3.4. Rewilding of orphans and zoo born lynx

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3.4.1. Release time

Juvenile lynx can be released starting from March to April, when they are 10 to 11 months old and would leave their mother to become independent under natural conditions (Borel et al. 2022a). However, a recent study on the survival of rehabilitated orphaned lynx suggests, that the period between May and August may be considered even more suitable, as lynx released during this period showed a higher survival (Molinari-Jobin et al., in prep.). In late spring and summer, a wide range of juveniles of various prey species is available. These can easily be hunted and therefore increase the chances of survival of released lynx. In some cases, rehabilitated orphans and zoo born lynx have also been released successfully in autumn and winter (Molinari-Jobin et al., in prep; C. Fuxjäger pers. Comm.).

At the time of the release, lynx should be in a good nutritional status to have reserves for the first days before they succeed in killing their first bigger prey animal. The weight of the young lynx should ideally be more than 12 kg, although in three known cases even rehabilitated orphaned lynx females with only 11 kg at release were able to hunt ungulates (pers. Comm. S. Wölfl & K. Vogt). Potential gains from a longer period in captivity (e.g., increased body weight) have to be weighed carefully against the risk of habituation and captivity-related health issues (Borel et al. 2022b). In some countries (i.e., Germany), the Nature Conservation Law requires the release of wild born animals as soon as they are capable to survive on their own.

3.4.2. Release method

Soft and hard release methods have been successfully applied for reintroduction or translocation of subadult and adult Eurasian lynx in Europe (Rodrigez et al. 1995, Vandel et al. 2006, Černe et al. 2019). There does not seem to be any difference between these two methods in terms of survival (Miquelle et al. 2016, Wilson 2018). However, if it is desired that the animals stay in a specific location, soft-release can be advantageous because it seems to increase the likelihood that animals stay near the release site (Černe et al. 2019, Garrote et al. 2022). Soft release strategies can be especially relevant for wild-caught adult lynx in order to suppress homing behaviour but, on the other hand, they may increase stress in wild-caught individuals by prolonging their captivity (IUCN/SSC 2013). Rehabilitated orphaned lynx or zoo-born lynx have undergone a prolonged period of captivity in enclosures (see protocols 3.1.5 *Transfer to coordination enclosure* and 3.2 *Rearing orphaned lynx*) and can be hard-released into their destined populations.

3.4.3. Selection of release sites

Zoo-born lynx will be released in the frame of reintroduction or reinforcement projects. For orphaned lynx, three release strategies are possible depending on the geographical origin of the orphan, national legislation and the needs of ongoing translocation projects:

- release at the place of origin;
- release in the same population but in an area with low lynx density or at the population edge;
- translocation to another population.

According to the IUCN/SSC Guidelines for Reintroductions and other Conservation Translocations (2013), release areas for translocations should meet all the species' biotic and abiotic requirements, be large enough to meet the required conservation benefit and have adequate connectivity to suitable habitat. At the local level, the release site should provide the animals access to an existing/establishing lynx population, a suitable (forest) habitat with sufficient size and good prey availability (Borel et al. 2022a, b). Furthermore, lynx should not be released within 500m to major roads, railways and settlements. Before any release, thorough feasibility and risk assessments should be carried out (IUCN/SSC 2013). Beside biological aspects, also socio-political constraints have to be considered before determining the release area (IUCN/SSC 2013). The release of translocated lynx must meet with sufficient acceptance in the target area, especially among hunters and livestock owners. Any translocation project should be preceded by detailed preparation and discussion/cooperation with all stakeholders and the local public. All responsible authorities must approve the release of animals on their territory. In case of release sites where dispersal to neighbouring countries can be expected, the responsible authorities and partner institutions in these countries should be informed and it is recommended to establish cooperation already prior to first releases (e.g., exchange of monitoring data, obtaining permits to recapture lynx who have dispersed across national borders etc.).

In case of (genetic) population reinforcements, releases into areas with saturated lynx populations can be counterproductive, because the filled capacity of the environment significantly complicates the integration of released lynx into the local population (due to territorial behaviour of residents). In an established lynx population, released animals have to find free space to establish their own territory and will most probably disperse and leave the release area (Borel et al. 2022 a,b). Therefore, this approach makes no or little demographic and genetic sense in terms of supporting the existing population. Moreover, it could increase controversies and conflicts with local communities. If national legislation allows for this option, releasing rehabilitated orphaned lynx in areas with low lynx density or at the population edge increases their survival (Molinari-Jobin et al. in prep.) and contributes more to the overall conservation goal than releasing them back into high-density lynx populations.

3.4.4. Preparation and release procedure

Of course, only fit and healthy lynx which can survive on their own in the wild should be released (Hall 2020). The requirements that rehabilitated orphan lynx chosen for interpopulation exchanges should meet and the infrastructure that consequently must be available in the countries of origin are summarized in Appendix *VII Orphans checklist*. To ensure a good health status for rehabilitated orphans and zoo born lynx see protocols *3.5 Quarantine* and *3.7 Clinical examination*. Special attention must be paid to physical changes which could decrease the fitness of the individual (see protocol *3.5 Quarantine*, Fig. 3.5.1). If the health status of a lynx can be checked upon arrival to the coordination enclosure and the animal appears healthy during its subsequent stay, another vet check during the anaesthesia for release is sufficient. If there are suspected health issues or if the animal won't be anaesthetised for the transport to the release site, another full clinical health check at least four weeks before the planned release is necessary (see protocol *3.5 Quarantine,* Fig. 3.5.1 and protocol *3.7 Clinical examination*).

The anaesthesia induction of lynx in the rehabilitation or coordination enclosure is best done in the adjacent quarantine area or holding pen using a distance injection from outside the enclosure (e.g., darting by blowpipe; Signer et al. 2021, Borel et al. 2022a, b; see protocol *3.6 Anaesthesia*) or with a capture box (see protocol *3.2 Rearing orphaned lynx*, Fig. 3.2.1). Nevertheless, if a suitable adjacent

quarantine or holding area is not available or the lynx refuses to enter, a box trap placed within the rehabilitation pen can be an alternative method. The lynx must be previously trained to enter the quarantine pen/box trap by gradually luring it with food.

Released rehabilitated orphans or zoo-born lynx should be monitored using telemetry collars (see protocol *2.5 Post-release monitoring*). This approach will allow to follow in detail the success of the release and further behaviour (e.g., the success of hunting and integration into the local population). However, the weight of the collar should not exceed 2% (Georgii 1980; pers. comm. A. Ryser) of the animal's body weight and the design should not be too bulky, so it will not limit the lynx within its natural activities (especially hunting and body hygiene). The telemetry collar must be prepared in advance (VHF and GPS transmitters programmed and tested, magnet removed) and should be equipped with a drop-off. The drop-off time of electric break-off devices can be predetermined but they add additional weight to the collar and are not always reliable. Mechanical drop-offs (e.g., cotton layers or break-off stitched with annealed wire) are another option. A collar is fitted so tightly on a lynx that it cannot be slipped off over the head but is not snug around the neck (movable and rotatable). Especially when the collared animals are subadult, the collar must not be too tight, as the neck circumference can increase by the next winter. However, the lynx must not be able to bring his lower jaw under the collar while grooming. Padding the collar with a strip of flexible material (e.g., foam) that will fall off after a few weeks to months can be useful. In Switzerland, lynx orphans radio-collared at the age of 10 to 14 months had neck circumferences between 24-30 cm (N=9), while the mean neck circumference for adult lynx was 30.1 ± 1.8 cm for females (N=52) and 34.1 ± 2.1 cm for males (N=50). Male lynx grew longer and gained more weight than females (until age three; KORA, unpublished data). For subadult animals, it is therefore advisable not to choose too long study periods until the collar will drop off and consider recaptures for changing the collar.

For **transport** see chapter 2.4 *Capture and transport*.

3.4.5. Recommendations in case of problems

Verification of the success of rehabilitation of released orphaned or zoo-born lynx is of upmost importance (see protocol *2.5 Post-release monitoring*). The events must be accurately documented so that lessons can be learned, and methods adapted (Borel et al. 2022a, b). During the first weeks after release, the movements and hunting success of the rehabilitated lynx should be closely monitored. After two months of survival and several successful hunts, it can be assumed that the lynx is able to sustain itself sufficiently (Borel et al. 2022b).

In case of problems such as poor nutritional or health status, or attacks on livestock, intervention is necessary (see also protocol *2.5 Post-release monitoring*). This may be solved by offering an ungulate (in particular roe deer) carcass during the first weeks after release or by aversive conditioning in case of livestock damage. If the animal is unable to hunt on its own in the long term, has serious health problems or specializes in attacks on livestock, it should be removed. For rehabilitated orphans, permanent readmission to a rehabilitation centre is not recommended. For zoo-born lynx the return to captivity can be considered. If the transfer of rehabilitated lynx from the wild to a zoo is taken into account, national animal welfare and conservation laws must be considered. In any case the reason for failure of the rewilding process has to be clear before such an individual can be included into breeding programmes to ensure the problem cannot influence negatively the genetic or health status of the captive population (see protocol *3.3 Genetic management*).

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