



LAYMAN'S REPORT

LIFE BONELLI





Name: "Integral recovery of the Bonelli's eagle population in Spain"

Abbreviation: LIFE+ Bonelli

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Contents

Summary	1
Almost a hundred individuals released	2
GREFA, breeding centre and also transit hub for all the eagles released	4
"Open hacking - Closed hacking - Cage hacking" ..., or the development of the method of release	5
Latest technology to track flight	7
Electrocution, the chief threat	9
A milestone in Mallorca: from local extinction to a self-sustaining population	10
A permanent European forum of specialists	12
The necessary social involvement	12
"Bonelli, a living symbol of conservation"	14
The good practices of entities and local populations	16
And after LIFE Bonelli?	16



Summary

As has occurred with the populations of other large raptors, the Bonelli's eagle (*Aquila fasciata*) has suffered a major regression throughout Europe, falling to 1,100-1,200 pairs.

In the last 50 years, the Spanish population has also dropped and the species even disappeared from the island of Mallorca. Of the approximately 750 pairs currently living on the Iberian Peninsula (80% of the European population), almost half belong to the Andalusian population, the only one which shows a stable trend.

In the first decade of this century, various regional governments developed projects to halt this significant regressive trend in the Bonelli's eagle populations, but it was not until 2013, with LIFE Bonelli, that a joint programme to comprehensively address the recovery of the Spanish population was launched.

Four years of dedicated work on the part of all the institutions and bodies associated with the project, both in each territory and in all the territories together, have managed to create and consolidate an increasingly specialised team network in constant collaboration with other similar European projects. And this is reflected in the results, because in only four years very significant progress has been made:

- In captive breeding methods, with a major effort to supply fledglings for reintroduction and a marked improvement in our knowledge of the different breeding techniques.
- In the release techniques, which have been developed to minimise the risks involved in this delicate phase.
- In the satellite tracking of all the individuals with transmitters, which has allowed us to discover and analyse the species' survival rates, the causes of mortality and its dispersion habits and parameters.

- In the reduction of the main threats to the species and particularly the foremost of these, electrocution.
- In the visibility and popularity of the species, which undoubtedly favour the implementation and results of conservation programmes and policies.

Over these four years, 92 Bonelli's eagles have been released within the scope of the project, a stable population has been reinstated in Mallorca and pairs have been formed on the Peninsula which now occupy some of the species' traditional territories and other new areas. Awareness about the species has also been raised and a degree of social involvement certain to play an important role in its conservation has been achieved.

Almost a hundred individuals released

Ninety-two Bonelli's eagles have been released during the Life project to boost struggling populations in Navarre, Madrid and Álava, and recover others which had already died out altogether, as in the case of Mallorca.

The availability of such a large number of individuals to release has been possible thanks to the work carried over these four years (2014-2017), which has followed three lines of action: captive breeding, the removal of wild eaglets from nests -some of which have been rescued because they were fatally affected by trichomonas- and the rehabilitation of sub-adult individuals in specialised centres. The following table shows the provenance of the nearly one hundred Bonelli's eagles released during the project:

Provenance of individuals	RELEASED IN				
	Álava	Madrid	Navarre	Mallorca	Total
Breeding centres: Ardeche (UFCS/LPO)	2	3	-	-	5
Vendée (UFCS/LPO)	3	9	16	3	31
GREFA	2	4	2	6	14
Removal	1	15	3	6	25
Rescue	-	4	2	3	9
Rehabilitation	-	1	-	7	8
TOTAL	8	36	23	25	92



A Bonelli's eagle at the GREFA facility.

GREFA
Junta de Andalucía



The work of the Andalusian Environmental Officers and particularly that of the Work at Height Unit has been essential to removing eaglets from nests.

Just over half the Bonelli's eagles released during the project (50 individuals) have come from three captive breeding centres associated with the LIFE project. Two of these centres are French, belonging to the *Union Française des Centres de Sauvegarde de la Faune Sauvage/Ligue pour la Protection des Oiseaux* (UFCS/LPO, French Union of Wildlife Preservation Centres/League for the Protection of Birds), and the third belongs to the Grupo de Rehabilitación de la Fauna Autóctona y su Hábitat (GREFA, Group for the Rehabilitation of Indigenous Wildlife and its Habitat), based in Majadahonda, Madrid. Between them, these three captive breeding centres have 12 breeding pairs of Bonelli's eagles and represent the main source of eaglets available for release.

The coordinated work of the three centres has made it possible to share and contrast the different experiences and methodologies, and ultimately establish the most stringent guidelines for captive breeding programmes for the species through consensus. In this regard, LIFE Bonelli has meant a fundamental step forwards in the management in captivity of young Bonelli's eagles for release into the wild and generated knowledge which can be applied to other similar programmes.

A further 34 eaglets reintroduced by Life Bonelli have either been removed or rescued from nests in the wild in Andalusia and Castile-La Mancha. The Andalusian Bonelli's eagle population accounts for 42-49% of the entire Spanish population and shows a stable trend, making it the most important source of the species on the Iberian peninsula.

The wildlife recovery centres in different autonomous communities (Catalonia, Valencian community, Castile-La Mancha and Andalusia) have also provided 8 Bonelli's eagles for release following treatment of their injuries or pathologies and rehabilitation at the GREFA wildlife hospital.



GREFA



GREFA



Bartomeu Bosch



GREFA

GREFA, breeding centre and also transit hub for all the eagles released

Throughout LIFE Bonelli, the GREFA facility has received all the eagles over the days or weeks prior to their release, both fledglings hatched at the three captive breeding centres and the individuals from wild nests, acting as a transit point to prepare the Bonelli's eagles for release.

GREFA has dealt with all the veterinary care needed as part of the different project actions; during the captive breeding period, treating the eaglets removed from nests in Andalusia, preparing groups for release, marking, taking samples, performing necropsies, etc.

It has also taken charge of all the recovery and rehabilitation work, where each type of treatment calls for specific techniques and facilities (food, muscle development, physiotherapy, etc.).

“Open hacking - Closed hacking - Cage hacking”...
or the development of the method of release

During the LIFE Bonelli project, the method used to release the eagles into the natural environment has changed on the basis of the results obtained and exchanging experiences with other European reinforcement and reintroduction projects.

At the beginning of the project, the method used was hacking, a method common to most raptor reintroduction programmes which reproduces rearing in the wild as naturally as possible in nests. At first, work was based on open hacking in adapted natural nests where the eaglets were left and then fed and monitored for the first few weeks. The initial results highlighted risks associated primarily with the vulnerability of the eaglets in their first few weeks: jumping the nest too early, predators, etc. Additionally, this method meant that only a limited number of birds could be managed and they had to be the same age.

So the method was adapted to avoid these risks and work focused on closed hacking in elevated artificial nests. With this method, the eaglets stay in large closed cages on top of release towers where they are fed and can exercise their wings before the cage is opened and they can fly for the first time (at the age of 60-65 days). Elevated feeding platforms, perches, baths, etc., all duly fitted with systems to protect them from predators, have been installed around the cages in the release areas.

The objective of hacking is for the birds released to imprint on (feel attached to) the release area and return to it as adults to establish their territory. For this reason, only fledglings aged 45-50 days are left in the



Bartomeu Bosch

Open hacking



GREFA

Photo of an elevated nest (closed hacking).



J.J. Iglesias GREFA

Photo of cage hacking facility, detail of the acclimatisation enclosure.



Carlota Viada COFFB

An intermediate form of hacking has been used in Navarre with a very large cage where the birds have been able practice flying prior to release.



GAN-NIK

ests. In Mallorca, an acclimatisation enclosure where the birds can fly and hunt live prey has been used to house sub-adults for a few days before final release. On occasions, it has proved necessary to recapture some of the eaglets released as part of LIFE Bonelli for treatment or rehabilitation before being released again. An acclimatisation enclosure has also been used in these cases. The benefits of combining closed hacking with an acclimatisation enclosure have also been recognised and a third method we have called "cage-hacking" has been developed. With this method, the advantages of a closed cage are complemented with those of a roomy enclosure in which the eaglets can stay for a longer period of time without predators and under closer surveillance during this extremely delicate stage.

In the LIFE Bonelli project, the different methods have been used in the different territories, meaning it has been possible to compare them and improve the results of the systems and methods of release significantly.

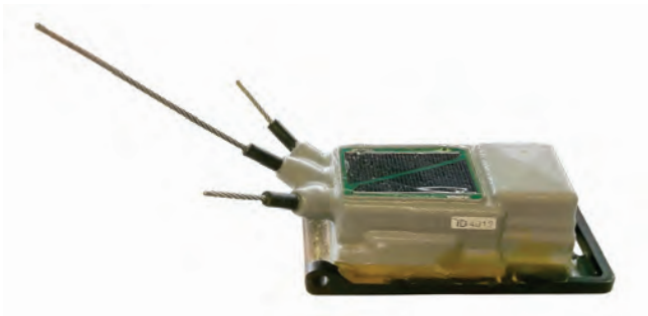
That said, an important part of the work associated with the release method is the choice of the site. This involves studying, among other things, the historical presence of the species, the suitability of the habitat, the protection of the space (Natura network...), accessibility for the technical team, the absence of sources of disturbance and the acceptance and support of the local population. All of these aspects have been taken very much into account during Life Bonelli for the releases carried out.

	Releases			
	Álava	Madrid	Navarre	Mallorca
Open hacking	8	-	3	-
Closed hacking	-	24	20	4
Acclimatisation enclosure	-	2	-	9
Cage hacking	-	10	-	12
TOTAL	8	36	23	25

Latest technology to track flight

During this LIFE project, 128 Bonelli's eagles have been tagged with GPA transmitters: all the individuals released (92), the wild offspring of the eagles released and other pairs settling in the project territories (33), and breeding adults captured in the centre of the peninsular and then released (3).

If these are added to the individuals tagged with similar transmitters as part of actions prior to the project, that makes for a total of 168 Bonelli's eagles





whose spatial movements are known. This information is vital when it comes to checking on the development and results of reintroduction processes and discovering and preventing threats to the species.

Tagging and tracking a large number of eagles means we can gain extensive knowledge of how they move around and monitor them scientifically to determine, among other things, the species' survival rates, the causes of mortality and its dispersion habits and parameters.

Thanks to these transmitters, we have learnt that the young Bonelli's eagles reintroduced have travelled practically all over the Iberian Peninsula during dispersion and two have even ventured as far as Africa. We also know that the eagles released in Mallorca use the entire island, with the exception of highly populated areas, and are able to study the movements of the all-important Andalusian population as it moves around the Iberian peninsula.

Tracking all the Bonelli's eagles tagged with transmitters has also made it possible to locate and analyse dead animals. This has allowed us to ascertain the causes of most deaths and, consequently, continue to work to minimise the threats to which the species is exposed.



Fernando de La Cruz



Fernando de La Cruz



Carlota Viada COFIB



Electrocutation, the chief threat

Tracking Bonelli's eagles released since 2010 and during this LIFE project with transmitters has shown that the chief constraint on the viability of the existing populations is electrocution. Indeed, it accounts for at least 42% of all deaths, and this figure rises to 50% when the deaths of individuals in the early stages of release that have still not adapted to living in the wild are factored out.

Significant efforts have been made in Navarre, Mallorca, Álava and Madrid to modify overhead power lines with European funding and the communities' own means; since 12 years before LIFE Bonelli even began in the case of Navarre, Alava and Mallorca. During LIFE Bonelli, risk maps have been drawn up and work has been performed on hazardous overhead power lines in Mallorca, Álava and Madrid to prevent electrocution (and also collision in the case of Álava).

In all, 477 pylons have been modified during Life Bonelli (263 in Mallorca, 206 in Madrid and 8 in Alava, where 2.6 km. of cables have also been fitted with diverters) and a great deal of knowledge has been gleaned regarding the habits of the species and its great vulnerability to electrocution. However, we still have a long way to go before electrocution no longer represents a constraint on maintaining Bonelli's eagle populations and those of other birds of prey.



Mallorca

The male *Deià*, son of *Bel* and *Vent* (the first pair to settle on the island) was the first Bonelli's eagle to hatch in the Sierra de Tramuntana (Mallorca) in the twenty-first century.

A milestone in Mallorca; from local extinction to a self-sustaining population

Present until the second half of the 20th century, the Bonelli's Eagle was extinct in Mallorca for more than 50 years. In 2009, the Government of the Balearic Islands approved the "Plan for the reintroduction of the Bonelli's eagle in Mallorca". Following this, the Consorcio para la Recuperación de la Fauna de las Islas Baleares (COFIB, Consortium for the Recovery of the Fauna of the Balearic Islands) and the Government of the Balearic Island's Ministry of the Environment, Agriculture and Fisheries joined LIFE Bonelli to implement many of the actions established in the plan.

The actual reintroduction actions got under way in 2011 and involved the release into the wild of a total of 40 individuals by mid-2017. The survival rate of the birds released, both fledglings and older individuals from recovery centres, has proved high and this has led to the establishment of a small breeding population on the island. 25% of the eagles released have occupied a territory with the intention of breeding and the first pair to settle managed to have a chick in 2014. Without doubt this was a milestone not only in the Reintroduction plan but also in LIFE Bonelli, marking the first breeding success among the eagles reintroduced as part of the Project.

Since the project began, the Bonelli's eagle has continued to breed in the wild on the island and there is now a "new population" of 27 individuals and seven territorial pairs. In the last few years, 11 Bonelli's eagles have hatched in the species' four territories in Mallorca.

The results are very encouraging and this has been confirmed by the "*Viability analysis of the Bonelli's eagle population reintroduced in Mallorca*" that COFIB commissioned the University of Barcelona's Conservation Biology Team to carry out. Its report suggests that "*according to the demographic projection models, the population is currently self-sustaining and will tend to increase progressively in the future.*"

Such a positive result is a source of pride for LIFE Bonelli and a great incentive to continue working for the recovery of the species.

And on the Peninsula as well...

In Navarre

Sielva and Arangoiti, two eagles released into the wild by LIFE Bonelli, have formed a pair and are expected to breed when they reach sexual maturity.



In the north of Burgos

Gobera, the offspring of the pair formed by *Filabres* (female released in Navarre as part of LIFE Bonelli) and *Thor*, a solitary male that commanded this territory between the Álava, Burgos, and La Rioja, hatched in 2015.



In the Community of Madrid

The Bonelli's eagle population has doubled thanks to the formation of two new pairs between the individuals released in LIFE Bonelli. Pairs formed by other eagles released have also claimed territory in Guadalajara and Toledo.





Experts from Italy, Israel, France and the Iberian Peninsula take part in the International Seminar held in Navarre at the end of the project.

A permanent European forum of specialists

Mallorca, Madrid, Nantes, Jaén, Vitoria and Pamplona have hosted the 8 Technical Committee meetings which have enabled the specialists from the different territories involved in this Life project to stay on ball.

An international seminar was also held in Mallorca at the start of the project and another in Navarre at the end, allowing the participants to learn of other projects to reintroduce endangered raptors on the Iberian peninsula and in Europe.

More than 40 scientific-technical dissemination actions on LIFE Bonelli have been carried out during the lifetime of the project: papers at conferences, publication of articles and scientific papers, and technical presentations in different settings. This has allowed the project to maintain continuous contact with technical specialists working on other projects (governments, universities and other entities) and consolidate a network to share and contrast the development and results of the different actions. Rewarding partnerships for LIFE Bonelli, which has benefitted from the experience and support of other projects and entities, which have, in turn, had access to all the knowledge generated during the project.

The necessary social involvement

LIFE Bonelli has not only focused on technical and scientific aspects. It has also borne in mind the extent to which social knowledge of a species, its popularity, favours conservation programmes and policies.

The recovery of other large birds of prey had relegated the Bonelli's eagle to the back seat until this LIFE project began to raise its profile in 2013 by combining the usual tools and methodologies used for conservation projects (reintroduction, population reinforcement, etc.) through an ambitious communication plan.

The website and social networks have provided the best showcase both for the actions carried out in each of the territories and the collective actions. Great lengths have been gone to at all times to keep the information up to date and disseminate the progress made in the project, offering engaging content for the different target groups (technical level, informative level, etc.). www.lifebonelli.org contains an abundance of news, summaries of the

The screenshot displays the website's layout. At the top is the header with the 'Life Bonelli' logo, the project title 'Integral Recovery of Bonelli's Eagle Population in Spain', and language options (ESP, EUS, CAT, FRA, ENG). Below the header is a navigation menu with links like 'Inicio', 'Life Bonelli', 'El Águila de Bonelli', 'Avances', 'Life=Natura2000', 'Área de prensa', 'Multimedia', and 'Contacto'. The main banner features a close-up image of a Bonelli's eagle with the text 'Life Bonelli' and 'Foto: Pedro Alvarado'. Below the banner are three boxes: '¡SUBSCRÍBETE A NUESTRO NEWSLETTER!', 'BIBLIOTECA VIRTUAL', and a news snippet titled 'El águila de Bonelli "Grazalema" ya vuela libre en Mallorca'. The main content area includes a news article 'La conservación del Águila de Bonelli (Aquila fasciata) en España se ha abordado hasta ahora trabajando en poblaciones concretas e independientes.' and a video player for 'Proyecto Life Bonelli.' with a play button and a quote: '¡HOLA! ME LLAMO BONELLI. MI NOMBRE VERDADERO ES: ÁGUILA FASCIATA. PERO EN ESPAÑA MUCHOS ME CONOCEN COMO ÁGUILA AZUL PERDICERA.' To the right, there are sections for 'SEMINARIO FINAL LIFE BONELLI' and 'FOLLETO DEL PROYECTO'. At the bottom, there are social media sharing icons for YouTube, Facebook, Google+, LinkedIn, and Twitter.



results obtained, photos and videos, etc., including a "Virtual Bonelli's eagle library" with lots of articles on or related to the species (for consultation and download).

It also highlights other outreach and awareness-raising actions, such as leaflets, panels, newsletters, environmental education and voluntary work programmes, work carried out with different social sectors, etc.

"Bonelli, a living symbol of conservation"

COFIB has created a Support Network in Mallorca to publicise the project and engage social and business sectors. The Network consists of a total of 32 public and private bodies from sectors key to the conservation of the species: municipalities, private property owners, government, rangers, the electricity industry, hunters, NGOs, the tourism industry, private individuals, etc.

The many activities carried out to publicise the project and the support network (44 events with more than 2,000 participants) have included the organisation of the Day of the Eagle, involving talks, workshops, activities and a small ceremony to recognise the involvement of the members of the Network, an event open to the general public and widely covered in the media.

GREFA also celebrates the Day of the Eagle in Madrid, holding it on the same date as its annual Open Day in support of World Environment Day, which



Day of the Eagle 2015: Conference by Miguel Delibes "Lynx, Eagles and creative conservation."



attracts a significant number of visitors.

The Support Network created by GREFA in Madrid has focused on collaboration with companies related to the environment and conservation, which have contributed to LIFE Bonelli by providing services and materials.

Since the start of the project, Madrid and Mallorca have relied on groups of volunteers who have performed some of the essential work involved in project actions, such as event organisation, eagle surveillance and tracking, etc.

GREFA in Madrid and COFIB and Fundación Natura Parc (FNP, Nature Park Foundation) in Mallorca have developed an environmental education programme called "Living Nature", which, through exhibitions, surveillance cameras and visits to various parts of the Centre, allows visitors to see how the species behaves and learn about the veterinary work carried out, the population reinforcement methods used, etc.



Day of the Eagle 2015: Award of diplomas to recognise the members of the support network.



Environmental Education Workshop "Living Nature".

The good practices of entities and local populations

Some traditional forms of land use, such as farming, contribute to biological diversity and changes in these directly impact habitats and the plant and animal species associated with them. Meanwhile, others, such as hunting, are firmly rooted in rural communities and can even represent an important source of income for many municipalities.

From the very start of the project, the needed has been seen to open up channels of collaboration and involvement with hunters, farmers and other political and social actors working in or with interests related to the conservation of the Bonelli's eagle in the areas where the conservation actions were to be carried out.

The involvement of local authorities and stakeholders in the habitat improvement and site selection actions has contributed not only to their sustainability but has also meant that the project's outreach and awareness-raising objectives have reached the local populations as a whole more comprehensively.



In addition to their involvement in the actions described, mayors, hunters, farmers and tourism managers have also collaborated with LIFE Bonelli by contributing to awareness-raising and dissemination (preparation of a guide, talks, press releases, etc.).

Publication with the details and results of the close cooperation between local populations, hunters and conservation workers.

And after LIFE Bonelli?

Most of the partners, now also in collaboration with the Italian Ministry of the Environment's *Institute for Environmental Protection and Research*, are going to continue to work to recover the Bonelli's eagle populations not only in those parts of the centre and north of the Iberian peninsula where the species has traditionally lived but also in Sardinia.

They are going to do this within the framework of a new project, *Aquila a-LIFE*, which is going to focus on reducing the mortality of the species by electrocution by working in conjunction with key sectors, such as electricity companies, local authorities and experts in the field.





Participants



Partners



www.lifebonelli.org

