



**Portuguese
Iberian Lynx
ex situ Conservation Plan**



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1. Introduction

Despite considerable effort and means devoted to the task, the last national survey detected no signs of the presence of Iberian lynxes (*Lynx pardinus*). The study of the spatial distribution and abundance of wild rabbit populations present in the species' historical range revealed that most of its habitat is not capable of supporting viable populations of lynxes. Although we cannot confirm extinction, the current scenario is pessimistic.

The last known populations of Iberian lynxes can be found in Andalusia (populations of Sierra Morena and Doñana, with numbers ranging from 115 to 175 animals in total) and are managed by this Autonomous Community, under the coordination of the Spanish Environment Ministry and the Iberian Lynx Working Group (Ministério de Medio Ambiente; GTLI).

The Portuguese Government, through the Institute for the Conservation of Nature (Instituto da Conservação da Natureza, ICN), actively participates in the GTLI, where the different approaches to lynx conservation are discussed and planned. Portugal is also represented in the Iberian Lynx Captive Breeding Team (Comité de Cria en Cautividad para el Lince Iberico, CCCLI) and takes part in some of the breeding teams working groups.

Portugal has committed to: financially and politically support the Iberian lynx *ex situ* conservation plan (see annex 1); participate in captive breeding programme by running an exclusive breeding centre within the Iberian network of breeding centres and under the technical and scientific guidance of the CCCLI; and promote other actions described in this plan.

The main aims of the Iberian lynx *ex situ* conservation strategy are to obtain a number of suitable animals for re-introduction / population reinforcement within the species' historical range; and to maintain animals as an "insurance" against extinction of the free-ranging populations using the best possible genetic and demographic management of the captive population, so as to ensure viability for this species for the next 30 years.

2. The Iberian Lynx Captive Breeding Programme – Global strategy

The aim of a captive breeding programme is to obtain a sufficient number of suitably prepared animals to aid in the re-establishment of a species in its natural habitat, helping to recover an endangered species from the likelihood of extinction. At the same time, captive breeding programmes are managed as a safeguard against the extinction of free-ranging populations, until the recovery of their size and viability is possible.

To achieve this, one needs to attend to the nutritional, ethological and spatial requirements of each individual, as well as establish a sound genetic and demographic management of the captive population. Only if all the requirements of a captive breeding programme are fulfilled and properly managed can we achieve the proposed aims. If the genetic and demographic management is sub-optimal, the conservation programme will be costlier and its progress slower. Extremely poor management may lead to the extinction of the captive population.

The optimal management of a captive population is achieved by rapidly increasing its size to a limit defined by the number of animals considered suitable for the species concerned and its status. Once that limit is reached, maximum efficiency is achieved by stabilizing the size of the captive population. It is essential to balance the need for the production of animals destined for re-introduction / population reinforcement with the requirements of the captive breeding programme, therefore taking into account the need for replacements for post-reproductive animals. The genetic and demographic management needs to be balanced with proper ethological management, in order to produce captive bred individuals capable of expressing natural behaviours that will increase their chances of survival in natural settings.

The *ex situ* conservation programme for the lynx is an important tool supporting the species' global recovery plans. Its aims include the maximum preservation of current genetic variability of free-ranging populations and the production of a sufficient number of animals for future re-introduction / population reinforcement actions within the historic range of the species.

The two main aims of the captive breeding programme are thus as follows:

- To establish a captive population of genetically and demographically viable, healthy lynxes that allows for the development of natural and assisted reproduction techniques;
- To prepare ethologically and genetically viable, healthy captive-bred Iberian lynxes for re-introduction / population reinforcement actions within the species' historic range.

To meet these aims, several general objectives have been defined, from which an array of specific actions have been derived. These can generally be broken down to the disciplines of husbandry, genetics and demographics, reproduction, health, re-introduction and population reinforcements, environmental education and media relations.

3. Global objectives

One of the main functions of the CCCLI is to implement the captive breeding action plan for the species. The 2004 action plan, a revised version of the 2001 plan, describes a captive breeding programme actively integrated into the *in situ* conservation programme, directed towards the preservation of maximum current genetic variability found in free-ranging populations and the production of viable animals for future re-introduction / population reinforcement programmes.

The general objectives of the captive breeding programme are:

- To preserve 85% of the current genetic variability found in free-ranging populations for a period of 30 years.
- To breed healthy, ethologically and genetically viable Iberian lynxes for future re-introduction / population reinforcement activities within the species' historical range.
- To maintain an *ex situ* conservation programme, managed by a unified executive directorship and assessorized by a captive breeding team following the design of an EEP (European Endangered species Programme).
- To add new captive breeding centres to the *ex situ* conservation programme, giving priority to the participation of Portugal and the Autonomous Communities actively involved in the protection and conservation of habitat.

To achieve these objectives, it is considered fundamental to incorporate new founders to the captive breeding programme, at a rate of 4 cubs / juveniles from large litters per year for the next 5 years (n=20) and one adult from wildlife rehabilitation centres every 2 years. To preserve 85% of the existing genetic diversity of the free-ranging populations, the programme must hold a nucleus of 60 breeders (including founders and captive-bred animals) distributed throughout a network of breeding centres.

Two urgent and fundamental needs have to be met if the abovementioned aims are to be achieved: sufficient space must be available to hold the breeding nucleus; and habitat conservation and restoration measures for future re-introduction activities must be carried out.

4. Specific objectives of the Portuguese Iberian lynx *ex situ* conservation programme

In the spirit of cooperation that has been the rule between Portuguese and Spanish conservation authorities, the Portuguese Iberian lynx *ex situ* conservation programme follows the directives and recommendations of the International Union for the Conservation of Nature (IUCN), the GTLI, and CCCLI, which resulted in the definition of a global strategy for the conservation of the species. The programme has the following objectives:

- A.** To develop animal exchange protocols between the Portuguese and Spanish conservation authorities for the development of captive breeding centres and future re-introduction activities.
- B.** To establish a captive population of Iberian lynxes integrated in the Iberian network of captive breeding centres under the unified management of the CCCLI, following its directives for the captive management of the species.
- C.** To establish a genetic resource bank for the species.
- D.** To contribute to advances in relevant disciplines, such as husbandry, genetics and demography, ethology, animal health, reproduction, environmental education and awareness and media relations, reaching out to national specialist teams and working groups for each discipline whenever possible.
- E.** To make the connection between the *ex situ* and *in situ* conservation programmes by: assisting with the design of structures and organigrams for the future experimental re-introduction centre; creating re-introduction protocols and techniques for the species; and contributing to the re-introduction viability analysis of areas within its historical range.
- F.** To raise the public and political profile of the species by developing a media relations plan for the Portuguese Iberian lynx Conservation Programme.
- G.** To help secure essential long-term financial support needed to implement the Portuguese Iberian Lynx Conservation Programme.

A – Development of animal exchange protocols between the Portuguese and Spanish conservation authorities.

To respond to the urgent need for space for the captive breeding programme, it is imperative that animal exchange protocols are developed and signed by all the parties involved, namely between the Andalusian Junta (the most likely source of all founders), the Spanish Ministry for the Environment (MIMAM) as the coordinator for the Spanish Iberian lynx conservation programme, and the prospective candidates to the breeding programme. These protocols will define the terms under which the animal exchanges will occur. Priority in these exchanges will be given to Portugal and the Spanish Autonomous Communities actively involved in the search, conservation, and improvement of habitat for the recovery of the species through future re-introduction activities.

ACTIONS

1.- To promote the formulation and signature of protocols between the ICN and other Portuguese candidates with the Andalusian Junta and MIMAM regarding their participation in the captive breeding programme.

Coordination: Rodrigo Serra, Pedro Sarmiento

Calendar: to be determined

Animal exchanges will be guided by the demographic and genetic needs of the captive breeding programme. The protocol must specify, among other things: a commitment to the unified management of all breeding centres; to follow the CCCLI's animal exchange directives; and to financially support and manage breeding centres for at least 15 years.

It is considered necessary to prepare for the inclusion of animals from other origins into the captive breeding programme, even if such incorporation seems unlikely at the moment. The protocol is currently under development, and its promotion is the responsibility of prospective candidates to the captive breeding programme.

2.- To promote the prospection of suitable habitat for future re-introduction activities as a condition for the participation of Portugal in the Iberian lynx captive breeding programme.

Coordination: Pedro Sarmiento, Rodrigo Serra

Calendar: to be determined

B – Establishment of a captive population of Iberian lynxes in Portugal.

New captive breeding centres will be needed in the near future to hold animals included in the captive breeding programme. As described by the demographic models of potential growth of the captive population, in five years the programme will need to accommodate 60 breeders and 12-13 animals destined to participate in re-introduction programmes. This means that 3 exclusive breeding centres, 4-5 associated breeding centres and 1 pilot breeding centre must be in place to hold the captive population at that time (the specifications for each type of centre can be found on the Portuguese version of this document and can be requested from the CCCLI).

The Portuguese government has committed to build and manage an exclusive breeding centre, and the ICN is currently in negotiations with the Ministry of Agriculture, Fisheries and Forests (MAPF) for construction on one of its estates at Alter do Chão (Coudelaria de Alter do Chão, CAC). This facility has the necessary space for such a centre, and is equipped with the means, equipment and infrastructure to receive and maintain a collection of Iberian lynxes in safety and isolation.

The CAC currently holds other EEP collections, is equipped with departments of relevant disciplines (reproductive physiology, reproduction and genetics laboratories, and veterinary hospital). It has infrastructures suitable for holding workshops and lodging of participants, and is located at: an intermediate point between Andalusia and the Serra da Malcata Nature Reserve (RNSM); between the RNSM and the area of Contenda / Barrancos; and near the border with the Spanish Autonomous Communities Andalusia, Extremadura and Castilla-Léon, actively involved in the Iberian lynx conservation programme.

To add to the exclusive breeding centre, the participation of other Portuguese institutions (zoological parks and collections) in the captive breeding programme has been actively promoted, with the intent of maintaining at least one associated breeding centre in Portugal to help meet the spatial and financial requirements of the captive breeding programme and to promote Iberian lynx conservation. Interest has been shown by the Quinta de Santo Inácio and Jardim Zoológico de Lisboa zoological parks, and other institutions are to be expected to follow in the near future.

ACTIONS

1.- To develop a document describing the requirements and infrastructures for the exclusive breeding centre to be built in Alter do Chão, following the directives and recommendations of the CCCLI.

Coordination: Rodrigo Serra

Calendar: under development

2.- Development of protocols to be established between ICN and other national candidate institutions to the captive breeding programme, describing the roles and responsibilities of each institution, so as to guarantee this programme's long-term efficiency.

Coordination: Rodrigo Serra, Pedro Sarmiento

Calendar: under development

The organigram can be found in annex 2. Protocols are currently under development.

3.- Development of the program and organigram for the exclusive breeding centre, following the recommendations and directives of the CCCLI.

Coordination: Rodrigo Serra

Calendar: to be determined

4.- Promotion and support candidatures by national zoological parks and collections interested in developing associated breeding centres to participate in the captive breeding programme, as recommended by the CCCLI.

Coordination: Rodrigo Serra

Calendar: under development

The requirements for captive breeding centres were delivered to candidate institutions.

C – Establishment of a national genetic resource bank for the Iberian lynx.

The Portuguese Iberian lynx conservation programme requires a genetic resource bank containing samples obtained from both captive and free-ranging individuals in order to preserve a maximum of currently available genetic diversity. A GRB preserving both male and female germplasm, cells, and tissues, will provide the PILCP with spatial and temporal flexibility to exchange genetic material between animals within the captive breeding programme, between free-ranging populations and the captive breeding programme, and, if feasible, between individuals of free-ranging populations.

The preservation of germplasm (and possibly embryos) will allow for the expansion of reproductive opportunities for animals while avoiding spatial and temporal constraints, and possibly avoiding the transmission of pathogens between animals. The cryopreservation of germplasm and/or embryos can therefore expand the reproductive life of individuals, even after their death. The preservation of somatic cells (or non-differentiated germinal cell lines) may allow sexually immature dead animals to reproduce, or extend the breeding potential of certain individuals. The GRB will also be used to store and preserve tissues, blood, serum and other biologic materials for future studies of genetics, disease prevalence, and other unforeseen analyses.

ACTIONS

1.- Promotion and establishment of protocols between the ICN and national institutions interested in creating and maintaining a genetic resource bank for the Iberian lynx.

Coordination: Pedro Sarmiento, ICETA/CIBIO

Calendar: concluded

2.- Establishing a genetic resource bank for the Iberian lynx (BRBLI) in Portugal.

Coordination: Nuno Ferrand

Calendar: to be determined

The document describing the requirements and specifications of the BRBLI is currently under development and can be found in the Portuguese version of this document.

D – Contributions to advancing knowledge in disciplines involved in Iberian lynx conservation.

The inclusion of Portuguese conservation institutions in Iberian lynx conservation programmes implies a contribution to advancing knowledge in a variety of disciplines. These institutions must therefore be prepared to make scientific and technical input to disciplines such as husbandry, genetics and demography, ethology, animal health, reproduction, environmental education and awareness, and media relations. Whenever possible, representatives of each institution will be organized into expert panels and working groups for each discipline, and act as consultants for the Portuguese and Spanish Iberian lynx conservation programmes.

Protocols detailing relationships and responsibilities must be established between the ICN and national collaborating laboratories, universities and other research institutions so that the necessary Iberian lynx-related research is conducted and the objectives of the programme pursued. It is also considered necessary to establish protocols with international research institutions for their participation in Iberian lynx research in fields not covered by national institutions. It is extremely important that the research conducted by national institutions is in agreement with the research priorities and objectives of the Spanish Iberian lynx conservation programme and associated research projects, so as to avoid unnecessary duplication of efforts and disparities in methods, analysis and interpretation of results.

ACTIONS

1.- To promote research projects and the formation of working groups in disciplines and subjects relevant for the conservation of the Iberian lynx.

Coordination: Rodrigo Serra

Calendar: under development

The promotion of Iberian lynx related scientific research must be conducted within the framework of environmental education and awareness activities detailed in section F of this plan. Several contacts have been made for the formation of working groups in relevant areas, and these will be developed in the future.

2.- To promote the establishment of a network of institutions and researchers with active participation in Iberian lynx conservation efforts.

Coordination: Rodrigo Serra

Calendar: under development

The network must be promoted as an integral part of the internet site as described in section F.

E – Planning and requirements for the experimental reintroduction centre and support for the viability analysis of suitable areas within the historic range of the species for future re-introductions.

The IUCN defines a re-introduction as “an attempt to establish a species in an area that was once part of its historical range, but from which it has been extirpated or become extinct”. For Iberian lynx conservation purposes, “re-introduction” means the use of captive-bred lynxes to establish new population nuclei, and “translocation” means the use of free-ranging animals to achieve the same goal. The term “population reinforcement” is used for the re-introduction or translocation of animals to an area where a population of the species is established.

Re-introductions and translocations have been extensively used as tools in conservation programmes for establishing free-ranging populations of endangered species. Many of these programmes have used captive breeding programmes as a tool to obtain animals for re-introductions, and although many of them are having a positive impact on conservation of emblematic species, it has been shown that the production of captive-bred animals for *in situ* conservation activities is a costlier and more logistically complex method than the translocation of free-ranging animals for the same purposes. However, translocations imply having to extract a considerable number of animals from free-ranging populations, which can have a serious negative impact upon them. This risk has to be evaluated before we attempt to establish new population nuclei within the species’ historical range, since this process will require a critical mass of founders. With an adequate production of captive-bred lynxes, properly trained to maximise their chances of survival in the wild, we can avoid extracting a significant number of free-ranging animals to establish new or reinforce existing populations. Both re-introduction and translocation have advantages and disadvantages, so a comparative study of both is therefore recommended to study which method – or combination of methods – is more useful for the conservation of Iberian lynxes.

Before any re-introduction is attempted, it is necessary to study its viability in great detail. One of the most important requirements is a study of habitat suitability demonstrating that the causes that led to the species’ local extinction have disappeared or have been mitigated to a sufficient level, and that the habitat has adequate size and quality for the establishment of a viable population.

Re-introduction attempts must be conducted scientifically. The re-introduction method results from a multidisciplinary approach to conservation, and it includes the contribution of ecology, ethology, veterinary science, sociology, social politics, and law, among others. Protocols must detail objectives, procedures, and individual and institutional responsibilities for all phases of the programme. If a detailed evaluation finds that a certain area is not suitable for re-introduction, elements that fail in the area must be determined and corrected.

The Serra da Malcata Nature Reserve has been legally protected for almost three decades, with the conservation of Iberian lynxes as its main objective and priority. It offers over 16,000 ha of protected land, suitable infrastructure, and has benefited from considerable investment in habitat and prey restoration over the last decade. Two measures have been pursued and will continue for the foreseeable future: wild rabbit recovery (with considerable results) and habitat restoration measures. The nature reserve is therefore a privileged location for an experimental re-introduction centre aiming to launch of the recovery Iberian lynx populations in Portugal. This centre is programmed as a bridge between *ex situ* and *in situ* conservation programmes for future re-introduction activities. Again, for these to take place it is essential that habitat viability studies are conducted at a national level and that the causes that led to the species extinction / extirpation have disappeared or have been reduced to an acceptable level.

ACTIONS

1.- To develop a programme for an experimental re-introduction centre, to be located at the Serra da Malcata Nature Reserve, detailing the requirements and infrastructures needed to conduct experimental re-introduction activities and research.

Coordination: Rodrigo Serra

Calendar: concluded

The first draft of the document planning the experimental re-introduction centre is concluded and is being evaluated by colleagues and external consultants, and can be found in annex 3. The centre aims to: hold up to 6 animals in three different enclosures; to test and develop release protocols and techniques at different supplementation and monitoring levels; and evaluate the techniques designed to prepare captive-bred animals for re-introduction. It is also designed to play a part in the habitat viability analysis to be conducted at a national level. The current document is meant to stimulate debate on the logistical needs of future re-introductions.

2.- Development of a working plan and organigram for the experimental re-introduction centre, following the recommendations of the CCCLI.

Coordination: Rodrigo Serra

Calendar: to be developed

The development of the working plan and organigram for the centre is dependent on the deliberations of the CCCLI for the re-introduction efforts, still to be compiled, and on the results of the consultation by colleagues, experts in the re-introduction and husbandry working groups, and external consultants.

3.- Development of research projects on the prevalence and incidence of relevant pathogens considered to pose a risk for the Iberian lynx in populations of carnivores within potential re-introduction areas in Portugal.

Coordination: Rodrigo Serra

Calendar: to be determined

The development of research projects on the prevalence and incidence of diseases considered to be harmful to the Iberian lynx is an important part of the habitat viability analysis for re-introductions, and will be conducted in areas within the species' historical range. These will target mainly populations of wild cats, foxes and feral domestic carnivores. The CCCLI's animal health working group will define the research priorities and guidelines in the near future.

F – Environmental education, awareness and media relations: development of a communication plan for the Portuguese Iberian lynx conservation programme.

Many of the factors that led to the current status of Iberian lynx populations in Portugal have resulted from attitudes and behaviours shown by some societal groups – both at a local and national level – towards nature, and particularly towards predators. The ethical and ecological values related to the conservation of ecosystems and endangered species are essential and need to be strengthened to ensure the long term success of any conservation programme. Both the general public and conservation agents demonstrate a current lack of knowledge and awareness of the status and characteristics of the Iberian lynx; this ignorance is prejudicial to its recovery and must be overturned. Only this way can we have an informed and active public opinion, essential for the increment of the public and political profile of the species, and acting as a positive pressure for the conservation of Iberian lynxes and for the change in attitudes towards the conservation of nature.

The potential attraction of a captive breeding programme must be used to: inform society about the current status of the species and the problems it faces; and the measures taken to mitigate them and to promote the recovery of Iberian lynx populations. The environmental education and awareness campaigns must inform the general public and conservation agents about the species characteristics; the captive breeding programme; the need to protect, prospect, and improve habitat quality for future re-introductions; and other aspects of Iberian lynx conservation.

It is considered vital to develop a communication plan to act as a voice for the conservation of the Iberian lynx in Portugal, spreading information about both the *ex situ* and *in situ* conservation programmes to society and conservation agents. A “corporate identity” must be devised, and media-friendly vehicles to disseminate information must be periodically updated, presented and/or distributed to the general public and conservation agents.

ACTIONS

1.- Devising an identity for the Portuguese Iberian lynx conservation programme.

Coordination: Rodrigo Serra

Calendar: under development

The definition of an identity linking all aspects of the Portuguese Iberian lynx conservation programme is essential for an easy identification of governmental efforts directed to the recovery of the species by all sectors of society. This identity is to be used in all vehicles of information dissemination programmed, and to manufacture merchandising to fundraise and contribute for the long term conservation of the species.

2.- Building and maintaining a website for the conservation programme.

Coordination: Rodrigo Serra

Calendar: to be developed

The internet site is to be built as a permanent exhibitor of all pertinent information related to the conservation of the species, with special emphasis on the exposure of all the information generated by the Portuguese Iberian lynx conservation programme. It is planned as dynamic website, destined to function as a portal for conservation agents, the general public, and collaborating researchers. It is also programmed as a database to hold all the information pertinent to all Iberian lynx-related research, reports and other documents from / for collaborating researchers.

3.- Release of information bulletins on the activities and progress of the conservation programme.

Coordination: Rodrigo Serra

Calendar: to be developed

The release of information bulletins (like the ones released by the Spanish Iberian lynx conservation programme) is meant to keep all interested parties informed of the current status of the activities and progress of the Spanish and Portuguese Iberian lynx conservation programmes. It will have a scientific component, an environmental education component and space for other aspects and subjects relevant to the conservation of the Iberian lynx.

4.- Promoting of environmental education and awareness activities

Coordination: to be determined

Calendar: to be determined

The Iberian Association of Zoos and Aquaria (AIZA) is currently developing awareness campaigns to be presented to visitors in zoos throughout the Iberian Peninsula, directed towards the current status of the species, the problems it faces, and the *ex situ* and *in situ* efforts to recover Iberian lynx populations and habitat. The ICN must support these campaigns and promote their presentation in national zoos and national parks.

It is also necessary to coordinate at a national level and update the environmental education campaigns to be delivered to students and schools in relevant areas within the historical range of the species. Awareness campaigns and presentations must be supported by hand-outs, multimedia presentations and other resources to be delivered to the public and directed specifically for each target population. The impact of

these efforts and the overall impact of awareness campaigns will be measured by an inquiry programme for all parties and groups involved.

An efficient coordination between scientific meetings and other events related to the conservation of the Iberian lynx - socio-cultural events - and media offensives is necessary to promote the public and political status of this species conservation. Specific actions are outlined in a communication plan (first draft) available in the Portuguese version of this document.

G – Searching for long-term financial support for the Portuguese Iberian lynx conservation programme.

All captive breeding programmes are long-term projects, and it is therefore crucial to guarantee the funding necessary for the management and maintenance of breeding centres for at least 15 years. This is a requisite for the participation in the Iberian lynx captive breeding programme. Long-term financial support will also be needed for the re-introduction programme to be established in the future, aimed at the recovery of the national populations of Iberian lynxes.

It is essential that the Portuguese efforts for the conservation of the Iberian lynx are properly funded. The lack of long-term financial support is presented in several studies as being one of the causes that has contributed decisively to the failure of many conservation programmes for protected or endangered species. Sufficient funding for the long-term viability of such a programme must be raised through a number of sources such as the following: government budgets; European Union funding; partnerships with public and private institutions; and the promotion of the Portuguese scientific patronage scheme to public and private companies.

As mentioned in section F, the captive breeding programme and the environmental education and awareness campaigns have the potential to attract attention and support for the Iberian lynx conservation programme, which can also be used to raise the necessary financial support. Specific multimedia presentations, hand-outs and other materials will be developed to promote scientific patronage for Iberian lynx conservation efforts.

ACTIONS

1.- Promotion of the scientific patronage scheme to companies, foundations and other relevant institutions.

Coordination: Rodrigo Serra, Pedro Sarmiento

Calendar: to be determined

Annex 1

Relevant policy-making for the Portuguese Iberian Lynx *ex situ* Conservation Plan

Considering that Iberian lynx populations have been under progressive and very significant decline for the past 20 years, the '*Dirección General de Conservación de la Naturaleza*' (DGCN, Ministry of the environment / MIMAM - Spain), the EU counsel, WWF and the IUCN have produced documents supporting the important role to be played by captive breeding, genetic management and subsequent reintroduction / population reinforcements for the conservation of the Iberian lynx. Portugal, through the Institute for the Conservation of Nature (ICN), actively participates in the GTLI (Iberian Lynx Working Group) where the different strategies for the conservation of the Iberian lynx are planned. The ICN is also represented at the Iberian Lynx Captive Breeding Committee (CCCLI), participating in the application of these strategies.

With its participation in the creation of the '*Plan de Cria en Cautividad del Lince Ibérico*', (Captive Breeding Action Plan, approved in June 2001 by the '*Comisión Nacional de Protección de la Naturaleza*' MIMAM, Spain), the Portuguese conservation authorities committed to support and finance several aspects of the Action Plan, contributing scientifically to the captive breeding programme and the genetic management by establishing an exclusive captive breeding centre and a genome resource bank.

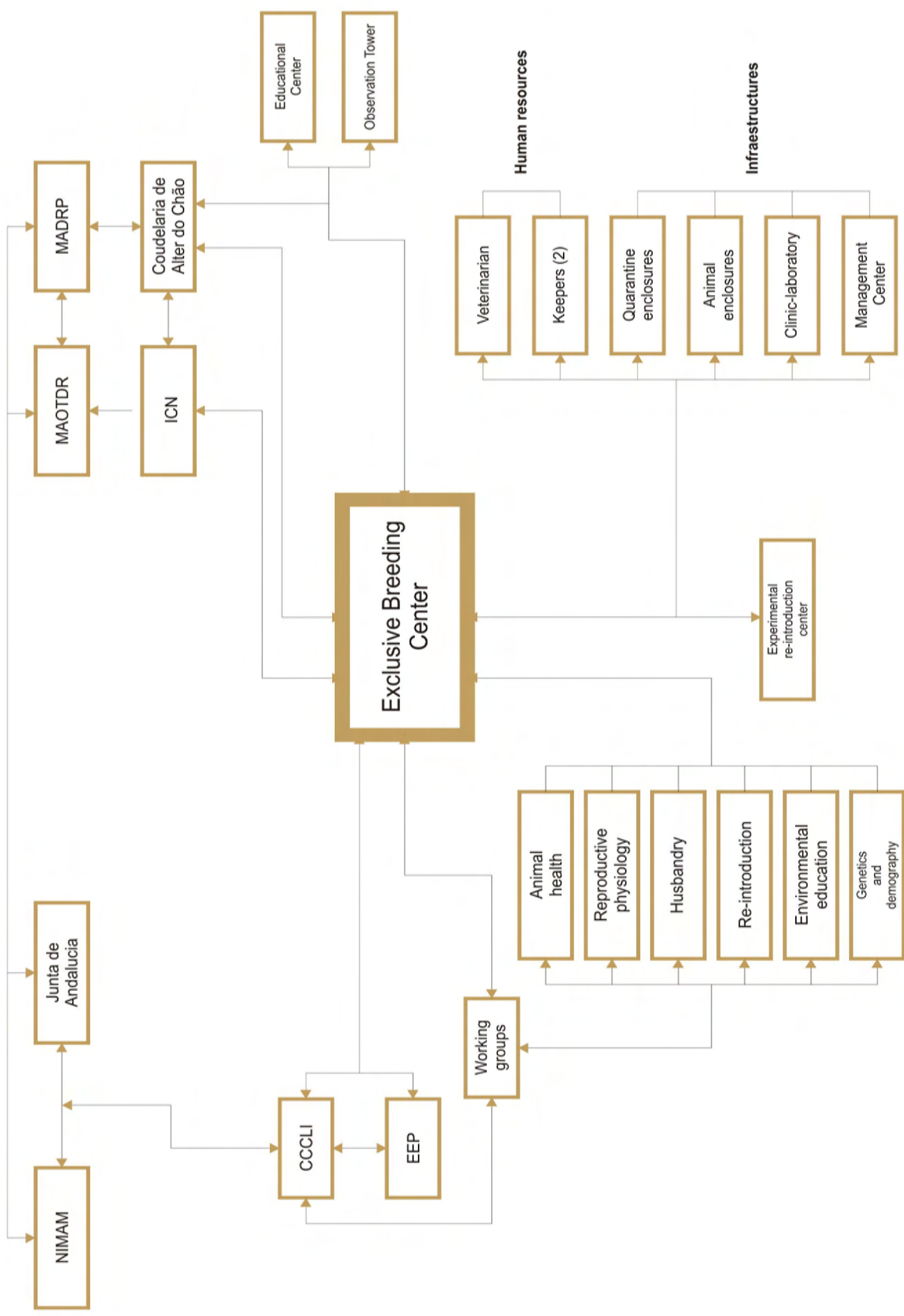
This commitment was then reinforced by the Portuguese Government with its resolution 152/2001 of October 11, defining a national strategy for the conservation of nature and biodiversity (Estratégia Nacional de Conservação da Natureza e da Biodiversidade - ENCNB). Strategic option nº5 determines the development of specific action plans to manage species and habitats through the establishment of captive breeding centres, cooperation with national and international genome resource banks and animal collections.

Portugal is concerting efforts with Spain for the conservation of the Iberian lynx. In this spirit of cooperation, the ICN has been working closely with the "Ministério de Medio Ambiente" (MIMAM, Ministry for the Environment, Spain) and the "Consejería de Medio Ambiente" (CMA, Counsel for the Environment, Junta de Andalucía) and that was reflected in the Memorandum of Understanding on the Cooperation for the Conservation of the Iberian Lynx and Imperial Eagle. This MOU was signed between the Portuguese Ministry for the Environment (MCOTA), the Portuguese Ministry for Agriculture, Fisheries and Forests (MAPF) and the MIMAM in October 2004, and is directed towards increasing the cooperation for the development and financing of strategies and actions directed to preserving the species, specifically in terms of the demographic and genetic management of the *ex situ* conservation programme.

More recently, the II International Seminar for the Iberian Lynx was held in Corboda (15th-17th December 2004) where, among others, the following conclusions were drawn:

- a) The captive breeding programme must be understood as an important tool for the future recovery of the species, contributing decisively to preserve current genetic diversity. The free living and captive Iberian lynx populations must be managed as a single unit to increase the likelihood of recovery for the species.
- b) New captive breeding centres are considered necessary with a certain degree of urgency. These should be in sufficient number and must follow the recommendations of the Captive Breeding Committee for the Iberian Lynx (CCCLI). Participation is offered to Portugal and other Spanish Autonomous Communities through agreements to be signed in the near future between them and Andalusia.
- c) Following IUCN recommendations, Portugal and the Spanish Autonomous Communities must identify, improve and prepare suitable habitat for future reintroduction / population reinforcements to create new population nuclei as soon as 2010. All detailed and updated information on habitat restoration and management must be gathered, and actions taken to prepare suitable habitat for reintroduction, population reinforcement and/or translocation of animals.

Organigram for the Exclusive Breeding Center





Requirements and planning for the Experimental Reintroduction Centre of the Serra da Malcata Nature Reserve– V 1.1



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1. Introduction

The present document intends to establish a blueprint for an experimental reintroduction centre to link the network of captive breeding centres and future reintroductions, linking ex-situ conservation and ex-situ conservation efforts. The centre will be scientifically oriented to safely test the release strategies and protocols proposed by the Reintroduction Working Group of the Iberian Lynx Captive Breeding Committee, and launch future Iberian lynx reintroductions in the Serra da Malcata Nature Reserve.

As mentioned in the Portuguese Action Plan for the Conservation of the Iberian Lynx, the status of the Portuguese Iberian lynx populations is presently profoundly negative. The last 2004 national census detected no lynxes or signs of its presence, confirming the pre-extinction status of these populations.

This situation led the Portuguese conservation authorities to commit to the Spanish ex-situ conservation efforts with the objective of participating in the captive breeding programme and other aspects of Iberian lynx conservation. The main objectives of the captive breeding programme are to raise and maintain a number of lynxes that will act as “insurance” against extinction and prepare offspring for future reintroductions / population reinforcements at suitable sites.

Reintroduction, therefore, is an indispensable conservation tool for the recovery of Iberian lynx populations and it will be the long term objective of the abovementioned Action Plan. It should be noticed, however, that reintroduction efforts are extremely complex, costly and slow, and that the current status of Iberian lynx populations in Portugal and Spain require immediate attention.

2. Current status of Iberian lynx populations

The Iberian lynx is on the verge of extinction, classified by the International Union for the Conservation of Nature (IUCN) as critically endangered. It has a highly restricted geographical distribution, its population confined to the Iberian Peninsula and distributed into two geographically separate nuclei in Andalusia.

These two populations, Doñana e Cardeña-Andújar, are estimated to contain about 150 to 200 lynxes in total (Guzmán *et al.*, 2002), although more recent data place these numbers between 100 and 120 animals. The numerous threat factors and high susceptibility to stochastic events (disease epidemics, natural disasters, etc) present grave danger to the species and seriously hamper the Iberian lynx conservation strategy.

The last national census did not detect any Iberian lynxes or signs of its presence, although great effort, years of research and considerable man/hours were directed towards it. Adding to this, wild rabbit populations studied throughout the historic range of the species could not, in the majority of sites studied, support viable lynx populations. Although we cannot confirm extinction at this point in time, the scenario is highly pessimistic (Sarmiento *et al.*, 2004).

3. Background

Considering that Iberian lynx populations have been under progressive and very significant decline for the past 20 years, the '*Dirección General de Conservación de la Naturaleza*' (DGCN, Ministry of the environment / MIMAM - Spain), the EU counsel, WWF and the IUCN have produced documents supporting the important role to be played by captive breeding, genetic management and subsequent reintroduction / population reinforcements for the conservation of the Iberian lynx.

With its participation in the creation of the '*Plan de Cria en Cautividad del Lince Ibérico*', (Captive Breeding Action Plan, approved in June 2001 by the '*Comisión Nacional de Protección de la Naturaleza*' MIMAM, Spain), the Portuguese conservation authorities acknowledged this role and

committed to support and finance several aspects of the Action Plan, contributing scientifically to the captive breeding programme and the genetic management by establishing an exclusive captive breeding centre and a genome resource bank.

This commitment was then reinforced by the Portuguese Government with its resolution 152/2001 of October 11, defining a national strategy for the conservation of nature and biodiversity (Estratégia Nacional de Conservação da Natureza e da Biodiversidade - ENCNB). Strategic option nº5 determines the development of specific action plans to manage species and habitats through the establishment of captive breeding centres, cooperation with national and international genome resource banks and animal collections.

More recently, the II International Seminar for the Iberian Lynx was held in Corboda (15th-17th December 2004) where, among others, the following conclusions were drawn:

- d) The captive breeding programme must be understood as an important tool for the future recovery of the species, contributing decisively to preserve current genetic diversity. The free living and captive Iberian lynx populations must be managed as a single unit to increase the likelihood of recovery for the species.
- e) New captive breeding centres are considered necessary with a certain degree of urgency. These should be in sufficient number and must follow the recommendations of the Captive Breeding Committee for the Iberian Lynx (CCCLI). Participation is offered to Portugal and other Spanish Autonomous Communities through agreements to be signed in the near future between them and Andalusia.
- f) Following IUCN recommendations, Portugal and the Spanish Autonomous Communities must identify, improve and prepare suitable habitat for future reintroduction / population reinforcements to create new population nuclei as soon as 2010. All detailed and updated information on habitat restoration and management must be gathered, and actions taken to prepare suitable habitat for reintroduction, population reinforcement and/or translocation of animals.

4. Objectives

Considering that new population nuclei should be created as soon as 2010, the main objective of this document is to define the profile of the infrastructures to be built in the Serra da Malcata Nature Reserve - linking the network of captive breeding centres with an area considered to be a priority reintroduction area in Portugal. The aim is to test and develop release protocols and techniques and prepare and monitor captive bred or wild caught lynxes safely for future reintroductions in the Serra da Malcata Nature Reserve and possibly elsewhere. To pursue the objective, it must:

- a) Possess suitable animal enclosures for receiving lynxes from the captive breeding network and animal rehabilitation centres. Three separate quarantine buildings, a minor enclosure of 1ha and a major enclosure of about 300ha are projected, creating the conditions to maintain a maximum of 6 animals and to test both soft and hard release techniques.
- b) Be equipped with adequate technical, logistical, financial and administrative means, as well as trained personnel, to pursue the long term objective following the recommendations of the IUCN reintroduction specialist group and the CCCLI reintroduction working group for Iberian lynx reintroductions.
- c) Be placed within the historic range of the species, in an priority area with full legal protection, logistical structure and adequate lynx habitat.

Aiming to:

- a) Test and develop adequate release strategies and protocols, studying aspects of the species' biology (adaptation to the wild, dispersal, causes of mortality), ethology, reproductive physiology and potential threats (including health threats) to evaluate the efficiency, costs and benefits of each strategy safely and at variable degrees of monitoring and supplementation.
- b) Evaluate the efficiency of the techniques developed by the CCCLI to prepare captive bred Iberian lynxes for future reintroductions, creating an information loop between the two.

5. Location

The Serra da Malcata Nature Reserve is the most studied and renowned Iberian lynx territory in Portugal, and the reserve was created as a Protected Area in 1981 to protect and conserve this species. The nature reserve was then benefited between 1994 and 1998 with habitat management practices contemplated in the LIFE project “Conservação do Lince-Ibérico em Portugal” (Iberian Lynx Conservation in Portugal), and, from 1999 to 2003, habitat restoration and wild rabbit reintroduction / population reinforcement activities were performed under a subsequent LIFE project. Iberian lynx conservation practices and actions are currently funded under the POA (Operational Environment Programme) “Gestão de espécies e habitats na Reserva Natural da Serra da Malcata” (Management of species and habitat in the Serra da Malcata).



Fig.1 The Serra da Malcata Nature Reserve

The SMNR is located on the border with the Spanish Autonomous Communities Castilla-Léon and Extremadura, directly involved in Iberian Lynx conservation efforts. It occupies 16.000ha of legally protected land and it has a comprehensive logistical and scientific structure. Its proximity to protected areas in Spain is important and can lead to an area of approximately 100.000ha available for new Iberian lynx population nucleus, ten times the minimum area considered as adequate for habitat viability analysis by the CCCLI reintroduction working group. The possibility of a trans-frontier park mustn't be overlooked and may play an important role for the future of Iberian lynx conservation efforts.

5.1 The Serra da Malcata Nature Reserve

The Serra da Malcata Nature Reserve (RNSM) was created in 1981 by governmental decree no. 294/81 of October 16th 1981. Its creation was justified with the much needed protection of its Iberian lynx population as well as of other important flora and fauna values present in the area. This Protected Area was later reclassified as a Nature Reserve by another governmental decree (no. 28/99, November 30th 1999).

The Nature Reserve has the following objectives:

- 1 – To protect the natural patrimony through correct territory management, dictated by the potential and characteristics of each area, in order to manage and preserve essential habitat for the conservation of its fauna and flora;
- 2 – To promote science and environmental education and to support traditional human practices and activities.

In acknowledgement of its important natural values, the SMNR gained international recognition through the attribution of several protection statuses under EU directives and international conventions, as follows:

- CORINE biotope (C12800014), August 1986;
- Classified as Biogenetic Reserve by the European Council, 1986;
- Classified as Special Protection Zone by Governmental Decree no. 384-B/99, September 1999;
- Classified as Nature 2000 Site PTCON0004 – Malcata, by Ministry Counsel Resolution no. 142/97, of August 1997.

This Protected Area has been established for over twenty years, and we now have a deep understanding of its natural patrimony. The Nature Reserve has a functional logistical, scientific and technical structure, and continuous investments in habitat and prey recovery for the Iberian lynx are being made. This area is therefore considered a priority area for future Iberian lynx reintroductions in Portugal.

5.2 Quinta do Major

The Experimental Reintroduction Centre will be located at a place known as 'Quinta do Major', a valley situated at approximately 600 meters above sea level and placed between the Bazágueda River and the Casinha stream, an integral protection area located in the heart of the SMNR. At the Quinta do Major we can find a complex of ruins and functional buildings that will be used for the Experimental Reintroduction Centre.



Fig.2 Quinta do Major

6. Infrastructures

The infrastructures are planned in harmony with the surrounding scenery and existing buildings, through the usage of materials like local wood and stone. The usage of renewable sources of energy and water and the maintenance of an adequate and rustic environment will also be encouraged. Focus will be put on the implementation of structures and on construction by modules, expandable and easily transportable.

The infrastructures destined to receive Iberian lynxes and other associated structures are designed following the directives of the CCCLI and are planned in accordance with the "Zoo Standards for Keeping Large Felids in Captivity" (Shoemaker, EAZA), the "Husbandry Standards for Keeping Small Cats in Captivity" (Mellen, AZA), the Husbandry Guide for Captive Iberian Lynxes (Guia de Manejo em Cautividad para el Lince-Ibérico, CCCLI, MIMAM), and with the "Proyecto de ejecución de jaulones e instalaciones para la conservación de la fauna silvestre en el monte de "La Aliseda", Santa Elena, Jaén" (CCCLI, MIMAM).

Also taken into account were the existing conditions at the El Acebuche pilot captive breeding centre in Doñana and subsequent alterations planned to benefit it (CCCLI, MIMAM). Visits to the CREA (Endangered Species Rehabilitation Centre) at Jerez Zoo (Jerez, Andalusia), to the El Acebuche pilot captive breeding centre and to the CREA of Los Hornos (Cáceres, Extremadura) were made, and visits to the CREA of Los Villares (Córdoba, Andalusia) and to the La Aliseda Exclusive Captive Breeding Centre (Jaén, Andalusia) are planned.

6.1 Existing structures

At the Quinta do Major there are a group of buildings, one of which has been recently rehabilitated as a housing complex with capacity to maintain four individuals indefinitely. There is also a storage room and a group of ruins that should be recovered in the future.

6.1.1 Housing Complex

It's equipped with kitchen, WC, two separate rooms and storage space. It will be used to house the centre's permanent team and may be expanded in the future. It occupies a total area of 101m² (Fig.2).

6.2 Structures to be built

As mentioned above, these structures are either designed to house Iberian lynxes or to provide the logistical and technical support to the centres' activities. Structures to be built can be divided into a building complex and animal enclosures.

6.2.1 Building Complex

a) Clinic – Laboratory – Coordination Centre

This building is destined to receive the equipments needed to proceed with the clinical and laboratory work and to provide a coordination centre equipped with a meeting room from where all the centres' activities will be monitored. The distribution of areas will obey to the necessities of each space, and if necessary divided into separate construction modules.

The clinic will be equipped with the materials and equipments needed for emergency, routine and/or triage procedures, a surgery room, radiology equipment and clinical pathology equipment. Post-surgery recovery, if needed, will be conducted at one of the quarantine areas.

The laboratory will be divided into two separate areas: one area destined to the storage and preparation of food for the animals; and another area for the processing and storage of samples obtained at clinical or field work. These two areas should remain separate. The samples will be forwarded to specialized laboratories recommended by the CCCLI for analysis and permanent storage.

The coordination centre is destined to receive the video surveillance system to be installed in all animal enclosures and buildings. It will be equipped with office space and a meeting room from where all the centre's activities will be prepared and monitored.

These three areas will have separate access and the building configuration will follow that rule. The total area occupied by the clinic – laboratory – coordination centre will be approximately 100m².

b) Quarantine buildings

The centre is to have three separate quarantine buildings, at a safe distance from each other and from other buildings and animal enclosures. Within each, four distinct areas are planned: an **access chamber** for disinfection and change of clothing, acting as a sanitary barrier between the animals and the exterior; from this chamber we access the **observation corridor** and the **feeding chamber**, from where we enter the indoor and outdoor chambers of the **quarantine enclosure** (Fig.3).

The **access chamber** must be equipped with appropriate safety mechanisms for controlled access to and from the exterior. It must have enough space to allow the transport box to enter and be placed in feeding chamber, from where the animals will enter the quarantine enclosure. It must be equipped with cabinets to store clothing and equipment and be fitted with easily cleanable surfaces for disinfection. Operators must have access to fresh water, electricity and artificial light.

From the access chamber we enter the **observation corridor**, parallel to the indoor chamber of the quarantine enclosure. It will be fitted with one-way observation windows or other means to minimize human exposure during observation of animals, and easily cleanable surfaces for disinfection. It can also be fitted with small access windows for remote infection if feasible.

The access chamber communicates with the **feeding chamber**, from where animals will be fed and watered using a drawer system similar to the ones found in El Acebuche. The door to the quarantine enclosure will be fitted with a smaller, central guillotine door for safe passage of the lynx

from the transport box to the enclosure. It will be fitted with observation windows similar to ones found at the observation corridor, electricity, artificial light and fresh water.

From the feeding chamber one enters the **quarantine enclosure**, composed of an indoor chamber and an outdoor chamber

The indoor chamber will have access from the feeding chamber and the observation corridor as described above. Lynxes will enter this chamber via the feeding chamber as described above or via the outdoor chamber. Separating the indoor and outdoor chamber there will be a sliding door, operated from the exterior and the observation corridor. It will be fitted with easily cleanable surfaces for disinfection, video surveillance, drawer system for food and water, heating, behavioural enrichment elements (elevated shelves and nest boxes). It will have natural and artificial light sources. It occupies an area of approximately 15m².

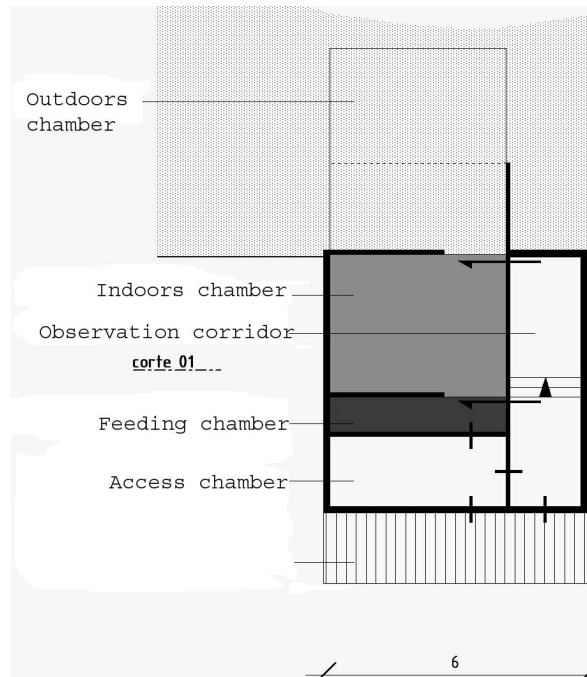


Fig.3 Quarantine building

The outdoor chamber will be a completely closed enclosure in wire mesh with a gauge of 2,5cm or less. The wire mesh gauge can be decreased in up to a meter above ground in one of the quarantine buildings to prevent accidents with cubs. It will be equipped with behavioural enrichment elements and it occupies an area of 25m².

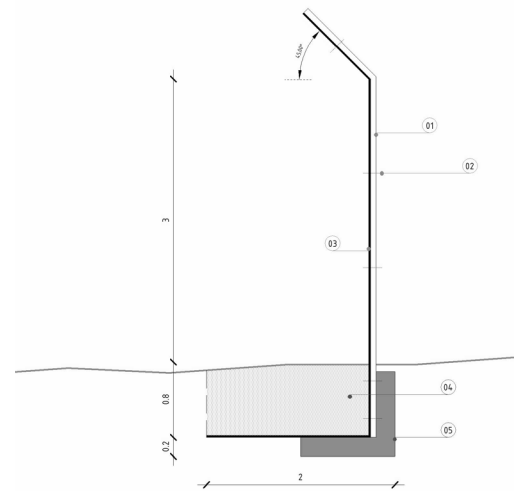
6.2.2 Animal enclosures

The complex of animal enclosures starts at a short but safe distance from the coordination centre and quarantine buildings. It is planned to hold a maximum of 3 adult lynxes at a given time: a couple in a 300ha enclosure, and one animal in a smaller enclosure..

a) The “big” enclosure

The 300ha enclosure surrounds a valley in the heart of Serra da Malcata, and will simulate a small Iberian lynx territory. It will have its' population of wild rabbits, natural sources of water, natural and artificial shelter and some degree of habitat management. Animal monitoring intensity is to be variable and simulate natural settings to the extent possible.

The enclosure is to be fenced by a 3-meter high wall in wire mesh, with an additional 1 meter at a 45° degree angle on the top to the inside of the enclosure. An electric wire fence system will be installed at the top of it as an additional safety measure. The fence must be buried at least one meter below ground, supported by an horizontal 2 meter gravel band towards the inside of the enclosure (fig.4).



The fence should be equipped with a video surveillance system. A 15-meter wide fire cut line will be created all around the enclosure. Vegetation 5 meters to the inside of the enclosure will also be periodically cut to prevent animals escaping using tree branches.

The enclosure can be accessed through a fenced corridor separating the two enclosures. This “common” corridor will be approximately 2 meters wide and will be equipped with mechanical doors, operated from the exterior. Access can also be made from two **access chambers** at both sides of the top of the valley.

The **access chambers** are planned to control access to and from the enclosure at contact points with the road network present at both sides of the valley. These completely fenced areas will allow agricultural machinery and all-terrain vehicles to access the enclosure in a two-step way, minimizing the risk of animals escaping.

b) The small enclosure and watch tower

The small enclosure is to be located at the bottom of the valley, occupying an area of approximately 1ha. This enclosure is planned to test soft release protocols. Animal monitoring, husbandry and habitat management are to be more intensive, similar to the management of captive lynxes if necessary. It will have natural and artificial shelter and sources of water, wild rabbit, natural behavioural enrichment elements, and access to supplementary feeding. Fencing, fire cut lines and video surveillance will be similar for both animal enclosures. A watch tower will be built next to the enclosure to monitor lynxes in both enclosures.

We can access the enclosure through the 'big' enclosure as described above and through an access chamber, similar to the ones found at the big enclosure, to be placed next to the watch tower. The access chamber doors will also be fitted with smaller doors for access to operators only.

The watch tower (fig. 5) will be placed near the access chamber overseeing the small enclosure and part of the big enclosure. The ground floor is destined to the supplementary feeding using a drawer system, avoiding visual contact between animals and operators in the process. During feeding animals will be monitored through the video surveillance system and possibly through one-way windows. The first floor is currently planned for storage, the second for water collection tanks, and the third for observation of animals in both enclosures.

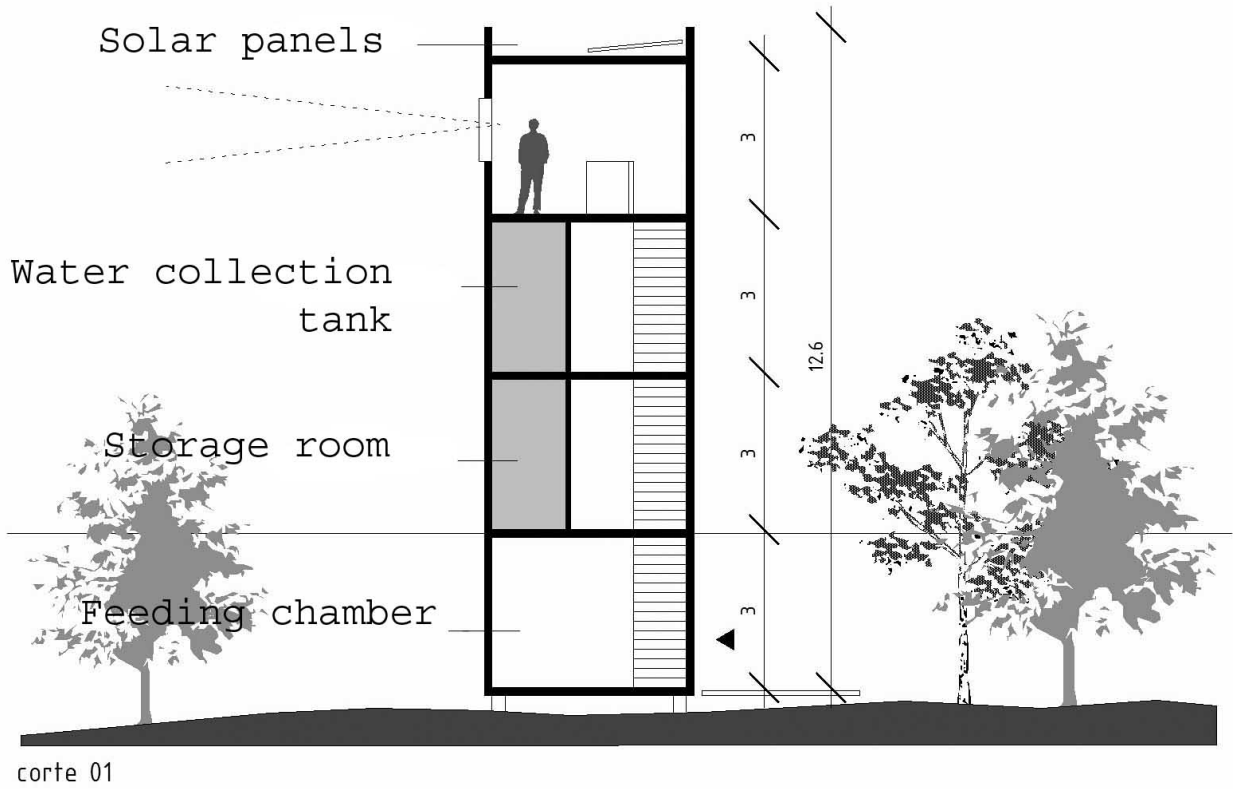


Fig.5 The watch tower

7. Calendar and Budgeting

The projected buildings and animal enclosures will be completed 12 to 18 months after the reception of the architects' project next May. Budgeting will begin after its completion and it's expected to reach the values estimated for exclusive captive breeding centres.

The acquisition of equipments must be decided later by the team chosen to conduct the centre's work. This list of equipments will be decided according to the centre's needs and the recommendations of the CCCLI.

The RNSM will provide the technical and scientific management of the centre, which will be unified under CCCLI management. The personnel to be hired – a part-time veterinarian, one keeper and one part-time keeper – must be trained in El Acebuche and in Jerez zoo for a minimum of 1 month. Operational costs are thought to be equivalent to those of associated breeding centres.

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