



INTERNATIONAL  
BEARDED VULTURE  
MONITORING

IOD 2021

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## 16<sup>th</sup> International Bearded Vulture Observation Days

Focal day - October 2<sup>nd</sup> 2021  
IOD Period - October 2<sup>nd</sup>-9<sup>th</sup> 2021



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# Imprint

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**The International Observation Days (IOD)** are an annual monitoring event for Bearded Vultures organised by the International Bearded Vulture Monitoring network (IBM). The monitoring action takes place in the first two weeks of October with a synchronous and coordinated survey on the focal day and covers large parts of the Alpine arc (since 2006), parts of the Massif Central (since 2012), the eastern part of the French Pyrenees (since 2016), several regions in Spain (since 2017) and some selected sites in Bulgaria (since 2018). The aim of this expanding network is to establish a Europe-wide monitoring of the Bearded Vulture population where time-synchronised observations on the focal day allow to make an approximate estimate of the population size and age class distribution. A monitoring action of this scale and the fact that birds are identified on an individual level whenever possible, is unique and generates baseline information for survival analyses and demographic modelling, which give valuable insight into the reintroduction progress. Furthermore, the number of participants during the IOD increases every year and thus the IOD represents a big public event that helps to increase awareness for the conservation of the Bearded Vulture as a flagship species.

## 1 Abstract

On this year's Focal Day on the 2<sup>nd</sup> of October, almost 1'300 observers were able to benefit from mostly favourable weather conditions and thus contribute to the 16<sup>th</sup> annual Bearded Vulture census. Although a small proportion of observers located south of the main Alpine ridge faced unsuitable weather conditions (16%), visibility was mainly good (77%) or moderate (7%) and allowed for 927 Bearded Vulture observations at 311 of the 748 (42%) occupied sites. 18 IBM-partners and several associated organisations coordinated synchronous observations at 726 sites on the focal day and 22 more during the IOD period. Furthermore, these experts are familiar with the local situation and are key to give an estimate about the population size in their region and also to identify individual birds. This made it possible to compile, evaluate and summarise the observations and estimates over the monitoring area in order to get an overview of the age class distribution and to compare the estimates on the alpine scale with the predicted population size from demographic modelling (Schaub et al. 2009)<sup>1</sup>.

The Alpine population was estimated to vary between 284 and 381 individuals. This is slightly lower than the model<sup>1</sup> estimate of 380 individuals. However, similar as in the previous years, the estimated age class distribution is well in line with the predicted values of the demographic model<sup>1</sup> with a slight underestimate of the number of subadult birds, which are difficult to identify correctly in the field (estimated age class distribution: 57% adults, 6% subadults, 18% immature, 14% juveniles). The population estimate and the age class distribution are based on observation data collected during the focal day combined with the estimated number of individuals that have not been observed but are supposed to be present in the specific region (territorial birds, in some exceptional cases their fledglings, GPS-tagged birds (N = 62 in 2021) etc.).

The small population of the Massif Central is estimated to vary between 7-13 individuals, and around 7 individuals have been estimated to be present in the Aude region in the French Pyrenees. In Spain, outside of the Pyrenees, Bearded Vulture populations haven been estimated to vary between 3 and 4 individuals in Maestrazgo and 21-33 in Andalusia and Rioja. Similar as in the last years, no Bearded Vultures have been observed in Bulgaria where the species has been considered extinct since 1972.

During this year's IOD, multiple Bearded Vulture individuals have been identified in the Alps (N=63), the Massif Central (N=6) and Spain (N=6), while another 19 (Alps) and 7 (Spain) individuals were identified with lower probability. Furthermore, 62 animals could be tracked by GPS, whereby only 14 of the 39 animals that were present in the Alpine region could be visually identified by observers. These valuable individual-based data provide important information on the life-history of the animals and can serve to calculate parameters for demographic modelling. Such individual-based information on an international scale is unique and allows to estimate survival rates and to follow the bird's life-history - important key elements in order to monitor the development of the Bearded Vulture project.

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<sup>1</sup> Schaub, M., Zink, R., Beissmann, H., Sarrazin, F., & Arlettaz, R. (2009). When to end releases in reintroduction programmes: demographic rates and population viability analysis of Bearded Vultures in the Alps. *Journal of Applied Ecology*, 46(1), 92-100.

## 2 Key facts

### Monitoring organisation

- 18 IBM-partners and several associated organisations coordinated the IOD 2021
- 1'295 observers participated in Austria, Bulgaria, France, Germany, Italy, Spain and Switzerland
- 726 sites were occupied during the focal day (2.10.2021) another 22 during the IOD period
- weather situation at the observation sites: 77% good, 7% moderate and 16% unfavourable

### Observation results

- 960 Bearded Vulture observations during the IOD period, 927 of them on the focal day 2<sup>nd</sup> October 2021
- Bearded Vultures observed at 311 out of 748 sites (42%)
- observed age class distribution (number of observations per age class)
  - adult (N = 523, 54%)
  - subadult (N = 42, 4%)
  - immature (N = 157, 16%)
  - juvenile (N = 138, 14%)
  - unknown (N = 100, 10%)

### Age class distribution & populations estimates

- estimated age class distribution in the alps (individuals)
  - adult (N = 182, 57%)
  - subadult (N = 20, 6%)
  - immature (N = 58, 18%)
  - juvenile (N = 44, 14%)
  - unknown (N = 17, 5%)
- estimated number of Bearded Vulture individuals:
 

|                        |           |
|------------------------|-----------|
| – Alps:                | 284 - 381 |
| – Massif Central:      | 7-13      |
| – Pre-Pyrenees (FRA):  | 6-7       |
| – Spain <sup>2</sup> : | 21-33     |
| – Maestrazgo (ESP)     | 3-4       |
| – Bulgaria:            | 0         |

### Individual based data

- 63 (Alps), 6 (Massif Central) and 6 (Spain) individuals were identified
- 19 (Alps) and 7 (Spain) individuals were probably identified
- GPS-data is available for 62 individuals during the IOD period 2021
- in the Alps 14 (~36%) of the 39 GPS-tagged individuals were identified by the observers

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<sup>2</sup> Only for monitored parts (e.g. no survey in Spanish Pyrenees and other mountain ranges)

## 3 Preface

After last year's IOD could not or only partially be carried out in certain regions due to bad weather conditions and snowfall, most regions benefited from favourable weather in 2021. The fact that this year a new record of participants was reached, shows that the fascination for Bearded Vultures continues to reach many people and brings them together at this annual event. Without the great support of the extensive network of volunteers and experts, it would not be possible to organise this unique event.

## 4 Methods

### 4.1 Organisation

The monitoring is coordinated and executed simultaneously over the four Alpine zones (eastern, central, north-western and southern Alps), in the Massif Central, in parts of the French Pyrenees, Spain and Bulgaria by local IBM-partners and associated organisations (**Figure 1**). This ultimately allows to gain information about Bearded Vulture presence thus reducing the chance of double counts and allowing us to get the big picture of Bearded Vulture distribution.

With a new releasing partner in the German Alps, a new observer network has been established in this region of the Eastern Alpine range in the last year. In the previous years, the monitoring network has evolved in the Pyrenees (department Aude in France) in order to reveal exchanges between the separated populations from the Alps and the Pyrenees. Since 2017, our Spanish colleagues (and new IBM-partner since 2019) organise the IOD within parts of Andalusia and Castilla y León and share their results with the IBM-network to contribute to get a more comprehensive picture of the Bearded Vulture population in western Europe. A new observer network is also establishing in the eastern parts of Europe in Bulgaria, where the *Green Balkans* participate at the IOD since 2018 and thus raise awareness for the regionally extinct species. As in the previous years, no IOD was organised on Corsica.

#### Time Period

The 2021's international survey was held between the 2<sup>nd</sup> and the 9<sup>th</sup> October with the focal day on Saturday 2<sup>nd</sup> of October. Due to the experience with the bad weather situation in 2020, an alternative date (weekend) was initially planned one week later but favourable weather conditions allowed for a European-wide survey on the first date. The buffer period of one week is chosen to allow more flexibility for areas where the weather conditions are not suitable on the focal day.

All dates are decided on mutual agreement among the IBM partners and take into account partner's availability, other ornithological appointments and the birds' reproductive behaviour (see [future dates](#)). The fact, that Bearded Vultures are active in nest building during October, makes this a suitable period to observe the birds and record possible new territories and breeding pairs.



## 4.2 Monitoring Area

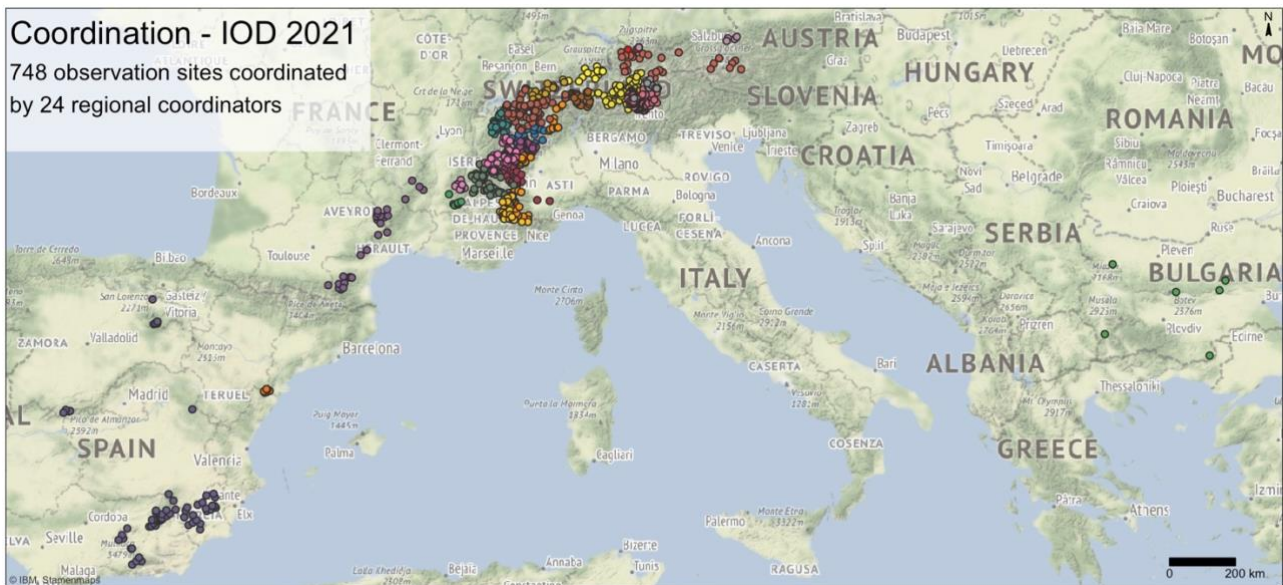


Figure 1. The IOD-monitoring area is regionally coordinated by 18 IBM-partners and associated organisations.

## 4.3 Data collection and observation protocol

Where weather conditions permitted, posts were occupied between 10:00 and 15:00 at least. The teams were composed of one or more observers, at least one of them being experienced, equipped with binoculars and, depending on availability, telescope and camera. For each observation site and Bearded Vulture sighting the following information was recorded:

### Observation site:

- Date and site occupancy (time)
- team/partner and observer names
- site name, address and coordinates
- weather conditions
- total number of observed Bearded Vultures
- presence/observation of other species

### Bird observation:

- date
- time and duration of the observation
- age of the bird<sup>3</sup>
- bird name / hypothesis
- picture if possible

<sup>3</sup> In age classes: juvenile (1.cy), immature (2.-3.cy), subadult (4.-5.cy) adult (≥6.cy)

## 4.4 Data Analysis

All data is collected at the end of the day by the local administrators who will review the reported observations. The local administrators work in close cooperation with field assistants/observers and other nearby local administrators responsible for the surrounding monitoring areas. Based on e.g. individual markings, temporal overlap of the sightings, knowledge about known territorial birds and their juveniles that still remain in the area, they are able to critically assess the number of observations and judge to how many individual Bearded Vultures the IOD observations refer to. GPS-tagged birds that were not observed, are added to the estimate and also serve as a measure for detection probability.

The population estimate should be based only on data from the focal day in order to avoid, that individuals are observed and thus counted twice in two different regions. Since individual identification is challenging, it is thus not always possible to assess whether several observations have been made of the same individual. Therefore, the final estimate includes a minimal and a maximal count number, namely accounting for a stricter versus a less conservative analysis.

After a critical assessment of possible double countings, these results are summarised over the whole monitoring area in order to get an overview of the estimated Bearded Vulture populations. Finally, the resulting population estimates of the IOD are compared with the estimates deduced from the demographic model of Schaub et al. (2009).

## 4.5 Age classification

Per definition the IBM always uses calendar years (cy) for age specifications (**Table 1**).

*Table 1. IBM-standard age classification.*

| Entry in the IBM<br>(life stage) | Calendar year<br>(cy) | Real age (years) |         | Life history event        |
|----------------------------------|-----------------------|------------------|---------|---------------------------|
|                                  |                       | Jan-Feb          | Mar-Dec |                           |
| juvenile (1. year)               | 1                     | -                | 0       | <i>hatch</i>              |
| immature (2. year)               | 2                     | 0                | 1       | <i>non-territorial</i>    |
| immature (3. year)               | 3                     | 1                | 2       | <i>non-territorial</i>    |
| subadult (4. year)               | 4                     | 2                | 3       | <i>non-territorial</i>    |
| subadult (5. / 6. year)          | 5                     | 3                | 4       | <i>potential nesting</i>  |
| adult (≥ 6. year)                | 6                     | 4                | 5       | <i>potential breeding</i> |
| adult (≥ 6. year)                | ≥7                    | 5                | ≥6      | <i>potential breeding</i> |

## 5 Results and Discussion

### 5.1 Weather conditions

The overall weather situation was favourable in 2021 with 77% good, 7% moderate and 16% bad weather conditions at the observation sites (**Figure 2**). In 2020 only 36% of the sites reported favourable weather. Unfavourable weather conditions decrease the detection probability of the individuals and should therefore be considered for the interpretation of the population estimates.

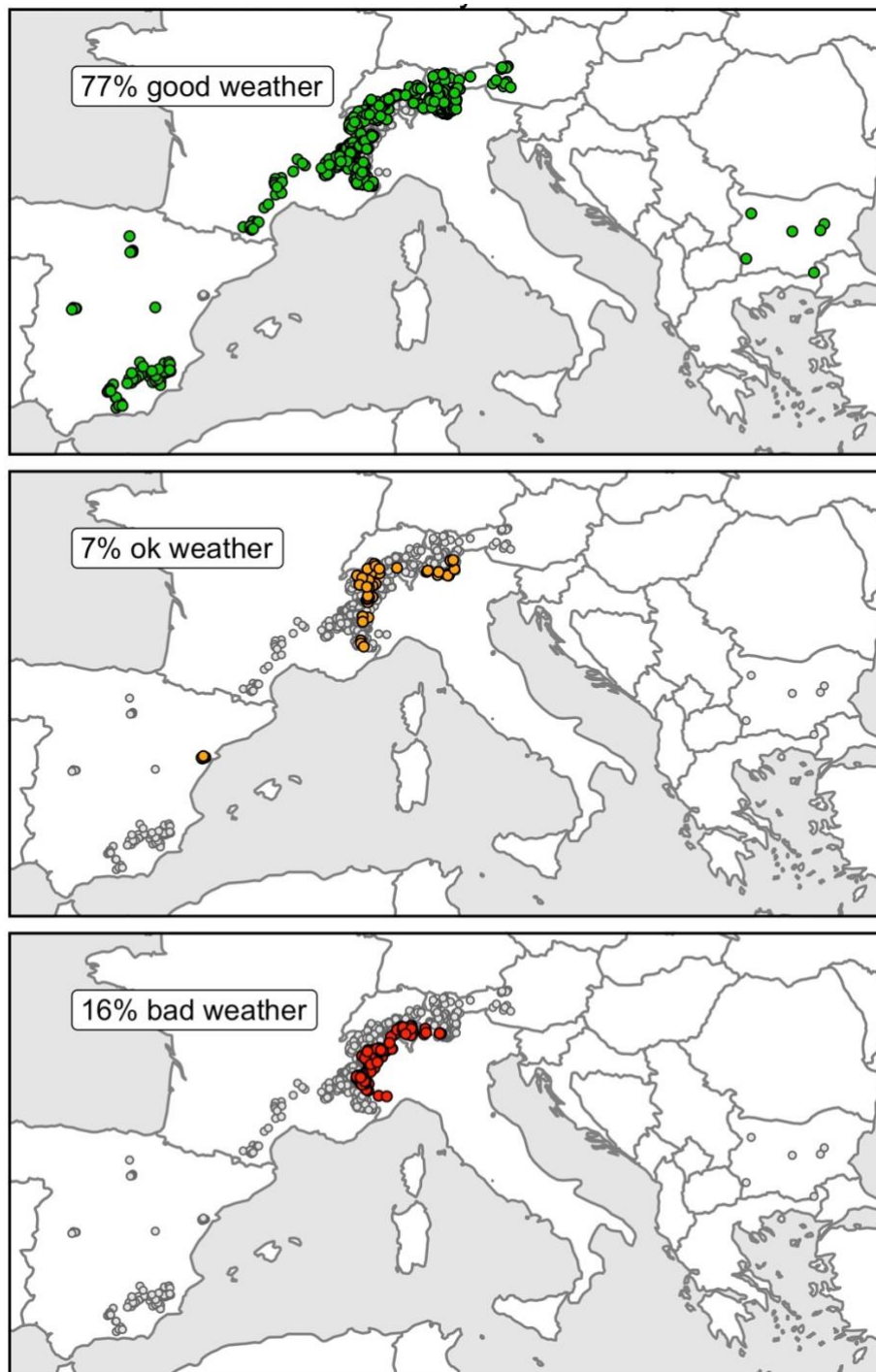


Figure 2. Weather conditions at the observations sites reported by the observers in the field during the IOD 2021. Most of the observers (77%) profited from good weather conditions and only at the southern side of the Alpine range some sites faced bad weather conditions.

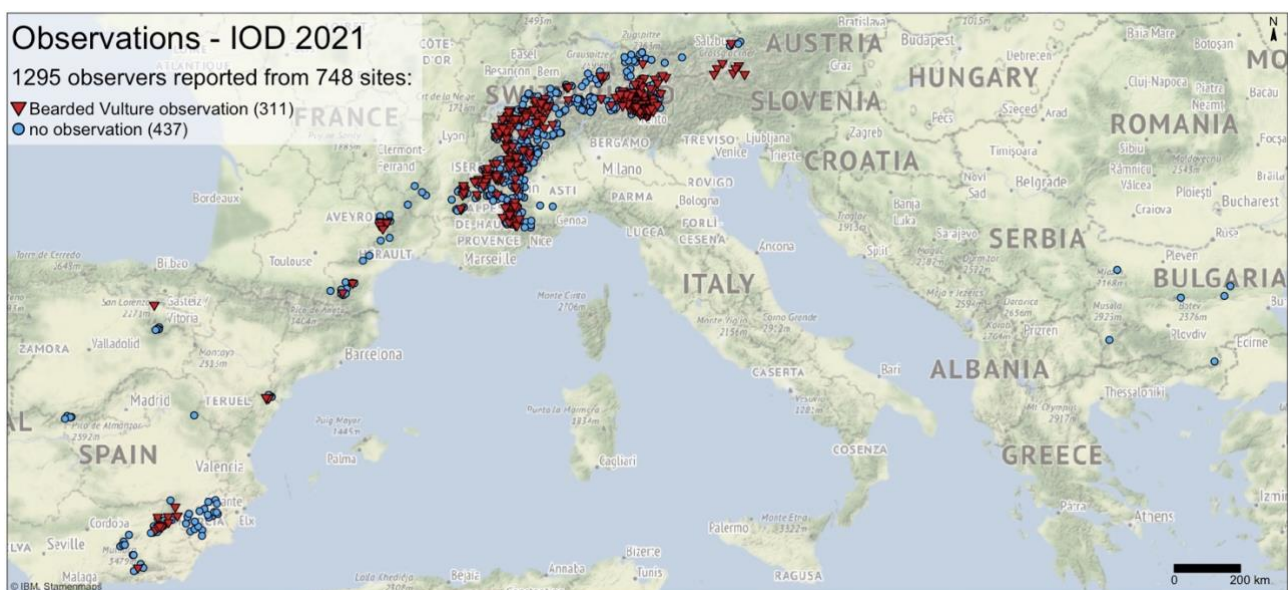
## 5.2 Observation data

In 2021, a total of 1'295 observers have occupied 748 observation sites in the Alps, in the French Pyrenees (department “Aude”), parts of Spain as well as Bulgaria (**Figure 3 and Table 2**).

The first IOD has been organised in the German Alps, where two birds have been released for the first time in 2021. Through the new reintroduction site, hopefully more people in this region will be made aware of the Bearded Vulture reintroduction project in the future.

As in the previous years, the western regions of the Alps remain the most thoroughly surveyed areas together with the area of the Stelvio National Park in the North of Italy. With additional observation sites close to the Spanish border near the Pyrenees, the IBM monitoring network plans to cover regions that might serve as a connection between the Bearded Vulture populations from the Alps and the Pyrenees. As it is known that Bearded Vultures in Spain move between the mountainous areas in the South and the region of Castilla y León, Castilla-La Mancha and La Rioja in the North, the observer network has been expanded in these areas.

In the eastern part of Europe, several observations sites in Bulgaria were also occupied for the first time in 2018, even though so far no Bearded Vultures are known to be present in this region. However, in the future this region could serve as a stepping-stone area between the Alpine and Greek Bearded Vulture population. Therefore, the establishment of an observer network in this area makes sense in the long-term perspective.



*Figure 3. Distribution of all 748 observation sites during the IOD 2021 in Europe. Red triangles depict sites where Bearded Vultures have been observed at least once during the IOD period 2<sup>nd</sup>-9<sup>th</sup> of October 2021 (N=311) while no observations have been reported from sites marked with a blue dot (N=437). In Austria, only those sites are reported where a Bearded Vulture was actually observed. This means that it is not possible to see where no Bearded Vulture has been observed and the monitoring effort is underestimated due to this figure.*

Table 2. Number of observation sites and observers per region during the IOD 2021 (focal day 02.10.2021). In Austria, only those sites are reported where a Bearded Vulture was actually observed. This means that it is not possible to see where no Bearded Vulture has been observed and the monitoring effort is underestimated due to this figure.

| Zone                            | Country | Region                     | Occupied sites in October 2021 |          |          |          |          | Total    |            |
|---------------------------------|---------|----------------------------|--------------------------------|----------|----------|----------|----------|----------|------------|
|                                 |         |                            | 2.                             | 3.       | 6.       | 7.       | 8.       |          | 9.         |
| <b>Alpine range</b>             |         |                            | <b>620</b>                     | <b>7</b> | <b>2</b> | <b>3</b> | <b>3</b> | <b>7</b> | <b>642</b> |
| <b>East</b>                     | AUT     | Kärnten                    | 2                              |          |          |          |          |          | 2          |
|                                 | AUT     | Salzburg                   | 5                              |          |          |          |          |          | 5          |
|                                 | AUT     | Tirol                      | 2                              |          |          |          | 1        |          | 3          |
|                                 | DEU     | Bayern                     | 2                              |          |          |          |          |          | 2          |
| <b>Central</b>                  | AUT     | Tirol                      | 9                              | 1        |          |          |          |          | 10         |
|                                 | AUT     | Vorarlberg                 | 8                              |          |          |          |          |          | 8          |
|                                 | CHE     | Central Switzerland        | 16                             |          |          |          |          |          | 16         |
|                                 | CHE     | Eastern Switzerland        | 59                             |          |          |          |          |          | 59         |
|                                 | CHE     | Ticino                     | 23                             |          |          |          |          |          | 23         |
|                                 | CHE     | Western Switzerland        | 6                              |          |          |          |          | 1        | 7          |
|                                 | DEU     | Bayern                     | 4                              | 1        |          |          |          |          | 5          |
|                                 | ITA     | Lombardia                  | 73                             |          |          |          |          |          | 73         |
|                                 | ITA     | Piemonte                   | 6                              |          |          |          |          |          | 6          |
|                                 | ITA     | Trentino-Alto Adige        | 31                             |          |          |          |          |          | 31         |
| <b>North-West</b>               | CHE     | Western Switzerland        | 61                             | 3        | 2        | 3        | 2        | 5        | 76         |
|                                 | FRA     | Rhône-Alpes                | 82                             |          |          |          |          | 1        | 83         |
|                                 | ITA     | Piemonte                   | 39                             |          |          |          |          |          | 39         |
|                                 | ITA     | Valle d'Aosta              | 38                             | 1        |          |          |          |          | 39         |
| <b>South-West</b>               | FRA     | Provence-Alpes-Côte d'Azur | 74                             | 1        |          |          |          |          | 75         |
|                                 | FRA     | Rhône-Alpes                | 42                             |          |          |          |          |          | 42         |
|                                 | ITA     | Piemonte                   | 38                             |          |          |          |          |          | 38         |
| <b>Massif Central</b>           |         |                            | <b>20</b>                      |          |          |          |          |          | <b>20</b>  |
|                                 | FRA     | Languedoc-Roussillon       | 11                             |          |          |          |          |          | 11         |
|                                 | FRA     | Midi-Pyrénées              | 5                              |          |          |          |          |          | 5          |
|                                 | FRA     | Rhône-Alpes                | 4                              |          |          |          |          |          | 4          |
| <b>Pre-Pyrenees</b>             | FRA     | Languedoc-Roussillon       | <b>11</b>                      |          |          |          |          |          | <b>11</b>  |
| <b>Spain (without Pyrenees)</b> |         |                            | <b>69</b>                      |          |          |          |          |          | <b>69</b>  |
|                                 | ESP     | Andalucía                  | 28                             |          |          |          |          |          | 28         |
|                                 | ESP     | Castilla y León            | 3                              |          |          |          |          |          | 3          |
|                                 | ESP     | Castilla-La Mancha         | 5                              |          |          |          |          |          | 5          |
|                                 | ESP     | Comunidad Valenciana       | 7                              |          |          |          |          |          | 7          |
|                                 | ESP     | Extremadura                | 1                              |          |          |          |          |          | 1          |
|                                 | ESP     | La Rioja                   | 5                              |          |          |          |          |          | 5          |
|                                 | ESP     | Región de Murcia           | 20                             |          |          |          |          |          | 20         |
| <b>Bulgaria</b>                 |         |                            | <b>6</b>                       |          |          |          |          |          | <b>6</b>   |
|                                 | BGR     | Blagoevgrad                | 1                              |          |          |          |          |          | 1          |
|                                 | BGR     | Haskovo                    | 1                              |          |          |          |          |          | 1          |
|                                 | BGR     | Montana                    | 1                              |          |          |          |          |          | 1          |
|                                 | BGR     | Sliven                     | 2                              |          |          |          |          |          | 2          |
|                                 | BGR     | Stara Zagora               | 1                              |          |          |          |          |          | 1          |
| <b>Sites total IOD 2021</b>     |         |                            | <b>726</b>                     | <b>7</b> | <b>2</b> | <b>3</b> | <b>3</b> | <b>7</b> | <b>748</b> |

Table 3. Number of Bearded Vulture sightings for each region during the whole IOD period 2021 (focal day 02.10.2021). 0 values indicate dates where sites were occupied but no Bearded Vulture have been observed.

| Zone   | Country                    | Region | Bearded Vulture observations in October 2021 |          |          |          |          |           | Total      |
|--|----------------------------|--------|--|----------|----------|----------|----------|-----------|------------|
|  |                            |        | 2.   | 3.       | 6.       | 7.       | 8.       | 9.        |            |
| <b>Alpine range</b>                                |                            |        | <b>868</b>                                   | <b>5</b> | <b>4</b> | <b>3</b> | <b>7</b> | <b>14</b> | <b>901</b> |
| <b>East</b>  | Kärnten                    | AUT    | 4  |          |          |          |          |           | 4          |
|  | Salzburg                   | AUT    | 5  |          |          |          |          |           | 5          |
|  | Tirol                      | AUT    | 2  |          |          |          | 2        |           | 4          |
|  | Bayern                     | DEU    | 2  |          |          |          |          |           | 2          |
| <b>Central</b>                                     | Tirol                      | AUT    | 9  | 1        |          |          |          |           | 10         |
|  | Vorarlberg                 | AUT    | 0  |          |          |          |          |           | 0          |
|  | Central Switzerland        | CHE    | 12   |          |          |          |          |           | 12         |
|  | Eastern Switzerland        | CHE    | 77   |          |          |          |          |           | 77         |
|  | Ticino                     | CHE    | 0  |          |          |          |          |           | 0          |
|  | Western Switzerland        | CHE    | 3  |          |          |          |          | 1         | 4          |
|  | Bayern                     | DEU    | 0  | 0        |          |          |          |           | 0          |
|  | Lombardia                  | ITA    | 244  |          |          |          |          |           | 244        |
|  | Piemonte                   | ITA    | 0  |          |          |          |          |           | 0          |
|  | Trentino-Alto Adige        | ITA    | 37   |          |          |          |          |           | 37         |
| <b>North-West</b>                                  | Western Switzerland        | CHE    | 60   | 4        | 4        | 3        | 5        | 12        | 88         |
|  | Rhône-Alpes                | FRA    | 264  |          |          |          |          | 1         | 265        |
|  | Piemonte                   | ITA    | 6  |          |          |          |          |           | 6          |
|  | Valle d'Aosta              | ITA    | 15   | 0        |          |          |          |           | 15         |
| <b>South-West</b>                                  | Provence-Alpes-Côte d'Azur | FRA    | 56   | 0        |          |          |          |           | 56         |
|  | Rhône-Alpes                | FRA    | 59   |          |          |          |          |           | 59         |
|  | Piemonte                   | ITA    | 13   |          |          |          |          |           | 13         |
| <b>Massif Central</b>                              |                            |        | <b>15</b>                                    |          |          |          |          |           | <b>15</b>  |
|  | Languedoc-Roussillon       | FRA    | 12   |          |          |          |          |           | 12         |
|  | Midi-Pyrénées              | FRA    | 3  |          |          |          |          |           | 3          |
|  | Rhône-Alpes                | FRA    | 0  |          |          |          |          |           | 0          |
| <b>Pre-Pyrenees</b>                                | Languedoc-Roussillon       | FRA    | <b>2</b>                                     |          |          |          |          |           | <b>2</b>   |
| <b>Spain (without Pyrenees)</b>                    |                            |        | <b>42</b>                                    |          |          |          |          |           | <b>42</b>  |
|  | Andalucía                  | ESP    | 28   |          |          |          |          |           | 28         |
|  | Castilla y León            | ESP    | 0  |          |          |          |          |           | 0          |
|  | Castilla-La Mancha         | ESP    | 3  |          |          |          |          |           | 3          |
|  | Comunidad Valenciana       | ESP    | 9  |          |          |          |          |           | 9          |
|  | Extremadura                | ESP    | 0  |          |          |          |          |           | 0          |
|  | La Rioja                   | ESP    | 2  |          |          |          |          |           | 2          |
|  | Región de Murcia           | ESP    | 0  |          |          |          |          |           | 0          |
| <b>Bulgaria</b>                                    |                            |        | <b>0</b>                                     |          |          |          |          |           | <b>0</b>   |
|  | Blagoevgrad                | BGR    | 0  |          |          |          |          |           | 0          |
|  | Haskovo                    | BGR    | 0  |          |          |          |          |           | 0          |
|  | Montana                    | BGR    | 0  |          |          |          |          |           | 0          |
|  | Sliven                     | BGR    | 0  |          |          |          |          |           | 0          |
|  | Stara Zagora               | BGR    | 0  |          |          |          |          |           | 0          |
| <b>Total Bearded Vulture observations IOD 2021</b> |                            |        | <b>927</b>                                   | <b>5</b> | <b>4</b> | <b>3</b> | <b>7</b> | <b>14</b> | <b>960</b> |

## 5.3 Telemetry data

### 5.3.1 IBM-monitoring area

During the IOD-period GPS-data of 62 Bearded Vultures with satellite tags have been retrieved in the Alpine range, the Massif Central, the Pyrenees, north-eastern Spain and Corsica<sup>4</sup> (**Figure 4**). Another GPS-tagged bird (Eglazine) was flying in the North (Netherlands & Belgium) during this time and was therefore not included in the map and analysis. Although this data is not part of the IOD, this information is collected as representative of their positions and to detect areas of monitoring deficiencies. Some of these birds still show their individual marking patterns (bleached feathers) and can therefore be identified by observers. Exceptions are the wild-hatched birds which have been GPS-tagged but not marked by bleaching their feathers.

GPS-data can serve as an indicator to assess the risk of double counting of individuals. The wide range movement patterns of some birds (**Figure 4**) underline the importance of using only observational data from a narrow period (focal day) for population estimation to avoid double counting.

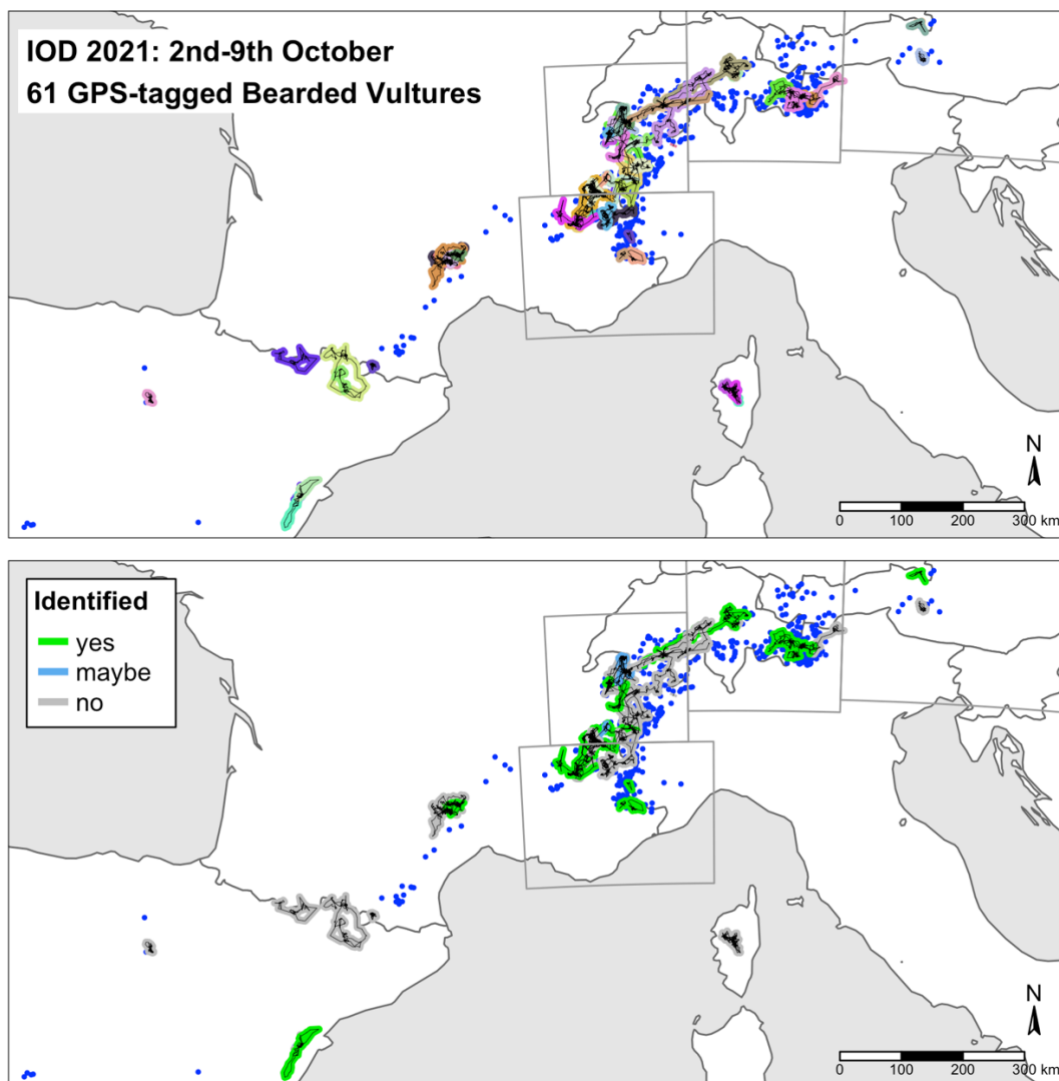


Figure 4. 61 GPS-tagged Bearded Vultures during the IOD periode. The GPS-tracks of Eglazine are not displayed on this map, as the bird was on a longer excursion in the North during the IOD-period. Blue dots = occupied observation sites.

<sup>4</sup> No IOD was organized on Corsica in 2021.

### 5.3.2 Alpine range

During this year's IOD, GPS-data in the Alpine range was available from 39 out of 40 GPS-tagged birds during the IOD period and on the focal day (02.10.2021). No data was available from Ewolina (BG838) on the focal day. Out of the 39 GPS-tagged birds 14 individuals could be sighted and identified, while 4 birds were identified with some uncertainty by observers. In summary, 36% of the GPS-tagged birds have been sighted and identified, which is a similar value compared to 2020 (38%).

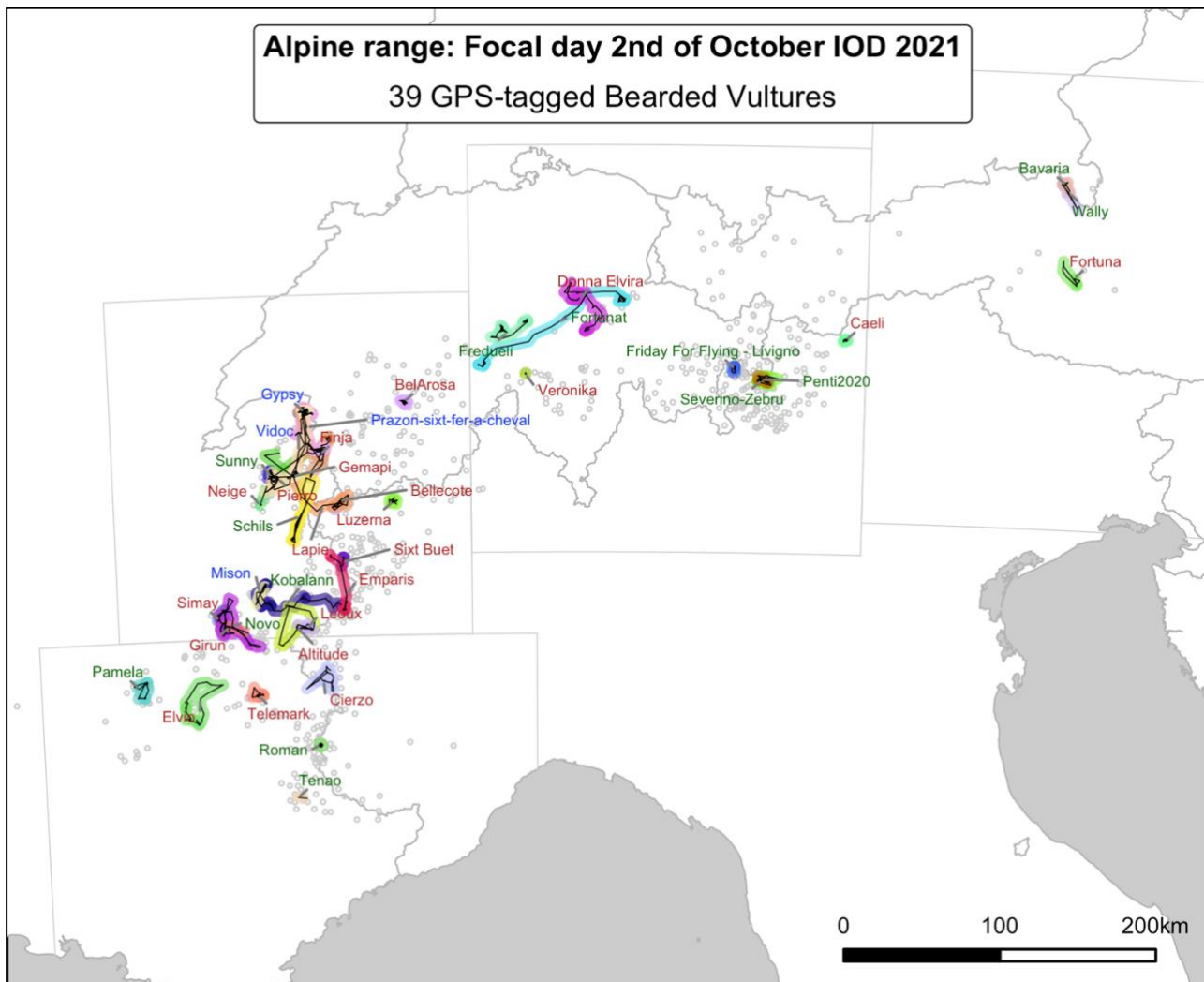


Figure 5. Positions of 39 Bearded Vultures tagged with GPS transmitters that were present in the Alpine range during the focal day (02.10.2021). Observation sites that were occupied during the IOD-period are marked with grey circles. During the IOD-period 14 birds have been identified (green labels), 4 birds have been probably identified (blue labels) and 21 birds couldn't be identified (red labels).



Table 4. 62 birds, 30 males and 29 females, with active GPS-tag during the IOD periode 2021. No IOD was organised in Corsica.

| Animal                           | BirdID    | Sex (m/f)    | Age class | Days with pos. | Pos. on focal day | Observed (yes/maybe/no) |
|----------------------------------|-----------|--------------|-----------|----------------|-------------------|-------------------------|
| <b>Alpine range</b>              | <b>41</b> | <b>20/17</b> |           |                |                   | <b>15/4/22</b>          |
| Roman                            | 854       | m            |           | 6              | 1                 | yes                     |
| Schils                           | 802       | m            |           | 8              | 30                | yes                     |
| Tenao                            | 755       | m            |           | 8              | 3                 | yes                     |
| Cierzo                           | 899       | m            |           | 8              | 48                | no                      |
| Ewolina                          | 838       | f            | adult     | 2              | 0                 | no                      |
| Fortuna                          | 843       | m            |           | 8              | 16                | no                      |
| Gemapi                           | W196      | f            |           | 8              | 5                 | no                      |
| Girun                            | 904       | f            |           | 8              | 4                 | no                      |
| Neige                            | W198      | m            |           | 7              | 3                 | no                      |
| Veronika                         | 321       | f            |           | 8              | 11                | no                      |
| Freduei                          | 1001      | m            |           | 8              | 80                | yes                     |
| Gypsy                            | W209      | m            |           | 8              | 36                | maybe                   |
| Mison                            | W230      | f            |           | 8              | 10                | maybe                   |
| Caeli                            | 998       | m            | subadult  | 8              | 25                | no                      |
| Finja                            | 1003      | f            |           | 8              | 84                | no                      |
| Lapie                            | W251      | m            |           | 8              | 25                | no                      |
| Léoux                            | 950       | f            |           | 8              | 9                 | no                      |
| Simay                            | 983       | m            |           | 8              | 24                | no                      |
| Fortunat                         | 1068      | m            |           | 8              | 3'585             | yes                     |
| Kobalann                         | 1063      | f            |           | 8              | 127               | yes                     |
| Mistral                          | 1022      | m            |           | 8              | 23                | yes                     |
| Pamela                           | 1031      | f            |           | 8              | 26                | yes                     |
| Penti2020                        | W349      | f            |           | 8              | 70                | yes                     |
| Prazon-sixt-fer-a-cheval         | W346      | u            |           | 8              | 10'774            | maybe                   |
| Vidoc                            | W356      | u            | immature  | 8              | 77                | maybe                   |
| Altitude                         | W313      | f            |           | 8              | 36                | no                      |
| Bellecote                        | W361      | u            |           | 8              | 48                | no                      |
| Elvio                            | 1026      | m            |           | 8              | 42                | no                      |
| Emparis                          | W284      | f            |           | 8              | 14                | no                      |
| Luzerna                          | 1071      | f            |           | 8              | 86                | no                      |
| Pierro                           | W301      | m            |           | 8              | 47                | no                      |
| Sixt Buet                        | W285      | f            |           | 8              | 25                | no                      |
| Bavaria                          | 1112      | f            |           | 8              | 9                 | yes                     |
| Friday For Flying - Livigno      | W396      | m            |           | 8              | 69                | yes                     |
| Novo                             | 1098      | m            |           | 8              | 72                | yes                     |
| Severino-Zebru                   | W372      | m            |           | 8              | 55                | yes                     |
| Sunny                            | W397      | u            | juvenile  | 8              | 846               | yes                     |
| Wally                            | 1113      | f            |           | 8              | 10                | yes                     |
| BelArosa                         | 1119      | m            |           | 8              | 48                | no                      |
| Donna Elvira                     | 1117      | f            |           | 8              | 73                | no                      |
| Telemark                         | 1101      | m            |           | 8              | 485               | no                      |
| <b>Massif Central</b>            | <b>8</b>  | <b>3/5</b>   |           |                |                   | <b>5/0/3</b>            |
| Layrou                           | 761       | m            | adult     | 8              | 21                | yes                     |
| Aven                             | 1067      | f            | immature  | 8              | 255               | yes                     |
| Ophrys                           | 1078      | f            | immature  | 8              | 417               | yes                     |
| Cévennes                         | 1032      | m            | immature  | 8              | 267               | no                      |
| Fario                            | 1079      | f            | immature  | 8              | 227               | no                      |
| Pradines                         | 1122      | f            | juvenile  | 8              | 577               | yes                     |
| Pyrenees                         | 1094      | f            | juvenile  | 8              | 944               | yes                     |
| Peyre                            | 1116      | m            | juvenile  | 8              | 96                | no                      |
| <b>Pyrenees</b>                  | <b>4</b>  | <b>3/1</b>   |           |                |                   | <b>0/0/4</b>            |
| Roc Genèse                       | -         | m            | adult     | 8              | 8                 | no                      |
| Alos                             | 992       | m            | subadult  | 8              | 15                | no                      |
| Bassi                            | 1033      | m            | immature  | 8              | 43                | no                      |
| Boira                            | 1040      | f            | immature  | 8              | 16                | no                      |
| <b>Corsica</b>                   | <b>4</b>  | <b>2/2</b>   |           |                |                   | <b>0/0/4</b>            |
| Muntagnolu                       | 890       | m            | adult     | 8              | 5                 | no                      |
| Luna                             | 959       | f            | subadult  | 8              | 8                 | no                      |
| Cintu                            | 1042      | m            | immature  | 8              | 83                | no                      |
| Orba                             | 1041      | f            | immature  | 8              | 24                | no                      |
| <b>Maestrazgo</b>                | <b>4</b>  | <b>1/3</b>   |           |                |                   | <b>2/0/2</b>            |
| Amic                             | 995       | m            | subadult  | 8              | 82                | no                      |
| Celest                           | 1073      | f            | immature  | 8              | 24                | no                      |
| Dalila                           | 1109      | f            | juvenile  | 8              | 21                | yes                     |
| Dena                             | 1104      | f            | juvenile  | 8              | 19                | yes                     |
| <b>Excursion (NDL &amp; BEL)</b> | <b>1</b>  | <b>0/1</b>   |           |                |                   | <b>0/0/1</b>            |
| Eglazine                         | 1069      | f            | immature  | 8              | 47                | no                      |
| <b>Total</b>                     | <b>62</b> | <b>30/29</b> |           |                |                   | <b>23/4/36</b>          |

## 5.4 Individual-based data

During the IOD 2021 period 63 individuals have been identified with high probability in the Alpine range. 6 of them in the eastern Alps, 31 in the central Alps, 10 in the north-western Alps, 16 in the south-western Alps. Another 6 birds have been identified in the Massif Central and 6 in Spain. Some birds could not be identified with certainty (Alps N = 19; Spain N=3) , these are marked as "maybe" observed in **Table 5**, **Table 6** and in **Table 7 for Spain (3)**. Such individual-based monitoring is only possible due to the international collaboration, information exchange and the coordination of marking patterns within the international Bearded Vulture monitoring network.

Table 5. 39 Bearded Vultures that were identified (2 of them with some uncertainty = maybe identified) in the eastern and central Alps during the IOD 2021 grouped by the region where they have been observed. \* Tag of Noel-Leya is not working since 02.01.2021 but bird could be identified by seeing the tag on the back.

| Zone              | Bird                        | Observed (yes/maybe) | BirdID | Sex (m/f) | Age (cy) | Tag               | Territory       | Region                               |
|-------------------|-----------------------------|----------------------|--------|-----------|----------|-------------------|-----------------|--------------------------------------|
| Eastern           | 39                          | 37/2                 | 18/19  |           |          |                   |                 |                                      |
|                   | Alexa                       | yes                  | 100    | f         | 34       |                   | Gastein/Rauris  |                                      |
|                   | Andreas Hofer               | yes                  | 260    | m         | 26       |                   | Gastein/Rauris  |                                      |
|                   | Felix2                      | yes                  | 793    | m         | 8        | GPS               | Mallnitz        | Hohe Tauern NP (AUT)                 |
|                   | Charlie                     | yes                  | 910    | f         | 6        |                   |                 |                                      |
|                   | Glocknerlady                | yes                  | 718    | f         | 10       |                   |                 |                                      |
|                   | Pinzgarus                   | yes                  | 558    | m         | 14       |                   |                 |                                      |
|                   | Wally                       | yes                  | 1113   | f         | 1        | GPS               |                 | Bavaria (DEU)                        |
|                   | Bavaria                     | yes                  | 1112   | f         | 1        | GPS               |                 |                                      |
|                   | Fredueeli                   | yes                  | 1001   | m         | 4        | GPS               |                 | Central Switzerland                  |
| Fortunat          | yes                         | 1068                 | m      | 2         | GPS      |                   |                 |                                      |
| Noel-Leya         | yes                         | 797                  | m      | 8         | GPS*     |                   |                 |                                      |
| Alpine range      | Diana-Stelvio               | yes                  | W07    | f         | 22       |                   | Albula          |                                      |
|                   | GT0116                      | yes                  | -      | m         | -        |                   | Bergün          |                                      |
|                   | GT0117                      | yes                  | -      | f         | -        |                   | Bergün          |                                      |
|                   | Ingenius                    | yes                  | 621    | m         | 12       |                   | Buffalora       |                                      |
|                   | Retia                       | yes                  | 357    | f         | 22       |                   | Buffalora       |                                      |
|                   | Ortler                      | yes                  | 439    | f         | 18       |                   | Ofenpass        |                                      |
|                   | Livigno                     | yes                  | W08    | m         | 22       |                   | Ofenpass        | Grison (CHE)                         |
|                   | GT038                       | yes                  | -      | f         | -        |                   | Poschiavo       |                                      |
|                   | GT057                       | maybe                | -      | m         | -        |                   | Poschiavo       |                                      |
|                   | Samuel                      | yes                  | 526    | m         | 15       |                   | Sinestra        |                                      |
|                   | Moische-Livigno             | yes                  | W11    | f         | 20       |                   | Sinestra        |                                      |
|                   | GT048                       | yes                  | -      | f         | 13       |                   | Tantermozza     |                                      |
|                   | Zebra                       | maybe                | W12    | m         | 20       |                   | Tantermozza     |                                      |
|                   | GT0132                      | yes                  | -      | m         | -        |                   | Foscagno        |                                      |
|                   | GT0129                      | yes                  | -      | f         | -        |                   | Foscagno        |                                      |
|                   | Cic                         | yes                  | 186    | m         | 29       |                   | Livigno         |                                      |
|                   | Moische                     | yes                  | 146    | f         | 31       |                   | Livigno         |                                      |
|                   | Friday For Flying - Livigno | yes                  | W396   | m         | 1        | GPS               | Livigno         |                                      |
|                   | Jo                          | yes                  | 169    | f         | 30       |                   | Ortler          |                                      |
|                   | Temperatio                  | yes                  | 495    | f         | 16       |                   | Val Martello    | Stelvio NP, Trentino & Sondrio (ITA) |
| Tell              | yes                         | 283                  | m      | 25        |          | Valle del Braulio |                 |                                      |
| Stift             | yes                         | 393                  | f      | 20        |          | Valle del Braulio |                 |                                      |
| Germano - Braulio | yes                         | W379                 | u      | 1         |          | Valle del Braulio |                 |                                      |
| Heinz-Serraglio   | yes                         | W45                  | m      | 15        |          | Zebra             |                 |                                      |
| Felice            | yes                         | 375                  | f      | 21        |          | Zebra             |                 |                                      |
| Severino-Zebra    | yes                         | W372                 | m      | 1         | GPS      | Zebra             |                 |                                      |
| Penti2020         | yes                         | W349                 | f      | 2         | GPS      |                   |                 |                                      |
| Sieglinde         | yes                         | W420                 | u      | 1         |          | Planeil           | Vinschgau (ITA) |                                      |

Table 6. 43 Bearded Vultures that were identified (17 of them with some uncertainty = maybe identified) in the north- and south-western Alps during the IOD 2021 grouped by the region where they have been observed.

| Zone         | Bird                     | Observed (yes/maybe) | BirdID       | Sex (m/f) | Age (cy) | Tag | Territory          | Region                           |                  |
|--------------|--------------------------|----------------------|--------------|-----------|----------|-----|--------------------|----------------------------------|------------------|
| Alpine range | <b>43</b>                | <b>26/17</b>         | <b>19/12</b> |           |          |     |                    |                                  |                  |
|              | Michegabri               | yes                  | 488          | m         | 16       |     | Chamoussière       |                                  |                  |
|              | GT094                    | yes                  | -            | m         | -        |     |                    | Gran Paradiso (ITA)              |                  |
|              | GT0167                   | yes                  | -            | m         | -        |     |                    |                                  |                  |
|              | Sunny                    | yes                  | W397         | u         | 1        | GPS | Bargy              |                                  |                  |
|              | Belle etoile             | maybe                | W394         | u         | 1        |     | Bargy BIS          | Haute Savoie (FRA)               |                  |
|              | Zufall                   | yes                  | 493          | f         | 16       |     |                    |                                  |                  |
|              | Schils                   | yes                  | 802          | m         | 8        | GPS |                    |                                  |                  |
|              | Nonno Bob                | yes                  | 548          | m         | 14       |     |                    | Savoie (FRA)                     |                  |
|              | Kobalann                 | yes                  | 1063         | f         | 2        | GPS |                    |                                  |                  |
|              | Novo                     | yes                  | 1098         | m         | 1        | GPS |                    | Savoie & Haute Dauphiné (FRA)    |                  |
|              | North-western            | Condamine            | maybe        | 586       | f        | 13  |                    |                                  |                  |
|              |                          | GT054                | maybe        | -         | m        | -   |                    |                                  |                  |
|              |                          | Gelas                | maybe        | 279       | f        | 25  |                    |                                  | Savoie (FRA)     |
|              |                          | Stelvio              | maybe        | W02       | u        | 24  |                    |                                  |                  |
|              |                          | Mison                | maybe        | W230      | f        | 5   | GPS                |                                  |                  |
|              |                          | Michel               | maybe        | W414      | u        | 1   |                    | Coude du Rhône                   |                  |
|              | Guillaumes               | maybe                | 411          | f         | 19       |     | Derborence_Vérouet |                                  |                  |
|              | Pablo                    | maybe                | 359          | m         | 22       |     | Derborence_Vérouet |                                  |                  |
|              | Kandersteg2021           | yes                  | W422         | u         | 1        |     | Kandertal          |                                  |                  |
|              | Sionne2021               | maybe                | W383         | u         | 1        |     | Sionne             | Wallis und Berner Oberland (CHE) |                  |
|              | Smaragd                  | maybe                | 675          | m         | 11       |     | Zermatt            |                                  |                  |
|              | Gildo                    | maybe                | 299          | f         | 24       |     |                    |                                  |                  |
|              | Gypsy                    | maybe                | W209         | m         | 5        | GPS |                    |                                  |                  |
|              | Prazon-sixt-fer-a-cheval | maybe                | W346         | u         | 2        | GPS |                    |                                  |                  |
|              | Vidoc                    | maybe                | W356         | u         | 2        | GPS |                    |                                  |                  |
|              | Roman                    | yes                  | 854          | m         | 7        | GPS | Maira              |                                  |                  |
|              | Chateaux                 | yes                  | W413         | u         | 1        |     | Usseglio           | Alpi Marittime (ITA)             |                  |
|              | Italia 150               | yes                  | 660          | m         | 11       |     | Usseglio           |                                  |                  |
|              | Volcaire                 | maybe                | 905          | m         | 6        |     |                    | La Drôme (FRA)                   |                  |
|              | South-western            | Bellemotte           | yes          | 708       | f        | 10  |                    | Bonette                          |                  |
|              |                          | Vignemale            | yes          | W391      | u        | 1   |                    | Bonette                          |                  |
|              |                          | Rimani               | yes          | W93       | f        | 11  |                    | Chambeyron-Ubayette              |                  |
|              |                          | Stephan              | yes          | 616       | m        | 12  |                    | Chambeyron-Ubayette              |                  |
|              |                          | Adrechoun            | yes          | W378      | u        | 1   |                    | Chambeyron-Ubayette              |                  |
|              |                          | Girasole             | yes          | 549       | f        | 14  |                    | Source de la Tinée               | Mercantour (FRA) |
|              |                          | Rocca                | yes          | 516       | m        | 15  |                    | Source de la Tinée               |                  |
|              |                          | Sereno               | yes          | 348       | m        | 22  |                    | Source de IUbaye                 |                  |
|              |                          | GT036                | yes          | -         | f        | -   |                    | Source de IUbaye                 |                  |
|              |                          | Tenao                | yes          | 755       | m        | 9   | GPS                | Val d'Entraunes                  |                  |
|              |                          | Mistral              | yes          | 1022      | m        | 3   | GPS                |                                  |                  |
|              |                          | GT150                | maybe        |           |          |     |                    |                                  |                  |
|              |                          | Kirsi                | yes          | 764       | m        | 9   |                    |                                  | Vercors (FRA)    |
| Pamela       | yes                      | 1031                 | f            | 3         | GPS      |     |                    |                                  |                  |
| <b>Total</b> | <b>82</b>                | <b>63/19</b>         | <b>37/31</b> |           |          |     |                    |                                  |                  |

Table 7. Bearded Vultures that were identified in the Massif Central (6) and Spain (9) (without the Pyrenees) during the IOD 2021.

| Zone                     | Bird     | Observed (yes/maybe) | BirdID | Sex (m/f)  | Age (cy) | Tag | Territory   | Region               |
|--------------------------|----------|----------------------|--------|------------|----------|-----|-------------|----------------------|
| Massif Central           | <b>6</b> | <b>6/0</b>           |        | <b>2/4</b> |          |     |             |                      |
|                          | Layrou   | yes                  | 761    | m          | 9        | GPS | Jonte amont | Massif Central (FRA) |
|                          | Adonis   | yes                  | 794    | m          | 8        |     | Jonte amont |                      |
|                          | Pradines | yes                  | 1122   | f          | 1        | GPS |             |                      |
|                          | Aven     | yes                  | 1067   | f          | 2        | GPS |             |                      |
|                          | Ophrys   | yes                  | 1078   | f          | 2        | GPS |             |                      |
| Pyrenees                 | yes      | 1094                 | f      | 1          | GPS      |     |             |                      |
| Spain (without Pyrenees) | <b>9</b> | <b>6/3</b>           |        | <b>4/5</b> |          |     |             |                      |
|                          | Dalila   | yes                  | 1109   | f          | 1        | GPS |             | Maestrazgo (ESP)     |
|                          | Dena     | yes                  | 1104   | f          | 1        | GPS |             |                      |
|                          | Tono     | yes                  | 486    | m          | 16       |     |             | Andalusia (ESP)      |
|                          | Bigup    | yes                  | 856    | m          | 7        |     |             |                      |
|                          | Sansón   | yes                  | 767    | m          | 9        |     |             |                      |
|                          | Viola    | yes                  | 707    | f          | 10       |     |             |                      |
|                          | Kika     | maybe                | 1018   | f          | 3        |     |             |                      |
|                          | Nerpio   | maybe                | 762    | m          | 9        |     |             |                      |
| Tormenta                 | maybe    | 963                  | f      | 5          |          |     |             |                      |

## 5.5 Estimated number of Bearded Vultures

### ***E<sub>foc</sub>* - Based on observations (focal day):**

Although the total amount of observations gathered during the IOD can be used as an indicative of the presence of Bearded Vultures, it is not possible to use data from the whole week (IOD-Period) due to the high mobility of the species (**Figure 4**). In order to omit the possibility of double counting birds and to create a more accurate picture of the Bearded Vulture distribution, only observations from the focal day were used to determine the approximate number of birds (*E<sub>foc</sub>* = estimate based on observations (focal day) **Table 8**). Furthermore, regional administrators were requested to communicate with nearby partners to avoid double counting of bird individuals.

### ***E<sub>hyp</sub>* - Hypothetically present birds:**

During the focal day it is not possible to observe and identify every single bird that is known to be present in a specific region. A second estimate (*E<sub>hyp</sub>* = hypothetically present birds) composed of the estimate based on observations (focal day) *E<sub>foc</sub>* and the number of individuals that were missed during the survey but that should be present in the region (e.g. territorial breeding pairs) should therefore give a picture of the expected number of Bearded Vulture individuals on the regional level (**Table 8**).

However, as the number of counted birds during the IOD depends on multiple external factors (weather conditions, observer etc.), these estimates are best used as a proxy for population trends and to be compared between years rather than directly and solely as a population size estimation.

### ***E<sub>GPS</sub>* – GPS-tagged non-territorial floater birds:**

Most of the GPS-tagged birds are non-adult floater birds, which do not necessarily stay in a certain area for a longer time period. Therefore, GPS-tagged individuals, which have not been observed during the IOD should be added to the subtotal of hypothetically present birds in order estimate the overall Alpine Bearded Vulture population.

### ***Final estimate:***

We estimate the number of Bearded Vultures observed on the focal day in the Alpine range to vary between 236 and 284 individuals (*E<sub>foc</sub>*). Together with the birds that are known to be present in the region (mainly territorial birds from the breeding pairs), the estimate sums up to 263 – 356 individuals (*E<sub>hyp</sub>*). Based on GPS-data we know, that 41 tagged birds were present in the Alpine range during this year's IOD. However, 23-27 of these individuals (*E<sub>GPS</sub>*) were not identified by observers and should therefore be added to the estimate (*E<sub>hyp</sub>*). Through the combination of estimates based on observation data, expert knowledge about territorial birds and GPS-data results it can be assumed that the number of Bearded Vultures in the Alpine population varies between 284 and 381 individuals.

The estimates of hypothetically present birds *E<sub>hyp</sub>* represent 75% (conservative) or 100% (optimistic) of the total population that is predicted by the demographic model from Schaub et al. 2009 (predicted population size = 380, **Figure 7 and Table 10**) with a lower variance than the estimates from the year 2019 (conservative = 256 (80%), optimistic = 344 (108%) with better weather conditions). However, looking at the estimates based on observations only, it was possible to observe 62% or 75% respectively of the birds predicted by the model – less than in 2019 (no estimate in 2020). In good weather conditions (thermals) the activity and flight distance of the birds increase, which can lead to double counting. In addition, it is expected that with good visibility, more observations will be possible.

Table 8. Estimates of minimal (conservative) and the maximal (optimistic) number of Bearded Vulture individuals observed during the focal day ( $E_{foc}$ ) and hypothetically present ( $E_{hyp}$  = observed and known not-observed birds) in each region during the IOD.

| Population                             | Country               | Region   | $E_{foc}$ - Estimate based on observations (focal day) |            | $E_{hyp}$ - Estimated number of hypothetically present birds |            |
|--|-----------------------|--|--|------------|--|------------|
|  |                       |  | min  | max        | min  | max        |
|  |                       | <b>East subtotal</b>                                   | <b>16</b>  | <b>20</b>  | <b>24</b>  | <b>32</b>  |
|  | AUT                   | Hohe Tauern NP   | 16   | 20         | 24   | 32         |
|  | GER                   | Allgaeu  | -  | -          | -  | -          |
|  |                       | <b>Central subtotal</b>                                | <b>97</b>  | <b>110</b> | <b>102</b>   | <b>143</b> |
|  | GER                   | Bavarian Alps  | 2  | 2          | 2  | 2          |
|  | AUT                   | Tyrol  | 4  | 5          | 4  | 5          |
|  | CHE                   | Central Switzerland                                    | 5  | 6          | 5  | 6          |
|  | CHE                   | Grison   | 50   | 57         | 53   | 85         |
|  | CHE                   | Ticino   | -  | -          | 2  | 4          |
|  | ITA                   | Stelvio NP, Sondrio, Brescia & Trentino Alto Adige     | 36   | 40         | 36   | 41         |
| Alpine range                           |                       | <b>North-west subtotal</b>                             | <b>76</b>  | <b>99</b>  | <b>89</b>  | <b>124</b> |
|  | CHE                   | Berner Oberland  | 5  | 7          | 5  | 7          |
|  | CHE                   | Wallis   | 26   | 36         | 28   | 44         |
|  | FRA                   | Haute Savoie   | 14   | 22         | 17   | 26         |
|  | FRA                   | Savoie   | 31   | 34         | 32   | 35         |
|  | ITA                   | Valle d'Aosta & Gran Paradiso NP                       | -  | -          | 7  | 12         |
|  |                       | <b>South-west subtotal</b>                             | <b>47</b>  | <b>55</b>  | <b>48</b>  | <b>57</b>  |
|  | FRA                   | Baronnies  | -  | -          | 1  | 1          |
|  | FRA                   | Haute Dauphiné   | 17   | 21         | 17   | 22         |
|  | FRA                   | Mercantour   | 14   | 17         | 14   | 17         |
| FRA                                    | Vercors NP            | 5  | 5  | 5          | 5  |            |
| ITA                                    | Alpi Cozie            | 3  | 3  | 3          | 3  |            |
| ITA                                    | Alpi Marittime - WAON | 8  | 9  | 8          | 9  |            |
| <b>Subtotal Alpine range</b>           |                       |  | <b>236</b>   | <b>284</b> | <b>263</b>   | <b>356</b> |
| <i>+ not observed GPS-tagged birds</i> |                       |  |  |            | 21   | 25         |
| <b>Total Alpine range</b>              |                       |  |  |            | <b>284</b>   | <b>381</b> |
| <b>Massif Central</b>                  | FRA                   | Grands Causses & Cevennes NP                           | 4  | 7          | 4  | 10         |
| <i>+ not observed GPS-tagged birds</i> |                       |  |  |            | 3  | 3          |
| <b>Total Massif Central</b>            |                       |  |  |            | <b>7</b>   | <b>13</b>  |
| <b>French Pyrenees</b>                 | FRA                   | Aude   | 2  | 2          | 6  | 6          |
| <i>+ not observed GPS-tagged birds</i> |                       |  |  |            | 1  | 1          |
| <b>Total French Pyrenees</b>           |                       |  |  |            | <b>7</b>   | <b>7</b>   |
| <b>Spain (without Pyrenees)</b>        | ESP                   | Andalusia, La Rioja, Castile y León, Castile la Mancha | 21   | 29         | 21   | 33         |
| <b>Maestrazgo</b>                      | ESP                   | Maestrazgo   | 2  | 2          | 2  | 2          |
| <i>+ not observed GPS-tagged birds</i> |                       |  |  |            | 1  | 2          |
| <b>Total Spain</b>                     |                       |  |  |            | <b>3</b>   | <b>4</b>   |
| <b>Bulgaria</b>                        | BRG                   |  | 0  | 0          | 0  | 0          |

Table 9. Comparison of the estimated number of Bearded Vultures in the Alpine range based on the survey during the IOD 2021 in comparison to the estimates from previous years (no estimate from 2020).

|                 | $E_{foc}$ - Estimate based on observations (focal day only) |            | $E_{hyp}$ - Estimated number of hypothetically present birds |            |
|-----------------|---|------------|--|------------|
|                 | min   | max        | min  | max        |
| <b>IOD 2021</b> | <b>236</b>  | <b>284</b> | <b>284</b>   | <b>381</b> |
| IOD 2019        | 215   | 257        | 256  | 344        |
| IOD 2018        | 153   | 177        | 208  | 284        |
| IOD 2017        | 152   | 182        | 208  | 251        |
| IOD 2016        | 149   | 178        | 172  | 218        |
| IOD 2015        | 120   | 153        | 166  | 199        |
| IOD 2014        | 87  | 95         | 112  | 130        |
| IOD 2013        | 87  | 98         | 117  | 128        |

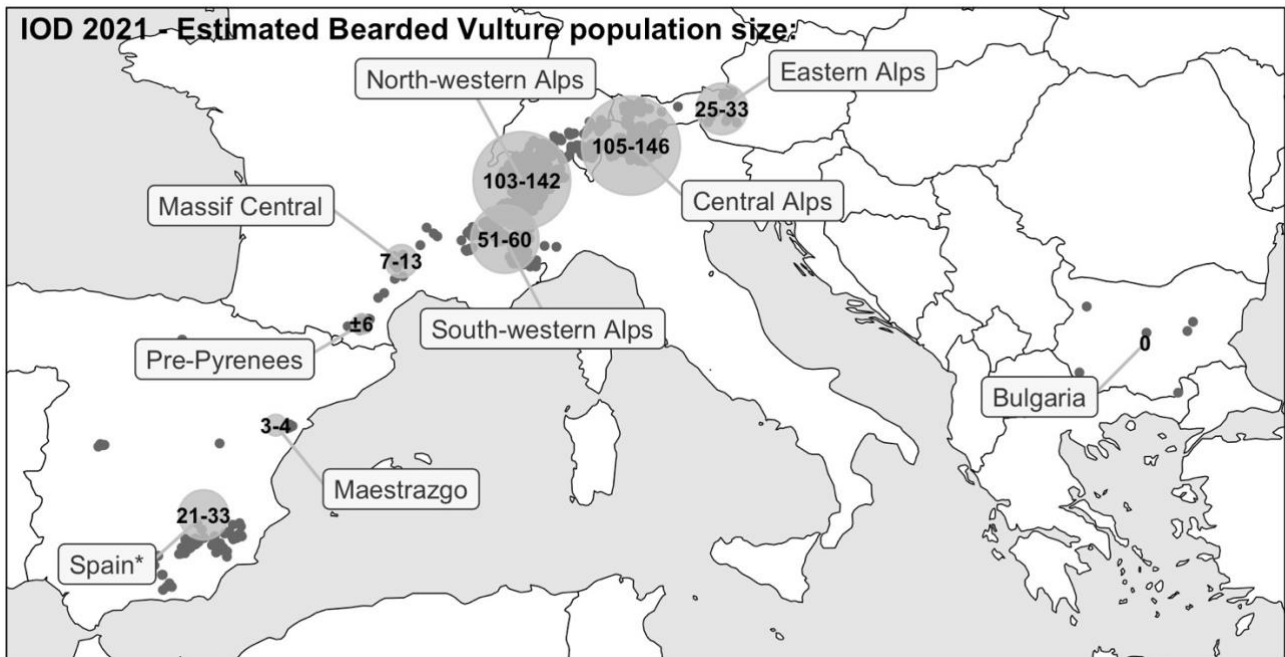


Figure 6. Overview of the estimated Bearded Vulture population size  $E_{hyp}$  on the regional level within the monitoring area of the IOD 2021. Estimates of the populations size are based on estimates derived from observations during the focal day of the IOD  $E_{foc}$  and an estimated number of birds that were not observed but should be present in the region (mostly territorial birds). \*The estimate for Spain is based on observation data from the occupied observation sites (grey dots) without taking the Bearded Vulture population of the Spanish Pyrenees into account. In Spain Bearded Vultures roam between mountainous areas in the south and in central and northern Spain. No IOD was organised in Corsica (FRA) where a small population of 4 breeding pairs survived. Since 2016 a restocking program is ongoing on Corsica to support this small island population. Since their extinction in 1972, no Bearded Vultures are present in Bulgaria.

## 5.6 Proportional distribution of age classes in the Alpine range

By looking at the total number of observations during the IOD it is possible to get an overview of age class distribution, which should be representative of the general Alpine Bearded Vulture population. Per definition the IBM always uses calendar years (cy) for age specifications (**Table 1**).

Comparing the results from the absolute numbers of observations with the estimated number of individuals per age class indicates that, even though there is some variation, observation data can be used as an estimate for the age class distribution. The estimate of the age class distribution based on the data collected during the IOD 2021 is similar as in the last year's estimate. Most of the birds observed on the focal day were adults (54%), followed by immatures (16%), juveniles (14%) and subadults (4%). In fact, similarly to last year's results, the proportion of sighted birds aged in their 5<sup>th</sup> calendar year or older (subadults & adults - potentially in age to establish a territory) almost reaches 2/3 of the total number of observations (**Table 10**).

Finally, the results were compared to the expected number of living individuals per age class derived by the demographic model designed by Schaub et al. (2009) (**Table 10, Figure 7**). The results from **Figure 7** indicate that the percentage of juveniles, immatures and adults coincide quite well with the model predictions, while similar as in the previous years the proportion of subadults is underestimated by the observations from the IOD. This is also the case for the absolute numbers ( $E_{hyp}$ ), where the estimated and predicted numbers overlapp quite well, except for the subadults.

There are multiple and additive explanations for the observed discrepancies in the age class distribution (A) and total estimate of the population size (B):

- A. More adult birds might be easier to recognise, detect and monitor as they settle into a region and are territorial. In addition, many observation sites were situated in the core area of known breeding units.
- A. Juveniles are also easier to detect as they are easier to discern from the other age classes and often the parents have already been detected and the territory is therefore regularly visited. Additionally, released birds up to 2 to 3 years can be identified individually thanks to the bleached feathers.
- A. In general it is considered difficult for non-professional ornitologists to determine the age of young vultures (especially subadult) and could therefore represent the number of observations under the category "unknown".
- B. The model of Schaub et al. (2009) is based on survival rates over the whole Alpine area and does not take differences in regions into account.
- B. The model of Schaub et al. (2009) is based on only two survival rates. One for juveniles (1.cy) and one for all older birds.



Table 10. Proportion of Bearded Vultures per age class based on observations reported during the focal day during the IOD 2021. Based on these observations the regional coordinators estimated a minimal and maximal number of Bearded Vultures per age class (estimated from observations  $E_{foc}$ ). The estimate of the birds that are hypothetically present also includes territorial birds, the birds that are known to be present in the region as well as the GPS-tagged birds that have not been identified during the IOD-period (estimated hypothetically present  $E_{hyp}$ ).

| Age class    | Observed       | Estimated        |             |                  |             | Predicted                |             |
|--------------|----------------|------------------|-------------|------------------|-------------|--------------------------|-------------|
|              | focal day only | E <sub>foc</sub> |             | E <sub>hyp</sub> |             | Model Schaub et al. 2009 |             |
|              | absolut        | mean(min,max)    | %           | mean(min,max)    | %           | absolut                  | %           |
| adult        | 484            | 152              | 57%         | 190              | 57%         | <b>198</b>               | 52%         |
| subadult     | 34             | 14               | 5%          | 25               | 6%          | <b>58</b>                | 15%         |
| immature     | 147            | 52               | 19%         | 65               | 18%         | <b>74</b>                | 19%         |
| juvenile     | 112            | 34               | 13%         | 47               | 14%         | <b>50</b>                | 13%         |
| unknown      | 90             | 17               | 6%          | 17               | 5%          | -                        | -           |
| <b>Total</b> | <b>867</b>     | <b>269</b>       | <b>100%</b> | <b>344</b>       | <b>100%</b> | <b>380</b>               | <b>100%</b> |

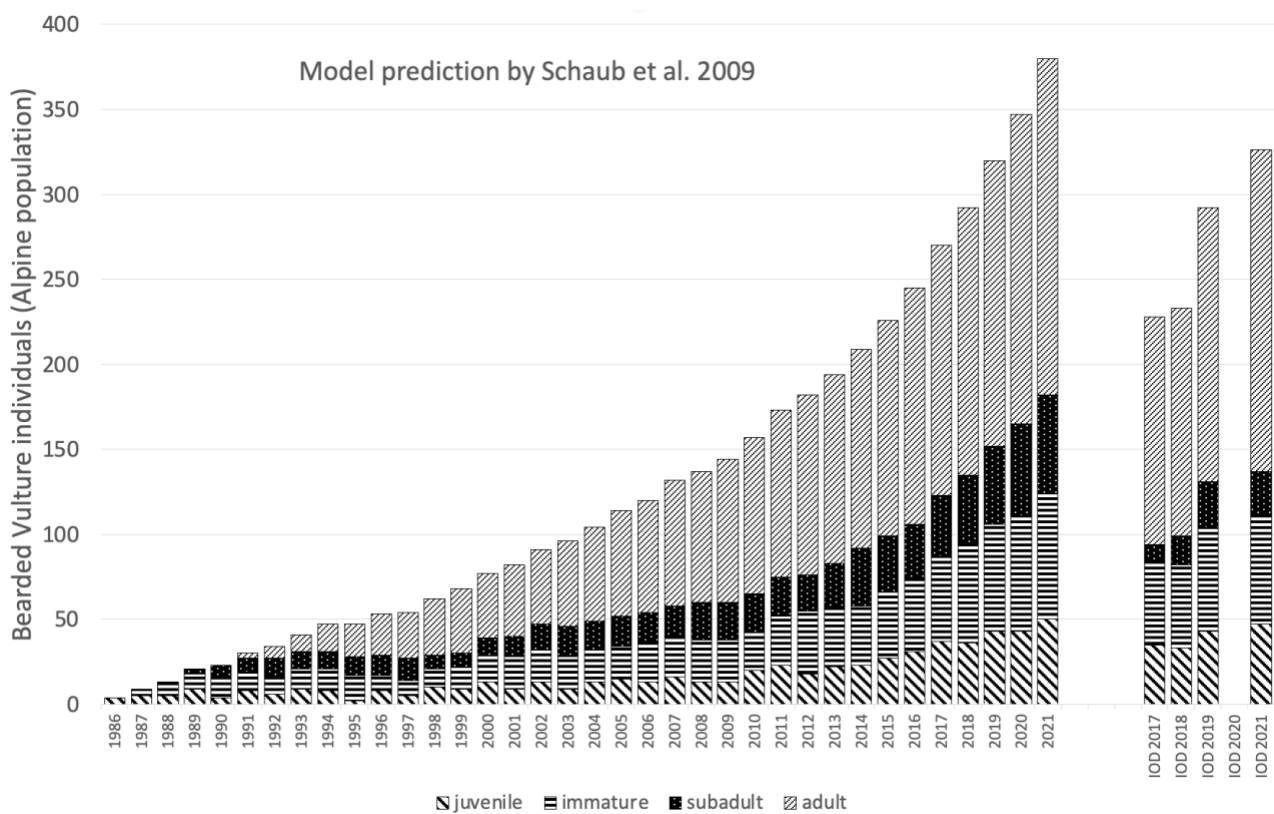


Figure 7. Predicted number of Bearded Vultures per age class according to the demographic model by Schaub et al. 2009<sup>1</sup> in comparison to the estimated number of birds that should hypothetically be present based on observation data (IOD) and expert knowledge from regional coordinators. (\*mean of minimal = 284 and maximal = 381 estimated number of hypothetically present Bearded Vultures and the GPS-tagged birds that have not been identified during the IOD; birds with unknown age are not included).

## 5.7 Spatial distribution of age groups

From 748 sites 960 Bearded Vulture sightings have been recorded during the whole period, 927 during the focal day (**Table 3**).

In terms of reintroduction and resettlement of a species like the Bearded Vulture, it is of interest to gain a picture of the spatial distribution of different age classes. In particular, the presence of sexually mature adult birds can be an indicator for the formation of new reproductive units in the periphery of the species' distribution.

The following figures (**Figure 8 - Figure 14**) show the presence of Bearded Vultures subdivided in the two age groups adult and non-adult (juvenile, immature, subadult) at the regional level and give a more detailed overview on the Bearded Vulture distribution during the whole observation period. Each symbol on the map represents the position of an observation site, while the white dots represent sites where no Bearded Vulture was observed.

### 5.7.1 Alpine range

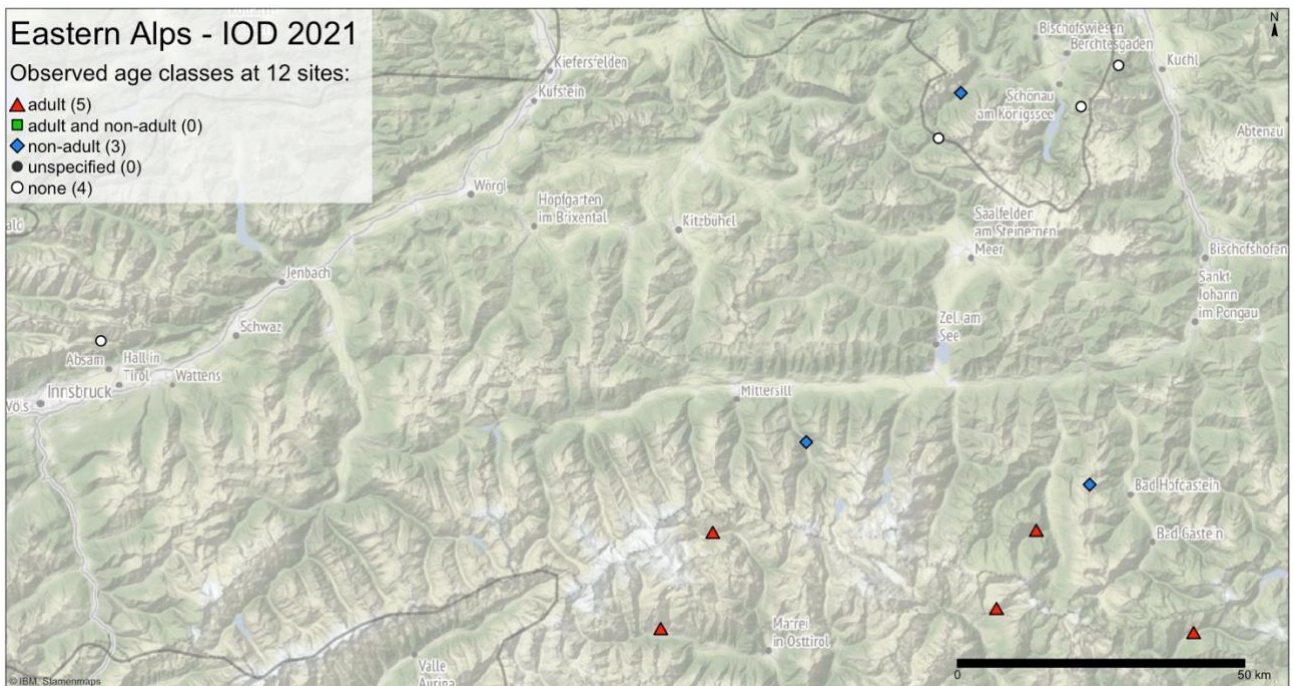


Figure 8. Age class distribution observed at 12 sites in the Eastern Alps during the IOD 2021.

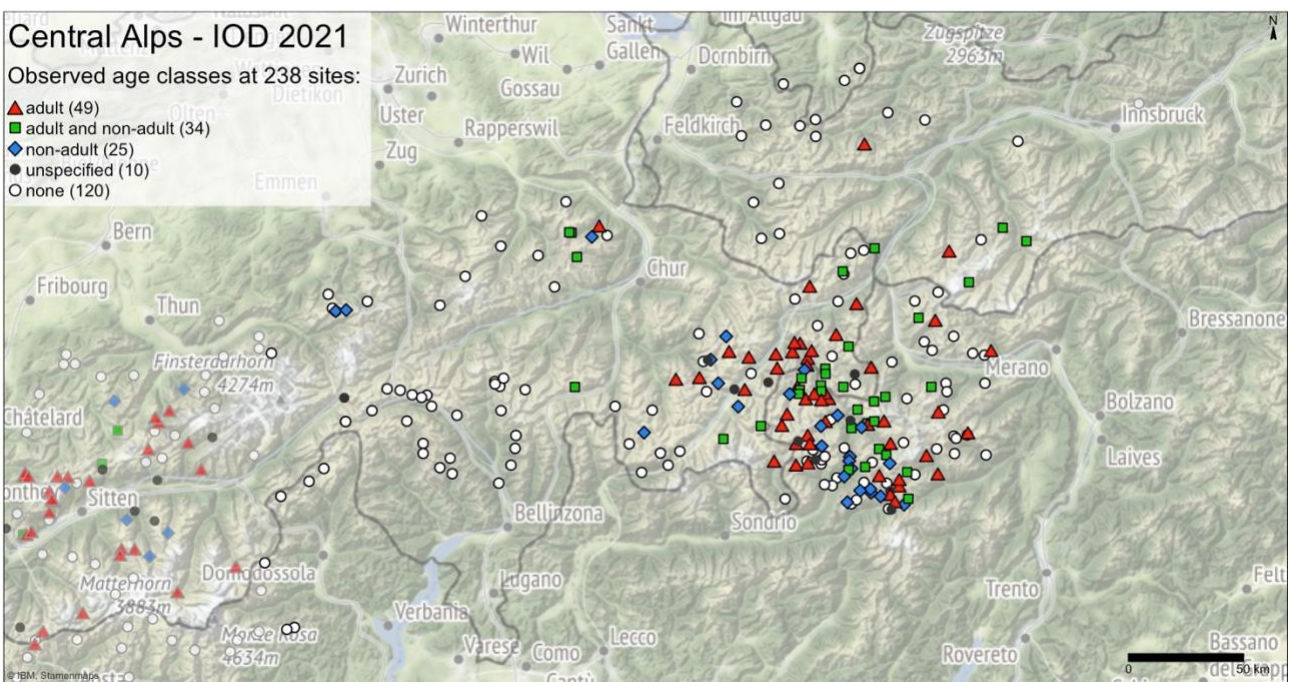


Figure 9. Age class distribution observed at 238 sites in the Central Alps during the IOD 2021.

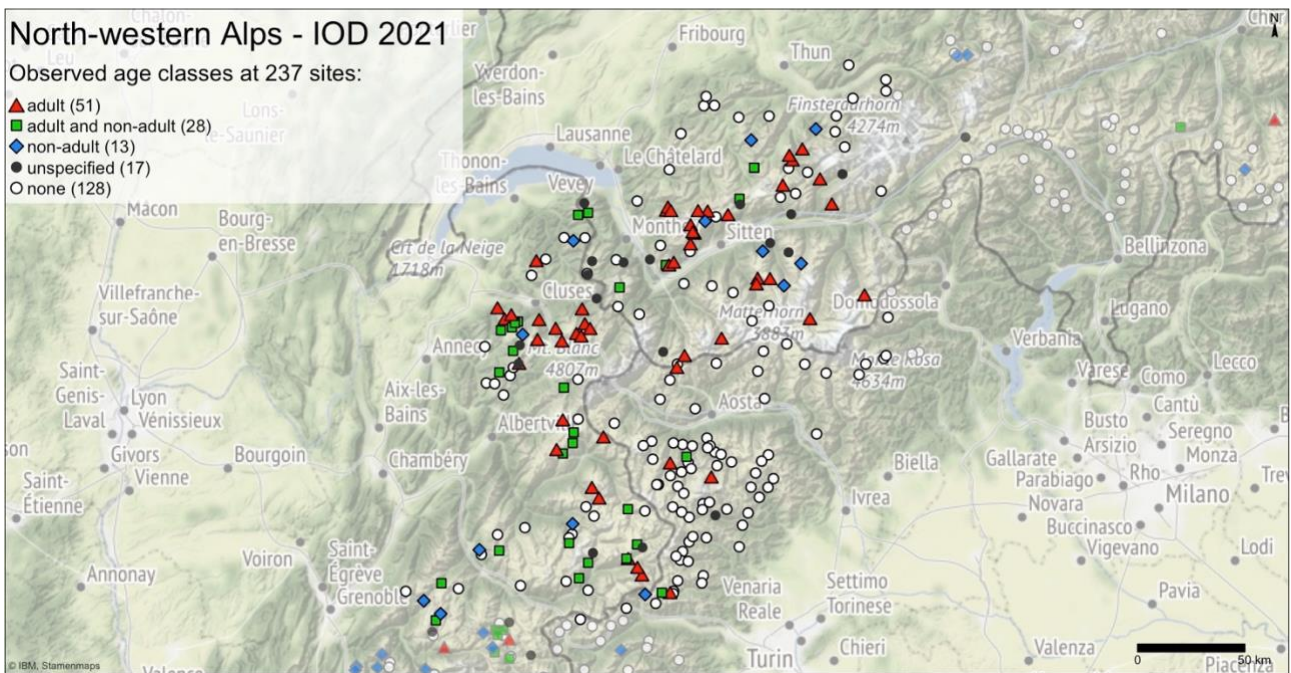


Figure 10. Age class distribution observed at 237 sites in the north-western Alps during the IOD 2021.

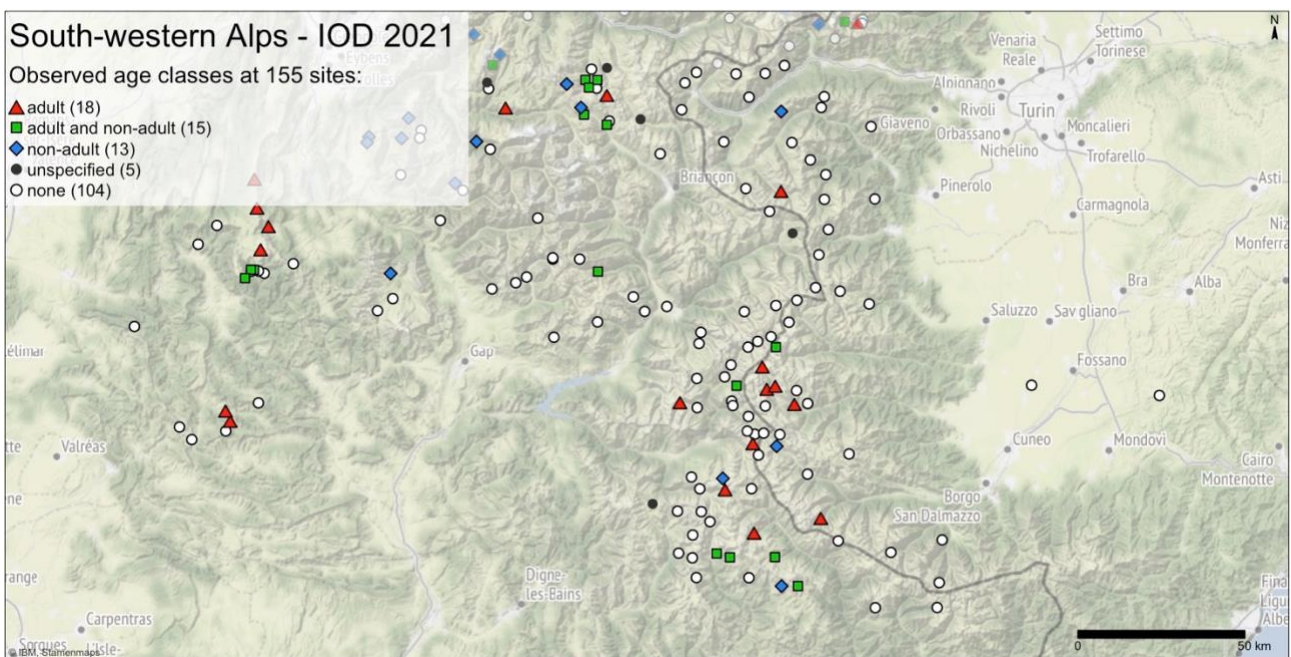


Figure 11. Age class distribution observed at 155 sites in the south-western Alps during the IOD 2021.

### 5.7.2 Massif Central & French Pre-Pyrenees

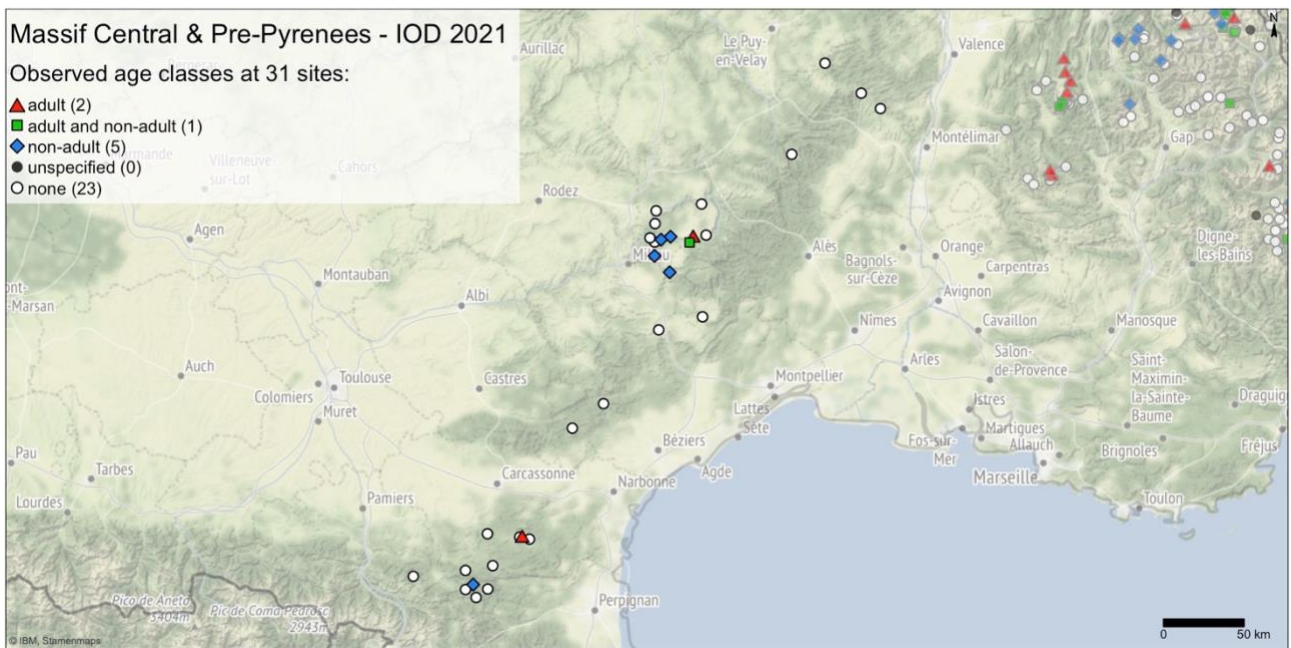


Figure 12. Age class distribution observed at 31 sites in the region of the Massif Central and the french Pyrenees during the IOD 2021.

### 5.7.3 Spain (without Pyrenees)



Figure 13. Age class distribution observed at 69 sites in Spain during the IOD 2021.

### 5.7.4 Bulgaria

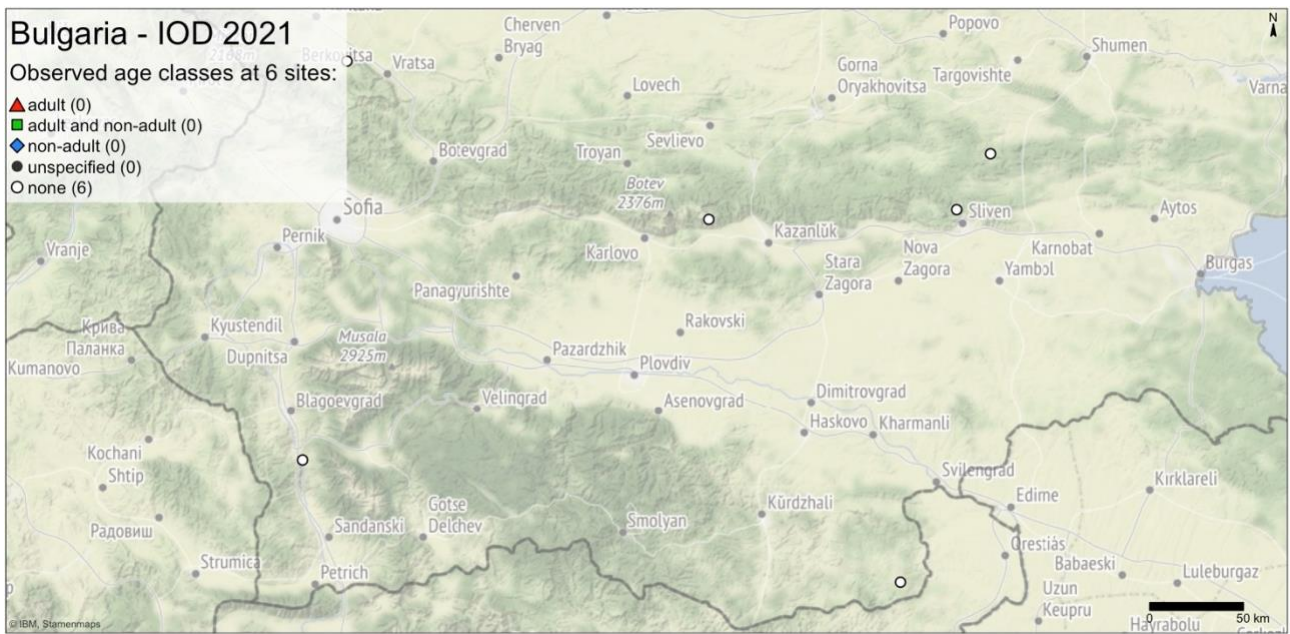


Figure 14. Age class distribution observed at 6 sites in Bulgaria during the IOD 2021.

## 6 Outlook 2022

For 2022 the focal day is planned for the 8.10.2022 which sets the start for the IOD-period during the following week. Based on last years' experience and feedback from IBM partners, it has become apparent that it is very impractical organisationally to plan for two dates. So that participants can plan the date better, it was therefore decided in plenary to decide on one date for the focus day and to decide according to the weather conditions whether it makes sense to carry out or cancel the IOD. This will have consequences on the possibility of population estimates locally and at population scale.

**Focal day**      **Sat 8<sup>th</sup> of October 2022**  
**Period**         **8<sup>th</sup> - 15<sup>th</sup> of October 2022**

Even though a period of one week was chosen for public communication, we would like to stress the importance of focused observation intensity. Observations can be cumulated only within the core period. Therefore, **the count by specialists and volunteers on observation posts shall be carried out only during the focal day.**

The focal time for the count starts at 10 am to at least 3 pm.

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| Alain Ducruet              | Andreas Gärber                | Audrey Foucher     |
| Alain Herraud              | Andreas Gygas                 | Audrey Niederer    |
| Alain Lefebvre             | Andreas Rofner                | Audrey Renault     |
| Alain Vincent              | Andreas Weiss                 | Audrey Ville       |
| Alba Solé Cabrera          | Andres Carrasco               | Augusto Rivelli    |
| Albert Borz                | Andrés Griñó Puig             | Aurane Genamez     |
| Albert Good                | Andrew Hargreaves             | Aurel Salamin      |
| Alberto Aquilini           | Ángel Jiménez Robledillo      | Aurelie Bea        |
| Alberto Cellerino          | Angela Lehnert                | Aurélie Castellana |
| Alberto Galdón             | Angela Schenatti              | Aurelio Lubini     |
| Alberto Nardi              | Angéline Guibert              | Aymeric Massé      |
| Alberto Palmarin           | Angelo Battaglia              | Barbara Folie      |
| Alberto Peracino           | Angelo Dan                    | Barbara Hochwimmer |
| Alberto Ressa              | Angelo Pasqua                 | Barbara Jenny      |
| Alberto Rossotto           | Anina Janett-Sonder           | Barbara Li Sanli   |
| Alberto Sancho             | Anita Saugy                   | Bastien Brunon     |
| Alberto Sorace             | Anna Boschiazzo               | Bastien Pascal     |
| Aldo Fasoli                | Anna Corti                    | Battista Silvestri |
| Aldo Pietrobon             | Anna Mira Arnau               | Beat Landolf       |
| Alessandra Iannascoli      | Anna Puchta                   | Beat Wartmann      |
| Alessandro Corgatelli      | Anna Sandig                   | Beatrice Annen     |
| Alessandro Mercogliano     | Anna Terras                   | Beatrice Gammino   |
| Alessandro Mucciolo        | Annalisa Bruccoli             | Beatrice Pozzi     |
| Alessandro Nessi           | Anne Bello                    | Ben Chomel         |
| Alessandro Perron          | Anne Carron-Bender            | Benjamin Corbin    |
| Alessandro Prezzi          | Anne Ledee                    | Benjamin Payet     |
| Alessia Chiappini Pelosato | Anne-Marie Trahin             | Benjamin Plumecocq |
| Alexander Dettwiler        | Annette Lebreton              | Benjamin Robira    |
| Alexandra Vasseur          | Annette Spreu                 | Benjamin Trager    |
| Alexandre Sbabo            | Annick Obert                  | Benoit Betton      |
| Alfonso Cirolo             | Anouk Taucher                 | Benoît De Fournas  |
| Alice Naudin               | Anrej Iwangoff                | Bernard Drillat    |
| Aline Guizzetti            | Antoine Breuvert              | Bernard Genand     |
| Alma Cozzolino             | Antoine Marnat                | Bernard Kientz     |
| Ana Cherta Val             | Anton Rattensberger           | Bernard Michellod  |
| Ana Moreno                 | Antonella Cordedda            | Bernard Petiteau   |
| Anaïs Fadhuile             | Antonella Cotza               | Bernard Rouillet   |
| Anaïs Merdrignac           | Antoni Pons Gómez             | Bernard Thomas     |
| Anais Plet                 | Antonia Bremer                | Bernie             |
| Anaïs Reynaud              | Antonia Lenstra               | Bertrand L.        |
| Andi Kofler                | Antonio Angulo                | Bianca Kleiber     |
| André Foulu                | Antonio Ceschi                | Birgit Rocco       |
| André Pichard              | Antonio Gonzalo Muñoz         | Bretrand Gabbud    |
| André Zapun                | Antonio Jesús Entrena Jiménez | Brigitte Pfau      |
| Andrea Bertoncetto         | Antonio Lingua                | Brigitte Pierson   |
| Andrea Caviezel            | Antonio Ronconi               | Bruna Morandotti   |
| Andrea Leccese             | Aran García Fàbrega           | Bruno Bösch        |
| Andrea Nicoli              | Ariane Bernard-Laurent        | Bruno Cuerva       |

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| Bruno Mooser          | Christian Pierson      | Dada Oreiller            |
| Bruno Perlotti        | Christian Rixen        | Dani Campos Caballer     |
| Bruno Usseglio        | Christian Rothen       | Daniel Carde             |
| Camille Birolini      | Christian Schild       | Daniel Chiardola         |
| Camille Bodot         | Christian Steiner      | Daniel Friedli           |
| Camille Montegu       | Christian Tessier      | Daniel Meier             |
| Camille Pasquet       | Christian Tschenett    | Daniel Perolini          |
| Camille Robert        | Christiane Seillé      | Daniel Querio            |
| Car. For. Bottini     | Christine Geanty       | Daniel Thonon            |
| Car. For. Di Dio      | Christine Isoardi      | Daniela Heldner          |
| Car. For. Giordano    | Christine Petiteau     | Danièle Bonnevie         |
| Car. For. Moino       | Christoph Katzenmaier  | Danièle Gaultier         |
| Car. For. Renzi       | Christoph Schmidlin    | Daniele Reteuna          |
| Carlo Carossio        | Christoph Vogel        | Daniele Spigoli          |
| Carlos Herrera        | Christophe Girardon    | Daniele Vezzoli          |
| Carlos Rossi          | Christophe Gotti       | Daniele Zonari           |
| Carola Trojer         | Christophe Pasini      | Danielle Legros          |
| Carole Bourdiaux      | Christophe Sahli       | Dario Contratto          |
| Carolin Specker       | Cinzia Fornero         | Dario Cretier            |
| Caroline Gehant       | Claire Bazoge          | Dario De Siena           |
| Caroline Mainguin     | Claire Gohet           | Dario Deio Borgogno      |
| Carolyn Nabholz       | Claire Oddou           | Dario Favre              |
| Caterina Beffa        | Claire Rameaux         | Dario Somaini            |
| Catherine Beciu       | Claire Souben          | David Izquierdo Acebes   |
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| Catherine Nombret     | Clara Petazzi          | David Laso Cuenca        |
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| Cathie Troussier      | Claude Duairé          | David Oblin              |
| Cathy Hustache        | Claude Pfau            | David Perea Galián       |
| Cathy Vincent         | Claude Romain          | David Ulrich             |
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| Célestin Luisier      | Claudia Soriano Nieto  | Davis Ritter             |
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| Eduardo Di Trapani      | Evelyne Brenière         | Franz Brügger          |
| Elena Castagna          | Evelyne Saint Dic        | Franz Köll             |
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| Elena Martínez Ferreras | Fabian Schneider         | Fréd Bertoletti        |
| Eline Richard           | Fabiano Sartirana        | Frédéric Bacuez        |
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| Elisabeth Bürkli        | Fabio Leport             | Friedrich Fliri        |
| Elisabeth Daum          | Fabio Maroni             | Fulgencio Sanchez      |
| Elisabeth Kalbermatten  | Fabio Santo              | Fulvio Genero          |
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| Eloise Souche           | Fadri Wehrli             | Gabriele Romanenghi    |
| Elsi Dettli             | Fanny Laugier            | Gabriella Berger       |
| Emanuel Egger           | Fanny Routin             | Gabriella Gerber       |
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| Emanuele Forlani        | Faustine Cretenet        | Georges Hudry          |
| Emanuele Pasini         | Federico Peretti         | Georges Reychler       |
| Emeline Moulin          | Federico Pino            | Georgi Stoyanov        |
| Emil Kuen               | Félix Deleage            | Gerald Lesacher        |
| Emilien Verdier,        | Ferdinand Lainer         | Géraldine Martel       |
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| Emilio López            | Fiore Cao                | Gérard Coffy           |
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| Enrico Gerber           | Francesco Malfasi        | Giorgio Paesani        |
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| Eric X                  | Herrera                  | Giulio Cosani          |
| Erica Bertoletti        | Franck Bornicat          | Giuseppe Castelli      |
| Erige De Thiersant      | Franck Della Vedova      | Giuseppe Dalla Torre   |
| Ernst Spychiger         | Franck Parchoux          | Giuseppe Ferrero       |
| Estelle Galop           | Franco Borgogno          | Giuseppe Marianini     |
| Etienne Bonino          | Franco Rizzolli          | Giuseppe Mirlocca      |
| Etienne Marle           | François Biollaz         | Giuseppe Nassi         |
| Ettore Mozzetti         | François Breton          | Giuseppe Roux Poignant |
| Eugen Jenal             | François Claude          | Giuseppe Speranza      |
| Eugenio Audibusso       | François Duchenne        | Giusi Mandelli         |
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| Eugenio Osele           | François Tissot          | Graziano Pala          |
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| Guido Meeus                | Ivan Ferrando           | José Luis Arriaza Ordóñez     |
| Guifrè Carles Orero Pastor | Iván Martínez Solera    | José Mellado                  |
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| Guillaume Laigle,          | Ivo Sedonati            | José Navarro                  |
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| Gunther Greßmann           | Jacqueline Chiardola    | Josef Christoph Schock        |
| Günther Kirstein           | Jacques Bertolotti      | Josepha Patras                |
| Gustave Fradin             | Jacques Thévoz          | Josiane Dreumont              |
| Hakim Jendoubi             | Jasmin Grießer          | Juan Alfonso Lozano           |
| Hanna Schreiber            | Jean Andrieux           | Juan Cristobal Vázquez        |
| Hans Ifanger               | Jean Deschatres         | Juan José Bas                 |
| Hans Lozza                 | Jean Hars               | Juán José Molina              |
| Hans Meierhans             | Jean Laurent Jordaney   | Juan Manuel Martínez Soriano  |
| Hans Resinger              | Jean Revolát            | Juan Monje                    |
| Hans Resinger              | Jean-Christian Piques   | Juan Ramón Jiménez Padilla    |
| Hansruedi Weyrich          | Jean-François Deroussin | Jules Coste                   |
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| Heinrich Klauzner          | Jean-Louis Meytral      | Julia Wildi                   |
| Heinz Jost                 | Jean-Luc Jardin         | Julie Berthollier             |
| Hélène Foulon              | Jean-Luc Pinel          | Julie Carlier                 |
| Helene Mattersberger       | Jean-Marc Blanchard     | Julie Corbin                  |
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| Henri Descombes            | Jean-Michel Flament     | Julien Traversier             |
| Henri Zara                 | Jean-Noël Loireau       | Julio José Valero             |
| Henry Ripert               | Jean-Paul Coulomb       | Juri Vonwyl                   |
| Herbert Hofer              | Jean-Pierre Brovelli    | Justine Kordylas              |
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| Hermann Sonntag            | Jean-Pierre Coutier     | Karine Pignon                 |
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| Hervé Cortot               | Jérémy Salamin          | Kassandra X                   |
| Hervé Tournier             | Jérémy Calvo            | Katia Lhoste-Asensio          |
| Hristo Peshev              | Jérôme Boegli           | Katja Rauchenstein            |
| Hubert Stillebacher        | Jéromine Clairet        | Kerstin Karbe-Lauener         |
| Hugo Padilla               | Jesus Ignacio Sánchez   | Khalil Outemzabet             |
| Hugo Socquet-Clerc         | Jesus Miñano            | Klaus Bliem                   |
| Hugues Pottier             | Jesús Olivares          | Konstantin Dichev             |
| Ignacio Gámez              | Jesús Romero Ruiz       | Krýstél' Mignot               |
| Ilan Cantoni               | Jo Lombard              | Laetitia Fortini              |
| Iliaria Cervellin          | Joao Guilherme          | Laetitia Régnier              |
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| Iliyan Stoev               | Joaquin Gamboa          | Laura Spagnoli                |
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| Isabel Bueno Cabrera       | Jocelyne Guillierz      | Laure Jacob                   |
| Isabel Guillamón Gallen    | Joel García Viñas       | Laure Scarzello               |
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| Isabelle Battentier        | Johannes Kallus         | Laurent Colombet              |
| Isabelle Cabi              | Johannes Tomaschett     | Laurent Martin-Dhermont       |
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| Isabelle Epp-Nicolino      | Jon Gross               | Laurent Sicsic                |
| Isabelle Gainche           | Jonathan Clack          | Laurianne Henet               |
| Isabelle Joly              | Jonathan Kemp           | Léa Petrazzelli               |
| Isaia Filippini            | Jonathan Remon          | Leire Pedrós Pla              |
| Ismael Invernizzi          | José Ángel Ruiz         | Léo Chapuis                   |
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| Lisa Minaca              | Marcel Pra                 | Martin Buisson         |
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| Lorenzo Colombo          | Marco Dallavalle           | Martin Wettstein       |
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| Lorenzo Pinamonti        | Marco Genova               | Martine Ditclerc       |
| Loreto Martínez Ferreras | Marco Gobbi                | Martine Dupont         |
| Louis Felix              | Marco Libretti             | Martine Tibaron        |
| Louis Salvaire           | Marco Marconi              | Martino Bertella       |
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| Louna Dupuy              | Marco Ponti                | Massimo Ciccarelli     |
| Luca Casparis            | Marco Salsotto             | Massimo Crema          |
| Luca Fornari             | Marco Sozzi                | Massimo Farcoz         |
| Luca Fornasari           | Marco Tasin                | Massimo Ferrier        |
| Luca Martignoni          | Marco Zahnd                | Massimo Lucco Castello |
| Luca Maurino             | Margaux Ipert              | Massimo Pellegrini     |
| Luca Quaglia             | Margherita Calcagno        | Massimo Pettavino      |
| Lucas Delalande          | Maria Ferloni              | Massimo Prati          |
| Lucas Liard              | Maria Gianatti             | Massimo Rosso          |
| Lucas Wauters            | Maria Mattersberger        | Mathéo Kresmann        |
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| Luciano Gelfi            | Marianna Frateschi         | Mathieu Krammer        |
| Luciano Martinet         | Marianne Correard          | Mathieu Louis          |
| Lucie Lombard,           | Marianne Küffer            | Mathieu Rey            |
| Lucien Tron              | Marianne Lörcher           | Mathieu Robert         |
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| Lucile Volut             | Marie Plasse               | Matteo Bert            |
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| Ludovic Bourdier         | Marie-Cécile Moisson       | Matteo Casparis        |
| Ludovic Klein            | Marie-Claire Rameau        | Matteo Cuna            |
| Luigi Bertero            | Marie-France Fosanelli     | Matteo Ravelli         |
| Luigi Damiano            | Marie-Françoise Aubert     | Matthias Mühlburger    |
| Luis De Matos            | Marie-Françoise Boisier    | Matthieu Vaslin        |
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| Luis García              | Marie-Paule De Thiersant   | Mattia Colombo         |
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| Michael Lagger        | Olivier Trompette       | Pia Kindlimann        |
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| Michele Sartori       | Paolo Mancardi          | Pierre Lauener        |
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| Miguel Guerrero Titos | Pascal Romi             | Pierre-Marie Epiney   |
| Mike Schaad           | Pascal Sonnenwyl        | Pilar Rubio           |
| Milo Manica           | Patrice Anquez          | Pino Gluderer         |
| Mirco Lauper          | Patrice Le Guilcher     | Purificación Galdo    |
| Mireia Sabater Tena   | Patrice Nortier         | Quentin Martinez      |
| Mireille Coulon       | Patricia Coste          | Quentin Peyre         |
| Mirjam Maag           | Patricia X              | Radames Bionda        |
| Mirko Micheletti      | Patrick Borredon        | Rafael Torralvo       |
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| Mme Collet            | Patrick Gaultier        | Raffaella Miravalle   |
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| Monique Amic          | Patrick Ormea           | Ralf Vanscheidt       |
| Monique Clerc         | Patrick Perret          | Ralph Imstepf         |
| Monique Corneo        | Patrick Pfeiffer        | Ramón Morcillo        |
| Morgane Tetu          | Patrick Pichard         | Raphaël Arlettaz      |
| Myriam Crozyer        | Patrick Scimè           | Raphaël Neouze        |
| Nadia Severgnini      | Pau Salvador Agut       | Raphaëlle Napoleoni   |
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| Nella Gulino          | Paul Dervaux            | Raul Chavero Garcia   |
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| Nicolas Boutroux      | Pedro Vizcaino          | Régis Bertolotti      |
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| Nicolas Moriset       | Peter Pfiffner          | Régis Picavet         |
| Nicole Carquillat     | Peter Wimmer            | Reinhard Gorfer       |
| Nicole Erard          | Philipp Bertagnolli     | Remo Basso            |
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| Nicole Petitpierre    | Philippe Archimbaud     | Renato Scarafoni      |
| Nicoletta Pott        | Philippe Ayral          | Renzo Borettaz        |
| Niki Sommerhalder     | Philippe Badin          | Reto Strimer          |
| Nils Zimmermann       | Philippe Fortini        | Ricardo Castillo      |
| Nino Basso            | Philippe Lavaux         | Ricardo Moreno        |
| Noa Rigoudy           | Philippe Lucas          | Riccardo Del Togno    |
| Norbert Jordan        | Philippe Maret          | Riccardo Ferrari      |
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| Richard Chervet          | Sarah Guiheux             | Suzanne Houot       |
| Richard Mazagg           | Sébastien Honore          | Svenja Crottogini   |
| Richard Prime            | Sébastien Lauper          | Svenja Summermatter |
| Richart Chaillou         | Sébastien Marie           | Swann Camviel       |
| Risti Curek-Pinelli      | Serena Barberis           | Sylvain Antoniazza  |
| Robert Golling           | Serge Denis               | Sylvain Grimaud     |
| Robert Joly              | Serge Lenogue             | Sylvain X           |
| Robert Straughan         | Sergio Fasano             | Sylvie Besnard      |
| Robert Zegg              | Sergio Perron             | Sylvie Claudon      |
| Roberta Latini           | Severin Hohenegger        | Sylvie Deligondès   |
| Roberto Bressanelli      | Séverine Lenogue          | Sylvie Geneve       |
| Roberto Corti            | Séverine Magnolon         | Sylvie Mosdale      |
| Roberto Fontana          | Severino Moranduzzo       | Tarin Tonon         |
| Roberto Lardelli         | Sharon Merki              | Teresa Spanò        |
| Roberto Permunion        | Silke Moll                | Theo Köhli          |
| Robi Janavel             | Silvana Nembrini          | Théo Mazet          |
| Robin Viton              | Silvia Alberti            | Thibault Longeroche |
| Rocco Leo                | Silvia Birocchi           | Thibault Veyret     |
| Rodolphe Papet           | Silvia Compagnoni         | Thierry Faivre      |
| Rodolphe Rauber          | Silvia Gatta              | Thierry Kerisit     |
| Roland De Coster         | Silvia Gennusa            | Thierry Sauzay      |
| Roland Molliet           | Silvia Kaserer            | Thierry Schwab      |
| Roland Paris             | Silvia Maroni             | Thierry Vincent     |
| Romain Barou             | Sílvia Navarro Barrachina | Thomas Bachofner    |
| Roméo Roux               | Silvia Salomoni           | Thomas Bouyard      |
| Romy Decarli             | Silvia Vercesi            | Thomas Gaupp        |
| Rosalba Di Tanna         | Simeon Marin              | Thomas Gorr         |
| Rosanna Pedrini          | Simon Jäger               | Thomas Parisse      |
| Rosanna Pedrini          | Simon Zeiner              | Thomas Roux         |
| Rossana Dassetto Daidone | Simona Adorni             | Thomas Ruetz        |
| Rosy Chevrier            | Simona Danielli           | Thomas Wehrli       |
| Rozen Hars               | Simona Molino             | Timothée Chaboud    |
| Rudy Vallet              | Simone Bocca              | Tito Princisvalle   |
| Ruedi Bösch              | Simone Liechti            | Tiziana Favre       |
| Ruedi Christen           | Simone Luzzato            | Tiziana Odelli      |
| Ruth Bstieler            | Simone Meytre             | Tiziano Beretti     |
| Ruth Klucker             | Simone Minessi            | Tiziano Quey        |
| Ruth Pfiffner            | Simone Roveyaz            | Tiziano Ruatti      |
| Ryan Coulon              | Simonetta Cutini          | Tom De La Cretaz    |
| Sabine Iwangoff          | Sònia Rabasco Chaparro    | Tom Lamy            |
| Sam Cruickshank          | Sonja Wipf                | Tommaso Del Prete   |
| Samson Acoca-Pidolle     | Sophie Leclerc            | Tommaso Delprete    |
| Samuel Bachmann          | Sophie Macon              | Tommy Bulle         |
| Samuel Gessler           | Sophie Marti              | Toni Kronig         |
| Samuel Talhoet           | Soraya Fàbrega Lorente    | Toni Reinstadler    |
| Samuele Cassani          | Steeve Peyron             | Toni Wegscheider    |
| Samuele Cuccuru          | Stefan Lerch              | Ueli Rehsteiner     |
| Samy Jendoubi            | Stefan Seifert            | Ugo Delpero         |
| Samy Michel              | Stefania Capelli          | Ugo Parolini        |
| Sandra Cuna              | Stefania Vuillermoz       | Ulisse Guchardaz    |
| Sandra Moor              | Stefano Allavena          | Ulrich Ruepp        |
| Sandra Pérez Aceituno    | Stefano Costa             | Umberto Poet        |
| Sandra Sáenz             | Stefano Marcolli          | Urs Kyburz          |
| Sandrine Mendès          | Stefano Nicolodi          | Ursula Ramseier     |
| Sandro Cerquetti         | Stefano Zuccaro           | Ursula Sterrer      |
| Sandro Pollinger         | Steivan Luzi              | Valentin Debons     |
| Santiago Solé Luz        | Stéphane Garnier          | Valentin Lauret     |
| Sara Boucheron           | Stéphane Savary           | Valentina Babolin   |
| Sara Ferreras Viruete    | Stéphane Thiebaud         | Valentina Cecchini  |
| Sara Segura Aduna        | Susanna Rossi             | Valère Marsaudon    |

Valeria Moris  
Valeria Paganoni  
Valeria Wylér  
Valter Vallet  
Vanesa Abad Gil  
Verena Eichenberger  
Véronique Rémyot  
Vianney Bajart  
Victor Seve  
Vincent Aubert  
Vincent Mugnier-Merlin  
Vincent Nobili  
Vincenzo Ragaglia  
Violaine Chervet  
Violaine Coulangé  
Violetta Fontana

Virgil Bassani  
Virginie Romanetto  
Vittorio Saccoletto  
Vitus Grond  
Vivian Buscaglia  
Walter Casarone  
Walter Guenzani  
Walter Palfrader  
Walter Pucher  
Werner Fischer  
Werner Rokitzky  
Werner Ruinelli  
Werner Schuh  
Willy Bourgeois  
Wolfi Fritz  
Xavier Fribourg

Yann Blanchard  
Yann Breull  
Yann Gerond  
Yohan Sassi  
Yvan Frutig  
Yvan Schmidt  
Yvan Sibourg  
Yves Jacquemoud  
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Yves Lazennec  
Yves Leuzinger  
Yves Roullaud  
Yves Sornay  
Yves-Marie Gorin  
Yvonne Markl