LIFE15 NAT/FI/000881

Final Report

Covering the project activities from 01/10/2016 to 31/12/2023

12.04.2024

WildForestReindeerLIFE

Project Data

Project location:	FINLAND
Project start date:	01/10/2016
Project end date:	31/12/2023
Total budget:	5 164 538 €
EU contribution:	3 054 098 €
(%) of eligible costs:	60

Data Beneficiary

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Package completeness and correctness check	
Obligatory elements	**✓ or N/A**
Technical report	
The correct latest template for the type of project (e.g. traditional) has been followed and all sections have been filled in, in English *In electronic version only*	✓
Index of deliverables with short description annexed, in English *In electronic version only*	✓
~~Mid-term report~~: ~~Deliverables due in the reporting period (from project start) annexed~~ Final report: Deliverables not already submitted with the MTR annexed including the Layman's report and after-LIFE plan Deliverables in language(s) other than English include a summary in English *In electronic version only*	✓
Financial report	
The reporting period in the financial report (consolidated financial statement **and** financial statement of each Individual Beneficiary) is the same as in the technical report with the exception of any terminated beneficiary for which the end period should be the date of the termination.	✓
Consolidated Financial Statement with all 5 forms duly filled in and signed and dated *Electronically Q-signed or if paper submission signed and dated originals* and in electronic version (pdfs of signed sheets + full Excel file)*	✓
Financial Statement(s) of the Coordinating Beneficiary, of each Associated Beneficiary and of each affiliate (if involved), with all forms duly filled in (signed and dated). The Financial Statement(s) of Beneficiaries with affiliate(s) include the total cost of each affiliate in 1 line per cost category. *In electronic version (pdfs of signed sheets + full Excel files) + in the case of the Final report the overall summary forms of each beneficiary electronically Q-signed or if paper submission, signed and dated originals**	✓
Amounts, names and other data (e.g. bank account) are correct and consistent with the Grant Agreement / across the different forms (e.g. figures from the individual statements are the same as those reported in the consolidated statement)	✓
~~Mid-term report (for all projects except IPs): the threshold for the second pre-financing payment has been reached~~	**N/A**
Beneficiary's certificate for Durable Goods included (if required, i.e. beneficiaries claiming 100% cost for durable goods) *Electronically Q-signed or if paper submission signed and dated originals* and in electronic version (pdfs of signed sheets)*	✓
Certificate on financial statements (if required, i.e. for beneficiaries with EU contribution ≥750,000 € in the budget) *Electronically Q-signed or if paper submission signed original and in electronic version (pdf)*	✓
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Additional information / clarifications and supporting documents requested in previous letters from the Agency (unless already submitted or not yet due) *In electronic version only*	✓
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**signature by a legal or statutory representative of the beneficiary / affiliate concerned*

1. TABLE OF CONTENTS

2. List of key-words and abbreviations

Keywords: **Wild forest reindeer** | ***Rangifer tarandus fennicus*** | **Finland** | **endemic** | **subspecies** | **reintroduction** | **reinforcement** | ***in situ*** | ***ex situ*** | **habitat restoration** | **GPS** | **population census** | **human dimension** | **population management** | **cross breeding prevention** | **large carnivores**

Abbreviations (beneficiaries): **MH** - Metsähallitus Parks & Wildlife Finland (CB) | **FTIA** - Finnish Transport Infrastructure Agency | **NRIF** - Natural Resources Institute Finland | **MHMOY** - Metsähallitus Forestry | **RHA** - Reindeer Herders' Association | **FWA** - Finnish Wildlife Agency | **WWF** - World Wide Fund for Nature Finland | **ZooHelCity** - Helsinki Zoo as a Section in the City of Helsinki administration until 1.1.2018 | **ZooHelFoun** - Helsinki Zoo as a foundation since 1.1.2018 | **ZooRanua** - Ranua Zoo | **ZooÄhtäri** - Ähtäri Zoo

Abbreviations (other): **PR1/PR2/PR3/PR4** - Progress Reports 1–4 | **MtR** - Mid-term Report | FR - Final Report | **WFR** - Wild forest reindeer | **LC** - Large carnivores | **CB** - Coordinating Beneficiary | **AB** - Associated Beneficiary | **GMA** - [local] Game Management Association | **EAZA** - European Association of Zoos and Aquariums | **HR** - Human Resources | **MAF** - Ministry of Agriculture and Forestry | **ME** - Ministry of Environment | **GA** - Grant Agreement

3. Executive Summary

3.1 Objectives and outputs

The planned core objectives of the project were to 1) extend the occurrence range of the wild forest reindeer (*Rangifer tarandus fennicus*) towards SW from its current largest subpopulation 2) reduce or prevent the cross breeding of WFR with domestic reindeer, 3) improve the genetic diversity of the WFR *ex situ* population, 4) reduce WFR traffic mortality 6) improve the subspecies' habitat in multi-use forest landscapes, and 7) improve the knowledge base of local peoples and general public on WFR and its conservation and management.

The most central of the planned expected outputs were 1) tagging of over 120 wild WFRs with GPS-collars for intense monitoring of breeding, survival, movements and habitat use, 2) piloting the WFR habitat restoration on selected target areas totalling 400 ha, 3) creating two new WFR subpopulations in Natura2000 -areas Seitseminen and Lauhanvuori with >30 free ranging individuals in each at the end of the project, 4) preventing the hybridization between WFR and domestic reindeer altogether, 5) increasing the number of founders in the WFR *ex situ* population from 8 to 14, and 6) improving the knowledge of WFR and its conservation *significantly* among public.

The long list of planned project deliverables (altogether 41, of which one was cancelled) showed a few core themes within which there were several independent publications in the offing, such as population censuses, anthropogenic mortality and illegal actions on WFR, and WFR habitat mapping, restoration and management. The most central project action C1 was to be represented in the D4 deliverable on replication and transfer. Index of deliverables is annexed (Annex 1).

In addition, we prepared a selection of additional deliverables that are annexed to this FR. They present 1) an extensive update of those Natura 2000 areas in Finland, where WFR needs to be added to the standard data form; 2) a survey of domestic reindeer keeping outside the

statutory reindeer herding area; 3) articles/submitted manuscripts of project topics; 4) description of the project's closing seminar held in June 2023, and 5) an extensive list of communication activity by the beneficiaries during the project.

3.2 Plans vs. progress

WildForestReindeerLIFE can be said to have been successful and the proceedings in the project actions have been to a large extent faithful to the project plan. Basically, only one major drawback took place during the project so far. With that we refer to the action C7, where we eventually ceased the habitat restoration because of quite overwhelming restoration boom nationwide. This has been thoroughly elaborated earlier, and again in this reporting. The habitat improvements were achieved many times over, but not by us. The savings from the action C7 cessation were redirected to closing seminar arrangements in June 2023 (see Annex 7). When it comes to notable changes in actions A6 or C2, for example, it is justified to assume that the final results turned out to have more potential in WFR conservation than those originally expected. Other minor problems and quite a few delays are described in more detail below. All 23 project actions were completed by the end of the project. It is, therefore, safe to summarize that the occurred delays have not been particularly severe and that they did not interfere with planned and successful completion of the project.

Almost all outputs materialized expectedly by the end of the project. As regards, the actions mentioned above (A6, C2, C7), the output obviously follows the changed situation. One minor deliverable in action C5 was cancelled altogether.

4. INTRODUCTION

4.1 Project background, problems and objectives

The Finnish wild forest reindeer (*Rangifer tarandus fennicus*) is a subspecies of reindeer/caribou (*Rangifer tarandus*) that has a circumpolar occurrence range. Nearly all populations of wild reindeer and caribou have been in decline in the last centuries or more recently. The *R. T. fennicus* is not an exception - it declined due to overharvesting since the 17th century and went extinct in Finland in the 1920s. It remained in a refugium in NW Soviet Union and returned to Finland in the 1940s. A modest steady increase and two reintroductions took place until in the early 2000s a severe decline occurred in the original population.

At the time of the project start, the conservation status of WFR in Finland (and thus, in the whole EU) was unfavourable. The major threats causing the alarming population to decline in the 2000s are related to excessive mortality in the original core area of occurrence. Research showed that the most significant causes of mortality were large carnivore predation and traffic. Large carnivore predation is assumed to be connected to habitat changes. In Russia, illegal killing is claimed to have drastic effects on the subspecies, but in Finland its role is assumed to be negligible.

Before and during the project WFR population had started recovering, and in 2019 the conservation status was updated as favourable.

An obvious long-term goal of WFR conservation in EU must be that the subspecies reclaims its historical range wherever there is suitable taiga forest habitat or otherwise suitable forest habitat available, and where the occurrence of the species does not jeopardize the fulfilment of social sustainability. The first step towards this long-term goal was taken in Finland already in the 1980s as the first reintroduction from Kainuu to Suomenselkä. This reintroduction

turned out to be a total success as the Suomenselkä population is now 2000-strong at the project end.

The most pressing issues in WFR conservation in Finland and in EU in the short-term has been the poor breeding success because of excessive calf mortality by large carnivores, high risk of cross breeding with the semi-domestic reindeer, and the degradation of forest habitat quality outside protected areas. The breeding success improved during the project after the mentioned severe decline in Kainuu between 2001-2015, but the threat still remains because, overall, WFR is a poor breeder by nature. A new threat has emerged only recently, stemming from the surge in clean energy production in recent years, the tremendous speed of which is, of course, ultimately due to Russia's unlawful attack on Ukraine in 2022. Unfortunately, the growth of onshore wind energy production seems to be targeting areas crucial for the WFR in Finland.

In WildForestReindeerLIFE the population threats were responded by striving towards the following objectives: 1) to expand the occurrence range westwards via reintroduction into two Natura 2000 areas; 2) to prevent the cross breeding of WFR with semi-domestic reindeer using various methods; 3) to improve the genetic diversity and viability of a small subpopulation in Central Finland; 4) to improve the genetic diversity of the WFR *ex situ* population; 5) to reduce the anthropogenic mortality, 6) to pilot the improvements of WFR habitat in multi-use forest landscapes; and 7) to broaden the knowledge base of local peoples and general public in terms of WFR conservation and management.

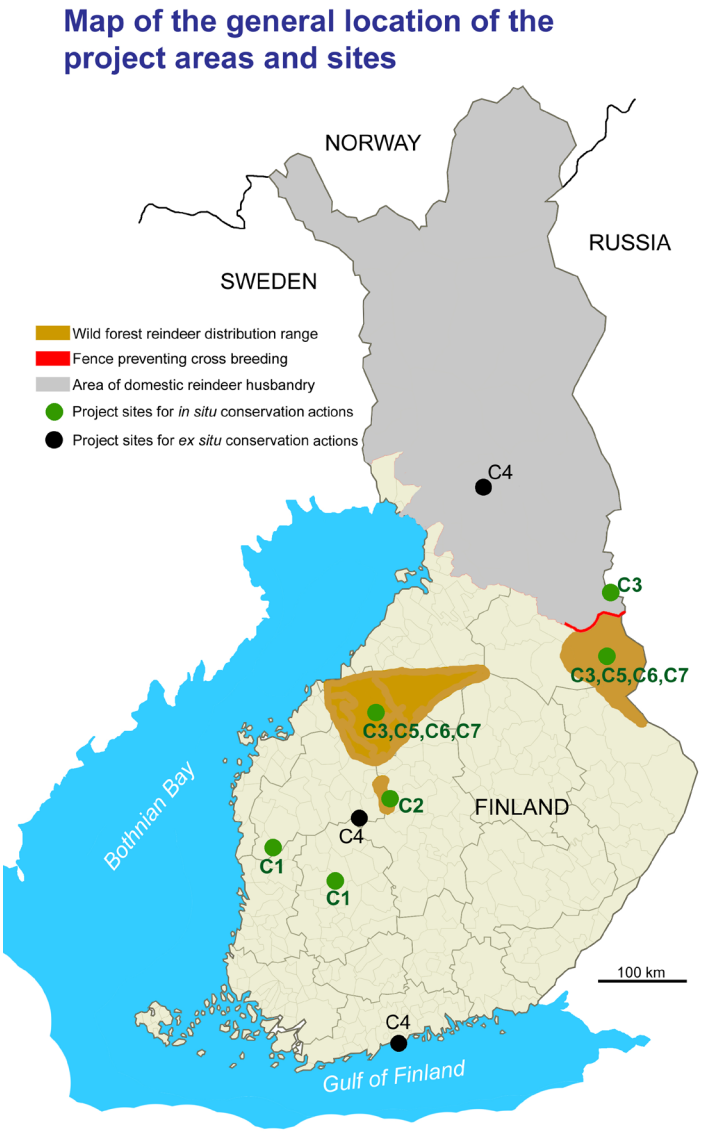
Because of the multitude of objectives / related tasks, the number of project sites was also relatively high. Concrete conservation actions took place throughout the WFR occurrence range, in selected sites along the reindeer herding area, in three Finnish zoos and in three Natura2000 sites Lauhanvuori FI0800001, Seitseminen FI0311002 and Aittosuo-Leppäsuo-Uitusharju FI0900005. (*Sites C1 and C2 on a map in Figure 1*)

Reintroducing WFR – or any other large-sized animal, for that matter – to a landscape inhabited and used by rural people and rural communities will obviously bring about socioeconomic effects. This, however, was not a new situation in Finland. Comparing to WFR, we have other ungulates whose numbers are orders of magnitude higher, such as the moose, the white-tail and the roe deer. Also, we have viable populations of several large carnivores - both terrestrial and marine. All those species have both positive and negative social and economic effects to local people, which must generally be considered whenever planning or implementing wildlife population management policy.

In socioeconomic sense the WFR is perhaps one of the easiest species to live with in its size class. It does not cause extensive crop damages, nor does it inflict practically any forest damages. Road collisions with WFR mostly end up with material damage only. Merging of local peoples' needs with WFRs need has already been done successfully on several occasions in Finland.

In Suomenselkä, the WFR is also utilised as tourist attraction. Viable populations could be an object for a low-profile but globally extremely exotic eco-tourism. It is noteworthy that the target populations of the project are probably the only *Rangifer tarandus* populations in Europe and perhaps in the whole world that occur within reach of modern public transportation.

Figure 1. Project areas and sites



In legislation WFR is a huntable game species. Some hunting licenses are issued annually, but their proportion is low (only 0,5 % of the population), and they are aimed at mitigating occasional crop damages. If WFR occurred in numbers that would allow sustainable harvest, it would provide ecosystem services for local people in the form of venison. Also, there would be potential for local economic benefits from WFR trophy hunting.

Social Impact Assessments for the sake of planned reintroductions have been carried out before and during the project in actions A3 and D5.

4.2 Expected longer term results

If uncontrolled excess mortality does not jeopardize the viability of the existing subpopulations or establishing of the reintroduced populations, the long-term results of the project in Finland will show expansion of WFR occurrence range, increase in WFR numbers, inclusion of WFR into the species lists of further protected areas (see Annex 8), perhaps modest alteration of forestry practises, and a potential for expanding the WFR occurrence to other Member States through replication and transfer. This brings us to the obvious long-term

goal of WFR conservation in the whole EU. Such goal could be that the subspecies reclaims its historical range wherever there is suitable taiga forest habitat or otherwise suitable forest habitat available, and where the occurrence of the species does not jeopardize the fulfilment of social sustainability.

5. ADMINISTRATIVE PART

The project manager **Sakari Mykrä-Pohja** has worked as a full-time for CB in the project from the day one. He has the main responsibility for the project management work and related correspondence with the ABs in action F1. In February 2107, CB recruited a full-time project planner **Milla Niemi** ('additional advisor' in the budget). They have participated in one way or another to practically all project actions, and one of them or both had a substantial role in A4, A5, A6, A7, C1, C2, C3, C6, C7, D3, D4, D5, D6, E1 and E2. Their co-working has been straightforward and efficient. Similarly, the relations between the CB and the ABs were smooth and honest with no disagreements.

All associated beneficiaries had persons responsible for technical and financial issues. In some cases, these persons were the same, which was far from being an optimal solution, obviously. The CB employed altogether 3-4 accounting experts specialized on various projects. One of them was assigned to allocate hours for the accounting of the CB's share of expenditures in this project. The coordinated project level financial reporting (all beneficiaries combined), on the other hand, belonged solely to the project manager.

As it is known, the budgeting to HR for the tasks assigned to CB failed, and the allocation was disproportionate with the actual workload. The coordination staff made the decision to secure the technical progression of the actions. This encumbered the project administration, and often the execution was not smooth nor timely. Delays occurred, but they were tackled before the project end.

Communication with the EASME was uncomplicated. We were heard and our situation regarding the HR issues were acknowledged and understood. Excusing for action delays and requesting of reporting deadline postponements have not felt particularly awkward, which is important in dealing with the stress that couldn't be avoided in those situations. The communication and correspondence with the NEEMO monitor were frequent throughout the project, and the outcome was always helpful – sometimes crucially so. Instead, the changes that led to the prohibition of direct contact with the monitor and the implementation of the Helpdesk were not welcomed at all.

Altogether four amendments were made during the project, which treated 1) changes in CB's name / address, 2) changes in AB's name / address, 3) taking on board a new AB (twice), 4) termination of an AB, 5) financial amendment initiated by EASME, and 6) extension of project for 3 months.

6. TECHNICAL PART

6.1 Technical progress, per action

Action A1 - Gathering and analysing of existing and new WFR telemetry data

Completed / Foreseen start: 01/10/2016 Actual start: 01/10/2016
Foreseen end: 31/12/2022 Actual end: 31/12/2022

A modern tracking technique was employed to gather spatially referenced data from all Finnish wild forest reindeer (WFR) subpopulations, with extensive analysis of both newly collected and existing data serving as a preparatory action for the entire project.

The project initially planned to purchase 121 GPS collars but managed with 110 due to efficient battery replacements. By refurbishing 50 devices, a total of 160 tracking periods were achieved. Currently, around 40 collars are functional for wild forest reindeer (WFR) conservation.

Throughout the project duration, Vectronic-type GPS IRIDIUM collars were utilized, generating a substantial volume of high-quality GPS-fix data. In total, 1,282,406 fixes were recorded between October 1, 2016, and September 30, 2023, with an average of 4951 fixes per animal. The fix rate per collar was primarily set at 4 hours, with a satellite delivery rate of 16 hours. Additionally, 1-hour and 2-hour fix rates were employed during field monitoring seasons. Each collar was assigned a unique ID and VHF-receiver frequency for fieldwork purposes, including tracking female status and calf inspection. Dropped functional collars were refurbished with new batteries and reused in subsequent marking sessions.

GPS fixes were transmitted from the Vectronic Iridium-server and stored in a database server provided by the Swedish University of Agricultural Sciences WRAM database service. The project manager of Luke/NRIF/NRIF (responsible AB of action A1) oversaw WRAM data maintenance and sharing using the Luke/NRIF sharing protocol. GPS fixes were disseminated across the species' range and habitats, covering breeding areas, wintering areas, and migration corridors, with special emphasis on mapping core areas crucial for species viability.

Mature female WFR were anesthetized and marked in accordance with the permit criteria set by the Finnish National Animal Experiment Board. Anaesthetized females were located either by helicopter or by waiting near supplementary feeding sites and were marked on the ground, adhering to established permit criteria. After administering the appropriate dose, marked females were handled according to approved methods outlined in the permit criteria. The project conducted a total of 173 new markings, with only adult females marked.

Action A1 played a vital role in the project, serving as a preparatory step for various other project actions. Initially intended to provide detailed information on the distribution, movement, habitat use, survival, and reproductive success of individually marked WFR throughout the project duration from 2016 to 2023, A1's significance was paramount. While its importance may have been slightly overestimated in hindsight, it undeniably served as a prerequisite for or greatly benefited many core actions, including A2, A6, C1, C2, C3, and D1.

Regarding modifications, problems, or delays, we are glad to tell that there were not any particular issues in action A1.

Perspectives for the future: WFR have been remote tracked for quite some time in Finland, but because of this LIFE-funding the scale of these operations was completely different during the project from previous practices. The large volume of accumulated data will be invaluable for forest reindeer conservation efforts in the future. Calf survival is evidently crucial for WFR conservation and population viability, and GPS-technology is the key to keep track on that. Moreover, remote monitoring plays a significant role in investigating the sudden, unforeseen land use changes in forests related to the emergence of green energy production. Extensive wind power construction may seriously endanger the viability and survival of the forest reindeer population, as a considerable portion of the construction targets precisely the species' core habitat areas. Using methods such as habitat modelling implemented in action A6 of the project, the possible effects of land use changes can be analysed using WFR's GPS data, and on the other hand, guide land use planning projects to areas with lower environmental risk.

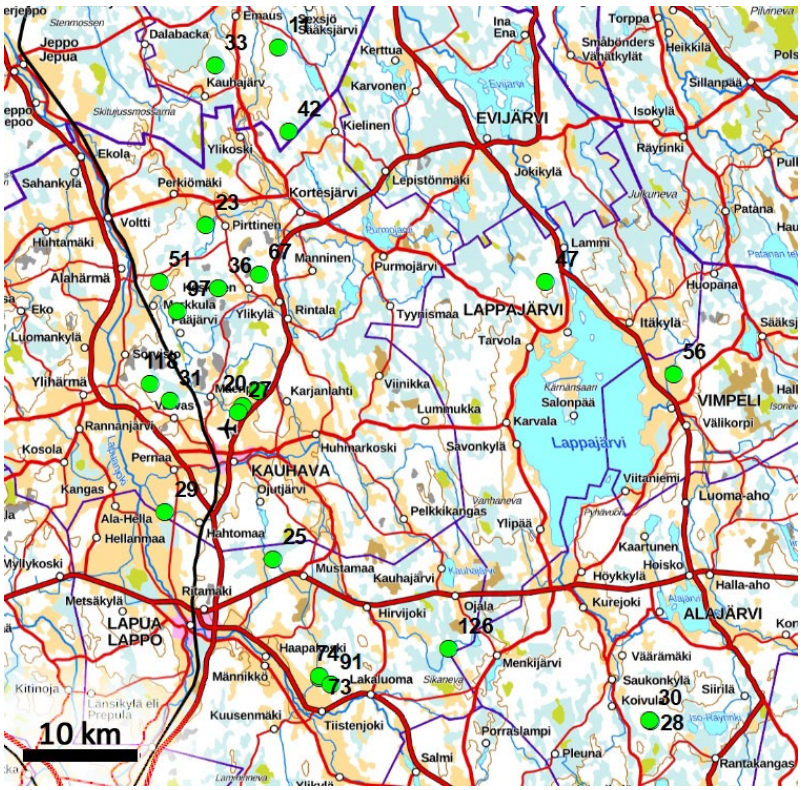


Figure 2. The telemetry data continued accumulating up to the end of the project and beyond Altogether 44 GPS-collars that were purchased in action A1 are still in use at the time of the FR submission. The map shows the fixes of the tagged females of Suomenselkä on the 21 March 2024. (Map: National Land Survey of Finland: Data: Luke/NRIF).

DELIVERABLE of A1: '*Final report of overall telemetry results during the project*' was uploaded to ***BUTLER*** on 19 March 2024.

Action A2 - The status of WFR population at the start of the project

Completed / Foreseen start: 01/01/2017 Actual start: 01/01/2017
Foreseen end: 15/05/2018 Actual end: 15/05/2018

The abundance and demographic structure of Finnish wild forest reindeer (WFR) subpopulations were measured in March 2017 and March 2018 using an opportunistic aerial census method with a helicopter, providing a comprehensive starting point for subsequent project actions.

The 2017 census in Kainuu region yielded successful results, with a recorded count of 748 individuals, estimating the sub-population size to be approximately 750. However, the calf proportion was remarkably low at 10.5%, hinting at potentially excessive large carnivore predation on calves during the winter months. In contrast, the 2017 census in Suomenselkä was incomplete due to unfavorable conditions, resulting in a count of 635 individuals, with a slightly higher calf proportion of 13.5%.

In 2018, the census in the Suomenselkä region was completed successfully, sampling nearly all individuals and estimating the sub-population size to be approximately 1450-1500 individuals. The calf proportion saw an improvement, reaching 18%, which was 4% higher than the previous successful census in 2015. However, the 2018 census in Kainuu was halted due to snow conditions, resulting in only 550 individuals counted. Given the challenges faced and the considerable effort required, persisting with the census in Kainuu would have been impractical and wasteful.

Despite facing challenges, both census years achieved a 50% success rate, aligning with the planned strategy of conducting two consecutive census years to validate population estimates. The proposed objective of censusing existing WFR subpopulations in 2017 and 2018 was met without issues regarding the timeline.

Late winter aerial census is contingent on WFR gathering in large flocks, which was achieved for both subpopulations in 2017-2018. However, challenges arose due to melting snow in Suomenselkä in 2017 and thick snow cover with frozen layers in Kainuu in 2018, making it difficult to detect dispersed WFR from aircraft.

See below the technical results of action D1 and the image attached therein on the development of the WFR population in Finland during the project years.

DELIVERABLES of A2: '*Report on the aerial census results of 2018*' and '*Report on the aerial census results of 2018*' were annexed to the ***PR1*** and ***PR2***, respectively.

Action A3 - Social impact assessment of reintroduction of WFR in Seitseminen region

Completed / Foreseen start: 01/10/2016 Actual start: 01/10/2016
Foreseen end: 31/12/2016 Actual end: 31/12/2016

In preparation for C1, a Social Impact Assessment (SIA) was conducted to evaluate the potential impacts, local acceptability, and community willingness to participate in the wild forest reindeer (WFR) reintroduction around the Seitseminen Natura 2000 area (FI0311002). Similar assessment had been made in Lauhanvuori region some time earlier before the project.

Project action A3 proceeded according to schedule, with the completion of a report titled 'Metsäpeuran palautusistutuksen sosiaalisten vaikutusten arviointi Seitsemisen kansallispuistossa ja lähiympäristössä' (Social Impact Assessment of Reintroduction of Wild Forest Reindeer in Seitseminen Region) before the deadline of December 31, 2016. This report was subsequently published in 2017. The assessment highlighted mostly positive impacts expected from the reintroduction of wild forest reindeer, although there were concerns

regarding potential negative impacts, such as attracting large carnivores and causing economic damages. Additionally, NRIF has published a peer-reviewed research article on the same topic (Hiedanpää & Pellikka 2022; see Annex 9 of this report). With that publication, it can be stated that action A3 is one of those that can be said to have exceeded 100% completion.

DELIVERABLE of A3: '*Metsäpeuran palautusistutuksen sosiaalisten vaikutusten arviointi Seitsemisen kansallispuistossa ja lähiympäristössä*' (Social impact assessment of reintroduction of wild forest reindeer in Seitseminen region) was annexed to the ***PR1***.

Action A4 - Examination of human-caused mortality of WFR

Completed / Foreseen start: 01/04/2017 Actual start: 01/04/2017
Foreseen end: 30/06/2018 Actual end: 25/03/2019

In assessing human-caused mortality of WFR, which includes hunting, traffic incidents, and illegal killings, the study surveyed records from traffic authorities, law enforcement, game management agencies, and district courts across the species' distribution range to elucidate previously unquantified mortality rates. This preparatory effort for Concrete conservation actions C5 and C6 consisted of two sub-actions designed to uncover the extent of unknown mortality.

Action A4 encountered challenges stemming from shortages in human resources and time constraints. Data collection for sub-action A4.1 commenced in the first reporting period and continued throughout late 2017 and the entirety of 2018. As for sub-action A4.2, the project planner conducted the initial meeting with the MH Game Wardens during the first reporting period, with subsequent meetings held in August and September 2018. The reports for both A4.1 and A4.2 were finalized by the project planner during February-March 2019.

Although A4 was not particularly demanding in terms of labour, its execution was delayed due to the presence of more urgent priorities.

Action A4 is also one of those that can be said to have exceeded 100% completion, since an article manuscript titled "*Traffic mortality of wild forest reindeer Rangifer tarandus fennicus in Finland*" that describes the findings of the action has been accepted for publishing by a peer-reviewed journal, *Nature Conservation* (see Annex 10).

DELIVERABLES of A4: '*Report on human caused WFR mortality*' [in Finnish with English abstract] was annexed to ***PR2***. It actually combined two of the planned A4 deliverables, namely, the '*Report on WFR poaching and disturbance prevalence*' and the '*Report of WFR traffic mortality*'.

Action A5 - Initiating a new coordinated field census method

Completed / Foreseen start: 01/01/2017 Actual start: 01/01/2017
Foreseen end: 31/12/2022 Actual end: 31/12/2022

In late winter and early spring, prior to the spring migration, Wild Forest Reindeer (WFR) gather in large herds. During this period, conducting aerial censuses using helicopters provides accurate data. However, this method is costly and highly dependent on weather and snow conditions; without significant snow cover, WFR are not easily spotted from the air. While favourable snow conditions are typical in Kainuu, areas like Suomenselkä and those farther south, targeted for reintroduction efforts, often experience a lack of extensive snow cover before the optimal census

date. Climate change exacerbates this challenge. Hence, there's a clear need for a coordinated and standardized autumn census.

Additionally, it's worth noting that autumn field monitoring occurs only five months after calving and six months before a potential aerial census. Given that calf predation mortality tends to be higher during the first months, this autumn census serves as an 'Early Warning System' for any excessive mortality among young calves. The calf percentages from late winter aerial censuses alone cannot distinguish between mortality during that winter and the preceding summer.

Volunteer training sessions were conducted in September 2017, drawing upon the expertise of NRIF and FWA professional WFR field personnel and existing training materials. A six-year period was allocated for developing this pilot census within the project.

In the initial stages, FWA field personnel encountered some challenges, which is understandable given the pilot nature of the project. However, overall, the project progressed as anticipated.

Year 2017: The first pilot census took place on November 14-15, 2017. However, the census teams only identified 33 WFR (3 bulls, 17 cows, 10 calves, and 9 unknown). This number fell short of expectations, and the sample size was inadequate for reliable estimates. Although plans were made for a second census round in week 51 of 2017, this was abandoned in favour of method improvement for 2018.

Year 2018: The census window was extended in 2018 to ensure better results. Conducted over a two-week period from December 1 to 14, the census teams identified 307 WFR, with 197 recognized (47 bulls, 107 cows, 43 calves, and 110 unknown).

Year 2019: The 2019 census took place from November 11 to 16, with a total of 245 WFR observed, of which 169 could be identified by sex and age. These censuses sampled approximately 20% of the known WFR population verified in the preceding spring's aerial census, meeting the success target. However, the proportion of unidentified individuals remained high, despite improvements in expertise and skills among the census takers.

Year 2020: The 2020 census, conducted in November, observed 337 WFR, with 275 identifiable by sex and age. The sampling in 2018 and 2019 covered approximately 22% of the known population, nearing the successful 20% target. Efforts to minimize unidentified individuals were successful, with only 18% remaining unidentified, the lowest from 2017 to 2020. Drone camera trials in 2020 yielded promising results, continuing into 2021, aiming to enhance identification accuracy and increase coverage for effective population assessment and conservation planning.

Year 2021: Spanning from October 19 to 31, the 2021 census observed 436 WFR, with 346 identifiable by sex and age. This census, following a successful aerial census, achieved a similar coverage percentage as previous years, around 22% of the verified WFR population. Despite aiming for higher coverage, even a 20% sample suffices. Efforts continue to minimize unidentified individuals, with 'unknown class' proportions at 18% in 2020 and 21% in 2021. While drone camera trials began in 2020, ground-level video footage proves more effective for complementary data collection, aiming to accurately estimate breeding success and detect population trends.

Year 2022: The 2022 census, conducted from November 18 to 21, observed 399 WFR, with 283 identifiable by sex and age. Like previous years, this census covered approximately 20% of the

WFR population, falling short of the 25-30% target. WFR behavior, possibly avoiding open farmland, may have affected coverage. Nonetheless, the sample size was sufficient to estimate calf proportions, indicating stable population trends without unexpected mortality. The standardized field survey developed during the project will continue in future years, ensuring continuity and reliability in monitoring WFR populations.

The pilot census team encountered difficulties in the field, as expected in a pilot initiative. In 2017, the first census yielded fewer Wild Forest Reindeer (WFR) than anticipated, leading to a decision to improve methods for 2018. Despite extensions to the census window in 2018, identifying WFR remained challenging. High proportions of unidentified individuals persisted in subsequent years, despite skill improvements. Delays occurred, such as the rejection of a second census round in 2017. However, progress continued, with efforts to enhance identification accuracy through drone camera trials. Despite encountering challenges, the project steadily evolved to improve population monitoring methods.

Continuing the development of a census action that complements the aerial census is imperative due to directive-based reporting obligations, necessitating a sustained readiness for accurate Wild Forest Reindeer (WFR) censuses in Finland. Initially, occasional aerial censuses will likely remain the primary method. However, to counter resource shortages and address potential challenges like inadequate snow conditions, it's crucial to persist in developing a robust field census methodology.

DELIVERABLES of A5: '*Report on the field census results of 2017*' and '*Report on the field census results of 2018*' [in Finnish with an English abstract] were annexed in ***PR2***. The '*Report on the field census results of 2019*' [in Finnish with an English abstract] was annexed to ***MtR***. '*Report on the field census results of 2020*' [in Finnish with an English abstract] was uploaded to ***BUTLER*** on 17 January 2024. '*Report on the field census results of 2021*' [in Finnish with an English abstract] was uploaded to ***BUTLER*** on 15 January 2024. '*Report on the field census results of 2022*' [in Finnish with an English abstract] was uploaded to ***BUTLER*** on 15 January 2024.

Action A6 - Mapping of WFR habitat and planning of its restoration and management

Completed / Foreseen start: 01/03/2017 Actual start: 01/03/2017
Foreseen end: 30/06/2023 Actual end: 31/12/2023

Sub-action A6.1 – Mapping of WFR habitats in state-owned areas: The project actions A6 and C7 were originally designed as a coherent whole. However, in the perspective of the whole project, those two actions ultimately faced the most significant delays and changes. Information on the situation and circumstances has been reported to EASME/CINEA throughout the project in reports and missions. Now that both project actions have reached their goals in slightly different ways, we will provide the actual results in this Final Report.

For both A6 and C7, the situation eventually turned out for the better (C7 will be discussed separately later in the text). In the case of project sub-action A6.1, the original plan was formulated with too few expert skills and following it would have resulted in questionable benefits. Therefore, the corrective action taken in the project was undoubtedly beneficial, and the achieved result is significantly higher in quality and more relevant for the future conservation of the wild forest reindeer, despite all the delays and difficulties encountered.

Here is a brief summary: After having realised the fact that A6.1 needs to be adjusted, we noticed that there are significant challenges due to constraints on personnel resources. The skills for taking on the new course in A6.1 GIS-work were available among the project personnel, but they were otherwise engaged because of acute and pressing needs in other project actions. Originally, A6.1 and C7 were intended to work in tandem, but discussions revealed the expertise of MHMOY forest management planners in directing restoration operations within WFR areas even without the help intended to be provided by the [original] A6.1. Consequently, the scope of A6.1 was revised to focus on modelling the habitat use of WFR females during the critical calf nursing period, which is the most critical period in WFR annual cycle in terms of long-term population viability. The objective was to identify landscape characteristics conducive to calf survival.

MH proceeded with the work in 2020 by recruiting an additional person with the required modelling expertise. However, despite this effort, we still encountered further delays due to complex data management issues. The volume of GPS positioning data was substantial, requiring unexpected additional work to ensure compatibility with the modelling tool. Despite setbacks, collaboration with the WFR research team of NRIF and a GIS professional from the University of Oulu helped bolster progress.

Unfortunately, even with this progress, we faced additional obstacles. The recruited individual eventually needed to divert attention to other tasks, and unresolved data quality issues persisted. Consequently, we had to reorganize our team once again. MH took on the responsibility for handling background data, while NRIF, assisted by an expert from the university, conducted the modelling. Despite these challenges, we managed to obtain results before the project's conclusion in late 2023.

This collaborative effort culminated in the presentation of the redesigned modelling process and its outcomes, marking a significant milestone in the project's progression. Furthermore, plans for future dissemination through a detailed manuscript and submission to a peer-reviewed journal underscore our commitment to scientific rigor and knowledge dissemination.

Despite significant changes and delays, project sub-action A6.1 clearly exceeded its objectives. A detailed account of the work and results achieved in the sub-action is provided in the relevant deliverable titled "Report on modelling and mapping of WFR calf nursing habitats."

Sub-action A6.2 – WFR forestry practice guide: Regarding sub-action A6.2, it also eventually achieved its planned outcomes concerning the consideration of the forest reindeer's habitat requirements in forestry. Originally, it was intended to draw from the results of A6.1 and C7, but since their connection was dissolved, A6.2 was conducted as an independent task. However, despite this change, the results of A6.2 still correspond to the originally planned objectives.

Sub-action A6.2 materialized as planned, albeit with its own delays and challenges, resulting in a written review on the relationship between forest reindeer and forestry, along with forest management guidelines for forest owners to promote the preservation of suitable habitats for the forest reindeer. An independent deliverable, the "Forestry practice guide," presents these findings.

*[**NOTE:** The original idea in A6.1 of a thematic map layer for forestry planning based on predictive modelling has evolved due to increased wind power development planning in Finland. This has led to a greater demand for information about WFR habitat use in the Environmental Impact Assessments (EIAs) of wind power development operations, placing additional burdens on MH's*

permanent staff. Nonetheless, the work done in A6.1 has the potential to substantially benefit WFR conservation in the future.]

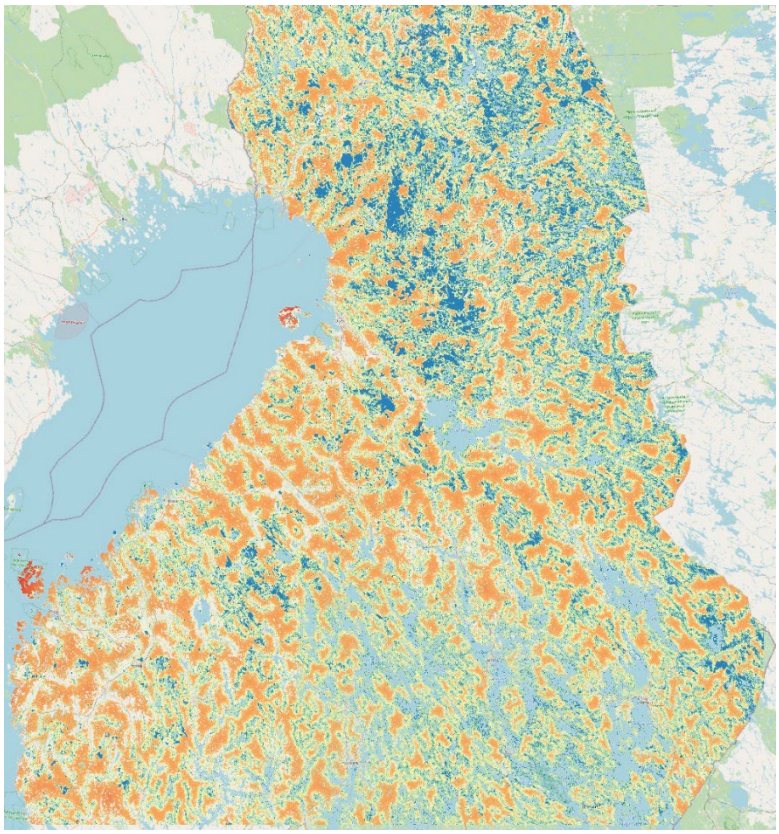


Figure 3. An example of a prediction map modelled in action A6 showing the amount and distribution of habitat preferred by a female WFR during calf nursing period in the weeks following calving. Blue/green shows preference, while red/orange is to be avoided. GPS collar data has been utilized as background data (Source: Luke/NRIF, Univ. of Oulu and WildForestReindeerLIFE)

DELIVERABLES of A6: Deliverable of A6.1 '*The mapping data of WFR habitats is saved into MH GIS system'* uploaded to ***BUTLER*** on 15 January 2024. Deliverable of A6.2 '*Forestry practice guide'* uploaded to ***BUTLER*** on 15 January 2024.

Action A7 - Updating of the Management Plan for the WFR Population in Finland

Completed / Foreseen start: 01/01/2020 Actual start: 01/03/2020
Foreseen end: 31/12/2020 Actual end: 26/09/2022

In this action A7, the national wild forest reindeer action plan (published in 2007) underwent updating, with the Ministry of Agriculture and Forestry taking responsibility to execute a process for the legal adoption and approval of the revised management plan by the project's conclusion.

As it has turned out, this action became plagued with delays as well. The drafting of the WFR population management plan update spanned from March 2020 to January 2021, carried out by a competent person temporarily recruited at SR/FWA. However, during the later stages of this process, this person transitioned to a permanent position elsewhere. This lead to a situation, where the finalization of the draft was left to the permanent personnel of SR/FWA amidst their

regular workload. Despite outlined expectations in the 2021 progress report, we were unable to submit the draft to the Ministry of Agriculture and Forestry for ratification in 2021. Internal differences of opinion regarding certain policies in the initial draft prompted a thorough reassessment by SR/FWA's permanent personnel, which extended into 2022. The revised draft was ultimately submitted to the Ministry on September 26, 2022, for final adjustments and ratification. Subsequently, SR/FWA and the Coordinating Beneficiary repeatedly emphasized to the Ministry their commitment to ratify the updated plan by the project's end date of September 30, 2023 (that was before the three-month extension in late 2023). The ministry reviewed the draft plan, made their own changes and clarifications to it, and sent it out for public consultation in May-June 2023. The Minister of Agriculture and Forestry confirmed the plan on September 29, 2023, thereby fulfilling their commitment.

DELIVERABLES of A7: '*Wild forest reindeer management plan*' was uploaded to ***BUTLER*** on 15 January 2024.

Action C1 - Reintroduction of WFR into two N2000 areas outside the present distribution

Completed / Foreseen start: 01/10/2016 Actual start: 01/10/2016
Foreseen end: 31/12/2022 Actual end: 30/09/2023

This action can be considered the cornerstone of the entire project. A significant portion of the work in the coordination office has been closely tied to this action in various ways.

The process of establishing and managing WFR enclosures in C1 encountered an initial delay of 2.5 months, primarily due to issues with the fence building contractor. Both NEEMO and EASME were notified of this delay in the latter half of 2017. We firmly insisted that the contractor fulfill their obligations according to the contract and provided instructions. Eventually, the construction of the C1 enclosures was completed satisfactorily.

Despite the initial delay, the overall outcome of C1 was largely in line with our plans. However, it necessitated numerous additional tasks and frequent adjustments that were not initially anticipated. While we meticulously replicated the successful WFR reintroduction methods from the early 1980s in our project planning, many aspects related to on-site captive breeding and soft releases were entirely new to us and other involved parties. Fortunately, with the expertise of our zoo partners, we were able to navigate these challenges effectively.

Originally, the breeding stock was planned to be introduced into the enclosures in late September 2017, just before the wild reindeer rutting season in October and early November. Due to the enclosure construction delay, this timeline was not met, and we were compelled to transport the WFR into unfinished enclosures during the rutting season. By late 2017, there were twelve breeding animals in the enclosures, including the first two wild-caught breeding bulls and a female from the Kainuu subpopulation.

In 2018, a total of five calves (all males) were born in the enclosures, fewer than expected due to the delayed import of the breeding stock in 2017. Nonetheless, all five calves survived and developed normally. Additional females from zoos and one wild female with her calf were introduced into the enclosures later in 2018, resulting in a total of six and seven females in Lauhanvuori and Seitseminen, respectively, after the 2018 rut. In February 2019, a new pair of wild-caught breeding bulls was introduced into the enclosures, while the previous pair were transferred to zoos for action C4 in March 2019.

First releases in C1 commenced as planned, with 17 individuals released between September and December 2019. Unfortunately, one calf born in 2019 died in the enclosure under unknown circumstances, and one released individual accidentally died in October 2019 after becoming entangled in the enclosure fencing wire. By late 2019, the enclosure population totaled 25 animals.

The brisk pace continued in C1 throughout the first half of 2020. Observations during the 2019-2020 winter revealed behavioral issues among the first released animals, attributed partly to their zoo background and partly to the timing of releases requiring supplementary feeding outside the pen post-release. Initial steps to address this issue were taken in 2020 by adjusting WFR keeping practices and release schedules.

Five young WFR born in zoos in 2019 were introduced into the Seitseminen enclosure at a younger age than ever before, aiming to minimize zoo exposure and tameness. As a result of the 2019-2020 breeding season, 12 calves were born inside the enclosures. Additionally, three gravid cows from the released WFR gave birth in the wild, marking the first free-ranging WFR births in the region in over 150 years.

The first calves conceived in the wild were born in May 2021. Releases continued in the summers of 2020 and 2021, totalling 43 individuals released from the two enclosures. Field observations suggested good survival rates among the released WFR by the end of the winter 2020/2021.

The last pair of wild-caught breeding bulls was introduced into the enclosures in March 2021, and the preceding pair were again transferred to zoos for action C4.

In both enclosures, there was a local person employed as a part-time keeper throughout the entire period. Overall, everything went smoothly, and the wild forest reindeer (WFR) remained healthy and in good condition. However, later on, we encountered some difficulties as the keeper at Lauhanvuori appeared to lack commitment to the work. To prevent information gaps regarding animal well-being, breeding results, individual identification, camera surveillance, and more, the keeper's negligence resulted in additional workload for the project coordination staff. Consequently, the contract with the keeper was not renewed, and *External assistance* was brought in for WFR care in Lauhanvuori for the remainder of the captive breeding period.

The five-year captive breeding period in action C1 concluded in July 2022 with the release of the last WFR from both enclosures, marking another milestone of the project. The final releases were also communicated by the CINEA Life Communication Group. In total, 82 individuals were released over five years, with six of the released females tagged with GPS collars. Additionally, a set of ~25 GPS ear tags of recent domestic design was purchased to monitor mortality of the released individuals. Unfortunately, these tags dropped off the network prematurely, with only one remaining operational.

The status of the wolf population, especially in the vicinity of the Lauhanvuori site, has been concerning since 2018, diverging from the situation during project planning. Local hunters twice applied for derogation for removal of the nearest wolf pack, citing WFR conservation in the application, but these derogations were not issued by the ‘public administration task’ officer within the SR/FWA (see Section 6.3).

All but one of the original six GPS collars were retrieved after automatic drop-off mechanisms were triggered as the battery was about to exhaust. However, four new collars were installed by

NRIF for WFR released in Lauhanvuori in November 2023. Near Seitseminen, there are currently no collars deployed.

During the five breeding seasons, a total of 51 calves were born in the enclosures. Since the first free-ranging WFR calves were born in May 2020, wild births have occurred annually, with an estimated total approaching 30 individuals.

C1 reintroduction in numbers	
Founders taken from zoos	***35***
Founders taken from the wild	***10***
Calves born in the two enclosures	***51***
Animals died in the enclosures	***8***
Wild-caught bulls taken to zoos	***6***
Released in the wild	***82***
Minimum estimate of 'wild calves'	***~30***
Known deaths of the released	***9***

The largest observed rutting herd comprised 23 individuals in Lauhanvuori National Park in October 2022. Although the enclosures remain intact contrary to the original plan, they are earmarked for a potential follow-up project for which a proposal will be submitted in the 2024 LIFE call.

Based on field observations, the survival rate of released WFR appears high, with only nine recorded deaths thus far. While predation cannot be ruled out entirely, no verified signs have been observed to date.

The number of released with the estimate of calf production in the wild suggests that we reached the upper limit of the range of the expected results even a year before the project end. This would suggest that the action C1 exceeded 100% completion.

Already before the last releases, the last pair of breeding males was transported from the enclosures to contribute in the *ex situ* population (see text on action C4 in this section).

The '*anticipated end*' for the action C1 in the proposal was at the end of 2022. However, due to obvious reasons, it was postponed to 30 September 2023. This adjustment was necessary to facilitate the calf-monitoring of the GPS-tagged females in summer 2023 and the monitoring of rutting herds in autumn 2023. These activities will obviously extend into post-project phase in 2024 and beyond.

Photo 1. Released WFR in the first aerial census made in the C1 reintroduction areas. Three animals in the front are males that are born in the project's breeding enclosure. The one in the middle – born 2018, released 2019 – has shed his antlers. The other two are three-years old. The fourth animal in the picture is a young unidentified female. A harsh winter in the wild is ending, but the animals y seem to be in a perfectly good condition. (Photo: Petri Timonen, Luke/NRIF)

DELIVERABLES of C1: No deliverables planned.

Action C2 - Reinforcement of an existing small subpopulation of WFR

Completed / Foreseen start: 01/04/2018 Actual start: 01/04/2018
Foreseen end: 31/12/2022 Actual end: 31/07/2021

The objective of action C2 was to strengthen the existing Wild Forest Reindeer subpopulation in the Ähtäri-Soini-Karstula region by releasing individuals into the Natura 2000 area FI0900005 'Aittosuo-Leppäsuo-Uitusharju'. An acclimatization enclosure was planned to be constructed at the border of the said Natura 2000 area. Due to difficulties encountered in action C1, we obtained permission from the MH Director of procurement to exclude the troublesome contractor from tendering and redirected the call to four other known contractors in early 2018. These four contractors included the company that ranked second in the C1 tendering process. Ultimately, this company won the C2 contract, and the enclosure was completed in time by mid-August 2018.

In September 2018, the first group of six zoo-born WFR, to be acclimated to wild living, was introduced into the enclosure. Since action C1 was prioritized over C2, all available females were introduced to the C1 enclosures, and this initial group in C2 comprised only males. The group was released on May 11, 2019, although only five out of six animals were released. One of the bulls developed an abscess from a sedation dart wound and, despite undergoing surgery by one of the project veterinarians, deteriorated and was euthanized before the release. The five released males, within less than 24 hours, found their way to the banks of the nearest highway, where they also began visiting residents' yards and gardens. Within a few weeks of release, one was killed in a collision with a van, and two more were euthanized nine months later in February 2020 due to extended periods of time spent in a country house courtyard, showing signs of starvation

and aggressive behavior towards residents. The fate of the remaining two is unknown, but there were no indications of their attempting to join the wild WFR in the area. This particular group of 'already institutionalized' *ex situ* males simply wasn't suited to life in the wild. (This lesson on the unsuitability of certain zoo individuals for life in the wild was subsequently reinforced in project action C2.)

Just a couple of months before the aforementioned unsuccessful release, a project presentation was given by CB staff to local hunters in the action C2 region. During this presentation, a lively discussion ensued based on the locals' own observations of WFR in the region. Local residents strongly believed that the number of WFR in the region could be higher than what occasional aerial censuses by NRIF had suggested and that this subpopulation might occasionally interact with the neighboring Suomenselkä subpopulation.

Considering this feedback, along with the subsequent failure of the initial release and the original aim of reinforcing the genetics of a presumably small and completely isolated subpopulation, we decided to pause action C2 and gather more information about the situation. We also decided to let the true status of the subpopulation in terms of isolation and gene flow determine the fate of action C2.

Based on field observations made by locals using SR/FWA's mobile sightings recording app and NRIF's GPS data, it became apparent that there was an existing connection and potential gene flow between the Ähtäri-Soini-Karstula region and Suomenselkä. Consequently, the action C2 was restructured in winter 2020-2021, and the new plan was presented to the NEEMO monitor in a mission on January 21, 2021.

By March 2021, four wild-caught adult female WFR were transported from the genetically diverse Kainuu subpopulation to the Karstula enclosure. These females were presumed to be pregnant and were released with their calves soon after calving. Eventually, three calves were born in May-June 2021, and all seven animals were released in July 2021. The females were tagged with GPS, and all remained in the area. Field observations suggested that at least two of the three calves born in 2021 survived for at least 6-12 months, and perhaps even to adulthood.

Since then, the four free-roaming WFR females have wandered far and wide, but what's significant is that they all still remain part of the Suomenselkä population after nearly three years of freedom. One of the collars went offline shortly after release, but the visible coloured collar is still around the animal's neck. Sightings of this female have been reported annually within a radius of about 50 kilometers from the release site, although its exact location can no longer be tracked.

Three of the four females are known to given birth in 2022–2023 (four calves), and since these calves born after release have been sired by males belonging to the Suomenselkä population, it can be fully justified to conclude that project action C2 has produced true gene flow from Kainuu to Suomenselkä subpopulation. This has never been verified to occur spontaneously since the inception of the Suomenselkä population in the 1980s. Although the events in action C2 are a result of a forced change in the project, the resulting gene flow (as well as the potential it provides for the future) is nevertheless one of the most significant achievements of the entire WildForestReindeerLIFE project. We are currently drafting a proposal for the EU LIFE 2024 call, outlining a continuation project. As part of this endeavor, we are refining various aspects of our previous project. One significant element we are including in the 2024 proposal is a plan to continue the reinforcement process with wild-caught individuals from Kainuu. This

reinforcement will utilize the existing enclosure located adjacent to the 'Aittosuo-Leppäsuo-Uitusharju' Natura 2000 area.

The original planned expected result of C2 in the proposal became irrelevant after the verification that the Ähtäri-Soini-Karstula subpopulation is not isolated from the Suomenselkä anymore.

Photo 2. In action C2, the female '26', one of the four wild-caught and GPS-collared females from Kainuu, ceased transmitting signals shortly after release into the Suomenselkä subpopulation area in July 2021. Due to the visible collar, there are some confirmed sightings of the female, and the most valuable of these is depicted in the image. A local game camera photo of '26' and her 2023 calf taken in Kannonkoski on 19 Oct 2023 confirms the gene flow between the Kainuu and Suomenselkä subpopulations as a result of WildForestReindeerLIFE project. These photos are a brilliant example of potential benefits of citizen science. (Photos: Aki Kauppinen)

DELIVERABLES of C2: No deliverables planned.

Action C3 - Preventing the cross breeding between WFR and semi-domesticated reindeer

Completed / Foreseen start: 01/01/2017 Actual start: 01/01/2017
Foreseen end: 31/08/2023 Actual end: 31/08/2023

To prevent genetic degradation in the WFR population, efforts were made to minimize interbreeding with domestic reindeer. This involved improving existing barrier structures between WFR range and reindeer herding area, as well as removing stray domestic reindeer among WFRs and vice versa. The latter theme has some bearing also to Southern Finland, where there is small-scale reindeer keeping, and occasionally there are escapees from those places as well.

Sub-action C3.1 – Improving the existing barrier structures: All budgeted jobs in construction/replacement/repair of barrier structures on the conservation fence between Kainuu WFR range and the reindeer husbandry area have been done: Four cattle-grids were replaced by FTIA because they were not working properly in winter conditions. Ten pedestrian gates/stiles were built, four existing forestry road gates have been repaired, and one cattle grid funnel fence built by MH.

Regarding one of the gaps on the eastern border reindeer fence towards Russia, the Raatejärvi landowners first permitted building of the fence during the proposal preparation, but then after a local quibble they had decided to withdraw from the contract as soon as the project started. To settle the local conflict, we made an extensive examination for alternative fence types. A suitable maker/supplier of a 'floating fence' was found, and the fence was installed during winter 2017-2018. The expenses of Raatejärvi fence did not differ significantly from the terrestrial alternative, but in that task the RHA *Personnel* cost needed to be changed to '*External assistance*'. The other gap on the Eastern border fence was closed with a 6 km terrestrial fence around the Lake Kivijärvi, built by RHA in 2018, and finalised towards the end of the project.

Action C3.1 proceeded as planned. In a mission in October 2022 the NEEMO monitor, and representatives of CB visited several C3-sites in Kainuu. Three minor unfinished construction/repair work on the existing barrier structures were noted. The completion of two of them occurred shortly after the mission, while the final one was finished in early summer of 2023. Alongside this last task, large information boards beside the four cattle-grids were also updated. This was achieved by affixing a new board to the existing heavy-duty stands, which were originally constructed during an earlier LIFE project (engagement number B4-3200/98/510) between 1998 and 2001 (see small photo below).

Photo 3. During a mission in October 2022, NEEMO monitor and representatives of CB visited several action C3-sites in Kainuu. Three minor unfinished construction/repair work on the existing barrier structures were noted. Two of them were completed still in the same Autumn soon after the mission. The last field work in sub-action C3.1 was the construction of this funnel fence belonging to the Purnu cattle grid structure. The fence was completed by the CB field worker in early summer of 2023. (Photo: Pekka Kilpeläinen)

Sub-action C3.2 – Removal of reindeers from the present and future WFR area: As for the sub-action C3.2, in 2019 we started a systematic recording of incidents that posed a potential cross breeding risk. In practise, such incidents refer to any situation at any time of year, where WFR

and domestic reindeer individuals end up in the vicinity of each other, or even come together forming a mixed pair/group/herd. The recording had started right at the beginning of the project, but it wasn't as systematic as one could have hoped. The results are presented in the deliverable of action D2. Those incidents themselves were managed as recurring actions, because the practise was already existing before the project. The goal was to minimize/end the occurrence of such incidents, but in reality, their number increased during the project. Partly this increase was due to the fact that Suomenselkä subpopulation increased and became more and more inclined to migrate towards NE for summer, eventually reaching and entering the Reindeer Herding Area. This turn of events brought about the fact that a conservation fence similar to the one in Kainuu is perhaps needs in the Northern Ostrobothnia as well, for keeping the Suomenselkä WFR and domestic reindeer apart. Another reason for the increase of the number of incidents was that the intensity of observation by the project staff, but also by the citizens was boosted because of the improved publicity of the topic following from the project communication. It is obvious, that the recurring actions for managing the crossbreeding risk along teh border of the reindeer herding area will remain for an indefinite period of time.

Another independent task in C3.2. was the survey of domestic reindeer keeping outside the statutory reindeer herding area. This survey was carried out in 2022. The results are given in an additional deliverable annexed to this Final report (see Annex 11). The total number of small-scale reindeer farms or other reindeer keeping places found outside the reindeer herding area was 59. The current (or recent) head count of their reindeer could be achieved from 42 keepers. Their combined stock was 179, which results 4,3 as the average number of reindeer/farm. Two animals were clearly the most common "herd" in a single farm. The activity is thus small scale, but nevertheless, it creates a crossbreeding risk whenever an escape takes place in or near any WFR occurrence range. We found evidence of a total of ten escape cases from the last decade and a handful of even older cases. These cases totalled at least 65 individual reindeer escapees.

We also cooperated with the geneticists working in Luke/NRIF, which cooperation was very much in the core of action C3, but no cost was incurred to the project. This cooperation has resulted a research manuscript that has been submitted for publishing in a peer reviewed journal (see Annex 12). The paper describes results of genetic analyses made from Rangifer samples that have been collected during the project from individuals of which there was a suspicion of them being potential hybrids.

DELIVERABLES of C3: No deliverables planned.

Action C4 - Improving the genetic base of WFR ex-situ population

Completed / Foreseen start: 01/01/2017 Actual start: 01/01/2017
Foreseen end: 31/08/2023 Actual end: 31/08/2023

Prior to this project, all European zoo populations of wild forest reindeer (WFRs) were descended from only 8 wild animals originating from the Kainuu area. The *ex situ* population had not received any new wild individuals since 2004 (male) and 1987 (male). The goal of action C4 was to increase the number of founders of the *ex situ* WFR population from 8 to 14 during the project.

In principle, this goal was achieved, as a total of six wild-caught breeding males were transported from the two C1 enclosures to various zoos after serving in the C1 captive breeding program for one or two breeding seasons: two males in 2019, another two in 2021, and the final pair in 2022 (see details on C1 in this section).

The decision to start genetic diversification of the *ex situ* population using males was based on their faster adaptation to enclosed environments compared to females, as well as the faster propagation speed of males.

Unfortunately, by the end of the project, three out of the six males had died: one due to old age and two in accidents. Specifically, one male escaped from ZooRanua and was found dead, while another was fatally injured by a conspecific in ZooÄhtäri in late 2022. Additionally, in 2023, one male had to be euthanized due to various age-related ailments.

A positive aspect is that only one of the males passed away before contributing to the zoo population's genetic diversity (contrary to what was stated in PR3, this male had not succeeded in contributing). The remaining five males have sired a total of 31 F1 and two F2 offspring. With the 2024 calving season approaching, this number is expected to rise.

In this context, the anticipated outcome fell slightly short. Without the first accidental death, all six males would have contributed, meeting the expected result.

There was initially a plan to transport some of the three available wild females to zoos. However, this plan was ultimately rejected because all three were deemed unsuitable for C4. One female was frail throughout her life and died in the Lauhanvuori enclosure at the age of 2.5 years, while another remained timid. The third female, despite still being productive, was quite old. The latter two were eventually released from the C1 enclosures in July 2022. It is noteworthy that one of them was discovered to be the oldest known WFR (17 years) when found dead six months after release.

See section 8. and Annex 13 for clarification regarding construction schedules in ABs ZooHelFoun and ZooRanua.

DELIVERABLES of C4: No deliverables planned.

Action C5 - Reducing road mortality of WFR

Completed / Foreseen start: 01/04/2018 Actual start: 01/01/2019
Foreseen end: 31/12/2018 Actual end: 31/12/2019

This action, initially delayed from the planned schedule, commenced in early 2019. Two meetings of traffic experts and WFR experts were conducted as outlined, with the first held in Oulu on May 28, 2019, and the second on October 4, also in Oulu. These meetings included participation from experts representing MH (4), FWA (1), NRIF (1), and FTIA (1), alongside traffic safety experts (4) from four Centre for Economic Development, Transport and the Environment (ELY-centres).

Based on these meetings, an action plan was devised to transfer knowledge regarding WFR migration movements and winter pastures to road management personnel. Seasonal risk areas, such as spring and autumn migration routes, were identified using GPS data and local knowledge, with NRIF personnel communicating findings to traffic safety authorities. A model was developed wherein NRIF researchers manually checked the location of collared WFRs, created maps to visualize their spatial distribution, and forwarded them to ELY-centre traffic safety experts responsible for warning sign placement and other safety arrangements.

Additionally, FWA began collecting species-specific ungulate-vehicle collision data with good spatial accuracy in 2017, which will continue post-project. During the autumn 2019 and spring

2020 migrations, traffic safety authorities successfully tested temporary warning signs with extra flashing lights in high-risk road sections in the Suomenselkä area. Although MH initially took responsibility for action C5, it was agreed that FWA would lead future development of WFR-collision mitigation tools in cooperation with traffic safety authorities.

However, the planned output and timeline of the action differed from initial expectations. The task, originally scheduled for 2018, was postponed to 2019, and while FWA was intended to lead, MH assumed responsibility for the meetings due to their expertise in road ecology studies. Despite initial plans to utilize real-time WFR GPS data for road management, technical limitations led to the development of an expert-based operational model supported by collision data collected by FWA. Consequently, the deliverable "Report on possibilities of WFR GPS-data in controlling telematics" was cancelled, as the expert group deemed the technology unfeasible in the near future. The resulting deliverable, "Guidelines for warning sign placement utilizing WFR GPS-data and local knowledge," was as annexed to MtR.

DELIVERABLES of C5: 'Guidelines for warning sign placement utilizing WFR GPS-data and local knowledge' was annexed to ***MtR***. '*Report on possibilities of WFR GPS-data in controlling telematics*' was ***CANCELLED***; see EASME letter LIFE15NATFI881MTR1LET JB AF on 8 October 2020.

Action C6 - Developing the monitoring of illegal actions toward WFR

Completed / Foreseen start: 01/01/2017 Actual start: 01/08/2018
Foreseen end: 31/12/2021 Actual end: 31/12/2021

Sub-action C6.1 – Training seminars for enforcement authorities and GMA wardens: In October 2019, the SR/FWA and MH held training seminars in Kuhmo and Pyhäntä with 29 participants from local GMAs in WFR areas, alongside personnel from MH and the Finnish Wildlife Agency. Topics included the WildForestReindeerLIFE project, WFR biology, and findings from the report "Examination of human-caused mortality of wild forest reindeer (action A4)." Discussions centered on enhancing monitoring activities, with GMAs showing interest in increased collaboration with MH.

Joint annual meetings between MH game wardens, police, and border guards have facilitated collaborative efforts in WFR areas. The SR/FWA and Metsähallitus held final seminars for project sub-action C6.1 in Kuhmo and Reisjärvi in December 2021, aiming to identify key areas for improving hunting supervision in wild forest reindeer territories. Five improvement actions were outlined:

1. Coordinating an annual joint monitoring theme day led by the Police, Customs, Border Guard, and MH Game Wardens to enhance collaboration with local GMAs.
2. Facilitating information exchange through training sessions for hunting supervisors, involving police liaison officers, game wardens, and seasonal wardens where possible.
3. Increasing support from the SR/FWA to aid GMAs in planning hunting supervision.
4. Disseminating information about reporting wild forest reindeer killed by large carnivores.
5. Conducting a comprehensive evaluation of hunting supervision responsibilities, roles, and authorities to assess needs for legislative changes.

The seminars stressed the importance of promptly reporting discovered dead wild forest reindeer to relevant authorities as required by the Hunting law. Additionally, there was a call to

raise awareness about species identification within the hunting community in autumn migration areas.

Sub-action C6.2 – Development of cooperation between MH and Game Management Associations: In line with the WildForestReindeerLIFE project's objectives from 2018 to 2020, seasonal monitors focused on areas where WFR are found in Kainuu, Northern Ostrobothnia, and Central Ostrobothnia regions of Finland. Working closely with local wildlife authorities, nine GMAs signed monitoring agreements with MH during the project period. Each year, three seasonal monitors conducted patrols within municipalities within WFR territories, collaborating with voluntary hunting supervisors from GMAs. Additionally, two game wardens were assigned to the WFR areas.

Practical monitoring activities were planned and targeted in collaboration with game wardens, wildlife planners, MH's WFR specialist, and GMA coordinators. Monitoring primarily took place during the autumn months, from late August to November, coinciding with the WFR rutting season and autumn migration.

The main outcome of the project was the deepening collaboration between MH and game management associations in local wildlife monitoring. Collaboration also involved voluntary hunting supervisors from GMAs. This collaboration is set to continue, with efforts to further develop it where possible.

During the project period, seasonal monitors did not observe any illegally killed WFRs. They engaged positively with local stakeholders, particularly hunters, addressing hunting legality and conducting awareness-raising activities about WFR conservation. Hunters demonstrated a positive and respectful attitude toward WFR, serving as potential sources of information on illegal activities.

Through game wardens, four suspected illegal killings of WFR (two in 2019 and two in 2021) were reported to the police for investigation. These cases were treated as severe hunting offenses. The project's findings and the A4 report on human-caused mortality of WFR indicate that illegal killing of WFR is minimal and does not pose a significant threat to the population.

Seasonal monitors expressed a desire for access to real-time GPS data on collared WFR to enhance monitoring efforts. Their observations supported data from the Natural Resources Institute Finland, indicating an increase in the WFR population in certain areas. The growing WFR population presents challenges, particularly concerning potential hybridization with reindeer in northern expansion areas, requiring increased prevention efforts.

Overall, the project period saw significant investment in monitoring efforts in WFR areas, fostering improved collaboration between MH and GMAs and raising awareness of monitoring challenges. Continued collaboration and communication efforts are crucial for crime prevention and wildlife management in WFR areas.

Sub-action C6.3 – Campaign to prevent illegal off-road traffic: In Finland, off-road traffic with motor vehicles is regulated by the Off-Road Traffic Act (1710/1995) and the Off-Road Traffic Decree (10/1996). With few exceptions stipulated in the law, off-road traffic always requires permission from the landowner.

Snowmobiling is directed onto official snowmobile trails, which do not require separate permits. Additionally, the Finnish Forest and Park Service (Metsähallitus) has planned snowmobile tracks on state-owned land, which do require permits. Off-trail permits for off-road traffic are discretionary decisions.

Forest and park rangers from Metsähallitus oversee off-road traffic on state-owned land, particularly targeting areas outside designated trails during winter.

As part of action A4 of the Forest Reindeer LIFE project, "Examination of human-caused mortality of wild forest reindeer," interviews were conducted with experts to map out disturbances caused by off-road traffic to the forest reindeer. In practice, this refers to unauthorized off-road traffic in areas where forest reindeer spend the winter. The situation warranted evaluation in Finland due to observations in Russia indicating significant disturbance to forest reindeer in their wintering areas, with instances of deliberate chasing.

The report reveals that unauthorized snowmobiling disturbs forest reindeer, especially in wetland areas adjacent to their wintering grounds. Issues have been observed in Pelson Nature Reserve in Siikalatva and Hiidenportti National Park in Sotkamo. During the winters of 2018-2019 and 2019-2020, Metsähallitus rangers Markus Aho and Seppo Toikkanen focused their off-road traffic surveillance on forest reindeer wintering areas, including Pelson Nature Reserve and Hiidenportti National Park.

Surveillance provided indications of unauthorized snowmobiling, with a few individual fines and police reports recorded. However, unauthorized off-road traffic often goes unpunished due to difficulties in identifying perpetrators; only the tracks are visible. Open wetland areas attract snowmobilers, potentially causing disturbance to forest reindeer in the area. No evidence of deliberate disturbance to forest reindeer was found. Targeted surveillance may have had a preventive effect on snowmobiling in the area.

There is no evidence to suggest that the disturbance caused by unauthorized off-road traffic impacts the development of the forest reindeer population. However, unauthorized off-road traffic is particularly common in vast wetland areas, which may also serve as important forest reindeer wintering grounds, resulting in indirect and unintentional disturbance to forest reindeer.

In the future, addressing disturbances caused by off-road traffic to forest reindeer will be best achieved by targeting surveillance efforts to wetland conservation areas where forest reindeer winter. Information about surveillance activities (visibility) effectively reaches local communities and also prevents unauthorized off-road traffic.

Sub-action C6.4 – Communications to prevent WFR poaching and disturbance: The sub-action C6.4 included preparing of the communication plan on C6 issues and publishing of altogether eight articles on various aspects of C6. The communication plan was presented in a Deliverable that was annexed to PR1.

WFR and the related Game Wardens' work, hunting supervision, and the WildForestReindeerLIFE project were featured in the publications listed below. The outcome fell two articles short of the intended eight, as the responsibility for their drafting fell mainly on the project planner, and the workload associated with other project tasks understandably limited the output in this regard.

- Pirttimaa, T. 2018: Villien peurojen paimen. - Kieppi 2018: 18–23.
- Niemi, M. 2019: Erävalvonta on yhteispeliä. - Poliisi & Oikeus -lehti 4/2019: 38–39.
- Niemi, M. 2019: Valtion pyyntimaiden vartijat. - Metsästäjä 6/2019: 52–53.
- Niemi, M. 2019: Erävalvonta on yhteistyötä. - Riistan vuoksi 29.11.2019
- Niemi, M. 2020: Poikkeuspäivä auringossa. - Me henki 2/2020: 8–11.
- Niemi, M. 2020: Erävalvontaa kansallispuistoissa. - Metsa.fi -lehden verkkojulkaisu 9.9.2020.

DELIVERABLES of C6: '*Communication plan*' [in Finnish] of the C6.4 and the '*Annual report by periodic wardens 2018*' of C6.2 were annexed to ***PR1***. The '*Annual report by periodic wardens 2019*' was annexed to ***MtR***. Deliverable of C6.3 'The report of campaign' was uploaded to ***BUTLER*** on 30 January 2024. Deliverable of C6.2 'Final report of C6.2, communications' was uploaded to ***BUTLER*** on 16 January 2024.

Action C7 - Initiating ecological restoration and management of WFR habitat

Completed / Foreseen start: 01/01/2017 Actual start: 01/06/2018
Foreseen end: 31/12/2022 Actual end: 31/12/2022

Sub-action C7.1 – Implementing the findings of action **A6.1 and the WFR friendly forestry measures in state owned areas:** The seminar program and materials for training MHMOY planners on wild forest reindeer (WFR) habitat identification and restoration in sub-action C7.1 were prepared in 2019. Originally planned to be held between January and March 2020, the seminars were postponed due to COVID-19. As the situation persisted, we transitioned from in-person meetings to webinars.

Ultimately, we organized the webinar on March 16, 2021, a year later than initially planned. Twenty-nine forest planners from MHMOY participated.

Sub-action C7.2 – Pilot restoration of WFR habitats: The bog habitat restoration outlined in action C7 of the WildForestReindeerLIFE project aimed to improve habitat quality for the wild forest reindeer (WFR). Despite including a 400-ha restoration target, the implementation of the restoration work was delayed due to other project priorities.

Ultimately, three restoration sites covering a total of 57 ha were executed. The first two sites, Valkeisneva in Kyyjärvi and Huttuneva in Kivijärvi, were completed between 2018 and 2019, while the third site, Peuro in Kainuu, was completed in 2019-2020.

However, the initiation of the national 'Helmi Habitat Restoration Programme 2021-2030' led to a surge in public funding for restoration projects. This, coupled with ongoing peatland habitat restoration on state-owned land, posed challenges in finding suitable sites and skilled contractors for our project.

The difficulty in finding contractors had been previously mentioned in MtR, and it even has been in the media outlets (https://yle.fi/a/3-12565002 - 9 August 2022). As a result, sub-action C7.2 was ceased as agreed upon in correspondence between CB and CINEA. The remaining funds were allocated to a Final Seminar held on June 16, 2023. Following the advice by CINEA and NEEMO, the savings from C7 were allocated to a Final Seminar that was held on the 16 June 2023. A separate annex on the seminar is attached to this Final Report (Annex 7).

It has become evident that the goals of action C7 will be achieved through measures implemented outside the LIFE project. We have compiled a map which reveals that such goal has been achieved already multiple times over. Furthermore, the bog habitat restoration work will go on strongly in the coming years, too.

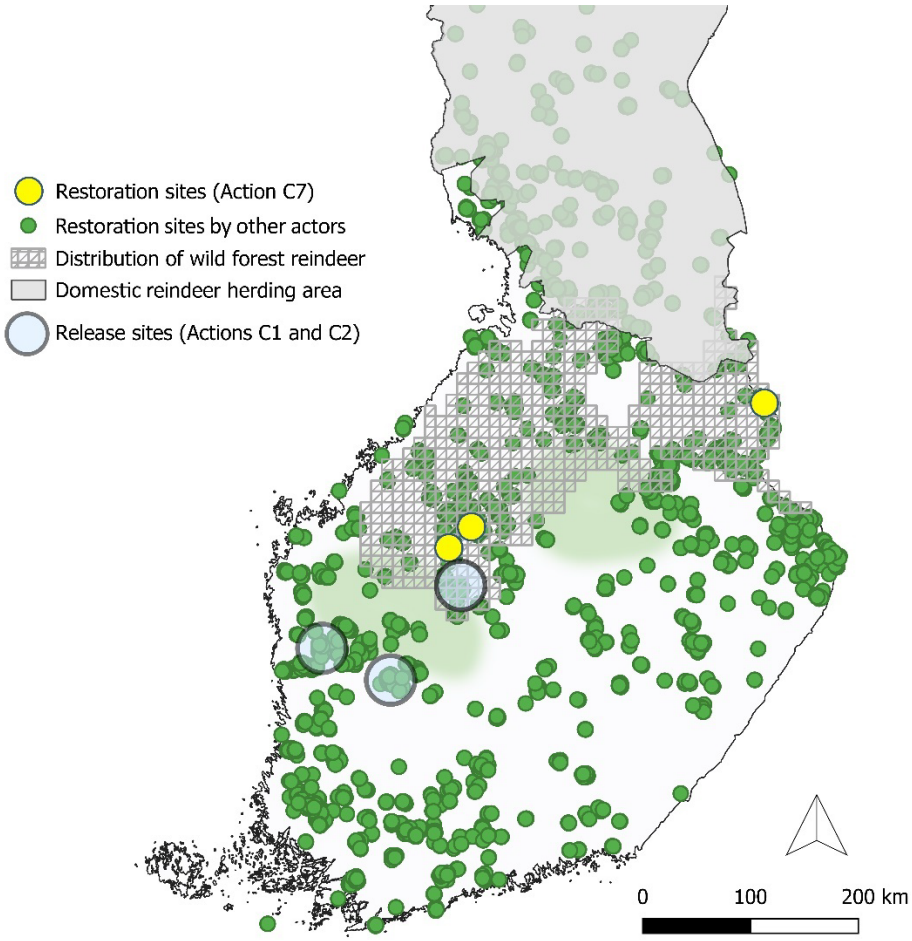


Figure 4. This map clearly points to the reason why the peatland restoration did not proceed as planned in action C7. The habitat restoration activity on peatland – mostly pine dominated bogs – has been very active during the project years and goes on still. Green dots refer to restoration work done on bog habitats totalling 26 138 ha outside the reindeer herding area. The yellow dots are the restoration sites completed in this project. However, substantial proportion of recent restorations has been done also in areas that are important in WFR conservation. The data is provided by Metsähallitus (MH and MHMOY), The Finnish Forest Centre, and the Snowchange Cooperative. Other sources of data: Natural Resources Institute of Finland (WFR distribution) and Reindeer Herder's Association (Reindeer Herding Area).

DELIVERABLES of C7: The deliverable of C7.1 'Material for training seminar' was annexed to the ***PR2***. Deliverable of C7.2 '*Report of habitat restoration in sub-action C7.2*' was uploaded to ***BUTLER*** on 20 March 2024.

Action D1 - Population size, mortality and breeding success of WFR

Completed / Foreseen start: 01/10/2016 Actual start: 01/10/2016
Foreseen end: 30/09/2023 Actual end: 30/09/2023

Since the purpose of project actions A2 and D1 was to reliably demonstrate changes in the WFR population during the project period, they are similar in content and methodology (see the description of A2 above in this same section). Both project actions allocated two aerial survey years (2017–2018 for A2 and 2022–2023 for D1) to ensure the acquisition of at least one reliable aerial survey result for both the Suomenselkä and Kainuu sub-populations. Additionally, in D1, aerial surveys were conducted in the vicinity of the Lauhanvuori and Seitseminen National Parks, even though they were not originally included in the plan. In practice, it was more important to assess how well the established aerial survey practices of Luke/NRIF were suitable for estimating the size of small reintroduction populations.

The 2022 census in the Kainuu region produced successful results, with a recorded count of 829 individuals. Similarly, in Suomenselkä, the census for that year was successful, with 1957 individuals recorded. The proportion of calves was 11% for Kainuu and 13% for Suomenselkä.

In 2023, the census was carried out only in Kainuu, where the population development needs closer scrutiny due to its population history. The census resulted in 885 individuals. The proportion of calves in the overwintering reindeer population of 2023 in Kainuu was approximately 15 percent, which is higher than usual. As the 2022 result from Suomenselkä had been accurate, and the census conditions had been favourable, a decision was made to postpone the census there until after the project for the next time (as of the time of writing this, the 2024 census for Suomenselkä has resulted in slightly under 2000 individuals).

The total population of WFR in Finland increased by approximately 35% from the early years of the project to its end. This growth figure takes into account both the aerial survey results and the establishment and growth of reintroduced populations in action C1.

Originally, the project plan also mentioned utilizing the results of A5 field census pilot in action D1. The result of action A5 is consistent with the population changes demonstrated by A2 and D1, but since A5 involved more of a pilot of an independent survey method, it is now clear in hindsight that a comparable time series could not be obtained for demonstrating the change because the A5 surveyors gained experience during the project years, which inevitably affects the results; the results towards the end are more accurate and comprehensive than at the beginning.

DELIVERABLES of D1: '*Report on the aerial census results of 2022*' was uploaded to ***BUTLER*** on 8 April 2024. '*Report on the aerial census results of 2023*' was uploaded to ***BUTLER*** on 3 April 2024.

Action D2 - Genetic purity of WFR population

Completed / Foreseen start: 01/10/2016 Actual start: 01/10/2016
Foreseen end: 30/09/2023 Actual end: 31/12/2023

As for the sub-action C3.2, in 2018 we started a systematic recording of A) the incidents that posed a potential cross breeding risk, and B) the preventive actions taken to manage the risk. In

practise, such incidents refer to any situation at any time of year, where WFR and domestic reindeer individuals end up in the vicinity of each other, or even come together forming a mixed pair/group/herd. The recordkeeping started at the beginning of the project and has continued since. However, the period 2016-2017 wasn't as systematic as one could have hoped.

The management of the incidents themselves were treated as recurring actions (under action C3 but with zero budget). At the time of the project start these tasks were shifted from SR/FWA to MH by the MAF, but in any case, they were the normal day-to-day task of Finnish wildlife administration that had pre-existed before the project.

Below is the summary table of the results during the whole project. The overall increase of incident number is against expectations, but it can be explained by the increase of WFR population and the severe situation in Northern Ostrobothnia, where the Northernmost range of Suomenselkä subpopulation is. In that area there are no barrier structures between WFR and semi-domestic reindeer. The success rate of operations has increased until 2020 both in Kainuu and North Ostrobothnia. This can be assumed to be due to the accumulation of field worker's skills and increasing uncomplicatedness in the co-op with reindeer herders. After 2020, the success continues to grow in North Ostrobothnia but at the same time it has decreased in Kainuu. Field work force is limited, and majority of efforts have been concentrated to Northern Ostrobothnia where the situation is most critical.

	Documented cases of cross-breeding risk		**% of cases with successful risk management operation**[a]		**Total no. of dispatched or returned reindeer and WFR**	**Dispatched WFR during operations**	
Year	*Kainuu subpopulation*	*Suomenselkä subpopulation*	*Kainuu subpopulation*	*Suomenselkä subpopulation*		*Kainuu subpopulation*	*Suomenselkä subpopulation*
2016	6	4	*100 %*	*100 %*	13	4	1
2017	3	1	*100 %*	*100 %*	>50[b]	4	0
2018	4	10	*25 %*	*10 %*	0	0	0
2019	17	12	*53 %*	*17 %*	9	1	0
2020	12	9	*75 %*	*44 %*	49[c]	1	0
2021	13	14	*69 %*	*50 %*	28	1	10
2022	14	13	*21 %*	*85 %*	394[d]	0	8
2023	15	10	*47 %*	*70 %*	26	5	13
Total[e]	75	68	*51 %*	*47 %*	**569**	**16**	**32**

Table 1. The documented cases of crossbreeding risk between semi-domestic reindeer and Wild Forest Reindeer (WFR) and the success of risk management operations in the vicinity of the southern border of the Reindeer Herding Area (RHA) in 2016-2023. During 2016-2017 only the risk management operations were registered but not the observations of potential risk cases as such. Therefore, the years 2016-2017 are not comparable to years 2018-2022. Semi-domestic reindeer are often caught alive and transported to the RHA, but returning of WFR back to their range can only be done by means of baiting and/or driving.

[a] **NOTE**: In this case 100% minus 'successful-%' doest NOT mean that crosbreeding would have taken place, but just that the risk has remained.
[b] In addition to six dispatches (including four WFR), one roundup of approx. 50 domestic reindeers back to Reindeer Herding Area was made.
[c] In addition to 13 dispatches (including one WFR), a return of altogether 36 WFR was made by baiting and by driving.
[d] Unusually large number is due to five cases, where a total of 380 semi-domestic reindeer were shepherded back to RHA from Suomenselkä area.
[e] Because of inadequate data quality, the grey cells of the table are omitted in first four cells of this row.

DELIVERABLE of D2: '*Report of the success in C3*' was uploaded to ***BUTLER*** on 30 January 2024.

Action D3 - Wild forest reindeer habitat improvements

Completed / Foreseen start: 01/10/2016 Actual start: 01/10/2016
Foreseen end: 30/09/2023 Actual end: 30/09/2023

The purpose of this action D3 was to monitor and report the WFR habitat availability, alongside with tracking the utilization of restored habitat patches by WFR.

Regarding the substantial changes in action C7 (as well as in action A6), it might have been justified to remove this action D3 altogether but since that was not done, we basically quote here what is said in the D3 deliverable about the changes made, and the references to the documents showing the actual results of action C7:

> *"C7.1: Implementing the findings of* action *A6.1 and the WFR friendly forestry measures in state-owned areas: Project actions A6.1 and C7.1, initially planned to be interconnected, were carried out independently at their own pace. The planning of* action *A6.1 had been unsuccessful right from the start, while existing knowledge enabled the implementation of* action *C7.1 autonomously (see Final Report and Deliverable of C7 annexed to Progress Report 2).*
>
> *The reoriented* action *A6.1 continued to focus on the landscape-level habitat assessment of WFR but was narrowed down to address the most critical phase of the specie's annual cycle. The work ultimately stretched until the very end of the project. Nevertheless, the outcome is excellent for the future conservation of WFR (see Final Report and Deliverable of A6.1 uploaded to Butler on the 15th of January 2024).*
>
> *C7.2: Pilot restoration of WFR habitats – CINEA confirmed the change we had proposed for project activity C7.2 in their letter LIFE15 NAT FI 000881 MISMC6LET 220414. Additionally, in the letter CINEA requested us to demonstrate that the targets of the* action *C7.2 will be reached through measures implemented outside the LIFE project, using other national funding. We have fulfilled this request (see Final Report and Deliverable of C7.2 uploaded to Butler on the 20th of March 2024)."*

DELIVERABLES of D3: '*Report of the success in C7*' was uploaded to ***BUTLER*** on 20 March 2024

Action D4 - Replicability and transferability of WFR reintroduction elsewhere in EU

Completed / Foreseen start: 01/10/2016 Actual start: 01/10/2016
Foreseen end: 30/09/2023 Actual end: 31/12/2023

*[**NOTE**: Originally, the plan was to spread out the execution of **sub-actions D4-D6** over a longer period of time during the final years of the project, but the time and HR constraints that plagued the project throughout its duration affected this plan as well. The written work for all the mentioned sub-actions was heavily concentrated towards the end of the project.]*

The objective of action D4 was to formulate an experience-based strategy for replicating and transferring the action C1 procedure and its justifications to future reintroduction efforts of WFR within its historical range in the EU.

In the deliverable of D4, we examine the rationales for reintroducing wild forest reindeer, emphasizing certain decisive facts and features that justify its place in species conservation. For the planning and implementation of WFR reintroduction, we propose a three-phase workflow

covering years of work, ranging from the preliminary assessment of available habitats and identification of stakeholders to post-release survey of the reintroduced population and restoration of habitats within the future dispersal range of the species.

The deliverable of D4 presents a draft (although more or less in a complete form), which will be subjected to expert scrutiny and will be finalised for publication and dissemination according to the plan described in the Deliverable of action E2.

In PR4 we mentioned that a preliminary request had been sent to the chair of the IUCN SSC CTSG about the possibility to publish the D4 output in their series of 'Taxon-specific Translocation Guidelines' (https://iucn-ctsg.org/policy-guidelines/taxon-specific-guidelines/). At that time, we hadn't yet received any response, but the chair of CTSG returned to us later. Their message was that publishing through them would be possible, but that the process for acceptance is rather complicated and did not seem feasible in terms of our planned schedule then. Obviously, dissemination through CTSG has not been rejected.

Project planner form the CB staff attended IUCN SSC CTSG annual congress in November 2023, and the lessons learned from there have been utilized and will continue to be utilized in the development of the strategy.

DELIVERABLE of D4:

Action D5 - The socio-economic impacts of wild forest reindeer reintroduction

Completed / Foreseen start: 01/10/2016 Actual start: 01/10/2016
Foreseen end: 31/12/2022 Actual end: 31/12/2023

*[**NOTE**: Originally, the plan was to spread out the execution of **sub-actions D4-D6** over a longer period of time during the final years of the project, but the time and HR constraints that plagued the project throughout its duration affected this plan as well. The written work for all the mentioned sub-actions was heavily concentrated towards the end of the project.]*

The objective of action D5 was to conduct an assessment for evaluating the socio-economic impacts of reintroduction in action C1. In the assessment we describe the findings regarding local level social and economic impacts of the wild forest reindeer reintroduction (*Project action* C1) made during WildForestReindeerLIFE in 2016-2023.

The social impacts of reintroducing wild forest reindeer in Seitseminen and Lauhanvuori National Parks were assessed through an online survey targeting individuals living, working, or engaging in activities within the reintroduction areas. Out of 87 respondents, the vast majority viewed the reintroduction positively, highlighting intrinsic values such as the species' role in Finnish fauna and biodiversity. Local residents and visitors differed slightly in their responses, but both groups largely perceived the reintroduction favourably. The survey also revealed stakeholders' preferences for obtaining information about wild forest reindeer and their future hopes for Wildlife Service Finland and other organizations involved in the reintroduction areas. Overall, the survey results suggest strong support for the reintroduction effort, with minimal reported negative impacts or conflicts. However, continued monitoring is needed to assess any potential long-term effects, especially as the population of wild forest reindeer increases.

After the Final Report of the project is submitted, we will prepare a manuscript for a peer reviewed scientific note/article of the social impacts of the reintroduction.

The economic impacts: While indirect local economic impacts, such as increased income for local service providers due to visitor attraction, were not measured, the direct flux of project resources to local actors was calculated. These included expenses for *External assistance*, *Consumables*, and *Personnel* costs for local WFR keepers hired for the project. Despite efforts to prioritize "best value for money" and obtain multiple bids, a significant portion of resources was directed to local actors, comprising 36-53% of total costs. This contribution to the local economy was made in accordance with procurement rules and was considered a substantial support for the region. The majority of local input was allocated to personnel costs for WFR keepers, followed by locally procured contractor work and *Consumables*. Overall, the project's investment in the local economy (~260.000 €) was seen as beneficial for improving project acceptability and achieving its main objective of establishing a WFR population in the region.

DELIVERABLE of D5: '*Assessment report on the socio-economic impacts of wild forest reindeer reintroduction*' was uploaded to ***BUTLER*** on 29 January 2024..

Action D6 - The impact of wild forest reindeer reintroduction on the ecosystem functions

Completed / Foreseen start: 01/10/2016 Actual start: 01/10/2016
Foreseen end: 31/12/2022 Actual end: 31/12/2023

*[**NOTE**: Originally, the plan was to spread out the execution of **sub-actions D4-D6** over a longer period of time during the final years of the project, but the time and HR constraints that plagued the project throughout its duration affected this plan as well. The written work for all the mentioned sub-actions was heavily concentrated towards the end of the project.]*

The objective of action D6 was to make an assessment to evaluate the impacts of reintroduction in action C1 on ecosystem functions relevant to the recovery of the wild forest reindeer's historic range.

Our assessment acknowledges the complexity of assessing the impacts of reintroducing wild forest reindeer (WFR) on ecosystem functions in Lauhanvuori and Seitseminen National Parks. In the assessment we consider factors like intra-specific social cohesion, large carnivore territories, grazing, trampling, predation, and competition. Movements of released WFR were tracked using GPS collars and field observations, indicating exploration within and beyond the parks.

Furthermore, we discuss the potential amalgamation of subpopulations and the absence of significant ecosystem effects due to low WFR densities. Predation risks from large carnivores, particularly wolves, are considered, but evidence is lacking. Apparent competition with other cervids is discussed, noting the challenges of WFR coexisting with abundant prey species. Ultimately, due to the low number of released WFR and their extensive range, we conclude that direct impacts on vegetation, carnivore territories, and interspecific competition are difficult to ascertain. Predation and apparent competition have not been observed significantly, indicating a favourable situation for the project's objectives.

DELIVERABLE of D6: '*Assessment report on the impact of wild forest reindeer reintroduction on the ecosystem functions*' was uploaded to ***BUTLER*** on 2 February 2024.

Action E1 - Dissemination planning and preparations

Completed / Foreseen start: 01/01/2017 Actual start: 01/01/2017
Foreseen end: 31/05/2023 Actual end: 31/05/2023

The content of *Project action* E1 was practically planned and budgeted in two directions. On the one hand, the project activity included annual communication planning tasks, which were managed through meetings among the most active project partners regarding communication. On the other hand, the project activity included work, procurements, and other expenses related to communication structures in zoos. Communication structures refer to information kiosks built in public zoos beside the pens where a breeding group of WFR are kept, as well as the communication materials presented in those kiosks.

The annual meetings of the communication planning group were held as planned in the years 2017, 2018, 2019, 2020, 2021, 2022, and 2023. The annual communication plans drafted as a result of these meetings have been published as individual deliverables each.

All information structures in the zoos were implemented during the project. At Ähtäri Zoo, the construction of a WFR viewing tower and a forest footpath leading to the tower was completed before the MtR. This construction was carried out in conjunction with the development of a large forest enclosure complex (action C1). Additionally, the first set of information materials was displayed early in the project at Helsinki Zoo, and somewhat later at Ranua Zoo. All zoos showcased identical information materials specifically designed for the WildForestReindeerLIFE project.

The construction of information kiosks in Helsinki Zoo and Ranua Zoo were delayed. The onset of the construction in both zoos was mentioned in PR4. An explanation for the delay has been provided in section 8.1 of the Final Report, as well as in a separate clarification prepared by the Zoos detailing the reasons for the delays in construction (Annex 7). However, it is important to emphasize that, with the exception of the very first few months of the project, all zoos have consistently throughout the entire duration of the project informed their visitors about the project and their role in it, and its EU funding.

DELIVERABLES of E1: '*Communication plan 2017*', '*Communication plan 2018*' and '*Communication plan 2019*' were annexed to **PR1**, **PR2** and **MtR**. '*Communication plan 2020*' and '*Communication plan 2021*' were uploaded to ***BUTLER*** on 15 January 2024. '*Communication plan 2022*' was uploaded to ***BUTLER*** on 11 September 2023. '*Communication plan 2023*' was uploaded to ***BUTLER*** on 11 September 2023. These plans are prepared to be used among project partners and are therefore only available in Finnish.

Action E2 - Dissemination and networking

Completed / Foreseen start: 01/01/2017 Actual start: 01/01/2017
Foreseen end: 30/09/2023 Actual end: 31/12/2023

A discrepancy between the initially planned minimal HR budgeting in Activity E2 and the actual workload of communication has been a recurring theme in the project reporting throughout its duration. Now, with the project concluded, it can be argued that by highlighting this discrepancy, we have essentially tried to provide explanations for what we perhaps perceived as insufficient investment in communication and outreach.

All of this has occurred without a proper analysis of the actual volume of communication in the project. It is quite telling that such an analysis was never conducted, primarily due to a perceived lack of time. However, for the purposes of the FR, the analysis was finally undertaken, and the results suggest that there may not have been a need for explanations. It is probable that our own perception of inadequate communication has inadvertently driven us to exert more effort and invest more resources in the task. It can be reasonably asserted that the communication and outreach efforts of the WildForestReindeerLIFE project have ultimately been sufficient, comprehensive, and of high quality.

While all project partners contributed to communication and outreach at some point, the bulk of the work predominantly fell on the shoulders of the CB and the zoos. Luke/NRIF, SR/FWA, and WWF occasionally communicated effectively on their specific topics.

The numbers in the table below speak for themselves. By tallying up all communication activities, we have averaged 2.7 interactions/events per week throughout the entire duration of the project. A more detailed statistic is available in Annex 14.

Appearances in digital and printed media, TV, radio etc.	*101*
Social media posts, newsletters sent, info boards on display	*>500*
EU-Life communication and other networking	*9*
Appearances in scientific and professional forums	*34*
Face to face chat, phone or email to public and local stakeholders	*>350*
Mean N of varying acts of communication/week throughout 7 project years	***2,7***

Table 2. Summary of beneficiaries' activity on various communication, information dissemination, networking and correspondence during the whole project. The numbers are minimum estimates resulting from a survey made only recently, and reaching back as long towards the project start as possible.

DELIVERABLE of E2: '*Dissemination of the strategy on replicability and transferability*' was uploaded to ***BUTLER*** on 2 April 2024.

Action F1 - Project management

Completed / Foreseen start: 01/10/2016 Actual start: 01/10/2016
Foreseen end: 31/12/2023 Actual end: 31/12/2023

The project manager and project planner collaborated closely in coordination. Both served as full-time employees for the CB. The project manager reported 100% of their hours for the project throughout its entirety, while the planner's hours were occasionally allocated to other projects, albeit ones also related to WFR conservation and management. The responsibilities of both the project manager and planner are outlined in Section 5.

The project steering group convened thirteen times. The majority of the meetings adhered to the schedule outlined in the project plan. In five instances, meetings were convened to address specific technical or financial issues. The composition of the steering group remained largely unchanged throughout the project. However, the foreman of the two-person coordination team at CB changed in 2021, resulting in a change in CB's representative in the steering group.

Taking into account both the technical and financial considerations, the project management has successfully steered the project progress almost as planned. Some changes and delays were

encountered, which is quite expected for a seven-year project. Below are listed some key achievements of the project. Credit for these achievements varies, but predominantly goes to those responsible for project management and key personnel collaborating with them from partner beneficiaries. Each of these points has been discussed in more detail elsewhere in this FR.

- **The project remained under budget; the reported expenditure for the entire project is 97.5% of the original budget.**
- **There have been transfers between budget categories amounting to only 5% of the original total project budget.**
- **No exceptions were found in the financial audits of beneficiaries MH and Luke/NRIF.**
- **No such last-minute changes, delays, or deficiencies occurred at the time of the FR submission that would have been unknown to EASME/CINEA.**
- **With a few exceptions, the outcomes of project actions met or exceeded expectations.**
- **The project delivered additional deliverables, which are included as annexes in this FR.**
- **Contrary to the perception of the CB coordination team, the project performed admirably in communication tasks.**

DELIVERABLES of F1: '*Audit report*' was uploaded to ***BUTLER*** on 8 April 2024. '*After Life plan*' was uploaded to ***BUTLER*** on 11 April 2024.

6.2 Main deviations, problems and corrective actions implemented

Both minor and major deviations, problems, and corrective actions are treated below, action by action:

A1: There was a change in the number of purchased GPS collars from planned 121 to 110, but this did not cause any problems.

A2: The 2017 census in Suomenselkä was incomplete due to unfavourable conditions, specifically melting snow, making it difficult to detect dispersed WFR from aircraft. The 2018 census in Kainuu was halted due to thick snow cover with frozen layers, which also made it challenging to detect dispersed WFR from aircraft. We were prepared for this already beforehand by planning the action to cover two census years.

A3: No significant deviations from the planned schedule or objectives.

A4: Action encountered some challenges due to shortages in human resources and time constraints, which likely resulted in deviations from the planned timeline for data collection of sub-actions A4.1 and A4.2. Measures were taken to mitigate the delays and ensure the completion of the tasks.

A5: Challenges were encountered during the initial stages of the pilot census in 2017, including a lower-than-expected number of WFR identified and difficulties in method implementation. High proportions of unidentified individuals persisted in subsequent years despite efforts to improve census methods, indicating ongoing challenges in accurately identifying WFR. Efforts were made to minimize unidentified individuals, with the adoption of ground-level video

footage for complementary data collection in addition to drone camera trials. Despite encountering challenges, the project steadily evolved to improve population monitoring methods, ensuring continuity and reliability in monitoring WFR populations.

A6: Originally, project actions A6 and C7 were designed as a coherent whole, but they ultimately faced significant delays and changes, deviating from the initial plan. Sub-action A6.1 was initially planned in the proposal with insufficient expert skills, leading to a need for adjustments and a revised focus on modelling the habitat use of WFR females during the critical calf nursing period. Constraints on personnel resources, complex data management issues, and unresolved data quality issues led to delays during the work in sub-action A6.1. Despite efforts to recruit additional personnel and collaborate with external experts, obstacles persisted, including the need for attention diversion to other tasks and ongoing data quality issues. Efforts were made to address delays and challenges by recruiting additional personnel with the required expertise and reorganizing the team's responsibilities. Collaboration with external experts and institutions, such as the WFR research team of NRIF and a GIS professional from the University of Oulu, helped bolster progress despite obstacles. Overall, despite significant changes and delays, sub-action A6.1 ultimately exceeded its objectives, showcasing the project's adaptability and commitment to achieving its goals.

A7: Action aimed at updating the national wild forest reindeer action plan, experienced delays in its execution. The drafting of the WFR population management plan update took longer than anticipated, spanning from March 2020 to January 2021, due to various factors including personnel transitions and internal differences of opinion. Efforts were made to submit the revised draft to the Ministry of Agriculture and Forestry for ratification, emphasizing the commitment to ratify the updated plan by the project's end date. Overall, while action A7 faced delays and encountered internal challenges during the drafting process, corrective actions were taken to address these issues and ensure the successful updating and ratification of the national wild forest reindeer action plan.

C1: There was an initial delay of 2.5 months in the process of establishing and managing WFR enclosures due to issues with the fence building contractor. This delay impacted the timeline for introducing the breeding stock into the enclosures. This delay in enclosure construction resulted in the transportation of WFR into unfinished enclosures during the rutting season, deviating from the planned timeline. Behavioral issues were observed among the first released animals, partly due to their zoo background and partly to the timing of releases requiring supplementary feeding outside the pen post-release.

Issues arose with the commitment of the Lauhanvuori keeper to the work, necessitating the non-renewal of the keeper's contract and the seeking of external assistance for WFR keeping in Lauhanvuori. Despite challenges, the project achieved significant milestones in WFR conservation and reintroduction efforts, including the successful conclusion of the captive breeding period and the release of 82 individuals over five years. Overall, despite the deviations from the planned timeline and the problems encountered during the implementation of action C1, corrective actions were taken to address these issues and ensure the successful reintroduction of WFR into the wild, achieving significant milestones in conservation efforts.

C2: Action C2 encountered deviations from the planned objectives due to the failure of the initial release and the realization that the Ähtäri-Soini-Karstula subpopulation was not as isolated as previously thought. This led to a restructuring of action C2. In response to the

challenges faced and the feedback received, action C2 was paused to gather more information about the situation, including the true status of the subpopulation in terms of isolation and gene flow. action was subsequently restructured in winter 2020-2021 to the transportation of four wild-caught adult female WFR from the Kainuu subpopulation to the Karstula enclosure. The restructured action C2 resulted in the verification of gene flow from the Kainuu to Suomenselkä subpopulation, which was one of the most significant achievements of the entire project.

C3: No significant deviations from the planned schedule or objectives. Comparing the planned schedule some rather insignificant delays occurred in C3.1.

C4: The goal of was to increase the number of founders of the *ex situ* WFR population from 8 to 14 during the project. While the goal was achieved in principle by transporting six wild-caught breeding males to various zoos, one of these males died before contributing to the zoo population's genetic diversity, resulting in a slightly lower outcome than anticipated. During the project this was planned to be fixed by transporting some of the three available wild females to zoos. This was, however, rejected because they were deemed unsuitable for zoo life, and their wellbeing might have been compromised. Despite the setbacks, the remaining five males contributed to the genetic diversity of the zoo population by siring offspring effectively.

C5: The action was initially delayed from the planned schedule, commencing in early 2019 instead of 2018. The planned output and timeline differed from initial expectations, with the cancellation of the deliverable "Report on possibilities of WFR GPS-data in controlling telematics" due to technical limitations. Despite the challenges, the action proceeded with the development of an expert-based operational model supported by collision data collected by FWA.

C6: Sub-action C6.4 aimed to publish eight articles on various aspects, but the outcome fell short by two articles. The responsibility for drafting articles mainly fell on the project planner, and the workload associated with other project tasks limited the output.

C7: Sub-action C7.1 experienced a deviation from the original plan due to the COVID-19 pandemic. Initially scheduled for in-person meetings between January and March 2020, the seminars were postponed and transitioned to webinars. The webinar ultimately took place on March 16, 2021, a year later than planned. Delays and challenges were encountered in the implementation of bog habitat restoration outlined in sub-action C7.2. Despite the target of 400 hectares for restoration, only three sites covering a total of 57 hectares were completed. The delay was attributed to difficulties in finding suitable sites and skilled contractors. Sub-action C7.2 was ceased as agreed upon in correspondence between CB and CINEA due to the challenges encountered. The remaining funds were allocated to a Final Seminar, following advice from CINEA and NEEMO. It was recognized that the goals of action C7 would be achieved through measures implemented outside the LIFE project. A map was compiled to demonstrate that these goals had already been achieved multiple times over, indicating a shift in focus from project-specific actions to broader environmental initiatives.

D1: Originally, the project plan mentioned utilizing the results of the A5 field census pilot in action D1, but it is now clear that a comparable time series could not be obtained due to the evolving experience of the surveyors during the project years.

D2: The systematic recording of incidents and preventive actions under sub-action C3.2 started in 2018, which was later than the ideal start date. While recordkeeping began at the beginning of the project, the period 2016-2017 wasn't as systematic as hoped, indicating a deviation from the planned timeline for initiating this aspect of the action. The overall increase in the number of incidents recorded during the project was against expectations. This increase can be attributed to factors such as the growth of the WFR population and the absence of barrier structures between WFR and semi-domestic reindeer in certain areas, particularly Northern Ostrobothnia. Despite the success rate of operations increasing until 2020 in both Kainuu and North Ostrobothnia, there was a subsequent decrease in success rate in Kainuu after 2020. This decrease could be due to limited field workforce and a concentration of efforts in Northern Ostrobothnia, where the situation was deemed more critical.

D3: The initial plan for action D3 was to monitor and report WFR habitat availability and track the utilization of restored habitat patches by WFR. However, due to substantial changes in action C7 (and action A6), it might have been justified to remove action D3 altogether.

D4: No significant deviations from the objectives. The available time shortened significantly from the planned schedule, mainly due to the rush caused by other actions, and the work on this action was heavily concentrated towards the end of the project. Eventually, it led to a request for extending the project by postponing the end date for three months. The deliverable of D4 contains content that is essentially ready, but it will still be improved, supplemented, and clarified before dissemination.

D5: No significant deviations from the objectives. The available time shortened significantly from the planned schedule, mainly due to the rush caused by other actions, and the work on this action was heavily concentrated towards the end of the project. Eventually, it led to a request for extending the project by postponing the end date for three months.

D6: No significant deviations from the objectives. The available time shortened significantly from the planned schedule, mainly due to the rush caused by other actions, and the work on this action was heavily concentrated towards the end of the project. Eventually, it led to a request for extending the project by postponing the end date for three months.

E1: The construction of information kiosks in Helsinki Zoo and Ranua Zoo experienced delays. The reasons for the delays are explained in Annex 13. Despite the delays in the construction of information kiosks, the zoos consistently informed their visitors about the project and their role in it throughout the entire duration of the project. This proactive communication ensured that visitors were still engaged and informed about the WildForestReindeerLIFE project despite the construction delays.

E2: There was a discrepancy between the initially planned HR budgeting in Activity E2 and the actual workload of communication. CB finally undertook a survey of communication activities for the purposes of the Final Report. The results of this analysis suggested that the communication and outreach efforts of the WildForestReindeerLIFE project have been sufficient, comprehensive, and of high quality. This indicates a corrective action taken to assess and validate the adequacy of communication efforts, providing reassurance that the project's communication objectives were met despite initial concerns about resource allocation.

F1: Because the project coordination team (project manager & project planner) at CB participated in, or, were responsible of a majority of project actions listed above, there was

more or less chronic deficiency of time/HR for systematic and meticulous coordination work. Despite that, however, the project management successfully steered the project progress almost as planned. This indicates that the project team effectively managed challenges and deviations from the original plan to ensure project objectives were still achieved within acceptable parameters.

6.3 Evaluation of Project Implementation

Methodology applied

In many project activities, the methods were tried and tested – some previously used for forest reindeer, and some at least in other species conservation work (A1, A2, A3, A7, C3, C4, C6, C7). In others, efforts were made to also apply new methods (A5, A6, C1, C2). And partly, these mentioned methods were also a mix of new and old. Methodologically, we experienced significantly more successes than failures. It could even be said that the only method failure classified as such was at the beginning of action C2, where the animal material used was unsuitable for the purpose.

The methodology in the central concrete conservation actions C1 was under our constant scrutiny. Although a similar acclimatization practice had been successfully implemented in Finland for one reintroduction in the late 1970s to early 1980s, in this project, a lot of things were done somewhat "for the first time". This was because, for example, regulations, values, and also natural conditions have changed over forty years. The capture, captivity, care, and handling of animals, intervention in the causes of natural mortality, the impact of project activities on nature and the environment, etc., are now monitored in a completely different way than before. What used to be allowed or possible through mere notification procedures and somewhat experimental in nature may now require significantly detailed justifications and permit procedures. Overall, action C1 proceeded smoothly in those aspects as well. However, as we are now planning for the continuation of this project, we are already in many ways in a different situation than during the planning phase of this project in 2014-2015.

As for cost-effectiveness, it may suffice as a general statement that achieving almost all results satisfactorily or well in a project that remained under budget speaks strongly in favor of cost-effectiveness.

Expected vs. achieved results

Action	Expected result in the proposal	Achieved 0--100% *(>100%)*	Evaluation
A1	121 GPS-tagged individuals have been under surveillance in Kainuu and Suomenselkä	**100**	*110 collars purchased (<100%), but thanks to battery replacements 160 tracking periods (>100%) either completed or still continuing*
A2	one reliable census result from Suomenselkä & Kainuu 2017 - 2018	**100**	*Kainuu censused succesfully in 2017, and Suomenselkä in 2018*
A3	social impact assessment reveals local acceptance toward C1	**>100**	*expected result from the SIA, and peer reviewed paper published*
A4	extent of road mortality and illegal killing of WFR are assessed	**>100**	*expected result achieved, and peer reviewed paper published*
A5	field census of autumn herds piloted and method begins to take shape	**100**	*results of piloting satisfactory, probably evolves further according to need (if snow conditions won't allow aerial census, for example)*
A6	WFR habitat on state and private land mapped / education material for foresters prepared / 400 ha of restoration pilots for C7 selected	**X (100)**	*expected result not achieved, **BUT** substantial change in actions A6 & C7 and 100% result in this new direction*
A7	WFR management plan updated and ratified before the end of project	**100**	*expected result achieved*
C1	30-50 strong reintroduced and breeding populations around Seitseminen and Lauhanvuori / six individuals GPS-tagged	**>100**	*the upper limit of the range of the expected results achieved a year before the project end*
C2	Ähtäri-Soini-Karstula subpopulation increased with three reinforcement releases totalling 20-30 individuals	**X (100)**	*expected result not achieved, **BUT** substantial change in action C2 and 100% result in this new direction*
C3	hybrids not found towards the end of the project / occurrence of WFR in reindeer area and vice versa not observed	**(50)**	*hybrids not found (100%) **BUT** hybrid detection methodology not as effective as assumed in project plannig / subspecies still mingling*
C4	number of founders of WFR *ex situ* population increased from 8 to 14.	**(100)**	*expected result achieved (100%) **BUT** one founder died before contributing to ex situ genetic diversity*
C5	road mortality of WFR reduced from the number revealed in A4 / species misidentifications of road kills occur no more	**30**	*action proceeded as expected, but increasing population means increasing collisions & mortality / also sub-action cancelled*
C6	monitoring of illegal actions toward WFR reveals that illegal killing and disturbance are/have become negligible.	**100**	*expected result achieved*
C7	400 hectares of WFR habitat in the vicinity of Natura 2000 areas restored	**20**	*only 57 ha of planned restoration completed (15%) **BUT** provided proof that the situation is far from being bad regarding restoration (+5%)*
D1	ne reliable census result from Suomenselkä & Kainuu 2022 - 2023 / population increasing & conservation status favourable	**100**	*both censuses succesful in 2022, and Kainuu also in 2023 / conservation status changed to favourable in 2019*
D2	No hybrids found	**(100)**	*hybrids not found (100%) **BUT** hybrid detection methodology not as effective as assumed in project plannig*
D3	The expected result of A6 and C7 verified by analysing the data of A1 and A5	**X**	*substantial change in A6 & C7 turned D3 irrelevant*
D4	strategy for replication and transfer of WFR reintroduction elsewhere in EU is completed	**90**	*Strategy completed **BUT** final touch and layout still missing*
E1	dissemination plans made / vistior guiding OK and infra built in Zoos	**100**	*expected result achieved*
E2	communication according to plan in E1 / strategy for D4 dissemination created	**>100**	*expected result achieved and exceeded in terms of communication volume and intensity*

Table 3. Evaluation of the degree of achievement of the results expected in the proposal. Justifications for the values are given in the 'Evaluation column' (right).

Visibility of project results vs. time

***NOTE**: The question posed by EASME in the guidelines for preparing the FR regarding the visibility of results at a later time is interesting in the sense that originally, the measurable expected results defined in the proposal were assumed to be generated and visible during the project period. Therefore, it is reasonable to assume that the question about 'long-term results' (EASME: '... and which results will only become apparent after a certain time period.') raised during the final reporting phase pertains to some other results than those expected results presented in the application. Otherwise, this question would only concern those project actions for which the expected results were not achieved during the project period*.

In the table 3 above, we have presented the realization of measurable expected results listed in the application during the project period. We will not repeat that here, but instead, we will present *speculations on what results* from certain project actions, which are generally suitable for this kind of future analysis, *may become visible* afterwards. That's really all we can do. We hope the note above provides sufficient justification for the response provided below.

A5: The piloted field survey will be finalized, standardized, and integrated into the WFR census scheme. *(Alternative scenario: Resource constraints in wildlife management administration prevent this.)*

A6: The predictive model influences land use planning in current and future WFR areas, thereby promoting the viability of the WFR population. *(Alternative scenario: Other factors, potentially harmful to WFR, outweigh the results of the predictive model in land use planning in that area.)*

A7: The implementation of the population management plan in the coming years will promote the viability of the WFR population. *(Alternative scenario: Resource constraints in wildlife management administration and associated management actors prevent this.)*

C1: In sub-populations created through reintroduction, the reproductive rate remains higher than mortality in the long term, resulting in population growth and amalgamation with the Suomenselkä sub-population. *(Alternative scenario: Habitat quality further deteriorates, preventing population growth, or predation by large carnivores cannot be controlled due to legislative obstacles.)*

C2: The genetic contribution of the Kainuu sub-population increases the genetic diversity of the Suomenselkä sub-population as a result of the reinforcement carried out in the project. *(Alternative scenario: The genetic lineage of the relocated individuals does not continue, and the potential of the new genetic material dies with them.)*

C3: The actions taken will continue to lower the risk of hybridization, and the motivation to allocate resources to safeguard the WFR genome remains. *(Alternative scenario: Resource constraints in wildlife management administration or issues related to land ownership do not allow continuation of the work at a sufficient level, for example, concerning the most acute issue, the construction of the conservation fence in Northern Ostrobothnia.)*

C4: The *in situ* founder's genetic contribution significantly increases the genetic diversity of the *ex situ* population. *(There is practically no alternative scenario.)*

C5: New, streamlined warning sign practices, and potential new technology, reduce WFR's traffic mortality. *(Alternative scenario: New practices are not adopted in road maintenance even over time.)*

C7: Restored habitats in the project, combined with habitats restored outside the project, enhance the viability of the WFR population. *(Alternative scenario: The WFR population declines significantly for other reasons, making the increase in the amount of good habitat irrelevant.)*

D4: The replication and transfer strategy facilitates WFR reintroductions in other member states. *(Alternative scenario: Member states do not consider WFR reintroduction as feasible.)*

E2: Improved awareness of WFR and its conservation and management among citizens, authorities, and stakeholders provides an overall improved foundation for the progress of WFR conservation and management. *(There is practically no alternative scenario.)*

Amendments promoting results

The requested amendments have been purely administrative and have no impact on the actual results. Therefore, they are not relevant in this context.

Results of replication

In the case of species' reintroductions, replication and transfer are processes that typically occur over a relatively long period of time, even at their fastest. However, in the coming years, we will undoubtedly start to see the initial signs of how the situation regarding replication and transfer in other parts of Europe is progressing, following the dissemination of Deliverable D4.

Effectiveness of the dissemination activities

In clarifying the important question of *How much the projects' communication has improved the WFR knowledge among citizens and stakeholders*, we made a mistake already in the proposal phase. A survey should have been conducted at the beginning and end of the project to assess public awareness of WFR and its conservation.

Currently, there are six wild ungulate species or subspecies living in Finland, including semi-domestic reindeer. Some of these species are native, while others are newcomers or introduced. Their established Finnish names also have the potential to create confusion. In this context, WFR, being rare and resembling domestic reindeer to a great extent, has been left in a disadvantaged position. The project began at a time when relatively few Finns were familiar with WFR without confusing it with several other species - either by name or by appearance. This situation in this project would have been ideal for examining how the average public knowledge evolves. Unfortunately, this opportunity was missed.

Key personnel in the project have been working in wildlife research and management practically throughout the 2000s. Over time, they have gained a good sense of prevailing perceptions in public discourse, as well as the knowledge and ignorance behind public speech. Although we did not measure any change, based on this intuition, we can empirically state that there has been a tremendous leap in public and official WFR knowledge during the project. Small glues are telling; citizens discuss WFR knowledgeably on online forums, and

police officers arriving at WFR collision scenes nowadays often correctly identify the species involved.

Roughly estimated, at least 90% of the WFR-related news during the project years was directly or indirectly linked to the project. From this, we can draw the realistic conclusion that the project's communication and dissemination of results have had a significant positive impact on WFR awareness.

Policy impact

Project achievements supporting legislation – This brings up three achievements: 1) Action A7 and the WFR population management plan, 2) the predictive model designed in action A6, and 3) the list of Natura 2000 sites to be updated for WFR conservation.

The WFR population management plan (1) developed in action A7, ratified by the ministry before the end of the project, is a document that outlines conservation and management policies for several years ahead. While periodically updated population management plans exist for game species mentioned in Finland's Hunting legislation, they are not inherently legally binding. Therefore, the true impact of the updated WFR management plan will be dependent on contemporary public resources in the years of implementation.

The predictive model (2) developed in action A6 is expected to have potential benefits in mitigating the adverse effects of land use decisions on WFR. Land use planning processes need to fulfil legal requirements that necessitate consideration and mitigation of the adverse impacts of future land use projects on the environment. This consideration needs to be based on research data, aiming to assess both the impact of individual projects and the cumulative effects of separate projects planned for the same area. With the unprecedented increase in the pace of wind power construction implementation and planning in WFR areas over the past couple of years, the anticipated results from the predictive model have become highly sought after. Now, upon their completion, these results are hastily going to be taken into account in land use planning in regions relevant to WFR.

A substantial progress was also made during the project concerning the Natura 2000 areas dedicated to WFR conservation (3), even though the work itself did not fall within the scope of any specific project action. At the time of drafting the proposal, WFR conservation was related to 31 Natura 2000 areas. Additionally, during the project planning phase, 16 more Natura 2000 areas were listed, for which it was justified to update the WFR as a protected species based on the occurrence data at that time. These 16 areas were subsequently updated, and currently, WFR is protected in 47 Natura sites. Since the WFR population has increased and expanded in the past years, updating the species information in Natura 2000 areas is once again relevant for WFR. In 2023, key project personnel from CB, SR/FWA, and Luke/NRIF compiled a list based on verified WFR observation data, comprising a total of 96 additional Natura 2000 areas where the standard data form needs to be updated for WFR. This list has been submitted to environmental authorities before the end of the project, and the these sites' data will be updated according to the established working schedule of ME on Natura related tasks. Upon completion, WFR will be protected in 144 Natura 2000 areas in Finland and the EU.

Main barriers – The main policy-related barriers to WFR conservation relate to the conservation policy regarding large carnivores. Despite research indicating that large carnivores can threaten the viability of the WFR population, the legal practice associated with

derogations from the protection of large carnivores under Article 16 of the Habitats Directive is so stringent that derogations sought under sub-paragraph 16(1)a cannot be granted preventively. The Commission's guidance document '*The strict protection of animal species of Community interest under the Habitats Directive*' specifically mentions sub-paragraph 16(1)a in the context of Finland's wolf and forest reindeer, but according to Finnish legal practice concerning this matter, derogations from the protection of large carnivores under 16(1)a can only be granted when evidence of predation can already be demonstrated.

This created a challenging situation for action C1. When drafting the proposal, a crucial criterion for selecting the reintroduction sites was the absence of permanent wolf territories in addition to ensuring high-quality WFR habitats. These criteria were successfully met. At the outset of the project, the Ministry of Agriculture and Forestry, as a significant co-financier, also emphasized the need to control potential occurrences of large carnivores in the reintroduction areas throughout the project that is funded by public resources. This was to ensure the survival and reproduction of the released WFR for as long as the reintroduced subpopulation remained critically small. This approach could be seen as representing a prudent use of public funds, rather than relying solely on luck regarding predation after the release of WFR.

A wolf pack established its territory adjacent to Lauhanvuori National Park already in 2018. The region has an abundant population of other ungulates, and since the wolf population in Finland was increasing, such vacant areas were quickly filled. Local hunting associations applied for a derogation from the wolf protection, protection of WFR reintroduction being the objective, but the request was denied by the authorities. The basis for the denial was that predation could not occur because no WFR had been released yet. Subsequently, other pack territories emerged in the area, and in 2022, locals renewed their application for a derogation. This time, the objective of the derogation was to protect the already released WFR population. However, the decision was negative again, with the rationale being the lack of evidence of wolves preying on WFR in that area. In the latest wolf population assessment from 2023, the distribution area of the released WFR in Lauhanvuori overlaps with three wolf territories. (See also 'C1' in section 6.1).

Until last year, the wolf was the only completely uncontrolled factor among large predators – at least by legal means. Coexistence with bear and lynx has been unproblematic. Their populations in Finland have been larger throughout the 2000s than they have been for over 150 years. Additionally, their conservation status has been favourable at least since the assessment period 2001-2006. The growth of both species has been sustainably regulated by hunting them annually under sub-paragraph 16(1)e. During this period, the population of both species has increased by 100-150%. However, last year, the Finnish administrative courts unexpectedly ruled that the objectives of derogations granted under sub-paragraph 16(1)e are illegal because such derogations cannot be used to regulate the population growth of a strictly protected species. According to research, the bear is the most significant predator of young WFR calves. It consumes the calf entirely in one sitting, leaving no traces of predation. Therefore, it can be predicted that after the end of population regulation based on sub-paragraph 16(1)e, sub-paragraph 16(1)a will also not be locally helpful in WFR conservation.

EU added value – In the Grant Agreement form B3, two separate award criteria are treated: 1) '*Replicability and transferability'*, and 2) *'Transnational, green procurement, uptake'*.

In the former ("*Replicability and transferability*"), there is a clear temporal dimension related to demonstrating added value. The EU added value may only become apparent after the project. This is precisely what was addressed when discussing the visibility of results over time in relation to action D4. The role of European zoos in replication and transfer was also specifically mentioned in Grant Agreement B3. Time is similarly linked to them in exactly the same way.

In the second aspect (*'Transnational, green procurement, uptake'*), the EU added value is most clearly linked to travel. In this regard, the greatest benefit likely came from COVID-19, which not only resulted in project travel expenditure being 40% lower than planned but also shifted employees to home offices, significantly reducing commuting between home and workplace.

*[**NOTE**: In our case the Grant Agreement form B1 (version 2015) does not recognize the 'significant biodiversity relation' nor does it offer any tick box for labelling the project in terms of that. In B1 the project is labelled being 'not significantly climate related'.]*

6.4 Analysis of benefits

*[**NOTE**: It is not crystal clear for us, how the sections 6.3 and 6.4 are different from each other. When getting acquainted with the instructions in the FR template, there seems to be some differences but also a substantial overlap between those two. Therefore, we express our apologies for not perhaps being consistent in our performance under those two titles of 6.3 and 6.4.]*

1. Environmental benefits

A. QUANTITATIVE BENEFITS

C1

- 82 released WFR individuals for reintroduction in the vicinity of Natura 2000 areas Lauhanvuori FI0800001 and Seitseminen FI0311002 by the end of the project
- Estimated ~30 calves born in the wild in the vicinity of the said Natura 2000 areas.
- WFR range extension through reintroductions: from 0 to 1800 hectares during the project (**KPI**)

C2

- Four wild-caught WFR females and their three calves from Kainuu subpopulation released for reinforcement in the vicinity of Natura 2000 area Aittosuo-Leppäsuo-Uitusharju FI0900005, and still all four are remaining alive among the Suomenselkä subpopulation by the end of the project.
- Another four calves (minimum) with mixed genome (Kainuu x Suomenselkä) given birth by the above four females born post release in the wild.

C3

- A total of 70 incidents out of 143 that might have led to a risk of crossbreeding have been solved in one way or another.

C4

- All six of planned minimum of six wild individuals were introduced to the partner Zoos. One died before contributing to the *ex situ* genetic diversity. All transported were breeding bulls.

- These bulls have sired 31 F1 descendants and two F2 descendants by the end of the project.

C5

- Several (number unknown?) occasions, where the streamlined guidance for warning sign placement succeeded. [The last one in winter 2024.

C7

- 57 hectares of WFR peatland habitat was restored by the end of the project.

Quantitative benefits with no direct connection to a particular C-action

- 96 additional Natura 2000 areas that are to be assigned for WFR conservation by the ME.
- WFR population increase in Finland and EU: From 2000 to 3000 individuals during the project (**KPI**).
- WFR range extension in Finland and EU: From 25000 to 48000 km^2 during the project (**KPI**).

B. QUALITATIVE BENEFITS

C1

- No trend detected. (Lacking data because aerial census not the most suitable for small N of individuals; improved camera surveillance starts in 2024-2025. MAF funding secured.)
- Action continues with a one-off short term acclimating and release of approx. five surplus *ex situ* individuals in Lauhanvuori in 2025. MAF funding secured.
- Action continues full scale, but with qualitative improvements if a follow-up LIFE-project gets started in 2026. Proposal will be submitted to 2024 Call.

C2

- Action continues full scale, but with qualitative improvements if a follow-up LIFE-project gets started in 2026. Proposal will be submitted to 2024 Call.

C3

- The basic level recurring tasks in safeguarding WFR genome continue uninterrupted all the time. MAF funding secured.
- The large scale investments (e.g. conservation fence in Northern Ostrobothnia) and nonrecurring tasks will hopefully be proceeded if a follow-up LIFE-project gets started in 2026. Proposal will be submitted to 2024 Call.

C4

- Next steps in managing the ongoing improvement of *ex situ* genome are left to be decided by the EAZA *Ex situ* Programme Coordinator at Helsinki Zoo. EAZA funding secured for the Programme.
- Lond Term Management Plan of WFR *ex situ* population management is finalised and put into action in by the Programme in 2024.
- New wild-caught founder are taken in to the *ex situ* population if a follow-up LIFE-project gets started in 2026. Proposal will be submitted to 2024 Call.

C5

- Recurring tasks in WFR collision prevention belong to the road maintenance. State financing secured.

C6

- Recurring tasks in game wardening on state-owned land continue uninterrupted. MAF/MH funding secured.

C7

- Restoration of peatland habitats described in the FR and its annexes will continue. Varying funding sources.
- Potential restoration effort between Kainuu and Suomenselkä subpopulations to facilitate the amalgamation of populations if a follow-up LIFE-project gets started in 2026. Proposal will be submitted to 2024 Call.

Qualitative benefits with no direct connection to a particular C-action

- WFR conservation status changed from unfavourable to favourable during the project.
- Positive trend in Finnish and EU population

Threats defined in Form B2d of the Grant Agreement

Form B2d of the Grant Agreement defines the following threats: *Large carnivores, crossbreeding, traffic mortality, poaching and disturbance, diseases & parasites, and climate change*. Suojelu ja populaatiokoon kasvattaminen voi tuoda WFR:lle resilienssiä uhkien torjumiseen tai sietoon. Alla jokaisen uhan osalta otetaan lyhyesti kanta siihen, että onko suojelutoimilla mahdollisuutta indusoida resilienssiä WFR-kannassa itsessään kyseistä uhkaa vastaan. Mikäli ei ole, niin uhkaan puuttuminen on ainoa keino turvata WFR.

- ***Large carnivores*** – Threat remains. Project did not have means or power to mitigate this threat directly (see '*Policy Impact*' in Section 6.3). However, in the long run population resilience can develop or be developed to compensate or counteract this threat. In practise this means that survival to maturity needs to be higher than predation mortality (combined with other mortality). This can be achieved either by increasing the size of the breeding WFR population or by reducing predation pressure. Given that WFR is a 'poor breeder,' reducing predation pressure would be critical, especially if the WFR subpopulation is small and local or if, in the case of a larger area, the population appears to be decreasing.
- ***Crossbreeding*** – The threat remains and appears to be intensifying. The project made significant efforts to mitigate this threat, but the population increase seems to have the opposite effect, as WFR in Suomenselkä are now migrating towards the good quality habitats that are available near the border and inside the reindeer herding area. Population resilience cannot develop or be developed to compensate or counteract the threat of crossbreeding. The only solutions to keep WFR and semi-domestic reindeers apart from each other are (A) a physical barrier, which is both expensive and socially challenging; (B) a buffer zone that is kept empty of all *Rangifers* by lethal control, which is both a conservation and a social issue; or (C) by

moving of the borders of the reindeer herding area for the benefit of WFR, which is hugely challenging both economically and socially.

- ***Traffic mortality*** – Threat remains after the project. In the project, efforts were made to reduce the threat, and progress has been achieved, but achieving complete control is impossible. Additionally, factors affecting the risk of collisions, such as snow conditions, are beyond human control. As regards resilience, same reasoning applies as is the case with predation above. The potential of digital technology was considered already in the proposal for this project (C5) but apparently the time wasn't right yet.
- ***Poaching and disturbance*** – Threat appeared to be minimal even without mitigation. At the project start, the severity of this threat was unknown. During the project, it became apparent that this threat is not a concern.
- ***Diseases & parasites, and climate change*** – Threat remains. Project did not have any true means or power to mitigate this threat, but in the long run population resilience can develop or be developed to compensate or counteract these threats. It's crystal clear that ensuring the large population size and diverse gene pool is the only way forward for adapting to threats such as these.

2. Economic benefits

While ensuring the best value for money and soliciting multiple tenders whenever possible, we successfully directed a significant portion of resources for the reintroduction of WFR into Lauhanvuori and Seitseminen National Parks to local actors. In the categories of *External Assistance* and *Consumables* combined, 36-53% of the funds were allocated to local actors. The largest expenditure in the *External Assistance* category was the contracted construction of captive breeding enclosures (€93,252.60). This contractor was selected through a comprehensive nationwide tendering process. Excluding this single procurement, local actors would account for 64% of the action C1 *External Assistance* costs.

Overall, we believe that in project action C1, we made a substantial contribution to the local economy, while adhering to procurement regulations. Whenever feasible, we compared local options for goods/services with those available elsewhere in terms of price (including freight costs) and delivery times and prioritized local suppliers for economic reasons. Hiring local keepers was essential for practical reasons. We believe that this support to the local economy has enhanced the project's acceptability and its primary objective of establishing a WFR population in the region.

In terms of the distribution of our local economic contribution across different cost categories, nearly half went to personnel costs for our regular WFR keepers, while the other half was divided between locally procured *External Assistance* work and *Consumables*.

3. Social benefits

In action D5 we studied the social impacts of reintroducing wild forest reindeer in Seitseminen and Lauhanvuori National Parks in action C1. We utilized an online survey for data collection and obtained a total of 87 responses. Notably, nine out of ten respondents viewed the reintroduction of wild forest reindeer as a positive operation, suggesting widespread approval of the conservation effort. However, we acknowledged the potential bias in the survey sample, as it likely attracted respondents already

interested in the topic, making the generalizability of the findings to the broader public opinion uncertain.

Among respondents who identified as visitors, the most selected impacts included the species' role as part of the Finnish fauna, increasing biodiversity, and the possibility to see WFR. This indicates a value placed on intrinsic and intangible aspects of the reintroduction. In contrast, responses from locals revealed minor differences in attitudes compared to pre-reintroduction forums, suggesting that the reintroduction may not have led to significant shifts in perceptions among local communities.

Of the impacts considered most significant by local respondents, five represented intangible values such as recreation or community image, indicating strong non-instrumental support for the reintroduction. However, some concerns were raised about potential damages caused directly or indirectly by the species, such as grazing on farmland. Despite this, the study found no significant conflicts arising from the reintroduction, aligning with previous expectations based on pre-reintroduction forums.

While no surprising themes emerged from open-text responses, our study emphasizes the need for continued monitoring to identify any unforeseen impacts over time, especially as the WFR population increases. Overall, respondents viewed the C1 reintroduction as a positive and appropriate conservation measure, with some comments addressing concerns about large carnivores and their population control in reintroduction areas.

4. Replicability, transferability, cooperation:

The replicability and transferability of WFR reintroduction represent a significant and multi-dimensional long term development trajectory initiated by this project, and as noted above with EAZA playing a central role. The strategy for replicability and transferability is defined in the deliverable of action D4 and will be disseminated in accordance with action E2's deliverable.

In essence, the initiation of replicability and transferability of WFR reintroduction means that we have described a strategy for reintroducing wild reindeer in specific regions of Europe. Our approach emphasizes targeting areas where the species disappeared mainly within the last few centuries due to excessive hunting pressure, rather than attempting comprehensive reintroductions across the entire EU or Europe.

We present a planning and operational workflow for assessing reintroduction feasibility, with a three-phase sequence designed to be interruptible at any point. The aim is to target public and private entities responsible for species conservation, intending to distribute our publication to relevant organizations in EU member states. Principally, EAZA members have a key role in this distribution.

While our aim is not to provide a step-by-step implementation guide, we focus on understanding the planning tasks and decisions necessary for successful reintroduction efforts. We recognize the importance of local expertise in determining suitable areas for restoration, emphasizing the need for careful consideration and evaluation before initiating any reintroduction activities. See deliverable of D4 for further details.

Regarding cooperation concerning replication and transfer, during the project period, we hosted representatives from Svenska Jägareförbundet and Umeå University from Sweden, as well as a representative from the LIFE11 NAT/IT/000210 project in Sardinia, in the context of reintroduction efforts. In Sweden, the plan for reintroducing WFR has been under development for a long time, but difficulties have arisen in finding suitable target areas due to reindeer herding area on one hand and wolf occurrence range on the other.

Another key collaboration in conservation and reintroduction efforts for a forest-dwelling *Rangifer tarandus* in forest environments was not directed towards the EU, but rather towards Canada. Partners from Canada included entities involved in the research and conservation of woodland caribou, *Rangifer tarandus caribou* (Parks Canada & Biodiversity Pathways). Woodland caribou and WFR belong to the same species, being ecologically closest to each other (excluding the subspecies in Siberia, Russia, as cooperation in that part of the world is currently impossible).

Visits were exchanged between the Canadians and this project (see Annex 7). The Canadian entities met with are also crucial in the implementation and planning of a large woodland caribou reintroduction complex that is under construction near Jasper national park in Alberta. Even before these visits the cooperation was established as WildForestReindeerLIFE project was the only non-North American actor invited to contribute in the feasibility study for the aforementioned caribou reintroduction project.

5. Best Practice lessons

- GPS-tagging in A1, aerial censuses in A2, and SIA methodology in A3 followed the tried and true methods of Luke/NRIF.
- Wild catching of WFR in C1 & C2 was based on methods used in the tagging mentioned above.
- Preparation of the population management plan for WFR in A7 was carried out by the SR/FWA and assisted by experts in partner organisations. This procedure has been applied in many Finnish game species' management plans before.
- Animal transportation, keeping and captive breeding in C1 & C2 was steered by the expertise of the zoo partners.
- The recurring prevention methods in C3, and peatland habitat restoration methods in C7 were part of the long-standing work by MH.

There is potential for improvement in refining animal care practices to prevent undue tameness among individuals intended for release. While we began exploring this aspect, time constraints ultimately impeded our progress.

6. Innovation and demonstration value

Three instances of innovation or demonstration value can be identified in the project:

- In action C3, a 200-meter-long floating fence was constructed to block an opening in the reindeer fence along the eastern border. This was done after the area's landowners withdrew from agreements to build a traditional fence on their land. After the landowners withdrew, the fence could not be built around the lake, so it

had to be constructed at a narrow strait across the lake. Floating buoys suitable for marine ice conditions were used as fence posts.

- In action C2, a significant change was made after the first of planned three releases of *ex situ* WFR failed miserably due to the tameness of the released animals. The use of wild translocated WFR will likely turn out to be much more beneficial for conservation goals than the initially planned action of three sporadic releases could ever have been.
- In action C1, approximately 25 GPS ear tags of Finnish construction were acquired, representing cutting-edge technology. However, there were numerous technical issues due to the novelty of the devices. Close collaboration with the manufacturer allowed the project to provide crucial feedback for perhaps improving the features of the innovative product.

7. Policy implications

*[**NOTE**: Kindly refer to the 'Policy Impacts' in Section 6.3 above. It's all in there.]*

7. KEY PROJECT-LEVEL INDICATORS

For the final reporting, the KPI guidance by EASME advises, "In this section please provide an analytical comparison with the targets at the beginning of the project." This project was designed in 2015 and commenced in 2016. Key Performance Indicators (KPIs) were introduced, to the best of our recollection, in 2018, initially appearing as a somewhat cryptic Excel worksheet. We are unsure of both content and fate of that particular worksheet regarding this project. Moreover, we do not feel that spending time searching for it as a reference of the 'beginning' would be the wisest use of our time.

The first substantial KPI snapshot was taken for the MtR, and it was further updated into a more (much more) comprehensive and reasonable snapshot for the FR. If we understand the purpose of this section 7. correctly, it is not necessary to repeat the results that are visible in the KPI tool itself. Therefore, we consider that it would be most appropriate to document here the changes made to the Specific Contexts and Indicators before the second snapshot intended for FR. All changes were made based on discussions with the KPI specialist and the project monitor from ELMEN EEIG, followed by our own deliberations.

CHANGES IN *SPECIFIC CONTEXTS*

- '*WFR range extension*' → '*WFR range extension through reintroductions*' name changed to better reflect the content (action C1).
- '*WFR conservation*' → '*WFR conservation and habitat restoration*' name changed to better reflect the content (action C7).
- A necessary new Specific Context created '*Genetic reinforcement of WFR subpopulations in nature*' for purposes of actions C1 and C2.
- A necessary new Specific Context created '*Genetic reinforcement of WFR zoo population for further conservation translocations*' for purposes of actions C4.
- A necessary new Specific Context created '*Overall conservation and management of WFR in Finland and EU*' – For enabling use of the indicator *14. Contribution to Economic growth*.

CHANGES IN *INDICATORS*

- 1.5. *Project area/length* – Changed the indicator to describe and measure the project working area in action C1 (under the Specific Context 'WFR range extension through reintroductions').
- 1.5. *Project area/length* – Changed the indicator to describe and measure the realised restoration instead of the expected in action C7 (under the Specific Context 'WFR conservation and habitat restoration').
- 1.6. *Humans (to be) influenced by the project* – Removed the value/tool 'Nature tourism' because its promotion has not been a project objective.
- 7.4. *Wildlife species* – Within the framework of the indicator, four out of six Specific Contexts are now being addressed (1. WFR range extension through reintroductions, 2. WFR conservation and habitat restoration, 3. Genetic reinforcement of WFR subpopulations in nature, 4. Genetic reinforcement of WFR zoo population for further conservation translocations). All of them have new sensible values, and some of them are entirely new.
- 11.1. *Website (mandatory)* – ALL digitally mediated (excl. phone calls) communication and outreach are treated within this indicator (under the Specific Context 'Awareness raising of WFR and its conservation').
- 11.2. *Other tools for reaching/raising awareness of the general public* – Removed two deprecated or irrelevant values/tools.