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The Eurasian lynx in Continental Europe





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For joining the Friends of the Cat Group please contact Christine Breitenmoser at ch.breitenmoser@kora.ch

Original contributions and short notes about wild cats are welcome

Send contributions and observations to ch.breitenmoser@kora.ch.

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Editors: Christine & Urs Breitenmoser
Co-chairs IUCN/SSC
Cat Specialist Group
KORA, Thunstrasse 31, 3074 Muri,
Switzerland
Tel ++41(31) 951 70 40
<u.breitenmoser@kora.ch>
<ch.breitenmoser@kora.ch>

Cover Photo: Camera trap picture of two Eurasian lynx kittens in north-eastern Switzerland. 11 December 2014 (Photo KORA).

PAOLO MOLINARI^{1*}, URS BREITENMOSER², ROK ČERNE³, CHRISTIAN FUXJÄGER⁴, KIRSTEN WEINGARTH⁵, ANDREAS RYSER² AND ANJA MOLINARI-JOBIN^{1,2}

The contribution of stepping-stone releases for enhancing lynx distribution

Assuming that large-scale reintroduction projects within the Alps or anywhere else in Western or Central Europe will be difficult to implement in the future, the stepping-stone approach to connect small and isolated populations seems an adequate strategy. Experiences indicate that the number of animals released in the frame of an adaptive release strategy (monitoring and further releases if needed) as well as distance to the nearest lynx population might be the crucial elements defining the success of these small-scale reintroductions.

“A raised stone used singly or in a series as a place on which to step when crossing a stream or muddy area” is the definition of stepping-stone. Figuratively, it can be defined as an action helping to make a limited, one-step progress towards a specified goal. In the context of lynx conservation, stepping-stones are defined as disconnected small occurrences that potentially connect otherwise isolated populations. Long-term viability of reintroduced lynx populations depends on the successful establishment of a large metapopulation,

ideally connected with the Carpathian founder population. The Alps play a crucial role due to their large size and range, potentially connecting populations in Western and Central Europe (von Arx et al. 2021). However, the Alpine lynx population itself is far from reaching its potential extension and abundance and cannot be considered viable. Presently, the population consists of four subpopulations (Fig. 1): (1) The north-western Alps population is the largest one with its centre in western Switzerland, spreading into France and occasionally Ita-

ly. It originates from reintroductions in the 1970s. (2) In 2001 a first stepping-stone was created in north-eastern Switzerland with the one explicit aim to further the expansion of the Alpine population. (3) The second stepping-stone population was established based on the presence of one single male present in the Limestone Alps, Upper Austria. (4) The south-eastern Alpine lynx population originates from immigration from the Dinarics (Molinari 1998), where in 1973 six lynx were reintroduced (Čop & Frkovic 1998). The Dinaric lynx population initially thrived and expanded soon into the Alps and southwards to Bosnia and Herzegovina. However, during the past 20 years, the trend reversed (Fležar et al. 2021, Sindičić et al. 2013) with the consequence that the lynx in the south-eastern Alps is at the brink of its second extinction. The populations in the north-western Alps and in eastern Switzerland are about to merge. However, between these populations and the occurrences in the eastern Alps is a gap of unoccupied, although suitable habitat of 300 and 150 km, respectively (Fig. 1; Zimmermann 2004, Molinari-Jobin et al. 2018). Compared to wolf and brown bear, lynx populations spread slowly and do not easily overcome barriers. Although the individual

dispersal capacity especially of male lynx is considerable, successful reproduction (and hence the spread of the population) requires a land tenure system with adjacent individual home ranges, allowing close contact to neighbouring conspecifics (Zimmermann et al. 2005). Nevertheless, during the past 20 years, the Alpine population has expanded its range by an average of 4% per year (Molinari-Jobin et al. 2018). The expansion was however to a large part due to stepping-stone projects. Our aim is to share experiences gained in the Alps and evaluate the significance of stepping-stone projects, discuss advantages and pitfalls, as well as future perspectives.

In the early 2000s the LUNO project was launched with the aim to improve lynx distribution in Switzerland (Robin & Nigg 2005). 2001–2003 a total of 9 lynx were translocated from the north-western Alps and the Jura Mountains to north-eastern Switzerland (Ryser et al. 2004). The lynx released soon established the typical land tenure system. The first cubs were reported one year after the first releases. Some outstanding events deserve to be mentioned: Male lynx TURO – likely on his attempt to return to the Jura Mountains, where he came from – crossed several highways and the Rhine River, before he was recaptured and rereleased. After his capture and rerelease, in a second attempt of homing, TURO became famous as he ventured into the city of Zurich. He did not succeed in crossing the city but stayed for several months in the city forest that provided plenty of roe deer, before he finally established a home range in the release area. The female AIKA crossed two highways and the river Reuss (Ryser et al. 2004). She spent the rest of her life without contact to other lynx. Female AURA never reproduced. Male ROCO established a territory but disappeared a few months after the release. His home range was soon taken over by male ODIN. Male VINO died in May 2003, resulting in the presence of only one adult male, ODIN, as TURO was not in contact with other females at the time (Ryser et al. 2004). After monitoring based on camera-trapping had revealed this unfavourable situation, it was decided to reinforce the occurrence with another three lynx in 2007–2008. This input boosted the stepping-stone population, which started expanding south-and eastwards. Reproduction was observed east of the Rhine River in Liechtenstein and Vorarlberg, Austria. The

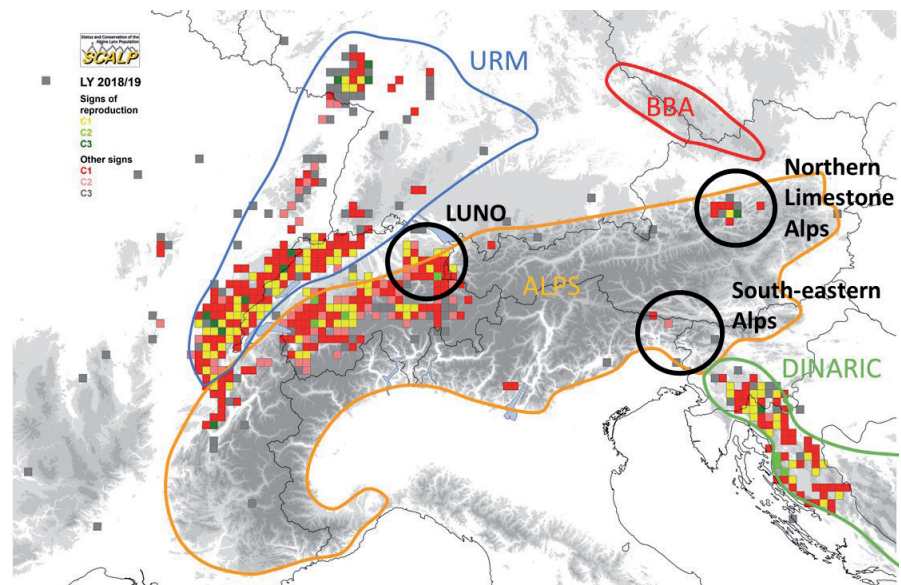


Fig. 1. Lynx distribution in the Alps, northern Dinarics, and Upper Rhine metapopulation (URM) based on SCALP categorisation (Molinari-Jobin et al. 2012) in 2018/2019. Mountain ranges are outlined in different colours (URM = blue, Alps = orange, Dinaric range = green, Bohemian Bavarian Austrian Forest = red). The stepping-stone occurrences are indicated with black circles. For C1, C2, C3 see Molinari-Jobin et al. 2021.

LUNO stepping-stone population is about to merge with the north-western Alpine population in Central Switzerland, although no exchange of individuals has been confirmed yet by camera trapping. Interestingly, an immigrant from the Jura Mountains was confirmed. Whether it reproduced is still open. The situation leading to the stepping-stone project in the Limestone Alps, in the area of National Park Kalkalpen (NP Kalkalpen), in Upper Austria was different (Fig. 1). In the late 1990s a male lynx of unknown origin appeared in the region. Based on the monitoring data, he remained the only lynx in the region for years and was detected from 2000–2012. In 2007 LUKA (Luchsarbeitskreis), a committee including representatives of all interest groups, was formed with the aim to establish a lynx occurrence with regular reproduction in the area of NP Kalkalpen and to balance stakeholder interests. From 2011 to 2013 two females and one male lynx were translocated from the Swiss Jura Mountains and the north-western Alps to the NP Kalkalpen. The lynx established the typical land tenure system and in 2012 the first litter was reported (Fuxjäger 2020). The number of litters increased to two with six cubs in 2013 and three litters and four cubs in 2014. In 2013 however, the translocated male lynx disappeared, and no reproduction was observed in 2015, 2016 and 2017 (Fuxjäger 2020). Two male lynx were illegally killed in 2014 by two hunters who were

later convicted. The denunciations were based on criminal law (§181 StGB) and civil law (additional compensation payments), the first of their kind in Austria. Thereupon the LUKA group decided to reintroduce two more lynx as a replacement for the proven illegal killings. In 2017 a male and female from the Jura Mountains were released. A cub from 2013 migrated to the Wilderness area Dürrenstein, approximately 50 km east of the NP Kalkalpen and was documented there in 2014 and 2015 (Fig. 2). In 2016 there was no evidence for lynx occurrence in the Dürrenstein area. But in 2017 and 2018 lynx was photographed again, however, based on picture quality individual identification was not possible. In 2018 one cub could be documented only once in the NP Kalkalpen and none in 2019, respectively, despite the confirmed presence of three males and three females in the area of NP Kalkalpen (Fuxjäger 2020). So far this stepping-stone population remained small and isolated. Due to the small genetic source, inbreeding is a constant threat to the population. The fact, that there is no population exchange with other lynx populations, neither the Alpine nor the Bohemian Bavarian Austrian (BBA) population, aggravates this effect and prevents the contemplated stepping-stone function of the northern Limestone Alps.

An Urgent Lynx Conservation Action (ULyCA) was initiated in 2012 when the decrease

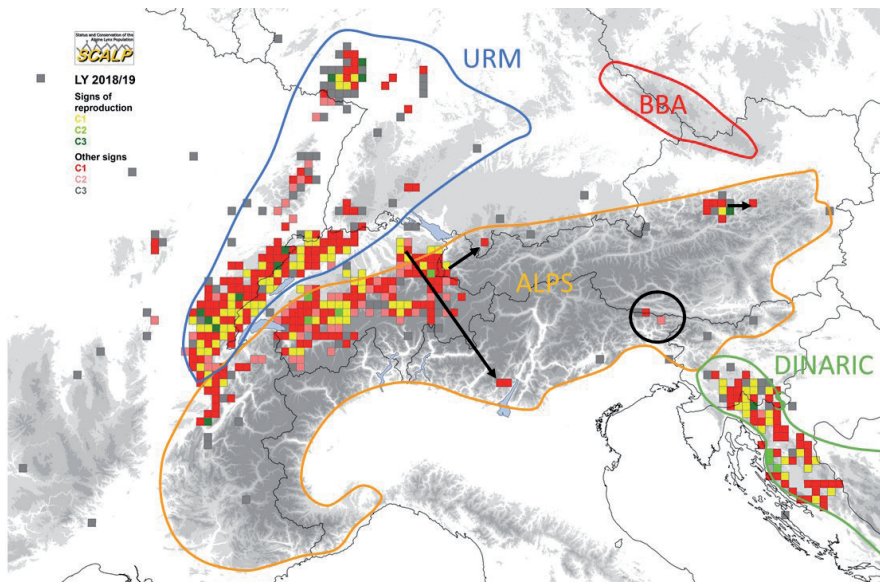


Fig. 2. Isolated lynx occurrences in the Alps are the result of dispersal from the stepping-stone populations (black arrows). Mountain ranges are outlined in different colours (URM = blue, Alps = orange, Dinaric range = green, Bohemian Bavarian Austrian Forest = red).

of lynx in the south-eastern Alps became evident (Molinari-Jobin et al. 2018). The aim was to prevent the extinction of the local occurrence by reinforcing it with 3 individuals. This action should buy time to prepare a larger project to save the local lynx population (see below). In 2014, a male and a female lynx from the Jura Mountains were translocated to the Julian Alps of Italy. Different to all other translocations, a soft-release protocol was applied in the ULyCA project (Fig. 3). One month after the release, both lynx had crossed the highway and moved into the Carnic Alps, where the female gave birth to two kittens. The male moved on, crossed the Alps northwards to settle at the Austrian-German border where he was illegally killed in September 2017, 140 km straight-line from the release site. The female stayed in the Carnic Alps where she however had no contact to other lynx. The project has been prepared in full respect of national and international guidelines

(AA.VV. 2007, IUCN 1998, 2013), e.g. the favourable opinion of hunters and politics was obtained. Nevertheless, after a replacement at the top of the local hunting association and the regional political panel, an opposition started leading to blocking the release of the third lynx and the whole project. At present, five years later, the political situation has changed again and the ULyCA project might be resumed.

In 2016 the larger project, LIFE Lynx, was approved for funding and started in 2017. The aim of LIFE Lynx is to prevent the extinction of lynx in the Dinaric Mountains and south-eastern Alps (Fležar et al. 2021). The plan includes the integration of 9 new lynx into the Dinaric population, as well as to create a stepping-stone population in the Alps. Five lynx were released in the Slovenian Alps in April 2021. Until present, they all stayed in the surrounding of the release sites, but it is too early to know where they will establish their territory.

Conclusion

Twenty years after the creation of the first stepping-stone population it is still too early to draw final conclusions. But the present situation is promising (Table 1). The LUNO population is slowly expanding to western Austria and south-eastern Switzerland, and most importantly it is close enough to other lynx populations, e.g. the north-western Alps, Jura Mts., potentially to Upper Rhine Meta-population (Swabian Alb-Black Forest, Herdtfelder et al. 2021) to allow the exchange of individuals. On the contrary, in the south-eastern Alpine population neither reproduction nor immigration was reported recently. The experience from the ULyCA project has shown that random and unpredictable socio-political events, even at local level, can seriously compromise the success of a project in spite of serious planning and implementation. The reinforcement in the frame of the LIFE Lynx project was urgently needed. Five lynx were released 60–70 km away from the northern edge of the Dinaric population (Fležar et al. 2021), close enough for dispersing lynx to immigrate into the stepping-stone occurrence (Čop & Frkovič 1998).

In contrast, the situation of the Limestone Alps stepping-stone population remains critical. With the integration of two additional lynx in 2017, the stepping-stone nucleus was saved in the short-term from extinction. However, future active management will be necessary, as small number of individuals, inbreeding, stochastic events and illegal killings may threaten the population. Compared to the other two stepping-stone populations, the lynx of the Limestone Alps lack a close-by neighbouring population that could provide immigrants in the near future. Although the BBA lynx population (Wölfel et al. 2021) is only 80 km away, they are separated by the Danube valley with its cultivated landscape. The distance to the stepping-stone occurrences in the south-eastern Alps is 140 km and to east-

Table 1. Comparison of stepping-stone projects. Number of animals released in brackets are yet to be released.

Project	Area of releases	Timeframe	Nr of animals released [m/f]	Estimated number of individuals 2018
LUNO	North-eastern Switzerland	2001-2008	5/7	25
NP Kalkalpen	Upper Austria	2011-2017	2/3	7
ULyCA	South-eastern Alps (I)	2014	1/1+(1+)	} 5-7
LIFE Lynx	South-eastern Alps (SLO)	2021	2/3	

ern Switzerland 350 km, respectively. Therefore, if the lynx nucleus of the Limestone Alps is to survive, other reinforcements will be necessary. Otherwise the lynx there will face the same destiny as the Austrian brown bear population that went extinct after a reintroduction project in the 1980s (Kruckenhauser et al. 2009). However, with the creation of another stepping-stone in-between the south-eastern Alps and the Limestone Alps, the survival perspective of the Limestone lynx would likely considerably improve. A population viability assessment (PVA) combined with habitat modelling should be performed to guide the stepping-stone approach regarding release locations and number of individuals. Assuming that large-scale reintroduction projects within the Alps or anywhere else in western or Central Europe will be difficult to implement in the future, the stepping-stone approach to connect small and isolated populations seems an adequate strategy. The here presented experience indicate that the vicinity to other lynx and the number of animals released in the frame of an adaptive release strategy (monitoring and further releases if needed) might be the crucial elements defining the success of these small case reintroductions.

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Fig. 3. Lynx release in the south-eastern Alps in 2014. Prior to release, the two translocated lynx spent 17 days in a soft release enclosure (visible in the background) to avoid homing (Photo R. Pontarini).

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¹ Progetto Lince Italia, Tarvisio, Italy

* <p.molinari@wilcons.eu>

² KORA – Carnivore Ecology & Wildlife Management, Muri, Switzerland

³ Slovenia Forest Service, Ljubljana, Slovenia

⁴ Nationalpark Kalkalpen, Molln, Austria

⁵ Habitat – Wildlife Services, Großraming, Austria