

Captive Breeding Plan for the Critically-endangered Iberian Lynx

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The Iberian lynx (*Lynx pardinus*) is considered one of the world's most endangered felid species and one of the European carnivores with highest chances of becoming extinct in the near future (Nowell & Jackson, 1996). Current area of occupancy is severely fragmented and the last national survey – conducted in 1988 – estimated a population size of 800-1000 individuals distributed among nine isolated populations, most of which contained less than 100 individuals (Rodríguez y Delibes 1992). Between 1960 and 1990 its area of distribution declined by 80%, and recent field inventories indicate that throughout the 1990's the decline has continued at an alarming rate (Delibes et al. 2000).

Although we lack systematic data to determine the actual number of remaining Iberian lynx, the Ministry of Environment estimates that the current lynx population does not surpass 300 animals (N. Guzmán, Iberian lynx Recovery Coordinator, pers. comm.). Ongoing threats to the species include habitat loss due to modern land use practices that destroy the Mediterranean forest and scrubland; a pronounced decline in European rabbits (*Oryctolagus cuniculus*, which constitute the lynx's main prey); and human-caused mortality, such as unintentional hunting and road-kills (Delibes et al. 2000). In addition, genetic, demographic, and environmental stochasticity further risk the long-term viability of remaining populations.

Given the dire perspectives, there has been growing national and international concern regarding the future of Iberia's most charismatic carnivore. In 1998, the Spanish Ministry of Environment (MIMAM) – in collaboration with IUCN's Conservation Breeding Specialist Group (CBSG) – organized a Population and Habitat Viability Analysis (PHVA) for the species (Heredia et al. 1999). This document, along with others such as the Council of Europe's Action Plan for the Conservation of the Iberian Lynx (Delibes et al. 2000), led to the development of the National Strategy for the Conservation of the Endangered Iberian Lynx (MIMAM 1999), a policy document that contains guidelines and priorities for lynx recovery. Priority measures include *in-situ* conservation actions, such as habitat protection and restoration, development of methods to enhance prey availability, enhancing connectivity between populations, and prevention of non-natural mortality, among others. All above-mentioned documents recommend captive breeding as a support tool to overall recovery efforts.

Planning for the Iberian Lynx *Ex-situ* Conservation Program

To address the National Strategy objective of developing an *ex-situ* conservation program for the Iberian lynx, the Ministry of Environment organized a three-day meeting to discuss relevant issues and to develop a Captive Breeding Action Plan for the species. The meeting was attended by Spanish and Portuguese professionals (biologists, veterinarians, managers, and administrators) with relevant experience or committed interest in participating in the effort.

The first two days were devoted to discuss and establish action items for biological issues (general program goals, and specific objectives for husbandry, reproduction, genetics, health issues, and reintroduction).

The last day was devoted to discuss program organization, management, and funding issues. After appropriate peer-review, the resulting Action Plan contained 21 objectives and 47 specific actions, which included proposed deadlines, and identified individuals interested in carrying out specific tasks (Vargas 1999). The Plan is considered a living document subject to an adaptive management approach. Thus, it will be revised on a yearly basis to ensure its full integration with on-going recovery efforts as well as adaptation of goals and objectives to newly acquired knowledge.

Participants at the planning meeting concurred that captive breeding should be used as a short-term tool to support on-going field conservation efforts, with the ultimate goal of learning how to breed Iberian lynxes in captivity as a safeguard for its conservation. Specific program goals contained in the Iberian lynx *Ex-situ* Conservation Action Plan include:

1. Developing adequate methods to ensure natural breeding of captive Iberian lynx.

2. Establishing a Genome Resource Bank (GRB) to help preserve as much of the genetic diversity presently found in the wild.
3. Developing assisted reproduction techniques to help manage the genetic diversity of the captive population without having to bring new specimens from the wild. If successful, these techniques could also be used to increase genetic variability among isolated wild populations.
4. Developing husbandry techniques to produce captive-born lynxes that could be viable for potential reintroduction into the wild.
5. Contribute to recovery efforts by developing training, education, and outreach methods that will help improve the conservation status of the Iberian lynx in Spain and Portugal.

Besides developing specific and measurable goals and objectives, other issues contained in the plan included addressing the number, origin, and placement of founders, determining who will be responsible for managing and implementing the program, how much funding will be necessary, and where is it going to come from.

Founder Population: Numbers, Origin, and Placement

Based upon recommendations at the 1998 PHVA – using the program Vortex as a decision-making tool – it was agreed that the founder population would consist of 12 lynxes, five males and seven females (Heredia et al. 1999). Two of the females are already in captivity (although by now they might be too old to breed), and the remaining 10 lynxes (five males and five females) should be captured in two phases. The first phase would involve

capture of three males and two females from the two largest populations, Sierra Morena and Doñana. The Action Plan also contemplated that, if after adequate viability analyses, certain small populations were considered doomed to extinction, they could provide founders for the program as well as candidates for translocation. Founder origin for the second phase would be decided upon genetic considerations and viability studies of potential wild population sources.

Regarding the placement of newly-established *ex-situ* programs, the Convention on Biological Diversity (Article 9) recommends to “adopt measures for the *ex-situ* conservation of components of biological diversity, preferably in the country of origin of such components”. In general, in-country *ex-situ* facilities allow for better integration of breeding efforts into overall recovery goals, including promoting education and training, research, and habitat preservation. Consequently, facilities to maintain the Iberian lynx breeding population will be based in Spain and Portugal. After long discussions, it was recommended that the first founders should be placed at a single center and afterwards subdivided into two or more facilities. Institutions present at the planning meeting that were interested in committing resources to breed Iberian lynx in captivity included El Acebuche Center at Doñana’s National Park, the Jerez Zoo, the Barcelona Zoo, the “Los Hornos” Rehabilitation Center in Extremadura, and the Instituto de Conservação da Natureza in Portugal. At the time of the meeting, only El Acebuche had adequate enclosures in place, as well as secured funding to cover associated costs. Therefore, it was assumed that the first founders would be placed at Doñana’s National Park.

Although the Action Plan does not yet specify when, where, and how the future captive population will be subdivided, it lists institutions and organizations that would be willing to participate in actual propagation and research efforts, and it specifies the level of technical and logistical commitment that these outfits can contribute to the program. Since the Plan is conceived as a living document, subdivision of the captive population will be addressed by the Captive Breeding Team (see below) and recommendations will be incorporated to the Plan prior to initiation of breeding efforts.

Program Organization, Management, and Financial Support

In Spain, the Ministry of Environment’s Nature Conservation Department (DGCN, MIMAM), is the lead agency in-charge of coordinating endangered species recovery efforts, but management and implementation of conservation plans are the responsibility of the various Autonomous Communities that form Spanish territory. Current lynx habitat comprises five different Autonomous Communities, all of which coordinate lynx conservation actions via the Iberian Lynx Recovery Working Group, established under the auspices of the Ministry of Environment’s Nature Conservation Department (DGCN, MIMAM). This Group ultimately depends upon the National Commission for the Protection of Nature, a body in-charge of procuring political support to conservation programs throughout Spanish territory. Given its coordinating and executive capabilities, as well as its commitment to lynx recovery, the Ministry of Environment accepted the responsibility of implementing the proposed *Ex-situ* Action Plan. The Plan recommended that propagation efforts would be organized through the creation of a Captive Breeding Team that could serve as an advisory outfit to the existing Iberian Lynx Recovery Working Group.

When discussing financial support to carry out the proposed program, workshop participants agreed that breeding efforts should in no way threaten or diminish availability of funds for *in-situ* actions. Moreover, whenever possible, the *ex-situ* program should financially assist specific *in-situ* efforts. After accounting for presently existing funding and infrastructure, it was clear that current financial support would only cover short- and mid-term actions. Although several organizations expressed interest in participating in the proposed breeding program – and expressed the level of technical and financial involvement they were willing to contribute – it was decided that no serious commitments could be established until the program was officially backed by the Spanish Administration and until adequate funding was procured for the program. Consequently, the Action Plan included steps to address administrative and financial concerns, all of which would have to be in place before beginning breeding efforts.

Current Status

In February 2000, the Iberian Lynx Recovery Working Group unanimously approved the Captive Breeding Action Plan and, a year later, the National Commission for the Conservation of Nature forwarded its official endorsement. Thus, presently there is official backing to start the program and political support from the Ministry of Environment’s Nature Conservation branch to execute the Action Plan. While waiting for endorsement, the Ministry promoted the realization of preliminary steps contained in the Plan. These included the establishment of an interim Captive Breeding Team, modeled after Survival Plans but tailored to species-specific needs and in-country realities. The interim Team included a coordinator and representatives for the subjects of Reproductive Physiology, Genetics, Veterinary Issues, Genome Resource Banking, Husbandry, Behavior, and Field Conservation, as well as representatives from in-country facilities interested in investing resources to breed lynx in captivity. The interim Captive Breeding Team has volunteered time and effort to the development of a “Manual of Protocols” that contains details about how to proceed with founders and offspring in regard to Health Issues, Reproduction, Genetics, and the establishment of a Genome Resource Bank. The Manual also contemplates budget provisions to help accomplish the proposed protocols.

Ongoing actions after official approval of the Action Plan include the establishment of partnerships between the Ministry of Environment and the relevant Regional Governments and Organizations that will participate in the program. Other priority actions that need to take place include the selection of the best areas from which to acquire founders (including an evaluation of the potential impact of extracting specimens from established wild populations) and the procurement of the necessary permits to carry out the captures.

Presently, the *ex-situ* Conservation Plan is up for its first revision, which will include – among other things – the election of a permanent coordinator, endorsement protocols, and the development of clear strategy to phase out propagation efforts once program goals have been accomplished.

Much remains to be done, red tape continues to claim its toll, and we cannot afford to move slowly. The Iberian lynx is disap-

pearing and we need to be assertive at the time of implementing effective recovery strategies, of which *ex-situ* conservation is but a small piece of the puzzle. It is important that that piece is well integrated with *in-situ* actions, as it is important that all actions are implemented promptly and effectively to prevent further decline of this charismatic Iberian cat.

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The Snow Leopard Conservancy

The Need for Community-based Actions for Protecting Snow Leopards

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Livestock depredation is becoming a significant problem across the snow leopard's range. Although annual losses typically amount to less than 1-2% of the overall livestock numbers, they can exceed 10-15% of the herd in areas constituting a depredation "hotspot." In the case of snow leopard, these are usually pastures with an abundance of cliffs and broken, rocky terrain that represents prime habitat for the species. Since depredation patterns generally vary widely from one year to the next or from one location to another, it is difficult to determine if such loss results from different individuals occasionally killing livestock, or whether it is more the work of the habitual depredator that has learned how easy domestic animals are to stalk and kill (Linnell et al. 1999).

Every winter there are numerous reports of a snow leopard entering poorly-constructed night enclosures and then killing most or all of the confined livestock. Herders commonly lose 20-50 of their sheep or goats in such an event, a significant economic loss in a region where the annual per

capita income is often US \$200 or less. While visiting a remote Tibetan valley near Mt. Everest, I was told by an angry villager of a snow leopard which had killed 107 of his livestock. In nature, such instances of multiple predation, or "surplus killing," are virtually unknown, for most prey species have well-developed predator detection and escape behaviors, and are seldom if ever cornered in any significant number.

While herders will tolerate the occasional loss, they usually retaliate by attempting to trap, poison or shoot predators blamed (rightly or wrongly) for recurrent or multiple losses. Ironically such "surplus killing" can be avoided entirely by ensuring all vulnerable night-time enclosures are predator-proofed. The other kind of depredation involves livestock that are taken after being left to roam at will or those snatched from a flock which is being poorly guarded. While such losses can never be entirely eliminated, they can be reduced to acceptable levels.

Other important factors thought to contribute to depredation include habitat loss and fragmentation, and the depletion of natural prey base (especially from poaching). As the number of wild prey declines, so snow leopards must increasingly turn to domestic stock for their survival. Like their counterparts elsewhere, herders in the Himalaya tend to blame predators without adequately accounting for other mortality

such as disease and accidents. Many have abandoned proven traditional shepherding practices. In addition to less vigilant guarding, livestock are often allowed to forage in areas offering good stalking cover for snow leopards. With more children in school and thus not serving as shepherds, families are increasingly letting their stock roam freely during the daytime; similarly, many fail to properly maintain or repair their corrals, which are easily accessed by a predator in search of a meal.

Since snow leopards are an endangered and thus a protected species, herders typically respond to any livestock depredation by demanding compensation from the government. For example, in Ladakh, the wildlife department devotes almost 60% of its annual budget to compensating herders for stock killed by snow leopard and wolf. Paying for such loss is hardly a sustainable solution, and furthermore it fails to address root causes of the problem. By contrast, predator-proofing corrals is a relatively easy and inexpensive proposition that prevents loss in the future. Other possibilities for reducing livestock depredation include use of trained guard dogs, communal shepherding, and preferential access to sheep or goat breeds with well-developed anti-predator traits (that is native rather than exotic breeds unfamiliar with predators).

Livestock predation has been a fact of