International Bearded Vulture Monitoring (IBM)

Annual Report 2013

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David Izquierdo & Richard Zink

Hohe Tauern National Park / Owl and Raptor Centre Haringsee
c/o Research Institute of Wildlife Ecology
University of Veterinary Medicine Vienna

Project partners:

LPO Grands Causses
Parc Naturel Régional du Vercors
Parc National du Mercantour
Parco Naturale Alpi Marittime
Parc National des Écrins
Parc National de la Vanoise
Regione Autonoma Valle d'Aosta & Parco Nazionale Gran Paradiso
A.S.T.E.R.S.
Parco Nazionale dello Stelvio/NP Stilfserjoch
Ufficio Faunistico, Provincia di Sondrio
Stiftung Pro Bartgeier
Vulture Conservation Foundation

Managed by the **Vulture Conservation Foundation** and
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GLOSSARY

1. Introduction

From an early stage, the re-introduction project has been praised in the international level as a model of success and optimal collaboration across borders, an example to follow in terms of management and long-term development. This is not only due to the endurance and survival skills of the Bearded Vulture, but equally to the selfless commitment of a wide number of well-intentioned people, who started this mission in the 70s and are already passing the torch onto the next generation. Thus, as the population develops, so shall the project evolve towards new horizons.

2013 has marked a historical landmark in several areas that make it a very significant year for the project and therefore the species: this year a new record was reached for the number of successfully fledged chicks in the wild, with a total of 16 individuals that now soar the Alpine skies. Moreover, there were 28 known territories occupied, 27 of them by adult pairs, four more than recorded since the first couple established its territory in France in 1995. One of the main purposes of the re-introduction in Middle Europe was to connect the remaining isolated populations of Bearded vultures in Eurasia and create a meta-population, and although this is still far from reality, in 2013 we were witnesses to the first recorded case of a bird released within the project to connect with the Pyrenean population, something that has not happened for almost a century. It was the individual **Cardabelle** (**BV719**) who was released in the Massif Central in 2012. Finally, this was also the first year that a wild-born individual has been marked in the wild; the bird has been called "**Linky**" (**W130**) in reference to the connection, the link, between released and wild-born populations.

As the years go by, the return of the Bearded Vulture to Middle Europe is becoming more and more tangible, something that few people would have bet on more than 25 years ago when the idea of bringing back this majestic and emblematic species was but the dream of some pioneer conservationists. Although the species was led to total extinction in most of the Eurasian mountain ranges by the hand of men, the hand of a different kind of men has been responsible for their return. There is still a lot to do and the way has been far from easy, but the beginning is always the hardest part and though our task is far from achieved, there are good reasons to believe that the species will once again claim its rightful place in the Alpine ecosystem.

The Bearded vulture is back. And it has come to stay.

2. IBM Database

2.1. Intensity of Database use in 2013

The intensity of use of the Database indicates the frequency that the IBM Members access the online database, and serves as an indication of (although not necessarily correlates with) the work effort of the IBM community. This is seen in recent years, where there was a negative tendency in the total amount of entries; decreasing by 8-9% from 2010 (1680) to 2011 (1531), and 8% from 2011 (1531) to 2012 (1406) (see IBM Annual Reports 2011 and 2012). However, this tendency was reverted in 2013 (1657), and this year there was an increment of 18% of entries in relation to 2012.

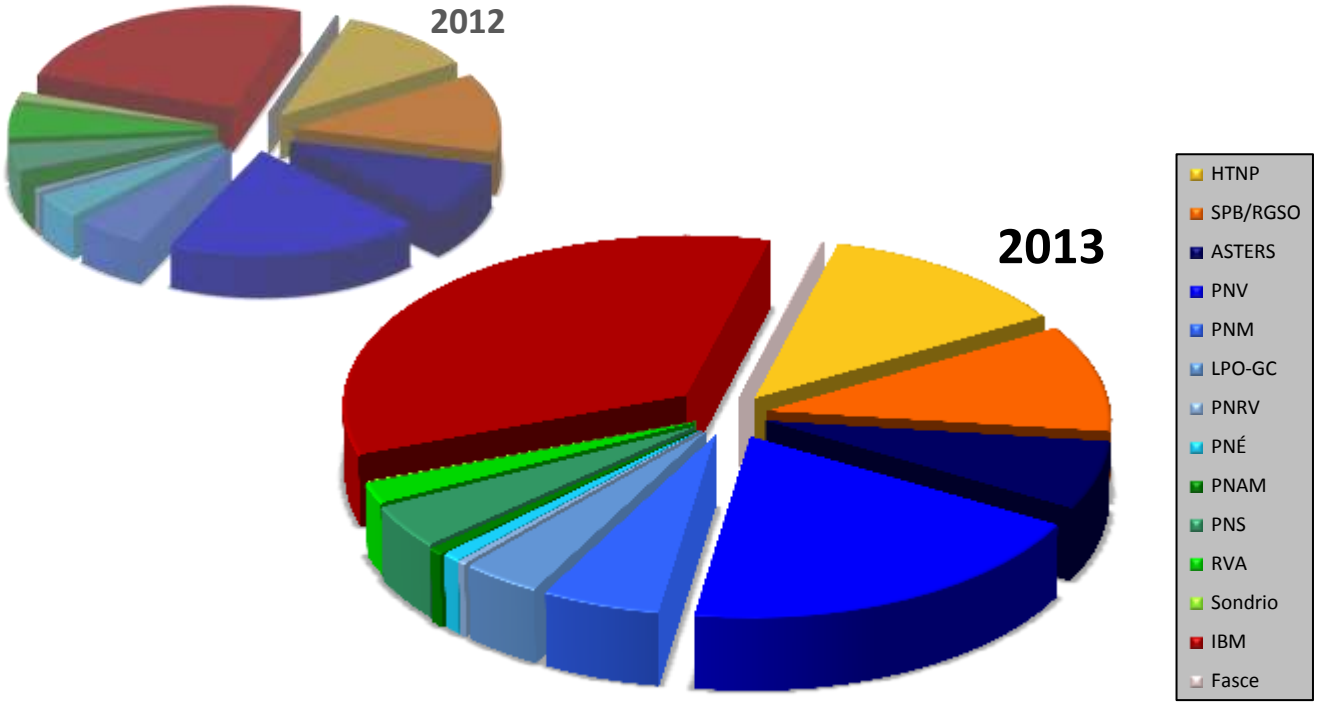


Figure 1: Percentage of access of the IBM database per partner in the years 2012 and 2013

When looking at the percentage of use per IBM Member, we find that the general trend remains fairly constant when compared to the previous years. **Figure 1** is a pie chart displaying the contribution of each partner to the total volume of database use, separating Members by colours and countries (yellow is members from Austria, orange from Switzerland, blue from France, green from Italy, the IBM administration in red and other special cases in grey) showing the results of 2012 (in shade) and 2013 for direct comparison. Setting aside the fraction of entries by the IBM Administration (almost 35%) the team of PN Vanoise (PNV, France) has, like in former years, accessed the Database more frequently than the rest (19%), followed by the teams of Hohe Tauern NP (HTNP, Austria) and Stiftung Pro Bartgeier/ Reseau Gypaète Suisse occidentale (SPB/RGSO, Switzerland), with 12.5% and 10.55%

respectively. The rest of Members have entered the Database less than 7% of the total, down to a single access by the team of Sondrio Province (Sondrio, Italy). The increase of use by the team of LPO Grands Causses (LPO-GC) in 2013 is quite remarkable, despite being one of the newest members.

The comparison between the level of Database use and information entered is shown in **Figure 2**. This chart represents the percentages of common observations (red), reproduction monitoring reports entered (blue), and percentage of Database use (yellow) per partner in 2013. The IBM administration, for example, presents the highest percentage of use due to their administrative work, whereas the amount of observations and reproduction reports entered by them is among the lowest since this is not part of their tasks. For the rest of the members, there seems to be some correlation between the ratios of time spent using the Database and the amount of information entered, although this relation is not direct in all cases. In former years, some Members had clearly accessed the Database more often than entered information, whereas others did the opposite and the percentage of use was lower when compared to the quantity of data entered. Although this distinction is not so evident in 2013, there is the case of PN Vanoise (PNV, France) that accessed the Database more often than entered data (both reproduction and common observations). On the other hand, there are the cases of PN des Écrins (PNÉ, France), ASTERS (France) or Hohe Tauern NP (Austria) that accessed the Database significantly less frequently but entered more information within that timeframe. Therefore, when looking at the results of the chart, a difference in usage is observed: Some Members use the Database to look for specific information, but do not enter many datasets in that session. Others use the database less frequently, but enter large amounts of data at once.

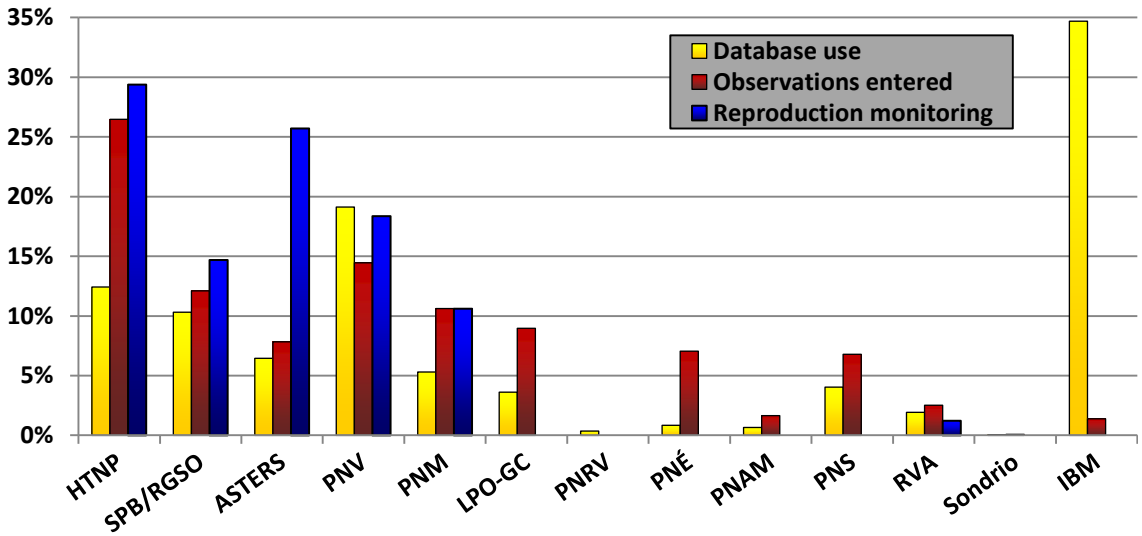


Figure 2: Comparison between the percentages of Database use, common observations and reproduction reports entered in the Database per partner in the year 2013.

The data on reproduction monitoring is not a good indicator of the amount of work that each Member invests in the Database, as the breeding units are not found in every monitoring area and there are more pairs in some regions than others. Common observations, on the other hand, should not present such a high disparity among Members even though the accessibility and development of the monitoring network fluctuate throughout the Alps. These differences among regions do not account for the significant variance in the percentages of common observations entered. Some possible justifications for this situation could be (1) the decreasing addition of data on birds as a result of misunderstanding of the possibilities offered by the relatively recent introduction of satellite telemetry in the monitoring of the population (see **section 2.2.1** for more details); (2) the steady decrease on local interest as the species becomes more and more common and therefore less exciting for observers; and (3) the gradual shift from some Members towards external databases (i.e. ornitho.xx). All 3 points have been discussed within the IBM community, although the apparent lack of success in addressing these problems might require a more specific strategy.

2.2. Observations in 2013

2.2.1. Common observations entered in the Database

Up to date, the IBM online Database hosts more than 47.400 common observations, some of them dating back to the 1980's, when the first birds were released in the Alps. This figure increases to almost 59.000 files when including the satellite telemetry, which has recently been added to the Database.

For the first 15 years of the project, after the first releases took place in 1986, all reports on Bearded vulture observations were handled on a local level and little success was achieved in establishing a unified monitoring network. Therefore, in 1998, the first Members met to create the foundations of the IBM, which would then be born in the year 2000. However, the storage of information was done manually in the beginning until the online Database was created in 2004. The evolution in the collection and storage of observations since the year 2000 can be seen in **figures 3** and **4**. These figures might give the impression that since 2004, year with the maximum number of observations entered in the Database, the effort and importance of the Database have been decreasing almost every year. Although it is a fact that the number of observations stored has indeed decreased, the quality of the information entered has also increased over the years. In the beginning, all reports were stored together without distinction, whereas nowadays the information is more specialized and targeted, such as the monitoring of couples (reproduction), which amounts to almost 250 entries only in 2013.

There are, however, some important issues to be addressed that might in time pose a risk for the future of the monitoring:

1) **Misunderstanding of the use of satellite telemetry**: Although it might seem a paradox that the rise of this new technology might affect the rest of the project, it is a crucial point to remark. Since the introduction of satellite telemetry to the Database, the number of common observations entered has been decreasing, either because some Members consider storing this data of little value, or because the common public is getting the wrong idea that since *some* birds are equipped with transmitters, it's less important to send their observations. The wide range of possibilities offered by satellite telemetry include, among others, the high efficiency in individual monitoring which might even mean the difference between life and death for some birds; such as the cases of **BV705 Bernd** and **BV718 Glocknerlady** in 2013 that could be recaptured and recovered. Telemetry also gives us a better understanding on the movements and dispersal of young animals, and sheds some light on the reasons behind habitat selection. However, as this technology is so far restricted to young released birds (up to 2-3 years), it leaves an important percentage of the population out of the scope: in particular wild-born and older released individuals which in total represent about 90% of the population in Middle Europe. Therefore, the decrease in common observations might mean for instance, that we are losing new couples or being unaware of the whereabouts of unreported tagged individuals. Moreover, even observations of birds with transmitters have high importance for the project, as knowing the position of an animal might not be enough to avoid some difficulties (i.e. an injured leg or erratic behaviour due to lead poisoning). The bird might also drop the transmitter and therefore only be found by direct observation, or if there is a simple malfunction of the device.

2) **Habituation and loss of interest**: Since the very beginning the IBM has been based on the data provided by observers distributed all over the Alps. When trying to keep the commitment of such a great number of people, it is necessary to retain their interest and motivation. Since the project has been running for quite some time already, it is possible that observers lose some interest and get "used" to the species, especially in areas with high concentration of individuals. Therefore, this situation might explain the decrease of a large portion of common observations in the Database as the number of Bearded vultures increases. An example that illustrates the opposite of this situation can be seen in **figure 3** when looking at the number of observations entered by the colleagues of LPO Grands Causses: In the two years that have passed since the beginning of releases in the area, the data entries have increased 5-fold (2012 to 2013), surpassing the entries of Members with bigger and more established populations. The possible solution

to this problem is the encouragement of the community on a local basis, although a more general plan should be discussed in future meetings.

3) **External databases**: As the number of observations entered in other databases increases, the information available to the IBM decreases. This issue has already been discussed before within the IBM community, but it seems important to keep on remarking how detrimental it is for the international project. Local databases provide something new to the observers, who prefer to see their observations used within their area by a community they know. Moreover, many of these observers are keen amateur ornithologists who go hiking in search of other species as well, so these local databases might be more attractive to them as it also gives them the option to enter information of other species observed. However, this information is rarely available for survey and especially limited beyond borders, which is particularly important when dealing with species that fly over big distances in short periods of time such as Bearded vultures. In recent years the IBM has been working to find a way to include these observations stored externally in the IBM Database, but so far no direct agreement has been reached.

   Despite the continuous discouragement from the IBM community, some IBM Members have been storing observations in external databases, hoping to retrieve this data in the future. Not only is this contrary to the Frame Convention that all Members signed when joining the IBM, but it also reduces the quality of data analysis as the information stored in the IBM Database is, in theory, more specific than the one reported to other databases.

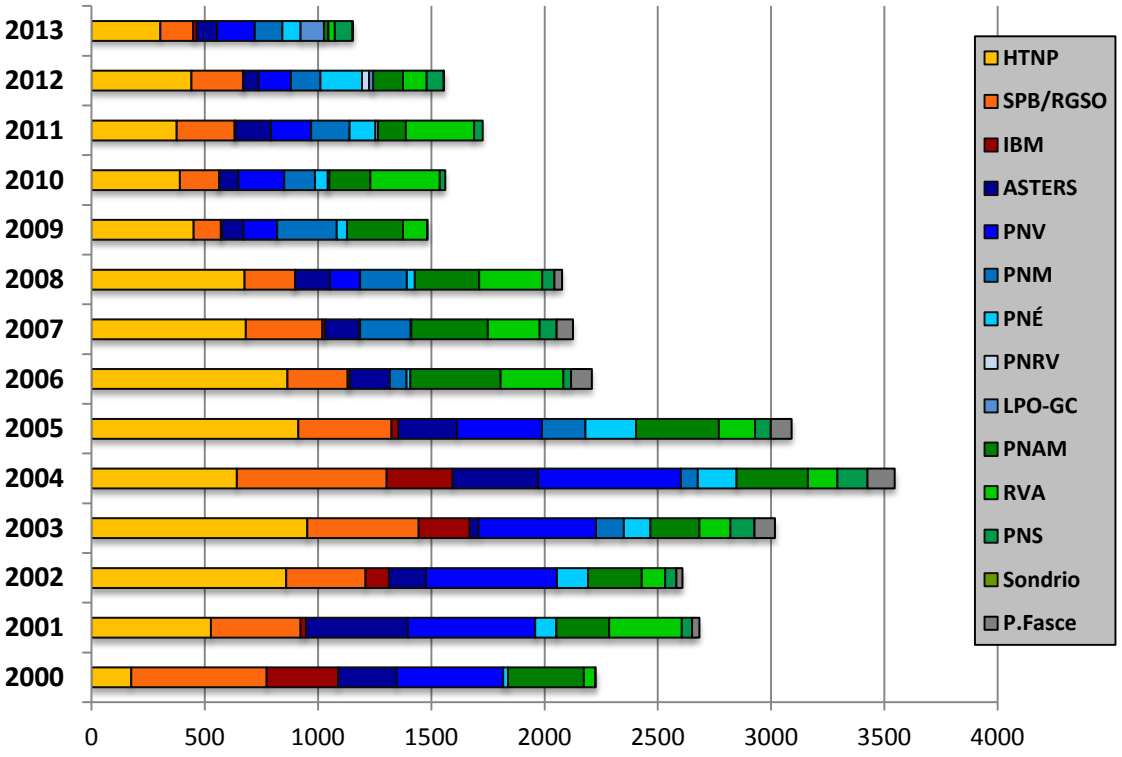


Figure 3: Total numbers of observations entered in the IBM Data base per IBM partner since the year 2000, including telemetry data in the years 2011 and 2012.

After the number of observations reached a maximum in 2004, there was a steady decrease until 2009, after which the numbers started to increase again. However, this trend reverted once again and the figures started to decrease again in 2011, losing 10% of the total from 2011 to 2012, and more than 25% from 2012 to 2013. Therefore, the 1148 observations stored in the Database this year marks a minimum for the period since the IBM was founded (see **figure 3**).

The general decrease in the total numbers can be seen when looking at the observations entered by the IBM Members in 2013 (see **figure 3**). On average, each Member has introduced 31 observations less than in 2012, although the numbers vary from the reduction of 138 observations in Hohe Tauern NP (HTNP, Austria), to the increase of 84 observations for LPO Grands Causses (LPO-GC), one of our newest Members. Despite the important decrease on the amount of observations entered (-31% from 2012 to 2013), HTNP still remains the Member that enters the highest number of datasets – As it has been since 2001– which is more than twice the amount of observations entered by the second in the line, PN Vanoise (PNV, France). As a general condition, it must be noted that most of the Members have reduced their contribution to the Data base; moreover, and what is even more concerning, this decrease affects especially those Members that in former years entered the highest number of observations, such as RA Valle d'Aosta (RVA, Italy), PN des Écrins PNE) or SPB/RGSO (Switzerland).

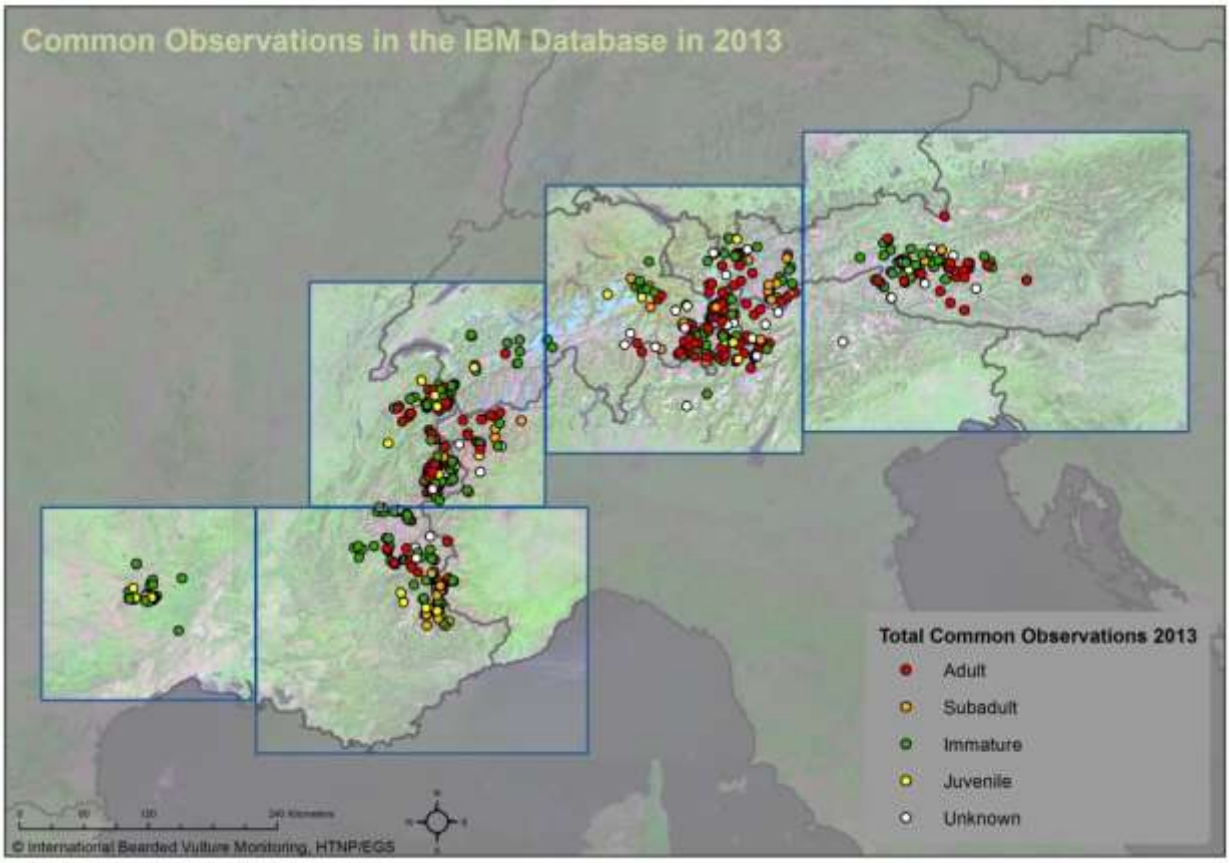


Figure 4: Map showing the distribution of common observations stored in the Database in each of the 5 different geographic regions of the study area in 2013.

Figure 4 is a map of the area covered by the IBM monitoring network in middle Europe. As expected, most of the observations are focused in areas with extant breeding units (**see figure 8** in **section 4**, Reproduction), especially for the cases of adults, and juveniles and immatures close to the pairs and release sites. It is interesting to look for instance at the region of the Massif Central (west of the Alps), where there are only observations of juveniles and immatures, as the releases have only been taking place for the last 2 years. In this region, the observations of juveniles are mainly confined to the area surrounding the release site, whereas the immature birds have already started dispersing further from the site.

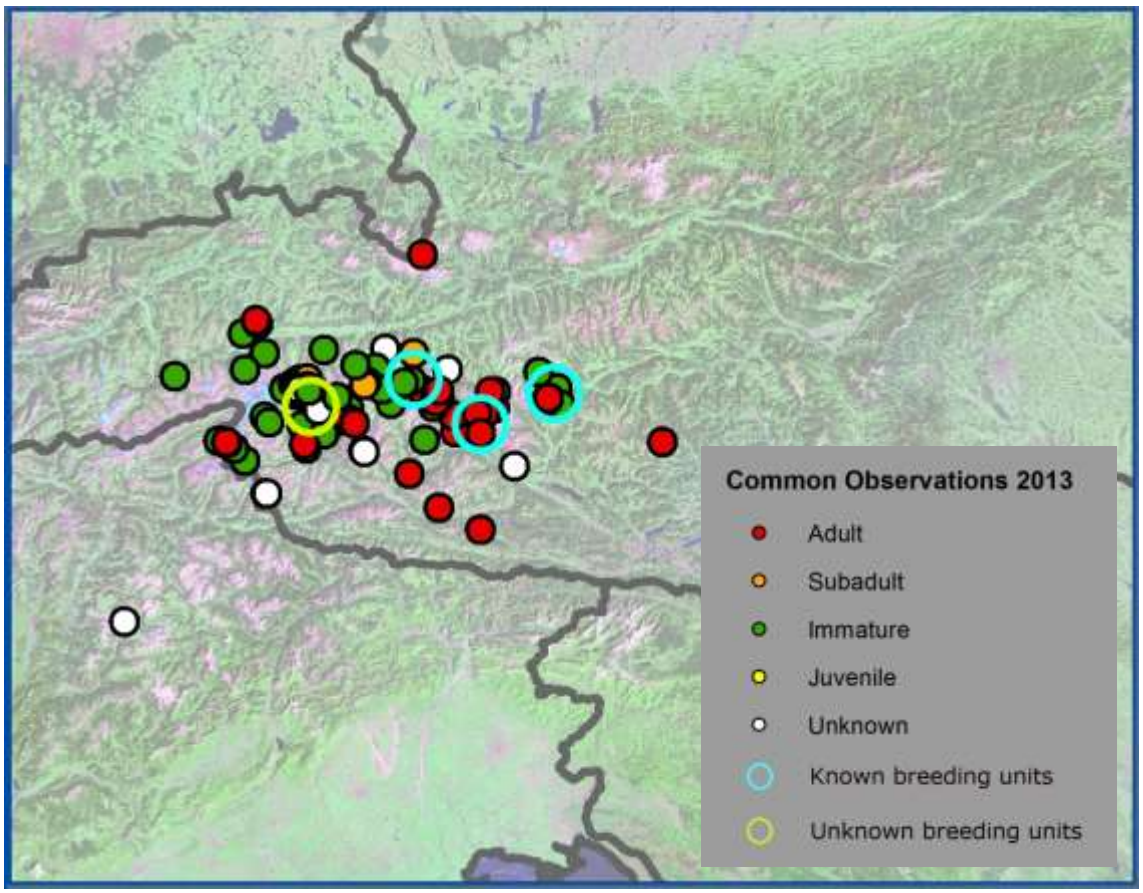


Figure 5: Detail of the Eastern Alps showing the distribution of common observations stored in the Database in 2013, and breeding units in the region.

Figure 5 is a detail of figure 4, focusing on the region of the Eastern Alps in order to illustrate the importance of common observations. As mentioned before, the vast majority of observations have been made close to one of the known pairs (Mallnitz, Gastein/Rauris and Katschberg, blue circles). However, there is an unusual concentration of observations west from these sites (lime circle), which might be an indication of some unknown pair in the area. As a matter of fact, a new pair has indeed settled in this region and has started breeding in the current season 2014. There are many more observations of adult birds in areas with no known pair, which might be an indication of either new established individuals, or floaters looking for a territory or a partner to procreate with.

➔ NOTE: This year, the Annual Report was written earlier than in recent years. In certain cases, we have observed that some Members enter data from the year before, and even other years, during the course of the current year. Although these observations would affect the figures, it is unlikely that these change will shift the general estimates. This is the case, for instance, of the colleagues of PN Alpi Marittime (PNAM, Italy) that didn't manage to enter their data in the Database but have reported more than 140 Bearded vulture observations in 2013.

2.2.2. Bearded vulture observations from external databases

In recent years some new databases have been created in a more local level and have rapidly spread through the ornithological and bird-watching communities, which collect many of the observations that otherwise would come into the IBM Data base. This situation has already been discussed within the IBM community several times as aforementioned, and some ideas have been proposed to settle this situation. At the moment the IBM is working to cope with some of these external databases, but this might take some time yet for the several difficulties that entails. So far the most complicated part of the logistics has already been solved, so there might be a solution to this situation in the upcoming months.

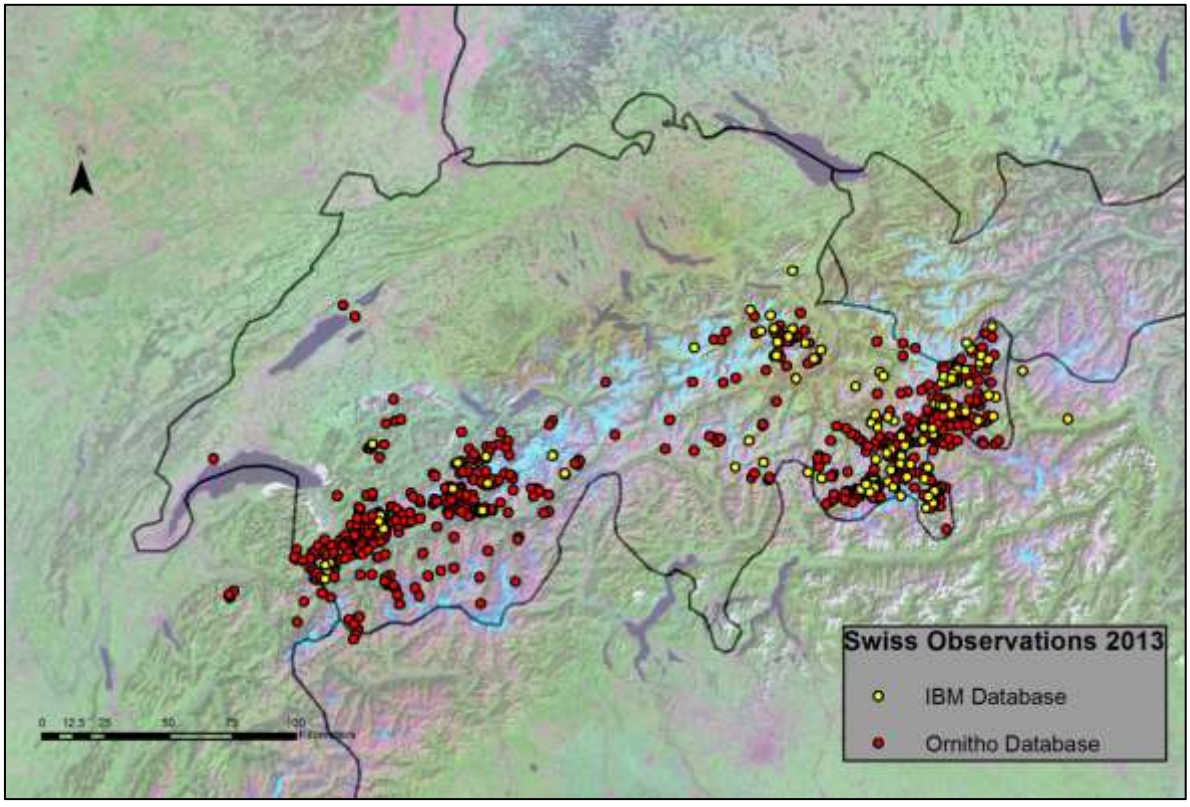


Figure 6: Observations of Bearded vultures in the Swiss Alps stored in the IBM Database and in the Ornitho network.

Most of the observations missing in the IBM Data base that are being stored in other databases are done particularly in Switzerland and France, where many people use the "ornitho.xx" data base. The comparison between the observations reported to the IBM and Ornitho databases in Switzerland are used to ilustrate this situation, (see **figure 6**), where it becomes obvious that the amount of data being missed by the IBM network surpasses that being stored in it, particularly in the western region of the country

2.2.3. Observations per age class in 2013

This year, the number of observations that could be assigned to a specific age class (of the four pre-defined ages, see **table 2**) has increased from the 84% in 2012 to the 92% in 2013. This significant increase might find an explanation in the better quality of observation devices and photographic equipment, which allows a higher level of recognition, as well as the experience of observers. For the analysis of the observations we have used the demographic model designed by Schaub et al (2009) to calculate the total population of Bearded vultures and how many individuals of each of the four age-classes are expected to be still alive in 2013. This information has then been extrapolated with the figures obtained with the common observations stored in the Database for the same year. The results have been presented in **table 1**. Thus, we expect that the group more represented in the population would be adults (50,7% of the population in 2013), as this is a long-lived species with low mortality levels. The other 49,3% is divided into Immatures (27,4%), Juveniles (12,2%) and Subadults (9,7%). When comparing these numbers with the percentages obtained empirically from common observations, we see the results don't fit very well in general: After normalizing the percentages by removing the fraction of unknown birds (which we assumed it more or less equally every age-class), we obtained that the age-group more commonly observed were adults (41,5%), followed by a 37,5% Immatures, 12,5% Subadults and 8,5% Juveniles. Adults is, by far, the group with the highest underestimation, with a difference of more than 9% between expected and observed; this could be due to the high number of adult observations that are not stored in the Database as common observations, but under the reproduction monitoring section, but it could also be that there are some adults established in areas that are not accessible for survey with the current monitoring network. Moreover, losing this fraction of adults might mean that we won't be able to identify new pairs as the breeding population expands. Besides Adults, Juveniles are also underestimated, although not so significantly. The reason might be found in the increasing significance given to satellite telemetry, since observers consider less important to report observations of birds they assumed are equipped with transmitters. On the other hand, the observations of Immatures and Subadults overestimate the fraction these represent in the population. This alone could suggest

the mortality in the Alps is lower than expected (Schaub et al., 2009) and therefore there are more observations of individuals of those age classes. However, paradoxically this might also mean that the model is not updated on the other direction, and the mortality of adults is higher than expected, as it's certainly not the case for juveniles which are better monitored and proven to have similar levels of mortality to those predicted by Schaub. This would reduce the percentage of adults observed and therefore increase accordingly the percentages of the rest of the groups. Another more favourable and possible explanation would be that the increase of observations of Immatures and Subadults comes from sightings in new regions, which would thus be more interesting to be reported, as these are the ages when Bearded vultures are dispersing.

Table 1: Observations of Bearded vultures in 2013 per age class and expected numbers of birds according to Schaub et al. (2009).
Composition of age classes:
Juveniles = juvenile (1.year)
Immatures = juvenile/immature + immature (2.year) + immature (3.year) + dark head
Subadults = subadult (4.year) + subadult (5./6.year) + immature/subadult + subadult/adult
Adults = adult (>6.year) + bright head

Age Class	n° obs	% obs	% obs relat.	Expected ind/age	% expected ind.
Juveniles	90	7,8%	8,5%	24	12,2%
Immatures	396	34,5%	37,5%	54	27,4%
Subadults	132	11,5%	12,5%	19	9,7%
Adults	438	38,2%	41,5%	100	50,7%
Unknown	92	8%	-	-	-
Total	1148	100%	100%	197	100%

2.3. Telemetry data (by Daniel Hegglin)

In the framework of the Alpine reintroduction project 41 Bearded vultures have been marked with satellite tags and in the meantime more 65'000 locations have been recorded (range: 24-8'8000 locations per individual). From 11 individuals we have so far only data from the first calendar year. For 30 individuals we have also data from the second, for 6 from the third and from 2 from the 4th calendar year.

The data shows a very patchy distribution of the locations. Some regions which are not related to release site are very frequently visited, e.g. the Austrian Lechtal, the north-eastern part of the Vallais in Switzerland, the French Vanois region and some part of the Italian Aosta Valley. On the other hand there are regions, like the Ticino in Switzerland, which were only occasional visited (s. Figure 1).

Among the marked 41 individuals, 6 individuals made extended excursions to areas outside the Alpine chain. Four individuals, Sardona, Scadella and Bernd from the Swiss release site in the Calfeisen Valley and Jakob from the National Park Hohe

Tauern, all flew in the spring of their second calendar year far to the North. Sardona, Scadella and Jakob made their way back home, whereas the Bearded vulture Bernd was very weakened and had to be recaptured. Thanks to the help of the Zoo Liberec and the Prague Zoo, the bird recovered soon and could be released a second time in the Calfeisen Valley. The Bearded vulture Maseta flew during its first calendar year to the Alpe Apuane in Italy and stayed the whole winter in these mountains, before flying back to Austria. The Bearded vulture Cardabelle, which was released in the Cévennes, was the first bird which flew to the Pyrenees. This is a promising result for the Corridor programme which aims to link the Alpine and the Pyrenean population.

The satellite data from the Alps was used to analyse the movement patterns of pre-adult individuals in comparison to wild-born individuals from the Pyrenees and released individuals from Andalucia. These analyses, which were recently published in Plos One (Margalida et al., 2013) showed that the distance travelled per day by each individual and the total dispersal distance had a positive relationship with age but were also highly dependent on the source population. The marked bearded vultures in Andalusia and the Alps moved significantly further than in the Pyrenees, where no excursions out of the Pyrenees have been recorded. To link the different Bearded vulture populations and establish a meta-population, the reasons for this observed pattern should be carefully analysed and possible management measures to improve the connectivity between the populations evaluated (e.g. management of feeding places).

Public maps are accessible which show all mid-day locations for different birds:

www.bartgeier.ch/streifzuege/i

www.parc-du-vercors.fr

http://www.hohetauern.at/de/online-service/bartgeier-online.html

http://rapaces.lpo.fr/node/944

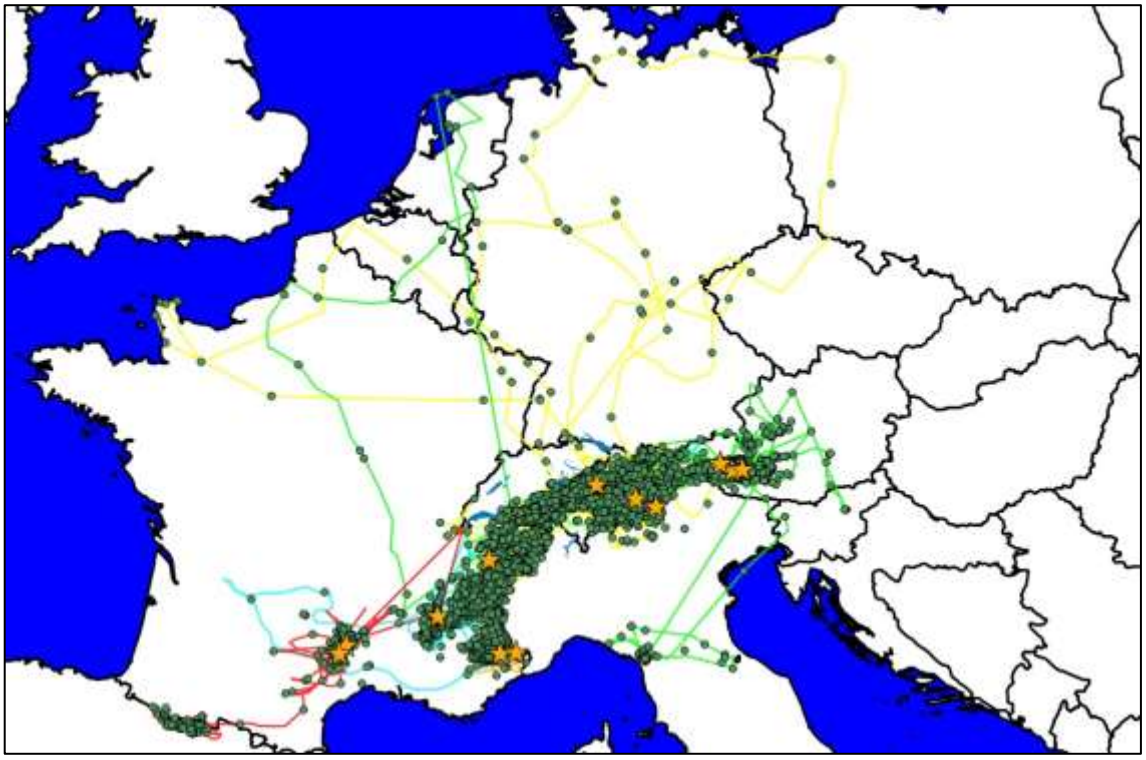


Figure 1: Satellite data of 41 bearded vultures marked in the Alps until December 2013.

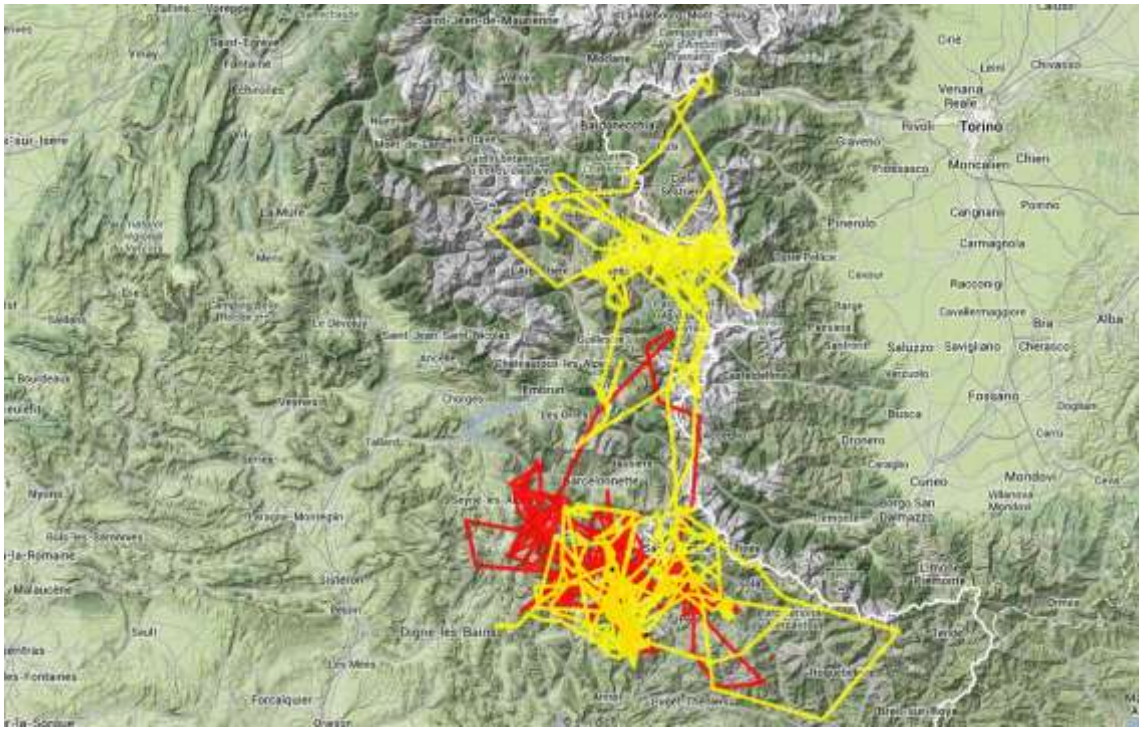


Figure 2: Locations of the bearded vultures Tenao (yellow) and Costa (red) which were marked in 2013 in the National Park Mercantour until December 2013.

2.4. Identified birds

Thanks to the work and effort of the whole IBM community, a total of 75 birds could be identified in 2013, setting a new maximum of identified birds since this parameter has been included in the Annual Report. According to the aforementioned model created by Schaub et al. (2009), this number represents a 65.2% of the identifiable fraction of the population (see **table 3**). There are some cases of wild-born vultures that can be individually recognized by some distinct characteristic. They also appear in **table 2**, but nonetheless most have been excluded from the calculations, as the reliability of these identifications is not very high, and moreover the vast majority of wild-born birds cannot be individualised, so the few cases that can be recognised are rather a curiosity. However, there is a special case that has been included: the bird W130 Linky, since it is the first Alpine wild-born Bearded vulture that has been ringed in the nest. More information about this case and the future implications are given at the end of this section. This information has been gathered from common observations, territorial birds and reproduction, and telemetry data.

This year we lost two Bearded vultures from the free-ranging population: BV760 Dourbie (Trevezel Grands Causses 2013) which died by collision with a cable, and BV465 Doraja (Rauris, 2005) that probably died in 2012 by unknown causes. Although BV705 Bernd had to be re-captured, it was re-released after a month; moreover, BV718 Glocknerlady, who was also re-captured in 2012, was re-released in 2013.

Table 2: List of birds identified in 2013 displaying age class, age (in days and years), and source of information. C.Obs. = common observations, Repr. = reproduction, IOD = International bearded vulture Observation Days, Sat. = satellite data. For birds with an asterisk the identification is not 100% sure. Birds in red are deceased

	Birds						Source of information			
	Identified birds	ID	Age class	Born	Age (d)	Age (y)	C.Obs.	Repr.	IOD	Sat.
1	**Balthazar**	99	adult	17/02/1988	9449	25,89		x		
2	**Colleen***	112	adult	19/02/1989	9081	24,88		x		
3	**Assignat**	111	adult	01/04/1989	9040	24,77		x		
4	**Moische**	146	adult	13/03/1991	8329	22,82		x		
5	**Cic**	186	adult	02/03/1993	7609	20,85		x		
6	**Andreas Hofer**	260	adult	26/02/1996	6518	17,86		x		
7	**Gelas**	279	adult	04/03/1997	6146	16,84	x	x		
8	**Tell**	283	adult	18/03/1997	6132	16,80		x		
9	**Republic 11**	288	adult	20/02/1998	5793	15,87		x		
10	**Gildo**	299	adult	23/02/1998	5790	15,86		x		
11	**Diana-Valais**	301	adult	13/03/1998	5772	15,81	x	x		
12	**Veronika**	321	adult	22/02/1999	5426	14,87		x		
13	**Sereno**	348	adult	03/02/2000	5080	13,92		x		

14	**Retia**	357	adult	03/03/2000	5051	13,84		x		
15	**Pablo**	359	adult	04/03/2000	5050	13,84		x		
16	**Montblanc**	361	adult	12/03/2000	5042	13,81		x		
17	**Louis**	364	adult	09/04/2000	5014	13,74		x		
18	**El Dorado***	372	adult	18/02/2001	4699	12,87	x			
19	**Felice**	375	adult	02/03/2001	4687	12,84	x	x		
20	**Paolo Peila***	388	adult	21/02/2002	4331	11,87		x		
21	**Ambo**	392	adult	27/02/2002	4325	11,85		x		
22	**Stift**	393	adult	02/03/2002	4322	11,84		x		
23	**Martell**	395	adult	08/03/2002	4316	11,82		x		
24	**Aravis**	405	adult	16/04/2002	4277	11,72	x			
25	**Guillaumes**	411	adult	17/02/2003	3970	10,88		x		
26	**Jausiers**	413	adult	23/02/2003	3964	10,86		x		
27	**Palanfre**	435	adult	17/02/2004	3605	9,88	x			
28	**Gilbert**	440	adult	04/03/2004	3589	9,83		x		
29	**Hubertus 2**	446	adult	04/04/2004	3558	9,75	x	x		
30	**Montecarlo***	455	adult	06/02/2005	3250	8,90	x			
31	**Swaro**	459	adult	17/02/2005	3239	8,87		x		
32	**Escalero**	462	adult	27/02/2005	3229	8,85		x		
33	**Michegabri**	488	adult	08/05/2006	2794	7,65		x		
34	**Romaris***	528	adult	19/02/2007	2507	6,87	x			
35	**Rocca**	516	adult	20/02/2007	2506	6,87		x	x	
36	**Nonno Bob**	548	Subadult	12/02/2008	2149	5,89	x			
37	**Girasole**	549	Subadult	16/02/2008	2145	5,88	x	x	x	
38	**Pinzgarus**	558	Subadult	05/03/2008	2127	5,83	x	x		
39	**Vaulabelle**	583	Subadult	24/02/2009	1771	4,85	x	x		
40	**Condamine**	586	Subadult	28/02/2009	1767	4,84	x			
41	**Eustachius***	587	Subadult	02/03/2009	1765	4,84	x			
42	**Elena**	613	immature	17/02/2010	1413	3,87	x		x	
43	**Spelugue**	615	immature	24/02/2010	1406	3,85	x			
44	**Stephan**	616	immature	01/03/2010	1401	3,84	x		x	
45	**Cordouane**	618	immature	01/03/2010	1401	3,84	x			
46	**Sardona**	624	immature	01/03/2010	1401	3,84	x			
47	**Ingenius**	621	immature	06/03/2010	1396	3,82	x			x
48	**Kira**	626	immature	11/03/2010	1391	3,81	x			x
49	**Tschadin**	629	immature	19/03/2010	1383	3,79	x			
50	**Italia 150**	660	immature	27/02/2011	1038	2,84	x			
51	**Tamina**	669	immature	04/03/2011	1033	2,83	x			
52	**Madagaskar**	665	immature	06/03/2011	1031	2,82	x			
53	**Nisa**	666	immature	09/03/2011	1028	2,82	x			
54	**Scadella**	667	immature	12/03/2011	1025	2,81	x			
55	**Tussac**	670	immature	14/03/2011	1023	2,80	x			
56	**Smaragd**	675	immature	19/03/2011	1018	2,79	x			x
57	**Jakob**	676	immature	24/03/2011	1013	2,78	x			x
58	**Junior Ranger**	702	immature	15/02/2012	685	1,88	x			
59	**Gallus**	703	immature	15/02/2012	685	1,88	x			x
60	**Il Malizia**	704	immature	22/02/2012	678	1,86	x		x	
61	**Bernd**	705	immature	24/02/2012	676	1,85	x			x

62	**Bellemotte**	708	immature	01/03/2012	670	1,84	x				
63	**Angèlo**	715	immature	06/03/2012	665	1,82	x	-		x	
64	**Basalte**	716	immature	12/03/2012	659	1,81	x			x	
65	**Cardabelle**	719	immature	15/03/2012	656	1,80	x			x	
66	**Glocknerlady**	718	immature	17/03/2012	654	1,79	x			x	
67	**Inge**	720	immature	22/03/2012	649	1,78	x			x	
68	**Aschka**	749	Juvenile	13/02/2013	321	0,88	x			x	
69	**Kalandraka**	750	Juvenile	13/02/2013	321	0,88	x			x	
70	**Tenao**	755	Juvenile	20/02/2013	314	0,86	x		x	x	
71	**Gerlinde**	759	Juvenile	28/02/2013	306	0,84				x	
72	**Costa**	757	Juvenile	03/03/2013	303	0,83	x		x	x	
73	**Layrou**	761	Juvenile	08/03/2013	298	0,82	x			x	
74	**Kirsi**	764	Juvenile	18/03/2013	288	0,79	x			x	
75	**Linky**	W130	Juvenile	01/04/2013	274	0,75	x				
76	**GT028**							x			
77	**GT031**							x			
78	**GT036**							x			
79	**Stelvio**	W02		08/04/1998			x	x			
80	**Diana-Stelvio**	W07		16/03/2000				x			
81	**Livigno**	W08		30/03/2000			x	x			
82	**Cassos**	W104		29/02/2012			x				
83	**Moische-Livigno**	W11						x			
84	**Zebru**	W12						x			
85	**Passieu**	W123					x				
86	**Marlon**	W133					x				
87	**Dourbie**	760	Juvenile	07/03/2013	299	0,82					
88	**Doraja**	465	adult	13/03/2005	3215	8,80					

The total number of birds identified in 2013 amounts to 75, higher than the results obtained in 2012, when 69 birds where identified. In general terms, these 75 individuals suppose a 66.4% of the estimated number of recognizable released and still living bearded vultures in 2013 (n= ~113), plus the bird W130, Linky, the first wild-born marked individual. Although there were 6 birds identified in 2013 that were not seen in 2012 (BV405 Aravis, BV372 El Dorado, BV587 Eustachius, BV 455 Montecarlo, BV 548 Nonno Bob and BV 583 Vaulabelle), there were more cases of birds that were identified in 2012 but not in 2013 (BV 628 Figol, BV 296 Jackpot 3, BV 619 Lousa, BV 497 Portobello, BV 311 Roubion, BV 559 Rurese and BV 460 Sallanches). This means that although the total number is higher in 2013, this simply corresponds with the annual growth rate of the population, and not necessarily with an increase in the quality of the observations. Having said this, we should also point out that there is still a certain amount of data missing from 2013 in the Database (not yet entered by some IBM Members) as well as the reports on the International Observation Days (IOD) and Genetics 2013, both very useful sources of information for identifications, which have not yet been published at the time this report was finished.

With this information, it's possible to quantify the quality of the monitoring network, comparing the results obtained in re-identifying birds and the number of expected individuals based on the aforementioned demographic model by Schaub et al. (2009). The results of this comparison are shown in **table 3**, with the number of identifiable birds per age class –both identified and expected– in 2013, and the percentages of birds identified and expected per age class, as well as a comparison between these two parameters.

Table 3: Results of re-identification parameters in 2013 and measurement of the quality of the monitoring of identifiable birds, giving the expected numbers of individuals per age class (according to Schaub et al. 2009) plus the percentage, numbers of identified individuals per age class plus the percentage and the relative percentage of identified birds within each age class.

Age Class	Exp. n° ind.	% expected	identified	% total ident.	% relat. ident.
Juveniles	8	7,1%	8	10,7%	**100%**
Immatures	26	23,0%	26	34,7%	**100%**
Subadults	7	6,2%	6	8,0%	**85,7%**
Adults	72	63,7%	35	46,7%	**48,6%**
Total	113	100,0%	75	100%	**66,4%**

As we could see in **section 2.2.3** for the whole population including wild-born birds, adults are the most frequent age class, followed by immatures and finally juveniles and sub-adults. In **section 2.2.3**, we could see that despite being the most numerous group –up to 50.7% of the total population– adults were the least observed birds in the wild. Likewise, when considering the percentages of identifiable birds per age class, the fraction of re-identified adults is quite low, about half (46.7%) of the expected individuals (versus 63.7% in the model).

The last column on the right of **table 3** shows the percentages of birds identified in each age group in relation to the expected number of birds. Thus, we see that the methodology used for identifying juveniles and immatures works perfectly, since the 100% of the living individuals in these age classes have been identified. Juveniles are followed during their first months of life to insure that they adapt properly to the environment. Moreover, these outstanding results can be easily explained thanks to the individual marking pattern, and obviously satellite telemetry that allows the continuous monitoring of some of the young birds. Rings, on the other hand, are not the main system used for identification of juveniles and young immatures, but gains importance as the animals grow and moult their bleached feathers and lose their transmitters. Satellite telemetry has increased greatly in the last years, having more vultures marked, and also improved so animals can carry their transmitters for longer periods of time nowadays, helping in the monitoring of older birds. The next group in total percentage of identification are subadults, with a remarkable 85.7% (6 out of 7 expected individuals) of re-identifications. The level of re-identification for subadults in former years was quite low, with only a 20.2% in 2011 and 58% in 2012. Some

possible explanations for this notable increase could be found in the experience of the observers in combination with the increase in the number of couples made up of at least one young individual; when young birds, still immatures and therefore easier to identify or more thoroughly followed, establish their territories and stay in the same area for several years, are more easily identified by the monitoring teams once they reach the subadult stage. Finally, when looking at adults, we can see that despite representing more than 63% (63.7%) of the expected population and being the most frequently identified birds in 2013 (46.7%), less than 50% (48.6%) of the expected identifiable adults have been re-identified in 2013. Adult birds are more difficult to identify individually because of missing marks (bleached feathers, satellite tags) and the difficulty of clearly distinguishing the rings, as the code used during the first years has been used in other birds and moreover the colour fades and is scratched away. Therefore, it becomes important to improve the monitoring of this division of the population in particular, as the rest is obtaining outstanding results.

This year, a new landmark has been achieved for the reintroduction project in the Alps: the first marking in the nest of a first wild-born bird. During the IBM Steering Committee that was held in Goldau (Switzerland) in 2012, it had been decided to ring a wild-born Bearded Vulture in the region of Haute Savoie in the following reproductive season, 2013. As this changes the whole methodology used up to date, it was necessary to set up a new scheme for the ringing of future years. First of all, the new Darvic rings should be used for wild-born birds and the usual Alu rings should still be used for released birds in the coming years, but if this new system proves more efficient for identification than the current one, the possibility to include released birds in the new ringing scheme will be considered. As a matter of fact, the birds (bird, as one of them died soon after fledging) released in the Grands Causses have been equipped with both Darvic and Alu rings.

3. Released birds in 2013

3.1. Summary of the birds released in Central Europe in 2013

In 2013, a total of 8 birds have been released in four different sites in Middle Europe, three in the Alpine range (P.N. Mercantour and PNR Vercors in France, and Calfeisental in Switzerland) and one in the Southern Massif Central (PNR Grands Causses, France) for the third year in a row. No birds have been released in Italy or Austria this year. Although the need to continue the releasing of birds has been discussed in recent years, the work of F. Lörcher (2011) highlights the importance of releasing more birds from genetic lines not as well represented in the wild population in order to maintain a higher genetic diversity of the of this European sub-population, which will ensure its long-term viability.

In Andalucía (Spain) five birds were released in two different sites. This is the second year that individuals have been released in the programme after the break in

2011, as a response to some worrying cases of poisoning. No cases of mortality by poison have been recorded after those episodes. The birds released in 2013 are BV767 (Sansón) and BV762 (Nerpio), released in Centenares (24th of June, Jaén), and BV752 (Vera), BV751 (Guadalquivir) and BV746 (Estela), released in Castril (20th of May, Granada). In total, there were 3 males and 2 females.

Each bird released as part of the re-introduction projects was marked with an individual distinctive pattern by bleaching some tail and/or wing feathers in their dark plumage (Frey & Zink, 2000), keeping the tips dark to avoid confusions with missing feathers. The silhouettes of the birds shown are seen from below; the primaries and secondaries are counted sequentially from the wing tip towards the body and the tail feathers are counted from the sides to the centre.

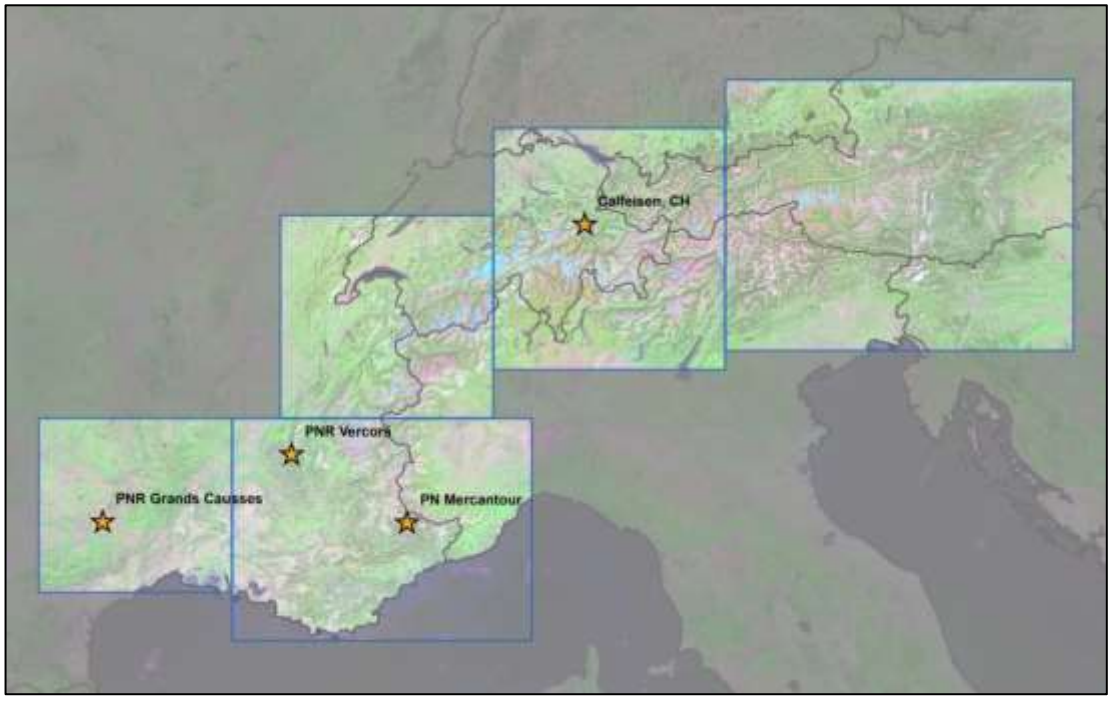


Figure 7: release sites used in 2013 across the Alpine range

Table 4: Summary of the marking pattern and rings used in the released birds in 2013. Dourbie died soon after release.

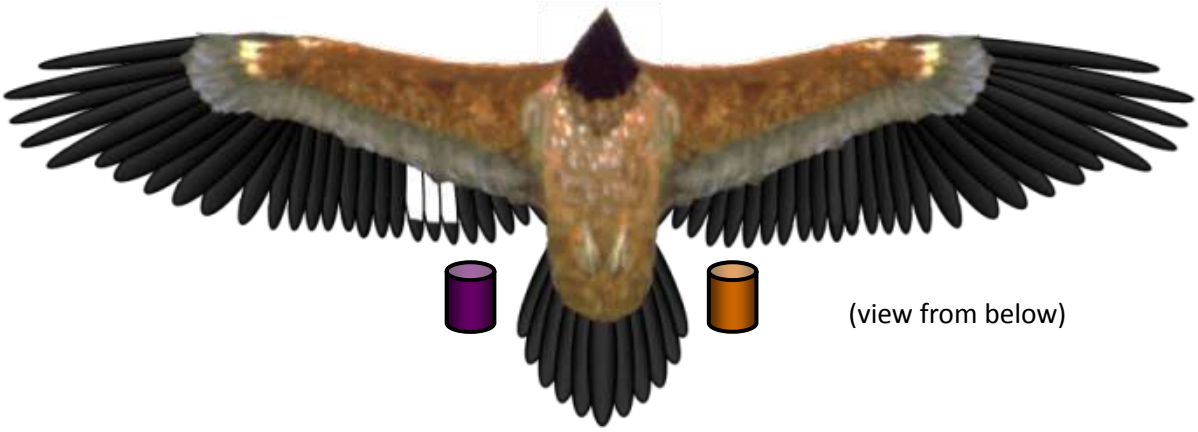
Bird			Bleached Feathers				Rings	
ID	Name	Sex	left wing	tail left	tail right	right wing	left talon	right talon
749	Aschka	f	-	-	-	2-3/13-14/22-23	gold	violet
750	Kalandraka	f	2-3/20-22	-	3-4	-	green	violet
755	Tenao	m	4-5	2-4	-	-	black	violet
757	Costa	f	-	-	21-23	3-4/ 21-23	blue	violet
759	Gerlinde	f	-	-	-	20-22	cupreous	violet
760	Dourbie	m	10-11/20-22	-	-	-	(Darvic) **JX**	violet
761	Layrou	m	4-5	-	2-4	21-23	(Darvic) **JZ**	violet
764	Kirsi	m	15-16/22-24	-	-	3-5	pink	violet

3.1.1. Trechenu-Creyers, Parc naturel régional du Vercors (France)

The westernmost of the Alpine release sites was located in the Parc Naturel Régional du Vercors, France. The individuals **Gerlinde** and **Kirse**, respectively a female and a male, were released on the 19th of June 2013.

1) BV759: GERLINDE

Place of birth:	TG Schönbrunn (A)
Birth date:	28.02.2013
Equipped with transmitter:	yes
Marks:	- right wing: 20-22
Rings:	right talon: violet; left talon: cupreous
Sex:	female
Release date:	19.06.2013



(view from below)

2) BV764: KIRSI

Place of birth:	Zoo Helsinki (FI)
Birth date:	18.03.2013
Equipped with transmitter:	yes
Marks:	- right wing: 3-5 - left wing: 15-16/ 22-24
Rings:	right talon: violet; left talon: pink
Sex:	male
Release date:	19.06.2013

(view from below)

3.1.2. Parc National du Mercantour (France)

The second release site in the South-western Alps was located in the Parc National du Mercantour, neighbour to the P.N. Alpi Marittime (Italy) where the releases took place in recent years but not in 2013. Two individuals, **Tenao**, male and **Costa**, female were released in Mercantour on the 30th of May 2013.

1) BV755: TENAO

Place of birth:	RFZ (A)
Birth date:	20.02.2013
Equipped with transmitter:	yes
Marks:	- left wing: 4-5 - tail left: 2-4
Rings:	right talon: violet; left talon: black
Sex:	male
Release date:	30.05.2013

(view from below)

2) BV757: COSTA

Place of birth:	Guadalentin (SP)
Birth date:	03.03.2013
Equipped with transmitter:	yes
Marks:	- right wing: 3-4/ 21-23 - left wing: 21-23
Rings:	right talon: violet; left talon: blue
Sex:	female
Release date:	30.05.2013

(view from below)

3.1.3. Calfheisental Swiss Alps (Switzerland)

For the fourth year in a row, this region in the Central Alps was chosen to release juvenile Bearded vultures. Also in this site, two female individuals, **Aschka** and **Kalandraka**, were released on the 25th of May 2013.

1) BV749: ASCHKA

Place of birth:	RFZ (A)
Birth date:	13.02.2013
Equipped with transmitter:	yes
Marks:	- right wing: 2-3/ 13-14/ 22-23
Rings:	right talon: violet; left talon: gold
Sex:	female
Release date:	25.05.2013

(view from below)

2) BV750: KALANDRAKA

Place of birth:	Guadalentín (SP)
Birth date:	13.02.2013
Equipped with transmitter:	yes
Marks:	- left wing: 2-3/ 20-22 - tail right: 3-4
Rings:	right talon: violet; left talon: green
Sex:	female
Release date:	25.05.2013

(view from below)

3.1.4. Parc naturel régional du Grands Causses (France)

In 2013 a new release in the Massif Central took place to increase the chances of connecting the Alpine and Pyrenean Bearded vulture populations. On the 6th of June 2013 two birds have been released in this site. For the first time, the birds released in this site have been fitted with Darvic rings, together with a normal Alu ring.

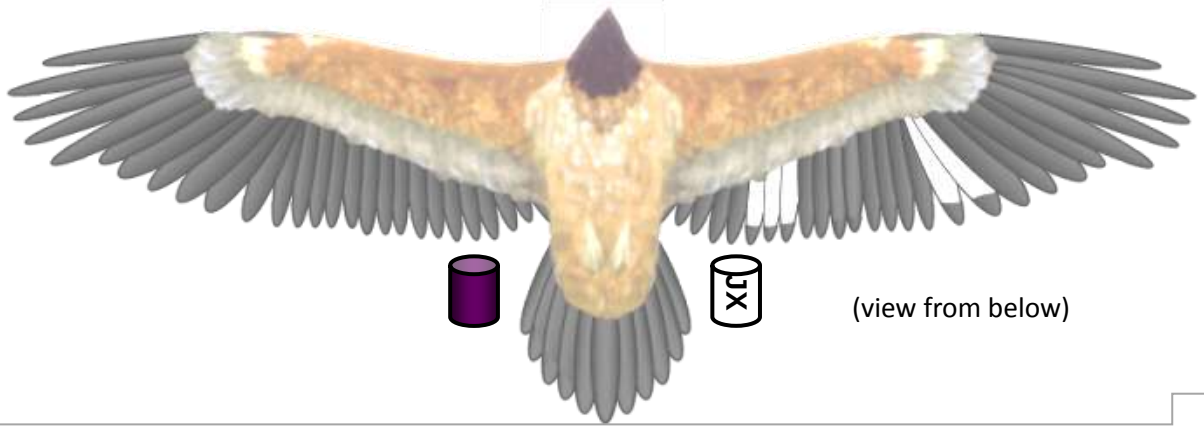
1) BV761: LAYROU

Place of birth:	Guadalentín (SP)
Birth date:	08.03.2013
Equipped with transmitter:	yes
Marks:	- right wing: 21-23 - left wing: 4-5 - tail right: 2-4
Rings:	right talon: violet; left talon: white Darvic ring “JZ”
Sex:	male
Release date:	06.06.2013

(view from below)

2) BV760: DOURBIE (DECEASED SOON AFTER RELEASE)

Place of birth:	Guadalentín (SP)
Birth date:	07.03.2013
Equipped with transmitter:	yes
Marks:	- left wing: 10-11/ 20-22 -
Rings:	right talon: violet; left talon: white Darvic ring “JX”
Sex:	male
Release date:	06.06.2013



(view from below)

4. Reproduction in the Alps 2012/2013

4.1. Summary of the season 2012/2013

When starting a re-introduction project, it is of paramount importance to be aware of the probabilities of success, having a precise idea of how much time and effort it will take. With species such as the Bearded vulture, which are long-lived and reach breeding age at a rather old age (~8 years), the success of the project can only be measured in decades, so any positive results won't be visible in the first years of the project. Although this tendency cannot be seen if we look at each year individually, the Alpine population have been steadily increasing since 1997 when the first chick was successfully raised in the wild. Therefore, although the number of successfully fledged individuals decreased in 2012 with respect to 2011, it increased again in 2013, setting a new record for the Alpine project, with an astonishing total of **16 birds**, which doubles the number of released birds this year (8 birds). Moreover, also the number of reproductive units has increased in 2013, with 25-26 pairs/trios starting with incubation, plus a pair that didn't even start to incubate, meaning a total of about 28 territories.

Apart from the above mentioned breeding units, this year there were several new pairs in formation that might start breeding in the next season 2013/14.

- **Eastern Alps**: Despite being the area with the highest number of birds released from the beginning of the project, the low number of pairs and productivity in the area might be an indication of low suitability. However, the number of pairs has been increasing since 2010, when the first bird was born in the area, and in more recent years the increase of breeding activities in the area shows that the situation might be changing. This year there was a switch of partners in the Tyrolean part of the National Park Hohe Tauern, when **BV 558 Pinzgarus** (Rauris 2008), that was partner of **BV 462 Escalero** (Fusch 2005) in Mallnitz in the season 2012/13, changed to the area of Gschlöß where he is now (season 2013/14) paired with an unknown adult female that has been resident in this area for a while. In the upper Ötztal (Tirol, Austria) a pair consisting of an immature and an adult bird was observed already in 2011/2012. Although the number of observations decreased in the season 2012/13, by the end of the 2013, again two birds (1 adult, 1 subadult) have been observed regularly in the area. Not far away on the Italian side of the Eastern Alps, 2 adult/subadult Bearded vultures could be observed in springtime in the Passeiertal (South Tyrol, Italy), even with copulation. But no further information about a breeding attempt was reported.

- **Central Alps**: The pair **Foscagno** was last observed in March 2012, but afterwards broke apart and a single bird remained in the territory. During

springtime a subadult bird has been observed together with an adult and they might form a new pair for the season 2013/14. In **Vanoise NP** regular observations of adult and subadult birds give a hint for possible new pairs in the area.

- **North-Western Alps**: In the Italian Val di Cogne (Aosta region) several young birds were observed flying together during the spring of 2013. This might be an indication for possible new pair formations.

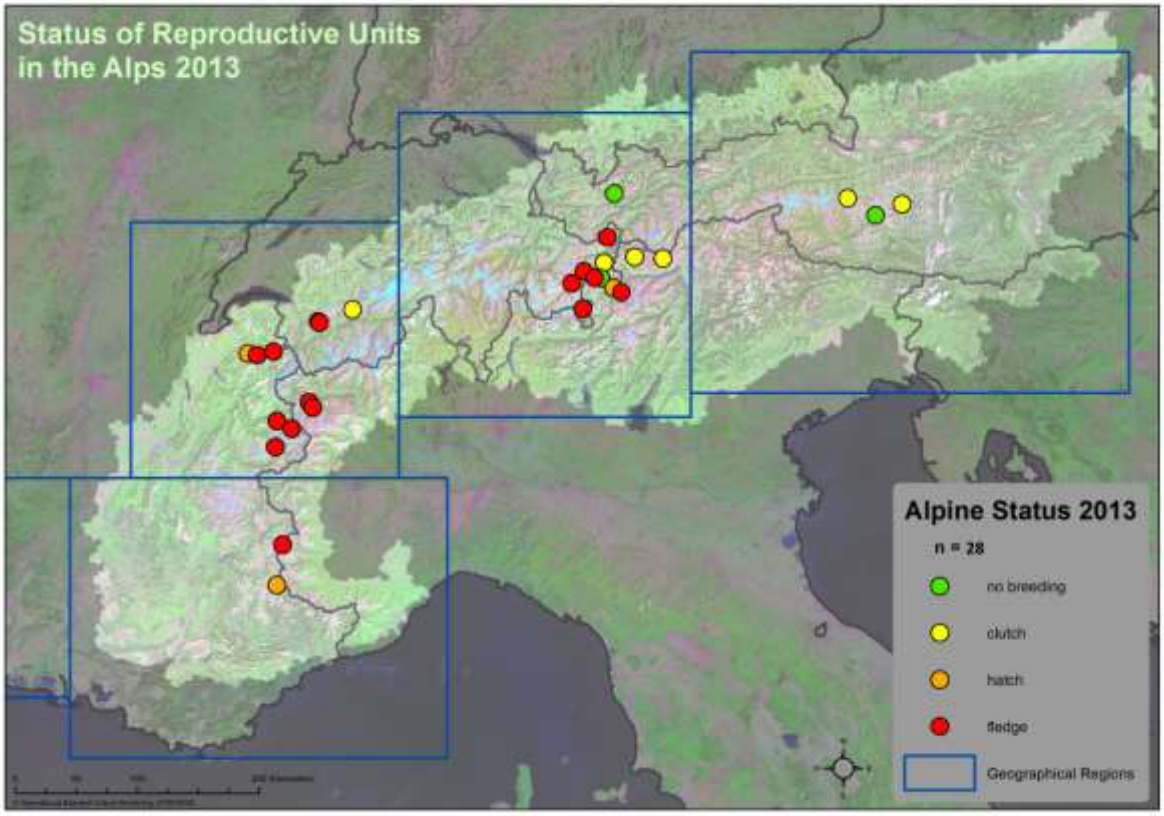


Figure 8: Reproductive status of the Alpine population in 2013, showing all reproductive units with clutch only, hatching, fledgling or without breeding attempt.

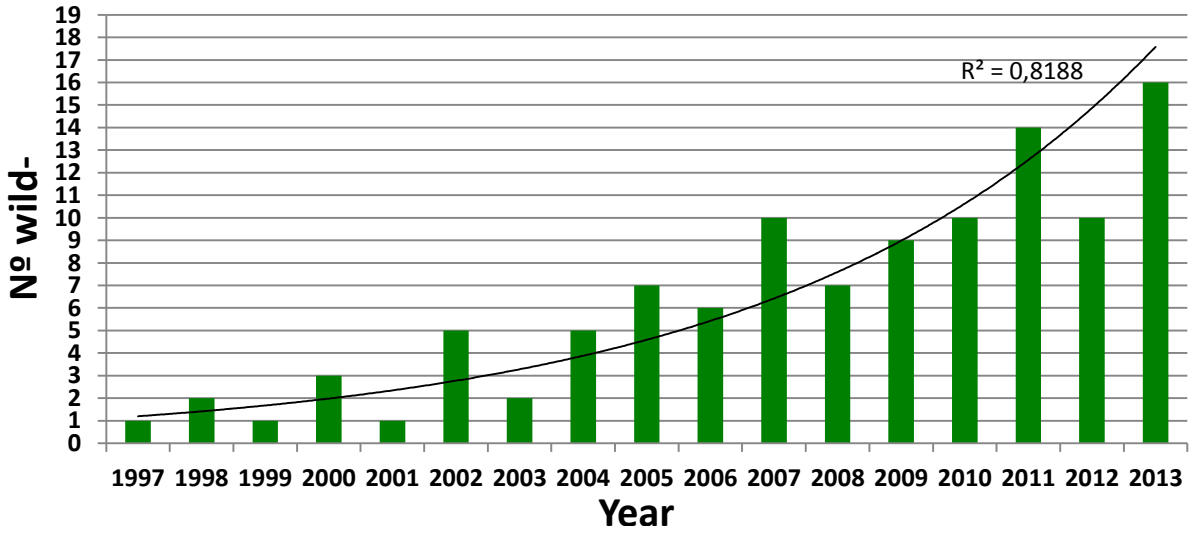


Figure 9: Number of chicks born in the wild in the Alpine range from 1997 till 2013.

Country	Pair	Birds ID			Important dates				Chick	Season of first	
		Male	Female	Other	Clutch	Hatch	Fledge	Failure		Occupation	Breeding
Eastern Alps	Gastein/Rauris	Andreas Hofer (BV260)	GT015		22.01.2013	-	-	15.04.2013	-	2002	2010
	Katschberg	Hubertus 2 (BV446)	Ambo (BV392)	? ♀	19.01.2013	-	-	25.02.2013	-	2009	-
	Mallnitz	Pinzgarus (BV558)	Escalero (BV462)		-	-	-	-	-	2012	-
Total	**3**	-	-	-	**2**	**0**	**0**	**2**	-	-	-
Central Alps	Lechtal	?	?		?	-	-	yes	-	2013	-
	Tantermozza	Zebru (W12)	Martell (BV395)		20.01.2013	21.03.2013	10.07.2013	-	Antonia-Tantermozza (W125)	2006	2007
	Sinestra	?	Moische-Livigno (W11)		01.02.2013	01.04.2013	17.07.2013	-	Curdin-Sinestra (W134)	2012	
	Foraz	?	GT031		09.02.2013	-	-	26.04.2013	-	2012	-
	Ofenpass	Livigno (W08)	Retia (BV357)		-	-	-	-	-	2006	2007
	Albula	Louis (BV364)	Diana-Stelvio (W07)		14.01.2013	14.03.2013	06.07.2013	-	Pep-Albula (W119)	2006	2008
	Poschiavo	?	?		21.02.2013	16.04.2013	18.08.2013	-	Carlo-Poschiavo (W131)	2013	2013
	Planeil	?	?		07.02.2013	-	-	01.05.2013	-	2013	-
	Schnals	?	?	?	13.02.2013	-	-	23.04.2013	-	2013	-
	Valle del Braulio	Tell (BV283)	Stift (BV393)		06.01.2013	01.03.2013	-	19.03.2013	-	1997	1998
	Livigno	Cic (BV186)	Moische (BV146)		22.01.2013	16.03.2013	05.07.2013	-	Urbano (W122)	1999	2000
	Zebru	?	Felice (BV375)		20.01.2013	14.03.2013	20.07.2013	-	Paco (W121)	2002	2002
Total	**12**	-	-	-	**10/11**	**7**	**6**	**4**	**6**	-	-
North-Western Alps	Aravis	GT028	Republic 11 (BV288)		20.01.2013	10.03.2013	11.07.2013	-	Plume d'Areu (W120)	2006	2009
	Bargy	Balthazar (BV099)	Assignat (BV111)		01.02.2013	25.03.2013	-	08.04.2013	-	1996	1997
	Termignon	Stelvio GT018	Gelas (BV279)		29.12.2012	20.02.2013	14.06.2013	-	Gygybarbe (W116)	2002	2002
	Val d'Isere	?	Jausiers (BV413)		21.01.2013	18.03.2013	12.07.2013	-	Toccata (W124)	1995	2002
	Derborence_Vérouet	Pablo (BV359)	Guillaumes (BV411)	Gildo (BV299) ♀	01.01.2013	01.03.2013	14.06.2013	-	Marlon (W133)	2004	2007
	Derborence_Down	Swaro (BV459)	Gilbert (BV440)		26.01.2013	22.03.2013	19.07.2013	-	Surprise (W126)	2012	2012
	Sixt Fiz	Montblanc (BV361)	Veronika (BV321)		07.02.2013	01.04.2013	20.07.2013	-	Linky (W130)	2004	2007
	Val di Rhemes	?	?		01.02.2013	31.03.2013	01.08.2013	-	Plume-Rhemes (W129)	2010	2012
	Peisey Nancroix	Phenix Alp action (W01)	GT027		18.01.2013	17.03.2013	19.07.2013	-	Passieu (W123)	2004	2005
	Chamoussière	Michegabri (BV488)	?		30.01.2013	25.03.2013	18.07.2013	-	Arc-en-ciel (W128)	2011	2012
	Leukerbad	Diana-Valais (BV301)	?		30.12.2012	-	-	20.01.2013	-	2011	-
Total	**11**	-	-	-	**11**	**10**	**9**	**2**	**9**	-	-
South-Western Alps	Source de la Tinée	Rocca (BV516)	Girasole (BV549)		07.03.2013	25.04.2013	-	02.05.2013	-	2012	-
	Source de l'Ubaye	Sereno (BV348)	GT036		05.01.2013	28.02.2013	25.06.2013	-	Seolane (W118)	2007	2008
Total	**2**	-	-	-	**2**	**2**	**1**	**1**	**1**	-	-
Total 2013	**28**	-	-	-	**25/26**	**19**	**16**	**10**	**16**	-	-

(Previous page) Table 3: Summary of the activity of breeding pairs in the Alps in 2013, organized by region, showing important dates in the reproductive season, offspring (if any) and years of first occupation and first successful breeding. Non-breeding and breeding failures are hghlighted in red.

4.2. Productivity

Productivity is measured as the number of fledged birds successfully raised per mature unit, and it is considered as an optimal parameter to check the state of the population, both on the general level when calculated for the whole population, and on the local level giving an idea of the suitability of each area to sustain Bearded vultures.

4.2.1. Total productivity across the years

When a species disappears from an area, the ecosystem tends to balance itself and the niche that this species occupied is taken over by another species. One of the problems that often arises in reintroduction programs is that the reintroduced species might need to fight its way back to recover the lost position, and therefore the recovering process takes longer than expected and often cannot be achieved. Fortunately, Bearded vultures have specialized in doing something that no other organism does: eating almost exclusively bones (up to 90% of its diet). Besides low competition for feeding resources, some other factors necessary for the survival of new populations are; the low level of mortality, optimal habitat suitability, availability of breeding sites, etc. Therefore, as long as the species can meet these requirements, it will thrive and the population will grow until the carrying capacity of the habitat is reached, which is yet far from happening in the Alps. For the Alpine Bearded vulture population, this growth can be observed when looking at the dynamics of the last 17 years (since the first clutch took place in the Alps, in 1996). **Figure 10** displays the productivity per year since 1996, which follows a positive lineal tendency with a low steepness (R^2 = 0.1171). From last year, the productivity increased by 27.2%, from the 0.43 in 2012 to the current **0.59** in 2013. At the moment, the average productivity for the Alps up to 2013 is almost **0.5** (0.491) (see **table 4**), which is quite good when compared, for instance, with the results obtained at other places such as The Pyrenees, the last stronghold of European Bearded vultures that was 0.35 in 2012. The global increase across the years in the Alpine values and the overall high levels, are good indicators for the positive development of this population. Moreover, it has been proven that productivity increases as pairs (or trios) get more experience (see Annual Report 2012), so this factor is also expected to help increase productivity in the future. However as the population grows, so does the number of new unexperienced couples, which might also lower the productivity, although this won't be very marked since the number of experienced pairs will most likely still be higher than that of new ones.

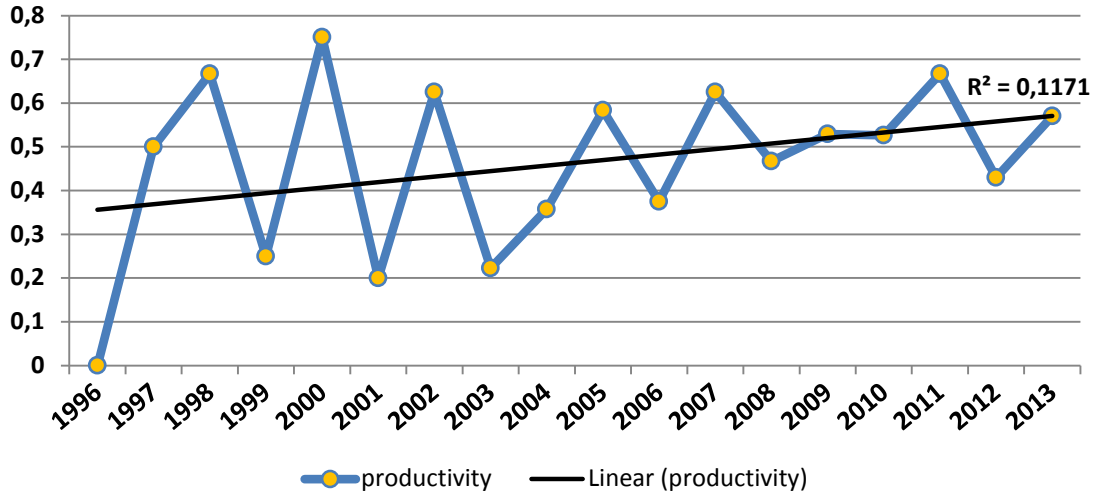


Figure 10: Total productivity in the Alps across the years, from 1996 to 2013

Table 4: Reproductive parameters in the whole Alps from 1995 to 2013

		95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	Total
C1	Territories	1	1	2	3	4	5	6	9	11	18	15	18	18	15	17	19	22	24	28	**236**
C2	Mature pairs	1	1	2	3	4	4	5	8	9	14	12	16	16	15	17	19	21	23	27	**217**
D	Clutch	0	1	1	2	4	4	5	6	7	8	8	9	13	15	13	18	20	18	25	**152**
E	Hatching	0	0	1	2	3	3	4	6	4	5	8	7	12	11	10	15	16	12	19	**119**
F	Fledgling	0	0	1	2	1	3	1	5	2	5	7	6	10	7	9	10	14	10	16	**93**
D/C2	% breeding	0	1	0,5	0,7	1	1	1	0,8	0,8	0,6	0,7	0,6	0,8	1	0,8	0,9	0,9	0,8	0,9	**0,803**
F/D	% successful	0	0	1	1	0,3	0,8	0,2	0,8	0,3	0,6	0,8	0,7	0,8	0,5	0,7	0,6	0,7	0,6	0,6	**0,639**
F/C2	Productivity	0	0	0,5	0,7	0,3	0,8	0,2	0,6	0,2	0,4	0,6	0,4	0,6	0,5	0,5	0,5	0,6	0,4	0,6	**0,491**

4.2.2. Total productivity per geographic region

The reproductive parameters per geographic region and per each of the mature couples registered up to 2013 are represented in **table 5** and **figure 11.** The location of these pairs and levels of productivity is displayed in the map of the Alpine range, coloured in different warm colours from white to dark red.

Table 5: Reproductive parameters per geographic region from 1995 to 2013

		S-Western	N-Western	Central	Eastern	Total Alps
C2	Mature pairs	16	104	77	21	190
D	Clutch	7	86	64	17	152
E	Hatching	6	65	56	8	119
F	Fledgling	4	52	48	3	93
D/C2	% breeding	**0,438**	**0,827**	**0,831**	**0,810**	**0,798**
F/D	% successful	**0,571**	**0,605**	**0,750**	**0,176**	**0,615**
F/C2	Productivity	**0,250**	**0,500**	**0,623**	**0,143**	**0,491**

When looking at the results of the productivity since 1995 per geographic region (see **table 5**), it is quite evident that there is a significant difference between the

"core zones" in the middle of the range (NW-Alps, 0,5 and Central Alps, 0,623), that present much higher values than those of the "extremes" (SW-Alps, 0,25 and E-Alps, 0,143), where productivity is lower. Not only is the productivity of the SW- and E-Alps alarmingly below the rest of the range, but also the results in other reproductive parameters are abnormally low. It is a likely that there are one or several factors affecting the settlement of couples in the area, as the number of mature pairs is significantly lower than in the "core zones". Considering that Bearded vultures show a strong philopatric behaviour, and that the number of birds that have been released in these areas is equal or higher (equal in the SW-Alps, higher in the E-Alps) than the core zones, it might be expected that these figures should be at least similar to those areas. This need not be that there are less birds coming to this area due to its unsuitability, but it could also reflect an increased mortality rate among older birds in the area, although this notion couldn't be proved thus far. Moreover, there's also some factor hindering the upraising of the chicks (i.e. possible higher levels of disturbance), since the number of chicks that reach the fledging age (F/D) is noticeably low too.

	S-Western						N-Western														Central												Eastern				
Pair	Source de l'Ubaye	Source de Tinée	Valle Varaita	Ussolo-Prazzo	Chatelet	Stura-Pietraporzio	Bargy	Aravis	Sixt Fiz	Peisey-Nancroix	Val d'Isere	Termignon	Rhêmes	Chamoussière	Derborence_Vérouet	Derborence_down	Leukerbad	Andagne	Valdigne	Modane	Bonneval	Albula	Tantermozza	Ofenpass	Livigno	Valle del Braulio	Zebru	Foscagno	Foraz	Sinestra	Poschiavo	Planeil	Lechtal	Mallnitz	Gastein/Rauris	Schnals/Pfossental	Katschberg	Heiligenblut
D/C2	0,8	1,0	0,0	0,0	1,0	0,0	1,0	1,0	0,8	1,0	0,8	1,0	1,0	1,0	0,5	1,0	0,3	1,0	0,3	0,0	0,0	0,8	0,8	0,5	1,0	0,9	0,9	0,5	1,0	1,0	1,0	1,0	0,0	0,0	0,9	0,5	0,8	1,0
F/D	0,8	0,0	0,0	0,0	0,0	0,0	0,7	0,3	0,7	0,7	0,6	0,7	0,5	0,7	0,6	1,0	0,0	0,0	0,0	0,0	0,0	1,0	0,5	1,0	0,8	0,7	0,8	1,0	0,0	0,5	1,0	0,0	0,0	0,0	0,2	0,0	0,3	0,0
F/C2	0,7	0,0	0,0	0,0	0,0	0,0	0,7	0,3	0,6	0,7	0,5	0,7	0,5	0,7	0,3	1,0	0,0	0,0	0,0	0,0	0,0	0,8	0,4	0,5	0,8	0,6	0,8	0,5	0,0	0,5	1,0	0,0	0,0	0,0	0,2	0,0	0,2	0,0

(Previous page) Figure 11: Main reproductive parameters of each reproductive unit per geographic region since 1995, displaying their position in the map of the Alps by geographic region.

The results for each individual couple follow a similar pattern. Just 5 of the couples present high productivity (> 0.75), 4 of them in the Central-Alps (Albula, tantermozza, Zebru and the new Poschiavo) and 1 in the NW-Alps (Derdorence_Down), and 7 more with medium-high productivities (from 0.5 to 0.75), this time just 1 in the C-Alps (Valle del Braulio), 6 in the NW-Alps (Bargy, Sixt Fiz, Peisey-Nancroix, termignon and Chamoussière) and the last one in the SW-Alps, the only viable couple so far. The main difference between the C-Alps and the NW-Alps is that in the latter one, the number of registered couples is higher but 1/3 of them have never raised a chick successfully, whereas in the C- Alps it's the opposite: although there are less mature pairs, these are extremely successful. Therefore the remarkable productivity in the C-Alps lies upon less pairs, but with outstanding results.

4.3. Effect of experience and region in reproduction (by André Pinheiro)

Since 1995, several nesting sites have been monitored, providing a vast amount of reproduction data that have been little studied up to date. Thus, we have conducted a short preliminary research to study whether or not there are correlations between two different parameters: Clutching Date and Breeding Success.

1) **Clutching Date(C.D.)**:

The average C.D. was 85.7 days (n=127). This was measured counting the number of days since November first of the previous year up until clutching occurred.

We studied the possibility of creating a model that predicted the C.D. using possible other parameters and came to the conclusion that Breeding Units (BU) and

Experience Years (the number of years the breeding unit has been established) are factored in 100% and 98% of the model possibilities to explain the C.D.

2) Breeding Success (B.S.)

We studied the possibility of creating a model that predicted the B.S. using the parameters Region (location), C.D. and Season (date of the reproduction event). The results were:

Region: 1.00
Clutching Date: 0.56
Season: 0.34

The results indicated that the C.D. and the Season were not relevant factors to predict the Breeding Success, but that Region was, in fact, present in all model possibilities to account for B.S.

A second model was created, integrating as well the Experience Years of the couple (the ammount of time the same couple has been together for). The results were:

Region: 1.00
Clutching Date: 0.53
Season: 0.29
Experience Years: 0.59

The results indicated, once again, that only Region played a significant role in the modelling of the Breeding Success, being the one that appears in all models.

Other questions arose with this study such as: does individual ID affect breeding success? That is, are specific individuals significantly more effective in reproducing than others, and if so why and what are the contributing factors? These along with other questions, require further testing and more data.

5. Mortality

Under natural conditions, the sole expansion of the population will increase the cases of mortality as a result of demographic dynamics. Therefore the numbers of dead Bearded vultures are likely to increase in the future. As this species dwells in remote and often unreachable places, the probabilities of actually finding the carcasses of deceased individuals are quite low. The fact mortality is a natural and expected process doesn't mean it's less painful to discover that one of our birds won't

soar the Alpine skies any longer, all birds in the wild are the result of a great effort from many devoted people.

In 2013, there were two known mortality cases. The first was the adult bird **BV456 Doraja**, found in a forest clearing in Carinthia (Austria) on the 13th of May, although suspected to be dead since 2012. Just three bones and the right ring could be collected from this individual, which is a well-known individual to the Alpine project. Doraja was released in 2005, and had to be re-captured following an episode of acute lead-poisoning after swallowing small pieces of bullets. Fortunately, it could be released once again after 8 months of recovery in the breeding centre RFZ in Haringsee (Austria). This bird remained within the Eastern Alps since then, and in 2011, Doraja joined the young bird BV 558 Pinzgarus in the area of Mallnitz which made us hope for a new pair formation, although the unfortunate death of Doraja would frustrate our expectations.

The second individual that died in 2013 was **BV760 Dourbie**. This individual was born in the breeding centre of Guadalentín (Spain), and released on the 6th of July this same year. The strong wish for freedom made Dourbie fledge before the security fence was removed, at the age of 119 days. However, barely 20 days after fledging, Dourbie would meet an untimely end after colliding with a cable, putting an end to this young bird's bold adventures.

6. Further recommendations

1) In 2013 the number of observations entered in the Data base has reached its historical minimum. Although the importance of common observations for a clear picture of the distribution of and the spatial use by Bearded vultures is undoubted, this decrease also points out there might be necessary to give a new direction to the project. Therefore, the main goal of the monitoring of the Central European population and therefore the work of the IBM might shift to other tasks such as monitoring of the reproductive output in the Alps, as the population expands.

2) While working with data on age classes, basic for the entire project, a problem that seems to have been overlooked in former years has arisen. When does a bird change from one group to the next? Seemingly there are different interpretations to this, so it becomes of paramount importance to discuss this topic in the next meeting of the Steering Committee to clarify the topic.

3) Data from external data bases have to be integrated in the IBM Data base. Ornitho.xx especially can provide an important part of the stored observation data. This is a point that has been discussed at length, but as has not yet been solved and it should be pointed out once again.

4) As the population grows, so does the difficulty on using a system to mark individuals for specific recognition. This is particularly important when speaking about the aluminium rings used up to date, since the combinations are being already repeated in some individuals. For this reason, some individuals have been marked with a Darvic ring (and another alu one for security). However, there are discrepancies about the effectiveness of such rings in the future, so alternatives and supporting data would be welcomed.

5) One of the main purposes of the monitoring of the population and collecting of data is, or should be, the use of this information for scientific research. The vast amount of data stored in the Database up to date is a real treasure that should be used in scientific publications more often. Therefore, universities and scientific constitutions should be encouraged by the IBM members to work with the data collected by the IBM on different questions.

6) The analyses on demography are almost entirely based on the model created by Schaub et al. in 2009. Although this model has been very useful and accurate up to date, it might be necessary to update it to the current state of the population.

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