4. Appendices

Appendix I

Memorandum of Understanding for sourcing ex-situ lynx for reintroduction

1. Background

Since the early 1970s Eurasian lynx have been reintroduced into former ranges in Western and Central Europe through various translocation events. Most of the released animals were translocated from the Carpathian population, namely from Slovakia. In some cases, there are still ongoing releases of lynx originating from ex-situ breeding programs in zoos or game reserves. While releasing animals born ex situ is a common and important practice for species conservation, it is also controversial for large carnivores due to conflicting human interests or potential dangers posed to humans.

In principle, Eurasian lynx kept in enclosures can be reintroduced into the wild, as experience through planned reintroduction projects (i.e. from zoo lynx released to the Harz Mountains) or in the case of unintentional escapes from enclosures or wild lynx rehabilitated for release has shown. Anecdotal observations also demonstrate that not all animals sourced from captivity are suitable for living in the wild; some have preyed on livestock, while others were too habituated to humans.

The phylogenetic background and genetic suitability of ex-situ lynx is crucial: several distinct subspecies of the Eurasian lynx are recognized. However, insufficient attention was directed to managing subspecies as distinct breeding lines in the past. An ex situ source population for release must fulfill both phylogenetic (correct subspecies) and population genetic (sufficiently diverse genetic founder) requirements.

There has been a mounting demand for releasing Carpathian lynx (*Lynx lynx carpathicus*) in Western and Central Europe in the near future. Inbreeding problems stemming from original founding populations are on the rise and require adequate genetic rehabilitation through restocking. Although reintroductions are currently planned for colonizing suitable habitats and to reinforce existing populations, it will be difficult to meet the demand through translocations sourced from the wild Carpathian population alone. On the one hand, wild lynx from Slovakia and Romania are not available in unlimited quantities. On the other hand, relocating wild-caught lynx is difficult to plan and technically complex (limited capture time with unpredictable success, quarantine, genetic and veterinary clarifications, and transport risks and logistics).

Sourcing ex situ lynx for in situ projects is a welcomed alternative because it offers planning security and facilitates a more targeted selection of individuals suitable for release. A combination of translocating wild animals (including orphan lynx kept temporarily in enclosures) along with animals from the ex situ program would be the most effective route to establishing new populations or restocking existing ones. However, both the breeding program and the institutions with candidates for release must meet specific requirements. A reintroduction project must meet the conditions outlined by the International Union for the Conservation of Nature (IUCN)[1], on the other hand, the special conditions for the lynx and its conservation in Europe must be taken into account. In this Memorandum of Understanding, the signatory institutions outline the framework conditions for the use of ex situ born

[1] IUCN/SSC (2013). Guidelines for Reintroductions and other Conservation Translocations. Version 1.0. Gland, Switzerland: IUCN Species Survival Commission, viiii + 57 pp.

Carpathian lynx for in situ projects and commit to a cooperation that will allow the implementation of these framework conditions in the coming years.

2. Geographical concept for lynx conservation in continental Europe

Europe is home to three genetically well-defined subspecies of Eurasian lynx recognized by the IUCN SSC Cat Specialist Group, *L. l. lynx* in the north, *L. l. carpathicus* in the Carpathians and *L. l. balcanicus* in the south-western Balkans. Since the last ice age, these subspecies have established geographically distinct regions and have not merged despite marginal overlap in distributions. The subspecies should therefore continue to be maintained as distinct phylogenetic units. Although the phylogenetic assignment of the historical distribution lynx in the areas where the species became extinct is uncertain, based on current distribution and prior reintroductions in Central Europe, it was decided at the international lynx expert conference in Bonn in June 2019 to delineate reintroduction and conservation of the three subspecies among the following areas of continental Europe (Figure 1):

- Northern lynx *L. l. lynx*: northern and north-eastern Europe, Baltic States and lowlands of northern continental Europe
- Carpathian lynx *L. l. carpathicus*: Carpathians, continental European low mountain ranges, Alps and northern Dinarides
- Balkan lynx *L. l. balcanicus*: Southern Dinarides and mountain ranges of the Southern Balkan Peninsula.

This geographical division is not intended to limit natural mixing through migration. But the geographical division ensures that optimal starting conditions for a networked metapopulation are provided and possible outbreeding depression is prevented based.

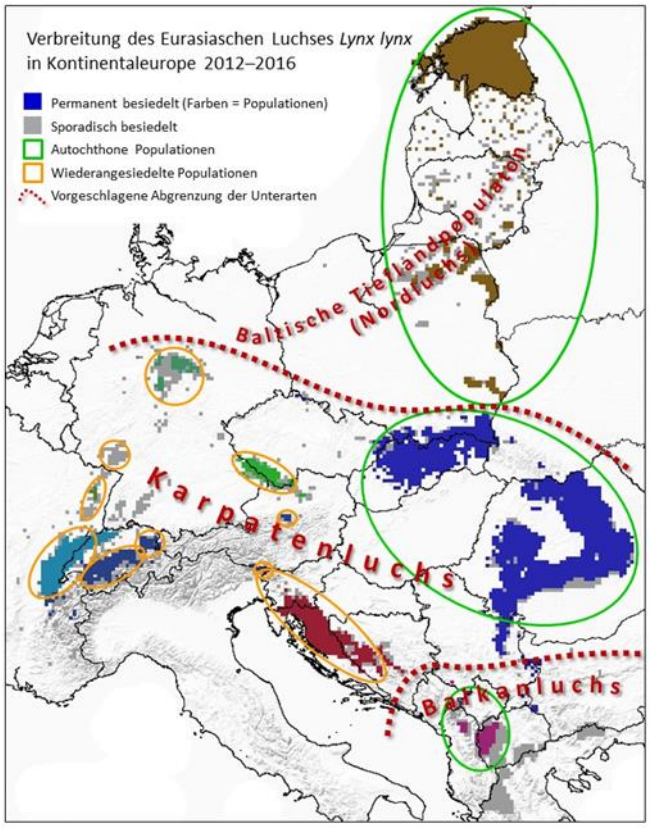

Figure 1: Proposed delineation across continental Europe for the conservation and reintroduction of the three Eurasian lynx subspecies.

Source: KORA Foundation, 2021. *50 years of lynx in Switzerland*. KORA Report No. 99, 88 pp, adapted from: Bonn Expert Group. 2021. Recommendations for the conservation of the Eurasian lynx *Lynx lynx* in Western and Central Europe. Results from the "Bonn Lynx Expert Group" workshop held in Bonn, Germany, 16-19 June. *Cat News* Special Issue 14, *in press*.

This Memorandum of Understanding focuses on a conservation strategy for the Carpathian Lynx. The aim is to sustain wild lynx as a viable, coherent population within the Carpathians and to expand its distribution to suitable and designated habitats across Western and Central Europe. Many forested mountain and hilly landscapes beyond the large massifs such as the Carpathians or the Alps today offer favorable conditions to support the return of the lynx. However, these habitats are too small to harbor viable populations in the long-term if they remain isolated. Therefore, a comprehensive, genetically variable and connected metapopulation of the Carpathian lynx should be established within the entire designated area. The long-term success of a reintroduction project depends largely on how quickly a robust group of animals can be released and establish as founders. With several projects taking place simultaneously in different countries, this means a considerable need for suitable lynx as well as skilled coordination between the respective projects and countries.

3. Partnership between ex situ and in situ projects

The creation and maintenance of a Carpathian lynx metapopulation in Western and Central Europe requires strategic international cooperation amongst authorities responsible for species and nature conservation, non-governmental organizations (NGOs) and scientific institutions dedicated to conservation. As the success of reintroduction and restocking is only predictable to a limited extent, an adaptive approach is required, which in turn implies a robust post-release monitoring of the demographic and genetic development of the population. As an increasing demand for suitable lynx for release is unlikely to be met by wild captures alone, the provision of selectively bred and well-suited animals from the ex situ program translocated to in situ projects is necessary. However, for the use of such lynx for release in the designated Carpathian Lynx regions, strict conditions have to be met:

1. Lynx must be clearly assigned to the subspecies *L. l. carpathicus*, on the basis of their pedigree and genetic test;
2. animals are bred in a way that avoids imprinting on humans;
3. lynx must be kept until release in suitable enclosures that allow species-appropriate socializations and feeding on wild prey (mainly deer) to prevent habituation to humans;
4. in a given reintroduction or restocking project, only ex situ lynx may be released that have been individually evaluated as suitable and meet the genetic (especially concerning the degree of relatedness to other animals of the population) and veterinary requirements;
5. post release, the fate of the individual released lynx as well as the development of the population must be closely monitored in order to ensure a continuous learning and inform adaptive management.

These prerequisites imply the identification or establishment of a suitable ex situ breeding group of Carpathian lynx, the provision of suitable infrastructure (e.g. rearing and intermediate enclosures) and guidelines for targeted husbandry and care and the post-monitoring requirements. The relevant protocols are partly already in place or can be derived from relevant experiences with other species that can be adapted for species-specific purposes.

4. Long-term cooperation and next steps

Reestablishing a large-scale metapopulation in western and central Europe is a long-term undertaking. The reintroductions to date have all been understood and organized as local or, at best, regional

projects. In continental Europe's fragmented landscape, a large-scale and coordinated approach to lynx reintroduction is not only a necessity from the point of view of species conservation, but also increases the chances of success and efficiency of individual projects through exchanging experience and the synergetic use of knowledge and infrastructure. The following steps are necessary to achieve this:

- Identification of purebred Carpathian lynx in zoos and game reserves based on pedigrees and targeted genetic analyses, as well as the selection and gradual expansion of a suitable ex situ breeding group from which candidate animals can be made available for in situ projects;
- Establishment of an ex situ group of keepers who can provide the necessary enclosures and care capacity. Not only facilities for breeding are needed, but also enclosures for species-appropriate husbandry of subadult lynx (breeding animals or orphans) intended for release;
- Provision of protocols for breeding, keeping, preparing and evaluating lynx for release into the wild, as well as guidelines for genetic and veterinary clarifications, quarantine, transport, etc.;
- Clarifying demand (reintroduction and restocking projects) and potential supply (breeding lynx, wild-caught lynx, orphan lynx) and establishment of a coordination platform.

The signatory partners have begun the necessary clarifications and will now gradually develop the necessary guidelines and protocols that will allow this MoU to be implemented in a timely manner. Other institutions involved in the return and conservation of lynx in Western and Central Europe are invited to join this agreement. Authorities that have to decide on permits for the reintroduction of lynx and donors who finance such projects are called upon to support the project as outlined in this Memorandum of Understanding.

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