RECOVERY OF THE IBERIAN LYNX IN THE DOÑANA BIOLOGICAL RESERVE: LARGE-SCALE PREY ENHACEMENT, INCREASE IN REPRODUCTIVE OUTPUT AND POPULATION EXPANSION

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Summary

The Iberian lynx is the most endangered felid in the world. Only 200 individuals remain in localities of Sierra Morena and Doñana (southern Spain). Governments, both Spanish and European, must take an active course to avoid the real danger of lynx extinction. Measures leading to population recovery are required in the short- and medium-term, and they should be designed on the basis of sound research. In the Doñana Biological Reserve, an ongoing research project with a novel approach aims at giving unequivocal and specific answers about the efficiency of several management options for the conservation of lynx in the short-term. To support this task, we seek funds from sponsors that believe in scientific-based conservation programmes, and those that would like to collaborate efficiently in reversing the process which places the Iberian lynx at the verge of extinction. We have also interest in increasing the awareness of the public opinion about lynx conservation problems, and thus our project includes the broadcasting of live images of wild lynx available on-line through the internet.

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1. INTRODUCTION

The Iberian lynx (*Lynx pardinus*) is the most endangered felid in the world.

Total population size is estimated at 200 individuals, and regular reproduction probably only occur in two localities of the south of the Iberian peninsula: Sierra Morena Oriental y Doñana.

The best studied lynx population is also the one that inhabits the best protected area, in the Doñana National Park and its surroundings.

The government of Spain and the authorities of the European Union are faced with the responsibility of allowing this species to survive whereas, at the local level, managers of Doñana protected areas have to take the necessary steps to secure the Doñana lynx population. Whatever the course of this population will be, it will considered as a reliable indication of the future of the species as a whole.

To avoid lynx extinction in Doñana and elsewhere, imagination and dauntless action supported by sound research are required.

The present project is included within a plan for the conservation and recovery of the Iberian lynx in the Doñana Biological Reserve, located at the core of the Doñana National Park, where we can find the best protected lynx population.

2. ABOUT THE DOÑANA BIOLOGICAL RESERVE

The Doñana Biological Reserve (BDR) is owned by the Spanish Council for Scientific Research. In 1964, the Spanish government, with the help of the World Wildlife Fund (WWF), bought this property which so became the first protected piece of land in the Doñana area. The Doñana National Park was declared five years later, and its limits have expanded since, last time in 2003.

Nowadays the BDR perhaps continues to be the best protected place within the Doñana National Park (DNP) and, undoubtedly, includes some of the natural values perceived as identity symbols of this Park, such as the large heron colony in a group of cork oaks at the marsh border. In addition, activities at the BDR are entirely restricted to conservation and research.

Commemorative statue for the purchase of DBR

View of the Vera of the DBR with the heron colony at the bottom

3. BACKGROUND AND CURRENT STATUS OF THE DBR LYNX POPULATION

By 1975 the whole area of the DBR that was covered with scrubland (5204 ha) was apparently occupied by lynx. Ten years later there were only four lynx territories in the DBR. Between 2001 and 2003, just two of these territories have been occupied by resident females, and only 29% of the DBR area is regularly used by the Iberian lynx.

In the DBR, female territory size is about 8 km^2. However, in other areas of the DNP where prey (rabbit) densities are much higher, the size of lynx territories is a 40% smaller.

During the last years we did not observed females accompanied by two kittens in the DBR, a number of young commonly found in areas with higher rabbit densities.

Iberian lynx litter inside a tree hollow

4. AIMS AND OBJECTIVES OF THE PROJECT

The present project has two aims. First, we want **to assess scientifically the efficiency and conservation projection of a recovery programme** targeted at the DBR lynx population, which will likely be a model for similar actions in other parts of the Iberian lynx range. Second, we want **to increase as much as possible the carrying capacity** of the DBR as well as the productivity of this lynx population.

Objectives at the short-, medium-, and long-term are, respectively, as follows:

The rabbit is the main prey of lynx

1. **Recovering wild rabbit populations** through the use of restocking, habitat management, and decrease of known causes of rabbit mortality

2. **Increasing the overall reproductive output of lynx** by providing resources thought to be in short supply, such as breeding dens and supplementary food

Female with young playing between the grass

Lynx umbushing a rrabit

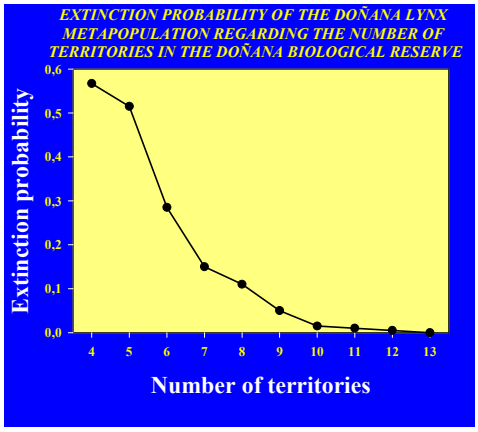
3. **Increasing lynx density and the area covered by resident**, breeding individuals, by attracting unsettled lynx, enhancing the abundance of primary resources, and improving the structure of the landscape

The Iberian lynx is restricted to Mediterranean scrublands and feeds almost exclusively upon rabbits. Therefore, activities aimed at recovering lynx populations in the short- and long-term necessarily require addressing the management of scrubland and rabbit populations.

The status of the Iberian lynx is critical. Thus, while habitat is improved through the management of rabbits and vegetation, urgent action is needed to guarantee the survival of the individuals that still remain. This project considers both urgent and long-term actions.

5. EXPECTED RESULTS

Assuming that all the objectives of the project will be fulfilled, we expect that the lynx population of the DBR will increase from the current 4-5 individuals to a maximum of 15-25 resident individuals and an overall production of 12-18 young per year.



Existing spatially-explicit demographic models predict that, with seven or eight lynx territories in the DBR, and maintaining the number of territories in other close population nuclei, the probability of extinction for the entire Doñana lynx metapopulation will decrease considerably.

6. MANAGEMENT

During the next three years, the following management measures will take place in the scrubland of the DBR:

Tagging a litter of 4 cubs

1. **Placement of 30 water sites** for lynx in areas without natural water during the dry period.
2. **Placement of 35 artificial hollow tree trunks**, in order to augment the availability of suitable breeding dens.
3. **Installation of 20 5-ha enclosures**, aimed at rabbit restocking. In each enclosure ten rabbit warrens will be constructed and the habitat will be managed (thinning of dense scrubland and plantation of native tall shrubs) to improve its quality for rabbits.

4. The same type of management (**rabbit restocking, scrubland thinning, planting**) will be applied to 20 5-ha unfenced sites.
5. **Building of 30 small wooden enclosures (4x4 m)** where alive domestic rabbits will be supplied on a regular basis for supplementary feeding of lynx.

Small enclosure with naturalized ramp for lynx ambushing and hunting rabbits

7. MONITORING AND RESEARCH

The monitoring and research programmes include the following activities:

1. Monitoring the success of management for the enhancement of rabbit populations by means of survival studies based on radio-tracking, and assessment of the impact of diseases on rabbit population dynamics.

2. Investigating the use of artificially supplied water sites and breeding dens by lynx.

3. Determining the variation in the pattern of use of supplementary food by lynx according to sex, age, reproductive status, and the abundance of wild rabbits.

4. Establishing whether supplementary food increases both the frequency of reproduction and the productivity of females in areas with low rabbit density.

5. Examining whether lynx territories supplemented with artificial food will be smaller, and whether territory holders will reduce their movements, thus allowing a more compact distribution of territories and a higher population density.

6. Finding out whether supplementary feeding allows lynx settlement in areas with low rabbit density.

7. Checking for any abnormal hunting behaviour of lynx using the supplementary feeding enclosures.

8. Seeking if supplementary feeding relaxes behavioural interactions between conspecifics allowing a rate of contacts between different lynx larger than in the absence of supplementation.

9. Deriving specific protocols for supplementary feeding of lynx oriented to similar management goals elsewhere.

10. Developing habitat models with the help of a Geographic Information System, taking into consideration any experimental habitat improvement (food, water, breeding dens, rabbit restocking, and so on) performed in the DBR.

11. Determining the genetic relationship between individual lynx (kinship, paternity) as well as the effective size of the lynx population inhabiting the DBR, and devicing a monitoring protocol of the lynx population based upon genetic and hormonal markers.

12. Performing a regular sanitary control and monitoring of the lynx population.

8. DIFFUSION OF THE RESULTS

1. Usual ways in research:
publications in specialized scientific journals, both national and international, communications to scientific congresses, articles in divulgative journals

Cover of scientific journal

Paper in divulgative journal

2. Mass media:
press, radio, TV

3. Diffusion through an internet web site:

3.1. Live images of lynx hunting in the supplementary feeding enclosures.

3.2. Live images of kittens in the breeding dens during the first weeks of life.

3.3. An updated summary of the results of the project.

3.4. An archive with pictures describing the actions and results of the project.

3.5. General information on the Iberian lynx.


Lynx with rabbit just hunted

9. PROJECT VIABILITY

The present project is ambitious both in its conception and its accomplishment. However, for the next three years we have the following resources available:

1. The necessary administrative permits to perform all the programmed activities in a protected area such as the DBR.

2. The infrastructures of the DBR, which include lodgement facilities, laboratories, and some scientific material. We also start with a long-term experience in lynx research and a good knowledge of the area credited by the research team.

3. Signed protocols of collaboration with the following administrations and companies:

3.1. Environmental Protection Agency (regional government of Andalucía) in the framework of a Life project entitled "Recovery of the lynx populations in Andalucía" whose budget is 623.532 €. This project finances all recovery and management actions.

3.2. Land Rover España S.A. lends us two four-wheel drive vehicles.

3.3. BP Oil España S.A. contributes 51.086 € during the first year.

10. REQUIRED FUNDS

We are seeking sponsors to cover totally or partially the amount of 270.000 €, which is the cost for the whole duration of the project (3 years) of the activities of monitoring and research specified in the section 7 above.