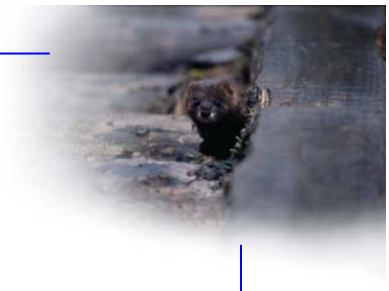


# Recovery of *Mustela lutreola* in Estonia: captive and island populations.

Project N$^{o}$ LIFE2000NAT/EE/7081

The Layman's Report

## BACKGROUND

The European mink, *Mustela lutreola,* is a semi-aquatic carnivore. Once it was widespread in almost everywhere in continental Europe except the Balkan countries, Portugal, Belgium, Denmark, Norway, and Sweden. Being a real endemic species for Europe its distribution started to shrink in the middle of 19$^{th}$ century. By now it's almost European-wide distribution has declined now into few remaining and further declining range fragments in Spain, France, Belarus and Russia. Possibly the most viable populations can nowadays found in Romania (Danube Delta) and Russia (Vologda and Arhangelsk Regions).

All prioritization lists, both local and international, acknowledge its critical status:

- IUCN Red List: Endangered
- IUCN Small Carnivore Action Plan: the Highest priority in Europe
- Bern Convention: Strictly protected species (Annex 2)

- EU Habitat Directive: Species of EC importance (Annex II, Annex IV); priority species since 2004
- National legislations: protected species ( except Russia)

The reason of extinction has long been discussed and in the attempts of explaining the demise of European mink number of ideas has been pushed forward, such as (1) habitat loss, (2) over-hunting, (3) pollution, (4) impact of marine/continental climate spells, (5) introduced disease, (6) dependence on declining prey, (7) inter-specific relations with the American mink, (8) inter-specific relations with the polecat, (9) intra-guild predation and aggression, (10) impact of Aleutian disease. At present, it is clear that no single agents can be blamed for the extinction of the European mink, but a set of factors differing by content depending upon the time and site is responsible for the extinction of this species. Earlier the habitat loss and overly extensive hunting were the main factors causing the local extinctions, but nowadays the widely spread alien American mink, *Mustela lutreola*, is competing with original mink for resources. Also, being larger it forces the original mink to withdraw to unsuitable habits through aggressive encounters (so called intra-guild aggression). In this way unstoppable spread of the alien American mink in Europe severely complicates the conservation of this European species and urges us to look for the means how to stand against the impact of the alien American mink.

## PROJECT AIMS AND OBJECTIVES

Our project was granted with 50% of funding by the European Commission under the aegis of European Union LIFE Program.

The remaining part of funding came from Zoos Help Foundation (the Netherlands), Helsinki Zoo, Rotterdam Zoo and several other zoos and institutions in Europe, but even in USA. This three-year project run in 2000 – 2004 was designed with the purpose to overcome, or, at least to mitigate, the detrimental impact of the American mink in local scale and, in this way, secure the survival of the endemic European mink. For this, we believe, the only reasonable solutions are to further to elaborate management of captive breeding of European mink and to establish island populations in places inaccessible for American mink.

The objectives were therefore defined as follows: **Ensuring the survival of *Mustela lutreola* in Europe and its recovery in Estonia – establishing viable captive and island populations of the species:**

(1) to establish, on the basis of the already existing breeding stock in Tallinn Zoo (Estonia), **a viable captive population of *Mustela lutreola*** capable of maintaining 90% of the genetic diversity of the species for 25 at least;

(2) to establish a second **viable island population of *Mustela lutreola*** in Estonian island Saaremaa inaccessible to *Mustela vison;*

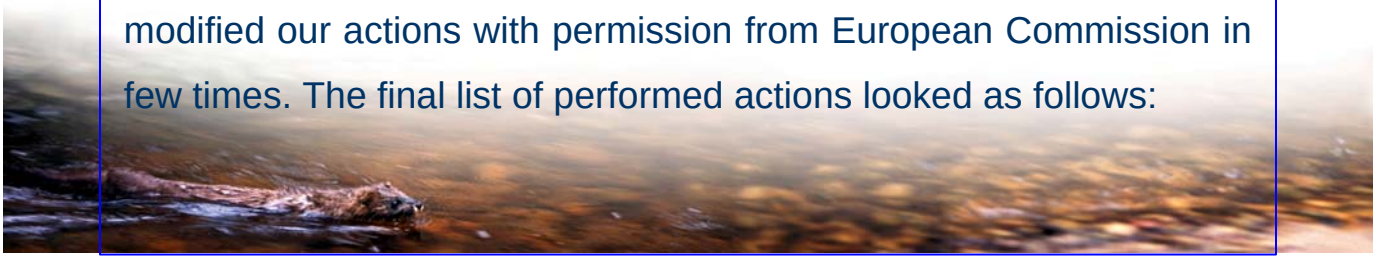
(3) to prepare the **management plan for already established *Mustela lutreola* population in Hiiumaa Island**.

The years-long activities and experience of foundation LUTREOLA and Tallinn Zoo in conservation of this species provided a solid foundation for the project:

- The conservation breeding was started already in early 1990-s under the aegis of European Association of Zoos and Aquaria EEP program and the basic requirements for the breeding center were already in place in Tallinn Zoo.
- The American mink was removed from Hiiumaa Island in the course of special eradication project and the establishment of island population in Hiiumaa Island (Estonia: ~1000 $km^2$) was launched in 2000.

## ACTIONS PERFORMED

As it is so common for almost all intensive species conservation actions, even the use of the best available knowledge it will not guarantee the achievement of initially hoped results. That is because for such a unique and unprecedented task most of needed knowledge is just not available and lots of experimenting is needed. Therefore, we used an experimental build-up of the project with lots of data collecting. That was helping us regularly analyze our activities and to undertake modifications in the project structure, when the need raised. In accordance with these analyses we modified our actions with permission from European Commission in few times. The final list of performed actions looked as follows:

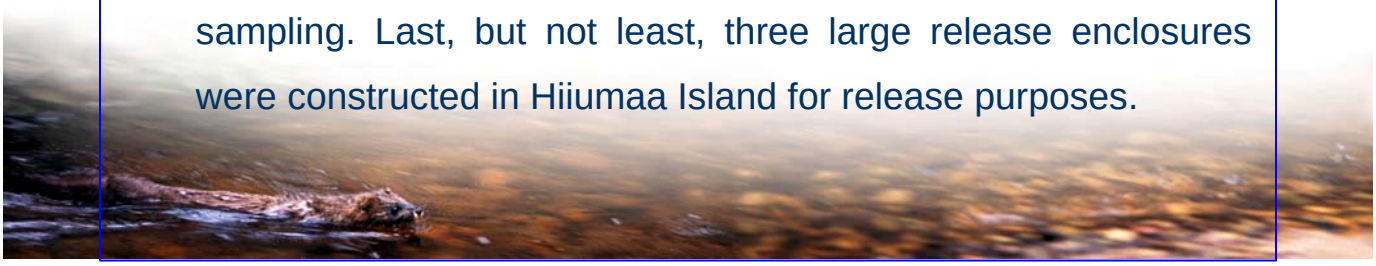


1. The construction of infrastructure for our European mink Conservation Breeding Center at Tallinn Zoo.
2. Performance of detailed field survey on the distribution of *Mustela vison* in Saaremaa and the availability of habitats/food resources for *Mustela lutreola* in Saaremaa Island.
3. Preparation of management plan for *Mustela lutreola* in Hiiumaa Island
4. Preparation of specimen for release in Hiiumaa Island
5. Release of *Mustela lutreola* in Hiiumaa Island and post-release monitoring
6. Husbandry and conservation breeding of *Mustela lutreola* in the special breeding facility at Tallinn Zoo (Estonia).
7. Overall project management.

## RESULTS

The project gained the following results:

1. The already existing conservation breeding facility at Tallinn Zoo was greatly enhanced: stationary electricity, water and sewerage water system was constructed; the keepers were provided with shelter with excellent possibilities for food preparation for animals and resting; the enclosures were partly renovated, three new and large enclosures with natural interior were constructed to better prepare animals for release. Also, the laboratory room was renovated to allow better handling of animals in preparation of release as well as for scientific sampling. Last, but not least, three large release enclosures were constructed in Hiiumaa Island for release purposes.



2. The pilot study conducted in 2001 – 2002 in Saaremaa Island provided us with sufficient data to positively decide over the feasibility of the future release of the European mink there. It was discovered that the American mink has not formed a viable population in that island, though few individuals rarely reach the island from mainland. However, the frequency of invasions seems to remain too low for the establishment of viable island population and invaded mink die for natural reasons. The most conservative estimate for carrying capacity of the island before reproduction period is 150 - 300 European minks, which is far more than calculated size of minimum viable population. It was shown that the release of *Mustela lutreola* in Saaremaa Island will not jeopardize the population of river crayfish *Astacus astacus,* as it was afraid by some local inhabitants. The major problems possibly counteracting to the success of the release are high number of fox, *Vulpes vulpes* as one of the main cause of mortality, and, relatively low number of amphibians - important food resource for *Mustela lutreola*. Both factors complicating the achieving of success with release can be compensated. The semi-sized carnivore control can be applied for the time of release. The shortage of amphibians will be most likely compensated by high number of water voles, *Arvicola terrestris* in Saaremaa Island.

   More detailed information is provided in the English summary of the pilot study available in internet:

   http://www.lutreola.ee/english/LIFEREPORTS_eng.htm

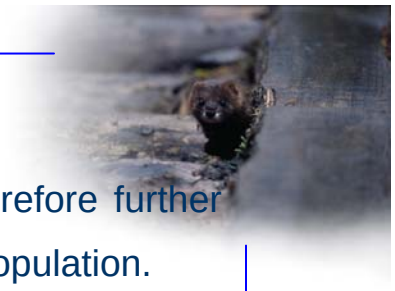
3. A detailed plan was prepared for further management of *Mustela lutreola* in Hiiumaa Island. In the course of preparation of the management plan various studies were performed in the island. The management plan contains lots of new information on the status of riparian habitats in the island. It foresees actions to further support the on-going formation of island population in Hiiumaa, to improve the quality of riparian habitats, to designate a protection regime for European mink core habitats and several actions to improve the public awareness. The management was approved by the order No 849 of the Minister of Environment in 20th of September 2004. The translation of the management plan is available in internet: http://www.lutreola.ee/english/LIFEREPORTS_eng.htm
4. The preparation of individuals for release is closely related to the next action – the release of European mink into the wild. The purpose of the action is to do what ever possible to prepare the animals for the new conditions in the wild and in this way to increase the survival of the released animals. Different methods were used for preconditioning like providing the opportunity to prey in the live fish, mice, rats, frogs and other prey species. Also the human avoidance was trained by reducing the contact with keepers as much as possible. The large enclosures were used for the very same purpose, as then the animals are in more natural settings and the need of keepers to enter to the enclosure is minimal. The swimming and diving skills of the

animals were trained and predator avoidance was increased in trials with domestic dogs.

In addition, numerous behavioral enrichment schemes were tested and applied to reduce the overall negative impact of captive conditions to the animals' behavioral capacity.

5. In the course of the project 149 animals were released in Hiiumaa Island which makes the overall number of released mink (with addition of animals released before the start of the project) equal to 207. Data gained from re-trapping indicate that all the animals surviving the adaptation period are doing well in the wild. Also the diet analyses show that the release animals have typical European mink diet. The main causes of mortality are other larger carnivores and bird of prey. They form 80% from all the identified cases of death in the wild. All the mortality cases tend to take place during the adaptation period, which is approximately 1,5 month. After this, the level of mortality decreases remarkably and levels down in expected natural level. However, due to the small sample size our data is not always sufficient to make scientifically "rock-solid" conclusions.

   The number of surviving animals detected by monitoring efforts has increased with every year of release. Unfortunately the monitoring almost fully failed in winter 2004/05 due to weird weather conditions, but the data from previous monitoring session (2002/2003) suggest that around 17 – 28 mink inhabited the island in spring. It is that this size of population



can not be regarded as a viable population. Therefore further support is needed for full formation of this island population.

The monitoring data also give ground for serious concern: the population structure with too few juvenile indicate that something is not in order with breeding in the wild. One possible explanation for this is the inefficiency of captive born male in breeding. This issue has been addressed with the experiments in breeding facility, though the exact causes of the males' inefficiency in breeding still have to be found.

6. The conservation breeding has been very effective. In the course of the project 213 young mink has been produced in accordance of the annual breeding plans which base in the demographic and genetic analyses. The sound demographic parameters have been maintained and the genetic quality of the population as been improved: the number of effective founders has increased, all the potential founders have contributed to the gene pool and the mean inbreeding coefficient has decreased almost thrice. According to our calculations 96,35% of the initial gene diversity has been maintained. The conservation breeding operation has been able to provide animals for release as well as for other breeding facilities in the frame of all-European EEP Program. However, for long-term genetic maintenance of the captive populations clearly additional founders are needed and this is regarded to be one of the most important tasks after the end of this project.

7. The overall project management was performed in accordance with the project documentation. The important issue was the public awareness. This has been performed via the webpage www.lutreola.ee, where all the reports and other documents produced in the course of the project has been made public.

   In the course of the whole project 37 presentations and/or articles for international or national audience has been prepared.

## CONCLUSIONS

I has to be stated that the project has collected a lot of information important for the conservation of *Mustela lutreola;* it has promoted remarkably the conservation breeding operations which is the guarantee that the species could be preserved even in case the rescue operations in the wild fully fail, and, finally an important steps have been made in establishing an island population of the European mink in Hiiumaa. However, it has to be admitted that the very initial project aim, to reach to the establishment of viable wild population, was not met. That was mostly because restoration of wild population appears to be far more complicated task than initially assumed. Our efforts elegantly prove the importance of precautionary measures in species conservation - not the let the status of the species to reach to the level where such restorations efforts are needed. It also has to be emphasized that our project has made great strides towards forming the viable island population and the steps after this project are likely to achieve this goal.