

## DISCUSSION FORUM

### IBERIAN LYNX CONSERVATION IN PORTUGAL: DILEMMAS AND SOLUTIONS

P. Sarmiento<sup>1,\*</sup>, J. Cruz<sup>1,\*\*</sup>, P. Monterroso<sup>2</sup>, P. Tarroso<sup>1,\*\*\*</sup>, C. Ferreira<sup>3</sup> & N. Negrões<sup>4</sup>

<sup>1</sup>Reserva Natural da Serra da Malcata – Rua António Ribeiro Sanches 6090 Penamacor Portugal;

e-mails: \* rns.m.sarmentop@icn.pt

\*\* joana.cruz@sapo.pt

\*\*\* ptg@clix.pt

<sup>2</sup>Parque Natural do Guadiana. Rua Dr. Afonso Costa, 40 1ª Dt, 7750-352 Mértola;

e-mail: monterroso\_pedro@hotmail.com

<sup>3</sup>Parque Natural do Sudoeste Alentejano e Costa Vicentina. Rua Serpa Pinto, 32, 7630-174 Odemira;

e-mail: catferreira@net.sapo.pt

<sup>4</sup>Parque Nacional da Peneda-Gerês. Av. António Macedo, 4704-538 Braga;

e-mail: nunonegroes@megamail.pt

#### Keywords

Iberian lynx,  
current situation,  
potential areas,  
conservation action plan  
in Portugal.

#### Abstract

A team of biologists and field assistants conducted, between January 2002 and May 2003, a survey on the status of the Iberian lynx in Portugal. The survey was performed on previously identified lynx areas, during studies carried out in the 1970-s and 1990-s

Intensive search for lynx scats, for DNA analysis, and camera trapping provided a basis for identifying potential lynx areas. Over 4200 km were covered during a global searching effort of 1975 man-hours. This effort resulted in the collection of 168 potential scats that were submitted to genetic validation with no positive lynx amplifications. Camera trapping was applied in a total effort of 5647 camera days, in three lynx potential areas. No positive detections were achieved. At the same time, a study on wild rabbit distribution reveals that most historical nuclei do not support lynx viable populations. Although we can not confirm extinction, the scenario is highly pessimistic. The Iberian lynx is presently in the verge of extinction. Intensive rabbit regression and massive habitat destruction are identified as the main causes of decline in recent decades. In the Portuguese lynx historical range, we could only identify significant areas suitable for lynx in the South-eastern part of the country, particularly in the Andalusian border, where we lack on recent evidence of lynx presence.

Being aware of the considerable difficulties pointed above, the ICN developed a Conservation Action Plan for the Iberian lynx in order to provide a consistent and effective approach to conserve the species in Portuguese territory.

This proposal describes guidance that retains future options, provides management consistent, offers necessary flexibility, in order to achieve the maximum goal of conserving the lynx in Portugal. Conservation measures have the goal of provide guiding lines for conservations agents in order to conduct actions that can positively affect lynx and/or to help avoid negative impacts through thoughtful planning of activities.

The proposal of Action Plan will be applied in all the areas located in the lynx historical distribution geographic area, that present suitable characteristics for the species presence or landscape features that can be optimize for lynx survival and that can be relevant for the species life-cycle, independently of their protection status. The goal of this plan is to apply pre-release strategic reintroduction activities to make possible, in a long-term, the reintroduction of Iberian lynx, in order to assure the viability of the species, as a fundamental element of Mediterranean ecosystems. For achieving this goal it will be necessary to establish a suitable connection between ex-situ and in-situ actions.

## Introduction

### *Current situation*

The global situation of the Iberian lynx is quite desperate [1,2] (Fig. 1). The two remnant populations of Andujar and Doñana are facing considerable problems related with prey scarcity, inbreeding and diseases. Recent data from Doñana, based on the use of camera-traps, revealed a total of 37 individuals (including young and subadult animals; P. Pereira, pers. com.). The Andujar population is presently estimated in about 100 animals, including 20-25 breeding females. In 2003, 26 cubs were born in this population and only 6 in Doñana (Gúzman, pers. com.).

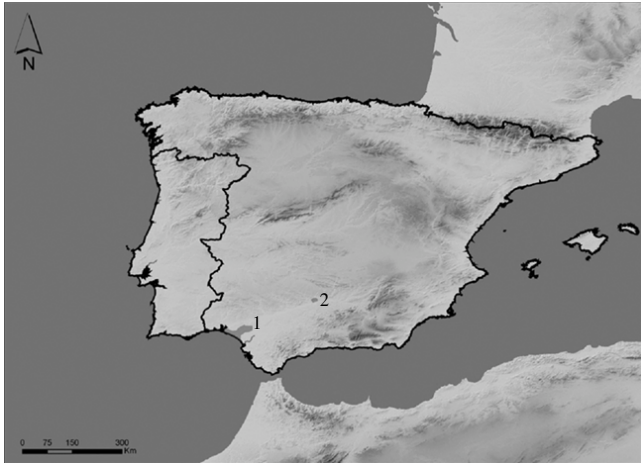


Fig. 1. Geographic distribution of Iberian lynx in Spain according to the most recent data (Guzmán et al., 2002; Sarmiento et al., 2004). 1- Doñana; 2 – Cardena-Andujar.

It seems that the only solution for controlling the extinction process is a proper organized programme of captive breeding and reintroduction. Is a well accepted fact that founders for this programme can only be obtained from the two remnant populations in Andalusia. Presently, there are eight Iberian lynxes in captivity, four females and four males [3].

The enforcement of most of the proposed measures by the IUCN for critical endangered species is being systematically delayed and in Portugal, presently, is not possible to apply any of the listed measures in Table 1, considering that either captive or free-ranging animals are unavailable (Table 2).

Table 1. Proposed measures by the IUCN for critically endangered species and their application in Spain and Portugal.

	SPAIN	PORTUGAL
Capture of wild animals for captive breeding	Yes	No
Reintroduction of animals in low density areas or extinction areas	No	No
Sperm bank or frozen embryos	No	No
Maintenance of captive animals for breeding or genetic banking	Yes	No
Translocation of individuals or genetic material	No	No

Table 2. Levels of conserving biodiversity and their respective status regarding the Iberian lynx in Spain and Portugal.

	SPAIN	PORTUGAL
Wild populations with no human interference	No	No
Wild populations with human management	Yes	No
Captive populations	4 females; 4 males	No
Genomic resource bank (reproductive cells)	No	No
Genomic resource bank (somatic cells)	Yes	No

### Conservation Action Plan in Portugal

The increasing awareness of all the above mentioned difficulties lead the ICN to develop a Conservation Action Plan for the Iberian lynx in order to provide a consistent and effective approach to the conservation of the species in Portuguese territory.

This proposal provides guidance for future options, provides management consistency, while offering the necessary flexibility, to achieve the maximum goal of conserving the lynx in Portugal. The plan relies in four main guidelines:

1. *Using the best scientific information available on Iberian lynx.* We used information from research performed throughout the geographic range of the species, recognizing that exists major differences, both in behaviour and ecology, between the Doñana area (the best studied population) and the rest of the lynx distribution;
2. *Acting in a conservative way in terms of habitat alterations.* A conservative approach is the best way to preserve the lynx historical range in order to maintain potentiality for future reintroduction;
3. *Consider the habitat requirements of other wildlife species.* An action plan that integrates recommendations for other endangered species is more likely to be successfully implemented;
4. *Develop a useful, proactive action plan to conserve lynx in its historical range, articulated with the Lynx Spanish Conservation Strategy.* The conservation actions proposed in this plan will be focused on suitable areas for lynx or in areas that can be successfully improved for future reintroduction, independently of their conservation status. Actions will act in breeding and dispersal habitats and will be mainly focused on the Portuguese-Spanish border. Therefore, the collaboration with Spanish authorities will be a key factor for the success of the plan.

### Approach to the development of conservation measures

The following conservation actions are intended to re-establish lynx populations in Portugal, and to reduce or eliminate threat factors. The goal of the conservation measures is to provide guide lines for conservation agents in order to conduct actions that can positively affect lynx and/or help to avoid negative impacts through thoughtful planning of activities. It is expected that plans that incorporate these actions and projects that implement them, will lead to the species conservation across its range.

As previously described, there is a considerable lack of knowledge on the dynamics of the process that conducted lynx populations to the present pre-extinction stage and therefore we are unaware of the potential effects of several actions upon the species. Consequently, most measures described in the plan are based on the available literature [4-10] and the updating with the information resulting from scientific work and population monitoring.

### Application level

The proposal of the Action Plan will be applied in all the areas within the lynx historical distribution geographic area<sup>1</sup>, that presented suitable characteristics for the species present or landscape features that can be optimized for lynx survival and that can be relevant for the species life-cycle, regardless of protection status (Fig. 2). We include in this definition residence, dispersal and reproduction habitats.

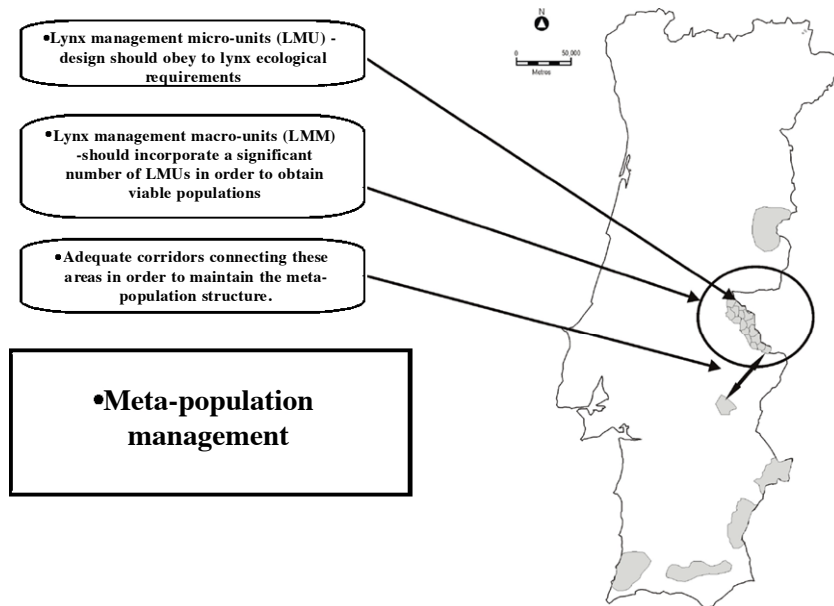


Fig. 2. Landscape units for the application of the Iberian lynx Conservation Action Plan.

### Conservation measures

#### *Goals and objectives*

The goal of this plan is to apply pre-release strategic activities in order to allow in the future reintroduction of the Iberian lynx, for assuring the viability of the species-

In order to achieve this goal it is necessary to establish a suitable connection between ex-situ and in-situ actions.

<sup>1</sup> Includes the historical populations of Malcata, S. Mamede, Vale do Guadiana, Sado and Algarve-Odemira [5].

### *Ex-situ actions*

Ex-situ actions of the plan will be applied as described in Figure 3. The implementation of these measures in Portugal will be completely dependent of the success of the Spanish captive breeding plan and so it is absolutely necessary the establishment of an official agreement between the Iberian States in order for Portugal to have access to captive-born lynxes.

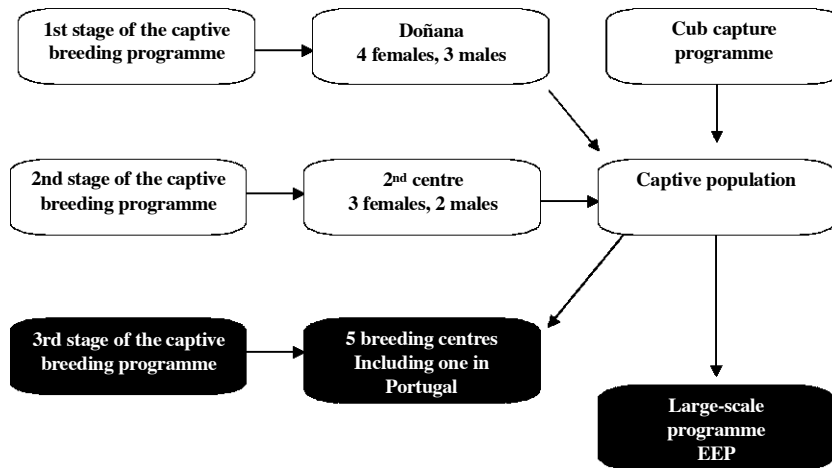


Fig. 3. Descriptive diagramme of the evolution of ex-situ actions

Presently, several actions related with captive breeding are being applied in Portugal. These actions include putting together a professional team and construction of facilities for breeding and reintroduction.

### *In-situ actions*

The conservation measures will probably be implemented in three different levels of decision-making: home-range level (micro-scale), population level (macro-scale) and ecological corridors, providing broad direction for management activities by establishing goals and guidelines.

The following managements units will be establish (Fig. 4):

#### *1. Micro-units for lynx management (MULs):*

The micro-units for lynx management are intended to be the smallest geographic scale for evaluation and monitoring of the effects of management actions on lynx habitat and correspond to theoretical home-ranges.

The MULs should incorporate all the habitat requirements for the Iberian lynx life cycle and should be managed as the species was present even in case of no detection. This approach is necessary for increasing or maintaining landscape suitability if we choose to apply a reintroduction plan, in order to ensure a proper success.

### Guiding lines for establishing MULs<sup>1</sup>:

1. The size of MULs should include 650-1 000 hectares of suitable continuous habitat or larger areas in case of fragmented habitat;
2. Wildrabbit density should vary between 1 individual per hectare, during the low density period, and 4.6 rabbits per hectare during the lynx breeding season;
3. General characteristics of MULs should include isolated trees, approximately 40% of scrubland cover and pasture land areas;
4. For each MULs potential lynx habitat should be mapped and reproduction, shelter and hutting areas should be identified;
5. Reproduction habitat should amount, at least, to 10 % of the total area;
6. Any activity that could altered MUL structure should be regulated;
7. Connectivity between MULs should be maintained.

### 2. Macro-units for lynx management (MALs):

MALs corresponde to theoretical populations, being a group of MULs, and this figure was created since the planification of actions and programmes should not be only focused in the home-range level (MULs). The landscape patrons of significant areas, that correspond to potential populations should be taken into account.

### 3. Ecological corridors:

Dispersal is a key issue for lynx survival, considering that the meta-population equilibrium could only be achieved if the genetic flow between populations is maintained (Palomares et al., 2000). Thus, the presence of linear landscape elements that allow survivorship and displacements, is critical in terms of conservation. Although this sorts of habitats usually do not allow reproduction and natality, they are essential for the species life-history requirements.

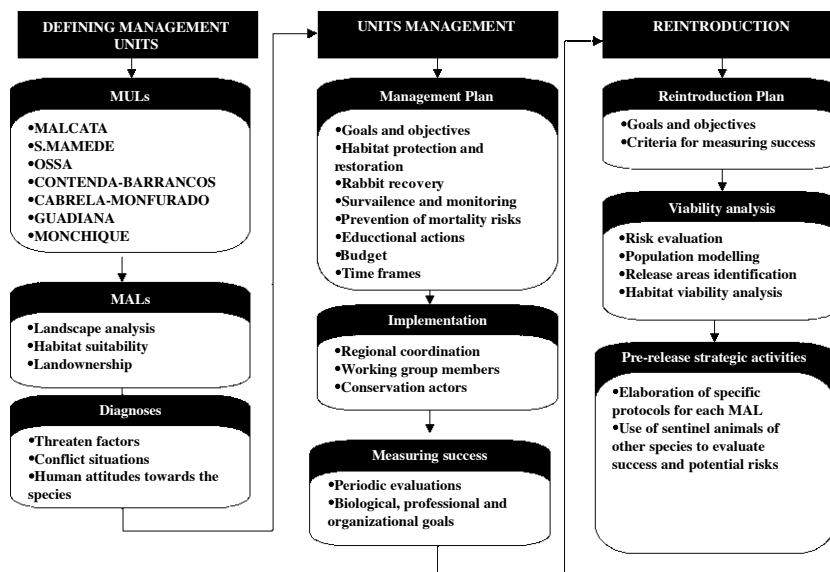


Fig. 4. Phases and application of the Action Plan for Iberian lynx conservation in Portugal.

<sup>1</sup>Conception based on Palomares (2001) [8].

## Project application

In order to achieve the goal of restoring Iberian lynx in Portugal it will be applied a consistent plan that will involve inter-agency and international collaboration. The programme will be applied by several teams thus allowing a multidisciplinary approach (Fig. 4). It is necessary to be aware that even with unlimited means and in ideal conditions the future of the Iberian lynx is quite uncertain, both in Portugal and in Spain, and only a professional attitude can prevent the extinction of this feline.

## References

1. Guzman, J.N., García, F. & Garrote, G. 2002. Censo-diagnóstico de las poblaciones de lince-ibérico en España. (Iberian lynx population census in Spain). DGCN. MIMAM. Unpublished internal report.
2. Sarmiento, P., Cruz, J., Monterroso, P., Tarroso, P., Negrões, N. & Ferreira, C. 2004. The Iberian lynx in Portugal. Status survey and conservation action plan. Instituto da Conservação da Natureza (ICN).
3. Vargas, A. 2004. Boletín informativo del programa de cría en cautividad de lince ibérico. (News report on the Iberian lynx captivity reproduction program). MIMAM.
4. Ferreras, P., Aldama, J.J., Beltrán, J.F. & Delibes, M. 1992. Rates and causes of mortality in a fragmented population of Iberian lynx (*Felis pardina*). *Biol. Conserv.* 61: 197-202.  
DOI: 10.1016/0006-3207(92)91116-A
5. Delibes, M., Rodríguez, A & Ferreras, P. 2000. Action Plan for the conservation of the Iberian lynx (*Lynx pardinus*) in Europe. WWF – Mediterranean program.
6. MIMAM (Ministério de Medio Ambiente) 2000. Propuesta de Plan de Cría en Cautividad del Lince Ibérico. (Iberian lynx captivity reproduction plan). Dirección General de Conservación de la Naturaleza, Secretaría General de Medio Ambiente, Ministério de Medio Ambiente.
7. Palomares, F., Delibes, M., Ferreras, P., Fedriani, J., Calzada, J. & Revilla, E. 2000. Iberian lynx in a Fragmented Landscape: Predispersal, Dispersal, and Postdispersal Habitats. *Conserv. Biol.* 14 (3): 809-818.  
DOI: 10.1046/j.1523-1739.2000.98539.x
8. Palomares, F. 2001. Vegetation structure and prey abundance requirements of the Iberian lynx: implications for the design of reserves and corridors. *J. Appl. Ecol.* 38: 9-18.  
DOI: 10.1046/j.1365-2664.2001.00565.x
9. Ferreras, P. 2001. Landscape structure and asymmetrical interpatch connectivity in a metapopulation of endangered Iberian lynx. *Biol. Conserv.* 100 (2001): 125-136.  
DOI: 10.1016/S0006-3207(00)00213-5
10. Rodríguez & Delibes 2003. Population fragmentation and extinction in the Iberian lynx. *Biol. Conserv.* 109 (3): 321-331.  
DOI: 10.1016/S0006-3207(02)00158-1