

EURASIAN BLACK VULTURE (*Aegypius monachus*) REINTRODUCTION PROJECT IN THE PYRENEES

ANNUAL REPORT

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For:



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Cover photo: The four Eurasian black vulture chicks that fledged in the Pyrenees in 2014. Photo: Mario Álvarez.

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Ernesto Álvarez with ABELLA. Photo: Gerard Plana.

GLOSSARY

annual net balance: number of individuals present in the colony at the end of the previous year + colony entries (births, releases and immigration) - colony exits (deaths, dispersions, disappearances and migrations); recorded at the end of the current year

core area: part of the home range in which the daily activity of the colony is concentrated

CR: *centro de recuperación*; wildlife rehabilitation centre

founder: any individual Eurasian black vulture introduced to the Boumort-Alinyà colony from the outside, irrespective of its reproductive contribution to the colony to date

home range: territory that includes ordinary and extraordinary movements of the colony members

MVP: minimum viable population; number of individuals, according to the feasibility study, that guarantee the demographic evolution of the colony without further releases

PAE: *punto de alimentación específica*; feeding point specifically suitable for the Eurasian black vulture

PAS: *punto de alimentación suplementaria*; supplementary feeding point for vultures; non-specific for the Eurasian black vulture

reintroduction area: range framed by the two release points of the project (RNC of Boumort and Espai Natural d'Alinyà)

RNC: *reserva nacional de caza*; national hunting preserve

***“They tried to bury us.
They did not know that we were seeds”
(indigenous proverb)***

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LITERATURE

1. SUMMARY

2014 has signified an enormous jump ahead for the Pyrenean Eurasian black vulture colony.

The Pyrenean colony of the Eurasian black vulture (*Aegypius monachus*) is at the best stage of its complex development to date. Throughout 2014, a quantitative and qualitative shift of essential importance has been achieved. This progress is the result of methodical and conscious efforts to provide an affordable source of food to the members of the colony at the specific feeding point PAE, created and managed by GREFA and TRENCA at the RNC of Boumort, and to thus support the colony members in their competition with the growing local population of griffon vultures (*Gyps fulvus*).

In quantitative terms, the colony has increased in size by 15 individuals (annual net balance = +15) from the 30 specimens surveyed in 2013 to 45 in 2014 - equalling an annual increase of 50%!

A total of 16 individuals was released into the colony (PABLO, HEDRA, TRO, MARC, GERARD, LORENA, FERNANDO, JEROME, VICTOR, VALLE, PEDRERA, MICÒ, MANCHEGA, EMILIE, FORN and MUNTANER), three chicks have hatched and fledged (ABELLA, PAN and ROC), and one new exogenous individual (PIROS) has been recruited. This represents a net increase of 20 Eurasian black vultures.

This number is contrasted with the departure of one French immigrant to its place of origin (QUERCY), three recently released individuals dispersing outside the reintroduction area of Boumort-Alinyà (MANCHEGA, MICÓ and VALLE), and one missing specimen (SALER). There have been no cases of death in 2014! This represents a net loss of as little as five Eurasian black vultures.

In qualitative terms, progress is evident in cohesion and stability of the colony, indicative of its high functionality and social structure. Experience and flow of information, in this regard, play a key role for survival of colony members. Finally, in early 2015 a total of 11 mature breeding pairs was observed, of which nine are already incubating at the time of writing this report.

There is a great demographic potential for reaching a total of 50 fixed individuals - the minimum viable population originally set as priority target of the reintroduction program - in the course of 2015.



Photo 1. ABELLA perched on the head of a mock Eurasian black vulture at Laortó, next to griffon vultures. Photo: Mario Álvarez.

2. COLONY STRUCTURE

The Pyrenean Eurasian black vulture colony is composed of 45 individuals.

In 2014, the Pyrenean colony of the Eurasian black vulture registered an annual net growth of 15 specimens (50% increase). Censed at 30 members at the end of 2013, by 31 December 2014 the colony consisted of 45 members with 41 individuals of endogenous origin (released or born in the reintroduction area of Boumort-Alinyà) and four exogenous members (immigrants).



Photo 2. BIC, a female born in 2013 in the Pyrenees. Photo: Mario Álvarez.

Individuals are recognized as members of the colony when both of the following conditions are met:

1. the individual is present at the colony at the end of the year,
2. the individual has been detected periodically during the annual monitoring.

This approach, therefore, accounts for visitors with ephemeral presence and specimens that left the area before the end of the year for one reason or another (death, dispersion, disappearance or emigration), excluding them from analysis.

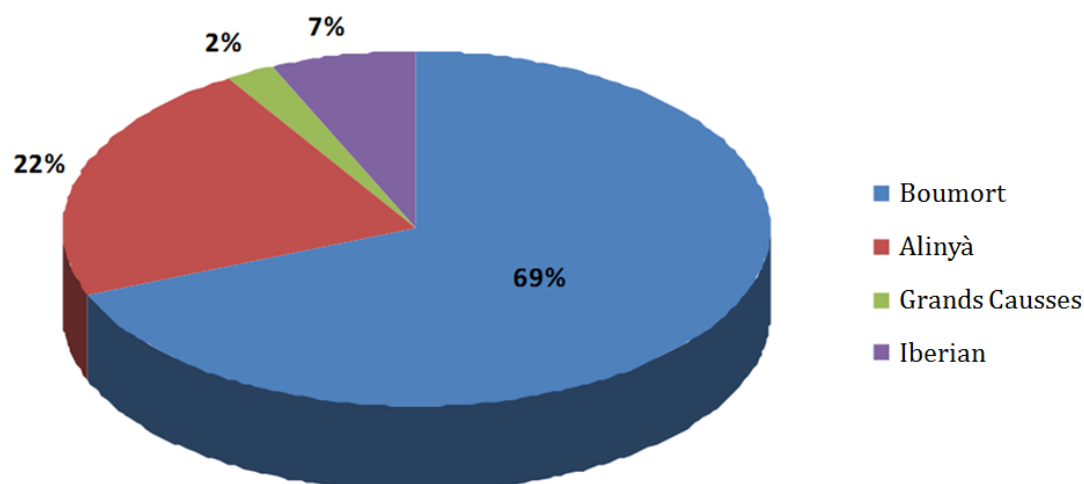


Figure 1. Geographic origin of colony members. Authors: Aleix Millet/Mario Álvarez.

Composition of the colony at the end of 2014 is detailed in figure 1 and table 1.

Table 1. Origin of members of the Pyrenean Eurasian black vulture colony. Numbers in parentheses represent year of birth. Origins are decoded as ■ = released at Boumort, ■ = released at Alinyà, ■ = born at the colony, ■ = exogenous from Iberia and ■ = exogenous from France. Values in black represent total numbers per site. Authors: Mario Álvarez/Aleix Millet/Emilie Delepoulle.

Boumort	Alinyà	native to colony	exog. Iberia	exog. France
Corneli (2003)	Perla (2005)	Gala (2010)	Ibex (2010)	Quasimodo (2012)
Pessonada (2002)	Portell (2006)	Coma (2012)	Neo (2011)	
Menta (2007)	Bruna (2007)	Mim (2013)	Piros (2012)	
Mario (2007)	Aleix (2009)	Pip (2013)		
Gallarda (2007)	Ares (2010)	Bic (2013)		
Gata (2007)	Trasgu (2010)	Roc (2014)		
Modesto (2002)	Muntaner (2010)	Abella (2014)		
Oriol (2009)	Forn (2013)	Pan (2014)		
Muga (2007)	Pedrerà (2013)			
Olga (2009)	Émilie (2012)			
Hornos (2011)				
Grèvol (2011)				
Foix (2011)				

Pouet (2011)				
Tró (1997)				
Lorena (2013)				
Marc (2013)				
Víctor (2013)				
Gerard (2013)				
Jerónimo (2013)				
Fernando (2013)				
Hedra (2012)				
Pablo (2014)				
24	10	8	3	1

Note: At the time of writing (February 2015), one further of the three individuals released in 2014 that showed dispersal at first (MICÒ) has stabilized in the reintroduction area. Following the criteria specified for analysis above, this specimen will not appear as a member of the colony until the end of 2015. Moreover, three additional exogenous individuals from France have recently joined the colony, two of them as breeders.

In terms of sex ratio, the previous imbalance with a female deficit has further increased in 2014 due to a strong bias for males among the newly released individuals (see chapter 6). The colony was composed of 26 males (57%) and 16 females (36%) at the end of 2014 (see figure 2). Of the remaining three (7%), genetic sex has yet to be determined for two chicks born in the wild in 2014 (ABELLA and PAN) whose original samples were lost upon transport by the courier company. An exogenous and unringed subadult (PIROS) that joined the colony this year represents the third specimen of unknown sex.

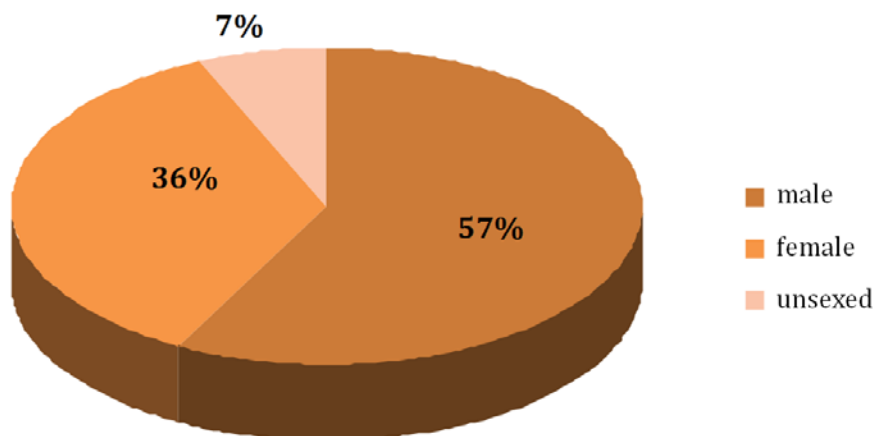


Figure 2. Sex-Ratio in the colony. Authors: Aleix Millet/Mario Álvarez.

Considering age classes, the colony consists of 15 juveniles of first and second calendar year (33%), ten subadults of third and fourth year (22%), and 20 adults of fifth year and beyond (45%, see figure 3).

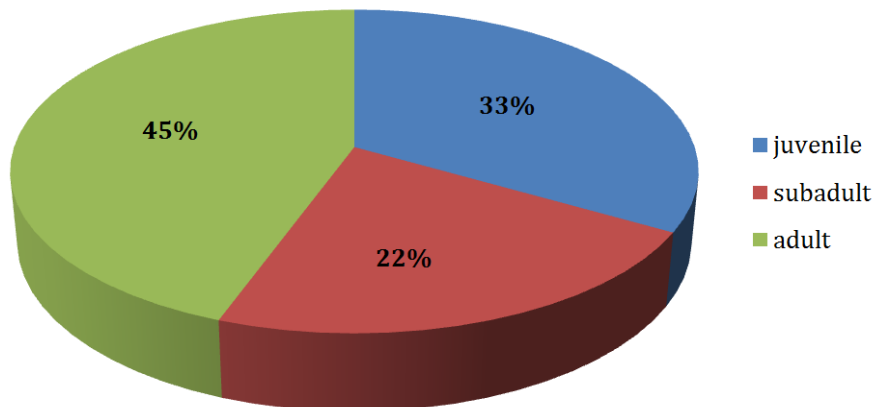


Figure 3. Age classes in the colony. Authors: Aleix Millet/Mario Álvarez.

Figure 4 illustrates demographic composition of the colony in 2014, fractionated by sex and age, and allows comparison with the superimposed ideal age pyramid for an expanding population. The structural imbalance in age distribution of previous years has been reduced in 2014. A strong fraction of young males is apparent.

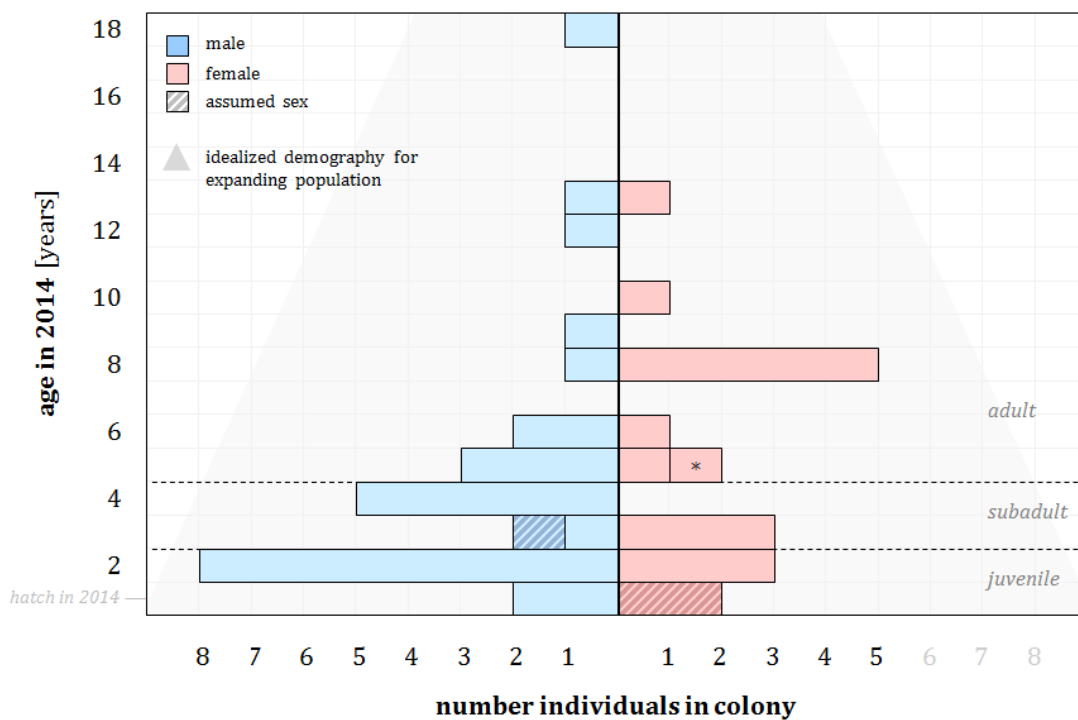


Figure 4. Colony demographic structure in 2014. Having formally reached the adult life stage in 2014, the asterisk indicates the first Eurasian black vulture chick born in the Pyrenean colony (GALA, 2010). Authors: Katja Wolfram/Mario Álvarez.

Note: In above figure, hypothetical sexes were assigned provisionally to the three unsexed individuals (ABELLA, PAN and PIROS) following morphological and ethological criteria.

3. ESTABLISHED BREEDING PAIRS

There are eight breeding pairs in the colony.

In addition to the seven pairs established in previous seasons (PERLA + PORTELL, MENTA + MARIO, BRUNA + CORNELI, PESSONADA + ORIOL, OLGA + ALEIX, IBEX + ARES and GALLARDA + MODESTO), an eighth pair was formed at the beginning of the 2014 breeding season (MUGA + NEO). Thus, the number of established breeding pairs in the colony at the end of 2014 amounts to eight.

Two of the eight pairs are composed of partners with mixed origin (IBEX + ARES and MUGA + NEO). Individuals IBEX and NEO are exogenous immigrants to the colony and of presumably Iberian origin (not carrying any mark or identification ring).



Photo 3. ALEIX (right) and OLGA. Photo: Mario Álvarez.

Promising behavioural patterns were observed and indicate the formation of several new breeding pairs in the 2015 season (HORNOS + GREVOL, COMA + QUASIMODO, BIC + POUET). However, with these individuals still being subadults, further observations are required to confirm the presence and development of their pair bond.

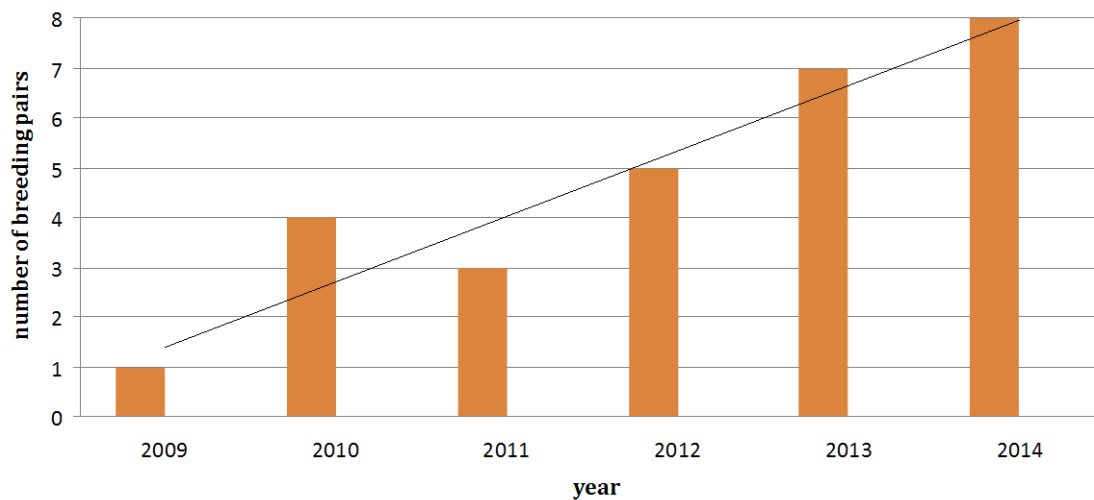


Figure 5. Number of Eurasian black vulture breeding pairs at the end of each year in the Pyrenean colony. Solid line represents the time trend. Authors: Aleix Millet/Mario Álvarez.

Note: During the first three months of 2015, three additional pairs were observed already established or in the process of forming. Two of them formed among individuals of the colony (HORNOS + GREVOL, GATA + FOIX), the third among two exogenous individuals (MONTENEGRO + PLINE), both born in the Grands Causses. The total of breeding pairs at the time of writing consequently amounts to 11, of which nine have started incubation already.

4. REPRODUCTION

The 2014 breeding cycle ends with three chicks born and fledged in the Boumort-Alinyà colony. One further young was born in captivity and released into the colony by hacking.

The 2014 breeding season is characterized by an increase in the number of breeding pairs (six, *versus* five in 2013) and a moderate reproductive success, with three fledged chicks and three couples with breeding failure during incubation.

An additional chick (PABLO), born in captivity at GREFA's premises, completed its development on a hacking platform at Boumort and successfully made its first flight from this artificial nest (see chapter 5).

STATUS

Of six breeding pairs that attempted reproduction in the 2014 breeding season, three succeeded with a hatch (PESSONADA + ORIOL, OLGA + ALEIX and BRUNA + CORNELI) after 55, 55 and 57 days of incubation, respectively.



Photo 4. CORNELI and young ROC on their nest. Photo: Mario Álvarez.

The remaining three couples (PERLA + PORTELL, MENTA + MARIO and MUGA + NEO) failed during incubation. MUGA and NEO produced a replacement clutch after loss of their initial clutch due to disturbance by griffon vultures and crows attacks - both a result of bad managing at a nearby non-specific artificial feeding point (PAS). The pair later also failed with its replacement clutch.

Blood samples were taken from all young of 2014 for genetic sex determination. As stated above, samples of two chicks (ABELLA and PAN) were lost upon transport to the laboratory by the courier company (MRW). Following physical and behavioural traits, both individuals are incorporated as hypothetical females in analyses at present.



Photo 5. Morphological development of ABELLA. Photo: Gerard Plana.

The third chick of 2014 (ROC), born and reared in a nest located in a very rugged and vented area, jumped (or fell) about two weeks prior his expected fledging date during one of his muscular exercises over the place. A hard landing after this fall may have caused an injury to the ligaments in his right knee. Although he returned to the nest and remained on it for an additional week, he since flies with his right leg slightly sagging from his body (see photo 6, see also chapter 11). In contrast, his locomotion and behaviour on the ground, as well as his takeoffs and landings, appear normal and not affected.

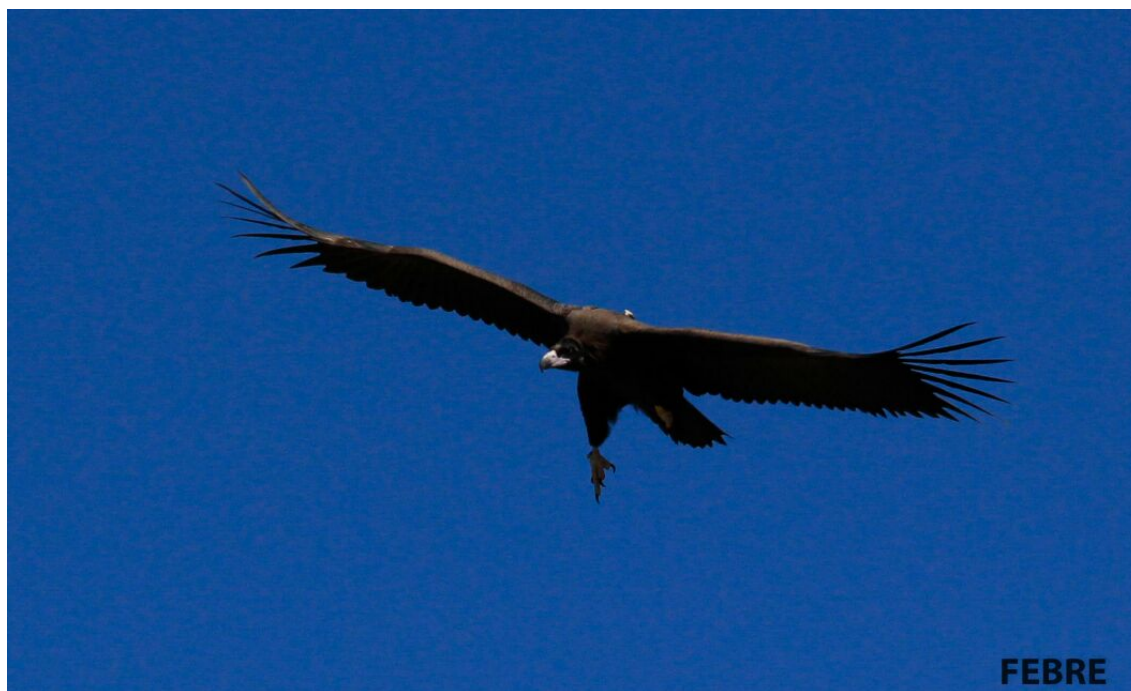


Photo 6. ROC in flight with his right leg protruding from the body. Photo: Jordi J. Febré.

Table 2. Principal data of the Eurasian black vulture chicks born and fledged at the Pyrenean colony in 2014. Authors: Mario Álvarez/Aleix Millet.

chick	ABELLA	PAN	ROC
parents	Pessonada & Oriol	Olga & Aleix	Bruna & Corneli
date of tagging [dd/mm/yy]	8/7/14	8/7/14	21/7/14
age at tagging [days]	83	80	87
weight at tagging [kg]	7.3	7.3	7.6
sex	(hypothetical) female	(hypothetical) female	male
GPS	yes	yes	yes
VHF	yes	yes	no
PVC	MR5 yellow (left tarsus)	9WN yellow (left tarsus)	MPO yellow (left tarsus)
date of birth (days of incubation)	17/4/14 (55 d)	20/4/14 (55 d)	8/5/14 (57 d)
date of fledge (days of age)	13/8/14 (119 d)	19/8/14 (122 d)	20/8/14 (108 d)

There were two pairs in the colony that showed signatures of pair bond, yet did not attempt to reproduce in 2014 (GALLARDA + MODESTO and IBEX + ARES). GALLARDA and her partner MODESTO occupied an artificial nest formerly used by another breeding pair (NEUS + ORIOL) and performed copulations, however, no egg was observed. IBEX and her partner ARES, on the other hand, are young individuals of subadult/adult age and only bonded recently. Their pair activity was limited to roaming suitable foraging areas at the northern edge of the colony together, still no copulations were observed for them.



Photo 7. GALLARDA (in air) and MODESTO on their artificial nest. Photo: Mario Álvarez.

CROSS-FOSTERING

In order to save the season for breeding pairs that incubated their (not fertilized or unviable) egg beyond the calculated hatch date without a hatch, two attempts of cross-fostering were carried out in 2014 (PERLA + PORTELL and MUGA + NEO). Captive-born griffon vulture chicks were used to replace the pairs' unhatched and overdue eggs. If accepted by the breeding pairs as their hatchling, actions already were taken to obtain Eurasian black vulture chicks to replace the griffon vulture chicks in a second step. Those Eurasian black vulture chicks would have completed the cross-fostering and been reared by their foster parents in the Boumort-Alinyà colony - as was successfully achieved with MIM in 2013.



Photo 8. Cross-fostering attempt at the nest of MUGA and NEO. Photo: Gerard Plana.

Unhatched clutches were removed from their nests and transported to the CR Vallcallent for necropsy at 70 days of incubation, *i.e.* when incubation was continued past the natural incubation time of the species (55 - 60 days) plus a safety margin. The captive-born griffon vulture chicks used for cross-fostering were about one month old, one provided by CR AMUS in Villafranca de los Barros and the other one by the CR Vallcallent in Lleida.

Both attempts failed. The males of the breeding pairs (PORTELL and NEO), both incubating at the time of placing the griffon chick, continued flying past and approaching the nest, but without landing to cover and feed the alien chick. Moreover, the females of the pairs did not show great enthusiasm for the griffon chick either when they returned to the area to take over parental care. Consequently, both griffon chicks were removed and immediately returned to their places of origin, being accepted back and raised by their biological parents.

The necropsy of the first egg (PERLA + PORTELL), by the official veterinary of Vallcallent (Olga Nicolás), showed the existence of an embryo without malformations and well positioned. The age, according to the estimation of Alex Llopis, also present at the opening, was about 40 days of embryonic development. In case of the second unhatched egg it was not possible to determine whether or not an embryo was present.



Photo 9. Content of MUGA and NEO's egg. Photo: Olga Nicolás.

HISTORICAL BALANCE

PERLA and PORTELL are the most productive couple of the Pyrenean colony, having bred without interruption since 2010 (five consecutive seasons). Three of their four chicks fledged (GALA, COMA and PIP) and all are fully integrated into the colony. Meanwhile, BRUNA and CORNELI have attempted four reproductive cycles with four chicks hatched, of which two survived and remained present locally (BIC and ROC). OLGGA and ALEIX have succeeded to raise their first chick in 2014 (PAN), as have PESSONADA and ORIOL (ABELLA) in their first season as a pair. The last of the surviving young (MIM) was born and initially reared by MENTA and MARIO in 2013, until former couple NEUS and ORIOL continued its upbringing in a pioneering cross-foster mission.

In short, of the 12 chicks born into the Boumort-Alinyà colony between 2010 and 2014, nine have fledged. More importantly, of these nine individuals, eight remained fixed in the colony until present.

Note: Although occurring outside the scope of this project, the successful breeding of COMÍ should be noted. He is a male released in Boumort in 2011, who dispersed and settled in the mountains of Avila that same year, then paired with a local female. The pair raised a chick in 2013. His detection as a breeder was made possible by a satellite GPS transmitter, funded by REE.

5. FOUNDERS

87% of the founders were obtained by GREFA's effort.

From historical perspective, the Pyrenean Eurasian black vulture reintroduction program is based on 62 founder individuals, all originating from recovery centres and captive breeding.



Photo 10. Eurasian black vultures in the Boumort aviary, awaiting their release. Photo: Mario Álvarez.

Figure 6 summarizes annual releases at the Boumort-Alinyà colony during the entire reintroduction program for both release sites.

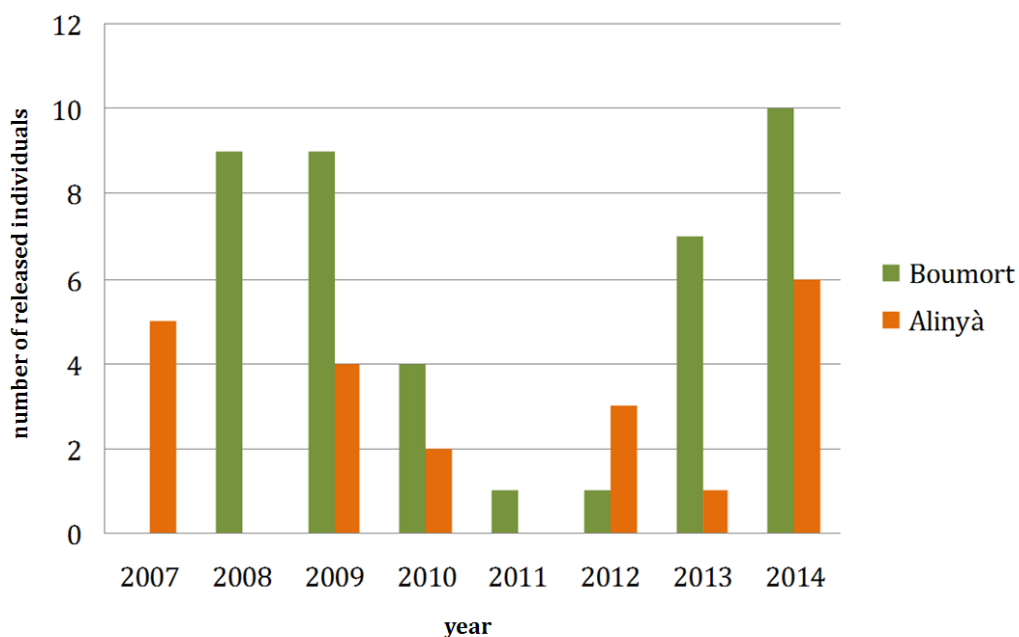


Figure 6. Releases into the colony per release site and over time. Authors: Aleix Millet/Mario Álvarez.

Of the released individuals, 58 (94%) originate from recovery centres and four (6%) were provided through captive breeding (see figure 7).

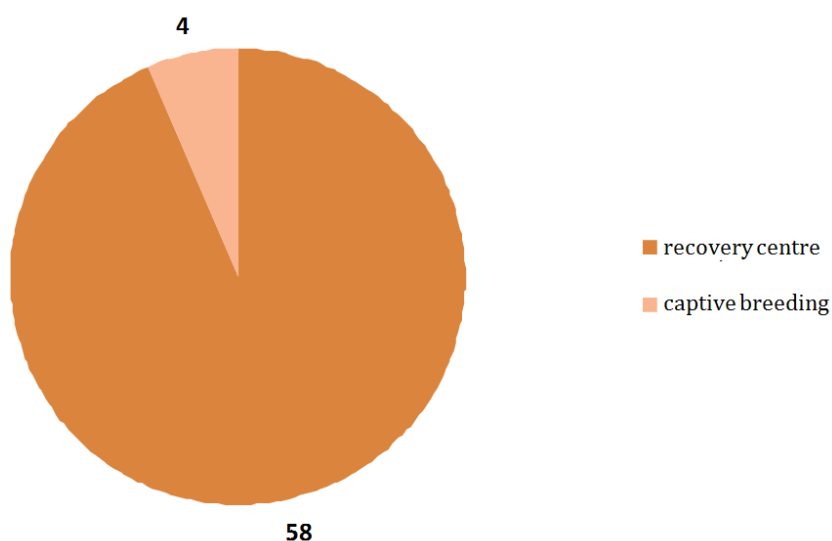


Figure 7. Classification of founders by entry type. Total individual numbers. Authors: Mario Álvarez/Aleix Millet.

GREFA directly or indirectly provided 54 of the founders to the reintroduction project. Of the remaining eight, six specimens were transferred into the Pyrenean project from the Junta de Extremadura by the BVCF (Black Vulture Conservation Foundation) at the start of the program, and two were contributed by Catalanian CRs (Torreferrusa and Vallcallent) as direct transfers.

By means of origin, 30 specimens (48%) were given by the Junta de Extremadura from its official recovery centre of Los Hornos. GREFA, in comparison, has directly provided 19 individuals to the program (31%), of which three were born in its own breeding facilities (OBAGA, PABLO and PAU) and the remaining 16 collected and recovered by GREFA's team at its own recovery centre. The 13 remaining Eurasian black vultures were provided by various public and private, Spanish and foreign entities.

Ultimately, 87% of the 62 Eurasian black vultures released in the Pyrenees entered the program through GREFA - a testimony to the continuous effort made in this regard by its president, Ernesto Álvarez. The remaining 13% are individuals that entered the project without GREFA's mediation.

A total of 16 founders was received for the reintroduction program in 2014: Six (38%) were rescued, recovered and transferred by GREFA (PABLO, PEDRERA, GERARD, MICÓ, TRO and MUNTANER), four (25%) by the Junta de Extremadura (MARC, EMILIE, VÍCTOR and FERNANDO), two (12%) came from Andalucía (LORENA and JERÓNIMO), one (6%) from the region of Murcia (VALLE), one (6%) from the Generalitat Valenciana (FORN), one (6%) from Castilla-la Mancha (MANCHEGA) and one (6%) from the Generalitat de Catalunya (HEDRA). Except for the latter, obtaining these individuals was achieved through the efforts of GREFA: by temporarily offering its facilities to accommodate individuals for recovery, performing clinical analysis, determining sexes and finally accomplishing their transport to Boumort-Alinyà.



Photo 11. Veterinary control of an individual. Photo: Gerard Plana.

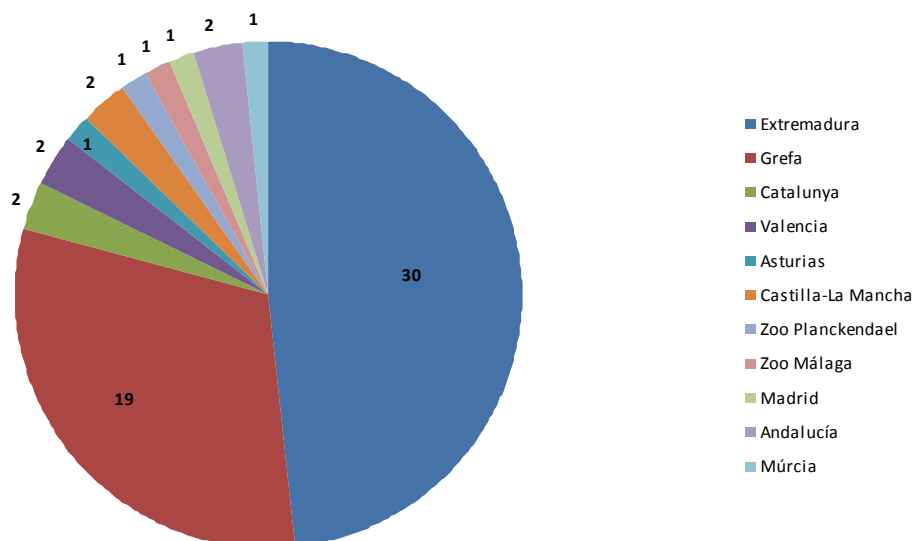


Figure 8. Origin of individuals released into the Boumort-Alinyà colony in the entire course of this project. Total individual numbers. Authors: Aleix Millet/Mario Álvarez.

6. RELEASES

In 2014, one specimen was reintroduced following the release-by-hacking method and 15 specimens were released from Boumort and Alinyà's aviaries.

The 2014 release season was defined by one individual born in captivity at GREFA's breeding unit (PABLO), who completed his rearing with a successful fledge from Boumort's hacking platform, and 15 individuals that entered in various Spanish recovery centres and were returned to the wild using acclimation enclosures at Boumort (nine individuals) and Alinyà (six individuals).

RELEASE OF PABLO BY HACKING

In 2014, PABLO was released into the Pyrenees, thanks to another success at the captive breeding unit ran by GREFA in its own facilities. PABLO is the third chick that was transferred from this centre for release purpose, after OBAGA (2009) and PAU (2012).



Photo 12. PABLO weighed during a veterinary control at GREFA, at the age of 40 days. Photo: Pablo Izquierdo.

At an age of 87 days, PABLO was placed into an artificial nest (hacking platform) in Boumort on 21 July 2014. He was equipped with a long-distance readable ring and a metal ring (see chapter 9 and table 3 for codes), as well as with a GSM-GPS transmitter unit attached to his back by a Teflon harness. His weight at release for hacking was 7.6 kg. PABLO abandoned his hacking platform on 15 August 2014 at an age of 112 days.

Being an untrained individual and lacking parental care that could assist him, PABLO was provided with additional and specific food items for about one month and a half (which he shared with ORIOL, see chapter 10) after his release for hacking. This extra human care allowed him to reach the end of his dependence period at slow pace, minimizing the risks for early dispersal movements.

PABLO remained fixed at the reintroduction area since his fledge and does not differ in behaviour from other members of the colony. He has not moved further than 30 km from the hacking site.



Photo 13. PABLO placed into position at the hacking platform of Boumort. Photo: Gerard Plana.

RELEASE OF 15 INDIVIDUALS FROM ACCLIMATION AVIARIES

The acclimation aviaries of Alinyà and Boumort were opened on 17 October 2014, giving free exit to the 15 specimens accommodated inside.

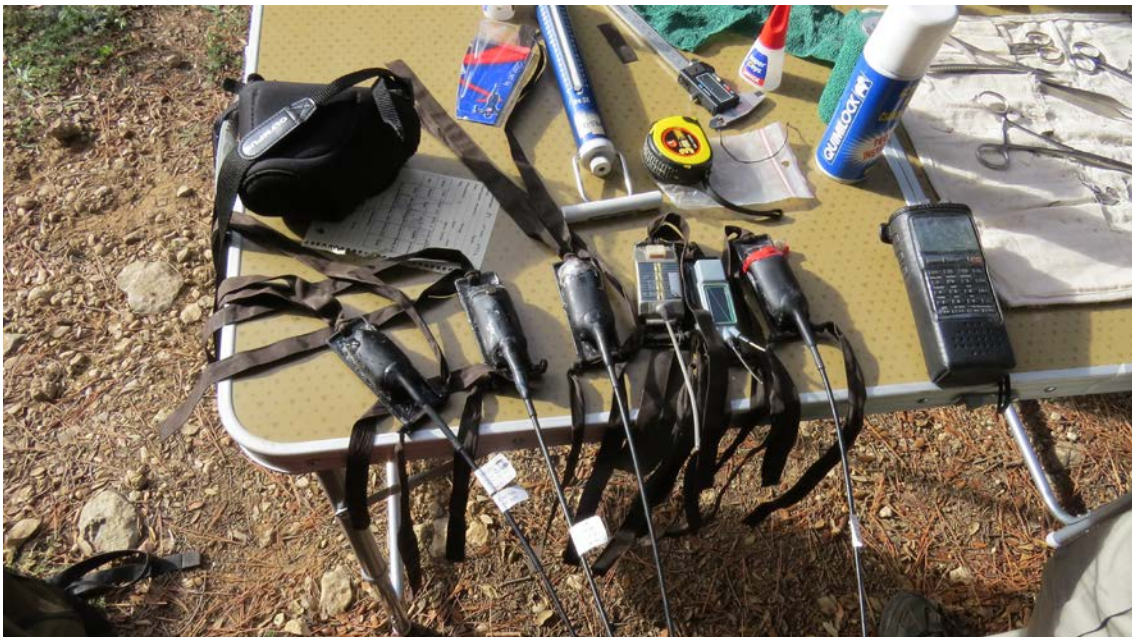


Photo 14. Equipment for the 2014 tagging. Photo: Gerard Plana.

In Alinyà, one (PEDRERA) of six release candidates left the aviary a week in advance, taking advantage of a casual incident. Of the other five, two decided to move rapidly towards NW (MANCHEGA and MICÓ) after release, settling in Navarra and Aragon, respectively. MICÓ returned to the reintroduction area in the meantime and is fixed at

the colony at the time of writing. The other three (EMILIE, MUNTANER and FORN) remained local upon release and perform their activity between Boumort and Alinyà.

Regarding the nine Eurasian black vultures released at Boumort, one flew away very quickly after release (VALLE), also moving towards NW up to the Basque Country. There, its GPS transmitter temporarily showed signs of failure, however, recovered after a period without signals and resumed sending GPS positions from Extremadura, in the very heart of Monfragüe National Park.

The remaining eight left the Boumort aviary gradually and with great calm, spanning a period that was almost four times longer than in previous years. 24 November 2014, finally, marked the departure of the last individual (JERÓNIMO) from the aviary. His leaving eventually may have been stimulated by another individual (HEDRA), who re-entered the open aviary twice in the meantime.

These eight specimens gradually grouped in the W sector of the outer fence of the RNC, with TRO, a one-eyed male with many years of captivity in GREFA's premises, apparently acting as their binding agent. This group was provided with food, specifically addressed at TRO, at a rate of three weekly feedings in small quantity (5 kg approx.) to strengthen their attachment to the reintroduction area.

Table 3. Index of individuals released from acclimation aviaries in Boumort and Alinyà in 2014. With ■ = release in Alinyà, ■ = release in Boumort, * = release by hacking, p/s/t/r = decolourized primary/secondary/tertiary/rectrice. Authors: Emilie Delepouille/Mario Álvarez.

individual	sex	year of birth	PVC ring (all yellow)	metal ring	transmitter [MHz]	plumage decolourisation
MICÓ	♂	2012	MPH (left)	111 1980	VHF: 147.294 + GSM	p8 & p9 left
MUNTANER	♂	2010	MPJ (right)	111 1981	GPS	s1 & s2 left
MANCHEGA	♀	2013	MPT (right)	111 1987	GSM	p8 & p9 right
EMILIE	♀	2013	MRH (right)	111 3344	VHF: 147.555 + GPS	t1 & t2 right
FORN	♂	2013	MR7 (left)	111 1971	VHF: 147.398	s1 & s2 right
PEDRERA	♀	2013	-	111 1982	-	-
VALLE	♀	2010	MPX (right)	111 1977	GPS	r5 right & r5 left
TRO	♂	1997	MRF (left)	111 1985	VHF: 867.300 + GSM	t1 & t2 left
LORENA	♀	2013	MPC (left)	111 1978	VHF: 147.052	-
MARC	♂	2013	MR3 (right)	111 3345	VHF: 147.599	-
VICTOR	♂	2013	MPN (right)	111 3337	VHF: 147.863	-
FERNANDO	♂	2013	MR8 (right)	111 3343	VHF: 147.620	-
GERARD	♂	2012	MRC (right)	111 1986	VHF: 147.745	-
JERÓNIMO	♂	2013	MPF (right)	111 1979	VHF: 147.903	-
HEDRA	♀	2013	H75 (left)	J1504	VHF: 147.680	-
PABLO *	♂	2014	MPU (left)	111 1988	GSM	-

Note: Details on identifiers and transmitters worn by other colony members are given in the previous annual report.

After three months, seven of the released specimens (JERÓNIMO, FERNANDO, VICTOR, LORENA, MARC, GERARD and HEDRA) use the colony feeding station frequently, as well as the peripheral feeding places. Meanwhile, TRO remains settled in the same area, evolving a little slower than the others, but shows increasing fluency and confidence in flying.

Note: On 24 February 2015, TRO was discovered dead on the shore of the Talarn reservoir by the field team of GREFA and TENCA. A necropsy performed in the CR Vallcallent found no evidence of shooting, electric hazard or trauma (also see chapter 11).



Photo 15. FORN (left) and TRO, two of the 16 specimens released in the Pyrenees in 2014. Photo: Mario Álvarez.

In summary, of the 62 Eurasian black vultures that were released in the Pyrenees in the course of this reintroduction program, 41 have been freed in Boumort (66%) and 21 in Alinyà (34%, see figure 9).

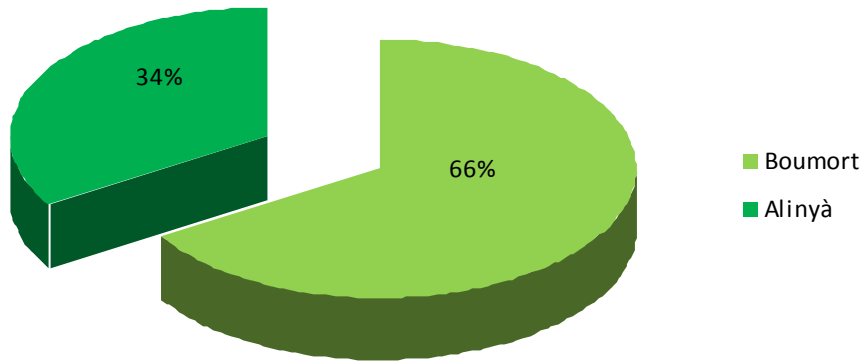


Figure 9. Contribution of both release sites to the reintroduction project until present. Authors: Aleix Millet/Mario Álvarez.

7. FEEDING

The specific feeding point (PAE) is the key to a positive demographic trend in the Pyrenean colony.

As already highlighted in previous reports, food plays an essential role in attaching the released and locally born individuals to the area, as well as in reducing dispersal losses and mortality rates - thus ultimately improving evolution and growth of the colony. In this sense, the presence of feeding stations in the foraging area facilitates colony development, as is also supported by numerous studies carried out on bearded vulture (*Gypaetus barbatus*) and other strict scavenging birds (Gil *et al.*, 2014):

“[...] bearded vultures of all age classes have taken advantage of these predictable sources of food. This has facilitated a population increase and the avoidance of potential sources of mortality resulting from vagrancy.”

The main limiting factor for the Eurasian black vulture in the Pyrenees is trophic competition with the griffon vulture - a species that clearly shows a demographic and territorial expansion, as well as numerical, physical and ethological superiority. Consequently, it is essential to reduce their interspecies competition in order to allow survival and optimal body condition for Eurasian black vultures throughout the year.

The preferred method to decrease interspecies competition is to scatter small quantities of little-sized food, as is proposed in many reference manuals about Eurasian black vulture management in Spain (see *e.g.* Moreno-Opo *et al.*, 2010):

“[...] the cinereous vulture benefits from carcasses being delivered with significant biomass, broken up into small and medium-sized pieces that

are scattered and not concentrated in one place. In order to increase the cinereous vulture's use of this resource, the delivery of a higher number of separate pieces of carrion would favour the birds' presence.”

The Pyrenean reintroduction area is no exemption to a practice that is well-documented and verified in literature at so many places and times.

Nevertheless, during the first three years of operation, food was the Achilles' heel for the Eurasian black vultures of the Pyrenean program. In response, the staff of GREFA and TRENCA responsible for daily monitoring decided to try an experimental feeding frame and analyse its impact.



Photo 16. Scattering food at the PAE. Photo: Mario Álvarez.

After a first phase of pilot tests conducted in 2012, a continuous and decisive feeding station management was established in 2013, designed to meet the specific needs of Eurasian black vultures in competition with griffon vultures: Agreements were made to establish locations at which selective trophic supplementations are carried out, referred to as PAE. Here, small pieces of scattered food items are offered at twilight (in the range of the first hour after sunrise) in small quantities (approx. 20 kg/day). This minimizes the attraction of griffon vultures, who at that time are still at their resting places.

The pilot phase has identified quail discards from slaughterhouses as an optimal PAE food item. Quail discards are ingested in a single bite by the target species, the Eurasian black vulture, while having low visibility and attraction to competing species, in particular griffon vultures, due to their colour and external appearance.

This method of selective and specific food supplementation has since greatly supported breeding pairs in the Boumort-Alinyà colony in rearing their chicks and saved many breeding seasons. It further encouraged a permanent presence of colony-born young in the project area after the end of their dependence period and reduced the risk of random dispersal movements. Moreover, this practice has helped to recruit exogenous individuals to the colony. Therefore, we want to express our sincere thanks to the Vallcallent staff (especially Joan Alas, César Piñol and Lluís Culleré) for their collaboration in collecting and providing such valuable material to the reintroduction program.

The fenced space in front of the acclimation aviary of Boumort has proved an ideal location for a PAE and acts, in short, as a life insurance for the resident and vagrant population of Eurasian black vultures. Simultaneously, it allows daily monitoring of the Pyrenean colony.

As a result of abovementioned supplementary feeding, the ratio of Eurasian black vulture to griffon vulture during feeding attempts at the PAE varies between 1:2 and 1:3, and even has achieved a ratio of 1:1 or 2:1 by the end of 2014.

By contrast, at the non-specifically managed PAS of Boumort, the ratio between both competing species is reversed to the great disadvantage of the Eurasian black vulture and ranges at common ratios of 1:20 to 1:30 individuals - ten times worse than at the specifically managed PAE. Crucially, a ratio of 1:10 already marks the upper threshold for Eurasian black vultures to successfully compete for food resources in the presence of griffon vultures, the latter exhibiting a much more aggressive approach to food items, as well as collective strategies that repel other species in food competition.

For the Eurasian black vulture reintroduction project it furthermore appears inconceivable to continue the deposition of large units of cattle (breeding pigs and even cows) at the PAS of Boumort for the reasons outlined above. Those actions only benefit the griffon vulture population in the area, but bring no advantage or even cause direct/indirect disadvantage to the colony members of the Boumort-Alinyà project.

During 2014, the principal author of this report has recorded 95 cases of large-size food disposal at the PAS Boumort (see figure 10), at a ratio of 1 cow to 3 breeding pigs and 1 breeding pig to 3 fattened pigs, respectively, and observing days with as much as three or even four breeding pigs disposed in parallel at one time.

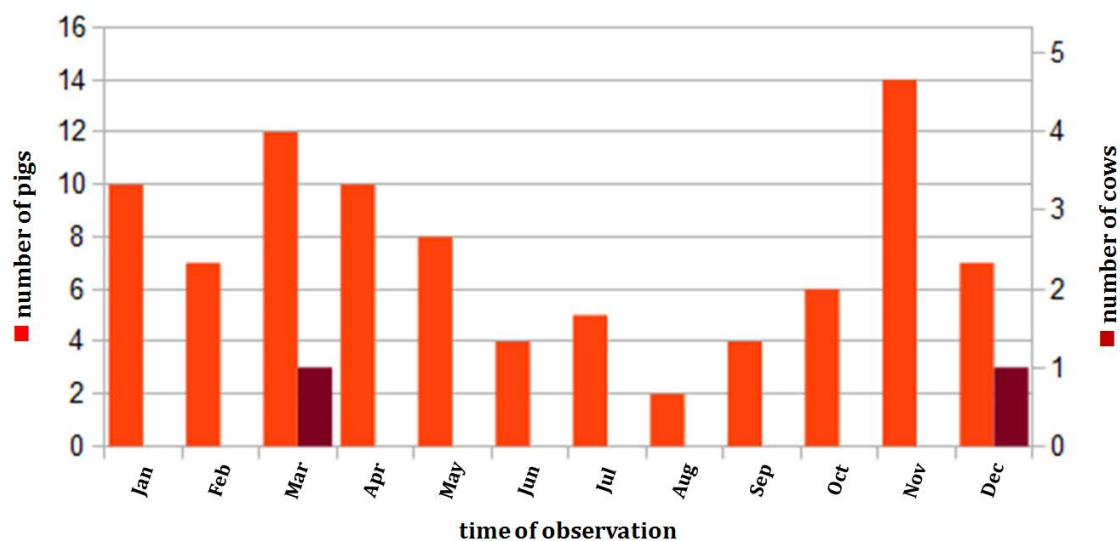


Figure 10. Disposal of large-sized food items observed at the PAS of Boumort in 2014. Author: Mario Álvarez.

In conclusion, food typology and feeding time shape the positive ratio for Eurasian black vultures at the specifically managed PAE. They increase the proportion of successfully feeding Eurasian black vultures by a tenfold compared to the non-specifically managed PAS of Boumort. Chances for obtaining food, in consequence, for a Eurasian black vulture individual are about ten times higher at the PAE than at the PAS of Boumort.

On average 1.5 tons of food are deposited per week at the PAS of Boumort, whereas approximately 150 kg/week are scattered at the PAE, rendering the efficiency of the PAE for freely ranging and feeding members of the Eurasian black vulture colony at 100 times above that at the PAS.

Appropriate food management has great potential to enhance the fixing of locally born individuals and of released specimens on the project site, as well as to stimulate the attraction and recruitment of further exogenous individuals with Iberian or French origin - each contributing its part to the overall success of the reintroduction project.

The complete management of the PAE, including transport, storage and distribution of food, is jointly and mutually carried out by GREFA and TRENCA staff in charge of daily monitoring tasks in the Pyrenean colony.



Photo 17. The PAE in front of the acclimation aviary of Boumort, showing high abundance of free-ranging individuals of the target species and only few individuals of the competing species. Photo: Photo-trap camera.

8. FIELD SURVEY

The daily visual control represents the basis of the field survey. GPS transmitters provide useful information that complement data obtained through observations.

Colony survey is performed at two interrelated levels:

1. compilation of Eurasian black vultures present in the area by direct observation and recognition of each individual sighted,
2. systematic monitoring during the reproductive cycle for all breeding pairs, spanning their prenuptial activities to the post-fledging period of their chicks.

Both tasks represent the framework of *in situ* monitoring, or fieldwork itself. To accomplish them and starting with the first releases at Boumort, GREFA employed a person with TOTAL AND EXCLUSIVE dedication (Mario Álvarez) and provided him with a vehicle owned by the NGO.



Photo 18. Tagging of GALA in 2010. Photo: Jordi Bas.

His basic work has been the daily control of the Pyrenean Eurasian black vulture colony during every month of the period 2008 to 2014, with the exception of a voluntary leave from November 2010 to January 2012 during which time the tasks were left in the hands of local entities. No *in situ* monitoring through a member of GREFA was performed during those 14 months, however, GREFA's staff continued analysis and documentation of satellite data (field survey *ex situ*).

In response to a steep decline in colony size during this 14-month period (see chapter 12) - a result of the loss (death, disappearance) of 40% of the colony members and 40% of previously established breeding pairs, as well as of the breeding failure of the four couples that started breeding in 2011 - decision was made in mutual agreement with all entities of the program to ask Mario Álvarez of GREFA to continue his original work, making way for a new phase of population growth.

Results obtained since then are indicative of the strategic and methodological decisions made by the joint monitoring team of GREFA and TRENCA, including the priority one: establishment of a PAE as specific feeding point for Eurasian black vultures of the Boumort-Alinyà colony (see chapter 6).

***IN SITU* MONITORING**

Monitoring of individuals, both endogenous and exogenous in origin, is carried out at every occasions where specimens congregate, to gather the most relevant information (activity, state of plumage, health aspect, etc.) as quickly and efficiently as possible. For obvious reasons, such congregations coincide largely with the supplementary feedings at the PAE and the PAS of Boumort, both located at the centre of the colony.

Numerous colony members and casual visitors appear there on a daily basis, allowing the identification of the vast majority of them by reading ring codes and/or facial

features from distance (approx. 500 m) by a telescope. Moulting patterns and VHF signals may occasionally be used to further corroborate identity.

Data collection by daily visual monitoring is conducted in accordance with the following guidelines:

1. only observations that result in a positive identification of an individual are recorded,
2. for each visually identified individual, one observation is recognized per day, even if there is more than one single contact throughout the day,
3. in case of exogenous individuals without rings or marks, the maximum number of individuals observed simultaneously at one location is taken into account to differentiate between specimens.

All observations are recorded and plotted in the Excel software for monthly sightings, which determine the presence of specimens, both endogenous and exogenous, and stability of the colony.

The cumulative daily monitoring results throughout 2014 are visualized in figure 11 for all individuals recognized through direct observation. A corresponding summary of direct observations on weekly basis can be found in Annex II.

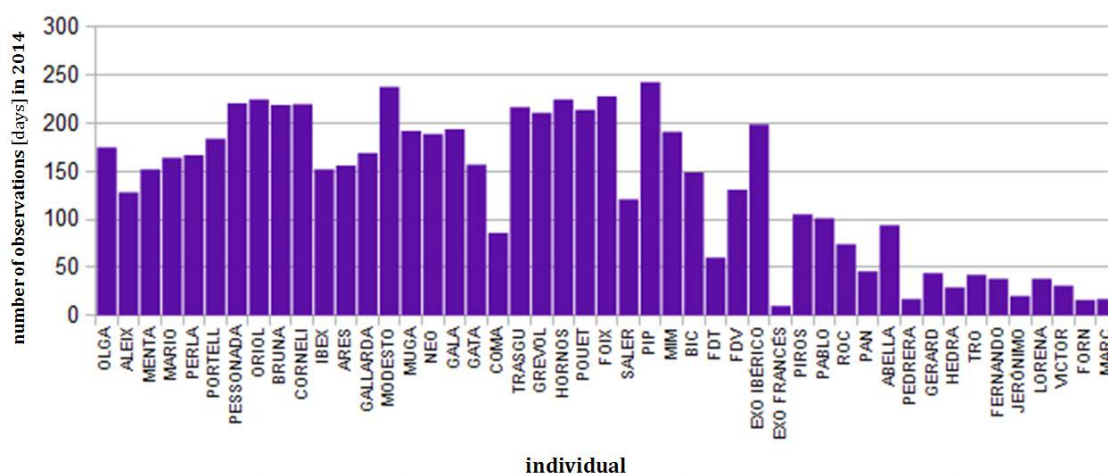


Figure 11. Daily observations per individual Eurasian black vulture in 2014. Authors: Mario Álvarez/Emilie Delepoulle.

Note: French Exo and Iberian Exo include records of the different exogenous specimens individually spotted daily and recognized either by ring (in the case of the French) or moulting patterns and/or facial features (in the case of Iberian).

The principal author of this report has collected 6299 daily individual observations in the course of one year of work, relating each and every one of these observations to Eurasian black vultures present in the reintroduction area during 2014 and identified visually from distance. The maximum number of individuals spotted and recognized within a single day was 40 - a record with short lifespan that recently was again surpassed with 44 specimens (recognized by Mario Álvarez through direct observation on 11 February 2015).

The individual who accumulated most contacts throughout the year 2014 has been PIP, observed on 243 days. The daily average number of Eurasian black vultures observed was 22 (during 288 days of effective monitoring).

Figure 12 cumulatively plots monitoring results of 2014 per month.

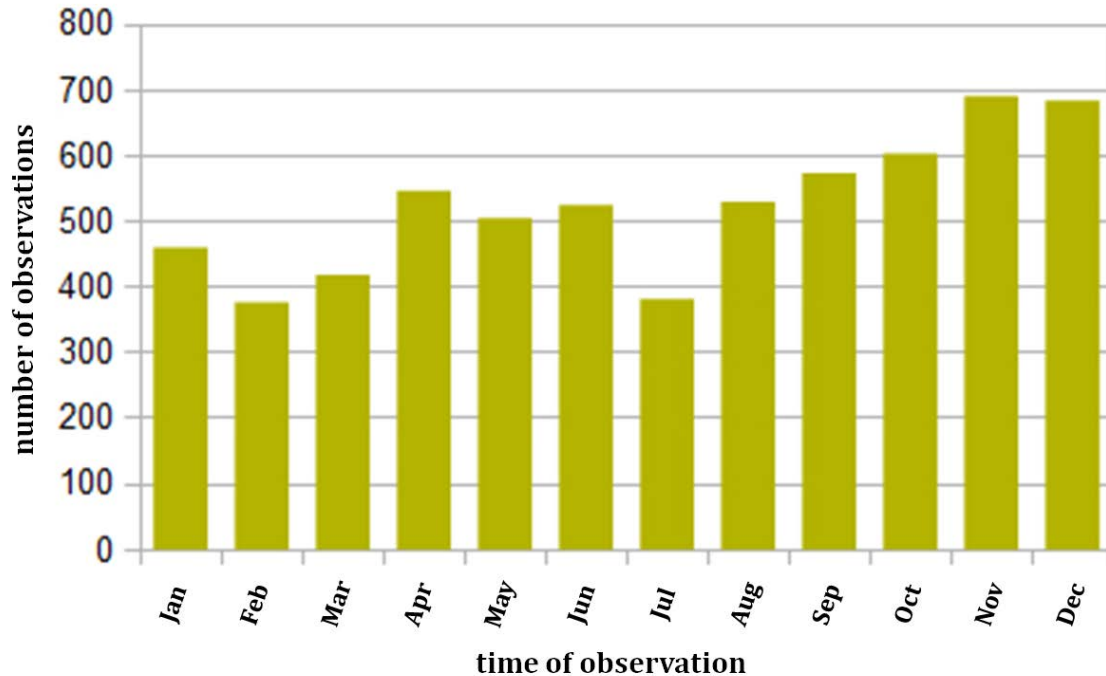


Figure 12. Cumulative monthly observations of Eurasian black vultures in the Boumort-Alinyà colony in 2014. Authors: Mario Álvarez/Emilie Delepouille.

The month with the highest score of identified specimens was November, with 691 records, equivalent to an average of 27 individuals per day. February and July marked the months with least observations, due to unfavourable weather and fewer observation days in the former and a focus on breeding pair monitoring in the latter case. Peaks in November and December observations result from incorporation of the newly released individuals into the colony in mid October (see chapter 6).

Constantly monitoring at such detailed scale makes it possible to assess the physical condition of each observed specimen. Along with other relevant biological indicators - such as pair formation, moult, arrival or departure of exogenous specimens in the colony, incubation success, rearing success and transition of chicks into independence - those data serve as indicators of possible issues and as effective conservation measures.

Note: The data shown in the graphs above were obtained exclusively from daily monitoring by the principal author of this report.

The amount of personal effort displayed throughout 2014 is illustrated in figure 13, including working days with field monitoring and those with office work (meetings, reporting, analysis).

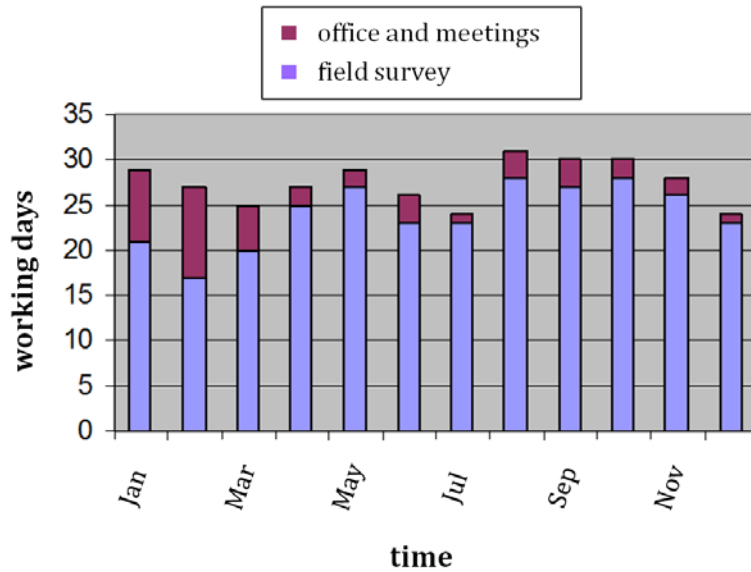


Figure 13. Monthly work effort. Author: Mario Álvarez.

The average time spent on fieldwork in this project was 24 days per month, in addition to 3.5 days of office work per month, with a daily dedication that on average exceeded nine working hours.

EX SITU MONITORING

Periodic GPS downloads are a valuable complement to *in situ* monitoring and allow to determine individual foraging areas, roosting places, mortality pitfalls and preferred feeding areas. In short, they permit a reconstruction of the life history of each individual and provide insight to how available resources in the area are used. Information provided by GPS map downloads are presented in Annex I.

The area inside the Pyrenean regions of Pallars Jussà, Pallars Sobirà and Alt Urgell represents a zone of intensive use ("core area") for the Eurasian black vulture breeding colony of Boumort-Alinyà. The home range, or extensive use area, of the colony extends over a circular area of about 30 km radius.



Photo 19. Detail of a GPS-GSM transmitter used in 2014. Photo: Gerard Plana.

By integrating data of direct *in situ* monitoring and indirect *ex situ* monitoring mentioned above, two basic conclusions may be drawn:

1. for individuals released and for chicks born/fledged in the Boumort-Alinyà colony, the presence of a food sources in the vicinity of the colony plays a key role in reducing dispersive tendencies and minimizing loss by non-natural mortality,
2. a proper management of the peripheral PAS, such as Buseu, Siall, Alinyà or Lleràs, helped individuals with strong wandering tendencies (GATA, COMA or GALLARDA) to settle in the reintroduction area, substantially cutting their usual foraging areas.

Both conclusions are reflected in figure 14 and in Annex I.

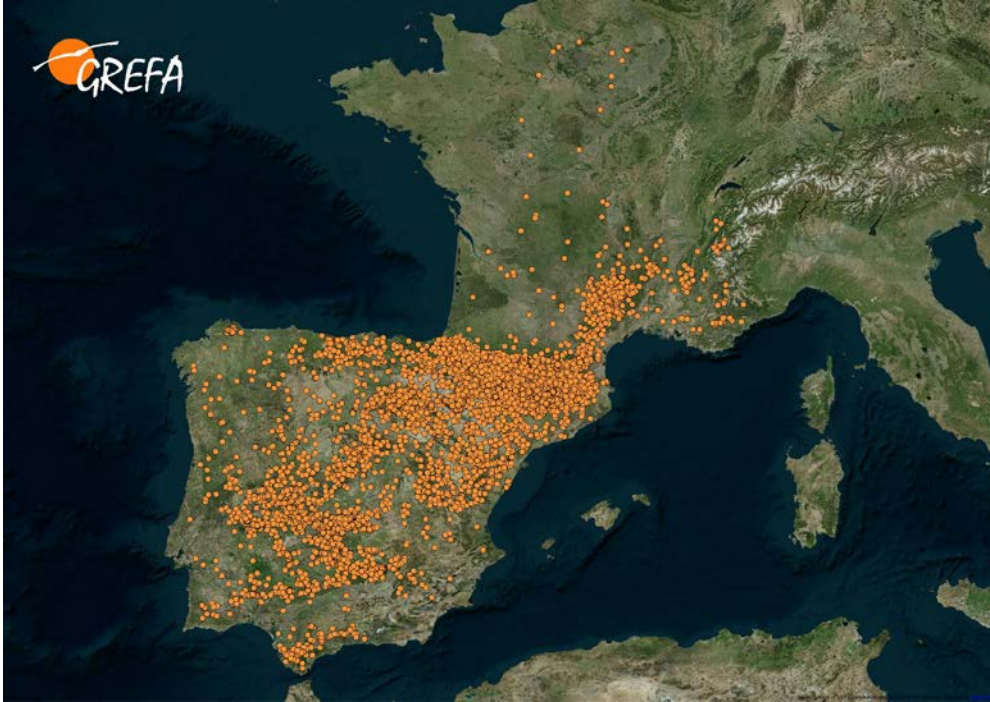


Figure 14. Total GPS movements of the Pyrenean colony between 2008 and 2014. Author: Manuel Galán.

GPS downloads for movements of the four chicks fledged in 2014 (including PABLO) add further support to above conclusions: the young have hardly moved further than 30 km from their natal area (or hacking point in the case of PABLO). This reinforces the argument expressed in chapter 6 about the indispensable role and crucial importance of the PAE to act as a regulator of early dispersions tendencies.

9. TAGGING

Víctor García, the MAGRAMA specialist for tagging, performs a high quality and professional task.

Tagging colony members with transmitters, either VHF or GPS/GSM/GPRS, has become an essential tool to collect basic data on spatial ecology and facilitates the adoption of conservation measures.



Photo 20. Fitting the transmitter of ROC. Photo: Gerard Plana.

This task has involved a major economic effort, channelled through the sponsorship of REE and ACCIONA. Both collaborations have been obtained by exclusive mediation of GREFA, which is in charge of managing and analyzing the telemetry data.

At present, 24 GPS units are in operation and financed through annual investment by the above sponsorships and GREFA's own budget. GREFA itself is not compensated by any other entity.

That is, GREFA is covering parts of the annual expenses for tagging procedures from its own funds, including costs for the person carrying out field monitoring (Mario Álvarez) and for the office staff collecting and analysing current satellite data (Juan Pablo Diaz and Manuel Galán). Neither task is receiving financial support from the Generalitat de Catalunya.

Results of this analysis are supplementing the daily tasks of field monitoring and conservation. Moreover, they generate a pool of valuable data for further studies and future publications that eventually contribute to a wider and deeper knowledge on the Eurasian black vulture colony in the Pyrenees, and the species in general.

Figure 15 summarizes the transmitter types used in this project over all 70 individuals that were equipped with such devices since the beginning of the project.

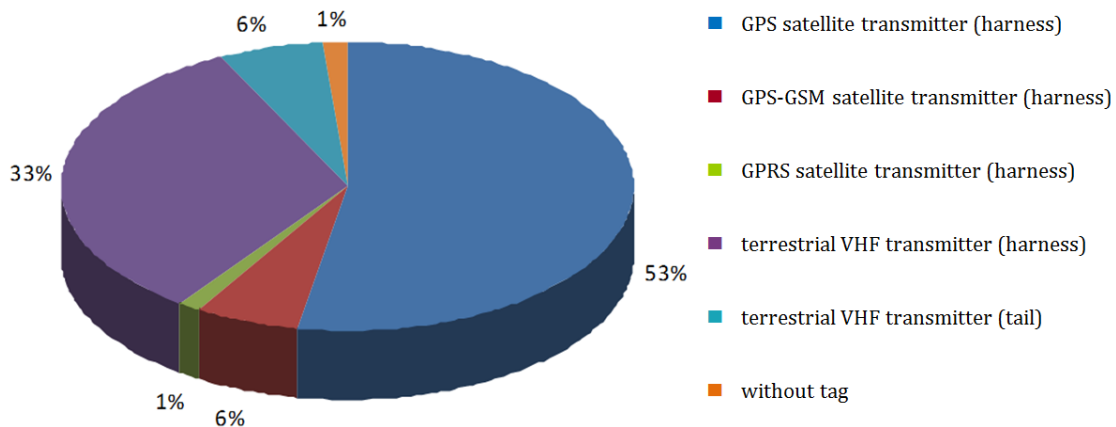


Figure 15. Transmitter typology over the entire course of this reintroduction project (n = 70). Authors: Aleix Millet/Mario Álvarez.

A total of 18 individuals was provided with GPS and/or VHF transmitters in 2014. The three chicks born in 2014 (ABELLA, PAN and ROC), as well as the captive-born chick of GREFA (PABLO), each carry a GPS device. Furthermore, among 14 of the 15 individuals released in October at Alinyà and Boumort, six are carrying a GPS transmitter and eight VHF devices (also see table 3).

TAGGING OF CHICKS

Tagging of the first two young that hatched in the colony in 2014 took place on 8 July 2014. Both were equipped with a satellite GPS + VHF transmitter, fitted to the back of the young by a Teflon harness. ABELLA was 83 days old, PAN 80 days, both then weighing 7.3 kg. The first was identified with alphanumeric ring reading MR5, the second with 9WN (see table 3).



Photo 21. PAN is brought back to the nest after tagging. Photo: Gerard Plana.

The remaining two young were tagged with a GSM-GPS transmitter on 21 July 2014 at the respective ages of 87 and 75 days. PABLO was identified with plastic alphanumeric ring reading MPU and metal ring 1111988, while ROC received plastic ring H77 and metal ring J-1506. They weighed 7.6 kg and 7.1 kg, respectively.

As always, the tagging process included a veterinary examination through GREFA personnel and was completed with a sampling for clinical analysis and genetic determination of sex.

Unfortunately, samples of ABELLA and PAN were lost in transit to the laboratory as mentioned above, making it impossible to determine their sex genetically and demanding a provisional sexing by morphological and ethological criteria. Both were assigned a hypothetical female sex. Genetic sex determination was thus only possible for ROC, a male. PABLO was previously sexed to be a male at GREFA's premises.



Photo 22. Veterinary examination of PAN by GREFA's staff. Photo: Gerard Plana.

TAGGING OF RELEASED INDIVIDUALS

Of the 15 Eurasian black vultures preparing for release in autumn 2014, one (PEDRERA) escaped days before the opening of the aviary in Alinyà. This individual, therefore, wears no transmitter and no plastic ring. Nevertheless, it has settled in the reintroduction area and remains integrated in the colony with periodical sightings.

Each of the remaining 14 release candidates, five in Alinyà and nine in Boumort, was captured in the aviary prior the release to perform a final veterinary examination and biometric control, after which it was fitted with a harness and transmitter.

In Alinyà, two specimens were equipped with a GPS-GSM satellite transmitter (MANCHEGA and MUNTANER), two with a combined GPS/VHF unit (EMILIE and MICÓ), and one with a conventional VHF device (FORN, see also table 3).

In Boumort, another seven individuals were equipped with conventional VHF transmitters (GERARD, MARC, FERNANDO, VICTOR, JERÓNIMO, LORENA and HEDRA), whereas the remaining two received a GPS unit (VALLE) and a GPRS unit (TRO). The latter two units perform with trouble: the first relays signals intermittently, the second failed emitting signals altogether within only one week of installation.

Taking into account the failures of several transmitters in recent time - ORIOL (May), ARES (September) and, more recently, HEDRA, MARC and LORENA (October) - the current status of the colony is as follows:

- 5 Eurasian black vultures are equipped with an active VHF transmitter,
- 20 Eurasian black vultures are equipped with GPS transmitters (and, where appropriate, an attached VHF unit),
- 20 Eurasian black vultures have lost their transmitters, their transmitters have ceased to function or they were never equipped with devices.

Note: Four additional active GPS units are worn by individuals that dispersed (VALLE, MANCHEGA and MICÓ) or settled in other colonies (COMÍ) and have to be added to

above numbers. The total number of GPS transmitters in function thus amounts to 24. Funding by REE and collaboration with MAGRAMA were obtained by the efforts of Ernesto Álvarez, president of GREFA.

10. SUMMER AND WINTER VISITORS

The past trends of arriving and departing visitors are maintained.

Arrivals to the Pyrenean Eurasian black vulture colony show an intriguing pattern, with Iberian specimens arriving in summer months, and French specimens in winter and spring.

The frequent presence of visitors emphasizes the crucial role played by the Boumort-Alinyà colony for linking and retaining a flow of individuals between populations of the Eurasian black vulture in SW Europe. Conversely, their presence points towards the ancestral role of the Pyrenees as wintering or summering grounds for vagrant populations of French and Iberian specimens.

In total, five individuals of French origin have visited the Boumort-Alinyà area in 2014, four of which are native to the Grands Causses (PLINE, MONTENEGRO, REVEUR and QUECHUA) and one to the Verdon canyon (CIEN).



Photo 23. REVEUR next to a mock Eurasian black vulture and griffon vultures at Laortó. Photo: Mario Álvarez.

A large number of individuals with Iberian origin, 15 (at minimum), visited the Boumort-Alinyà area in 2014, most of which were not wearing rings or individual identification marks. The three exceptions to this were identified as two specimens ringed as chicks at the colony of Valle del Lozoya with alphanumeric ring codes LU0 and LV3, and one individual recovered and released in Córdoba, wearing plastic ring JAL (pers. comm., Jordi Canut in Buseu).

The predominant age of visitors, both Iberian and French, was second and third calendar year, corresponding to the climax of wandering tendencies in this species. To a lesser extent, visitors were recognized as subadults in their fourth and even fifth year, as well as first year young in some cases.

Figure 16 summarizes the daily observations of visitors coming from colonies in France (French exogenous) and Spain (Iberian exogenous) in 2014, recognizing at most one registration per identified individual and day. Visitor observation data provide clear evidence for a distinct temporal pattern in visits from either origin, as well as a strong predominance of visitors from Spanish colonies. The latter may be attributed to the much larger size of Iberian populations that outnumber their French counterparts by nearly two orders of magnitude.

Geographic distance, on the other hand, does not suffice to explain the great differences in visitor counts in the Boumort-Alinyà colony, since the Pyrenean reintroduction area is located at about equal distance to the next nearest colonies on either side (400 km to Iberian Valle del Lozoya and to the French Grands Causses).

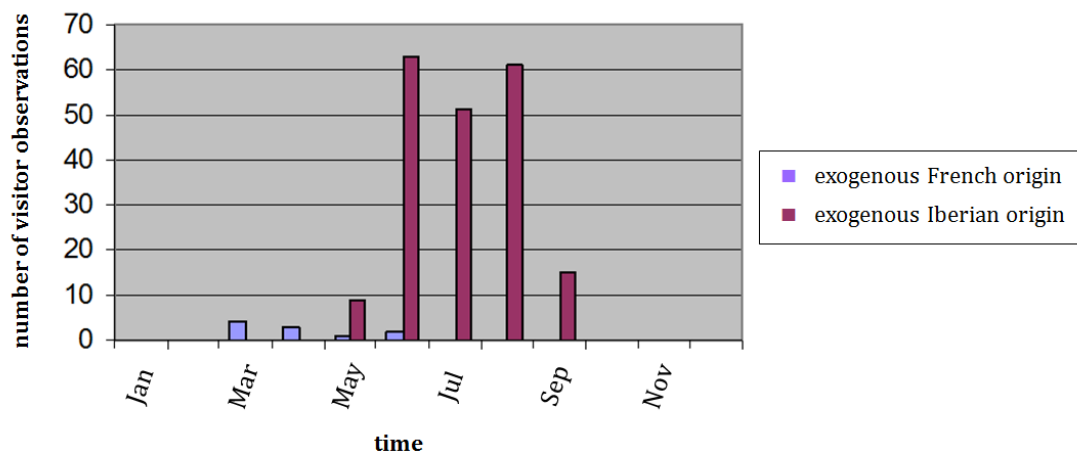


Figure 16. Seasonality of exogenous visitors in the Boumort-Alinyà area in 2014. Author: Mario Álvarez.

Visits to neighbouring colonies also occur in reverse direction: two of the chicks born in the Pyrenean colony in 2013, BIC and PIP, showed extensive dispersal towards NE in spring 2014. BIC visited all four major areas for Eurasian black vultures in France (Grands Causses, Vercors, Baronnies and Verdon) in May 2014, while PIP, almost at the same time, visited the geographically nearest of the four sites (Grands Causses) only. One further young individual, born in the Boumort-Alinyà colony in 2012 (COMA), was drawn to the Grands Causses in a long distance movement in 2014, where she was observed in the months of April and June enjoying the company of local

young Eurasian black vulture QUASIMODO (pers. comm. Philippe Lecuyer/Bertrand Berthemy). In late summer 2014, she returned with him to her Pyrenean home colony at Boumort-Alinyà, where they remain stable at present.



Photo 24. COMA (left) and QUASIMODO in Grands Causses. Photo: Bruno Berthemy.

It is noteworthy that in 2014 a new breeding pair has formed with one partner being endogenous to the Boumort-Alinyà colony and the other one being exogenous (MUGA + NEO). They represent the second mixed pair in the colony, besides IBEX + ARES (see chapter 3). The exogenous partner is presumably of Iberian origin in both pairs, taking their time of arrival to the Pyrenean colony into account and the clear seasonality of visits outlined in figure 16 above.

COMA and her French partner QUASIMODO represent the third mixed pair in the program.

Most remarkable is the discovery of MONTENEGRO and PLINE in Boumort in June 2014 by the principal author of this report (Mario Álvarez). Both are Eurasian black vultures of French descent (born in the Grands Causses in 2008 and 2011, respectively), and had, separately, been observed in the area before. In summer 2014, they started to show signs of early pair bond formation that have grown into a well-established bond by the end of the year. Both individuals were not sexed at their home colonies and sexed in Boumort based on behavioural traits: MONTENEGRO to be the female and PLINE to be the male. Whether they will return to their French home area at the end of the wintering period or settle in the Boumort-Alinyà colony will be answered in the 2015 breeding season. By February 2015, both individuals still remain present at the colony.

Note: Just at the time of closing this report (early March 2015), Mario Álvarez observed PLINE & MONTENEGRO are breeding in the heart of the RNC of Boumort.

From historical perspective (2008-2014), the field survey team of GREFA and TRENCA identified 25 different individuals of French origin in the Boumort-Alinyà reintroduction area, appearing with an almost stable rate of about three to four visitors per year.

By contrast, visitors of presumable Iberian origin are appearing at an increasing rate over time. However, exact figures for their visiting frequency are difficult to obtain over the years due to the absence of rings in their vast majority. Being prudent in estimation and following identification by facial morphology and moult patterns, a minimum quantity exceeding 100 Iberian visitors appears plausible. Of this total estimate, only seven wore alphanumeric rings: six were identified as natives to the Iberian colonies of Valle del Lozoya (five) and Valdemaqueda (one), while the remaining one was released in Córdoba.

11. MORTALITY

The annual mortality rate in the colony has been reduced to zero in 2014!

In species with low reproductive rates such as the Eurasian black vulture, an increase in mortality may easily cause the collapse of populations of small size like in the Pyrenees. Fortunately, over the past 12 months not a single case of death was recorded, neither natural nor anthropogenic.

Figure 17 depicts annual mortality as percentage of fatalities over all colony members, measured at the end of each year since start of the reintroduction project. Remarkably, in the seventh year since the start, mortality has again reached a value of zero in 2014!

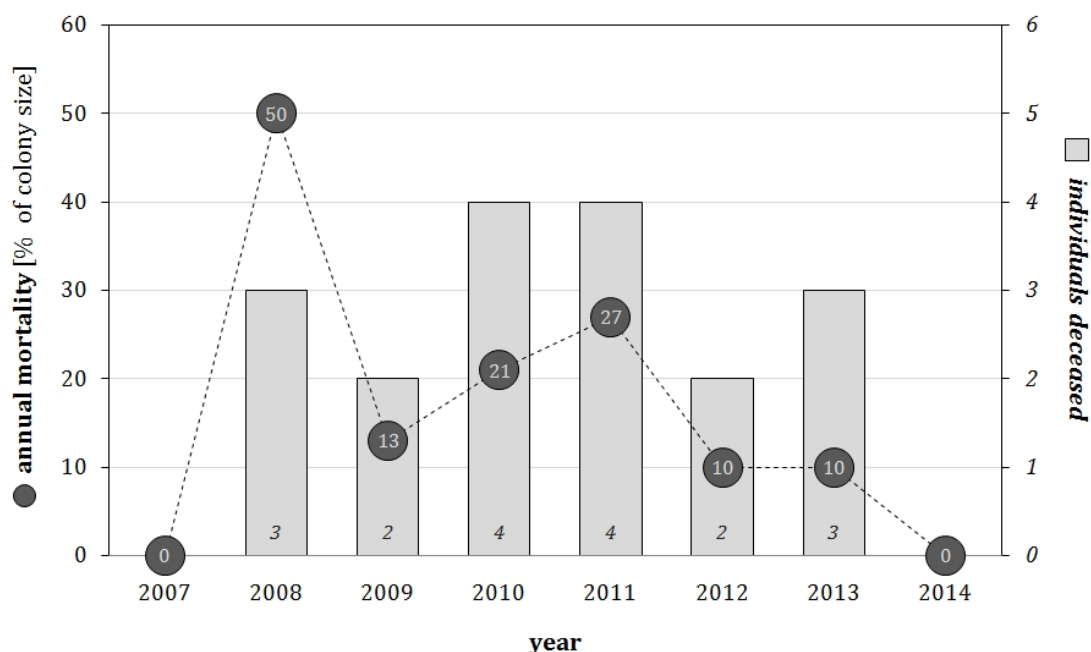


Figure 17. Annual mortality rates (●) and total number of annual fatalities (■) in the Boumort-Alinyà colony over time. Authors: Katja Wolfram/Mario Álvarez.

Thanks to daily field monitoring, two individuals who had developed serious physical problems promptly attracted attention in summer 2014 and could be observed with special focus thereafter:

The first case (ORIOL) had suffered a possible fracture/dislocation of the joint at the right foot and as a result developed a profound swelling at the distal end of the tarsus and first phalanges. The individual recovered autonomously without clinical treatment. His full recovery is crucially attributed to the provision of specific food items to him (at that time along with PABLO) through members of GREFA and TRENCA's monitoring team (see chapters 4 and 5). ORIOL's good recovery and present condition is confirmed by observations of apparently flawless copulations with his partner (by the principal author of this report, 22 January 2015), and by the pair's guarding and incubation activities on their nest (13 February 2015).

The second case (ROC) had suffered a sprained or torn ligament in his right knee during first jumps from the nest prior to his fledge (also see chapter 4). As a result, ROC keeps his right leg projected below his body in flight, while showing normal behaviour upon landing, taking-off and walking. ROC, too, did not require veterinary intervention.



Photo 25. Detail of ORIOL's injury. Photo: Jordi J. Febré.

***Note:** Colony member TRO was discovered dead in February 2015, possibly from drowning. No signs of gunfire, electric hazard or fatal injury were detected when a necropsy was performed on his body at the CR Vallcallent. On the other hand, results of a toxicological analysis (commissioned by GREFA to the institute for hunting resources investigation IREC) were recently obtained for the previous fatality (NEUS, deceased in*

November 2013). Results suggest the presence of a rodenticide product in her body - emphasizing the need to be extremely vigilant and alert.

Figure 18 details different reasons for fatalities in the Boumort-Alinyà colony over the entire run of the Eurasian black vulture reintroduction project. With a mortality of zero in 2014, there are no differences to the previous annual report.

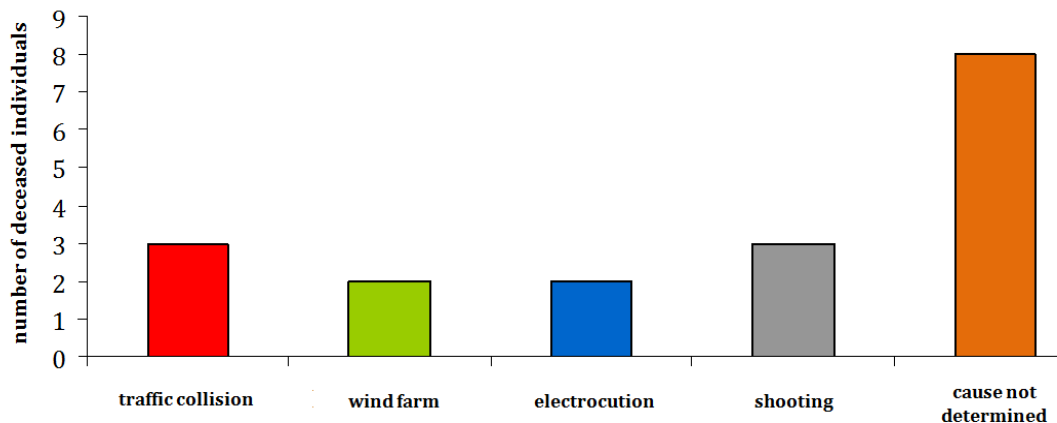


Figure 18. Cause of death in the course of the entire project. Authors: Aleix Millet/Mario Álvarez.

12. ADDITIONAL ACTIONS

Public awareness and global spreading of the project activities were intensified in 2014.

ARTIFICIAL NESTS

As in previous years, artificial nesting platforms in the Pyrenean colony required maintenance work or even replacement. Three platforms were relocated in Boumort, one was newly constructed in Alinyà.



Photo 26. Relocation of an artificial nesting platform. Photo: Gerard Plana.

PUBLIC DIFFUSION

The main route to raise awareness about the Pyrenean Eurasian black vulture reintroduction project leads through the corporate website of GREFA, which features on average two articles on the project per month and propagates them through social media channels. Another route leads through the project's official website ([blackvultures-pyrenees](http://blackvultures-pyrenees.com)). Thanks to cross-links and presence in social media and search engines, relevant information and news are amplified in reach by several orders of magnitude.

AWARENESS

The principal author of this report has provided a Spanish translation to an educative and illustrated book on European vultures (see photo 27), which centres around a captive-born reintroduced Eurasian black vulture as main character. The plot emphasizes the irreplaceable ecological role of European vultures, features all four European species and is suitable for all audiences. Its German original with 48 pages was published in 2013 (ISBN 9783844239744) under a title translating to "*The scared little vulture and his wild friends*". Katja Wolfram is author of text, illustrations and layout of the original, and aims to publish the Spanish edition with the principal author of this report in due time. Catalan and other translations are in progress.



Photo 27. Cover of the Spanish edition of an awareness book about European vultures, with a reintroduced Eurasian black vulture as protagonist. Photo: Katja Wolfram/Mario Álvarez.

GREFA prepared and edited an informative fully coloured booklet in early 2014 to summarize the various facets of the project and quantify its results clearly. The booklet is written in three languages (Spanish, English and Catalan) to reach a maximum audience.



Photo 28. Booklet of the Pyrenean Eurasian black vulture reintroduction project. Photo: Mario Álvarez/Aleix Millet.

PUBLIC PRESENTATIONS

At the premises of GREFA, a coordination meeting between European organizations working in Eurasian black vulture conservation took place on 27 February 2014, jointly organized by GREFA and the VCF (Vulture Conservation Foundation). The results achieved in the Pyrenean reintroduction program at Boumort-Alinyà were presented at this meeting.

A further oral presentation was introducing the project on occasion of the Spanish-Portuguese Ornithological Congress, organized by the SPEA in Portugal, on 1 to 4 March 2014. This presentation highlighted the role of the Pyrenean colony for the connectivity of Eurasian black vulture populations in Western Europe.

At the internal meeting of the advisory board of the VCF at Planes de Son on 30 March 2014, the lead author of this report gave a brief presentation on the actions undertaken and the results achieved in the course of this project.



Photo 29. Presentation of the project at the VCF advisory board meeting in Planes de Son. Photo: Jesús Garzón.

Finally, GREFA commissioned Emilie Delepoulle to give a further presentation on the project at the annual meeting of the French Vultures Work Group, set in October 2014 in the Baronnies.

13. CONCLUSION

In 2015, the threshold of a minimum viable population (MPV) may be in reach.

Figure 19 summarizes the Pyrenean reintroduction program for the Eurasian black vulture in hard numbers: 62 individuals have been released, 45 have settled locally and are considered fixed, 18 have died or been termed irrecoverable, 14 dispersed beyond the boundaries of the project or went missing, 12 chicks were born in the Boumort-Alinyà colony, 9 of which fledged and 8 of which eventually remained integrated in the colony.

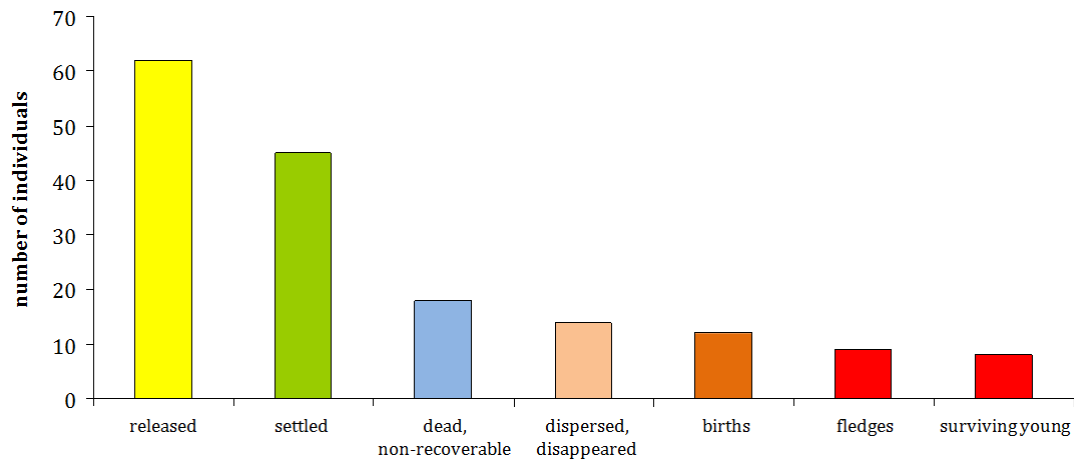


Figure 19. Results of the Boumort-Alinyà reintroduction program over its entire runtime. Authors: Aleix Millet/Mario Álvarez.

As was already speculated in the 2013 annual report, in 2015 the threshold of 50 individuals may be passed, if the rate of population growth remains unchanged (see figure 20). A value of 50 represents the minimum viable population (MPV) level, according to the feasibility studies of the project.

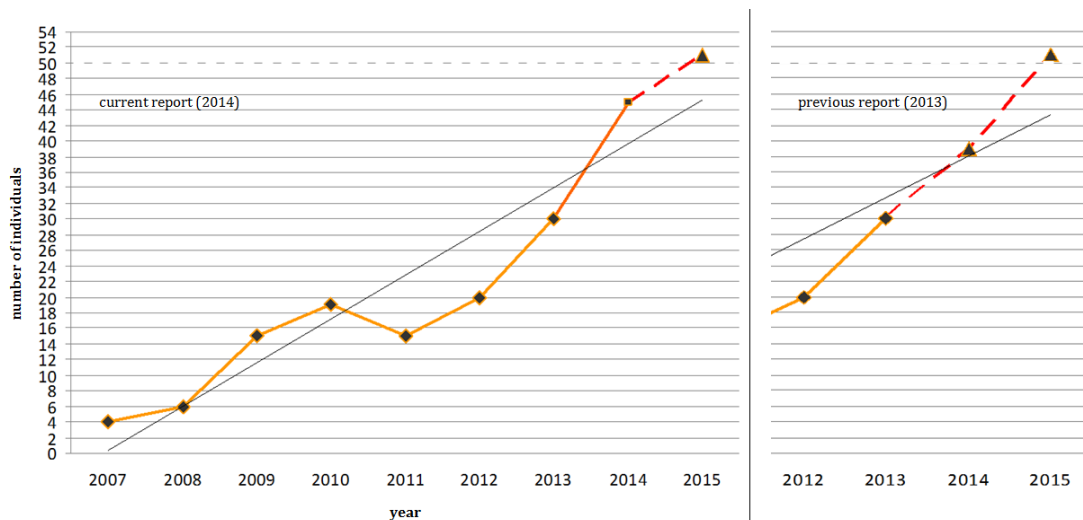


Figure 20. Demographic trend of the Pyrenean Eurasian black vulture colony with a projection for 2015 based on the 2014 season (left, this report). For comparison, the projection from the previous report based on the 2013 season is shown on the right. Both recent analyses suggest the minimum viable population size of 50 individuals (dashed line) will be reached within 2015. Authors: Aleix Millet/Mario Álvarez/Katja Wolfram.

Comparison of the current demographic status to the corresponding plot produced in late 2013 shows an increase in actual individual number for 2014 ($n = 45$) beyond the forecast value computed in the previous year ($n = 39$).

Population growth was thus greater and its curve steeper than expected, mainly due to the remarkable success in fixing the individuals released in fall 2014 on the Boumort-Alinyà area.

Providing specific feeding opportunities, that are tailored to the Eurasian black vulture as target species and are carried out in the vicinity of their temporary resting area, played a key role in achieving this development (see chapter 5). This method of feeding was designed and implemented by two members of the GREFA and TRENCA team (Mario Álvarez and Gerard Plana).

In conclusion, the remaining task appears more achievable at present than projected a year ago: a positive net balance (births, releases and immigration *versus* disappearances, deaths and emigrations) of +5 individuals throughout 2015, equivalent to a rate in demographic growth of 11%, suffices.

This goal is well within reach, if management patterns that have amply demonstrated their effectiveness are maintained. Those are:

1. daily food supplementation with small-sized items and in reduced quantity, placed at dawn at the PAE specifically for the Eurasian black vulture,
2. a comprehensive and continuous monitoring of the Pyrenean colony,
3. control of the activity of the Eurasian black vultures by motivated and proactive personnel, with proven experience in management of the species and able to visually identify individuals.

Lastly, if opportunities arise to introduce female specimens to the Boumort-Alinyà colony and thereby compensate the present imbalance of sexes to some degree, those should be taken advantage of.

Team members of GREFA and TRENCA in Boumort and its counterpart from the Fundació Catalunya-La Pedrera in Alinyà have designed, tested and implemented relevant guidelines. Thanks to them it was possible to establish a breeding colony of Eurasian black vultures in the Pyrenees, consisting of nearly fifty individuals, in just seven years.

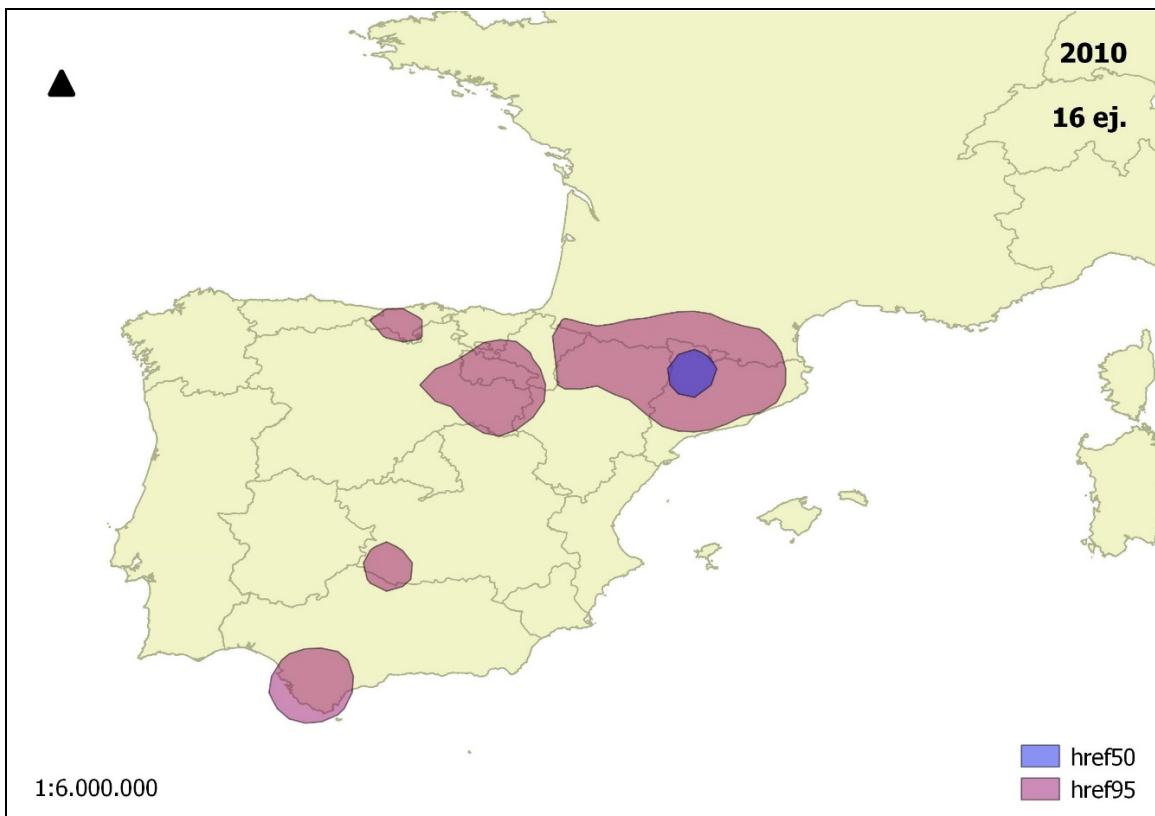
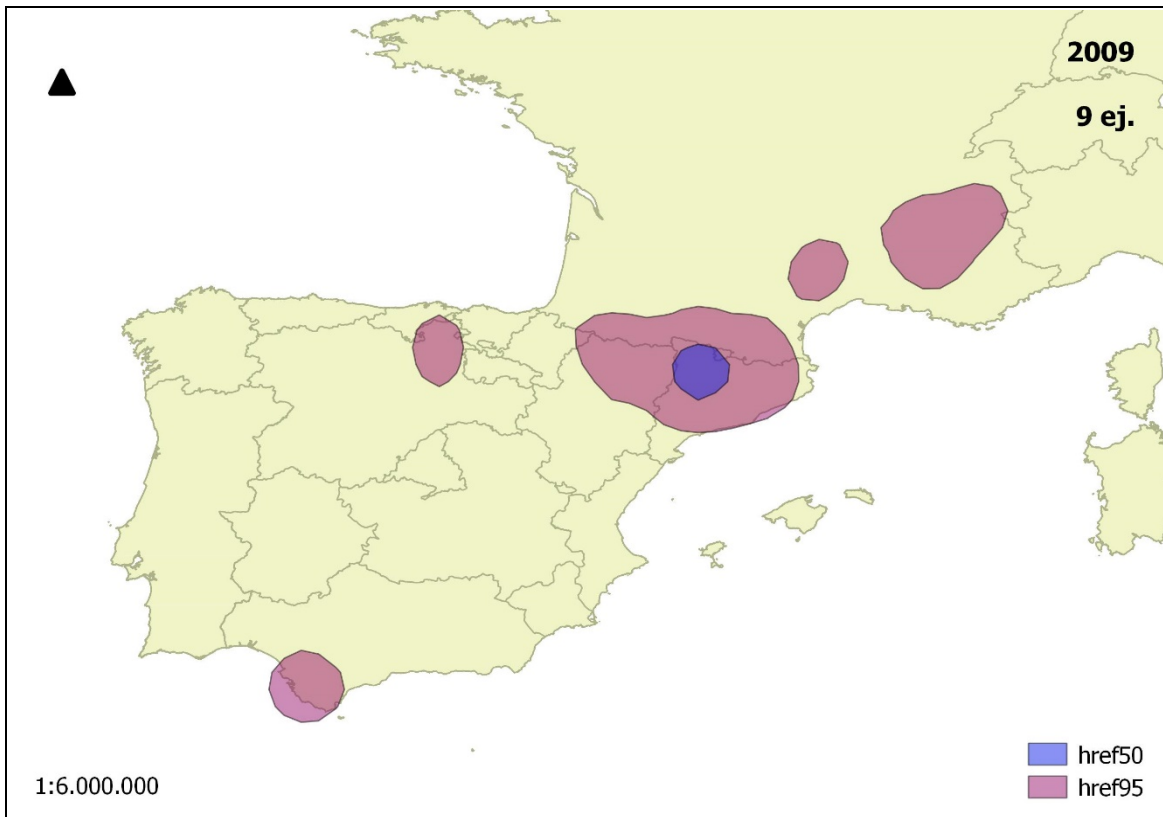


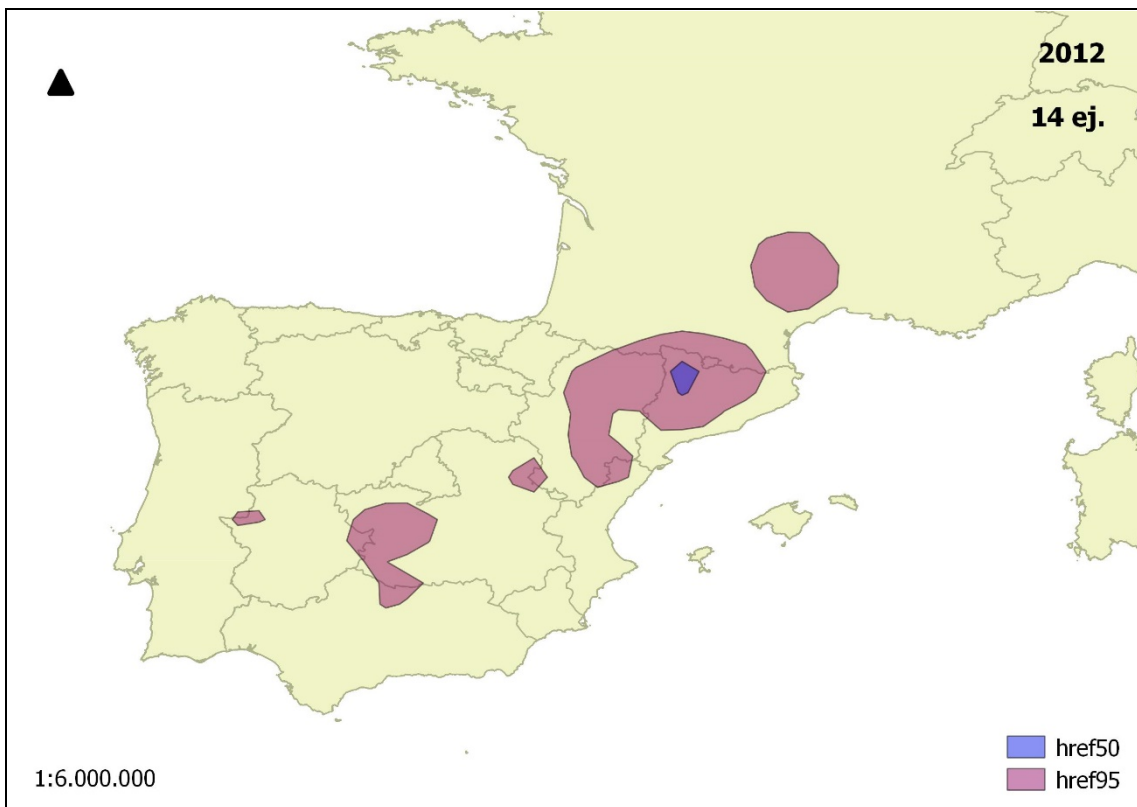
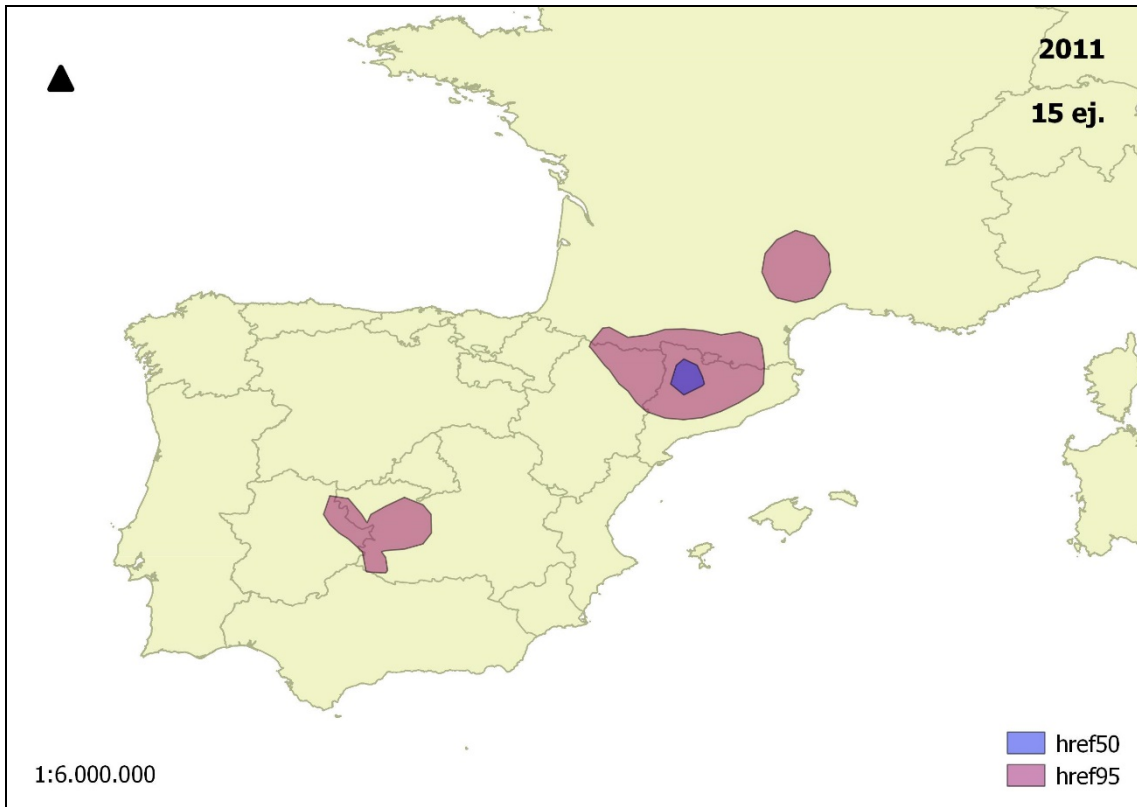
Photo 30. PABLO soaring. Photo: Mario Álvarez.

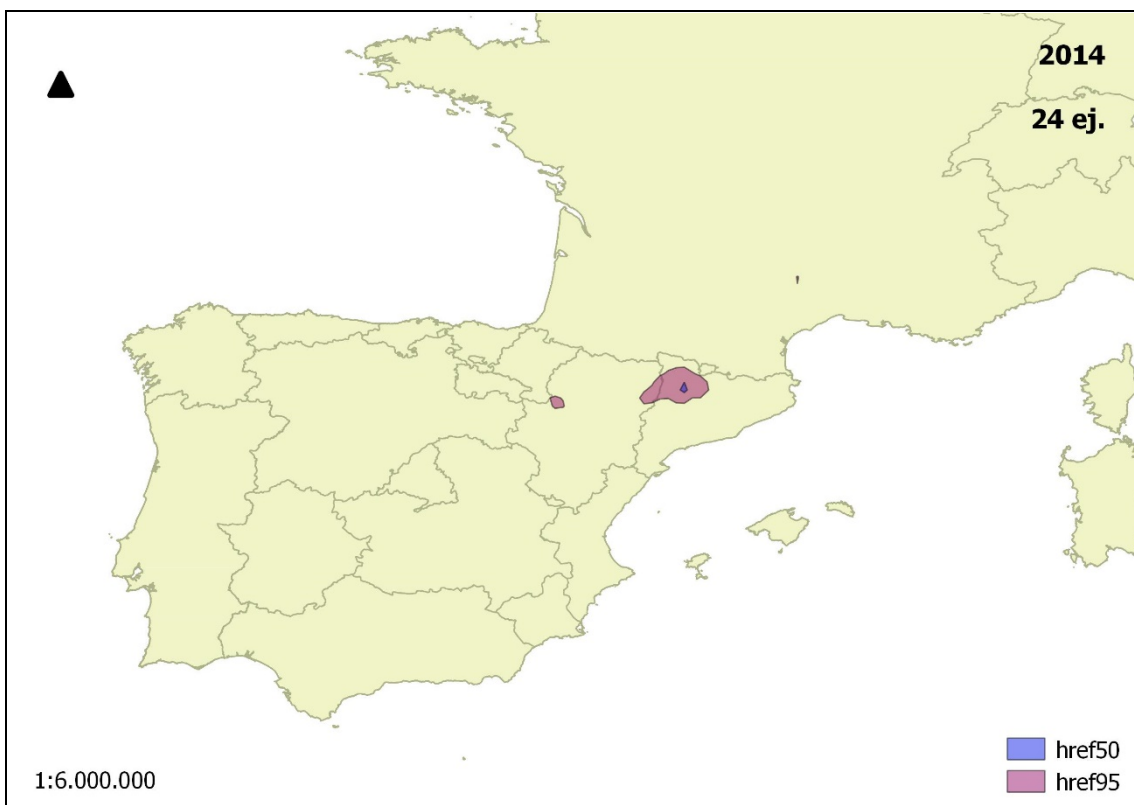
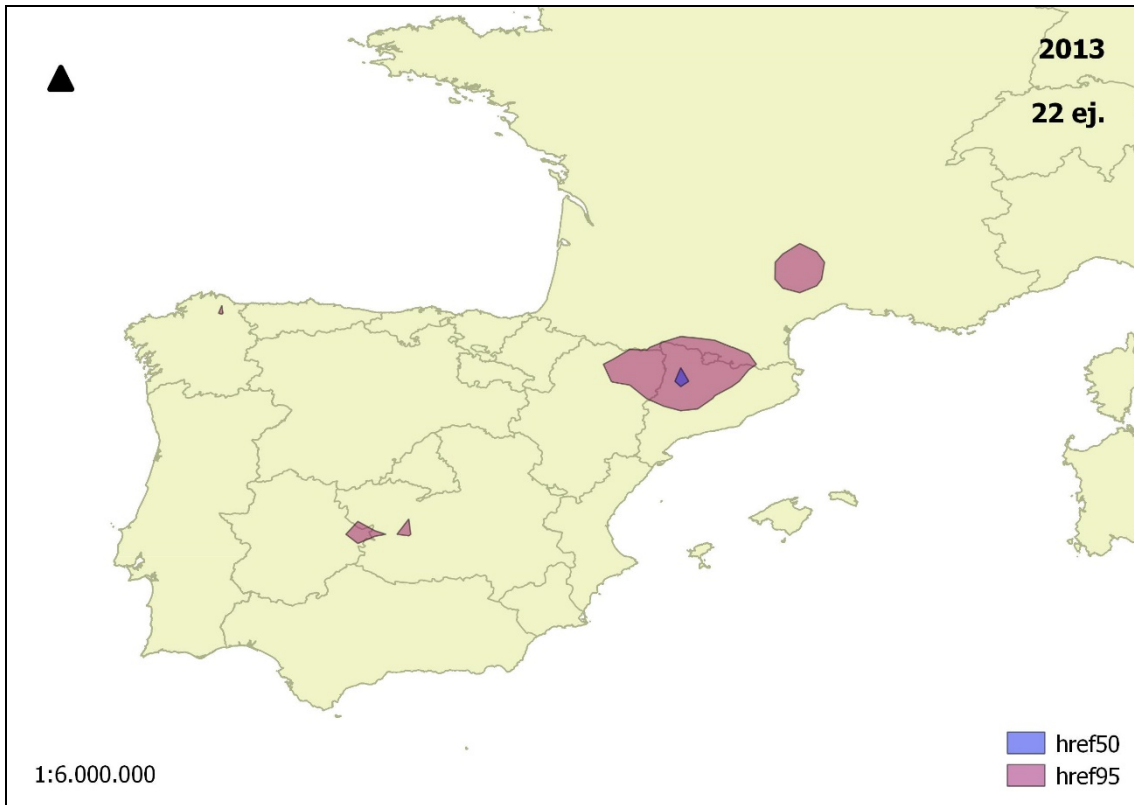
Mario Álvarez Keller

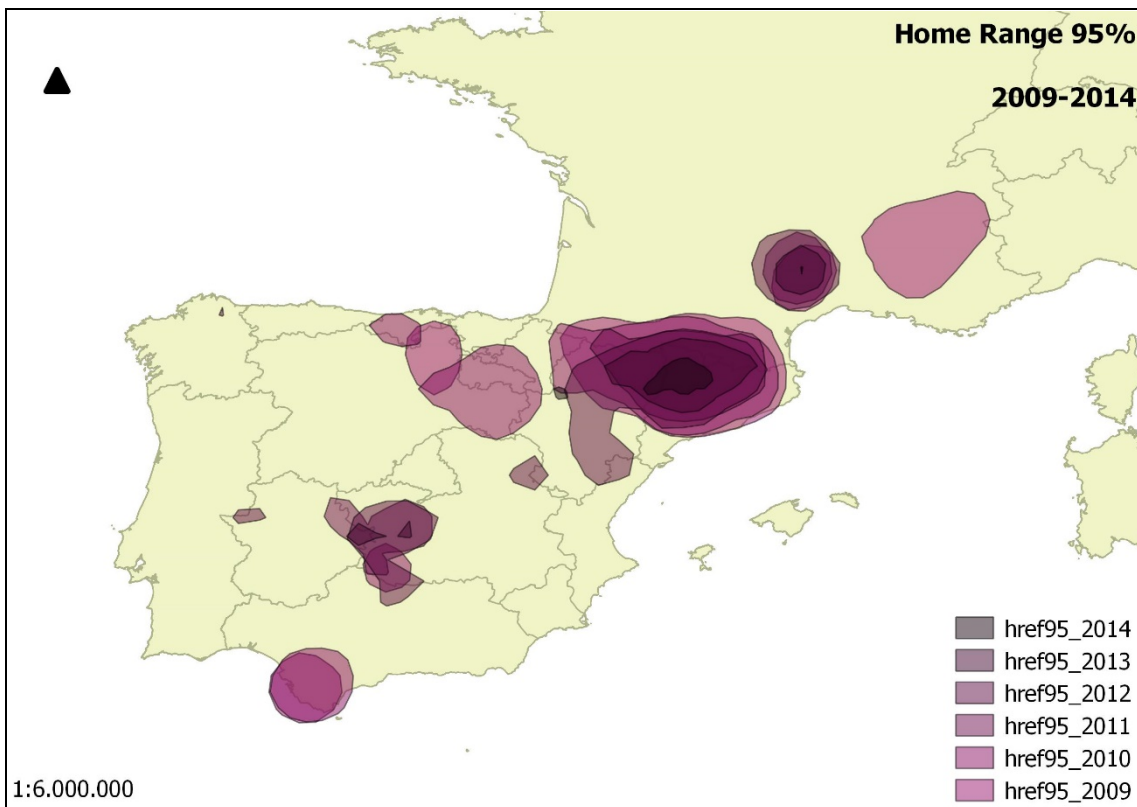
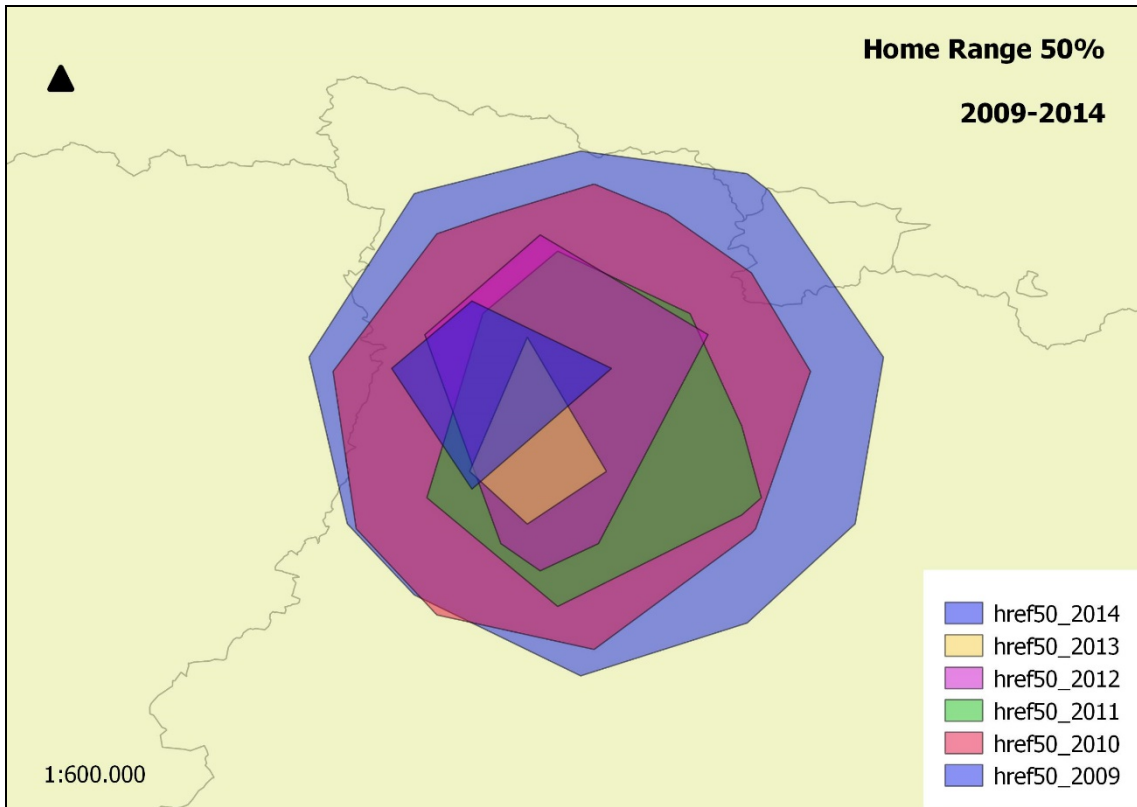
March 2015

ANNEX I. CORE AREA AND HOME RANGE DETERMINED BY GPS (Author: Manuel Galán).

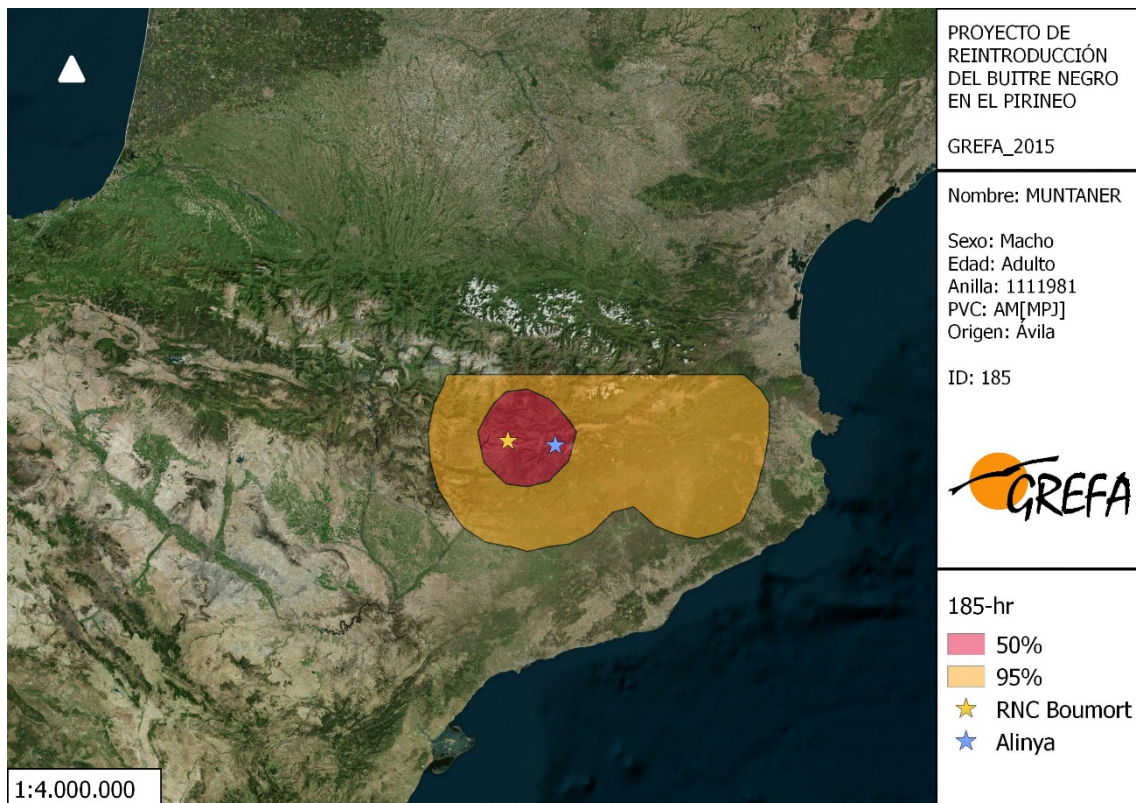
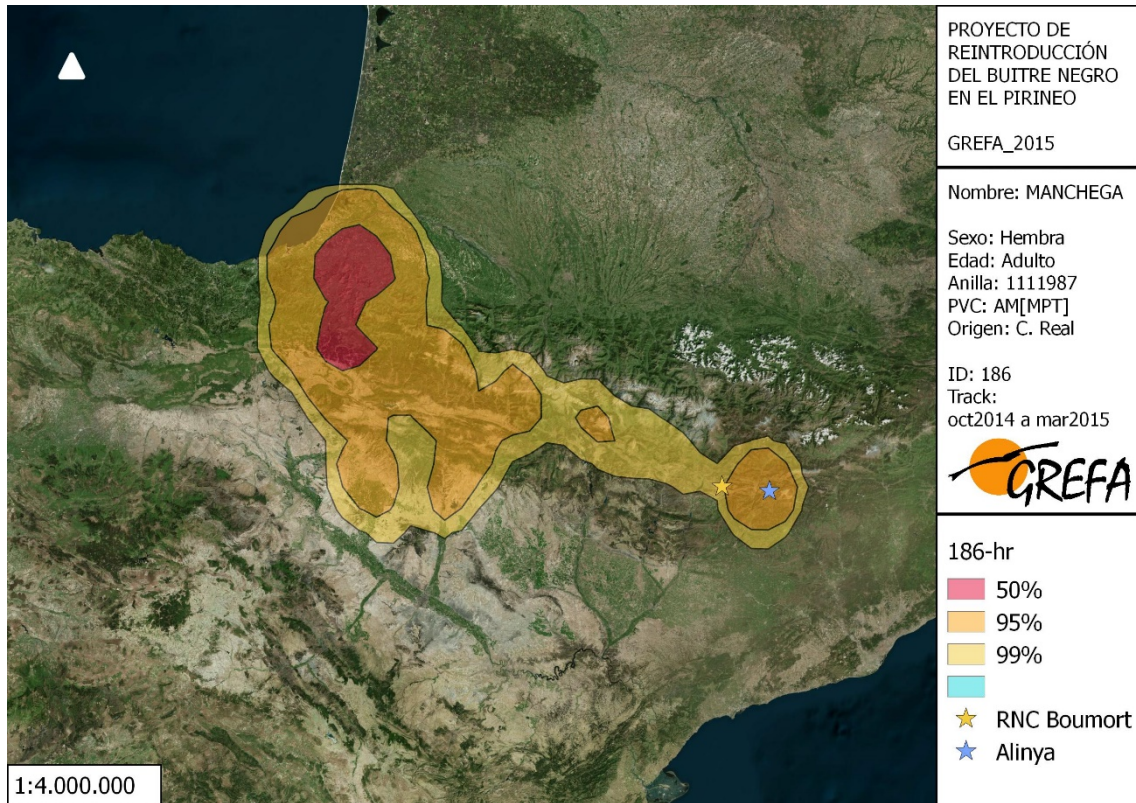




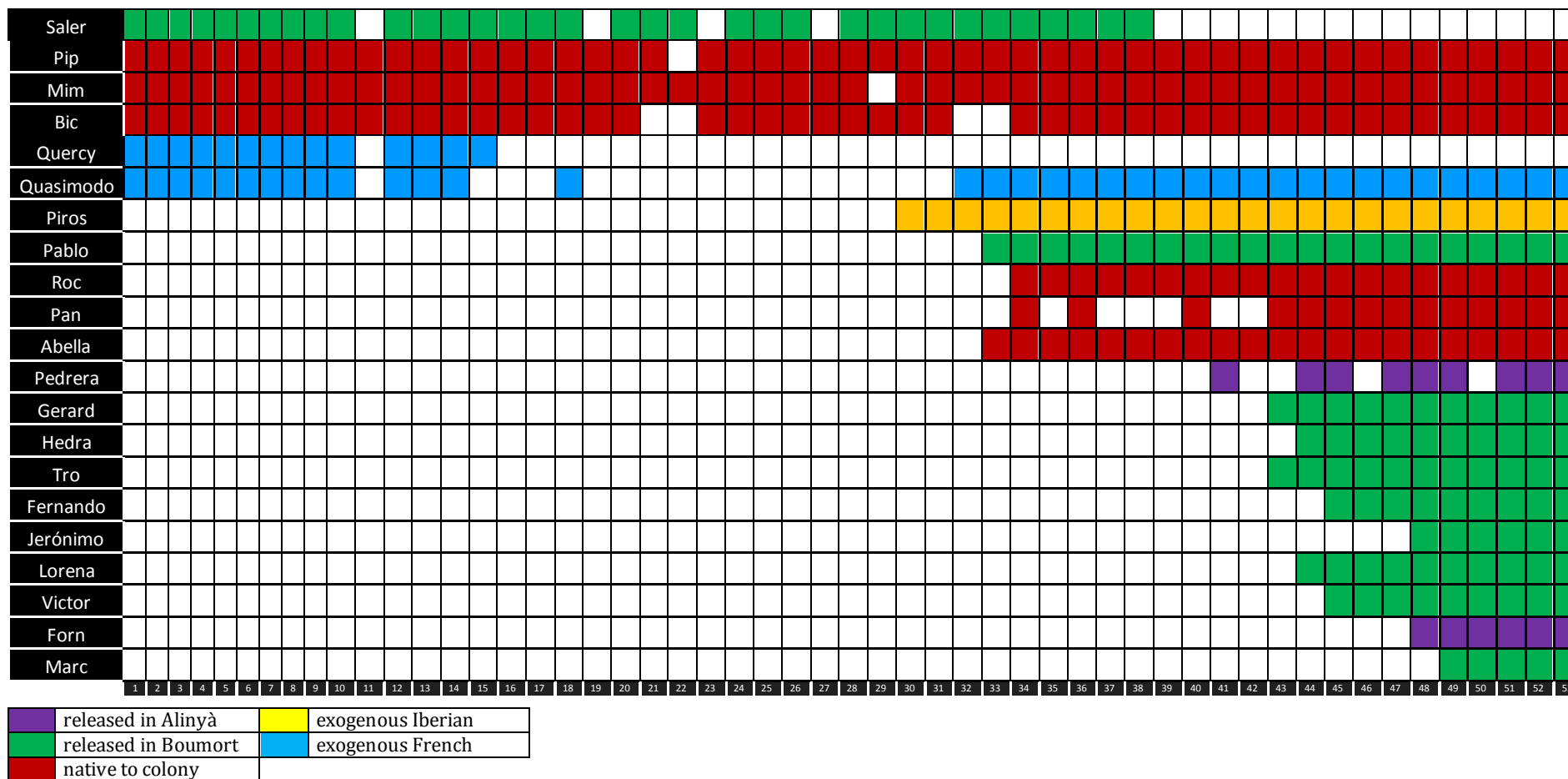




Figures above: Home range of the Pyrenean Eurasian black vulture colony between 2009 and 2014.



Figures above: Two single cases with GPS-GSM devices (MANCHEGA and MUNTANER).



Note: This figure shows the presence of colony members in the reintroduction area detected by Mario Álvarez during all weeks of 2014. At least one true identification per individual each week is plotted as indicator of weekly presence.

LITERATURE (with explicit citation within this annual report)

Gil, J. A., Báguena, G., Sánchez-Castilla, E., Antor, R. J., Alcántara, M., & López-López, P. (2014). Home Ranges and Movements of Non-Breeding Bearded Vultures Tracked by Satellite Telemetry in the Pyrenees. *Ardeola*, 61(2), 379-387.

Moreno Opo, R., Arredondo, Á., & Guil, F. (2010). Foraging range and diet of cinereous vulture *Aegypius monachus* using livestock resources in central Spain. *Ardeola*, 57(1), 111-119.