



WildForestReindeerLIFE:
**Supporting the homecoming
of native wild forest reindeer**

LAYMAN'S REPORT

PROJECT ACTIVITIES AND RESULTS 2016–2023



Cover image: Wild forest reindeer female and its calf in the breeding enclosure in Seitsemien National Park. Photo: Tiina Mäkelä

Other photographs: Milla Niemi, Metsähallitus Parks & Wildlife Finland; Tiina Mäkelä, Pekka Kilpeläinen, Metsähallitus Parks & Wildlife Finland, Sakari Mykrä-Pohja, Metsähallitus Parks & Wildlife Finland; Petri Timonen, Natural Resources Institute Finland; Outi Saarinen, Ähtäri zoo

Text and editing: Milla Niemi, Sakari Mykrä-Pohja

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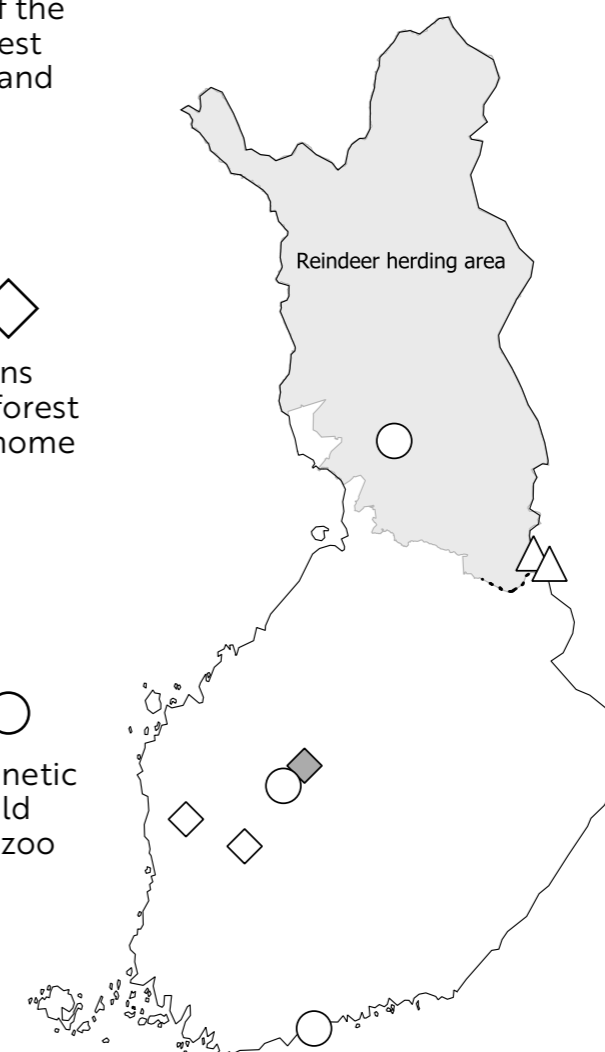
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A short history and current status of the native wild forest reindeer in Finland

The wild forest reindeer *Rangifer tarandus fennicus* is a subspecies of reindeer or caribou with a circumpolar distribution. Along with another subspecies, mountain reindeer *R. t. tarandus*, it was one of the first large mammal species to spread to the area of present-day Finland after the Ice Age. While mountain reindeer populated open mountains found in the north, wild forest reindeer inhabited forested areas in particular, although bone findings have shown that this forest-dwelling subspecies has also lived quite far north. At times the subspecies' range reached as far as the Baltic countries and Central Europe, but when climate and environmental conditions changed, and human populations grew and expanded, the wild forest reindeer retreated towards the north.

Once a common species throughout Finland, the wild forest reindeer was gradually hunted to nationwide extinction by the 1920s. Fortunately, the subspecies survived in western Russia, and began re-establishing in the Kainuu region of Finland in the 1950s. Slowly, the number of animals began to increase, and the wild forest reindeer reclaimed its place as a part of Finnish fauna. The return of wild forest reindeer was accelerated by implementing a reintroduction in Salamajärvi National Park in the early 1980s, leading to a current subpopulation of 2000 individuals. The reintroduced subpopulation

is based on ten founder individuals, and no approved gene flow between subpopulations has been detected.

Today, wild forest reindeer only occur in Finland, Russian Karelia, and the westernmost part of the Arkhangelsk oblast, with the total world population at approximately 5 000 individuals. In the late winter of 2023, approximately 3 000 individuals lived in Finland, divided over the two main subpopulations, Kainuu and Suomenselkä. In addition, two new subpopulations have been established recently.

Despite the massive conservation efforts and the positive trend in population development, the wild forest reindeer is not safe yet. A slow reproductive rate and strict habitat requirements predispose the species to danger. Threats include changes to landscape structure, predation by large carnivores, traffic mortality and other disturbances caused by humans.

As the majority of the world's wild forest reindeer population lives in Finland, the responsibility for preserving the subspecies falls on Finland, and thereby also on the EU. Therefore, the WildForestReindeerLIFE project, co-funded by the EU, was established in 2016 to improve the conservation status of the wild forest reindeer.

Photo: Milla Niemi



The wild forest reindeer has played a significant role in the settlement of Finland. Large herds provided a source of food along with materials for clothing and tools. The species importance is also reflected in the numerous place names derived from the word "wild reindeer", for example *Peurajärvi*, *Peura-aho*, and *Peura-aapa*, located all over the historical range of the wild forest reindeer.

Our intensive conservation efforts help to ensure that the wild forest reindeer is not only a figure from history but also an important part of Finland's future fauna.

The main objectives of WildForestReindeerLIFE-project were:

1. Expand the occurrence range of wild forest reindeer westwards by targeting reintroductions into two Natura 2000 sites, Lauhanvuori and Seitsemien National Parks
2. Improve the genetic diversity and viability of a small and isolated subpopulation living in central Finland
3. Improve the genetic diversity of the zoo population (*ex situ* population)
4. Prevent crossbreeding or hybridization between wild forest reindeer and semi-domestic reindeer
5. Improve the knowledge of local people and the general public regarding's knowledge about the wild forest reindeer

Enhancing knowledge to support conservation actions

During the WildForestReindeerLIFE project, we enhanced our knowledge of the wild forest reindeer by studying for example subpopulation sizes, animal movements, and causes of death. The collected data were utilized in planning concrete conservation actions, evaluating project success, and updating the Management Plan for the wild forest reindeer population in Finland.

Benefits of GPS collaring

To monitor their movements and survival, we equipped wild forest reindeer females with GPS collars. In total, we collected 160 monitoring periods, with durations ranging from three to four years. Six collars were fitted to females released from breeding enclosures into Lauhanvuori and Seitsemien National Parks (pp. 8–9), while four collars were allocated to females released to support the Ähtäri–Soini–Karstula subpopulation (p. 10). The remaining collars were targeted to the Suomenselkä and Kainuu subpopulations.

GPS monitoring helped us, among other things, to target aerial surveys and autumn censuses to the correct areas and to monitor wild forest reindeer movements near the reindeer herding area, thus facilitating the management of crossbreeding risks.

We also used the GPS data to model and map the habitat selection of wild forest reindeer females for calf nursing. Our primary objective was to identify and predict the distribution and abundance of the most valuable potential calf nursing habitats, emphasizing the importance of reducing the effects of intensive land use and avoiding unnecessary disturbances in these areas. Our secondary goal was to effectively visualize and communicate our findings to environmental consultants, authorities, and other stakeholders involved in making future land use decisions. Preliminary maps were published in the final phases of the project, with plans to further refine and improve them in the future.

Aerial censuses reveal wild forest reindeer population status

At the beginning of the project, we assessed the abundance and demographic structure of wild forest reindeer subpopulations. This was carried out through an aerial census from a helicopter. As wild forest reindeer tend to form large herds during winter, the census was conducted as a total count, in which nearly every individual was counted and photographed for later detailed identification. Aerial censuses are highly dependent on snow conditions. In 2017, the census was successfully conducted in Kainuu, revealing a subpopulation size of 750 individuals. A year later, the census in Suomenselkä was successful, giving an estimate of approximately 1450–1500 individuals.

Aerial censuses were also conducted towards the end of the project. In the late winter of 2022, 829 wild forest reindeer were counted in Kainuu and 1957 in Suomenselkä. In the late winter of 2023, no census was conducted in Suomenselkä, but a slightly larger number of wild forest reindeer were found in Kainuu than the previous year, totalling 885 individuals.

In 2023, we tested the aerial censuses for the first time to survey the reintroduced subpopulations in Lauhanvuori and Seitsemien, identifying a total of 41 individuals. As we knew from other sources that more wild forest reindeer were living in the areas, we concluded that we will need to invest more in pre-census field observations in upcoming years, to direct the aerial censuses to the right areas.



During aerial censuses, all spotted wild forest reindeer are photographed. Thereby it is possible to obtain additional information on the population's demographics, such as the proportion of calves. Censuses can be accurately directed to the right areas based on GPS-collared individuals and preliminary field observations.



Reintroductions helped the wild forest reindeer return home

The core of the WildForestReindeerLIFE project was to reintroduce the wild forest reindeer to new areas located in its historical range, thereby helping the species to expand its distribution area. The selection of actual reintroduction sites was based on careful planning. First, we identified areas where both summer and winter habitats were available. Then, to avoid the risk of crossbreeding with semi-domestic reindeer, we excluded sites with suitable habitat that were located too close to the reindeer herding area. Also, potential sites with a high density of large predators were rejected, although this situation changed during the project, as the focus of Finland's wolf population shifted from eastern Finland towards the west. Before beginning the concrete reintroduction work, we also conducted social impact assessments to ensure that local stakeholders accepted and supported the return of this native ungulate.

During the summer of 2017, we constructed breeding enclosures in Lauhanvuori and Seitsemien National Parks, which we selected as the reintroduction sites. The five-year captive breeding period began in late 2017, when we transported the first founder individuals to the enclosures. The majority of founders were born in zoos, underlining the importance of zoo populations in conservation translocations such as reintroductions. During the project, we also caught a total of ten individuals from the wild, to improve the genetic diversity of the reintroduced populations.

The first calvings occurred in the enclosures in May 2018, with a total of 51 calves born in captivity throughout the project. We were able to release 44 of them. Unfortunately, seven calves died in the enclosures, usually during labour or shortly after birth.

In autumn 2019, we released the first individuals into the wild. Specifically, after a habituation period, these young males born in zoos were freed from the enclosure into Lauhanvuori National Park. Next summer, we were also able to release individuals born within the enclosures. We continued the releases until July 2022, when the last individuals were set free from both enclosures. During the project, we released a total of 82 individuals from enclosures to the national parks.

The first free-ranging wild forest reindeer calves were born in May 2020 in Seitsemien National Park, and since then free-ranging calves have been born each year. The exact number of calves born in the wild is not known but likely approaches 30 individuals. Thus, both

reintroduced populations are reproducing naturally, and their future development depends on the individuals' survival. So far, the known survival rate has been relatively good, and both reintroduction sites have populations of 40–50 wild forest reindeer.

Although the results of the reintroductions have partly exceeded even the original goals, we need to monitor and support the development of both new subpopulations in the future, because they will be extremely sensitive to excess mortality by predation or other causes. It is also important to support the gene flow between the reintroduced subpopulations and the Suomenselkä subpopulation, to ensure their genetic diversity and long-term viability.

Left page photo: A female wild forest reindeer, released from the Lauhanvuori breeding enclosure, tends to her newborn calf. Right page photo: Wild forest reindeer calves, just a few weeks old, inside the Lauhanvuori breeding enclosure.



Photo: Sakari Mykrä-Pohja



Photo: Milla Niemi

Reinforcement of an existing small subpopulation in central Finland

When the WildForestReindeerLIFE project was in its planning phase, it seemed clear that a small wild forest reindeer subpopulation living in the Ähtäri–Soini–Karstula area was not connected to the Suomenselkä subpopulation. This isolated subpopulation originated from a reintroduction made in the late 1980s and early 1990s by releasing zoo-born individuals, and its genetic diversity was expected to be low.

One of our aims was to support the Ähtäri–Soini–Karstula subpopulation by releasing more wild forest reindeer individuals on three occasions, thus increasing the size and diversity of the subpopulation. In autumn 2018, we brought a group of adult zoo-born males into the enclosure and kept them there over winter. We believed that this period would be long enough to allow those individuals to become accustomed to living in wild-like conditions. Unfortunately, this proved to be a mistaken

assumption. All five released individuals behaved unexpectedly tamely.

We did not want to repeat our mistake, so after careful consideration, we decided to replace the two remaining supplementations with zoo-born wild forest reindeer with one event but using individuals from the wild. Thus, in March 2021, we captured four adult females from the Kainuu subpopulation and transferred them into the enclosure. Three of them gave birth in captivity, and the entire herd was released in mid-summer. As the females were GPS-collared, we have been able to follow their movements and know that they have joined the local wild forest reindeer population. During the project, it has also become clear that this supported subpopulation is not as small and isolated as expected but rather a part of the Suomenselkä subpopulation.

Improving the genetic base of the wild forest reindeer zoo population

Zoos are vital partners in numerous conservation translocation and reintroduction projects, and WildForestReindeerLIFE is no exception. Here, zoos offered veterinary expertise and assisted with capturing, transporting, and marking of animals. In addition, zoos provided most of the founder animals for the breeding enclosures, thus creating a solid base for the wild forest reindeer reintroduction. To continue using zoo-born animals in future reintroduction efforts, it is crucial to maintain the genetic diversity of zoo (*ex situ*) populations.

Before starting the WildForestReindeerLIFE project, all wild forest reindeer individuals (140) in European zoos (19) were descended from eight founder individuals originating from the Kainuu subpopulation. Thus, one important aim of our

project was to improve the genetic diversity of the *ex situ* population in Finnish and other European zoos.

During the project, we captured a total of six adult wild forest reindeer males to serve as founder individuals for the reintroductions. First, these males spent between one and two years in breeding enclosures, thereby contributing their valuable genes to the new subpopulations established in the project. Subsequently, the males were transferred to our three Finnish partner zoos, where they adapted well to the new conditions. By the end of 2023, five of them have produced offspring (30 F1-calves and two F2-calves). The number of founders in the wild forest reindeer *ex situ* population was thus increased to 13.

Left page photo: The wild forest reindeer were released from the Karstula enclosure simply by opening a gap in the fence.
Right page photo: Wild born wild forest reindeer male in Ähtäri Zoo.



Photo: Milla Niemi



Photo: Outi Saarinen

Protecting the wild forest reindeer genome

Preventing crossbreeding with semi-domestic reindeer

The wild forest reindeer and the semi-domestic reindeer are both subspecies of the reindeer *Rangifer tarandus* and are thus capable of crossbreeding. The semi-domestic reindeer is domesticated from the mountain reindeer – and given its domestication in general, hybridization between these subspecies has been recognized as a major threat to the wild forest reindeer genome.

Preventive actions have been taken especially in Kainuu, eastern Finland, where wild forest reindeer occur next to the reindeer husbandry area. There, a 90-km long conservation fence,

built in the 1990s, separates the subspecies from each other and is the most important tool for preventing crossbreeding. During the WildForestReindeerLIFE project, we improved the existing barrier structures by replacing four non-functional cattle grids, by repairing three existing forestry road gates, and by constructing ten new pedestrian gates to help human crossings. In addition, we filled two gaps in the border reindeer fence by erecting a traditional terrestrial fence around Lake Kivijärvi and a floating fence through Lake Raatejärvi. This was to prevent wild forest reindeer from slipping into the reindeer herding area while migrating from their summer pastures in Russia to their wintering habitat in Kainuu.

Autumn herd censuses also allow for observations of semi-domestic reindeer that have joined wild forest reindeer herds. This herd, photographed in Kuhmo, consists solely of wild forest reindeer. The inset photo is from Lake Raatejärvi in Suomussalmi, where probably the world's first floating reindeer fence was constructed to serve as part of the border reindeer fence.

Reindeer outside the reindeer herding area pose a crossbreeding risk

In addition to northern Finland, where free-roaming semi-domestic reindeer are an important part of the actual local livelihood, they are sometimes kept as private pets also outside the reindeer herding area. There, semi-domestic reindeer are often seen in petting zoos or other tourist attractions, and sometimes they are used for small-scale meat production. Such reindeer keeping creates a threat for the wild forest reindeer conservation when pet animals escape from farms.

When we began the WildForestReindeerLIFE project in 2016, no regulations were in place concerning reindeer keeping outside the reindeer herding area or even the individual marking of pet reindeer. Therefore, one of the

project actions was to survey and map farms and other reindeer keeping establishments, and to plan the systematic marking of reindeer. The survey was conducted in 2022, and it resulted in bringing to light a total of 59 small-scale reindeer farms or other establishments outside of the reindeer herding area. In general, the keepers were reluctant to provide details of any escape incidents, but based on their interviews and a newspaper search, it was obvious that some reindeer have occasionally been able to flee from their enclosures. According to the owners, most of the escaped reindeer had been recovered, but some animals remained missing. Regardless of the project, new EU regulation considering the identification of cervids was implemented in 2021, thus effectively putting an end to the abovementioned deficiency in small-scale reindeer farm registration and animal marking.



Photo: Tiina Mäkelä

From recovery to resilience: future steps for wild forest reindeer conservation

Reintroduced subpopulations will need support to establish themselves

Overall, the WildForestReindeerLIFE project achieved significant success. We even exceeded our goals with the most critical conservation action, the reintroductions; after the project, both Lauhanvuori and Seitsemien National Parks boast a herd of 40–50 wild forest reindeer each. However, this should only be considered the beginning of the work.

Small populations are widely acknowledged to be particularly vulnerable to stochasticity, potentially leading to increased extinction risk and affecting population dynamics. Therefore, supporting the development of these reintroduced subpopulations in the forthcoming years is essential. Efforts will include releasing more wild forest reindeer into the reintroduction areas to expand the sizes of the new subpopulations and to improve their genetic diversity.

Enhancing connectivity among subpopulations

Over the long term, we must aim to facilitate the natural connectivity between subpopulations. This applies not only to those that have been reintroduced but also to the Suomenselkä and Kainuu subpopulations, which are not known to have been interacting yet. By implementing a reintroduction in the critical areas between subpopulations and carefully considered animal transfers between subpopulations, we could help create movement between the subpopulations.

To enhance the establishment of a permanent connection, we plan to intensify drained peatland restoration in the areas between the subpopulations. Additionally, we will continue to produce knowledge on the habitat requirements of the wild forest reindeer and actively share this information to land use planners.

Effective management of the crossbreeding risk is necessary

To protect the wild forest reindeer genome, an active prevention programme has been implemented to prevent crossbreeding with semi-domestic reindeer. Most of these measures have been targeted to Kainuu, where the subspecies have coexisted for a long time.

One future challenge will be to prevent the hybridization of wild forest reindeer and semi-domestic reindeer in North Ostrobothnia, where the Suomenselkä subpopulation is expanding its occurrence towards the reindeer herding area. One non-lethal possibility is to separate the subspecies by constructing a reindeer fence along the southern border of the reindeer herding area, such as in Kainuu. In addition, the intensive monitoring of both wild forest reindeer and semi-domestic reindeer and active collaboration with reindeer owners will be needed.

At least in theory, hybridization could occur practically anywhere within the range of the wild forest reindeer. Hybrid individuals cannot always be recognized based on their phenotypes.

Therefore, in addition to traditional tools, such as monitoring and communication, there is a need to develop rapid and cost-effective DNA analyses for identifying hybrids. In the future, each wild forest reindeer captured from the wild for reintroduction purposes or to improve zoo populations should be tested to detect potential hybridization. These tools could also be utilized to reveal poaching when only meat or a skinned carcass is found.

Intensive conservation efforts demand substantial resources

The Ministry of Agriculture and Forestry is responsible for the costs associated with monitoring the reintroduced wild forest reindeer subpopulations and the routine work to manage the crossbreeding risk. However, actions requiring significant investment, such as new reintroductions and enhancing gene flow between subpopulations, cannot succeed with national funds alone. Therefore, we are currently preparing a new LIFE funding application to the EU, to increase resilience and improve the long-term conservation status and viability of this endemic species.



Photo: Milla Niemi

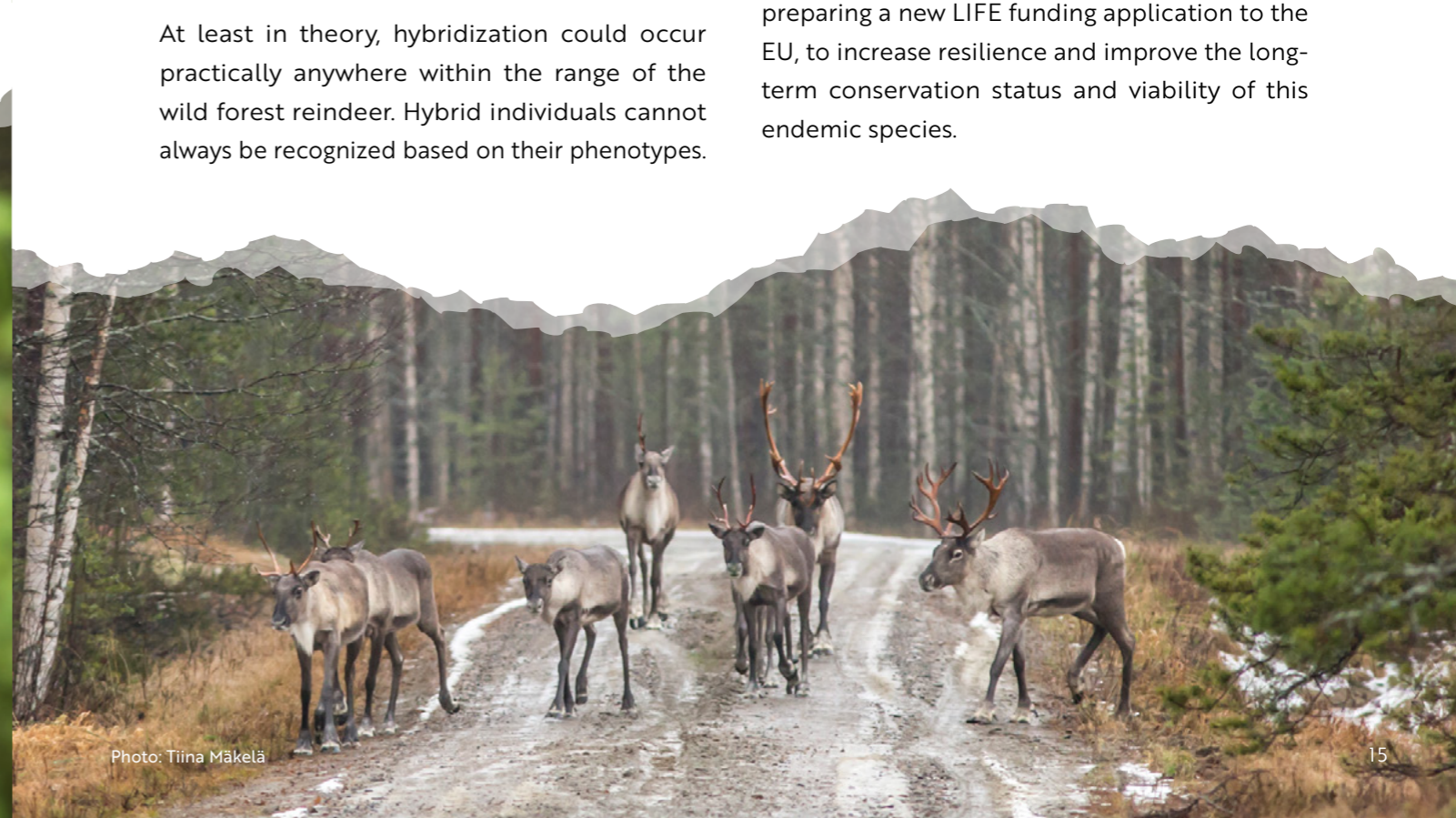


Photo: Tiina Mäkelä

Photo: Milla Niemi

