at an acceptable level in the future. Focus should be set on breeding the new potential founders and disperse their progeny as effectively as possible into the existing ex situ population.

Table 3 shows that an equal number of males and females have been born (300 males:311 females), but also that the number of reproducing hinds has been 142 per cent greater than the number of stags participating in breeding. Among the living animals, 15 males have sired offspring while the number of females that have delivered calves is 49. Captive populations of polygamous species, where a dominant male controls the breeding, often exhibit a distorted sex distribution. Figure 7 shows that the sex ratio in the current population is one male to 1.6 females. Such a biased sex ratio in favour of females is far from unique for forest reindeer but can be found in most captive populations of polygamous species where dominant

males prevent the majority of males from mounting the hinds (*Kleiman 1980*). In the vast majority of zoos, only one adult stag can be kept in a breeding herd and a surplus of males therefore arises. It is important to realise that a surplus number of males is merely a product of the inherently limited available space within a captive programme and not necessarily an indicator of genetic importance. In the wild, forest reindeer stags constantly have to compete for their position of harem masters during the rut. Although the dominant male is likely to do the majority of matings during a couple of years, sub-ordinate stags may also reach the status of harem masters at the end of the rut when the dominant stag is exhausted. We know that in many harem species, "sneaky" matings can occur at the periphery of the harem master's territory. These situations seldom occur in captive herds as the enclosure sizes generally do not allow for more than one fully mature male to peacefully co-exist.

The main objective of the reintroduction plan is to improve the species' conservation status both in situ and ex situ and to expand its current distribution westwards through reintroductions and natural dispersal. The reintroduced Suomenselkä sub-population in central Finland has already been utilized as a tourist attraction and the ongoing project will hopefully contribute positively to tourism, recreation and hunting policies in the two national parks. As progeny of the wild-caught animals will be incorporated into the studbook population, the project offers participating EAZA zoos a unique opportunity to diversify the genome of the ESB-population and concurrently ensure that future reintroductions of forest reindeer remain possible. The LIFE project will consequently trigger a multitude of actions that will enhance the wild forest reindeer population in Finland.

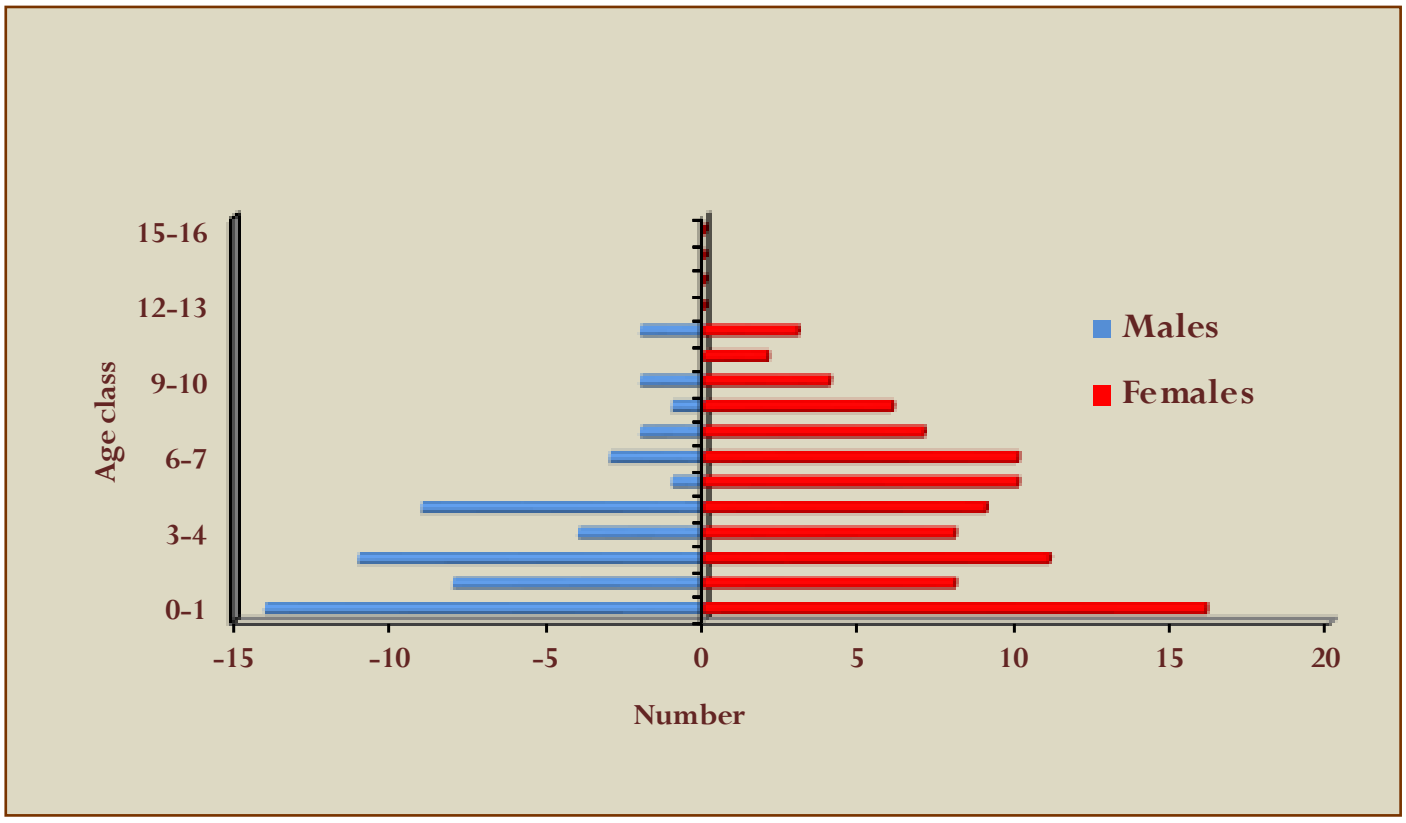


Figure 7. Age/sex distribution in captive population 2017

8. References

Blomqvist, L. (2001): Forest reindeer – e new European studbook (ESB) species. Helsinki Zoo Ann. Rep. 2000: 42-51. Helsinki Zoo

Blomqvist, L. & D. M. Richardson (2012): The forest reindeer: A success story of a large herbivore in Europe. European studbook for forest reindeer, *Rangifer tarandus fennicus*, 2011. pp. 3-7. Nordens Ark Foundation

Blomqvist, L. (2015): EAZA Husbandry guidelines for Eurasian forest reindeer, *Rangifer t. fennicus*, Lönnb. 1909 and the 2014 European studbook (ESB). 59 pp. Nordens Ark Foundation

Blomqvist, L. (2016): Forest reindeer report 2015. Nordens Ark Ann. Rep. 2015: 20-22. Nordens Ark Found.

Blomqvist, L. & S. Mykrä (2017): Reindeer recovery. Zooquaria 96: 20-21

Blomqvist, L. (2017): Long-term EU funding to support forest reindeer conservation. EAZA Deer TAG Webpage

Blomqvist, L., S. Mykrä and M. Niemi (2018): LIFE-project for wild forest reindeer reintroductions in Finland (in press)

Foose, T. J., J. D. Ballou (1998): Population management: theory and practices. Int. Zoo Yearb. 27: 26-41

Frankham, R. (1995): Effective population size/ adult population size ration in wildlife: A review. Genet. Res. 66: 95-107

Gilpin, M. E., M. E. Soulé (1986): Minimum viable populations: processes of species extinction. pp. 19-34. In: M. E. Soulé (Ed.) Conservation biology: the science of scarcity and diversity. Sinauer Assoc., Sunderland, MA, USA

Gunn, A. (2016): Rangifer tarandus. The IUCN Red List of Threatened Species 2016: e.T29742A22167140. http://dx.doi.org/10.2305/IUCN.UK.2016-1.RLTS.T29742A22167140.en. Downloaded on 23 May 2018.

Kleiman, D. G. (1980): Thee sociobiology of captive propagation. In: Conservation Biology. An evolutionary-ecological perspective. pp. 243-261. M. E. Soulé and B. A. Wilcox (Eds.). Sinauer Assoc. Inc.

Kojola, I. (1986): Rutting behavior in an enclosed group of wild forest reindeer (Rangifer tarandus fennicus Lönnb). Rangifer 1: 173-179.

Kojola, I., J. Tuomivaara, S. Heikkinen, K. Heikura, K. Kilpeläinen, J. Keränen, A. Paasivaari & V. Ruusila (2009): European wild forest reindeer and wolves: endangered prey and predators. Ann. Zool. Fennici 46:416-422

Lees, C. M. & J. Wilcken (2013): Global programmes for sustainability. WAZA Magazine 12: 2-5

Leus, K., L. Bingaman Lackey, W. van Lint, D. de Man, S. Riewals, A. Veldkam, J. Wijmans (2011): Sustaiability of European Association of Zoos and Aquaria Bird and Mammal Populations. WAZA Magazine 12: 11-14

Mace, G. M. (1986): Genetic management of small populations. Int. Zoo Yearb. 24/25: 167-174

Ministry of Agriculture and Forestry (2007): Management plan for wild forest reindeer population in Finland. 77. pp. http://julkaisut.valtioneuvosto.fi/handle/10024/80554

Pollak, J. P., R. C. Lacy, J- D. Ballou (2007): Population Management 2000, version 1.213. Chicago Zool. Soc., Brookfield, IL., USA

SPARKS (2012): Singe Population Animal Record Keeping System Software. Version 1.65. International Species Inventory System. Eagan, MN., USA

9. Living forest reindeer population 1.1. 2018 per location. Changes taking place after 1.1.2018 marked in red.

Stud#	Sex	Birth Date	Sire	Dam	Location	Date	LocalID	Event	Tag/Band	Name	Transponder
AHTARI - Zoo Ahtari, Ähtari, Finland											
375	F	13 May 2010	266	261	JARVZOO	13 May 2010	JZM10010	Birth		GLENDA	968000004326763
					AHTARI	16 Apr 2013	213005	Transfer			
439	F	19 May 2012	266	280	JARVZOO	19 May 2012	JZM12006	Birth	29	GERSTIN	968000004325683
					AHTARI	16 Apr 2013	213003	Transfer			
440	F	20 May 2012	266	375	JARVZOO	20 May 2012	JZM12007	Birth	26	GRETA	968000004320483
					AHTARI	16 Apr 2013	213004	Transfer			
479	F	20 May 2013	266	375	AHTARI	20 May 2013	213016	Birth	0107	LENITA	985170002270017
480	M	26 May 2013	389	172	RANUA	26 May 2013	213008	Birth	GREEN 003	MAGNUS	978101081198891
					AHTARI	8 Oct 2015	215068	Transfer			
482	M	3 Jun 2013	389	418	RANUA	3 Jun 2013	213013	Birth	WHITE 006	TOFFO	978101081198865
					AHTARI	8 Oct 2015	215065	Transfer			
494	M	19 May 2014	389	418	RANUA	19 May 2014	214022	Birth	BLUE 005	MOKKE	978101081157058
					AHTARI	8 Oct 2015	215066	Transfer			
505	F	13 May 2014	223	375	AHTARI	13 May 2014	214028	Birth	BLUE 385	FLOORA	
524	M	29 May 2014	389	227	RANUA	29 May 2014	214025	Birth	PURPLE 007	MIKKI	978101198852
					AHTARI	8 Oct 2015	215067	Transfer			
559	M	27 May 2015	270	458	HELSINKI	27 May 2015	215029	Birth		HAVU	
					AHTARI	31 Oct 2016	216059	Transfer			
585	M	16 May 2016	270	369	HELSINKI	16 May 2016	216040	Birth	Blue	ILMARI	934000011107143
					AHTARI	30 Oct 2017	217039	Transfer			
600	M	24 May 2016	270	458	HELSINKI	24 May 2016	216043	Birth	GREEN	IIVARI	934000011107147
					AHTARI	30 Oct 2017	217038	Transfer			
614	M	15 May 2017	482	479	AHTARI	15 May 2017	217010	Birth	Red474	JUHA	
629	F	19 May 2017	482	505	AHTARI	19 May 2017	217015	Birth	Red 464	PIPSA	
631	F	21 May 2017	482	440	AHTARI	21 May 2017	217017	Birth	White	MONA	
Totals: 8.7.0 (15)											
ARNHEM - Burgers' Zoo, Arnhem, Gelderland, The Netherlands											
337	M	17 May 2009	223	235	AHTARI	17 May 2009	209006	Birth	258 BLACK	JOHAN	985170002298737
					KERKRADE	5 Nov 2013	M09200	Transfer			
					ARNHEM	14 Dec 2016	7382	Transfer			
397	F	17 May 2011	330	307	HUNBSTRND	17 May 2011	211039	Birth	D.BLUE/D.BLU	MIRKA	977200007675453
					ARNHEM	13 Apr 2012	616968	Transfer			
407	F	22 May 2011	176	179	ARNHEM	22 May 2011	616407	Birth			0007023863
430	F	11 May 2012	176	198	ARNHEM	11 May 2012	617027	Birth	Light pink		00071AFBB4
490	F	14 May 2014	408	397	ARNHEM	14 May 2014	2313	Birth	Orange		5280934900326
562	F	31 May 2015	408	198	ARNHEM	31 May 2015	6531	Birth	Orange		528257000003282
586	F	12 May 2016	408	430	ARNHEM	12 May 2016	7056	Birth	PURPLE		52825700004186
					BERN	4 Jan 2018	B80001	Transfer			
632	F	20 May 2017	408	397	ARNHEM	20 May 2017	7571	Birth	Yellow		528257000032396
					BERN	4 Jan 2018	B80002	Transfer			
633	F	21 May 2017	408	430	ARNHEM	21 May 2017	7572	Birth			528257000036206
Totals: 1.8.0 (9)											

BERLINZOO - Zoologischer Garten Berlin Ag, Berlin, Germany

314	M	7 May 2008	176	198	ARNHEM	7 May 2008	614626	Birth		RINUS	000680B219
					KERKRADE	12 Mar 2009	M08017	Transfer			
					ROTTERDAM	9 Feb 2010	107965	Transfer			
					MAGDEBURG	20 Oct 2011	443023	Transfer			
					BERLINZOO	7 Feb 2013	M0800020	Transfer			
322	F	16 May 2008	219	115	RIGA	16 May 2008	M08137	Birth		RAGNA	428098100000223
					BERLIN TP	26 Feb 2010	_____	Transfer			
					BERLINZOO	24 Mar 2010	M0800019	Transfer			
343	F	16 May 2009	219	220	RIGA	16 May 2009	M09070	Birth			428098100000125
					BERLIN TP	26 Feb 2010	_____	Transfer			
					BERLINZOO	24 Mar 2010	M0900027	Transfer			
393	F	12 Jun 2010	176	315	BERLINZOO	12 Jun 2010	M1000015	Birth			0006B2B584
422	F	31 May 2011	355	322	BERLINZOO	31 May 2011	M1100025	Birth			0006B2FEB2
425	F	11 May 2012	355	343	BERLINZOO	11 May 2012	M1200027	Birth			0006B25C24

Totals: 1.5.0 (6)

BERN - Tierpark Dählhölzli, Bern, Switzerland

264	F	28 May 2006	137	120	HELSINKI	28 May 2006	206043	Birth	LIGHT BLUE 9YYLI		968000004143265
					BERN	22 Mar 2007	A70029	Transfer			
311	M	8 Jun 2008	270	200	HELSINKI	8 Jun 2008	208039	Birth	PINK 193	AHTI	968000000397344
					BERN	16 Nov 2009	A90261	Transfer			

Totals: 1.1.0 (2)

HELSINKI - Helsinki Zoo, Helsinki, Finland

369	F	15 May 2010	270	173	HELSINKI	15 May 2010	210012	Birth	GREEN 274/BLCLIO		956000001737456
458	F	20 May 2013	219	220	RIGA	20 May 2013	M13092	Birth	YELLOW	KRUSA	98570002681727
					HELSINKI	25 Feb 2014	214001	Transfer			
485	F	3 Jun 2013	270	288	HELSINKI	3 Jun 2013	213044	Birth	WHITE	FINKA	956000008419397
567	M	15 May 2015	223	479	AHTARI	15 May 2015	215031	Birth	WHITE 170	MAXI	9851110057860
					HELSINKI	27 Oct 2016	216101	Transfer			
636	F	7 Jun 2017	567	458	HELSINKI	7 Jun 2017	217040	Birth	Red	JOIKU	934000011107127
637	M	8 Jun 2017	567	485	HELSINKI	8 Jun 2017	217041	Birth	Black	JAKALA	934000011107155
640	F	12 Jun 2017	567	369	HELSINKI	12 Jun 2017	217049	Birth	PINK	JUOLUKKA	943000011107122

Totals: 2.5.0 (7)

HUNBSTRND - Nordens Ark, Hunnebostrand, Sweden

307	F	19 May 2008	116	157	HUNBSTRND	19 May 2008	208031	Birth	VIOLET/VIOLERAJA		977200007078792
						21 Feb 2018		Death			
373	F	26 May 2010	116	145	HUNBSTRND	26 May 2010	210031	Birth		IRMA	977200007465015
571	M	15 May 2015	223	440	AHTARI	15 May 2015	215032	Birth	BLUE 309	ALVAR	985111001057859
					HUNBSTRND	28 Oct 2016	216181	Transfer			
599	F	23 May 2016	330	373	HUNBSTRND	23 May 2016	216054	Birth	WHITE	PYRY	968000010165467
646	M	22 Jun 2017	571	307	HUNBSTRND	22 Jun 2017	217135	Birth	Yellow	PAKKILA	752098100816663
					LYCKSELE	23 Apr 2018	LRTS1705	Transfer			

Totals: 2.3.0 (5)

JARVZOO - Jarvzoo, Jarvsö, Gävleborg, Sweden

261	F	24 May 2006	168	157	HUNBSTRND	24 May 2006	206018	Birth	GREEN/GREEN	MIKAELA	977200004210694
					JARVZOO	14 May 2007	JZM07031	Transfer			
266	M	2 Jun 2006	207	204	BORAS	2 Jun 2006	HR0023	Birth		CIRIUS	968000000272488
					JARVZOO	23 Jan 2008	JZM08004	Transfer			
350	F	15 Jun 2009	240	279	LYCKSELE	15 Jun 2009	LRTS0902	Birth		FLORA	968000004367726
					JARVZOO	22 Nov 2011	JZM11029	Transfer			
420	F	20 May 2011	240	279	LYCKSELE	20 May 2011	LRTS1103	Birth		HILDUR	968000003399786
					JARVZOO	22 Nov 2011	JZM11028	Transfer			
617	F	18 May 2017	266	261	JARVZOO	18 May 2017	JZM17011	Birth			968000010595938
					HUNBSTRND	24 Apr 2018	218034	Transfer			
621	M	22 May 2017	266	420	JARVZOO	22 May 2017	JZM17012	Birth			968000010584210
					HANSURLES	19 Apr 2018	GR134	Transfer			
622	M	24 May 2017	266	350	JARVZOO	24 May 2017	JZM17013	Birth			968000010592436
					HANSURLES	19 Apr 2018	GR135	Transfer			

Totals: 3.4.0 (7)

KERKRADE - GaiaZOO Kerkrade, Kerkrade, Limburg, The Netherlands

267	F	22 May 2006	223	101	AHTARI	22 May 2006	206010	Birth	213 GREEN	JASSU	985120028553783
					KERKRADE	20 Apr 2007	M06024	Transfer			
317	F	23 May 2008	184	206	KERKRADE	23 May 2008	M08037	Birth	BROWN/BLACK	GAIA 9	0006B8A44E
367	F	25 May 2009	184	267	KERKRADE	25 May 2009	M09058	Birth	BROWN 020	GAIA 16	0006C92CB6
408	M	29 May 2011	311	264	BERN	29 May 2011	B10069	Birth		BILLY	756098100543212
					ARNHEM	20 Sep 2012	617259	Transfer			
					KERKRADE	14 Dec 2016	M11754	Transfer			
569	F	5 Jun 2015	337	267	KERKRADE	5 Jun 2015	M15122	Birth	RED 038		528257000009127
570	F	7 Jun 2015	337	206	KERKRADE	7 Jun 2015	M15123	Birth	GREEN 002		528257000009128
579	F	16 Jun 2015	337	367	KERKRADE	16 Jun 2015	M15160	Birth	WHITE 013	GAIA 31	529257000009158
605	F	30 May 2016	337	267	KERKRADE	30 May 2016	M16249	Birth	BLUE 052	GAIA 37	
639	F	3 Jun 2017	337	367	KERKRADE	3 Jun 2017	M17221	Birth		Gaia 38	528257000028958

Totals: 1.8.0 (9)

KERZHENSK - Zapovednik Kerzhensky, Nizhny Novgorod, Russia

462	F	19 May 2013	381	390	MOSCOW	19 May 2013	130110	Birth		LENA	
					KERZHENSK	4 Dec 2014	462	Transfer			
464	M	20 May 2013	380	387	MOSCOW	20 May 2013	130112	Birth	135	IGNAT	
					KERZHENSK	25 Dec 2014	464	Transfer			
518	M	19 May 2014	381	390	MOSCOW	19 May 2014	140162	Birth			
					KERZHENSK	4 Dec 2014	518	Transfer			
521	F	28 May 2014	380	354	MOSCOW	28 May 2014	140238	Birth		LUSYA	
					KERZHENSK	4 Dec 2014	521	Transfer			
540	M	12 May 2015	381	325	MOSCOW	12 May 2015	150195	Birth			
					KERZHENSK	17 Mar 2016	540	Transfer			
543	M	17 May 2015	380	339	MOSCOW	17 May 2015	150207	Birth			
					KERZHENSK	17 Mar 2016	543	Transfer			
564	M	2 Jun 2015	381	338	MOSCOW	2 Jun 2015	150253	Birth			
					KERZHENSK	17 Mar 2016	564	Transfer			
612	M	14 Jun 2016	464	462	KERZHENSK	14 Jun 2016	ZINOVIY	Birth		ZINOVIY	
641	M	10 Jun 2017	518	521	KERZHENSK	10 Jun 2017	17101-10	Birth		TOSHA	

Totals: 7.2.0 (9)

KINGUSSIE - Highland Wildlife Park, Kingussie, Highland, Scotland (UK)

469	F	24 May 2013	330	373	HUNBSTRND	24 May 2013	213041	Birth	Orange	SAHTI	968000010082569
					KINGUSSIE	8 May 2014	5759	Transfer			
591	M	22 May 2016	408	397	ARNHEM	22 May 2016	7055	Birth	WHITE		528257000004181
					KINGUSSIE	24 Oct 2017	6058	Transfer			
608	F	30 May 2016	401	431	PRAHA	30 May 2016	160161	Birth			
					KINGUSSIE	23 Oct 2017	6057	Transfer			

Totals: 1.2.0 (3)

KRONBERG - Opel-Zoo Von Opel Hessische Zoostiftung, Kronberg, Germany

459	M	4 Jun 2013	219	298	RIGA	4 Jun 2013	M13096	Birth		LIETUTINS	98511000344060
					KRONBERG	26 Oct 2015	LIETUTIN	Transfer			
544	M	19 May 2015	311	284	BERN	19 May 2015	B50088	Birth			7560981006969824
					KRONBERG	21 Apr 2016	544	Transfer			
604	M	30 May 2016	506	416	SALZBURG	30 May 2016	S2275	Birth			040094501003862
					KRONBERG	14 Feb 2017	3059	Transfer			

Totals: 3.0.0 (3)

LAUHANVUO - Lauhanvuori National Park, Isojoki, Finland

388	F	13 May 2010	223	101	AHTARI	13 May 2010	210005	Birth	WHITE 189	JADE	985121018050353
					LAUHANVUO	1 Nov 2017	189	Transfer			
403	F	19 May 2011	223	235	AHTARI	19 May 2011	211001	Birth	WHITE 186	ELVIIRA	
					LAUHANVUO	1 Nov 2017	186	Transfer			
492	F	16 May 2014	330	259	HUNBSTRND	16 May 2014	214015	Birth	WHITE	JETZIN	968000010174269
					AHTARI	4 Oct 2016	216052	Transfer			
					LAUHANVUO	28 Nov 2017	WHITE	Transfer			
530	F	22 May 2012	223	253	AHTARI	22 May 2012	212004	Birth	328	JAFFA	
					LAUHANVUO	1 Nov 2017	328	Transfer			
558	F	21 May 2015	270	485	HELSINKI	21 May 2015	215028	Birth	Pink	HILLA	934000007103
					AHTARI	31 Oct 2016	216060	Transfer			
					LAUHANVUO	1 Nov 2017	PINK	Transfer			
638	M	6 Jun 2017	482	558	AHTARI	6 Jun 2017	217020	Birth	Violet 561	PATE	
					LAUHANVUO	1 Nov 2017	561	Transfer			
653	M	~ 2013	WILD	WILD	FINLAND	7 Nov 2017	NONE	Capture	Yellow BB		978101081038795
					LAUHANVUO	8 Nov 2017	YELLOWBB	Transfer			

Totals: 2.5.0 (7)

LIBEREC - Zoologicka Zahrada Liberec, Liberec, Severocesky, Czech Republic

426	F	12 May 2012	330	259	HUNBSTRND	12 May 2012	212032	Birth	ROSA/ROSA	YKSI	977200008167014
					LIBEREC	10 May 2013	665001	Transfer			
428	F	14 May 2012	330	307	HUNBSTRND	14 May 2012	212035	Birth	WHITE/WHITE	KAKSI	977200008167119
					LIBEREC	10 May 2013	665002	Transfer			
602	M	28 May 2016	337	367	KERKRADE	28 May 2016	M16234	Birth	BROWN	TEEMU	528257000004301
					LIBEREC	28 Sep 2017	665007	Transfer			

Totals: 1.2.0 (3)

LYCKSELE - Lycksele Djurpark, Lycksele, Sweden

278	F	15 May 2007	116	157	HUNBSTRND	15 May 2007	207020	Birth	GREEN/GREEN	RANJA	977200004321311
					LYCKSELE	5 Feb 2008	LRTS0701	Transfer			
374	F	17 May 2010	240	278	LYCKSELE	17 May 2010	LRTS1001	Birth		RITA	968000003432874
560	M	30 May 2015	266	261	JARVZOO	30 May 2015	JZM15030	Birth	Blue	VIKING	968000010110947
					LYCKSELE	22 Sep 2015	LRTS1505	Transfer			
						18 Apr 2018		Death			
648	M	29 May 2017	560	349	LYCKSELE	29 May 2017	LRTS1701	Birth		ESTERKALV	
						18 Apr 2018		Death			
649	M	5 Jun 2017	560	278	LYCKSELE	5 Jun 2017	LRTS1702	Birth		RANJAKALV	
						18 Apr 2018		Death			
650	F	7 Jun 2017	560	279	LYCKSELE	7 Jun 2017	LRTS1704	Birth		MIESSI	
651	F	8 Jun 2017	560	374	LYCKSELE	8 Jun 2017	LRTS1703	Birth		RITAKALV	
						18 Apr 2018		Death			

Totals: 3.4.0 (7)

MAGDEBURG - Zoologischer Garten Magdeburg, Magdeburg, Germany

273	M	12 Jun 2006	187	179	ARNHEM	12 Jun 2006	613306	Birth			0006654F2D
					ROTTERDAM	1 Feb 2007	107592	Transfer			
					MAGDEBURG	20 Oct 2011	443022	Transfer			
611	M	12 Jun 2016	408	407	ARNHEM	12 Jun 2016	7076	Birth	YELLOW		528257000004171
					MAGDEBURG	30 Nov 2016	443025	Transfer			

Totals: 2.0.0 (2)

MOSCOW - Moscow Zoological Park, Moscow, Russia

325	F	15 May 2008	223	101	AHTARI	15 May 2008	208008	Birth	WHITE 184	REBEKKA	985121005406388
					MOSCOW	16 Dec 2011	110669	Transfer			
338	F	19 May 2009	223	253	AHTARI	19 May 2009	209007	Birth	LILIAC 547	NEELA	
					MOSCOW	16 Dec 2011	110671	Transfer			
354	F	14 Aug 2009	270	200	HELSINKI	14 Aug 2009	209063	Birth	PINK	BAJAJAGA	956000001838283
					MOSCOW	16 Dec 2011	110664	Transfer			
381	M	14 May 2010	219	115	RIGA	14 May 2010	M10149	Birth		RANTANS	972270000005576
					MOSCOW	20 Apr 2011	110183	Transfer			
392	F	26 May 2010	228	172	RANUA	26 May 2010	210026	Birth	GREEN 10	MANJA	985170000342098
					MOSCOW	16 Dec 2011	110667	Transfer			
461	M	19 May 2013	380	354	MOSCOW	19 May 2013	130109	Birth	132		
463	M	20 May 2013	381	325	MOSCOW	20 May 2013	130111	Birth			
466	M	5 Jun 2013	381	339	MOSCOW	5 Jun 2013	130260	Birth			
588	F	16 May 2016	381	392	MOSCOW	16 May 2016	160176	Birth			
624	F	20 May 2017	381	325	MOSCOW	20 May 2017	170889	Birth			
625	M	22 May 2017	381	354	MOSCOW	22 May 2017	170890	Birth			
626	F	24 May 2017	381	338	MOSCOW	24 May 2017	170891	Birth			
627	F	26 May 2017	381	392	MOSCOW	26 May 2017	170892	Birth			

Totals: 5.8.0 (13)

PLEUGUEN - Parc Zoologique De La Bourbansais, Pleugueneuc, Ille-et-Vilaine, France

452	F	9 May 2013	355	343	BERLINZOO	9 May 2013	M1300031	Birth			00074-EF37B
					PLEUGUEN	24 Mar 2014	CR3	Transfer			
454	M	16 May 2013	330	259	HUNBSTRND	16 May 2013	213019	Birth	WHITE	KOFF	968000010080420
					PLEUGUEN	25 Apr 2014	CR4	Transfer			

456	F	24 May 2013	311	284	BERN	24 May 2013	B30052	Birth			756098100629617
					PLEUGUEN	24 Mar 2014	CR1	Transfer			
457	F	24 May 2013	311	264	BERN	24 May 2013	B30053	Birth			756098100631100
					PLEUGUEN	24 Mar 2014	CR2	Transfer			
643	F	22 May 2017	454	457	PLEUGUEN	22 May 2017	CR5	Birth			955000004050807
						7 Apr 2018		Death			

Totals: 1.4.0 (5)

PLOCK - Miejski Ogrod Zoologiczny Plock, Plock, Poland

532	M	28 May 2014	187	341	ROTTERDAM	28 May 2014	Z14215	Birth		FEREK	528046000025976
					PLOCK	21 Oct 2015	A20537	Transfer			
547	F	19 May 2015	401	446	PRAHA	19 May 2015	150148	Birth			900032001749463
					PLOCK	22 Mar 2016	A20565	Transfer			
593	F	24 May 2016	266	158	JARVZOO	24 May 2016	JZM16007	Birth		MINA	968000010592607
					PLOCK	22 Nov 2017	A20644	Transfer			
595	F	26 May 2016	266	420	JARVZOO	26 May 2016	JZM16008	Birth		MEDINA	968000010592830
					PLOCK	22 Nov 2017	A20645	Transfer			

Totals: 1.3.0 (4)

PRAHA - The Prague Zoological Garden, Praha, Czech Republic

401	M	19 May 2011	219	298	RIGA	19 May 2011	M11060	Birth		LORDS	985170000942082
					PRAHA	28 Oct 2013	130427	Transfer			
431	F	17 May 2012	311	284	BERN	17 May 2012	B20077	Birth			7560998100562596
					PRAHA	9 Oct 2013	130383	Transfer			
446	F	27 May 2012	270	288	HELSINKI	27 May 2012	212016	Birth	Pink	ELOVEENA	956000008385445
					PRAHA	28 Oct 2013	130428	Transfer			
447	F	10 May 2012	316	317	KERKRADE	10 May 2012	M12019	Birth	PINK 001	GAIA 19	528093490007253
					PRAHA	6 Nov 2013	130451	Transfer			
616	M	18 May 2017	401	447	PRAHA	18 May 2017	170156	Birth			
					HANSURLES	9 May 2018	GR318	Transfer			
623	M	25 May 2017	401	431	PRAHA	25 May 2017	170157	Birth			
					HANSURLES	9 May 2018	GR317	Transfer			

Totals: 3.3.0 (6)

RANUA - Ranua Wildlife Park, Ranua, Finland

389	M	16 May 2010	223	237	AHTARI	16 May 2010	210007	Birth	BLUE 336	JOKKE	985121018247575
					RANUA	20 Nov 2011	211058	Transfer			
418	F	23 Jun 2011	270	200	HELSINKI	23 Jun 2011	211052	Birth	RED	DIMMA	956000001734688
					RANUA	16 Nov 2012	212061	Transfer			
489	F	1 Jun 2013	413	374	LYCKSELE	1 Jun 2013	LRTS1301	Birth	SE039435-001	MAJBRITT	968000003414806
					RANUA	30 Apr 2015	215005	Transfer			
527	F	16 May 2014	413	349	LYCKSELE	16 May 2014	LRTS1401	Birth	SE0394350013	CAROLA	968000003468955
					RANUA	30 Apr 2015	215006	Transfer			
618	F	20 May 2017	389	527	RANUA	20 May 2017	217012	Birth	Light blue 0	CARLA	
619	M	21 May 2017	389	489	RANUA	21 May 2017	217013	Birth	Green 020	MASA	
645	M	20 Jun 2017	389	418	RANUA	20 Jun 2017	217037	Birth	Grey 001	DUOMAS	

Totals: 3.4.0 (7)

RIGA - Riga Zoo, Riga, Latvia

298	F	25 May 2007	223	235	AHTARI	25 May 2007	207004	Birth	536 LILAC	LIME	246098100189586
					RIGA	24 Apr 2008	M07219	Transfer			
400	F	14 May 2011	219	220	RIGA	14 May 2011	M11059	Birth		REZIJA	985170000942783
402	F	26 May 2011	219	115	RIGA	26 May 2011	M11064	Birth		KALME	985170000951327
429	M	18 May 2012	270	173	HELSINKI	18 May 2012	212005	Birth		ELMO	956000001842455
					RIGA	27 Feb 2014	M12290	Transfer			
523	F	27 May 2014	219	298	RIGA	27 May 2014	M14119	Birth		LAIMINA	
597	M	20 May 2016	429	400	RIGA	20 May 2016	M16097	Birth			985141000868116

Totals: 2.4.0 (6)

ROTTERDAM - Rotterdam Zoo, Rotterdam, The Netherlands

341	F	26 May 2009	116	141	HUNBSTRND	26 May 2009	209021	Birth	RED/RED	RITA	977200007250298
					BORAS	12 May 2010	HR0037	Transfer			
					ROTTERDAM	10 Dec 2010	Z10058	Transfer			
565	M	2 Jun 2015	266	420	JARVZOO	2 Jun 2015	JZM15029	Birth	035	JAQUES	968000010594012
					ROTTERDAM	25 Sep 2017	Z17395	Transfer			
581	F	29 May 2015	187	341	ROTTERDAM	29 May 2015	Z15118	Birth		SJAKIRA	528210004193881

Totals: 1.2.0 (3)

SALZBURG - Salzburg Zoo Hellbrunn, Anif, Salzburg, Austria

416	F	11 May 2011	270	173	HELSINKI	11 May 2011	211007	Birth	GREEN 241	DUULI	956000008413264
					SALZBURG	7 Nov 2013	S1863	Transfer			
557	M	26 May 2015	429	400	RIGA	26 May 2015	M15077	Birth		RUDZIS	9851170002978608
					KRONBERG	26 Oct 2015	2475	Transfer			
					SALZBURG	15 Feb 2017	S2372	Transfer			
620	F	21 May 2017	506	416	SALZBURG	21 May 2017	S2406	Birth			

Totals: 1.2.0 (3)

SEITSEMIN - Seitseminen National Park, Ylöjarvi, Finland

491	F	14 May 2014	330	307	HUNBSTRND	14 May 2014	214012	Birth	PINK	FINLANDIA	968000010165788
					AHTARI	4 Oct 2016	216053	Transfer			
					SEITSEMIN	28 Nov 2017	PINK	Transfer			
497	F	29 May 2014	330	373	HUNBSTRND	29 May 2014	214036	Birth	RED	FINKA	968000010166031
					AHTARI	4 Oct 2016	216051	Transfer			
					SEITSEMIN	28 Nov 2017	RED	Transfer			
555	F	24 May 2015	389	227	RANUA	24 May 2015	215030	Birth	DARK PURPLE	MINNIPENNI	978101080838251
					SEITSEMIN	15 Nov 2017	56	Transfer			
594	F	20 May 2016	389	418	RANUA	20 May 2016	216023	Birth	Green 19	DIDI	978101080835409
					SEITSEMIN	15 Nov 2017	19	Transfer			
652	M	~ 2011	WILD	WILD	FINLAND	7 Nov 2017	NONE	Capture	Yellow AA		
					SEITSEMIN	8 Nov 2017	YELLOWAA	Transfer			
654	F	~ 2011	WILD	WILD	FINLAND	7 Nov 2017	NONE	Capture	Yellow 87		978101081038436
					SEITSEMIN	8 Nov 2017	YELLOW87	Transfer			

Totals: 1.5.0 (6)

SLOTTSKOG - Slottsskogen Zoo, Göteborg, Sweden

539	M	15 May 2015	330	307	HUNBSTRND	15 May 2015	215015	Birth	LILIAC	RAKKI	752098100700395
					SLOTTSKOG	9 Mar 2016	2016002	Transfer			

550	F	22 May 2015	311	264	BERN	22 May 2015	B50104	Birth		LAVRA	756098100688686
					SLOTTSKOG	9 Mar 2016	2016001	Transfer			
566	F	22 May 2015	266	350	JARVZOO	22 May 2015	JZM15020	Birth	034	AILA	968000010080094
					SLOTTSKOG	21 Mar 2016	2016004	Transfer			
574	F	16 May 2015	266	158	JARVZOO	16 May 2015	JZM15018	Birth	033	NOOMI	968000010080969
					SLOTTSKOG	21 Mar 2016	2016003	Transfer			

Totals: 1.3.0 (4)

TOTALS: 57.94.0 (151)
25 Institutions

Compiled by: Leif Blomqvist thru Nordens Ark
Data current thru: 1 Jan 2018 - European regional
Printed on 31 Dec 2017 using Sparks v1.65

10. Forest reindeer calves born 2016-2017. Changes taking place after 1.1.2018 marked in red.

Stud#	Sex	Birth Date	Sire	Dam	Location	Date	LocalID	Event	Tag/Band	Name	Transponder
583	?	4 May 2016	408	198	ARNHEM	4 May 2016	7023	Birth			
						4 May 2016		Death			
584	M	14 May 2016	266	261	JARVZOO	14 May 2016	JZM16002	Birth			
						7 Oct 2017		Death			
585	M	16 May 2016	270	369	HELSINKI	16 May 2016	216040	Birth	Blue	ILMARI	934000011107143
					AHTARI	30 Oct 2017	217039	Transfer			
586	F	12 May 2016	408	430	ARNHEM	12 May 2016	7056	Birth	PURPLE		52825700004186
					BERN	4 Jan 2018	B80001	Transfer			
587	M	14 May 2016	381	354	MOSCOW	14 May 2016	160175	Birth			
						29 Jun 2016		Death			
588	F	16 May 2016	381	392	MOSCOW	16 May 2016	160176	Birth			
589	F	16 May 2016	330	259	HUNBSTRND	16 May 2016	216042	Birth	ORANGE	ASSAT	968000010173067
						23 Sep 2016		Death			
590	F	18 May 2016	330	307	HUNBSTRND	18 May 2016	216045	Birth	LIGHT BLUE	LUKKO	968000010164679
						12 Jun 2017		Death			
591	M	22 May 2016	408	397	ARNHEM	22 May 2016	7055	Birth	WHITE		528257000004181
					KINGUSSIE	24 Oct 2017	6058	Transfer			
592	M	23 May 2016	330	378	HUNBSTRND	23 May 2016	216046	Birth	LIGHT GREEN	TAPPARA	968000010165816
					BERLINZOO	28 Apr 2017	M1600155	Transfer			
						30 Sep 2017		Death			
593	F	24 May 2016	266	158	JARVZOO	24 May 2016	JZM16007	Birth		MINA	968000010592607
					PLOCK	22 Nov 2017	A20644	Transfer			
594	F	20 May 2016	389	418	RANUA	20 May 2016	216023	Birth	Green 19	DIDI	978101080835409
					SEITSEMIN	15 Nov 2017	19	Transfer			
595	F	26 May 2016	266	420	JARVZOO	26 May 2016	JZM16008	Birth		MEDINA	968000010592830
					PLOCK	22 Nov 2017	A20645	Transfer			
596	M	27 May 2016	266	350	JARVZOO	27 May 2016	JZM16016	Birth			
						3 Oct 2017		Death			
597	M	20 May 2016	429	400	RIGA	20 May 2016	M16097	Birth			985141000868116
598	F	20 May 2016	429	402	RIGA	20 May 2016	M16141	Birth			
						20 May 2016		Death			
599	F	23 May 2016	330	373	HUNBSTRND	23 May 2016	216054	Birth	WHITE	PYRY	968000010165467
600	M	24 May 2016	270	458	HELSINKI	24 May 2016	216043	Birth	GREEN	IIVARI	934000011107147
					AHTARI	30 Oct 2017	217038	Transfer			
601	F	27 May 2016	337	317	KERKRADE	27 May 2016	M16233	Birth		GAIA 35	
						28 Sep 2016		Death			
602	M	28 May 2016	337	367	KERKRADE	28 May 2016	M16234	Birth	BROWN	TEEMU	528257000004301
					LIBEREC	28 Sep 2017	665007	Transfer			
603	M	28 May 2016	429	298	RIGA	28 May 2016	M16099	Birth			9851410000868137
						22 Sep 2017		Death			
604	M	30 May 2016	506	416	SALZBURG	30 May 2016	S2275	Birth			040094501003862
					KRONBERG	14 Feb 2017	3059	Transfer			
605	F	30 May 2016	337	267	KERKRADE	30 May 2016	M16249	Birth	BLUE 052	GAIA 37	
606	M	4 May 2016	401	446	PRAHA	4 May 2016	160159	Birth			
						31 May 2016		Death			
607	M	14 May 2016	401	447	PRAHA	14 May 2016	160160	Birth			
						15 May 2016		Death			
608	F	30 May 2016	401	431	PRAHA	30 May 2016	160161	Birth			
					KINGUSSIE	23 Oct 2017	6057	Transfer			

609	M	2 Jun 2016	187	332	ROTTERDAM	2 Jun 2016	Z16171	Birth			JAQUES	528210004404742
						4 Jun 2016		Death				
610	M	7 Jun 2016	247	469	KINGUSSIE	7 Jun 2016	5948	Birth	PINK HWP3		FLOKI	981000008316013
						31 Aug 2016		Death				
611	M	12 Jun 2016	408	407	ARNHEM	12 Jun 2016	7076	Birth	YELLOW			528257000004171
					MAGDEBURG	30 Nov 2016	443025	Transfer				
612	M	14 Jun 2016	464	462	KERZHENSK	14 Jun 2016	ZINOVIY	Birth			ZINOVIY	
613	?	5 Feb 2017	311	284	BERN	5 Feb 2017	B70003	Birth				
						5 Feb 2017		Death				
614	M	15 May 2017	482	479	AHTARI	15 May 2017	217010	Birth	Red474		JUHA	
615	F	16 May 2017	401	446	PRAHA	16 May 2017	170145	Birth				953010000453081
						1 Jul 2017		Death				
616	M	18 May 2017	401	447	PRAHA	18 May 2017	170156	Birth				
					HANSURLES	9 May 2018	GR318	Transfer				
617	F	18 May 2017	266	261	JARVZOO	18 May 2017	JZM17011	Birth				968000010595938
					HUNBSTRND	24 Apr 2018	218034	Transfer				
618	F	20 May 2017	389	527	RANUA	20 May 2017	217012	Birth	Light blue 0		CARLA	
619	M	21 May 2017	389	489	RANUA	21 May 2017	217013	Birth	Green 020		MASA	
620	F	21 May 2017	506	416	SALZBURG	21 May 2017	S2406	Birth				
621	M	22 May 2017	266	420	JARVZOO	22 May 2017	JZM17012	Birth				968000010584210
					HANSURLES	19 Apr 2018	GR134	Transfer				
622	M	24 May 2017	266	350	JARVZOO	24 May 2017	JZM17013	Birth				968000010592436
					HANSURLES	19 Apr 2018	GR135	Transfer				
623	M	25 May 2017	401	431	PRAHA	25 May 2017	170157	Birth				
					HANSURLES	9 May 2018	GR317	Transfer				
624	F	20 May 2017	381	325	MOSCOW	20 May 2017	170889	Birth				
625	M	22 May 2017	381	354	MOSCOW	22 May 2017	170890	Birth				
626	F	24 May 2017	381	338	MOSCOW	24 May 2017	170891	Birth				
627	F	26 May 2017	381	392	MOSCOW	26 May 2017	170892	Birth				
628	M	18 May 2017	482	375	AHTARI	18 May 2017	217014	Birth	Yellow 54		POJU	
						11 Aug 2017		Death				
629	F	19 May 2017	482	505	AHTARI	19 May 2017	217015	Birth	Red 464		PIPSA	
630	F	20 May 2017	482	439	AHTARI	20 May 2017	217016	Birth				
						20 May 2017		Death				
631	F	21 May 2017	482	440	AHTARI	21 May 2017	217017	Birth	White		MONA	
632	F	20 May 2017	408	397	ARNHEM	20 May 2017	7571	Birth	Yellow			528257000032396
					BERN	4 Jan 2018	B80002	Transfer				
633	F	21 May 2017	408	430	ARNHEM	21 May 2017	7572	Birth				528257000036206
634	M	29 May 2017	408	407	ARNHEM	29 May 2017	7573	Birth	Black			
						30 May 2017		Death				
635	F	7 Jun 2017	429	298	RIGA	7 Jun 2017	M17115	Birth				
						17 Sep 2017		Death				
636	F	7 Jun 2017	567	458	HELSINKI	7 Jun 2017	217040	Birth	Red		JOIKU	934000011107127
637	M	8 Jun 2017	567	485	HELSINKI	8 Jun 2017	217041	Birth	Black		JAKALA	934000011107155
638	M	6 Jun 2017	482	558	AHTARI	6 Jun 2017	217020	Birth	Violet 561		PATE	
					LAUHANVUO	1 Nov 2017	561	Transfer				

639	F	3 Jun 2017	337	367	KERKRADE	3 Jun 2017	M17221	Birth		Gaia 38	528257000028958
640	F	12 Jun 2017	567	369	HELSINKI	12 Jun 2017	217049	Birth	PINK	JUOLUKKA	943000011107122
641	M	10 Jun 2017	518	521	KERZHENSK	10 Jun 2017	17101-10	Birth		TOSHA	
642	F	18 Jun 2017	571	373	HUNBSTRND	18 Jun 2017	217122	Birth	Light green	PIHLAJA	752098100818439
						24 Aug 2017		Death			
643	F	22 May 2017	454	457	PLEUGUEN	22 May 2017	CR5	Birth			955000004050807
						7 Apr 2018		Death			
644	M	20 Jun 2017	337	267	KERKRADE	20 Jun 2017	M17247	Birth	Yellow 050	GAIA 41	528257000029050
						28 Jun 2017		Death			
645	M	20 Jun 2017	389	418	RANUA	20 Jun 2017	217037	Birth	Grey 001	DUOMAS	
646	M	22 Jun 2017	571	307	HUNBSTRND	22 Jun 2017	217135	Birth	Yellow	PAKKILA	752098100816663
					LYCKSELE	23 Apr 2018	LRTS1705	Transfer			
647	M	30 Apr 2017	454	456	PLEUGUEN	30 Apr 2017	CR6	Birth			
						30 Apr 2017		Death			
648	M	29 May 2017	560	349	LYCKSELE	29 May 2017	LRTS1701	Birth		ESTERKALV	
						18 Apr 2018		Death			
649	M	5 Jun 2017	560	278	LYCKSELE	5 Jun 2017	LRTS1702	Birth		RANJAKALV	
						18 Apr 2018		Death			
650	F	7 Jun 2017	560	279	LYCKSELE	7 Jun 2017	LRTS1704	Birth		MIESSI	
651	F	8 Jun 2017	560	374	LYCKSELE	8 Jun 2017	LRTS1703	Birth		RITAKALV	
						18 Apr 2018		Death			

TOTALS BIRTHS 2016-2017: 82.121.2 (206)

Compiled by: Leif Blomqvist thru Nordens Ark
Data current thru: 1 Jan 2018 - European regional
Printed on 1 May 2018 using Sparks v1.65

11. Wild-caught forest reindeer 2016-2017

Stud#	Sex	Birth Date	Sire	Dam	Location	Date	LocalID	Event	Tag/Band	Name	Transponder
652	M	~ 2011	WILD	WILD	FINLAND	7 Nov 2017	NONE	Capture	Yellow AA		
					SEITSEMIN	8 Nov 2017	YellowAA	Transfer			
653	M	~ 2013	WILD	WILD	FINLAND	7 Nov 2017	NONE	Capture	Yellow BB		978101081038795
					LAUHANVUO	8 Nov 2017	YELLOWBB	Transfer			
654	F	~ 2011	WILD	WILD	FINLAND	7 Nov 2017	NONE	Capture	Yellow 87		978101081038436
					SEITSEMIN	8 Nov 2017	Yellow87	Transfer			

TOTALS: 2.1.0 (3)

Compiled by: Leif Blomqvist thru Nordens Ark
Data current thru: 1 Jan 2018 - European regional
Printed on 29 Dec 2017 using Sparks v1.65

12. Forest reindeer transfers 2016-2017. Changes taking place after 1.1.2018 marked in red.

Stud#	Sex	Birth Date	Sire	Dam	Location	Date	LocalID	Event	Tag/Band	Name	Transponder
337	M	17 May 2009	223	235	AHTARI	17 May 2009	209006	Birth	258 BLACK	JOHAN	985170002298737
					KERKRADE	5 Nov 2013	M09200	Transfer			
					ARNHEM	14 Dec 2016	7382	Transfer			
355	M	6 May 2009	176	198	ARNHEM	6 May 2009	615211	Birth		Mr.ED	0006D0BD91
					BERLIN TP	3 Feb 2010	_____	Transfer			
					BERLINZOO	24 Mar 2010	ESB355	Transfer			
					MAGDEBURG	21 Feb 2013	443024	Transfer			
					LIBEREC	7 Nov 2016	665006	Transfer			
						30 Aug 2017		Death			
388	F	13 May 2010	223	101	AHTARI	13 May 2010	210005	Birth	WHITE 189	JADE	985121018050353
					LAUHANVUO	1 Nov 2017	189	Transfer			
403	F	19 May 2011	223	235	AHTARI	19 May 2011	211001	Birth	WHITE 186	ELVIIRA	
					LAUHANVUO	1 Nov 2017	186	Transfer			
408	M	29 May 2011	311	264	BERN	29 May 2011	B10069	Birth		BILLY	756098100543212
					ARNHEM	20 Sep 2012	617259	Transfer			
					KERKRADE	14 Dec 2016	M11754	Transfer			
491	F	14 May 2014	330	307	HUNBSTRND	14 May 2014	214012	Birth	PINK	FINLANDIA	968000010165788
					AHTARI	4 Oct 2016	216053	Transfer			
					SEITSEMIN	28 Nov 2017	PINK	Transfer			
492	F	16 May 2014	330	259	HUNBSTRND	16 May 2014	214015	Birth	WHITE	JETZIN	968000010174269
					AHTARI	4 Oct 2016	216052	Transfer			
					LAUHANVUO	28 Nov 2017	WHITE	Transfer			
497	F	29 May 2014	330	373	HUNBSTRND	29 May 2014	214036	Birth	RED	FINKA	968000010166031
					AHTARI	4 Oct 2016	216051	Transfer			
					SEITSEMIN	28 Nov 2017	RED	Transfer			
530	F	22 May 2012	223	253	AHTARI	22 May 2012	212004	Birth	328	JAFFA	
					LAUHANVUO	1 Nov 2017	328	Transfer			
539	M	15 May 2015	330	307	HUNBSTRND	15 May 2015	215015	Birth	LILIAC	RAKKI	752098100700395
					SLOTTSKOG	9 Mar 2016	2016002	Transfer			
540	M	12 May 2015	381	325	MOSCOW	12 May 2015	150195	Birth			
					KERZHENSK	17 Mar 2016	540	Transfer			
541	M	12 May 2015	380	354	MOSCOW	12 May 2015	150196	Birth			
					KERZHENSK	17 Mar 2016	541	Transfer			
						19 Mar 2016		Death			
542	F	15 May 2015	381	390	MOSCOW	15 May 2015	150206	Birth			
					KERZHENSK	17 Mar 2016	542	Transfer			
						18 Mar 2016		Death			
543	M	17 May 2015	380	339	MOSCOW	17 May 2015	150207	Birth			
					KERZHENSK	17 Mar 2016	543	Transfer			
544	M	19 May 2015	311	284	BERN	19 May 2015	B50088	Birth			7560981006969824
					KRONBERG	21 Apr 2016	544	Transfer			
547	F	19 May 2015	401	446	PRAHA	19 May 2015	150148	Birth			900032001749463
					PLOCK	22 Mar 2016	A20565	Transfer			
550	F	22 May 2015	311	264	BERN	22 May 2015	B50104	Birth		LAVRA	756098100688686
					SLOTTSKOG	9 Mar 2016	2016001	Transfer			
555	F	24 May 2015	389	227	RANUA	24 May 2015	215030	Birth	DARK PURPLE	MINNIPENNI	978101080838251
					SEITSEMIN	15 Nov 2017	56	Transfer			
557	M	26 May 2015	429	400	RIGA	26 May 2015	M15077	Birth		RUDZIS	9851170002978608
					KRONBERG	26 Oct 2015	2475	Transfer			
					SALZBURG	15 Feb 2017	S2372	Transfer			
558	F	21 May 2015	270	485	HELSINKI	21 May 2015	215028	Birth	Pink	HILLA	934000007103
					AHTARI	31 Oct 2016	216060	Transfer			
					LAUHANVUO	1 Nov 2017	PINK	Transfer			
559	M	27 May 2015	270	458	HELSINKI	27 May 2015	215029	Birth		HAVU	
					AHTARI	31 Oct 2016	216059	Transfer			
564	M	2 Jun 2015	381	338	MOSCOW	2 Jun 2015	150253	Birth			
					KERZHENSK	17 Mar 2016	564	Transfer			

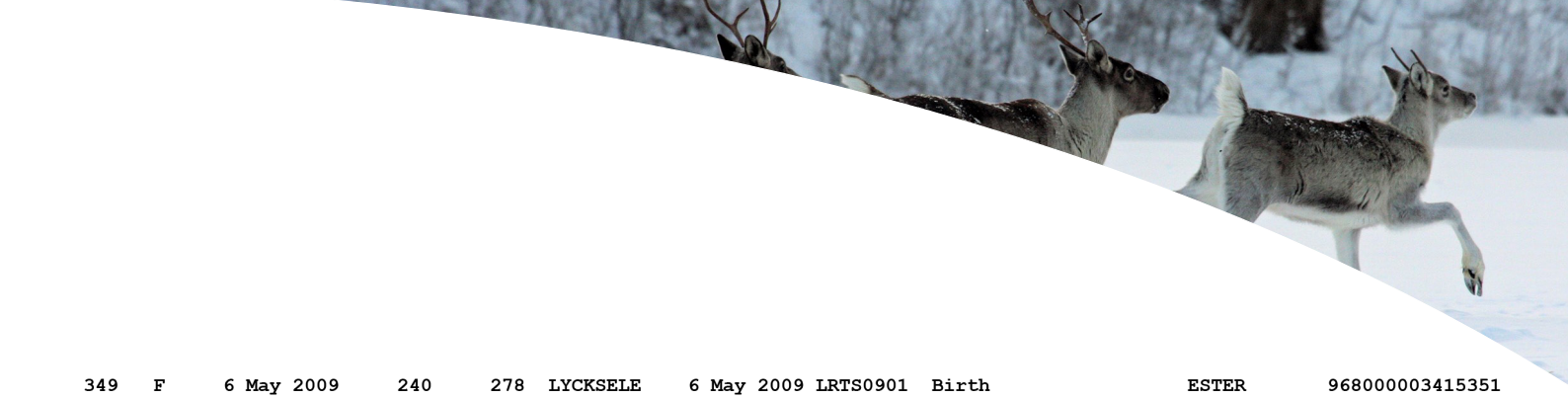
565	M	2 Jun 2015	266	420	JARVZOO	2 Jun 2015	JZM15029	Birth	035	JAQUES	968000010594012
					ROTTERDAM	25 Sep 2017	Z17395	Transfer			
566	F	22 May 2015	266	350	JARVZOO	22 May 2015	JZM15020	Birth	034	AILA	968000010080094
					SLOTTSKOG	21 Mar 2016	2016004	Transfer			
567	M	15 May 2015	223	479	AHTARI	15 May 2015	215031	Birth	WHITE 170	MAXI	9851110057860
					HELSINKI	27 Oct 2016	216101	Transfer			
571	M	15 May 2015	223	440	AHTARI	15 May 2015	215032	Birth	BLUE 309	ALVAR	985111001057859
					HUNBSTRND	28 Oct 2016	216181	Transfer			
574	F	16 May 2015	266	158	JARVZOO	16 May 2015	JZM15018	Birth	033	NOOMI	968000010080969
					SLOTTSKOG	21 Mar 2016	2016003	Transfer			
585	M	16 May 2016	270	369	HELSINKI	16 May 2016	216040	Birth	Blue	ILMARI	934000011107143
					AHTARI	30 Oct 2017	217039	Transfer			
586	F	12 May 2016	408	430	ARNHEM	12 May 2016	7056	Birth	PURPLE		52825700004186
					BERN	4 Jan 2018	B80001	Transfer			
591	M	22 May 2016	408	397	ARNHEM	22 May 2016	7055	Birth	WHITE		528257000004181
					KINGUSSIE	24 Oct 2017	6058	Transfer			
592	M	23 May 2016	330	378	HUNBSTRND	23 May 2016	216046	Birth	LIGHT GREEN	TAPPARA	968000010165816
					BERLINZOO	28 Apr 2017	M1600155	Transfer			
						30 Sep 2017		Death			
593	F	24 May 2016	266	158	JARVZOO	24 May 2016	JZM16007	Birth		MINA	968000010592607
					PLOCK	22 Nov 2017	A20644	Transfer			
594	F	20 May 2016	389	418	RANUA	20 May 2016	216023	Birth	Green 19	DIDI	978101080835409
					SEITSEMIN	15 Nov 2017	19	Transfer			
595	F	26 May 2016	266	420	JARVZOO	26 May 2016	JZM16008	Birth		MEDINA	968000010592830
					PLOCK	22 Nov 2017	A20645	Transfer			
600	M	24 May 2016	270	458	HELSINKI	24 May 2016	216043	Birth	GREEN	IIVARI	934000011107147
					AHTARI	30 Oct 2017	217038	Transfer			
602	M	28 May 2016	337	367	KERKRADE	28 May 2016	M16234	Birth	BROWN	TEEMU	528257000004301
					LIBEREC	28 Sep 2017	665007	Transfer			
604	M	30 May 2016	506	416	SALZBURG	30 May 2016	S2275	Birth			040094501003862
					KRONBERG	14 Feb 2017	3059	Transfer			
608	F	30 May 2016	401	431	PRAHA	30 May 2016	160161	Birth			
					KINGUSSIE	23 Oct 2017	6057	Transfer			
611	M	12 Jun 2016	408	407	ARNHEM	12 Jun 2016	7076	Birth	YELLOW		528257000004171
					MAGDEBURG	30 Nov 2016	443025	Transfer			
617	F	18 May 2017	266	261	JARVZOO	18 May 2017	JZM17011	Birth			968000010595938
					HUNBSTRND	24 Apr 2018	218034	Transfer			
621	M	22 May 2017	266	420	JARVZOO	22 May 2017	JZM17012	Birth			968000010584210
					HANSURLES	19 Apr 2018	GR134	Transfer			
622	M	24 May 2017	266	350	JARVZOO	24 May 2017	JZM17013	Birth			968000010592436
					HANSURLES	19 Apr 2018	GR135	Transfer			
632	F	20 May 2017	408	397	ARNHEM	20 May 2017	7571	Birth	Yellow		528257000032396
					BERN	4 Jan 2018	B80002	Transfer			
638	M	6 Jun 2017	482	558	AHTARI	6 Jun 2017	217020	Birth	Violet 561	PATE	
					LAUHANVUO	1 Nov 2017	561	Transfer			
646	M	22 Jun 2017	571	307	HUNBSTRND	22 Jun 2017	217135	Birth	Yellow	PAKKILA	752098100816663
					LYCKSELE	23 Apr 2018	LRTS1705	Transfer			
652	M	~ 2011	WILD	WILD	FINLAND	7 Nov 2017	NONE	Capture	Yellow AA		
					SEITSEMIN	8 Nov 2017	YELLOWAA	Transfer			
653	M	~ 2013	WILD	WILD	FINLAND	7 Nov 2017	NONE	Capture	Yellow BB		978101081038795
					LAUHANVUO	8 Nov 2017	YELLOWBB	Transfer			
654	F	~ 2011	WILD	WILD	FINLAND	7 Nov 2017	NONE	Capture	Yellow 87		978101081038436
					SEITSEMIN	8 Nov 2017	YELLOW87	Transfer			

TOTAL TRANSFERS 2016-2017: 27.21.0 (48)

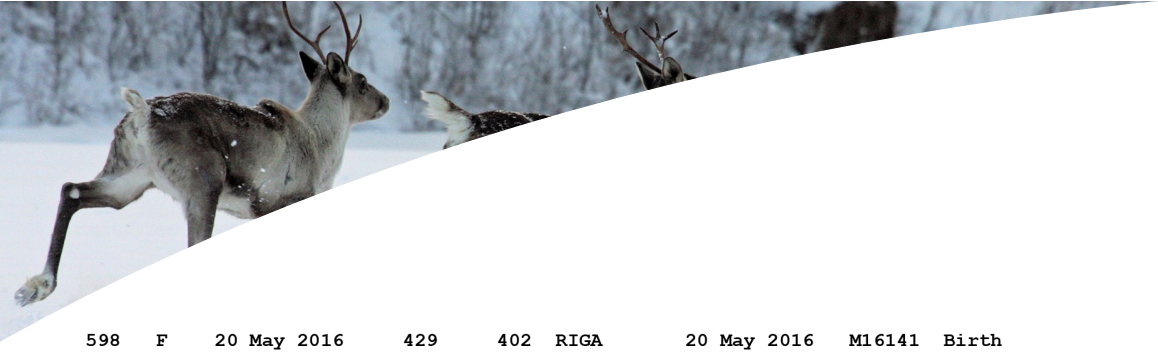
Compiled by: Leif Blomqvist thru Nordens Ark
Data current thru: 1 Jan 2018 - European regional
Printed on 1 May 2017 using Sparks v1.65

13. Deaths of forest reindeer 2016-2017. Deaths taking place after 1.1.2018 marked in red.

Stud#	Sex	Birth Date	Sire	Dam	Location	Date	LocalID	Event	Tag/Band	Name	Transponder
158	F	31 May 2001	137	52	HELSINKI	31 May 2001	201040	Birth	NEONRED 25	URSULA	0001BF225B
					JARVZOO	31 Jan 2002	JZM02003	Transfer			
						6 Jan 2017		Death			
187	M	2 Jun 2002	86	38	RANUA	2 Jun 2002	202039	Birth	89 RED	PUMMEL	985120015276514
					ARNHEM	28 Mar 2003	610664	Transfer			
					ROTTERDAM	1 Feb 2007	107590	Transfer			
						30 Nov 2016		Death			
198	F	16 May 2003	137	107	HELSINKI	16 May 2003	203032	Birth	GREEN 214	UTU	0001D368D5
					ARNHEM	27 Feb 2004	611546	Transfer			
						15 Jun 2016		Death			
200	F	25 May 2003	137	51	HELSINKI	25 May 2003	203048	Birth	YELLOW 38	USVA	00012A206C
						20 May 2016		Death			
206	F	21 May 2003	116	152	AHTARI	21 May 2003	203006	Birth	0479 RED	JENNA	985120015197951
					ARNHEM	27 Feb 2004	611548	Transfer			
					KERKRADE	18 Jan 2005	M03015	Transfer			
						12 Feb 2017		Death			
227	F	25 May 2004	86	104	RANUA	25 May 2004	204040	Birth	BLUE 66	MIINA	985120021312576
						17 Feb 2016		Death			
259	F	19 May 2006	168	145	HUNBSTRND	19 May 2006	206014	Birth	YELLOW/YELLO	JORUN	977200004154602
						27 Oct 2016		Death			
265	F	22 May 2006	136	166	BERN	22 May 2006	A60137	Birth	GREEN 050	TINA	968000004444253
					KERKRADE	3 Sep 2007	M06111	Transfer			
						2 Sep 2016		Death			
272	M	10 Jun 2006	187	202	ARNHEM	10 Jun 2006	613305	Birth		REND	00061BD1B3
					ROTTERDAM	1 Feb 2007	107591	Transfer			
					MAGDEBURG	20 Oct 2011	443021	Transfer			
						3 Nov 2016		Death			
279	F	20 May 2007	116	141	HUNBSTRND	20 May 2007	207024	Birth	RED/RED	NUMMI	977200004332858
					LYCKSELE	5 Feb 2008	LRTS0702	Transfer			
						7 Jun 2017		Death			
284	F	17 May 2007	136	245	BERN	17 May 2007	A70066	Birth		TULA	968000004442600
						21 Jul 2017		Death			
294	F	31 May 2007	228	227	RANUA	31 May 2007	207030	Birth	PURPLE 047	MAIJA	985120032351791
					KINGUSSIE	4 Apr 2008	5279	Transfer			
						9 Jan 2017		Death			
299	F	26 May 2007	223	151	AHTARI	26 May 2007	207005	Birth	BLACK 256	LOLA	246098100189980
					KINGUSSIE	4 Apr 2008	5280	Transfer			
						9 Sep 2016		Death			
307	F	19 May 2008	116	157	HUNBSTRND	19 May 2008	208031	Birth	VIOLET/VIOLE	RAJA	977200007078792
						21 Feb 2018		Death			
315	F	17 May 2008	176	210	ARNHEM	17 May 2008	614684	Birth		BESTIE	0006809CDF
					BERLIN TP	3 Feb 2010	_____	Transfer			
					BERLINZOO	24 Mar 2010	M0800018	Transfer			
					PLOCK	20 Oct 2015	A20536	Transfer			
						13 Aug 2016		Death			
324	F	7 May 2008	223	152	AHTARI	7 May 2008	208007	Birth	WHITE 178	VIOLA	985121005529830
						2 Mar 2017		Death			
330	M	25 May 2008	207	88	BORAS	25 May 2008	HR0030	Birth		SATO	968000000295051
					HUNBSTRND	13 May 2009	209007	Transfer			
						8 Sep 2016		Death			
332	F	31 May 2008	207	260	BORAS	31 May 2008	HR0032	Birth		KAARINA	968000000264431
					ROTTERDAM	10 Dec 2010	Z10057	Transfer			
						14 Nov 2017		Death			
339	F	21 May 2009	223	151	AHTARI	21 May 2009	209008	Birth	ORANGE/YELLO	MAIKKI	
					MOSCOW	16 Dec 2011	110672	Transfer			
						21 Mar 2016		Death			



349	F	6 May 2009	240	278	LYCKSELE	6 May 2009	LRTS0901	Birth		ESTER	968000003415351
						31 Oct 2017		Death			
355	M	6 May 2009	176	198	ARNHEM	6 May 2009	615211	Birth		Mr.ED	0006D0BD91
					BERLIN TP	3 Feb 2010	_____	Transfer			
					BERLINZOO	24 Mar 2010	ESB355	Transfer			
					MAGDEBURG	21 Feb 2013	443024	Transfer			
					LIBEREC	7 Nov 2016	665006	Transfer			
						30 Aug 2017		Death			
378	F	2 Jun 2010	116	259	HUNBSTRND	2 Jun 2010	210061	Birth	GREEN/GREEN	PIRJO	977200007467183
						7 Feb 2017		Death			
435	F	20 May 2012	176	202	ARNHEM	20 May 2012	617028	Birth			00071ADEDB
					SALZBURG	14 Apr 2014	S1933	Transfer			
						12 Jun 2017		Death			
468	M	8 Jun 2013	219	402	RIGA	8 Jun 2013	M13101	Birth		KASPERS	985141000868386
						26 Apr 2016		Death			
506	M	28 May 2014	311	264	BERN	28 May 2014	B40093	Birth	BLUE		756098100666179
					SALZBURG	7 Apr 2015	S2070	Transfer			
						12 Dec 2016		Death			
537	M	18 May 2015	389	418	RANUA	18 May 2015	215013	Birth	WHITE 007	BONDI	
						6 Sep 2016		Death			
538	M	13 May 2015	330	259	HUNBSTRND	13 May 2015	215014	Birth	YELLOW	JAHKI	752098100702414
						10 Mar 2016		Death			
541	M	12 May 2015	380	354	MOSCOW	12 May 2015	150196	Birth			
					KERZHENSK	17 Mar 2016	541	Transfer			
						19 Mar 2016		Death			
542	F	15 May 2015	381	390	MOSCOW	15 May 2015	150206	Birth			
					KERZHENSK	17 Mar 2016	542	Transfer			
						18 Mar 2016		Death			
548	M	18 May 2015	330	378	HUNBSTRND	18 May 2015	215017	Birth	GREEN	PLAKKI	752098100699548
						10 Mar 2016		Death			
553	M	17 May 2015	413	374	LYCKSELE	17 May 2015	LRTS1502	Birth	ORANGE	PONTA	
						31 May 2016		Death			
554	M	18 May 2015	413	279	LYCKSELE	18 May 2015	LRTS1503	Birth		NUDUS	
						31 May 2016		Death			
560	M	30 May 2015	266	261	JARVZOO	30 May 2015	JZM15030	Birth	Blue	VIKING	968000010110947
					LYCKSELE	22 Sep 2015	LRTS1505	Transfer			
						18 Apr 2018		Death			
577	M	3 Jun 2015	429	298	RIGA	3 Jun 2015	M15136	Birth		LINNIS	958170002978101
					KRONBERG	26 Oct 2015	LINNIS	Transfer			
						6 Oct 2016		Death			
583	?	4 May 2016	408	198	ARNHEM	4 May 2016	7023	Birth			
						4 May 2016		Death			
584	M	14 May 2016	266	261	JARVZOO	14 May 2016	JZM16002	Birth			
						7 Oct 2017		Death			
587	M	14 May 2016	381	354	MOSCOW	14 May 2016	160175	Birth			
						29 Jun 2016		Death			
589	F	16 May 2016	330	259	HUNBSTRND	16 May 2016	216042	Birth	ORANGE	ASSAT	968000010173067
						23 Sep 2016		Death			
590	F	18 May 2016	330	307	HUNBSTRND	18 May 2016	216045	Birth	LIGHT BLUE	LUKKO	968000010164679
						12 Jun 2017		Death			
592	M	23 May 2016	330	378	HUNBSTRND	23 May 2016	216046	Birth	LIGHT GREEN	TAPPARA	968000010165816
					BERLINZOO	28 Apr 2017	M1600155	Transfer			
						30 Sep 2017		Death			
596	M	27 May 2016	266	350	JARVZOO	27 May 2016	JZM16016	Birth			
						3 Oct 2017		Death			



598	F	20 May 2016	429	402	RIGA	20 May 2016	M16141	Birth			
						20 May 2016		Death			
601	F	27 May 2016	337	317	KERKRADE	27 May 2016	M16233	Birth		GAIA 35	
						28 Sep 2016		Death			
603	M	28 May 2016	429	298	RIGA	28 May 2016	M16099	Birth			9851410000868137
						22 Sep 2017		Death			
606	M	4 May 2016	401	446	PRAHA	4 May 2016	160159	Birth			
						31 May 2016		Death			
607	M	14 May 2016	401	447	PRAHA	14 May 2016	160160	Birth			
						15 May 2016		Death			
609	M	2 Jun 2016	187	332	ROTTERDAM	2 Jun 2016	Z16171	Birth		JAQUES	528210004404742
						4 Jun 2016		Death			
610	M	7 Jun 2016	247	469	KINGUSSIE	7 Jun 2016	5948	Birth	PINK HWP3	FLOKI	981000008316013
						31 Aug 2016		Death			
613	?	5 Feb 2017	311	284	BERN	5 Feb 2017	B70003	Birth			
						5 Feb 2017		Death			
615	F	16 May 2017	401	446	PRAHA	16 May 2017	170145	Birth			953010000453081
						1 Jul 2017		Death			
628	M	18 May 2017	482	375	AHTARI	18 May 2017	217014	Birth	Yellow 54	POJU	
						11 Aug 2017		Death			
630	F	20 May 2017	482	439	AHTARI	20 May 2017	217016	Birth			
						20 May 2017		Death			
634	M	29 May 2017	408	407	ARNHEM	29 May 2017	7573	Birth	Black		
						30 May 2017		Death			
635	F	7 Jun 2017	429	298	RIGA	7 Jun 2017	M17115	Birth			
						17 Sep 2017		Death			
642	F	18 Jun 2017	571	373	HUNBSTRND	18 Jun 2017	217122	Birth	Light green	PIHLAJA	752098100818439
						24 Aug 2017		Death			
643	F	22 May 2017	454	457	PLEUGUEN	22 May 2017	CR5	Birth			955000004050807
						7 Apr 2018		Death			
644	M	20 Jun 2017	337	267	KERKRADE	20 Jun 2017	M17247	Birth	Yellow 050	GAIA 41	528257000029050
						28 Jun 2017		Death			
647	M	30 Apr 2017	454	456	PLEUGUEN	30 Apr 2017	CR6	Birth			
						30 Apr 2017		Death			
648	M	29 May 2017	560	349	LYCKSELE	29 May 2017	LRTS1701	Birth		ESTERKALV	
						18 Apr 2018		Death			
649	M	5 Jun 2017	560	278	LYCKSELE	5 Jun 2017	LRTS1702	Birth		RANJAKALV	
						18 Apr 2018		Death			
651	F	8 Jun 2017	560	374	LYCKSELE	8 Jun 2017	LRTS1703	Birth		RITAKALV	
						18 Apr 2018		Death			

TOTAL DEATHS 2016-2017: 26.27.2 (55)

Compiled by: Leif Blomqvist thru Nordens Ark
Data current thru: 1 Jan 2018 - European regional
Printed on 1 May 2017 using Sparks v1.65

14. Location Glossary - FOREST REINDEER Studbook

AHTARI Zoo Ahtari
Karhunkierros 130, Ahtari, Finland, FI-63700
+358.6.5393.555 fax: +358.6.5393.611 mauno.seppakoski@ahtarizoo.fi
Contact: Mauno Seppakoski Data current to 31 Dec 2017

ARNHEM Burgers' Zoo
Antoon van Hooffplein 1, Arnhem, Gelderland, The Netherlands, 6816 SH
+31.26.445.0373 fax: +31.26.443.0776 M.Giesen@burgerszoo.nl
Contact: Marleen Giesen Data current to 31 Dec 2017

BERLIN TP Tierpark Berlin-Friedrichsfelde GmbH
Am Tierpark 125, Berlin, Germany, D-10307
+49.30.51531.111 fax: +49.30.512.4061 f.sicks@tierpark-berlin.de
Contact: Florian Sicks Data current to 31. Dec 2017

BERLINZOO Zoologischer Garten Berlin AG
Hardenbergplatz 8, Berlin, Germany, D-10787
+49.30.25.40.12.05 fax: +49.30.25.40.12.55 h.kloes@zoo-berlin.de
Contact: Dipl. Biol. Heiner Klös

BERN Tierpark Dählhölzli
Tierparkweg 1, Bern, Switzerland, CH-3005
+41.31.357.1518 fax: +41.31.357.1510 marc.rosset@bern.ch
Contact: Dr. Marc Rosset Data current to 31. Dec 2017

BORAS Boras Djurpark Zoo
PO Box 502, Boras, Alvsborg, Sweden, S-503 13
+46.33.353273 fax: +46.33.105339 bo.kjellson@boraszoo.se
Contact: Bo Kjellson

HELSINKI Helsinki Zoo
PO Box 4600, Helsinki, Finland, FI-00099
+358.8.169.5939 fax: +358.9.169.5990 nina.trontti@hel.fi
Contact: Curator Nina Trontti Data current to 31. Dec 2017

HUNBSTRND Nordens Ark
Åby Säteri 4025, Hunnebostrand, Göteborg, Sweden, S-450 46
leif.blomqvist@nordensark.se
Contact: Mr. Leif Blomqvist Data current to 31. Dec 2017

JARVZOO Jarvzoo
Box 17, Jarvso, Gavleborg, Sweden, S-82040
+46.651.411.25 lina.jelk@jarvzoo.se
Contact: Lina Jelk Data current to 31. Dec 2017

KERKRADE GaiaZOO, Kerkrade
Postbus 68, Kerkrade, Limburg, The Netherlands, 6460 AB
+31.45.567.6070 fax: +31.45.567.6071 t.termeulen@gaiazoo.nl
Contact: Tjerk Ter Meulen Data current to 31. Dec 2017

KERZHENSK Zapovednik Kerzhensky
Nizhny Novgorod, Russia
sgsurov@gmail.com
Contact: Sergei Surov Data current to 31. Dec 2017

KINGUSSIE Highland Wildlife Park
Kincraig, Kingussie, Highland, Scotland (uk), PH21 1NL
+44.1540.651.970 drichardson@rzss.org.uk
Contact: Douglas Richardson Data current to 31. Dec 2017

KRONBERG Opel-Zoo von Opel HessischeZoostiftung
Konigsteiner Strasse 35, Kronberg, Hesse, Germany, D-61476
+49.6173.78670 fax: +49.6173.995279 joerg.beckmann@opel-zoo.de
Contact: Joerg Beckmann Data current to 31. Dec 2017

LAUHANVUO Lauhanvuori National Park
Lauhanvuorentie, Isojoki, Finland, FI-64930

LIBEREC Zoologicka zahrada Liberec
Masarykova 1347/31, Liberec, Severocesky, Czech Republic, CZ-460 01
+420.482.710.616 fax: +420.482.710.618 melichar@zooliberec.cz
Contact: Lubomir Melichar

LYCKSELE Lycksele Djurpark/Zoo
Box 505, Lycksele, Sweden, S-921 81
+46.950.16710 carola.stalfjall@lycksele.se
Contact: Carola Stålfjäll

MAGDEBURG Zoologischer Garten Magdeburg
Zooallee 1, Magdeburg, Sachsen-anhalt, Germany, D-39124
+49.391.53.53.90.05 fax: +49.391.280.90.12 konstantin.ruske@zoo-magdeburg.de
Contact: Curator Konstantin Ruske

MOSCOW Moscow Zoological Park
Bolshaya Gruzinskaya Ulitsa, Moscow, Russia, 123242
+7.95.252.1053 fax: +7.95.973.2056 zoopark-moscow@mail.ru
Contact: Daria Gorianina Data current to 31. Dec 2017

PLEUGUEN Parc Zoologique de la Bourbansais
Pleugueneuc, Ille-et-vilaine, France, F-35720
+33.2.9969.4007 fax: +33.2.9969.4604 zoo.bourbansais@wanadoo.fr
Contact: Arnaud Dazord Data current to 31. Dec 2017

PLOCK Miejski Ogrod Zoologiczny, Plock
ul. Norbertanska 2, Plock, Poland, 09-402
+48.24.366.05.27 fax: +48.24.366.0513 wiktor.zduniak@zoo.plock.pl
Contact: Wiktor Zduniak

PRAHA The Prague Zoological Garden
U Trojskeho Zamku 3/120, Praha, Czech Republic, CZ-171 00
+420.296.112226 fax: +420.296.112.226 dobiasova@zoopraha.cz
Contact: Curator Barbora Dobiasova Data current to 31. Dec 2017

RANUA Ranua Wildlife Park
Rovaniementie 29, Ranua, Finland, FI-97700
mari.heikkila@ranua.fi
Contact: Ms. Mari Heikkila

RIGA Riga Zoo
Meza prospekts 1, Riga, Latvia, LV 1014
+371.6754.0444 fax: +371.6754.0011 guna.vitola@rigazoo.lv
Contact: Guna Vitola

ROTTERDAM Rotterdam Zoo
Diergaarde Blijdorp, Rotterdam, South Holland, The Netherlands, 3000 AM
+31.10.4431.411 fax: +31.10.4431.466 b.westerveld@rotterdamzoo.nl
Contact: Ben Westerveld Data current to 31. Dec 2017

SALZBURG Salzburg Zoo Hellbrunn
Anifer Landesstr. 1, Anif, Salzburg, Austria, A-5081
+43.662.820176.12 fax: +43.662.820.1766 m.wisener@salzburg-zoo.at
Contact: M. Wiesner Data current to 31. Dec 2017

SEITSEMIN Seitseminen National Park
Seitsemisentie 110, Ylojarvi, Finland, FI-34530

SLOTTSKOG Slottsskogen Zoo
Park-och naturförvaltningen, Göteborg, Sweden, SE-401 22
+46.31.365.5819 anna.schonstrom@ponf.goteborg.se
Contact: Anna Schönström Data current to 31. Dec 2017