INTERNATIONAL
BEARDED VULTURE
MONITORING

# IOD 2023

## 18th International Bearded Vulture Observation Days

Focal day - October 14th 2023
IOD period - October 14th-22nd 2023

# Imprint

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**The IOD 2023 were organised by the following IBM-members[1] and associated organisations[2]:**

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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 October 14th, during this year's Focal Day, more than thousand observers enjoyed generally favourable weather conditions as they took part in the 18th annual Bearded Vulture census. Although some observation sites on the north side of the main Alpine ridge experienced bad weather (24% of sites), visibility was generally good (28%) or moderate (48%). Consequently, during the IOD period 617 Bearded Vulture sightings were reported at 251 out of the 676 occupied sites (37%).

In collaboration with 19 IBM partners and several associated organisations, synchronous observations were conducted at 656 sites on the focal day and an additional 23 sites during the IOD period. Local experts and monitoring personnel, well-versed in their regions, played a crucial role in estimating the population size and identifying individual birds. By aggregating and evaluating these observations and estimates across the monitoring area, an overview of the age class distribution was obtained and compared with predictions from demographic modelling (Schaub et al., 2009) at the Alpine scale.

The Alpine Bearded Vulture population was estimated to vary between 316 and 419 individuals, notably lower than the demographic model's estimate of 460 individuals. However, the age class distribution closely resembled the predicted values, with a slight underestimation of subadult birds due to identification challenges in the field. The estimated age class distribution was: 59% adults, 9% subadults, 15% immature, and 14% juveniles. These estimates were derived from observation data collected during the focal day, combined with estimates of unobserved individuals in the region, including territorial birds, fledglings, and GPS-tagged birds (N = 70 in 2023), among others. In the Massif Central, the Bearded Vulture population was estimated at around 11 individuals, while approximately 6 to 7 individuals were estimated in the Aude region of the French Pyrenees. Outside of the Pyrenees in Spain, Bearded Vulture populations were estimated between 4-5 individuals in Maestrazgo and 39-54 individuals in Andalusia and Rioja. As in previous years, no Bearded Vultures were observed in Bulgaria, where the species has been considered extinct since 1972.

During this year's IOD, multiple Bearded Vultures were identified in the Alps (N=69), the Massif Central (N=8), and Spain (N=7), with an additional 19 individuals in the Alps identified with lower certainty. Furthermore, 70 animals were tracked using GPS, though only 10 out of the 47 animals present in the Alpine region could be visually identified by observers. These individual-based data are invaluable for understanding the life-history of Bearded Vultures and can aid in calculating parameters for demographic modelling. The availability of such international-scale individual-based information is unparalleled and facilitates the estimation of survival rates, thereby monitoring the project's progress in understanding the Bearded Vulture populations' dynamics.

# 2 Key facts

**Monitoring organisation**

- 19 IBM-partners and several associated organisations coordinated the IOD 2023
- 1'124 observers participated in Austria, Bulgaria, France, Germany, Greece, Italy, Spain and Switzerland
- 676 sites were occupied during the IOD period, 656 of them on the focal day (14.10.2023)
- 28% good, 48% moderate and 24% unfavourable weather was reported at the observation sites

**Observation results**

- 617 Bearded Vulture observations during the IOD period, 584 of them on the focal day 14.10.2023
- Bearded Vultures observed at 251 out of 676 sites (37%)
- observed age class distribution (number of observations per age class)
  - adult (N = 376; 61%)
  - subadult (N = 32; 5%)
  - immature (N = 84; 14%)
  - juvenile (N = 76; 12%)
  - unknown (N = 49; 8%)

**Age class distribution & populations estimates**

- estimated age class distribution in the Alps (individuals)
  - adult (N = 218, 59%)
  - subadult (N = 33, 9%)
  - immature (N = 55, 15%)
  - juvenile (N = 53, 14%)
  - unknown (N = 10, 3%)

- estimated number of Bearded Vulture individuals:
  - Alps: 316 - 419
  - Massif Central: ±11
  - Pre-Pyrenees (FRA): 6-7
  - Spain[1]: 39-54
  - Maestrazgo (ESP) 4-5
  - Bulgaria: 0

**Individual based data**

- 69 (Alps), 8 (Massif Central) and 7 (Spain) individuals were identified with certainty
- 19 individuals were probably identified in the Alps
- GPS-data is available for 70 individuals during the IOD period 2023
- in the Alps 10 (~21%) of the 47 GPS-tagged individuals were identified by the observers

[1] *Only for monitored parts (e.g. no survey in Spanish Pyrenees and other mountain ranges)*

# 3 Preface

Once again, more than 1,100 participants opted to demonstrate their support for Bearded Vultures in Europe. Through their dedication and the collaboration of 25 locally responsible organisations, the International Bearded Vulture Observation Day (IOD) marked its 18th consecutive year. Once again, this year, the majority of observers enjoyed favourable conditions, enhancing the accuracy of population estimates gathered through this 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.

In 2023, no IOD was organised on Corsica, in the area around the Stelvio National Park and in South Tyrol (both ITA). This year we even received a few reports of Bearded Vulture sightings from Crete, Greece.

Time Period
The 2023's international survey was held between the 14th and the 22th October with the focal day on Saturday 14th of October. 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

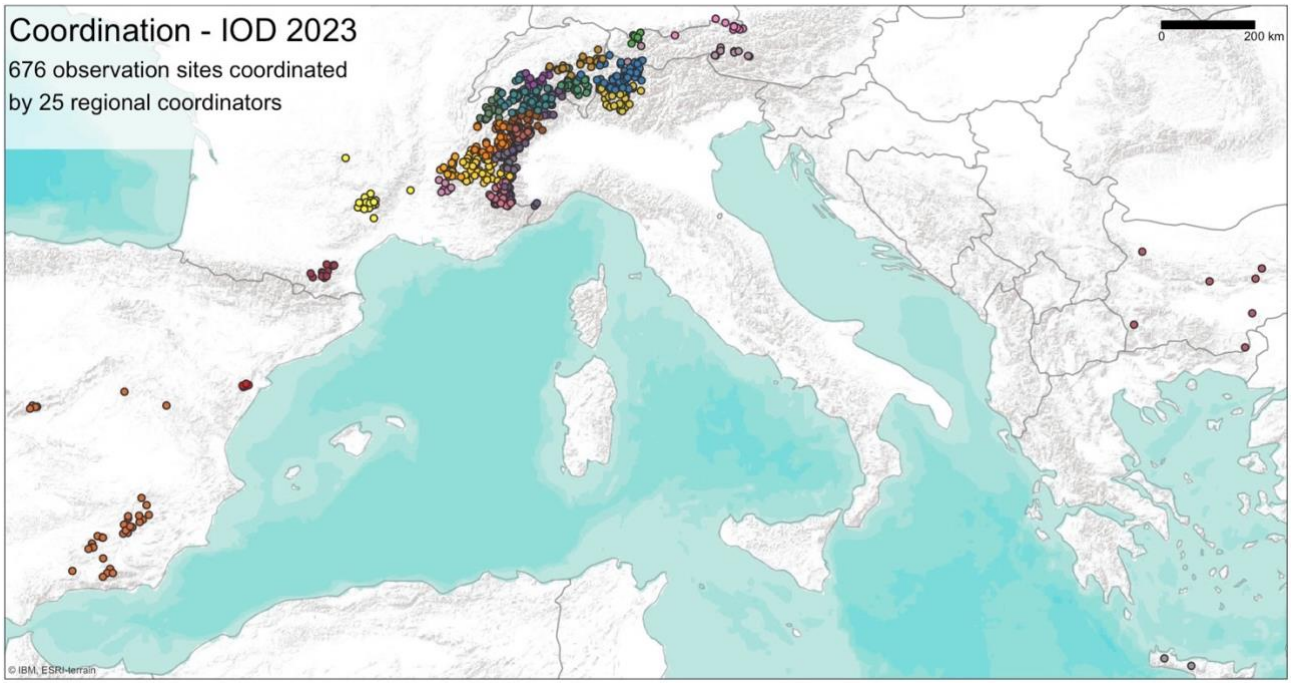


*Figure 1. The IOD-monitoring area is regionally coordinated by 19 IBM-partners and associated organisations.*

## 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[2]
- bird name / hypothesis
- picture if possible

[2] *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 counting, 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 (life stage) | Calendar year (cy) | Real age (years) Jan-Feb \| Mar-Dec | | Life history event |
|---|---|---|---|---|
| juvenile (1. year) | 1 | - | 0 | *hatch* |
| immature (2. year) | 2 | 0 | 1 | *non-territorial* |
| immature (3. year) | 3 | 1 | 2 | *non-territorial* |
| subadult (4. year) | 4 | 2 | 3 | *non-territorial* |
| subadult (5. / 6. year) | 5 | 3 | 4 | *potential nesting* |
| adult (≥ 6. year) | 6 | 4 | 5 | *potential breeding* |
| adult (≥ 6. year) | ≥7 | 5 | ≥6 | *potential breeding* |

# 5 Results and Discussion

## 5.1 Weather conditions

The overall weather situation was favourable in 2023 with 28% good, 48% moderate and 24% bad weather conditions at the observation sites (Figure 2). In 2022 71% 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.

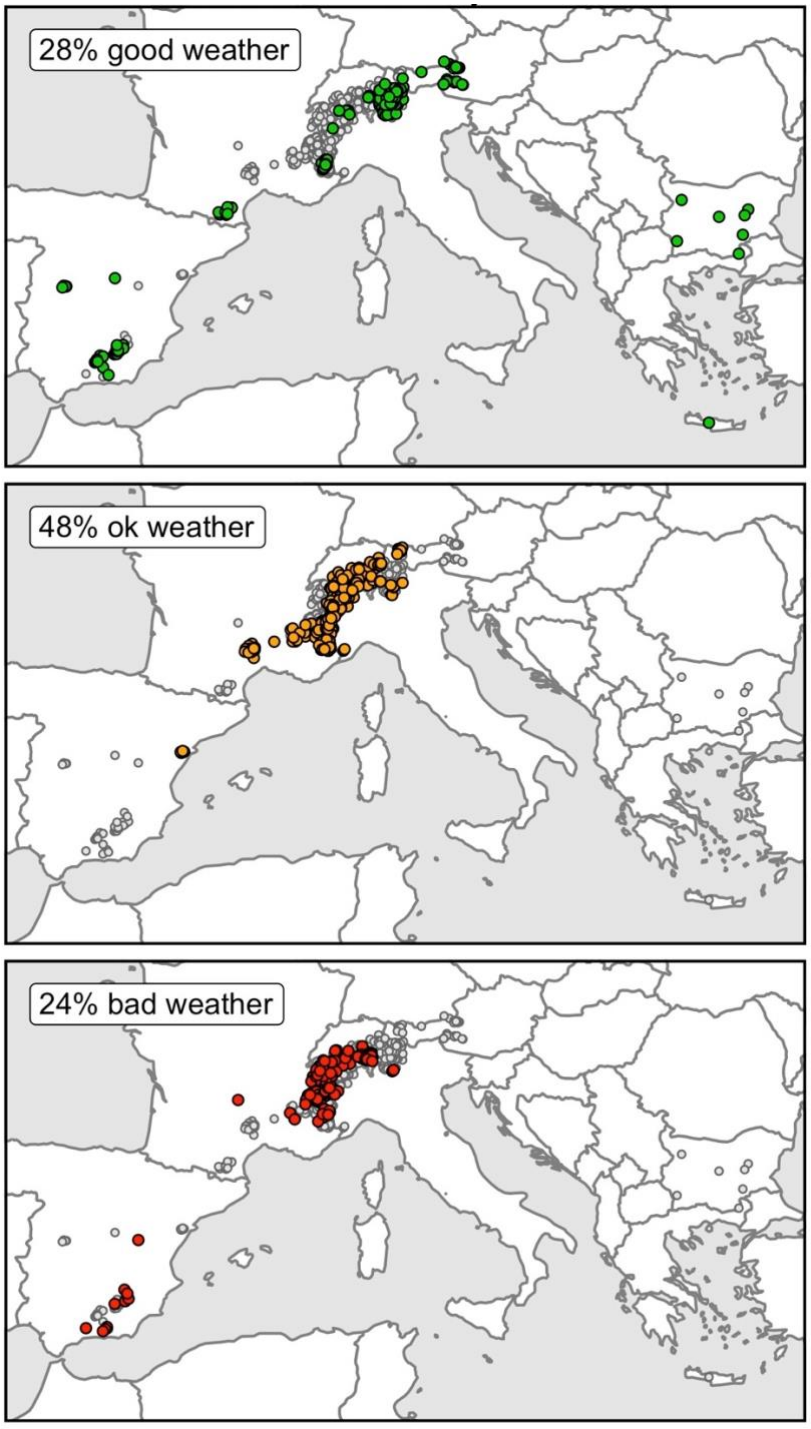


*Figure 2. Weather conditions at the observation sites reported by the observers in the field during the IOD 2023. Most of the observers (76%) profited from good or moderate weather conditions while at the northern side of the Alpine range some sites faced bad weather conditions (24%).*

## 5.2 Observation data

In 2023, a total of 1'124 observers have occupied 676 observation sites in the Alps, in the French Pyrenees (department Aude), parts of Spain, on Crete (Greece) as well as Bulgaria *(**Figure 3** and **Table 2**).*

The third International Observation Day (IOD) took place in the German Alps, where six Bearded Vultures have been released since 2021. As in previous years, the monitoring effort was highest in the western Alpine range. The IBM monitoring network is extending its reach towards the Spanish border near the Pyrenees, aiming to cover areas that could facilitate the connection between Bearded Vulture populations in the Alps and the Pyrenees. Given the known movement patterns of Bearded Vultures in Spain between the southern mountainous regions and the northern areas of Castilla y Léon, Castilla-La Mancha, and La Rioja, observation networks in these regions have been expanded.

In Eastern Europe, observation sites in Bulgaria were occupied for the first time in 2018, despite the absence of Bearded Vultures in this region thus far. Nevertheless, plans to start Bearded Vulture releases in Bulgaria in 2025 underscore the importance of establishing an observer network. Additionally, this reintroduction site is envisioned to serve as a crucial link between the Alpine population and the Bearded Vulture populations in Greece and Turkey in the future. This year there was one observer on Crete, who could report some observations of Bearded Vultures.

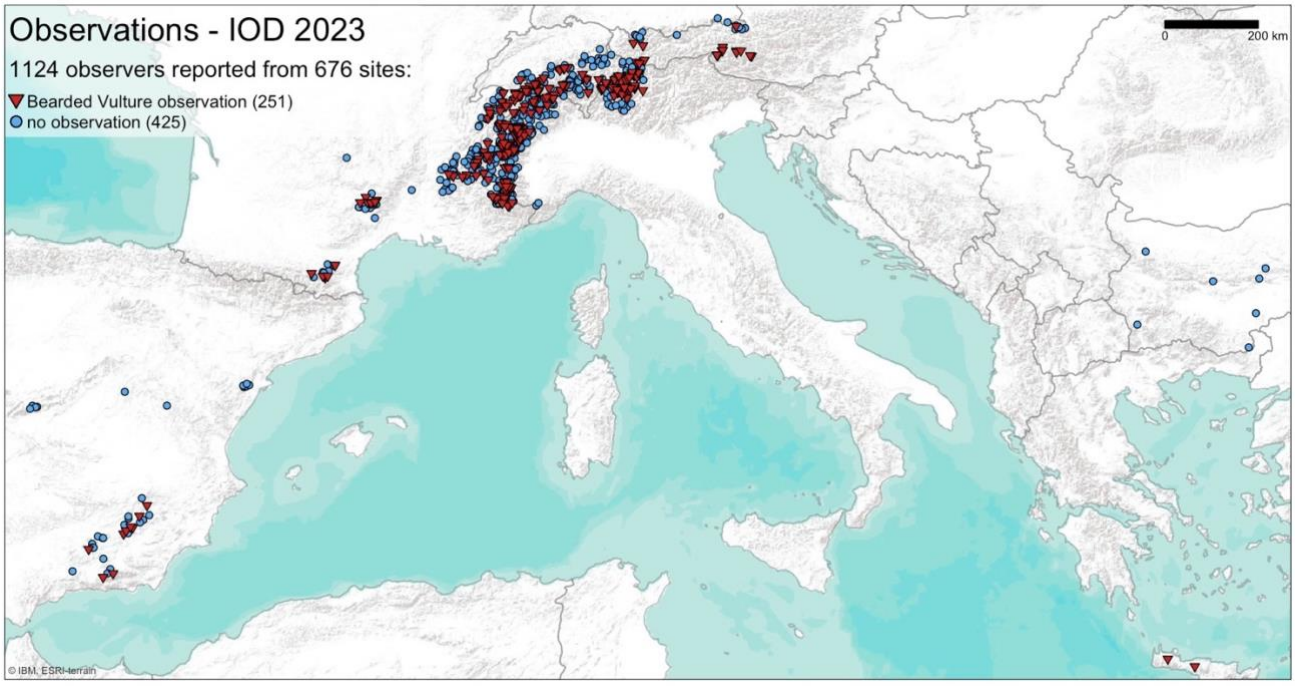


*Figure 3. Distribution of all 676 observation sites during the IOD 2023 in Europe. Red triangles depict sites where Bearded Vultures have been observed at least once during the IOD period 14th-22nd of October 2023 (N=251) while no observations have been reported from sites marked with a blue dot (N=425).*

*Table 2. Number of observation sites per region during the IOD 2023 (focal day 14.10.2023). The total of 679 site occupations differs from 676 sites that were occupied (Figure 3), as some of the sites were occupied on multiple days within the IOD period.*

| Zone | Country | Region | occupied sites in October 2023 | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 14. | 15. | 16. | 17. | 18. | 19. | 20. | 21. | 22. | |
| **Alpine range** | | | 575 | 5 | 6 | 2 | 2 | 2 | 2 | 3 | 0 | 597 |
| **Eastern** | AUT | Kärnten | 2 | | | | | | | | | 2 |
| | AUT | Salzburg | 6 | | | | | | | | | 6 |
| | AUT | Tirol | 6 | | 1 | | 1 | 1 | 1 | | | 10 |
| | DEU | Bayern | 6 | | | | | | | | | 6 |
| **Central** | AUT | Tirol | 1 | | | | | | | | | 1 |
| | AUT | Vorarlberg | 1 | | | | | | | | | 1 |
| | CHE | Central Switzerland | 20 | | | | | | | | | 20 |
| | CHE | Eastern Switzerland | 65 | | | | | | | | | 65 |
| | CHE | Ticino | 28 | | | | | | | | | 28 |
| | CHE | Western Switzerland | 7 | 1 | | 1 | | | | | | 9 |
| | DEU | Bayern | 6 | | | | | | | | | 6 |
| | ITA | Lombardia | 31 | | | | | | | | | 31 |
| | ITA | Piemonte | 9 | | | | | | | | | 9 |
| **North-West** | CHE | Central Switzerland | 2 | | | | | | | | | 2 |
| | CHE | Western Switzerland | 54 | 4 | 5 | | 1 | 1 | 1 | 3 | | 69 |
| | FRA | Rhône-Alpes | 70 | | | 1 | | | | | | 71 |
| | ITA | Piemonte | 45 | | | | | | | | | 45 |
| | ITA | Valle d'Aosta | 46 | | | | | | | | | 46 |
| **South-West** | FRA | Provence-Alpes-Côte d'Azur | 80 | | | | | | | | | 80 |
| | FRA | Rhône-Alpes | 42 | | | | | | | | | 42 |
| | ITA | Piemonte | 48 | | | | | | | | | 48 |
| **Massif Central** | | | 19 | | | | | | | | | 19 |
| | FRA | Languedoc-Roussillon | 12 | | | | | | | | | 12 |
| | FRA | Midi-Pyrénées | 6 | | | | | | | | | 6 |
| | FRA | Rhône-Alpes | 1 | | | | | | | | | 1 |
| **Pre-Pyrenees** | | | 15 | | | | | | | | | 15 |
| | FRA | Auvergne | 1 | | | | | | | | | 1 |
| | FRA | Languedoc-Roussillon | 14 | | | | | | | | | 14 |
| **Spain** | | | 39 | | | | | | | | | 39 |
| | ESP | Andalucía | 24 | | | | | | | | | 24 |
| | ESP | Castilla y León | 3 | | | | | | | | | 3 |
| | ESP | Castilla-La Mancha | 6 | | | | | | | | | 6 |
| | ESP | Comunidad Valenciana | 5 | | | | | | | | | 5 |
| | ESP | Extremadura | 1 | | | | | | | | | 1 |
| **Bulgaria** | | | 7 | | | | | | | | | 7 |
| | BGR | Blagoevgrad | 1 | | | | | | | | | 1 |
| | BGR | Haskovo | 2 | | | | | | | | | 2 |
| | BGR | Montana | 1 | | | | | | | | | 1 |
| | BGR | Sliven | 2 | | | | | | | | | 2 |
| | BGR | Stara Zagora | 1 | | | | | | | | | 1 |
| **Kreta** | | Kreta | 1 | | | | | | | | 1 | 2 |
| **Site occupations total IOD 2023** | | | 656 | 5 | 6 | 2 | 2 | 2 | 2 | 3 | 1 | 679 |

*Table 3. Number of Bearded Vulture sightings for each region during the whole IOD period 2023 (focal day 14.10.2023). 0 values indicate dates where sites were occupied but no Bearded Vulture have been observed.*

| Zone | Country | Region | Bearded Vulture observations in October 2023 | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 14. | 15. | 16. | 17. | 18. | 19. | 20. | 21. | 22. | |
| **Alpine range** | | | 530 | 4 | 8 | 6 | 3 | 2 | 5 | 4 | 0 | 562 |
| **Eastern** | AUT | Kärnten | 3 | | | | | | | | | 3 |
| | AUT | Salzburg | 12 | | | | | | | | | 12 |
| | AUT | Tirol | 27 | | 1 | | 2 | 1 | 2 | | | 33 |
| | DEU | Bayern | 1 | | | | | | | | | 1 |
| **Central** | AUT | Tirol | 2 | | | | | | | | | 2 |
| | AUT | Vorarlberg | 0 | | | | | | | | | 0 |
| | CHE | Central Switzerland | 8 | | | | | | | | | 8 |
| | CHE | Eastern Switzerland | 70 | | | | | | | | | 70 |
| | CHE | Ticino | 4 | | | | | | | | | 4 |
| | CHE | Western Switzerland | 8 | 1 | | 5 | | | | | | 14 |
| | DEU | Bayern | 1 | | | | | | | | | 1 |
| | ITA | Lombardia | 32 | | | | | | | | | 32 |
| | ITA | Piemonte | 9 | | | | | | | | | 9 |
| **North-West** | CHE | Central Switzerland | 0 | | | | | | | | | 0 |
| | CHE | Western Switzerland | 64 | 3 | 7 | | 1 | 1 | 3 | 4 | | 83 |
| | FRA | Rhône-Alpes | 62 | | | 1 | | | | | | 63 |
| | ITA | Piemonte | 39 | | | | | | | | | 39 |
| | ITA | Valle d'Aosta | 52 | | | | | | | | | 52 |
| **South-West** | FRA | Provence-Alpes-Côte d'Azur | 84 | | | | | | | | | 84 |
| | FRA | Rhône-Alpes | 23 | | | | | | | | | 23 |
| | ITA | Piemonte | 29 | | | | | | | | | 29 |
| **Massif Central** | | | 23 | | | | | | | | | 23 |
| | FRA | Languedoc-Roussillon | 22 | | | | | | | | | 22 |
| | FRA | Midi-Pyrénées | 1 | | | | | | | | | 1 |
| | FRA | Rhône-Alpes | 0 | | | | | | | | | 0 |
| **Pre-Pyrenees** | | | 12 | | | | | | | | | 12 |
| | FRA | Auvergne | 0 | | | | | | | | | 0 |
| | FRA | Languedoc-Roussillon | 12 | | | | | | | | | 12 |
| **Spain** | | | 17 | | | | | | | | | 17 |
| | ESP | Andalucía | 15 | | | | | | | | | 15 |
| | ESP | Castilla y León | 0 | | | | | | | | | 0 |
| | ESP | Castilla-La Mancha | 2 | | | | | | | | | 2 |
| | ESP | Comunidad Valenciana | 0 | | | | | | | | | 0 |
| | ESP | Extremadura | 0 | | | | | | | | | 0 |
| **Bulgaria** | | | 0 | | | | | | | | | 0 |
| | BGR | Blagoevgrad | 0 | | | | | | | | | 0 |
| | BGR | Haskovo | 0 | | | | | | | | | 0 |
| | BGR | Montana | 0 | | | | | | | | | 0 |
| | BGR | Sliven | 0 | | | | | | | | | 0 |
| | BGR | Stara Zagora | 0 | | | | | | | | | 0 |
| **Kreta** | | Kreta | 2 | | | | | | | | 1 | 3 |
| **Total Bearded Vulture observations IOD 2023** | | | 584 | 4 | 8 | 6 | 3 | 2 | 5 | 4 | 1 | 617 |

## 5.3 Telemetry data

### 5.3.1 IBM-monitoring area

During the IOD period GPS-data of 70 Bearded Vultures with satellite tags has been collected in the Alpine range, the Massif Central, the Pyrenees, north-eastern Spain and Corsica[3] (***Figure 4***). 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.

*[3] No IOD was organized on Corsica in 2023.*

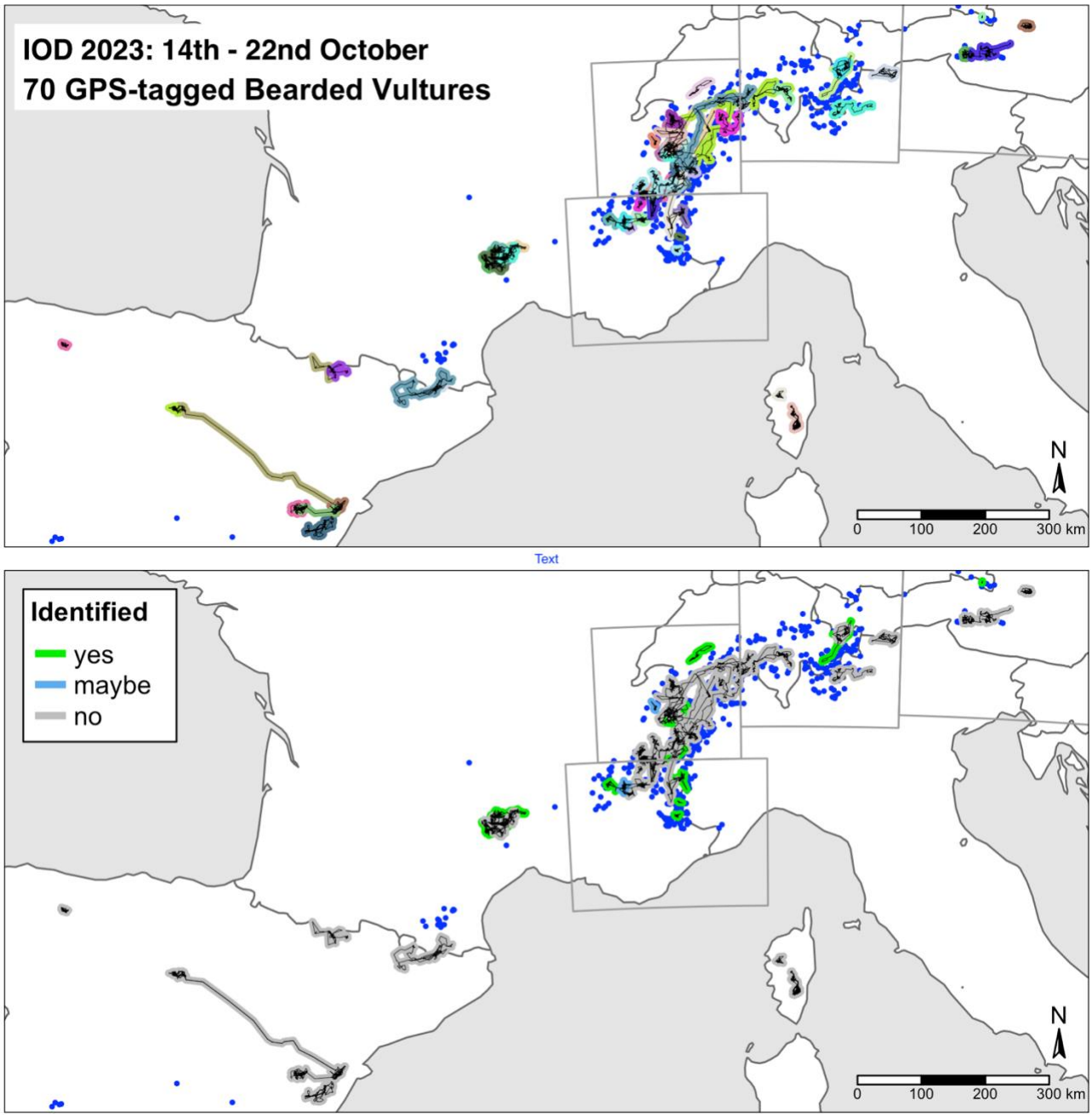


*Figure 4. 70 GPS-tagged Bearded Vultures during the IOD period. Blue dots = occupied observation sites.*

### 5.3.2 Alpine range

During this year's IOD, GPS-data in the Alpine range was available from 47 GPS-tagged birds during the IOD period and on the focal day (14.10.2023). Out of the 47 GPS-tagged birds 10 individuals could be sighted and identified, while 3 birds were identified with some uncertainty by observers. In summary, 21% of the GPS-tagged birds have been sighted and identified, which is less compared to 2021 (27%).

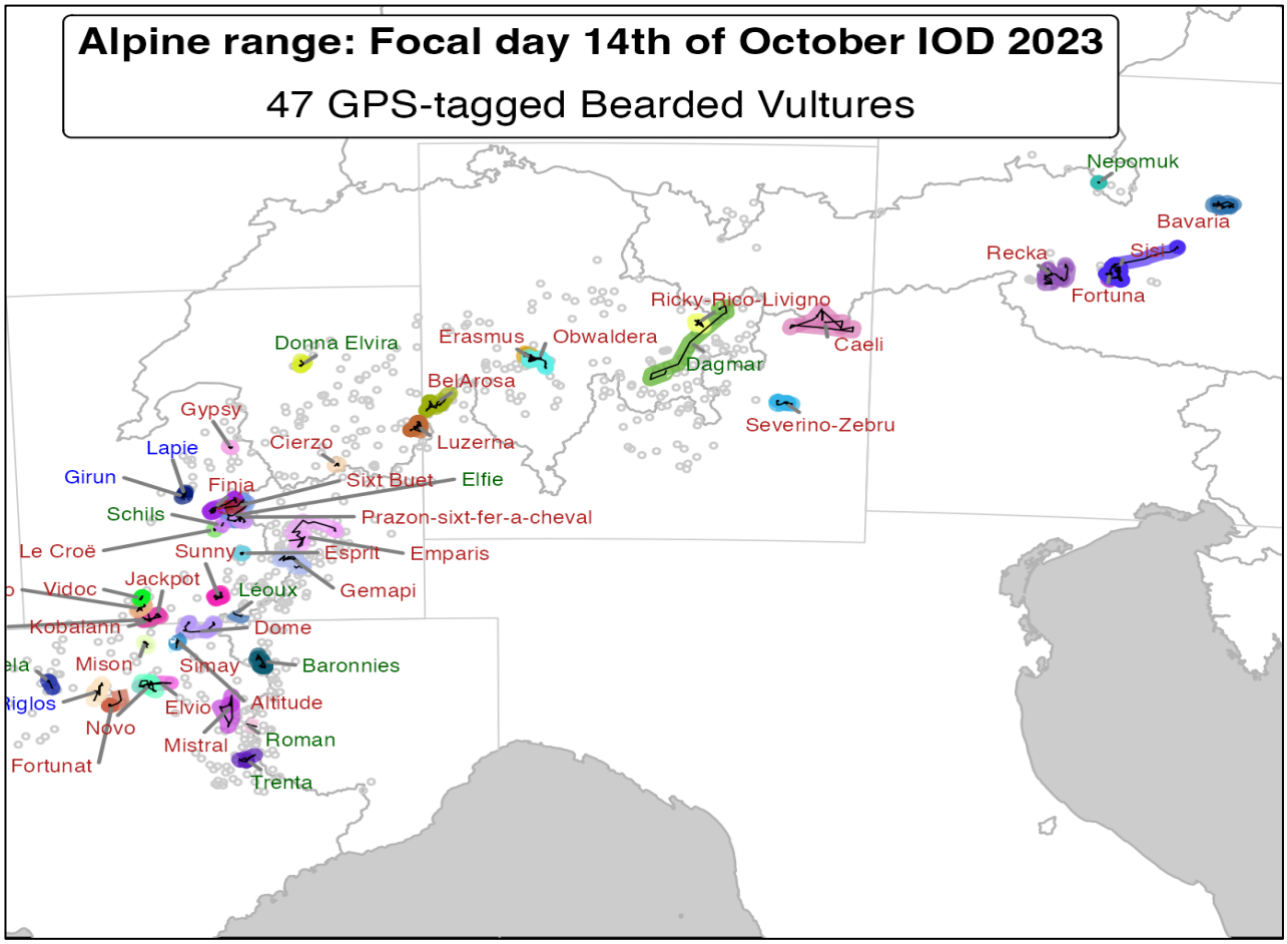


*Figure 5. Positions of 47 Bearded Vultures tagged with GPS transmitters that were present in the Alpine range during the focal day (14.10.2023). Observation sites that were occupied during the IOD period are marked with grey circles. During the IOD period 10 birds have been identified (green labels), 3 birds have been probably identified (blue labels) and 34 birds couldn't be identified (red labels).*

*Table 4. 70 birds, 36 males and 28 females, with active GPS-tag during the IOD period 2023. No IOD was organised in Corsica. 16 of the GPS-tagged individuals have been identified and 3 were probably identified during the IOD.*

| Animal | BirdID | Sex (m/f) | Age class | Hatch | Days with pos. | Pos. on focal day | Observed (yes/maybe/no) |
|---|---|---|---|---|---|---|---|
| **Alpine range** | **47** | **23/18** | | | | | **10/3/34** |
| Léoux | BG0950 | f | | 2017 | 9 | 4 | yes |
| Roman | BG0854 | m | | 2015 | 8 | 2 | yes |
| Schils | BG0802 | m | | 2014 | 9 | 6 | yes |
| Girun | BG0904 | f | | 2016 | 7 | 1 | maybe |
| Lapie | W0251 | m | | 2018 | 9 | 10 | maybe |
| Caeli | BG0998 | m | | 2018 | 9 | 23 | no |
| Cierzo | BG0899 | m | adult | 2016 | 7 | 9 | no |
| Finja | BG1003 | f | | 2018 | 9 | 86 | no |
| Fortuna | BG0843 | m | | 2015 | 9 | 9 | no |
| Gemapi | W0196 | f | | 2016 | 9 | 39 | no |
| Gypsy | W0209 | m | | 2017 | 9 | 21 | no |
| Mison | W0230 | f | | 2017 | 8 | 6 | no |
| Simay | BG0983 | m | | 2018 | 9 | 7 | no |
| Pamela | BG1031 | f | | 2019 | 9 | 22 | yes |
| Altitude | W0313 | f | | 2019 | 8 | 4 | no |
| Elvio | BG1026 | m | | 2019 | 9 | 6 | no |
| Emparis | W0284 | f | | 2019 | 9 | 29 | no |
| Fortunat | BG1068 | m | | 2020 | 9 | 69 | no |
| Kobalann | BG1063 | f | subadult | 2020 | 9 | 44 | no |
| Luzerna | BG1071 | f | | 2020 | 9 | 86 | no |
| Mistral | BG1022 | m | | 2019 | 9 | 23 | no |
| Pierro | W0301 | m | | 2019 | 9 | 45 | no |
| Prazon-sixt-fer-a-cheval | W0346 | u | | 2020 | 9 | 68 | no |
| Sixt Buet | W0285 | f | | 2019 | 9 | 6 | no |
| Vidoc | W0356 | f | | 2020 | 9 | 44 | no |
| Dagmar | BG1145 | f | | 2022 | 9 | 15 | yes |
| Donna Elvira | BG1117 | f | | 2021 | 9 | 46 | yes |
| Elfie | W0437 | u | | 2022 | 9 | 38 | yes |
| Riglos | BG1138 | m | | 2022 | 9 | 24 | maybe |
| Bavaria | BG1112 | f | | 2021 | 9 | 71 | no |
| BelArosa | BG1119 | m | immature | 2021 | 9 | 68 | no |
| Dome | W0478 | u | | 2022 | 9 | 70 | no |
| Novo | BG1098 | m | | 2021 | 9 | 46 | no |
| Recka | BG1147 | f | | 2022 | 9 | 67 | no |
| Ricky-Rico-Livigno | W0466 | m | | 2022 | 9 | 74 | no |
| Severino-Zebru | W0372 | m | | 2021 | 9 | 134 | no |
| Sunny | W0397 | m | | 2021 | 9 | 73 | no |
| Baronnies | BG1163 | f | | 2023 | 9 | 45 | yes |
| Nepomuk | BG1178 | m | | 2023 | 9 | 47 | yes |
| Trenta | W0512 | u | | 2023 | 9 | 70 | yes |
| Dromie | BG1162 | m | | 2023 | 9 | 45 | no |
| Erasmus | W0549 | u | juvenile | 2023 | 9 | 88 | no |
| Esprit | W0545 | u | | 2023 | 9 | 67 | no |
| Jackpot | BG1175 | m | | 2023 | 9 | 45 | no |
| Le Croë | BG1169 | m | | 2023 | 9 | 45 | no |
| Obwaldera | BG1187 | m | | 2023 | 9 | 69 | no |
| Sisi | BG1171 | f | | 2023 | 9 | 3277 | no |

...

| Animal | BirdID | Sex (m/f) | Age class | Hatch | Days with pos. | Pos. on focal day | Observed (yes/maybe/no) |
|---|---|---|---|---|---|---|---|
| **Massif Central** | **9** | **5/4** | | | | | **6/0/3** |
| Layrou | BG0761 | m | adult | 2013 | 9 | 21 | yes |
| Aven | BG1067 | f | subadult | 2020 | 9 | 39 | yes |
| Cévennes | BG1032 | m | | 2019 | 9 | 126 | yes |
| Fario | BG1079 | f | | 2020 | 9 | 57 | yes |
| Ophrys | BG1078 | f | | 2020 | 9 | 203 | yes |
| Pyrenees | BG1094 | f | immature | 2021 | 9 | 3308 | yes |
| Rei del Causse | BG1128 | m | | 2022 | 9 | 67 | no |
| Sargas | BG1161 | m | juvenile | 2023 | 9 | 67 | no |
| Serapias | BG1164 | m | | 2023 | 9 | 70 | no |
| **Spain (without Pyrenees)** | **7** | **3/4** | | | | | **0/0/7** |
| Amic | BG0995 | m | adult | 2018 | 9 | 11 | no |
| Bassi | BG1033 | m | subadult | 2019 | 9 | 93 | no |
| Dalila | BG1109 | f | immature | 2021 | 9 | 155 | no |
| Dena | BG1104 | f | | 2021 | 9 | 21 | no |
| Esperit | BG1135 | m | | 2022 | 9 | 70 | no |
| Farigola | BG1172 | f | juvenile | 2023 | 9 | 288 | no |
| Flora | BG1177 | f | | 2023 | 9 | 23 | no |
| **Corsica** | **3** | **3/0** | | | | | **0/0/3** |
| Muntagnolu | BG0890 | m | adult | 2016 | 9 | 3 | no |
| Cintu | BG1042 | m | subadult | 2019 | 9 | 201 | no |
| Sulana | BG1144 | m | immature | 2022 | 9 | 3056 | no |
| **Pyrenees** | **4** | **2/2** | | | | | **0/0/4** |
| Alos | BG0992 | m | adult | 2018 | 9 | 11 | no |
| Celest | BG1073 | f | subadult | 2020 | 9 | 16 | no |
| Peyre | BG1116 | m | immature | 2021 | 9 | 49 | no |
| Pradines | BG1122 | f | | 2021 | 9 | 69 | no |

## 5.4 Individual-based data

During the IOD 2023 period 88 individuals have been identified with high probability in the Alpine range. 11 of them in the eastern Alps, 37 in the central Alps, 21 in the north-western Alps, 19 in the south-western Alps. Another 8 birds have been identified in the Massif Central and 7 in Spain (***Table 5, Table 6 and Table 7***). Some birds could not be identified with certainty (Alps N = 19), these are marked as maybe observed in. 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. 48 Bearded Vultures that were identified (2 of them with some uncertainty = maybe identified) in the eastern and central Alps during the IOD 2023 grouped by the region where they have been observed.*

| | | Bird | Observed (yes / maybe) | BirdID | Sex (m/f) | Hatch | Tag | Territory | Region |
|---|---|---|---|---|---|---|---|---|---|
| Alpine range | Eastern | **11** | **11 / 0** | | **4 / 4** | | | | |
| | | Nepomuk | yes | BG1178 | m | 2023 | GPS | | Bavaria (DEU) |
| | | Alexa | yes | BG0100 | f | 1988 | | Gastein/Rauris | Hohe Tauern NP (AUT) |
| | | Andreas Hofer | yes | BG0260 | m | 1996 | | Gastein/Rauris | |
| | | Glocknerlady | yes | BG0718 | f | 2012 | | Gschlöß | |
| | | Pinzgarus | yes | BG0558 | m | 2008 | | Gschlöß | |
| | | Ambo | yes | BG0392 | f | 2002 | | Heiligenblut | |
| | | Heiligenblut2023 | yes | W0510 | u | 2023 | | Heiligenblut | |
| | | Charlie | yes | BG0910 | f | 2016 | | Mallnitz | |
| | | Felix2 | yes | BG0793 | m | 2014 | | Mallnitz | |
| | | Prägraten2023 | yes | W0505 | u | 2023 | | Prägraten | |
| | | Gschlöß2023 | yes | W0535 | u | 2023 | | | |
| | Central | **37** | **35 / 2** | | **11 / 17** | | | | |
| | | Madagaskar | yes | BG0665 | m | 2011 | | Lechtal | Tyrol (AUT) |
| | | Natura | yes | BG0464 | f | 2005 | | Lechtal | |
| | | Fredueli | yes | BG1001 | m | 2018 | GPS | | Central Switzerland |
| | | Albula2023 | yes | W0499 | u | 2023 | | Albula | Grison (CHE) |
| | | Diana-Stelvio | yes | W0007 | f | 2000 | | Albula | |
| | | GT0116 | yes | | m | | | Bergün | |
| | | GT0117 | yes | | f | | | Bergün | |
| | | Ingenius | yes | BG0621 | m | 2010 | | Buffalora | |
| | | Retia | yes | BG0357 | f | 2000 | | Buffalora | |
| | | Foraz2023 | yes | W0514 | u | 2023 | | Foraz | |
| | | GT031 | yes | | f | | | Foraz | |
| | | Folio | yes | BG0463 | f | 2005 | | Maloja | |
| | | Maloja2023 | yes | W0502 | u | 2023 | | Maloja | |
| | | Rurese | yes | BG0559 | m | 2008 | | Maloja | |
| | | Margna2023 | yes | W0551 | u | 2023 | | Margna | |
| | | GT0171 | yes | | f | 1999 | | Ova Spin | |
| | | GT0163 | maybe | | f | | | Pontresina | |
| | | GT038 | yes | | f | | | Poschiavo | |
| | | GT057 | yes | | m | | | Poschiavo | |
| | | Poschiavo2023 | yes | W0513 | u | 2023 | | Poschiavo | |
| | | Moische-Livigno | yes | W0011 | f | 2002 | | Sinestra | |
| | | Samuel | yes | BG0526 | m | 2007 | | Sinestra | |
| | | GT090 | yes | | f | | | Spöl | |
| | | Spöl2023 | yes | W0516 | u | 2023 | | Spöl | |
| | | GT048 | yes | | f | 2009 | | Tantermozza | |
| | | Zebru | yes | W0012 | m | 2002 | | Tantermozza | |
| | | Cravallo | yes | W0156 | m | 2015 | | Tinizong | |
| | | Inge | yes | BG0720 | f | 2012 | | Tinizong | |
| | | GT062 | yes | | f | | | Trupchun | |
| | | Trupchun2023 | yes | W0508 | u | 2023 | | Trupchun | |
| | | Urbano | yes | W0122 | m | 2013 | | Trupchun | |
| | | Dagmar | yes | BG1145 | f | 2022 | GPS | | |
| | | GT0129 | yes | | f | | | Foscagno | Province Sondrio & Bergamo (ITA) |
| | | GT0132 | yes | | m | | | Foscagno | |
| | | Balmat | yes | W0141 | f | 2014 | | Sondrio | |
| | | Ecureuil-Maloja | yes | W0184 | u | 2016 | | Sondrio | |
| | | Alfonso | maybe | W0554 | u | 2023 | | Sondrio | |

*Table 6. 40 Bearded Vultures that were identified (17 of them with some uncertainty = maybe identified) in the north- and south-western Alps during the IOD 2023 grouped by the region where they have been observed.*

| | | Bird | Observed (yes / maybe) | BirdID | Sex (m/f) | Hatch | Tag | Territory | Region |
|---|---|---|---|---|---|---|---|---|---|
| Alpine range | North-western | **21** | **12 / 9** | | **6 / 9** | | | | |
| | | Girun | maybe | BG0904 | f | 2016 | GPS | | Haute Savoie (FRA) |
| | | Lapie | maybe | W0251 | m | 2018 | GPS | | |
| | | Nonno Bob | yes | BG0548 | m | 2008 | | Andagne | Savoie (FRA) |
| | | Schils | yes | BG0802 | m | 2014 | GPS | Bourg-Saint-Maurice-2 | |
| | | Costa | maybe | BG0757 | f | 2013 | | Bramans | |
| | | Elfie | yes | W0437 | u | 2022 | GPS | | |
| | | Junior Ranger | maybe | BG0702 | f | 2012 | | | |
| | | Elena | yes | BG0613 | f | 2010 | | Coude du Rhône | Wallis und Berner Oberland (CHE) |
| | | Guillaumes | yes | BG0411 | f | 2003 | | Derborence_Vérouet | |
| | | Pablo | maybe | BG0359 | m | 2000 | | Derborence_Vérouet | |
| | | Ferret2023 | yes | W0558 | u | 2023 | | Ferret | |
| | | GT0126 | yes | | f | | | Kandertal | |
| | | GT0138 | yes | | m | | | Kandertal | |
| | | Silvan-Tantermozza | yes | W0095 | f | 2011 | | Saas | |
| | | Saas2023 | maybe | W0496 | u | 2023 | | Saas | |
| | | Smaragd | yes | BG0675 | m | 2011 | | Zermatt | |
| | | Zermatt2023 | maybe | W0550 | u | 2023 | | Zermatt | |
| | | Donna Elvira | yes | BG1117 | f | 2021 | GPS | | |
| | | Kandertal2023 | yes | W0552 | u | 2023 | | | |
| | | Gildo | maybe | BG0299 | f | 1998 | | | |
| | | Voilà | maybe | W0193 | u | 2016 | | | |
| | South-western | **19** | **11 / 8** | | **8 / 7** | | | | |
| | | Léoux | yes | BG0950 | f | 2017 | GPS | MVG | Alpi Cozie (ITA) |
| | | Baronnies | yes | BG1163 | f | 2023 | GPS | | |
| | | Roman | yes | BG0854 | m | 2015 | GPS | Maira | Alpi Marittime (ITA) |
| | | Ali | Yes | W0525 | u | 2023 | | Maira | |
| | | Italia 150 | yes | BG0660 | m | 2011 | | Usseglio | |
| | | Bellemotte | yes | BG0708 | f | 2012 | | Bonette | Mercantour (FRA) |
| | | Trenta | yes | W0512 | u | 2023 | GPS | Bonette | |
| | | GT150 | maybe | | m | | | Bonette | |
| | | Sereno | maybe | BG0348 | m | 2000 | | Source de lUbaye | |
| | | Rocca | yes | BG0516 | m | 2007 | | Source de la Tinée | |
| | | Vignols | yes | W0522 | u | 2023 | | Source de la Tinée | |
| | | Girasole | maybe | BG0549 | f | 2008 | | Source de la Tinée | |
| | | Tenao | maybe | BG0755 | m | 2013 | | Val dEntraunes | |
| | | Socha | yes | W0526 | u | 2023 | | | |
| | | GT036 | maybe | | f | | | | |
| | | Gerlinde | maybe | BG0759 | f | 2013 | | Ambane | Vercors (FRA) |
| | | Pamela | yes | BG1031 | f | 2019 | GPS | Archiane | |
| | | Riglos | maybe | BG1138 | m | 2022 | GPS | | |
| | | Stephan | maybe | BG0616 | m | 2010 | | | |
| | | **88** | **69 / 19** | | **29 / 37** | | | | |

*Table 7. Bearded Vultures that were identified in the Massif Central (8) and Spain (7) (without the Pyrenees) during the IOD 2023.*

| | Bird | Observed (yes / maybe) | BirdID | Sex (m/f) | Hatch | Tag | Territory | Region |
|---|---|---|---|---|---|---|---|---|
| Massif Central | **8** | **8 / 0** | | **4 / 4** | | | | |
| | Adonis | yes | BG0794 | m | 2014 | | Jonte amont | Massif Central (FRA) |
| | Layrou | yes | BG0761 | m | 2013 | GPS | Jonte amont | |
| | Aven | yes | BG1067 | f | 2020 | GPS | | |
| | Calandreto | yes | BG0948 | m | 2017 | | | |
| | Cévennes | yes | BG1032 | m | 2019 | GPS | | |
| | Fario | yes | BG1079 | f | 2020 | GPS | | |
| | Ophrys | yes | BG1078 | f | 2020 | GPS | | |
| | Pyrenees | yes | BG1094 | f | 2021 | GPS | | |
| Spain (without Pyrenees) | **7** | **7 / 0** | | **3 / 4** | | | | |
| | Blimunda | yes | BG0633 | f | 2010 | | | Andalusia (ESP) |
| | Encina | yes | BG0713 | f | 2012 | | | |
| | Estela | yes | BG0746 | f | 2013 | | | |
| | Iruela | yes | BG0984 | m | 2018 | | | |
| | Miguel | yes | BG0800 | m | 2014 | | | |
| | Tono | yes | BG0486 | m | 2006 | | | |
| | Tormenta | yes | BG0963 | f | 2017 | | | |

## 5.5 Estimated number of Bearded Vultures

***$E_{foc}$ - 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 ($E_{foc}$ *= 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.

***$E_{hyp}$ - 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 ($E_{hyp}$ = *hypothetically present birds*) composed of the estimate based on observations (focal day) $E_{foc}$ 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.

***$E_{GPS}$ – 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 224 and 260 individuals ($E_{foc}$). 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 282 – 382 individuals ($E_{hyp}$). Based on GPS-data we know, that 47 tagged birds were present in the Alpine range during this year's IOD. However, 34-37 of these individuals ($E_{GPS}$) were not identified by observers and should therefore be added to the estimate ($E_{hyp}$). 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 316 and 419 individuals.

The estimates of hypothetically present birds $E_{hyp}$ represent 69% (conservative) or 91% (optimistic) of the total population that is predicted by the demographic model from Schaub et al. 2009 (predicted population size = 460, **Figure 7** *and* ***Table 10***) with a similar variance than the estimates from the year 2022 (conservative = 288 (70%), optimistic = 377 (91%) with slightly better weather conditions). However, looking at the estimates based on observations only, it was possible to observe 49% or 57% respectively of the birds predicted by the model – a bit less than in 2022. 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 | | $E_{hyp}$ - Estimate | |
|---|---|---|---|---|---|---|
| | | | min | max | min | max |
| Alpine range | **East subtotal** | | **15** | **15** | **22** | **40** |
| | AUT | Hohe Tauern NP | 15 | 15 | 22 | 40 |
| | GER | Bavarian Alps | - | - | - | - |
| | **Cenral subtotal** | | **66** | **82** | **80** | **121** |
| | GER | Allgaeu | - | - | 1 | 1 |
| | CHE | Central Switzerland | 2 | 2 | 2 | 2 |
| | CHE | Grison | 52 | 60 | 61 | 92 |
| | CHE | Ticino | 5 | 8 | 7 | 12 |
| | ITA | Sondrio & Bergamo Region | 7 | 12 | 9 | 14 |
| | **North-west subtotal** | | **89** | **103** | **121** | **154** |
| | CHE | Berner Oberland | 13 | 16 | 13 | 16 |
| | CHE | South-Western Switzerland | 25 | 30 | 32 | 52 |
| | FRA | Haute Savoie | 6 | 6 | 16 | 17 |
| | FRA | Savoie | 25 | 27 | 34 | 36 |
| | ITA | Valle d'Aosta & Gran Paradiso NP | 20 | 24 | 26 | 33 |
| | **South-west subtotal** | | **54** | **60** | **59** | **67** |
| | FRA | Baronnies | - | - | - | - |
| | FRA | Haute Dauphiné | 10 | 10 | 13 | 13 |
| | FRA | Mercantour | 17 | 21 | 18 | 23 |
| | FRA | Vercors NP | 3 | 5 | 3 | 6 |
| | ITA | Alpi Cozie | 13 | 13 | 13 | 13 |
| | ITA | Alpi Marittime - WAON | 11 | 11 | 12 | 12 |
| **Subtotal Alpine range** | | | **224** | **260** | **282** | **382** |
| *+ not observed GPS-tagged birds* | | | | | 34 | 37 |
| **Total Alpine range** | | | **224** | **260** | **316** | **419** |
| **Massif Central** | FRA | Grands Causses & Cevennes NP | 8 | 8 | 8 | 8 |
| *+ not observed GPS-tagged birds* | | | | | 3 | 3 |
| **Total Massif Central** | | | | | **11** | **11** |
| **French Pyrenees** | FRA | Aude | 6 | 6 | 6 | 6 |
| *+ not observed GPS-tagged birds* | | | | | - | 1 |
| **Total French Pyrenees** | | | | | **6** | **7** |
| **Spain (wihtout Pyrenees)** | ESP | Andalusia, La Rioja, Castile y Leòn, Castile la Mancha | 12 | 17 | **39** | **54** |
| **Maestrazgo** | ESP | Maestrazgo | | | - | - |
| *+ not observed GPS-tagged birds* | | | | | 4 | 5 |
| **Total Maestrazgo** | | | | | 4 | 5 |
| **Bulgaria** | BRG | | - | - | - | - |

*Table 9. Comparison of the estimated number of Bearded Vultures in the Alpine range based on the survey during the IOD 2023 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 |
| **IOD 2023** | **224** | **260** | **316** | **419** |
| IOD 2022 | 209 | 248 | 288 | 377 |
| IOD 2021 | 236 | 284 | 284 | 381 |
| IOD 2020 | - | - | - | - |
| 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 |

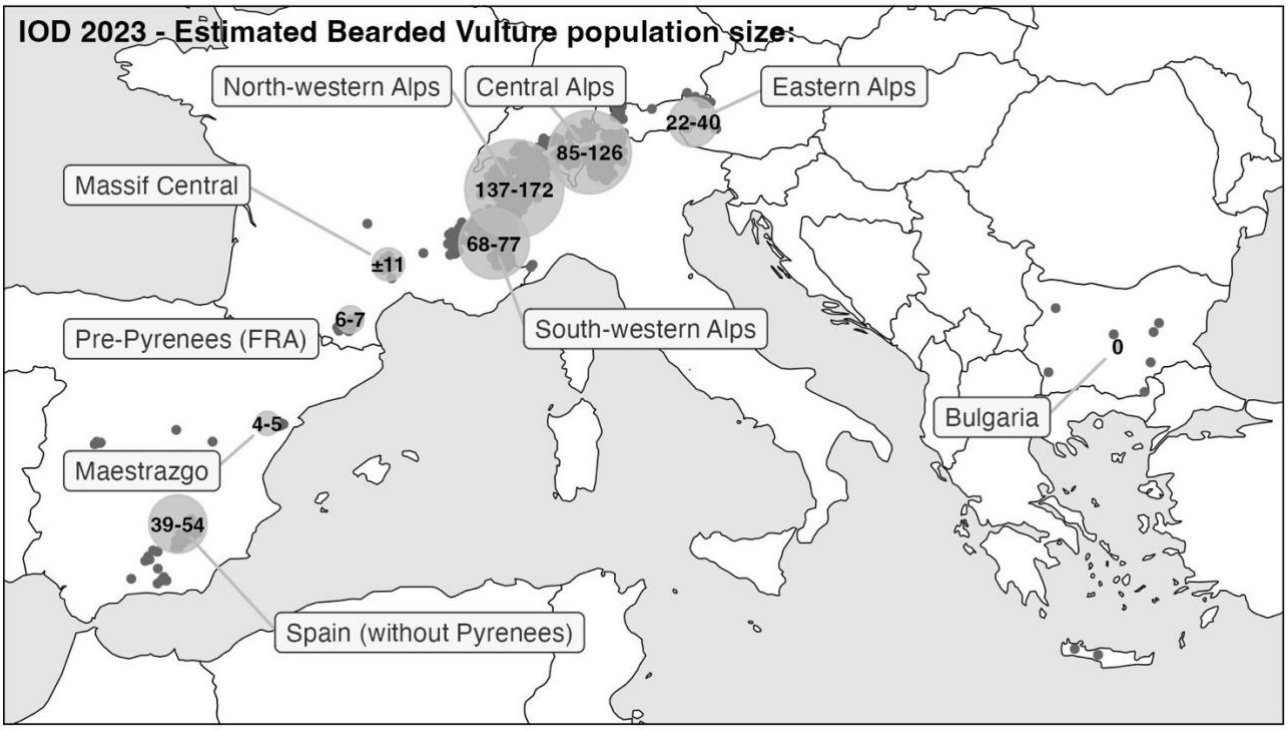


*Figure 6. Overview of the estimated Bearded Vulture population size $E_{hyp}$ on the regional level within the monitoring area of the IOD 2023. Estimates of the populations size are based on estimates derived from observations during the focal day of the IOD $E_{foc}$ and an estimated number of birds 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 2023 is similar as in the last year's estimate. Most of the birds observed on the focal day were adults (59%), followed by juveniles (15%), immatures (16%) and subadults (6%). In fact, similarly to last year's results, the proportion of sighted birds aged in their 5$^{th}$ 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 coincide quite well with the model predictions. However, the proportion of subadults and immatures are underestimated, while the proportion of adults is overestimated by the observations from the IOD.

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 ornithologists 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 2023. 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 | Efoc | | Ehyp | | Model Schaub et al. 2009 | |
| | absolut | mean(min,max) | % | mean(min,max) | % | absolut | % |
| adult | 322 | 146 | 59% | 218 | 59% | **236** | **51%** |
| subadult | 18 | 14 | 6% | 33 | 9% | **68** | **15%** |
| immature | 75 | 40 | 16% | 55 | 15% | **89** | **19%** |
| juvenile | 73 | 36 | 15% | 53 | 14% | **67** | **15%** |
| unknown | 40 | 10 | 4% | 10 | 3% | - | - |
| **Total** | **528** | **246** | **100%** | **369** | **100%** | **460** | **100%** |

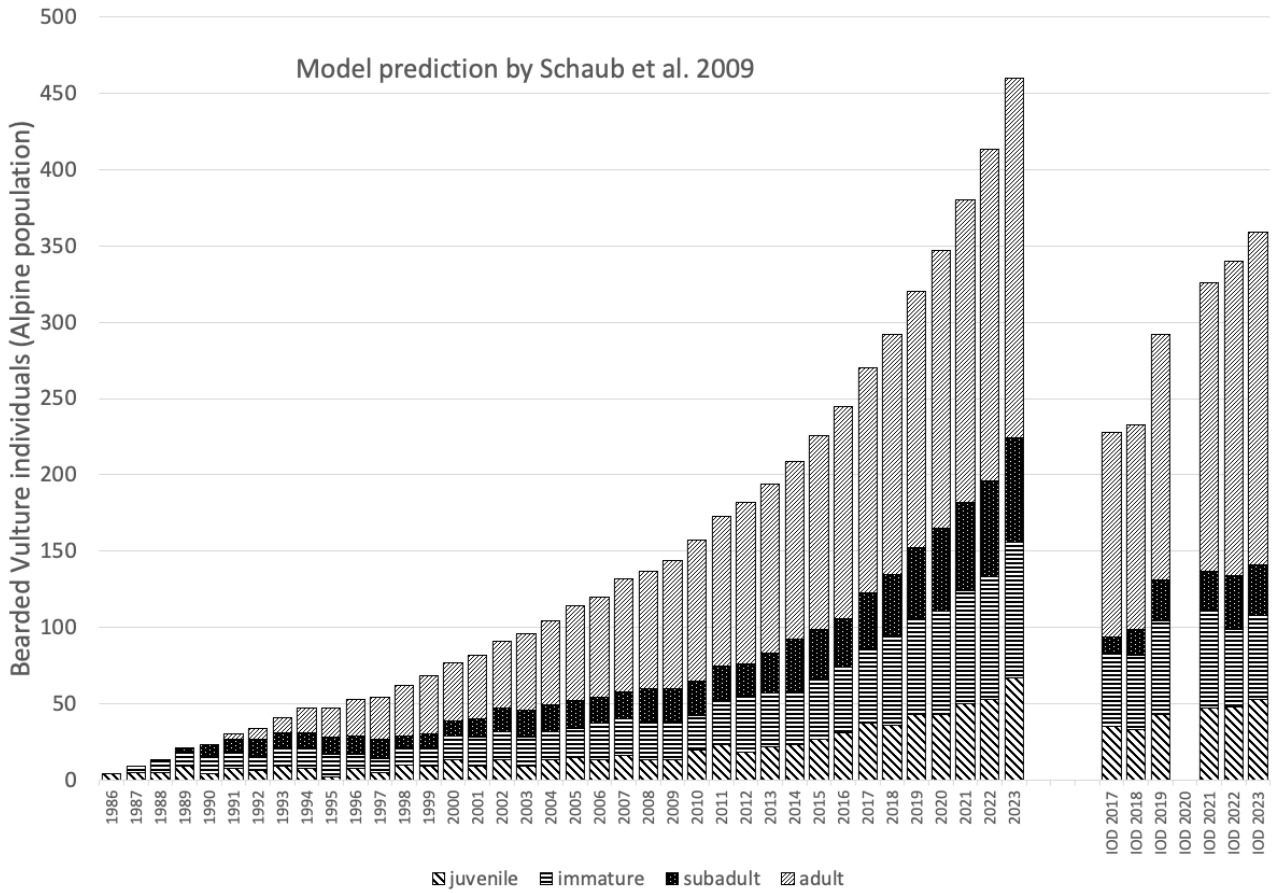


*Figure 7. Predicted number of Bearded Vultures per age class according to the demographic model by Schaub et al. 2009[1] in comparison to the estimated number of birds that should hypothetically be present based on observation data (IOD) and expert knowledge from regional coordinators.*

### 5.6.1 Spatial distribution of age groups

From 676 sites 669 Bearded Vulture sightings have been recorded during the whole period, 636 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.

### 5.6.2 Alpine range

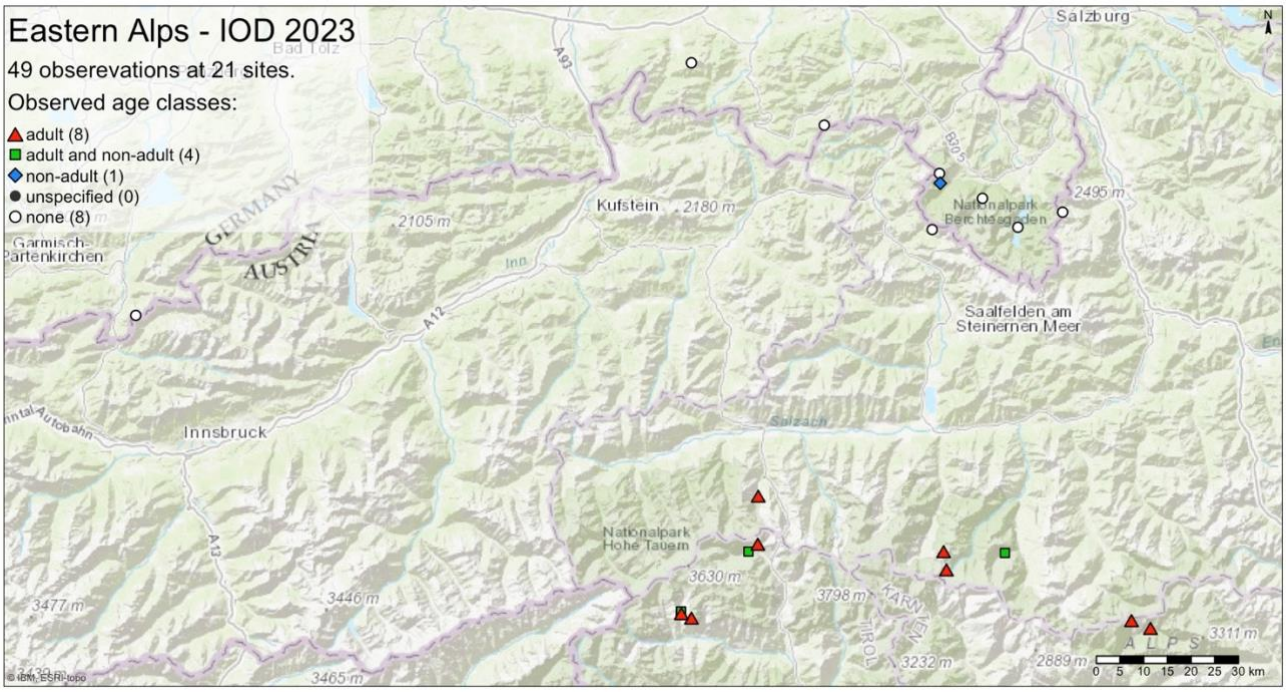


*Figure 8. Age class distribution observed at 21 sites in the Eastern Alps during the IOD 2023.*

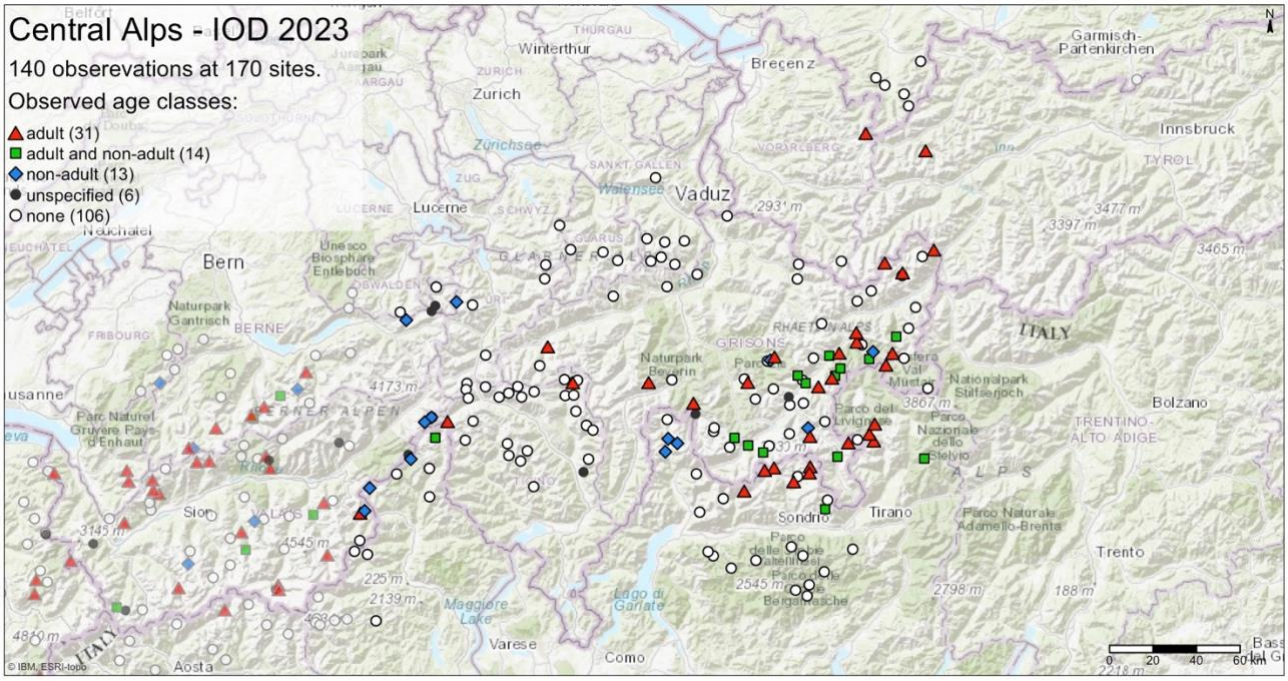


*Figure 9. Age class distribution observed at 170 sites in the Central Alps during the IOD 2023.*

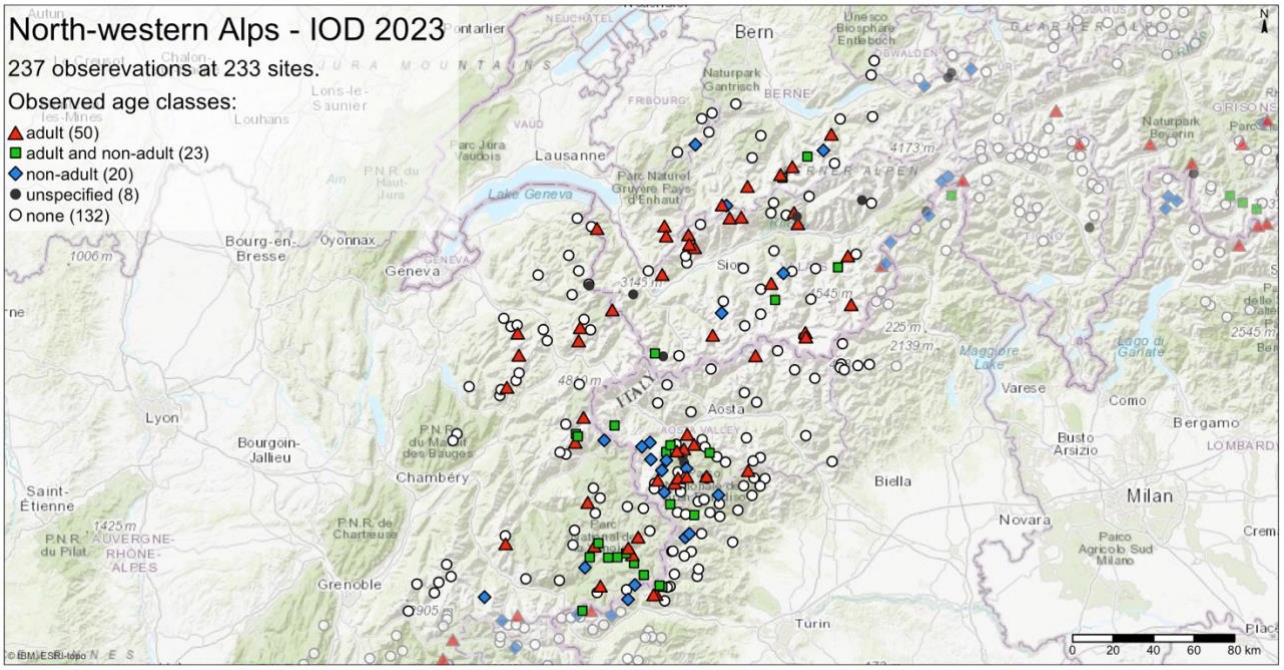


*Figure 10. Age class distribution observed at 233 sites in the north-western Alps during the IOD 2023.*

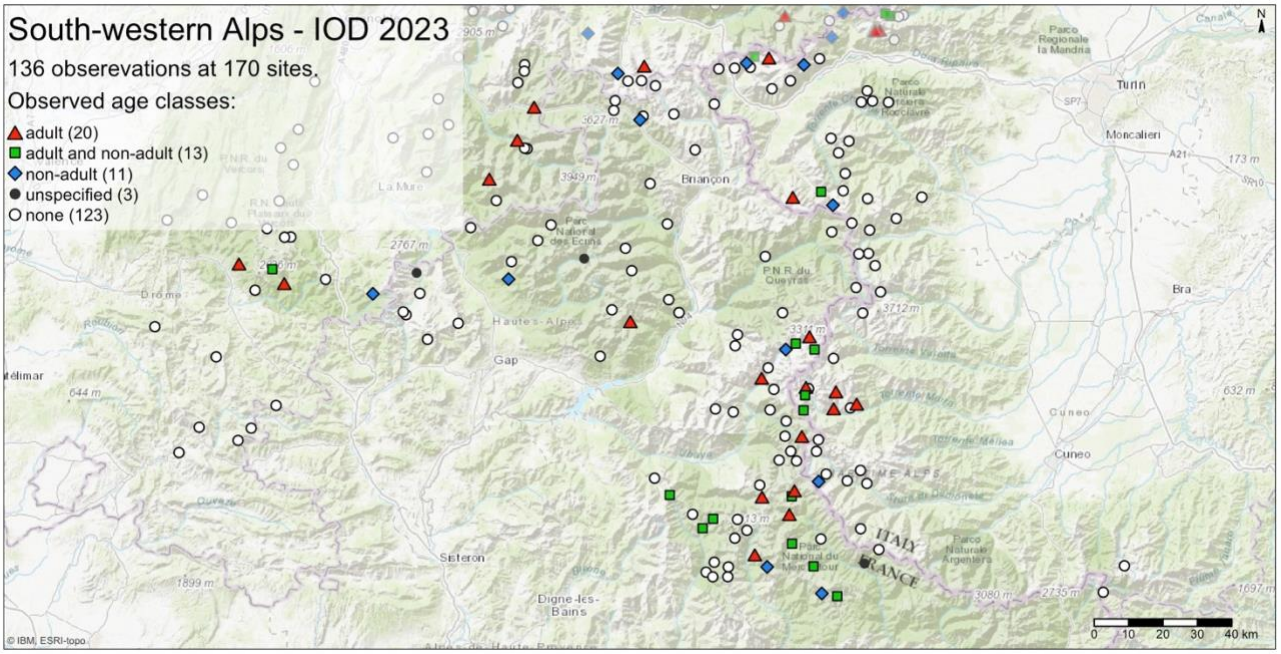


*Figure 11. Age class distribution observed at 170 sites in the south-western Alps during the IOD 2023.*

### 5.6.3 Massif Central & French Pre-Pyrenees


*Figure 12. Age class distribution observed at 34 sites in the region of the Massif Central and the French Pyrenees during the IOD 2023E.*

### 5.6.4 Spain (without Pyrenees)


*Figure 13. Age class distribution observed at 39 sites in Spain during the IOD 2023.*

### 5.6.5 Bulgaria

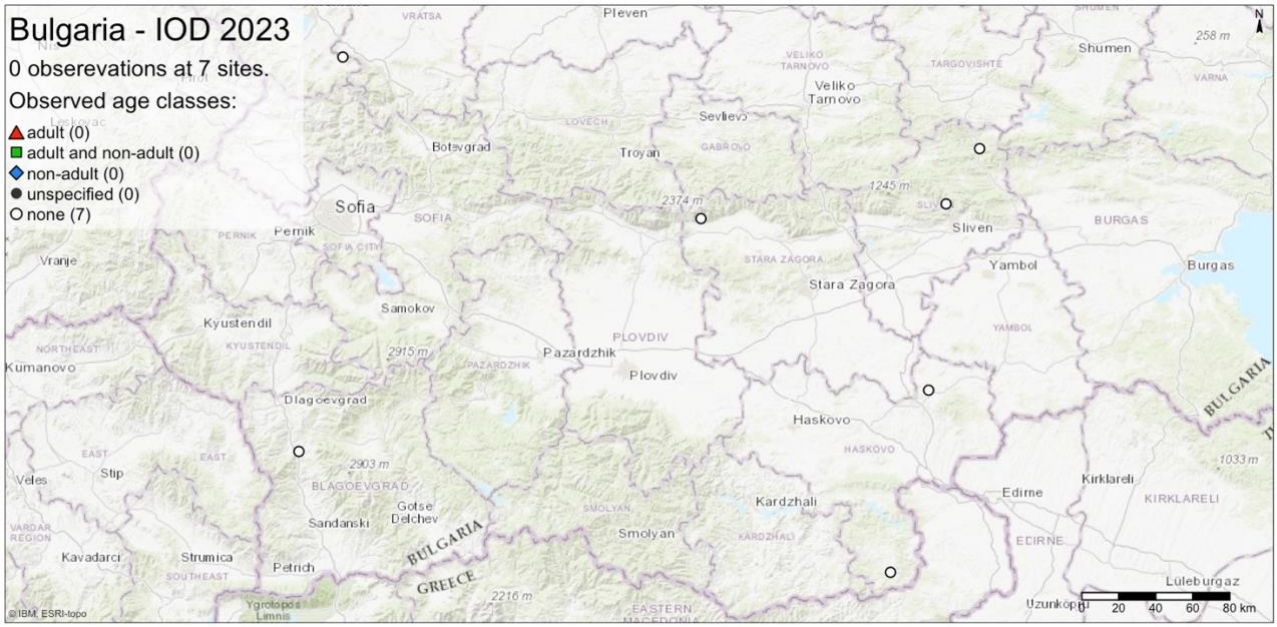


*Figure 14. Age class distribution observed at 7 sites in Bulgaria during the IOD 2023.*

### 5.6.6 Crete, Greece

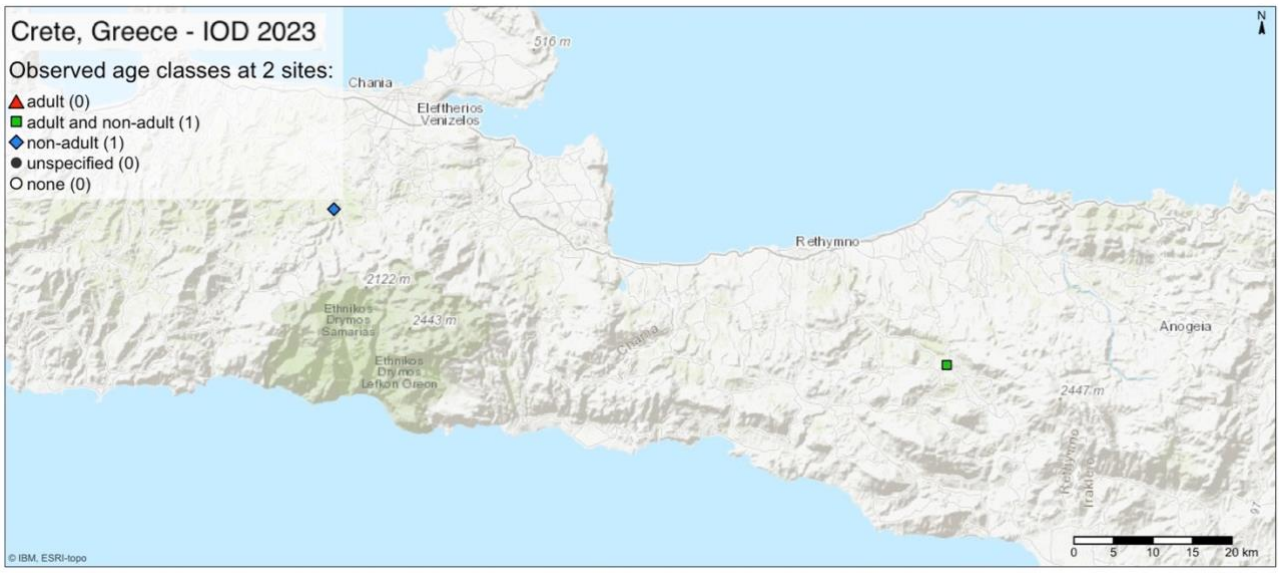


*Figure 15. Age class distribution observed at 2 sites on Crete (Greece) during the IOD 2023.*

# 6 Outlook 2024

For 2024 the focal day is planned for the 12.10.2024 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 select 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 locally. This will have consequences on the possibility of population estimates locally and at population scale.

**Focal day** **Sat 12th of October 2024**
**Period** **12th - 20th of October 2024**

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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