



Wolf (*Canis lupus*) Mortality in Italy
in the period 2019–2023

by Io non ho paura del lupo APS

A production of

Io non ho paura del lupo APS

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1. Introduction

1.1 Objectives of the report

This report aims to provide an up-to-date and in-depth overview of wolf (*Canis lupus*) mortality in Italy in the five-year period **between 2019 and 2023**. The data used for this analysis was obtained from the **competent national and regional authorities** responsible for collecting and managing information on wildlife, with particular reference to reports of dead wolves found on Italian territory.

The main objective of this work is to **quantify the number of wolves found dead** each year in Italy and to analyze the causes of death, dividing them into homogeneous and recognizable categories in order to understand their distribution and incidence throughout the country. In particular, the report distinguishes between **natural causes** (e.g., intraspecific mortality, disease, or aging), **direct anthropogenic causes** (i.e., poaching, which generally involves killing with firearms, traps, or poisoning), **indirect anthropogenic causes** (especially road and rail collisions) and **undetermined causes**, i.e., those cases in which it was not possible to ascertain the cause of death. In the tables and graphs, direct anthropogenic causes are indicated as **poaching**, while indirect anthropogenic causes are indicated as **collisions**.

The analysis also aims to identify any recurring temporal or geographical trends, thus providing a useful tool for conservation and management strategies for the species, which

is still the subject of heated controversy and particular attention from both the scientific community and public opinion.

Although limited to known and documented cases, the data presented nevertheless provide an important information base for reflecting on the impact of human activities, the coexistence of humans and wildlife, and the effectiveness of the protection measures currently in force.

The collection and processing of information was carried out according to **scientific and methodological criteria** that were as uniform as possible, while acknowledging the differences that exist between the methods of data collection and management used by different local authorities.

In this sense, this report also represents a first step towards the **national standardization of data on wolf mortality**, with a view to promoting the integrated and shared management of this species, which is symbolic of Italian and European biodiversity.

1.2 Legislative framework on wolves in Italy

In Italy, the wolf (*Canis lupus*) is protected by a complex legal framework based on national laws, European directives, and international conventions. At the international level, the species is regulated by the **Washington Convention (CITES)**, which governs trade in endangered species, and by the **Bern Convention (1979)**, aimed at ensuring the conservation of wildlife and natural habitats in Europe.

Following recent changes adopted in 2025, the wolf was officially downgraded within the Bern Convention, moving from **Appendix II**, which includes strictly protected species, to **Appendix III**, which lists protected species subject to a less restrictive level of protection. Similarly, in July 2025, the wolf was also downgraded at the European level, moving from **Annex IV** to **Annex V** of the **Habitats Directive (92/43/EEC)**. This shift represents a change from “strict protection” to the category of “protected species,” granting Member States greater flexibility in the management of the species.

At the time of publication of this report, under Italian law, **Law No. 157/1992** continues to classify the wolf as a “particularly protected species,” prohibiting its hunting, possession, killing, and any form of harassment. Violations of these prohibitions are subject to criminal penalties.

Species management is entrusted to Regions and Autonomous Provinces, but must comply with the national and European legal framework, under the coordination of the **Ministry of the Environment and Energy Security (MASE)**. The Ministry is responsible for approving possible derogations and providing guidelines for species conservation. To this end, in 2015, a review was launched of the first Action Plan drawn

up in Italy for the species, dating back to 2002. The draft of the new **Plan for the conservation and management of wolves in Italy** has been amended several times over the years, without a final agreement ever being reached within the State-Regions Conference.

1.3 Importance of collecting mortality data

The systematic collection of data on wolf mortality, including the causes that determine it, is of fundamental importance for understanding the evolution of the population of this species in the country. Monitoring mortality means not only keeping track of the number of individuals that have died, but also analyzing in depth the reasons behind each death: for example, road accidents, poisoning, diseases transmitted by domestic animals, or illegal killings, to which legal killings are now added. This information is essential **for assessing the extent of human impact on the species** and for identifying any local critical issues or worrying trends on a broader level.

Only through regular and scientifically sound estimates of the total number of wolves present in the territory, supplemented with **accurate data on annual mortality**, is it possible to outline the real population dynamics: growth or decline rates, migratory flows, ability to colonize new areas, and resilience to environmental and human impacts. These dynamics are not static, but vary over time and space, influenced by multiple ecological and anthropogenic factors.

Knowledge of these elements therefore becomes an essential prerequisite for any well-founded, balanced, and transparent management assessment. Without reliable data on birth rates, mortality rates, and distribution, **any decision regarding the conservation or control of the species risks being arbitrary**, ineffective, or even harmful. On the contrary, rigorous and constant monitoring provides the basis for developing management policies consistent with conservation objectives, national and international regulatory obligations, and the expectations of local communities.

2. Sources and Methodology

2.1 Data collection methodology

Data on wolf mortality during the period 2019–2023 were requested by the association *Io non ho paura del lupo APS* through **Generalized Civic Access** under Article 5 of Legislative Decree 14 March 2013, No. 33 (*Reorganization of the rules concerning civic access rights and the obligations of publicity, transparency, and dissemination of information by public administrations*). The requests were submitted via certified email (PEC) to the competent authorities.

Each authority was asked to provide the following data:

- **Number of wolf (*Canis lupus*) specimens** found dead in the reference territory between 1 January 2019 and 31 December 2023.
- **Date and place** of discovery.
- **Sex and estimated age** of the specimen.
- **Cause** of death.

The data were requested from:

- **Regions and Autonomous Provinces** (excluding Sardinia and Sicily, where the species is not currently present).
- **Zooprophyllactic Institutes** responsible for each territory.
- **Local Health Authorities (ASL)** responsible for each territory (in specific cases).
- **ISPRA – Italian Institute for Environmental Protection and Research.**

- **Wolf Apennine Center**, for the provinces of Parma and Reggio Emilia only.

In addition, the following data were requested:

- On 10/02/2025, from the CRAS “Monte Adone”, data on wolves treated and released with radio collars, with related survival rates and causes of death – the request was denied, and no data were provided.
- On 17/02/2025, from the University of Sassari, data on wolves captured for scientific research and released with radio collars, with survival rates and causes of death – the request was denied, and no data were provided.
- Informally, from the Wolf Apennine Center, data on wolves captured for scientific research and released with radio collars, with survival rates and causes of death – the request was denied, and no data were provided.

To compensate for the lack of data provided by some authorities and to obtain an additional reference, the information available on the [“Dead Wolf Tracker – Portal of Wolves Found Dead in Italy”](#), managed by the Ministry of Health and the Zooprohylactic Experimental Institute of Lazio and Tuscany “M. Aleandri”, was also used. This portal has collected data starting from 2021.

2.2 Collection and verification criteria

The data collected was systematized in a spreadsheet (Microsoft Excel 365), structured in such a way as to allow a clear and detailed analysis of the trend in wolf mortality over time and space.

The information was organized by reference year and divided according to the different **causes of mortality** identified above: **direct anthropogenic causes (poaching)**, **indirect anthropogenic causes (roadkill)**, **natural causes**, and **undetermined causes**.

Within each category of death cause, the data were further disaggregated according to the **sex of the individual**, male, female, or undetermined, in order to detect any gender imbalances within the sample of individuals who died during the years considered. This distinction, combined with information on **age**, **weight**, and **geographical location** of the findings, helps to build a more complete picture of the sample of wolf individuals found dead in our country during the years of the survey.

In cases where two or more sources referring to the same event or territory were available, such as data provided by different entities, supervisory bodies, or studies conducted by different subjects or in different periods, a **careful record-by-record comparison** was carried out. Each individual field (date, region, province, municipality, specific location, gender, age, weight, cause of death) was compared between sources to verify **actual correspondence** and to prevent the **risk of double entries**. This cross-validation process was necessary to ensure the reliability of the final dataset, minimizing overlaps and errors.

2.3 Data collection procedure for Regions and Autonomous Provinces

Below is a synthesis, organized by Region, of the data collection process and the results obtained, along with the issues and criticalities encountered case by case.

Abruzzo

The request was submitted via certified email (PEC) on 24/07/2024 to the **Department of Agriculture** and, for information, to the **Head of Corruption Prevention and Transparency**. On 25/07/2024 a reply was received stating that **the Service did not possess data regarding the discovery of dead animals**. Therefore, on 17/11/2024 a new request was sent via PEC to the **Zooprophylactic Experimental Institute of Abruzzo and Molise “G. Caporale”**. On 12/12/2024 **the Institute** replied that it **was unable to provide the general information requested**, since it only held data on certain wolf specimens submitted to the Institute for necropsy, which represented only a portion of those found dead within the Abruzzo region.

The request was therefore forwarded to the relevant **Local Health Authorities**, specifically: Protocol Office of ASL 1 (Avezzano, Sulmona, L'Aquila), Public relations office of ASL 2 (Lanciano, Vasto, Chieti), **Veterinary Department, Public Relations Office**, Protocol Office, Head of Corruption Prevention and Transparency of ASL 3 (Pescara) and **Veterinary Department and Public Relations Office** of ASL 4 (Teramo). **ASL 1**, on 05/02/2025, transmitted the requested information (with the

exception of weight), reporting that between 2019 and 2023 a total of **166 wolves were found dead in its jurisdiction, 25 in 2019, 30 in 2020, 45 in 2021, 31 in 2022 and 35 in 2023**. It should be noted that the causes of death were classified only as “collision” or “found dead,” without further specification. **ASL 2**, on 03/02/2025, transmitted the requested information, reporting a total of **47 wolves found dead between 2019 and 2023, of which 8 in 2019, 5 in 2020, 9 in 2021, 13 in 2022 and 12 in 2023**. In the accompanying letter it was specified that the causes of death were attributable to violent impacts with vehicles, as reported in the intervention records. **ASL 3**, on 22/01/2025, transmitted the requested information (again excluding weight), reporting **7 wolves found dead in its territory during the reference period: 1 in 2019, 1 in 2020, none in 2021, 2 in 2022 and 3 in 2023**. **ASL 4**, on 30/01/2025, also transmitted the requested information (excluding weight), reporting **17 wolves found dead** in its territory between 2019 and 2023: **1 in 2019, 1 in 2020, 1 in 2021, 6 in 2022 and 8 in 2023**. In the accompanying letter it was specified that these data referred to individuals that had died from traumatic events (for example, vehicle collisions) and had been transferred to the **Zooprophyllactic Experimental Institute of Teramo** for necropsy and diagnostic examinations.

These data were also integrated with those transmitted on 15/11/2024 by the Molise Region, which had redirected the request to the **Unified Department for the Prevention of Animal Health and Livestock Production of ASREM**. This department provided the requested list of wolves (*Canis lupus*) found dead within the regional territory, which also included data from the Abruzzo provinces of Chieti and L’Aquila, for a total of 10 records (**3 in 2019, 2 in 2020, 2 in 2021, 1 in 2022 and 2 in 2023**). The comparison confirmed all 10 records as new.

Further integration was carried out with data available on the National “Dead Wolf Tracker” portal, which has been collecting records since 2021. After record-by-record comparison (date, province, locality), **one additional case was identified for 2022.**

Finally, on 05/03/2025 a request was submitted to ISPRA (Italian Institute for Environmental Protection and Research) for available national data, which were transmitted on 02/04/2025. Two databases were provided: one concerning wolves found dead specifically during the National Wolf Monitoring Program (referring only to field data from 2020–2021), and another containing all other data transmitted by the competent authorities. For the reference period, the first database contained 4 records and the second 75. Following record-by-record comparison (date, region, province, municipality, location, sex, age, weight, cause of death), the records not already included were integrated. This comparison revealed **23 new cases, of which 2 in 2019, 6 in 2020, 13 in 2021, 1 in 2022 and 2 in 2023.**

Basilicata

The request was submitted via certified email (PEC) on 24/07/2024 to the **Office for Fisheries and Hunting Policies, Wildlife Management, Agro-Environment and to the Public Relations Office (URP)**. As no reply was received, on 24/09/2024 a follow-up request was sent to the same addresses. Again, no response was received, and on 28/10/2024 the request was submitted via PEC to the **Zooprophylactic Experimental Institute of Apulia and Basilicata**. As no reply followed, on 07/01/2025 a reminder was sent to the Institute. Once again no answer was received, and this silence was therefore considered a refusal. Consequently, on 20/02/2025 a request for review of the refusal was submitted. No reply being received, it was necessary to rely on the records available from the **National “Dead Wolf Tracker” Portal**, which has collected data since 2021.

According to this portal, a total of **16 wolf specimens** were found dead in Basilicata during the 2019–2023 period, all of them in 2023, with no records for 2019, 2020, 2021 or 2022. For these records, only the date of discovery and the location (locality and province) were available, with **no indication of cause of death**, sex, age class or weight.

On 05/03/2025, data were also requested from **ISPRA** (Italian Institute for Environmental Protection and Research), which transmitted them on 02/04/2025. Two databases were provided: one relating to wolf specimens found dead specifically during the National Wolf Monitoring Program, referring only to field data from 2020–2021, and another relating to all other data transmitted by the competent authorities. For the reference period, the first database contained 1 record and the second 5. Following

record-by-record comparison with the aforementioned data, all 6 records were integrated as new, **2 of them in 2020 and 4 in 2021.**

Calabria

The request was submitted via certified email (PEC) on 25/07/2024 to the **Department of Agriculture, Agri-food Resources – Forestry, Wildlife Heritage and Hunting Unit**. As no reply was received, on 29/09/2024 a reminder was sent to the same address, again without response. On 06/11/2024 the request was then transmitted via PEC to the Regional Public Relations Office, which on 12/11/2024 communicated that the requested data were not available from the Department in question but might instead be held by the **Department of Health Protection**. On 14/11/2024 the request was therefore transmitted via PEC directly to the **Zooprophylactic Experimental Institute of Southern Italy**.

As no reply was received, on 07/01/2025 a reminder was again sent to the Institute, which was not answered. This silence was considered a refusal, and on 18/02/2025 a request for review of the refusal was submitted. On 25/02/2025, a reply was finally received from the **Veterinary Epidemiological Observatory** of the Institute, which transmitted the requested data. These ones included year, place of discovery, province, cause of death, sex, age class and notes reporting the specimen's weight.

In total, **34 wolves** were found dead in Calabria during the period 2019–2023: **3 in 2019, 10 in 2020, 8 in 2021, 5 in 2022 and 8 in 2023**.

On 05/03/2025, data were also requested from ISPRA (Italian Institute for Environmental Protection and Research), which transmitted them on 02/04/2025. Two databases were provided: one relating to wolf specimens found dead specifically during the National Wolf Monitoring Program, referring only to field data from 2020–2021, and

another relating to all other data transmitted by the competent authorities. Following record-by-record comparison (date, region, province, municipality, locality, sex, age, weight, cause of death), records not already included were integrated. This comparison revealed **5 new records, 2 of them in 2020 and 3 in 2021.**

Campania

The request was submitted via certified email (PEC) on 24/07/2024 to the **General Directorate for Agricultural, Food and Forestry Policies** and to the **Head of Corruption Prevention and Transparency**. On 30/07/2024 the Unit for Prevention and Veterinary Public Health transmitted the requested data relating to wolves found dead in the period 2019–2024. For the years 2019–2023, the total amounted to **27 specimens, of which 7 in 2019, 6 in 2020, 4 in 2021, 5 in 2022 and 5 in 2023.**

On 05/03/2025, data were also requested from **ISPRA** (Italian Institute for Environmental Protection and Research), which transmitted them on 02/04/2025. Two databases were provided: one relating to wolves found dead specifically during the National Wolf Monitoring Program, which refers only to field data collected in 2020–2021, and another including all other data transmitted by the competent authorities. For the reference period, the first database contained 2 records and the second 7. Following record-by-record comparison with the aforementioned data, the records not already included were integrated. This comparison revealed 4 new records, **2 in 2020 and 2 in 2021.**

Emilia-Romagna

As the data were not available from the Region, as communicated informally by the staff of the Department of Wildlife-Hunting Activities, Fisheries and Aquaculture, the request was transmitted via certified email (PEC) on 06/11/2024 to the **Zooprophylactic Experimental Institute of Lombardy and Emilia-Romagna**, which on 02/12/2024 transmitted the requested data. These amounted to a total of **206 wolves, of which 15 in 2019, 27 in 2020, 37 in 2021, 54 in 2022 and 73 in 2023.**

On 05/03/2025, data were also requested from **ISPRA** (Italian Institute for Environmental Protection and Research), which were transmitted on 02/04/2025. Two databases were provided: one concerning the wolves found dead specifically during the National Wolf Monitoring Program, referring only to field data collected in 2020–2021, and another including all other data transmitted by the competent authorities. For the period under review, the first database contained 8 records and the second 70.

Following record-by-record comparison with the aforementioned data, records not already included were integrated. This comparison revealed 45 new records, of which **24 in 2019, 15 in 2020, 4 in 2021, 1 in 2022 and 1 in 2023.**

Finally, data available to the **Wolf Apennine Center** were requested informally, **limited to wolves that died directly or indirectly due to poaching** in the provinces of **Parma and Reggio Emilia**. The **WAC** transmitted these on 23/04/2025, providing the annual number of cases for the two provinces, amounting to **26**. The comparison with previously collected data made it possible to integrate 15 further records, of which **5 in 2020, 1 in 2021, 5 in 2022 and 4 in 2023.**

Friuli-Venezia Giulia

The request was submitted via certified email (PEC) on 24/07/2024 to the **Hunting and Fishery Resources Service**. On 05/08/2024, the **Central Directorate for Agri-food, Forestry and Fishery Resources** transmitted the requested data, extracted from the INFOfauna platform. These reported a total of **17 wolves** found dead in the region during the reference period, of which **2 in 2019, 3 in 2020, 5 in 2021, 4 in 2022 and 3 in 2023**.

On **05/03/2025**, data were also requested from **ISPRA** (Italian Institute for Environmental Protection and Research), which transmitted them on **02/04/2025**. Two databases were provided: one relating to wolves found dead specifically during the National Wolf Monitoring Program, referring only to field data collected in 2020–2021, and another relating to all other data transmitted by the competent authorities. For the reference period, only **one record** was present, in the second database, referring to **2022**. Following record-by-record comparison with the aforementioned data, this case was added to the count.

Lazio

The request was submitted via certified email (PEC) on 24/07/2024 to the **Regional Directorate for Agriculture, Food Sovereignty, Hunting and Fishing, Forests – Hunting Office**, which on 13/08/2024 replied that it could not accept the request as it did not possess the requested information, since this did not fall within its competence.

Therefore, on 03/09/2024, the request was forwarded via PEC to the **Zooprophylactic Experimental Institute of Lazio and Tuscany “M. Aleandri”**. As no reply was received, on 29/10/2024 a reminder was sent to the same address. On 04/11/2024 a response was received stating: **“with regard to the request in question, the competent party is to be identified as the entity that carried out the sampling, as responsible for the procedure. To this end, it is advisable to contact said entities in order to request the relevant information”**. Since this reply could be interpreted in various ways, on 05/11/2024 a request for clarification was sent to the same address. As no reply was received, on 07/12/2024 another reminder was sent, again without result. Given the continued lack of response, this silence was considered a refusal. On 21/02/2025, a request for review of the refusal was transmitted via PEC to the **Head of Transparency and Corruption Prevention**, but again no reply was received.

Since no response was received again, the recordings available on the **National “Dead Wolf Tracker” portal** were used, which has collected records since 2021. According to the portal, a total of **28 wolves** were found dead in Lazio between 2019 and 2023, of which **0 in 2019, 0 in 2020, 0 in 2021, 4 in 2022 and 24 in 2023**. For these records,

only the date of discovery and location (municipality and province) were available, with no indication of cause of death, sex, age class or weight.

On **05/03/2025**, data were also requested from **ISPRA** (Italian Institute for Environmental Protection and Research), which transmitted them on 02/04/2025. Two databases were provided: one relating to wolves found dead specifically during the *National Wolf Monitoring Program*, referring only to field data collected in 2020–2021, and another including all other data transmitted by the competent authorities. For the reference period, the first database contained 4 records and the second 38. Following record-by-record comparison with the aforementioned data, the records not already included were integrated. This comparison revealed 37 additional cases, of which **1 in 2019, 10 in 2020, 14 in 2021, 9 in 2022 and 3 in 2023**.

Liguria

The request was transmitted via PEC on 24/07/2024 to the **Wildlife, Hunting and Gamekeeping Supervision Department**. Since no reply was received, on 19/09/2024 a follow-up request for feedback was sent via PEC to the same address. On 01/10/2024 the Wildlife, Hunting and Gamekeeping Supervision Department transmitted the requested data, which are as follows: a total of **52 specimens, of which 7 in 2019, 6 in 2020, 8 in 2021, 19 in 2022, and 15 in 2023**.

On 05/03/2025, **ISPRA** (Italian Institute for Environmental Protection and Research) was asked to provide the available data concerning the national territory, which were transmitted on 02/04/2025. The data referred to two databases: one concerning the specimens found dead specifically during the National Wolf Monitoring, which only refers to field data collected in the years 2020–2021, and another containing all the remaining data transmitted by the competent authorities to the Institute, but which did not include records relating to the regional territory of Liguria.

Lombardy

The request was transmitted via PEC on 24/07/2024 to the **Directorate General for Agriculture, Food Sovereignty and Forests**. Since no reply was received, on 17/09/2024 a follow-up request for feedback was sent via PEC to the same address. On 10/10/2024, the **Directorate General for Territory and Green Systems, Parks, Biodiversity and the Nature and Biodiversity Knowledge System** informed that the requested data were all freely accessible in the Regional Large Carnivore Reports for the Lombardy Region, made available online for public consultation from 2019 onwards, providing the relevant links for access.

From the consultation of the Reports, it emerged that during the reference period a total of **26 specimens** had been recovered, of which **4 in 2019, 1 in 2020, 1 in 2021, 7 in 2022, and 13 in 2023**. Furthermore, on 06/11/2024 a request was transmitted via PEC to the **Experimental Zooprohylactic Institute of Lombardy and Emilia-Romagna**, which on 02/12/2024 transmitted the requested data for the reference period, amounting to 28, of which 4 in 2019, 8 in 2021, 10 in 2022, and 6 in 2023.

Following the comparison of each individual record (date, region, province, municipality, locality, sex, age, weight, cause of death) with the above-mentioned data, the records not already included were integrated. The comparison revealed **17 new records, of which 2 in 2019, 4 in 2021, 5 in 2022, and 6 in 2023**.

Finally, on 05/03/2025, **ISPRA** (Italian Institute for Environmental Protection and Research) was asked to provide the available data concerning the national territory, which were transmitted on 02/04/2025. The data referred to two databases: one concerning the

specimens found dead specifically during the National Wolf Monitoring, which only refers to field data collected in the years 2020–2021, and another concerning all the remaining data transmitted by the competent authorities to the Institute. For the reference period, the data in the second database amounted to 7.

Following the comparison of each individual record (date, region, province, municipality, locality, sex, age, weight, cause of death) with the above-mentioned data, the records not already included were integrated. The comparison revealed **1 additional record in 2019**.

Marche

The request was transmitted via PEC on 24/07/2024 to the **Department of Forestry and Wildlife-Hunting Policies**, which on 17/09/2024 transmitted the requested data (with the exception of weight). In the period 2019–2023, a total of **155 wolves were found** in the regional territory, of which 29 were recovered alive. Of the remaining 126 found dead, **8 were from 2019, 13 from 2020, 26 from 2021, 47 from 2022, and 32 from 2023.**

Furthermore, on 03/09/2024, a request was transmitted via PEC to the **Umbria and Marche Zooprohylactic Institute “Togo Rosati”**. Since no reply was received, on 29/10/2024 a follow-up request for feedback was sent via PEC to the same address. On 13/11/2024, the Zooprohylactic Institute transmitted the requested data (with the exception of weight). According to the Institute’s database, in the period 2019–2023, a total of **65 specimens** were found in the regional territory, **of which 17 in 2019, 8 in 2020, 7 in 2021, 10 in 2022, and 23 in 2023.**

Following the comparison of each individual record (date, region, province, municipality, locality, sex, age, cause of death) with the above-mentioned data, the records not already included were integrated. The comparison revealed **45 additional records, of which 17 in 2019, 8 in 2020, 5 in 2021, 5 in 2022, and 10 in 2023.**

Finally, on 05/03/2025, **ISPRA** (Italian Institute for Environmental Protection and Research) was asked to provide the available data concerning the national territory, which were transmitted on 02/04/2025. The data referred to two databases: one concerning the specimens found dead specifically during the National Wolf Monitoring, which only

refers to field data collected in the years 2020–2021, and another concerning all the remaining data transmitted by the competent authorities to the Institute. For the reference period, the data amounted to 5 in the first database and 42 in the second.

Following the comparison of each individual record (date, region, province, municipality, locality, sex, age, weight, cause of death) with the above-mentioned data, the records not already included were integrated. The comparison revealed **2 additional records in 2020**.

Molise

The application was transmitted via PEC on 09/08/2024 to the **Regional Government** and, in the absence of a reply, a follow-up request for feedback was sent on 25/09/2025. On 21/10/2024, **the Service “Coordination and Management of European Policies for Agriculture, Aquaculture and Fisheries – Hunting Activities”** redirected the application to the **Single Department for Prevention, Animal Husbandry Hygiene and Zootechnical Production of ASREM**, which transmitted the requested data on 15/11/2024. The transmitted data, relating to wolves found dead in the period 2019–2023, are as follows: a total of **51 specimens** in the reference period, **of which 6 in 2019, 12 in 2020, 4 in 2021, 9 in 2022, and 20 in 2023.**

Furthermore, on 05/03/2025, **ISPRA** (Italian Institute for Environmental Protection and Research) was asked to provide the available data concerning the national territory, which were transmitted on 02/04/2025. The data referred to two databases: one concerning the specimens found dead specifically during the National Wolf Monitoring, which only refers to field data collected in the years 2020–2021, and another concerning all the remaining data transmitted by the competent authorities to the Institute. For the reference period, the data amounted to 6 in the first database and 39 in the second.

Following the comparison of each individual record (date, region, province, municipality, locality, sex, age, weight, cause of death) with the above-mentioned data, the records not already included were integrated. The comparison revealed **5 additional records, of which 2 specimens in 2020 and 3 in 2023.**

Piedmont

The request was transmitted via PEC on 25/07/2024 to the **Department for Wildlife Conservation and Management and Aquaculture**. The request was internally redirected on 26/07/2024 to the **Directorate for Environment, Energy and Territory – Department for Sustainable Development, Biodiversity and Natural Areas**, which on 23/08/2024 transmitted a report containing an elaboration of the requested data. From this report it emerged that in the period 2019–2023, a total of **280 specimens were found, of which 31 in 2019, 49 in 2020, 50 in 2021, 73 in 2022 and 77 in 2023. The data relating to causes of death was not provided in detail year by year, but through an overall analysis that shows the distribution of the various causes of mortality over the entire period considered.** Furthermore, on 05/03/2025, the available data relating to the national territory were requested from **ISPRA** (Italian Institute for Environmental Protection and Research), and these were transmitted on 02/04/2025. The data provided concerned two databases: one relating to the deceased specimens collected specifically during the National Wolf Monitoring, which refers only to the field data collected in the years 2020–2021, and another relating to all the remaining data transmitted by the competent Authorities to the Institute.

The data relating to the reference period amounted to 4 in the second database but, given the characteristics of the aforementioned data, made available by the Region, it was not possible to carry out any comparison between the two sets; therefore, the data present in the ISPRA database were not counted.

Apulia

The request was submitted via certified email (PEC) on 24/07/2024 to the **Department of Agriculture, Rural and Environmental Development** and, in the absence of a reply, a follow-up request was sent on **24/09/2025**. On **14/10/2024**, a reply was received transmitting the data available to the Department, relating to wolf specimens that had arrived alive between 2019 and 2024 at the Wildlife Rescue Center in Bitetto, amounting to a total of 6 individuals, of which 1 in 2019, 1 in 2020, 1 in 2021, 1 in 2022 and 2 in 2023. **These data were not included in the count, as they did not concern deceased individuals.** Furthermore, it was specified that the Wildlife Rescue Center, which falls under the **Regional Wildlife Observatory of Apulia**, does not hold information regarding the discovery of wild animal carcasses in the territory and that, in accordance with the provisions of the Veterinary Service of the Apulia Region, competence for the collection and management of data concerning wolf carcasses lies with the **Veterinary Service** of the territorially competent **Local Health Authority (ASL)**, which is activated in the event of carcass discoveries. The veterinarian who intervenes on site then arranges for the carcass to be transferred to the **Zooprophylactic Experimental Institute of the Region** for diagnostic tests. Therefore, for specimens found dead, reference is to be made to the Zooprophyllactic Experimental Institute of Apulia and Basilicata. Consequently, on 28/10/2024, the request was transmitted via PEC to the Zooprophyllactic Experimental Institute of Apulia and Basilicata. As no reply was received, on 07/01/2025 a follow-up request was again sent to the Institute.

As no response was received, this silence was considered as a refusal, and therefore on 20/02/2025 a request for review of the refusal was submitted via PEC. As no reply was

again received, it was necessary to use the records available from the **National “Dead Wolf Tracker” Portal**, which has collected data since 2021. These records revealed that a total of **4 wolves** were found dead in the regional territory in **2023**.

In addition, on **05/03/2025** data were requested from **ISPRA** (Italian Institute for Environmental Protection and Research), which transmitted them on **02/04/2025**. Two databases were provided: one relating to deceased specimens collected specifically during the *National Wolf Monitoring Program*, referring only to field data gathered in 2020–2021, and another relating to all other data transmitted by the competent authorities to the Institute. For the reference period, the first database contained 15 records and the second 5. Following record-by-record comparison (date, region, province, locality) with the aforementioned data, those not already present were integrated. This comparison showed that all **20 records** were new, of which **5 referred to 2019, 9 to 2020** and **6 to 2021**.

Tuscany

The request was submitted via certified email (PEC) on 24/07/2024 to the **Sector for Wildlife-Hunting Activities, Sea Fishing and Relations with the Local Action Groups of Inland Fisheries**, which on 26/08/2024 replied that the requested information was held by the **Zooprophylactic Experimental Institute of Tuscany and Lazio**, the body responsible for receiving wolf carcasses found in the regional territory and for determining sex and age classes as well as causes of death identified through necropsy. Consequently, on 03/09/2024, the request was transmitted via PEC to the **Zooprophylactic Experimental Institute of Lazio and Tuscany “M. Aleandri”**.

As no reply was received, on 29/10/2024 a reminder was sent via PEC to the same address. On 04/11/2024, a response was received stating: **“with regard to the request in question, the competent party is to be identified as the entity that carried out the sampling, as responsible for the procedure. To this end, it is advisable to contact said entities in order to request the relevant information”**. Since this response lent itself to different interpretations, on 05/11/2024 a request for clarification was sent to the same address. As no reply followed, on 07/12/2024 another reminder was sent via PEC to the same address, again without response. Finally, as no reply was ever received, this silence was considered a refusal, and therefore, on 21/02/2025, a request for review of the refusal was transmitted via PEC to the **Head of Transparency and Corruption Prevention**, which also went unanswered. It was therefore decided to submit the requests directly to the three Local Health Authorities (ASL) present in the region of Tuscany.

On 10/01/2025, the request was transmitted via PEC to the **SOC General Affairs and Contracts of the Tuscany Central Local Health Authority**, which on 13/01/2025 requested from the applicant an additional document certifying the status of Legal Representative of the association "*Io non ho paura del Lupo*". Considering the responses that followed, which would have resulted in incomplete data at the regional level, it was decided not to proceed further with the request to the Tuscany Central Local Health Authority.

On the same date (10/01/2025), the request was transmitted via PEC to the **Public Relations Office (URP) of the Tuscany South-East Local Health Authority**, which on 13/02/2025 replied that it did not possess the requested data. In its communication, it specified that, pursuant to **Regional Resolution No. 711 of 26/06/2023**, passive surveillance of wildlife is carried out through collaboration among different institutions and bodies operating at the territorial level (ASL veterinarians, private veterinarians, Provincial Police officers, Carabinieri Forestali officers, wildlife operators, voluntary rangers, hunters, truffle gatherers, etc.), all of whom are required to deliver carcasses to the Diagnostic Sections of IZSLT, territorially competent for diagnostic, phenotypic and morphological investigations. Given the entire previous correspondence with the Zooprophyllactic Institute in question, it was decided not to pursue the request further with the Tuscany South-East Local Health Authority.

Again on 10/01/2025, the request was transmitted via PEC to the **Institutional Relations Unit (UOC) of the Tuscany North-West Local Health Authority**, which on 13/01/2025 replied that the requested data were not in its possession, as the authority was not involved in the census of carcasses found. It was specified that within the territory

of Tuscany a dedicated structure exists, the “**Wolf Task Force**”, to which the applicant was advised to turn, providing the relevant contact email address.

On 21/01/2025, the request was therefore transmitted by email to the **Wolf Task Force of the Tuscany Region**, which on 24/01/2025 replied that it did not possess the requested data, since wolf specimens found dead in the regional territory are sent to the premises of the Zooprophyllactic Experimental Institute of Tuscany and Lazio for epidemiological analyses required under the wildlife health surveillance plan. Considering all the previous correspondence with the Zooprophyllactic Institute, it was decided not to follow up further on these instructions.

In the absence of an official response from the institutions contacted, it was therefore necessary to use the data available from the **National “Dead Wolf Tracker” Portal**, which has collected records since 2021. According to this source, a total of **58 wolves** were found dead in Tuscany during the period 2019–2023, of which **0 in 2019, 0 in 2020, 11 in 2021, 14 in 2022** and **33 in 2023**. For these records, only the date of discovery and location (municipality and province) were available, with no information on cause of death, sex, age class or weight.

In addition, on **05/03/2025**, data were requested from **ISPRA** (Italian Institute for Environmental Protection and Research), which transmitted them on 02/04/2025. Two databases were provided: one relating to specimens found dead specifically during the *National Wolf Monitoring Program*, referring only to field data collected in 2020–2021, and another including all other data transmitted by the competent authorities. For the reference period, the first database contained 20 records and the second 39.

Following record-by-record comparison (date, region, province, municipality, locality, sex, age, weight, cause of death) with the aforementioned data, those not already included were integrated. This comparison revealed **51 additional records**, of which **7 in 2019, 19 in 2020, 16 in 2021, 7 in 2022** and **2 in 2023**.

Autonomous Province of Trento – Trentino

The data were drawn from the following documents published on the website of the **Provincial Administration of Trento**: the *Large Carnivore Reports* for the years **2019, 2020, 2021, 2022 and 2023**, prepared annually by the **Wildlife Service of the Autonomous Province**. In total, **44 wolves** were found dead in the provincial territory, of which **2 in 2019, 7 in 2020, 7 in 2021, 14 in 2022 and 14 in 2023**.

In addition, on 05/03/2025, data were requested from **ISPRA** (Italian Institute for Environmental Protection and Research), which were transmitted on 02/04/2025. Two databases were provided: one relating to specimens found dead specifically during the *National Wolf Monitoring Program*, referring only to field data collected in 2020–2021, and another including all other data transmitted by the competent authorities. Neither of these databases, however, contained records referring to the territory of the Autonomous Province of Trento.

Autonomous Province of Bolzano – Alto Adige/Südtirol

The request was submitted via certified email (PEC) on 08/02/2025 to the **Office for Institutional Affairs of the Provincial Administration**, which on 10/02/2025 transmitted the requested data (excluding weight and the exact day-month of discovery). During the period under review, a total of **4 wolves** were found dead in the provincial territory, of which **1 in 2019, 2 in 2022** and **1 in 2023**.

In addition, on 05/03/2025, data were requested from **ISPRA** (Italian Institute for Environmental Protection and Research), which were transmitted on 02/04/2025. Two databases were provided: one relating to specimens found dead specifically during the *National Wolf Monitoring Program*, referring only to field data collected in 2020–2021, and another including all other data transmitted by the competent authorities. Neither of these databases, however, contained records referring to the territory of the Autonomous Province of Bolzano.

Umbria

The request was submitted via certified email (PEC) on 24/07/2024 to the **Forests, Mountains, Natural Systems and Wildlife-Hunting Service**, which on 29/08/2024 replied by transmitting the only available data, referring to the period 2008–2017, published in the poster presented at the XI Italian Theriological Congress, Florence, 20–22 June 2018: “*The Wolf in Umbria (Central Italy) and new management perspectives*” (Convito L., Vercillo F., Gobbi M., Grelli D., Sergiacomi U.). With regard to the reference period, however, it was specified that the data are collected by the **Zooprophylactic Experimental Institute of Umbria and Marche “Togo Rosati”**.

Consequently, on 03/09/2024, the request was transmitted via PEC to the Institute. As no reply was received, on 29/10/2024 a reminder was sent to the same address. On 13/11/2024, the Institute transmitted the requested data (excluding weight). According to the database of the Zooprophyllactic Institute, during the period 2019–2023, a total of **80 wolves** were found dead in the regional territory, of which **16 in 2019, 10 in 2020, 13 in 2021, 26 in 2022 and 15 in 2023**.

In addition, on 05/03/2025, data were requested from **ISPRA** (Italian Institute for Environmental Protection and Research), which transmitted them on 02/04/2025. Two databases were provided: one relating to specimens found dead specifically during the *National Wolf Monitoring Program*, referring only to field data collected in 2020–2021, and another including all other data transmitted by the competent authorities. For the reference period, the first database contained 3 records and the second 10.

Following record-by-record comparison (date, region, province, municipality, locality, sex, age, weight, cause of death) with the aforementioned data, records not already included

were integrated. This comparison revealed **3 additional records**, of which **1 in 2020, 1 in 2021** and **1 in 2022**.

Aosta Valley

The request was submitted via certified email (PEC) on 20/09/2024 to the **Secretary General of the Region**. On 23/09/2024, the application was internally redirected by the Secretary General to the **Department of Natural Resources and Forestry Corps**, which on 08/10/2024 transmitted the requested data.

The data transmitted, relating to wolves found dead during the period 2019–2023, were as follows: a total of **31 individuals**, of which **5 in 2019**, **5 in 2020**, **10 in 2021**, **7 in 2022** and **4 in 2023**.

On 05/03/2025, data were also requested from **ISPRA** (Italian Institute for Environmental Protection and Research), which transmitted them on 02/04/2025. Two databases were provided: one relating to specimens found dead specifically during the *National Wolf Monitoring Program*, referring only to field data collected in 2020–2021, and another including all other data transmitted by the competent authorities. However, neither of these databases contained records referring to the regional territory of the Aosta Valley.

Veneto

The request was submitted via certified email (PEC) on 03/09/2024 to the **Directorate for Agro-environment, Fishery and Wildlife-Hunting Planning and Management**, which on 05/09/2024 replied by transmitting the technical report “*The Wolf in Veneto*” (2020–2022). This report included data on wolves recovered in the period between 01/05/2020 and 30/04/2022, which were as follows: between 01/05/2020 and 30/04/2021, **10 individuals** were recovered; between 01/05/2021 and 30/04/2022, **6 individuals** were recovered; in addition, **1 wolf** was recovered alive but **injured** and **subsequently died**, and a further individual was fitted with a radio collar and released following recovery.

Since the data transmitted were only partial compared to those requested, on 13/09/2024 a request for integration was sent to the Region (asking for the period 2020–2022, with reference to the specimens indicated in the Report: date of discovery, sex and estimated age, cause of death, as well as the missing data relating to 2019 and 2023). On 03/10/2024, the Region replied that the requested information could not currently be provided as it was the subject of ongoing investigations by the competent Authorities.

In addition, on 05/03/2025, data were requested from **ISPRA** (Italian Institute for Environmental Protection and Research), which transmitted them on 02/04/2025. Two databases were provided: one relating to specimens found dead specifically during the *National Wolf Monitoring Program*, referring only to field data collected in 2020–2021, and another including all other data transmitted by the competent authorities. For the reference period, the second database contained 19 records.

Following record-by-record comparison (date, region, province, municipality, locality, sex, age, weight, cause of death) with the aforementioned data, records not already included were integrated. This comparison revealed **11 additional cases**, of which **8 in 2019** and **3 in 2023**, and also allowed completion of missing information in part of the data already provided by the Region.

Table 1 Data transmitted by each entity in relation to wolf (*Canis lupus*) mortality in the period 2019-2023 in the territory under its jurisdiction.

Region	Entities from which data has been requested	Data transmission result
Abruzzo	Department of Agriculture of Abruzzo Region	Data not held
	Zooprophylactic Experimental Institute of Abruzzo and Molise “G. Caporale”	Incomplete data held - not transmitted
	Local Health Authority ASL 1 Avezzano, Sulmona, L’Aquila	Transmitted data
	Local Health Authority ASL 2 - Lanciano, Vasto, Chieti;	
	Local Health Authority ASL 3 - Pescara	
	Local Health Authority ASL 4 - Teramo	
	Unified Department for the Prevention of Animal Health and Livestock Production of ASREM	Data transmitted for Chieti and L’Aquila
	National “Dead Wolf Tracker” Portal	Data available for download online
ISPRA	Transmitted data	
Basilicata	Office for Fisheries and Hunting Policies, Wildlife Management, Agro-Environment of Basilicata Region	No reply received
	Zooprophylactic Experimental Institute of Apulia and Basilicata	

	National “Dead Wolf Tracker” Portal	Data available for download online
	ISPRA	Transmitted data
Calabria	Department of Agriculture, Agri-food Resources – Forestry, Wildlife Heritage and Hunting Unit of Calabria Region	Data not held
	Zooprophylactic Experimental Institute of Southern Italy	Transmitted data
	ISPRA	
Campania	General Directorate for Agricultural, Food and Forestry Policies of Campania Region	Transmitted data
	ISPRA	
Emilia-Romagna	Department of Wildlife-Hunting Activities, Fisheries and Aquaculture of Emilia-Romagna Region	Data not held
	Zooprophylactic Experimental Institute of Lombardy and Emilia-Romagna	Transmitted data
	ISPRA	
	Wolf Apennine Center	Data transmitted exclusively for the provinces of Parma and Reggio Emilia
Friuli-Venezia Giulia	Central Directorate for Agri-food, Forestry and Fishery Resources of Friuli-Venezia Giulia Region	Transmitted data
	ISPRA	

Lazio	Regional Directorate for Agriculture, Food Sovereignty, Hunting and Fishing, Forests – Hunting Office of Lazio Region	Data not held
	Zooprophylactic Experimental Institute of Lazio and Tuscany “M. Aleandri”	
	National “Dead Wolf Tracker” Portal	Data available for download online
	ISPRA	Transmitted data
Liguria	Wildlife, Hunting and Gamekeeping Supervision Department	Transmitted data
	ISPRA	
Lombardy	Directorate General for Territory and Green Systems, Parks, Biodiversity and the Nature and Biodiversity Knowledge System of Lombardy Region	Data available for download online
	Zooprophylactic Experimental Institute of Lombardy and Emilia-Romagna	Transmitted data
	ISPRA	
Marche	Department of Forestry and Wildlife-Hunting Policies of Marche Region	Transmitted data

	Zooprophylactic Experimental Institute of Umbria and Marche “Togo Rosati”	
	ISPRA	
Molise	“Coordination and Management of European Policies for Agriculture, Aquaculture and Fisheries – Hunting Activities” of Molise Region	Request forwarded to ASREM
	Unified Department for the Prevention of Animal Health and Livestock Production of ASREM	Transmitted data
	ISPRA	
Piedmont	Forestry and Wildlife Management Sector of the Region of Piedmont	Transmitted data
	ISPRA	
Apulia	Department of Agriculture, Rural and Environmental Development of Apulia Region	Data on animals rescued at the Wildlife Rescue Centre in Bitetto Data on dead wolves not held by the Region
	Zooprophylactic Experimental Institute of Apulia and Basilicata	No reply received
	National “Dead Wolf Tracker” Portal	Data available for download online
	ISPRA	Transmitted data
Tuscany	Sector for Wildlife-Hunting Activities, Sea Fishing and Relations with the Local Action Groups of Inland Fisheries of Tuscany Region	Reference to the Experimental Zooprophylactic

		Institute of Lazio and Tuscany ‘M. Aleandri’
	Zooprophylactic Experimental Institute of Tuscany and Lazio “M. Aleandri”	Data not held
	SOC General Affairs and Contracts of the Tuscany Central Local Health Authority USL Toscana Centro	Data not transmitted
	Public Relations Office (URP) of the Tuscany South-East Local Health Authority	Data not held
	UOC Rapporti Istituzionali dell'ASL Toscana Nord-Ovest	
	Wolf Task Force Lupo of Tuscany Region	
	National “Dead Wolf Tracker” Portal	Data available for download online
	ISPRA	Transmitted data
Trentino – Alto Adige/Südtirol	Wildlife Service of the Autonomous Province of Trento	Data available for download online
	Forestry Service Division of Autonomous Province of Bolzano	Transmitted data
	ISPRA	
Umbria	Forests, Mountains, Natural Systems and Wildlife-Hunting Service of Umbria	Data transmitted for the period 2008-2017
	Zooprophylactic Experimental Institute of Umbria and Marche “Togo Rosati”	Transmitted data
	ISPRA	
Aosta Valley	Department of Natural Resources and Forestry Corps of Aosta Valley Region	Transmitted data

	ISPRA	
Veneto	Directorate for Agro-environment, Fishery and Wildlife-Hunting Planning and Management of Veneto Region	Data transmitted for the period 2020-2022, while data for 2019 and 2023 cannot be transmitted.
	ISPRA	Transmitted data

3. Analysis of wolf mortality data collected for the five-year period (2019–2023)

First of all, it should be noted that the data reported in this report are not derived from a specific sampling design, therefore the discovery of dead wolves in the territory, with the recording of the relative causes, **does not constitute a representative sample of the mortality factors of the species in that territory**. The different causes of death can, in fact, affect the probability of finding the carcasses. Those of wolves that have died from **indirect anthropogenic causes**, i.e., roadkill, are much easier to find than those in other categories, as they occur mainly in an anthropized environment. Conversely, **deaths of natural origin** result in carcasses that are difficult to find, except in areas with high human traffic. The probability of finding **carcasses of wolves that have been poached** may depend, however, on factors related to the specific social context. It can be assumed that they are **generally deliberately hidden or very difficult to find**, for example in the case of wolves that have been poisoned or shot. However, there are some known cases in which carcasses have been exposed to the community as a way of denouncing the disruption caused by the impact of wolves on human activities.

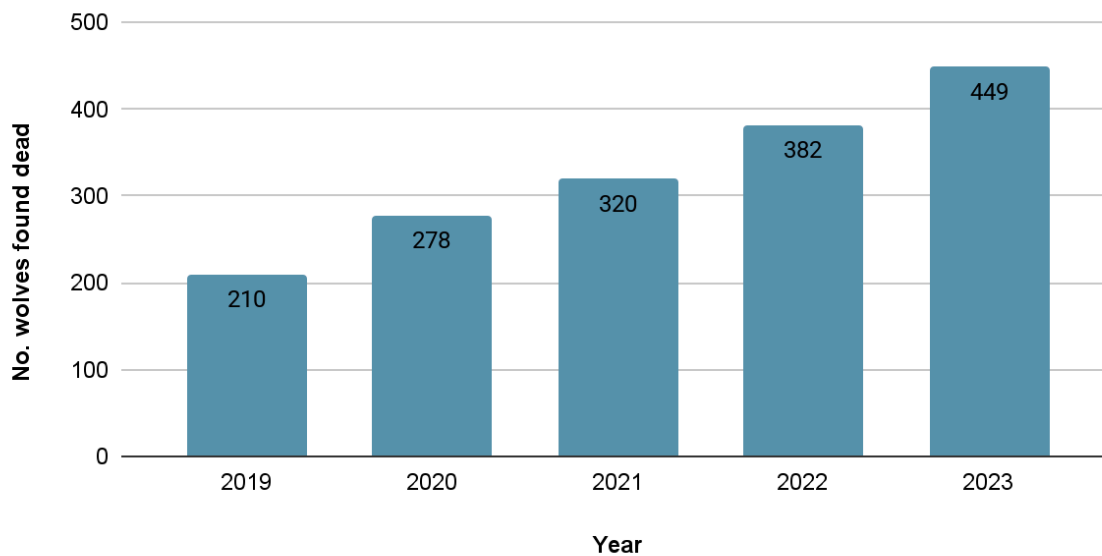
3.1 Total annual deaths in the reference period

During the period **2019–2023**, a total of **1,639 wolves** were found dead in Italy, distributed by year as follows:

- n. **210** in 2019;
- n. **278** in 2020;
- n. **320** in 2021;
- n. **382** in 2022;
- n. **449** in 2023.

Wolves found dead in Italy 2019–2023

Wolf mortality in Italy in the period 2019-2023 - edited by Io non ho paura del lupo APS

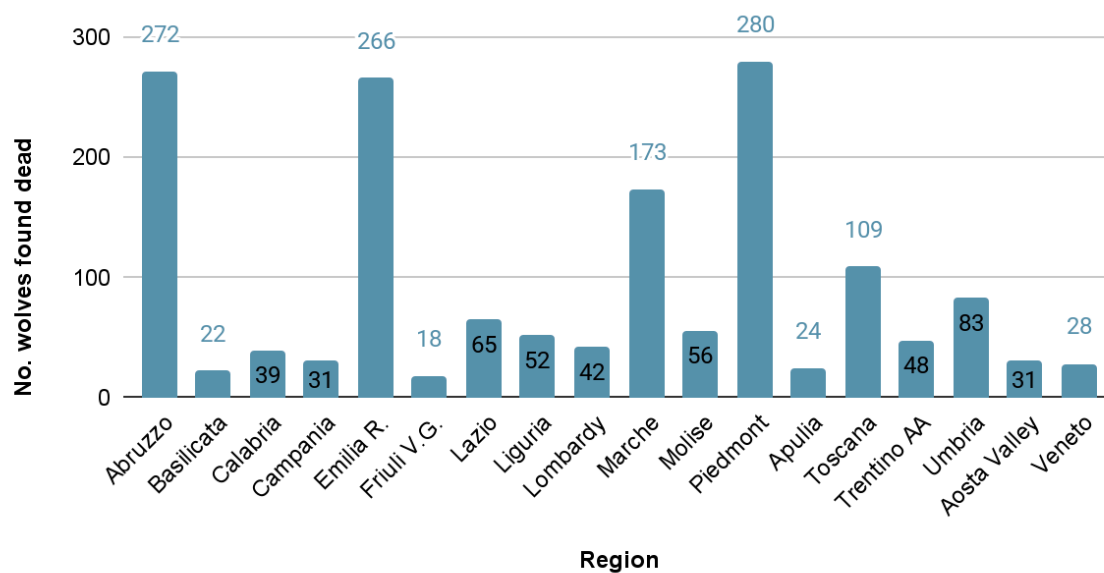


3.2 Regional geographical distribution

The number of wolves found dead in each region/autonomous province is reported below, both as a total and with annual breakdown.

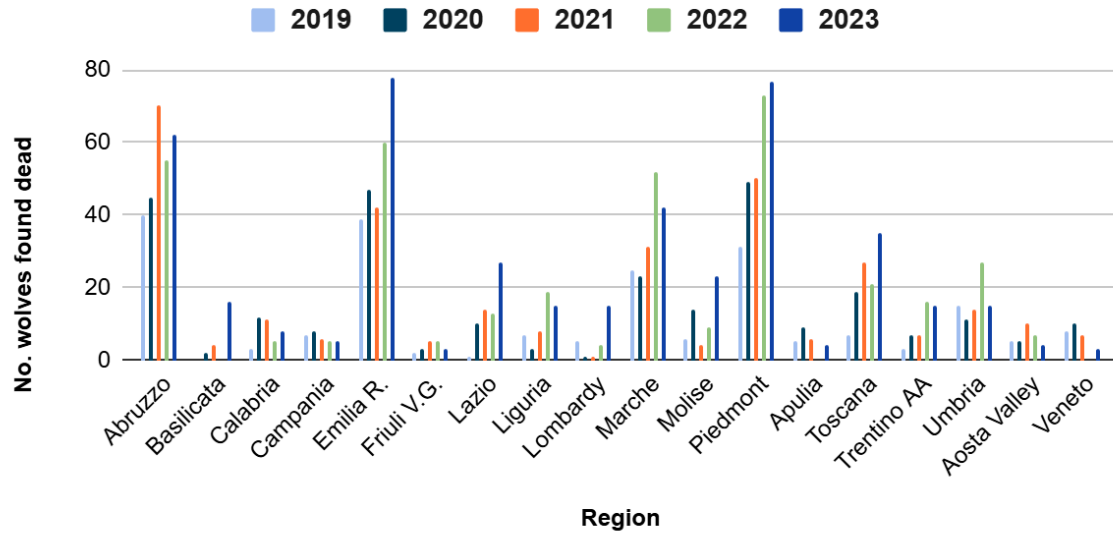
Wolves found dead by region in the period 2019-2023

Wolf mortality in Italy in the period 2019-2023 - edited by Io non ho paura del lupo APS



Annual distribution of wolves found dead by region in the period 2019 - 2023 Regione nel periodo 2019 - 2023

Wolf mortality in Italy in the period 2019-2023 - edited by Io non ho paura del lupo APS



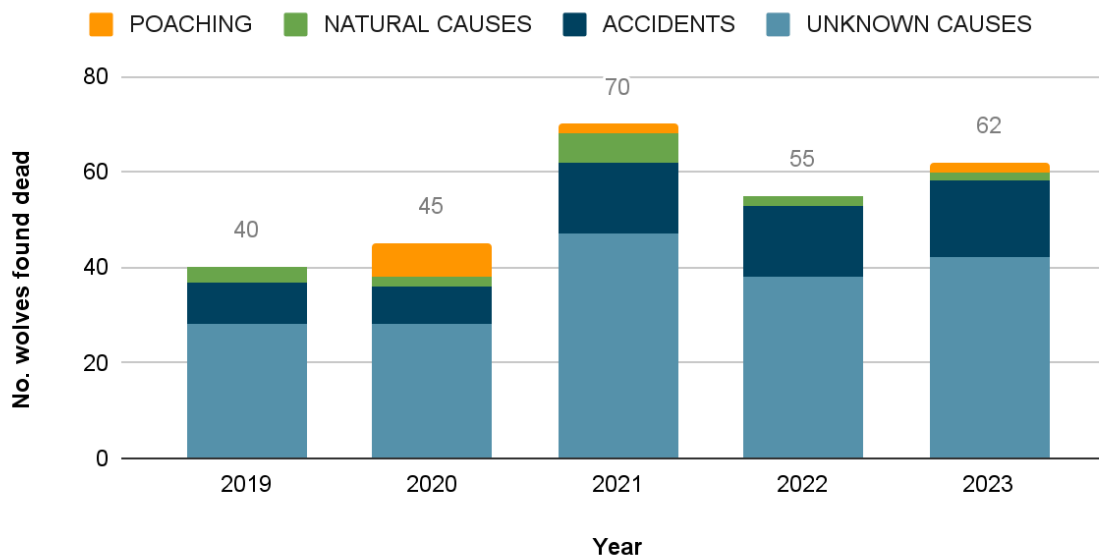
Abruzzo

During the period 2019–2023, a total of 272 wolves were found dead, distributed by year as follows:

- n. 40 in 2019;
- n. 45 in 2020;
- n. 70 in 2021;
- n. 55 in 2022;
- n. 62 in 2023.

Abruzzo: wolves found dead between 2019 and 2023

Wolf mortality in Italy in the period 2019-2023 - edited by Io non ho paura del lupo APS



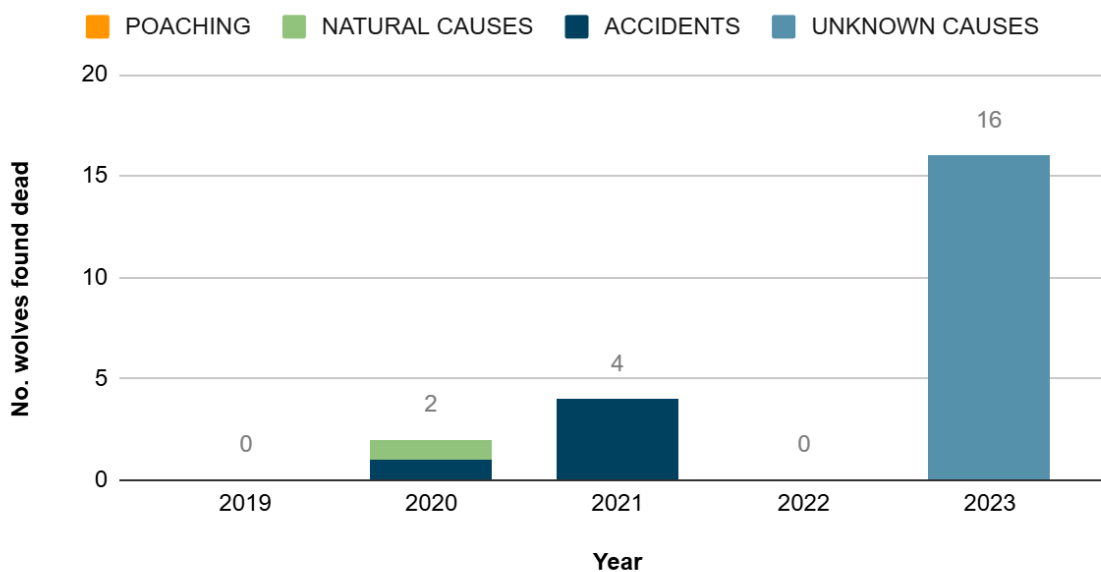
Basilicata

During the period 2019–2023, a total of 22 wolves were found dead, distributed by year as follows:

- n. 0 in 2019;
- n. 2 in 2020;
- n. 4 in 2021;
- n. 0 in 2022;
- n. 16 in 2023.

Basilicata: wolves found dead between 2019 and 2023

Wolf mortality in Italy in the period 2019-2023 - edited by Io non ho paura del lupo APS



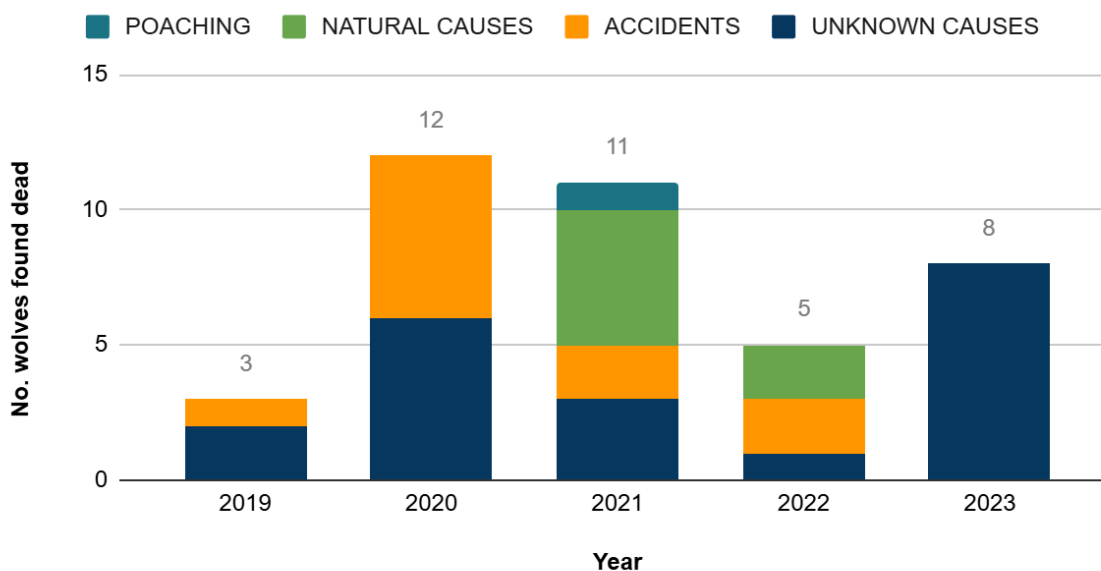
Calabria

During the period 2019–2023, a total of 39 wolves were found dead, distributed by year as follows:

- n. 3 in 2019;
- n. 12 in 2020;
- n. 11 in 2021;
- n. 5 in 2022;
- n. 8 in 2023.

Calabria: wolves found dead between 2019 and 2023 - 2023

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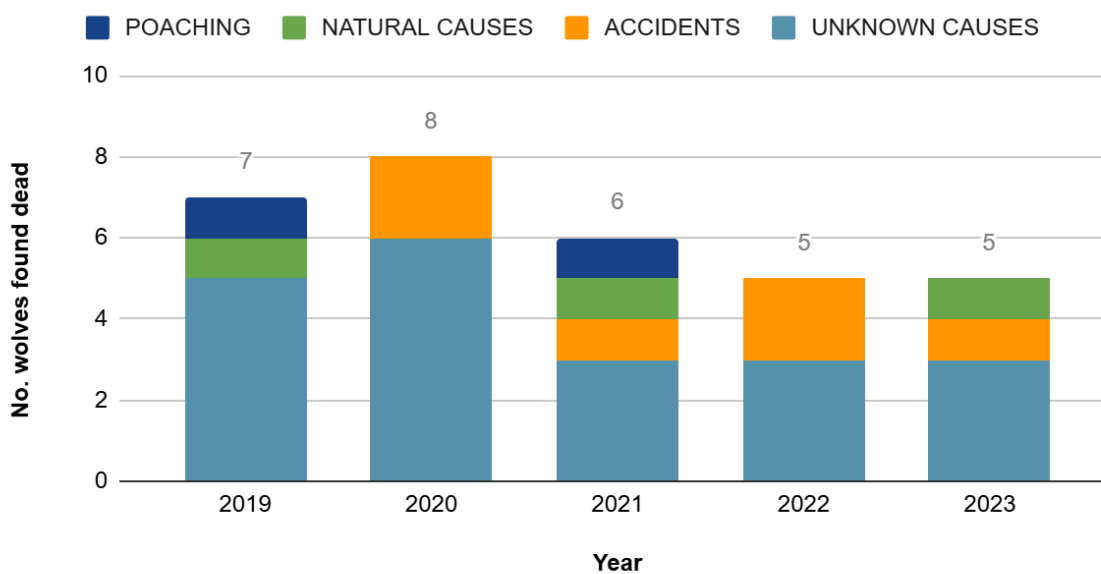
Campania

During the period 2019–2023, a total of 31 wolves were found dead, distributed by year as follows:

- n. 7 in 2019;
- n. 8 in 2020;
- n. 6 in 2021;
- n. 5 in 2022;
- n. 5 in 2023.

Campania: wolves found dead between 2019 and 2023 - 2023

Wolf mortality in Italy in the period 2019-2023 - edited by Io non ho paura del lupo APS



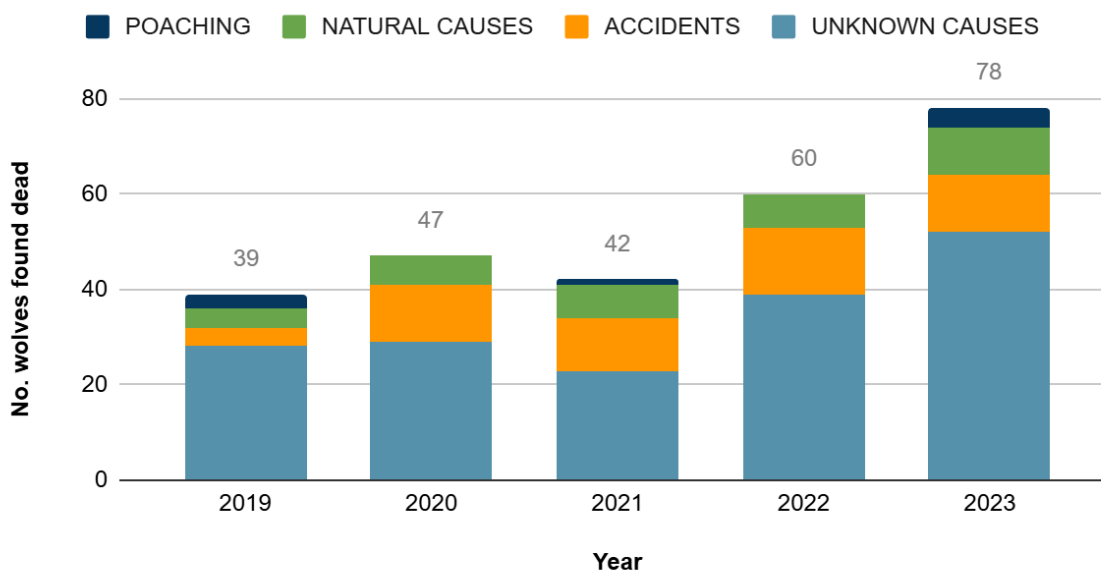
Emilia-Romagna

During the period 2019–2023, a total of 266 wolves were found dead, distributed by year as follows:

- n. 39 in 2019;
- n. 47 in 2020;
- n. 42 in 2021;
- n. 60 in 2022;
- n. 78 in 2023.

Emilia-Romagna: wolves found dead between 2019 and 2023

Wolf mortality in Italy in the period 2019-2023 - edited by Io non ho paura del lupo APS



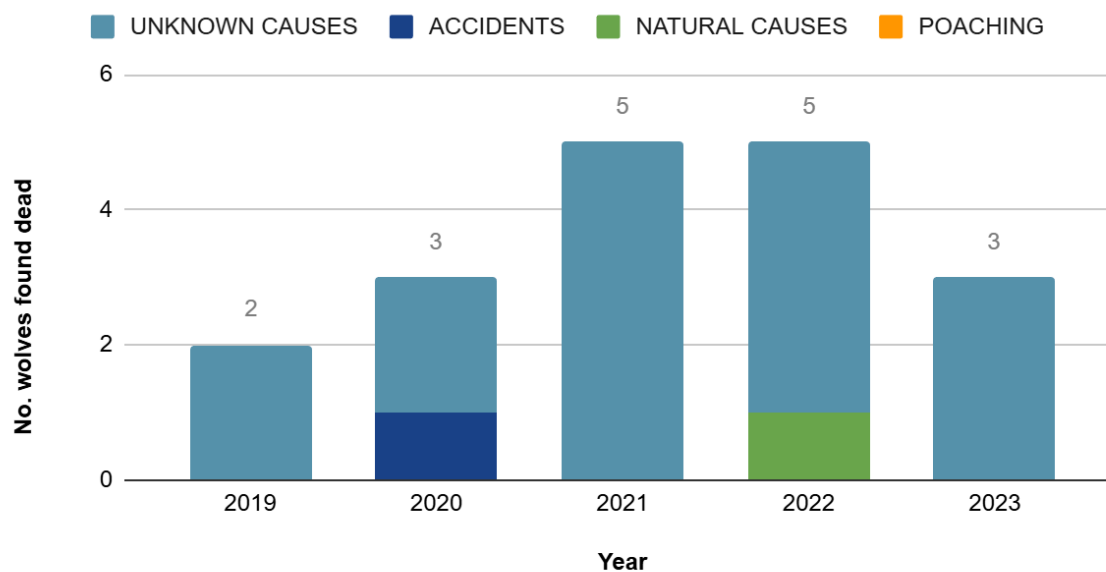
Friuli-Venezia Giulia

During the period 2019–2023, a total of 18 wolves were found dead, distributed by year as follows:

- n. 2 in 2019;
- n. 3 in 2020;
- n. 5 in 2021;
- n. 5 in 2022;
- n. 3 in 2023.

Friuli Venezia Giulia: wolves found dead between 2019 and 2023

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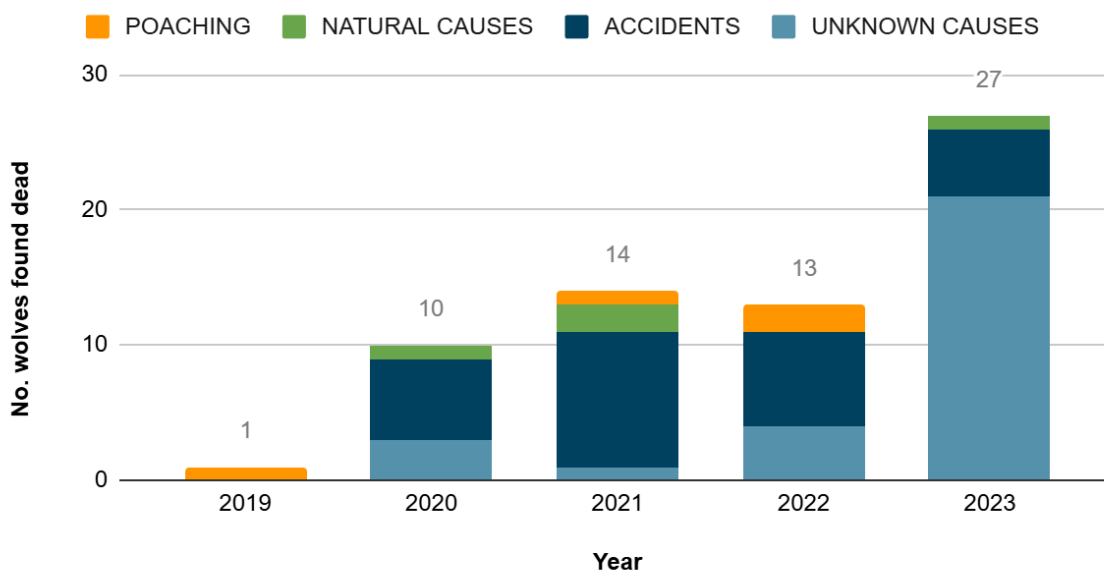
Lazio

During the period 2019–2023, a total of 65 wolves were found dead, distributed by year as follows:

- n. 1 in 2019;
- n. 10 in 2020;
- n. 14 in 2021;
- n. 13 in 2022;
- n. 27 in 2023.

Lazio: wolves found dead between 2019 and 2023

Wolf mortality in Italy in the period 2019-2023 - edited by Io non ho paura del lupo APS



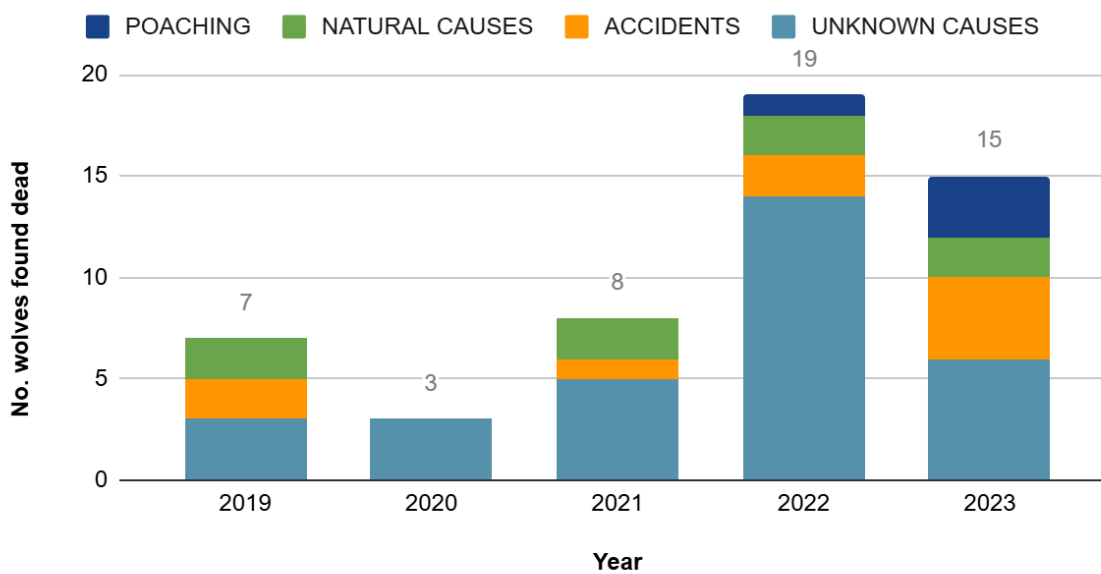
Liguria

During the period 2019–2023, a total of 52 wolves were found dead, distributed by year as follows:

- n. 7 in 2019;
- n. 3 in 2020;
- n. 8 in 2021;
- n. 19 in 2022;
- n. 15 in 2023.

Liguria: wolves found dead between 2019 and 2023

Wolf mortality in Italy in the period 2019-2023 - edited by Io non ho paura del lupo APS



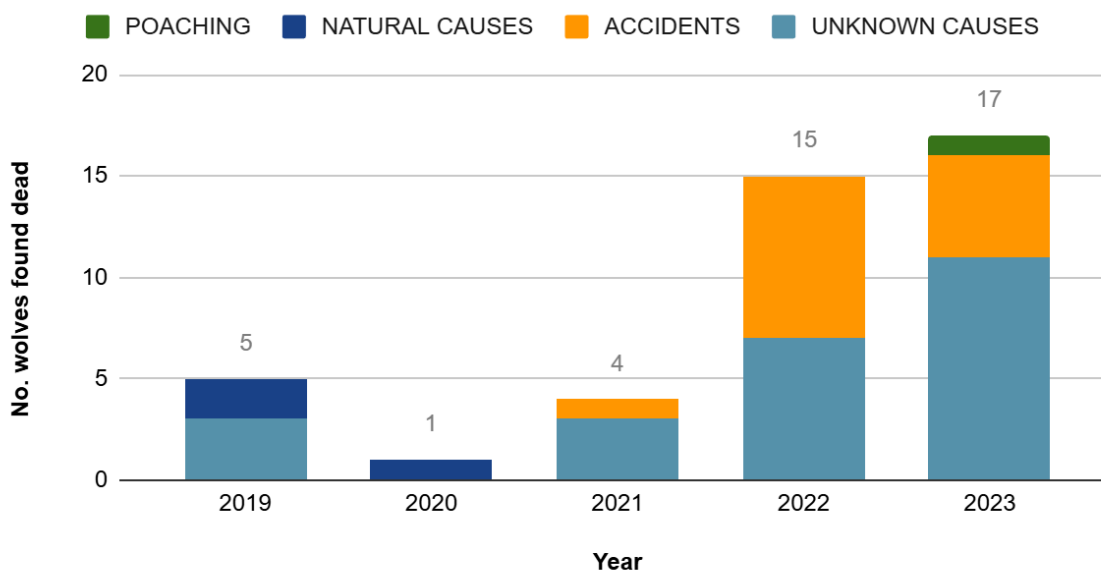
Lombardy

During the period 2019–2023, a total of 42 wolves were found dead, distributed by year as follows:

- n. 5 in 2019;
- n. 1 in 2020;
- n. 4 in 2021;
- n. 15 in 2022;
- n. 17 in 2023.

Lombardy: wolves found dead between 2019 and 2023

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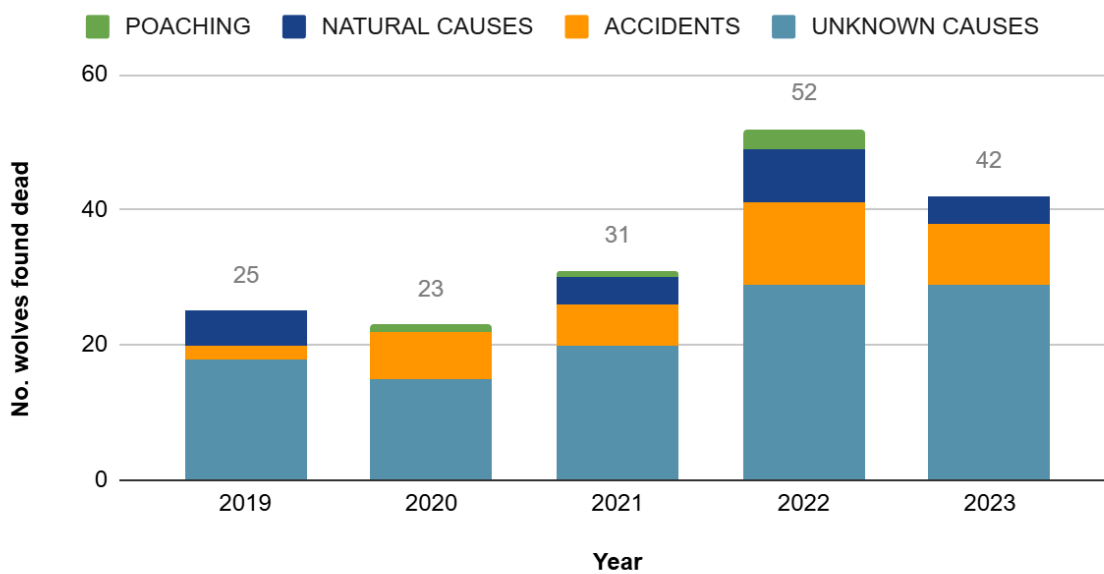
Marche

During the period 2019–2023, a total of 173 wolves were found dead, distributed by year as follows:

- n. 25 in 2019;
- n. 23 in 2020;
- n. 31 in 2021;
- n. 52 in 2022;
- n. 42 in 2023.

Marche: wolves found dead between 2019 and 2023

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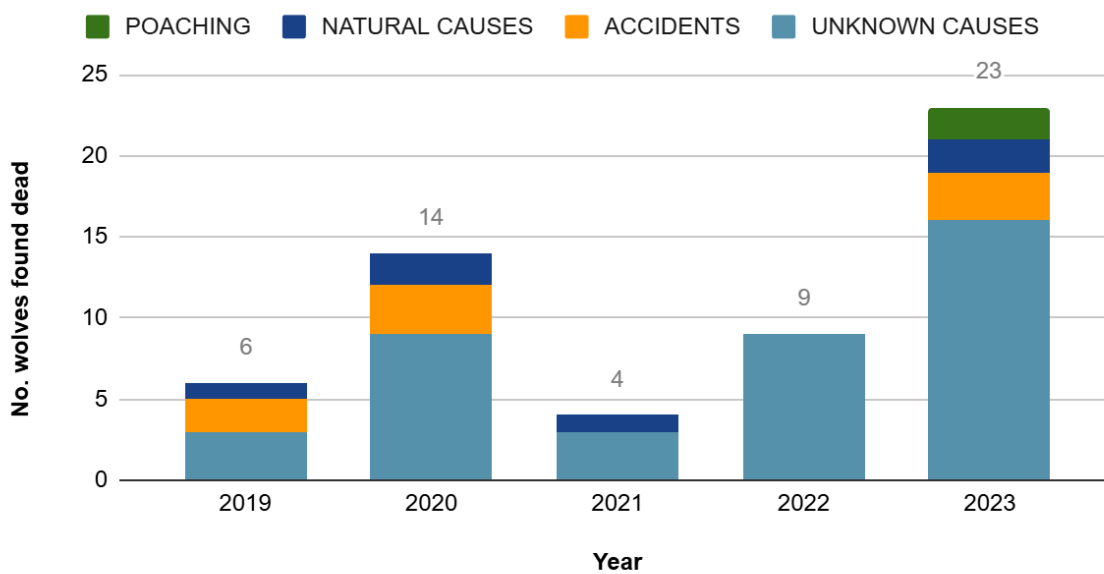
Molise

During the period 2019–2023, a total of 56 wolves were found dead, distributed by year as follows:

- n. 6 in 2019;
- n. 14 in 2020;
- n. 4 in 2021;
- n. 9 in 2022;
- n. 23 in 2023.

Molise: wolves found dead between 2019 and 2023

La mortalità del lupo in Italia nel periodo 2019 - 2023 - a cura di Io non ho paura del lupo APS



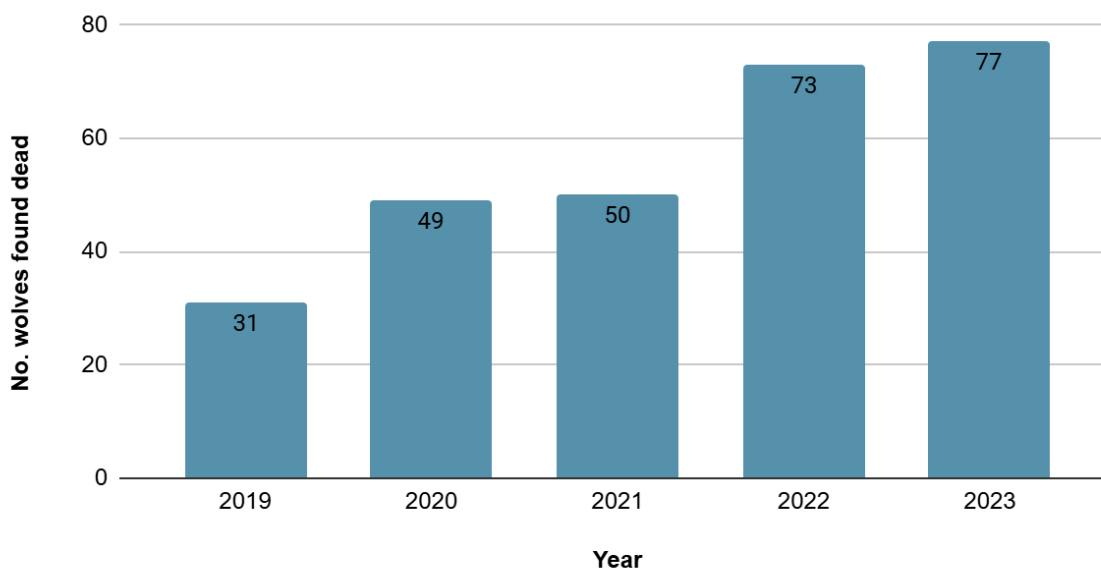
Piedmont

During the period 2019–2023, a total of 280 wolves were found dead, distributed by year as follows:

- n. 31 in 2019;
- n. 49 in 2020;
- n. 50 in 2021;
- n. 73 in 2022;
- n. 77 in 2023.

Piedmont: wolves found dead between 2019 and 2023

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The data provided by the Piedmont Region consists of the total number of individuals found dead for each year, without distinction of cause of death. The latter were provided separately, as a percentage of the total number of individuals, 65 together with the

monthly trend over time and the distribution within age groups and the overall breakdown by gender. However, these data do not allow a simultaneous analysis of mortality trends over the years with respect to individual causes of death. Details on the percentage distribution of causes of death in the Piedmont region are available in paragraph 3.4 (Table 2 and related graph).

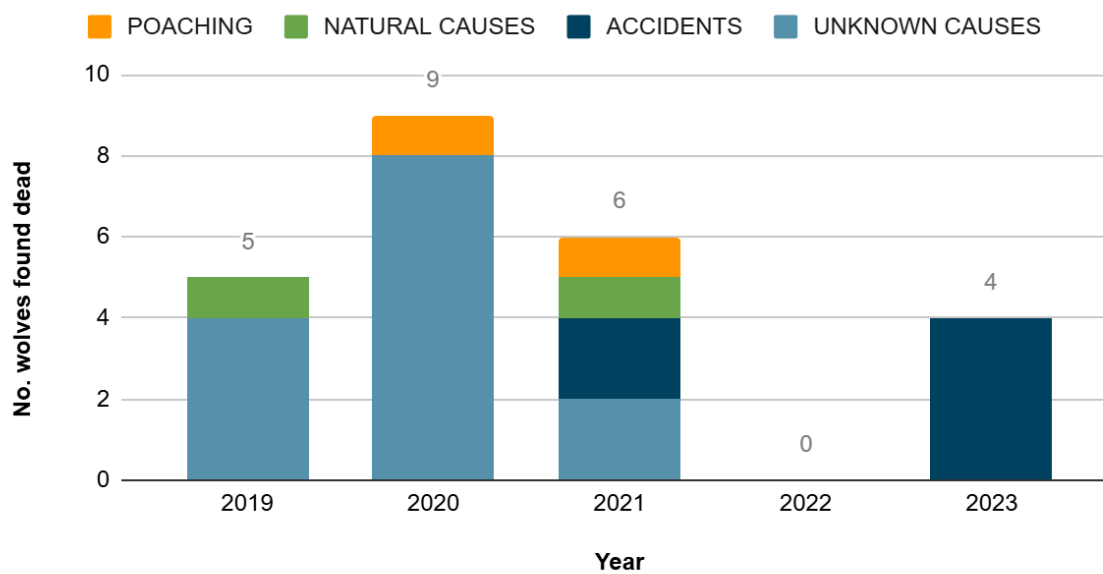
Apulia

During the period 2019–2023, a total of 24 wolves were found dead, distributed by year as follows:

- n. 5 in 2019;
- n. 9 in 2020;
- n. 6 in 2021;
- n. 0 in 2022;
- n. 4 in 2023.

Apulia: wolves found dead between 2019 and 2023

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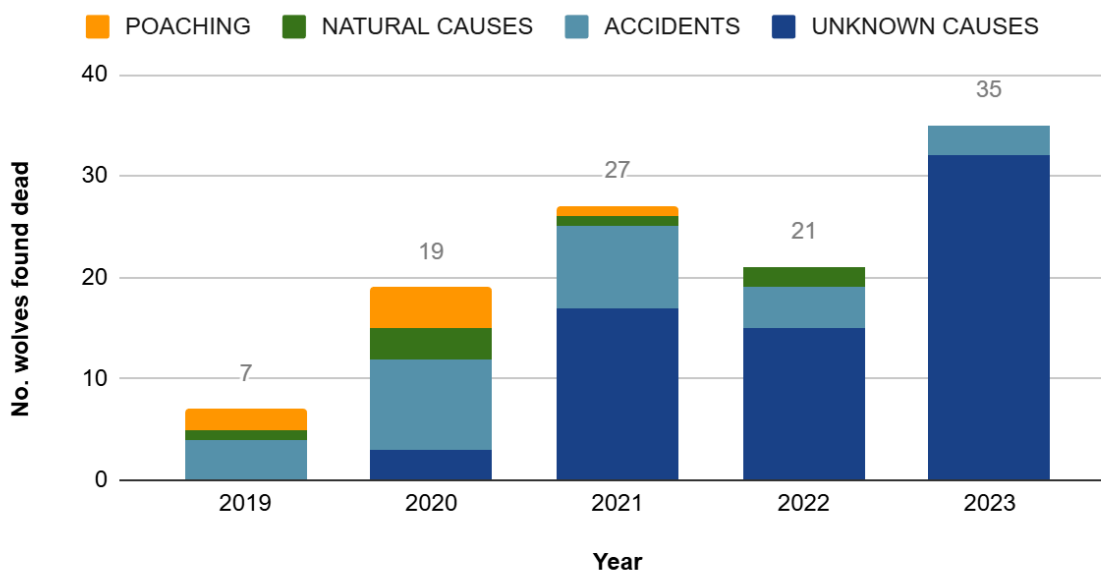
Tuscany

During the period 2019–2023, a total of 109 wolves were found dead, distributed by year as follows:

- n. 7 in 2019;
- n. 19 in 2020;
- n. 27 in 2021;
- n. 21 in 2022;
- n. 35 in 2023.

Tuscany: wolves found dead between 2019 and 2023

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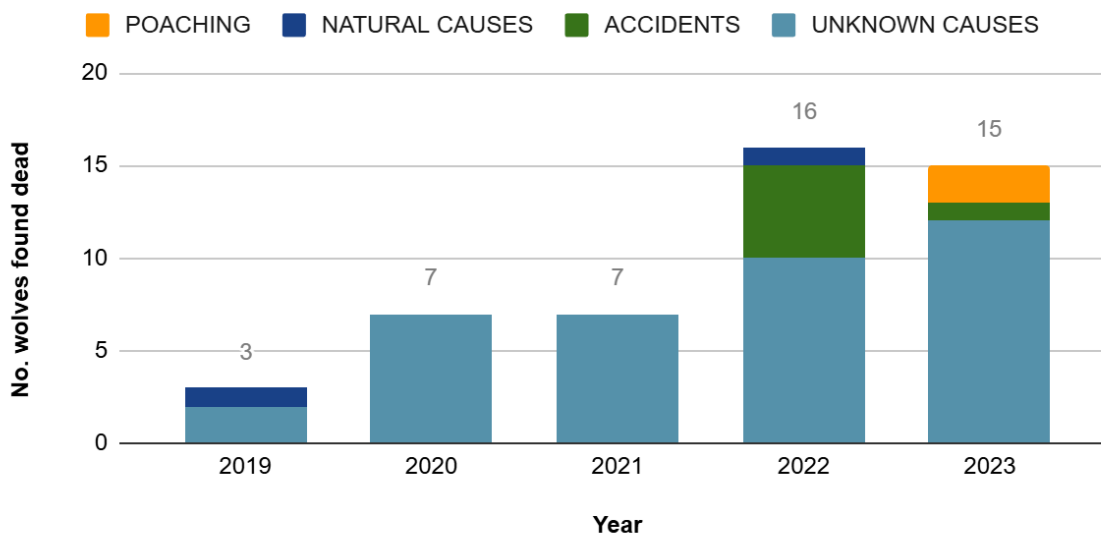
Trentino- Alto Adige/Südtirol

During the period 2019–2023, a total of 48 wolves were found dead, distributed by year as follows:

- n. 3 in 2019;
- n. 7 in 2020;
- n. 7 in 2021;
- n. 16 in 2022;
- n. 15 in 2023.

Trentino-Alto Adige/Südtirol: wolves found dead between 2019 and 2023

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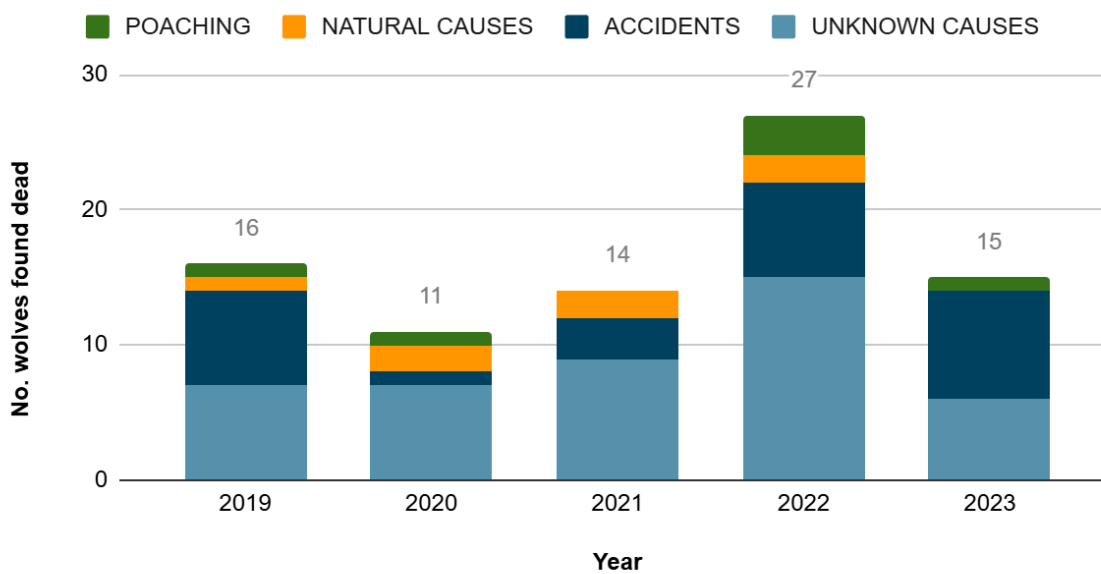
Umbria

During the period 2019–2023, a total of 83 wolves were found dead, distributed by year as follows:

- n. 15 in 2019;
- n. 11 in 2020;
- n. 14 in 2021;
- n. 27 in 2022;
- n. 15 in 2023.

Umbria: wolves found dead between 2019 and 2023

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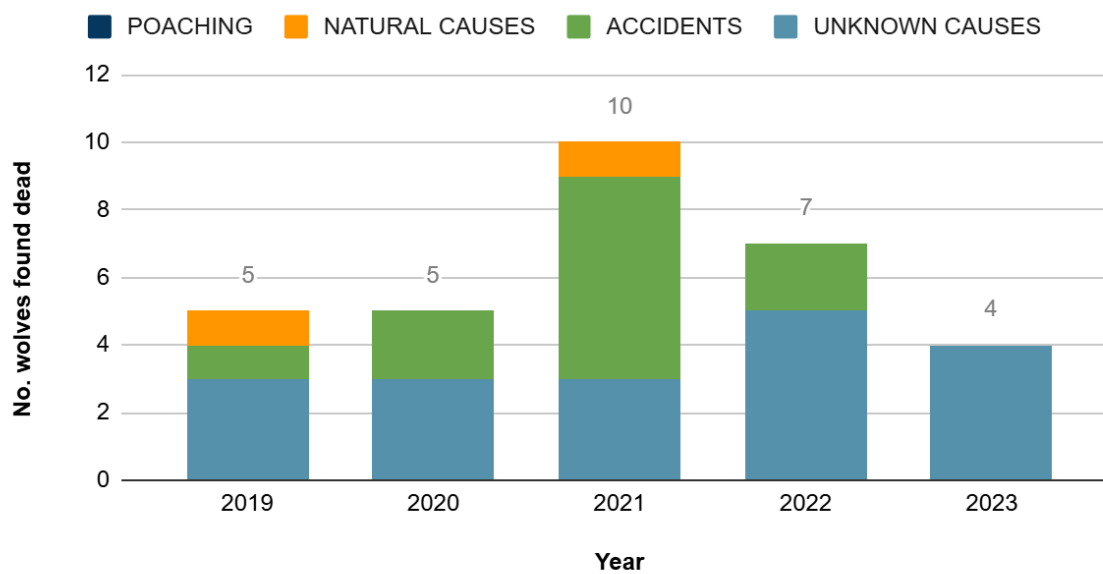
Aosta Valley

During the period 2019–2023, a total of 31 wolves were found dead, distributed by year as follows:

- n. 5 in 2019;
- n. 5 in 2020;
- n. 10 in 2021;
- n. 7 in 2022;
- n. 4 in 2023.

Aosta Valley: wolves found dead between 2019 and 2023

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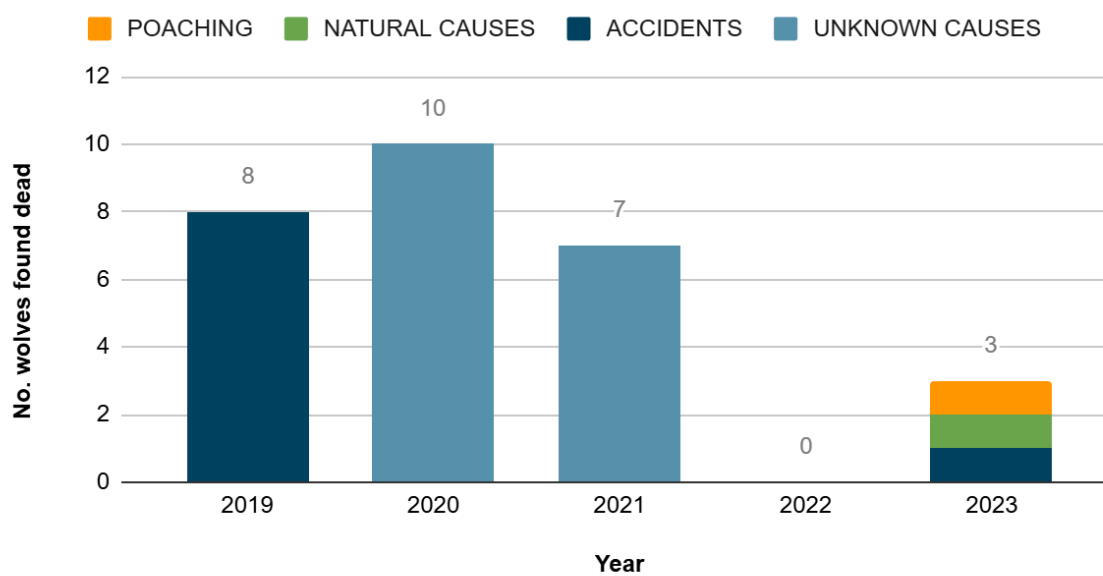
Veneto

During the period 2019–2023, a total of 28 wolves were found dead, distributed by year as follows:

- n. 8 in 2019;
- n. 10 in 2020;
- n. 7 in 2021;
- n. 0 in 2022;
- n. 3 in 2023.

Veneto: wolves found dead between 2019 and 2023

Wolf mortality in Italy in the period 2019-2023 - edited by Io non ho paura del lupo APS

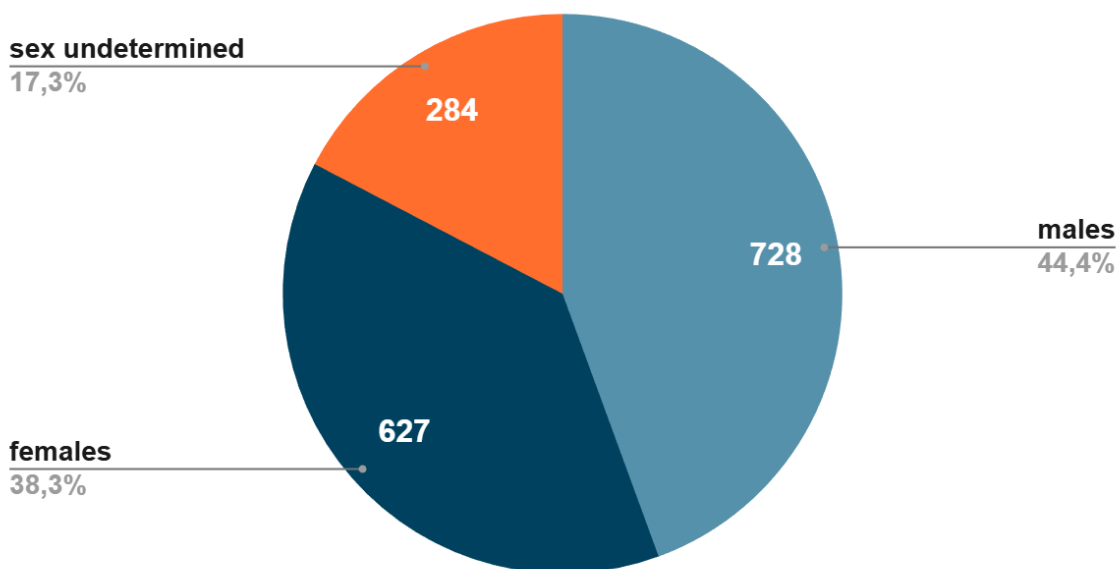


3.3 Sex of individuals found

Below is the total number of specimens found dead, broken down by sex (male, female, unidentified sex). It should be noted that sex data were not recorded/missing in **32.95%** of the records.

Sex of individuals found dead in the period 2019–20233

Wolf mortality in Italy in the period 2019-2023 - edited by Io non ho paura del lupo APS



This graph also includes data on the breakdown by males, females, and individuals of undetermined sex provided by the Piedmont Region on the total number of deaths during the period. This breakdown is not available by year, therefore in the graph on page 77 "*Wolves killed by gender, broken down by year and cause of death,*" the data for Piedmont are all counted as individuals of undetermined sex.

In total, during the reference period, **1,639 wolves** were found dead, of which: **728 males; 627 females; 284 sex undetermined.**

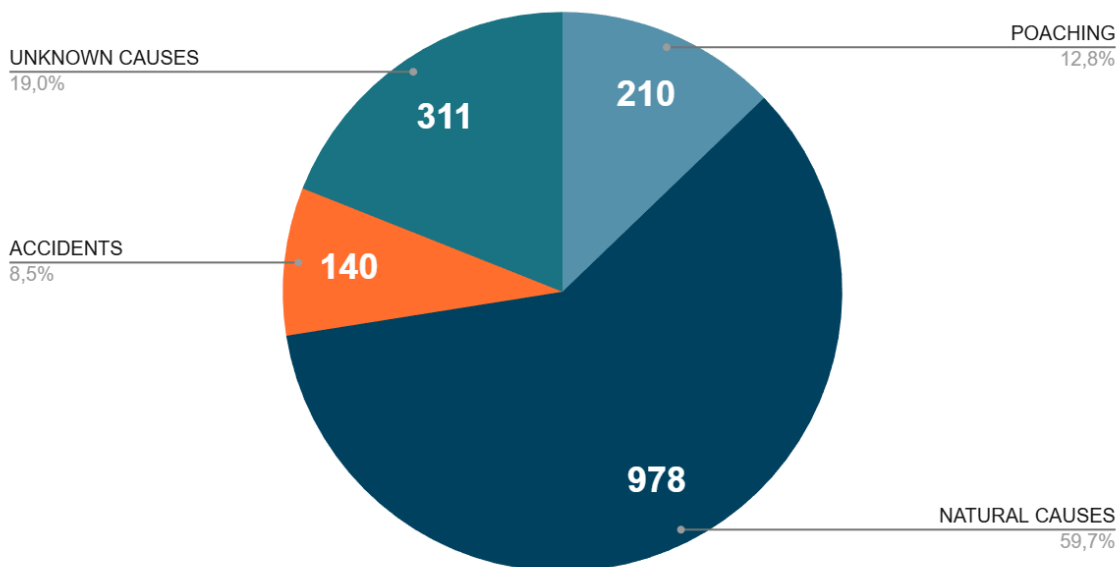
Within the total number of wolves found dead, the proportion represented by males is slightly higher, though not apparently significantly, than that represented by females, while individuals with unidentified sex account for approximately one third of the total.

3.4 Identified causes of death

Below is the breakdown of the total number of specimens found dead, divided by cause: accidents (no. 978 specimens), poaching (no. 210 specimens), natural causes (no. 140 specimens) and unknown causes (no. 311 specimens).

Causes of death identified in the period 2019–2023

Wolf mortality in Italy in the period 2019-2023 - edited by Io non ho paura del lupo APS



This graph also includes the percentages of causes of death reported by the Piedmont Region, calculated on the total number of individuals who died during the period, which were not reported in the corresponding graph in section 3.2 because they were not specified on an annual basis.

Below is a more detailed breakdown within each category of death:

- **Poaching** (by poison, trap, snare, firearm, poaching without specified method, specimens rescued and survived poaching attempts, specimens victim of poaching but not dying directly from this cause);
- **Natural causes** (disease, conflict with conspecifics or with stray dogs, hunting wounds, other);
- **Accidents** (with vehicle collisions, railway collisions, undetermined vehicle or railway collisions, undetermined traumas);
- **Unknown causes** (undeterminable cause, unspecified cause, GPS signal interrupted and never recovered).

The following table and graph show the percentages, on a regional basis, of individual causes of death.

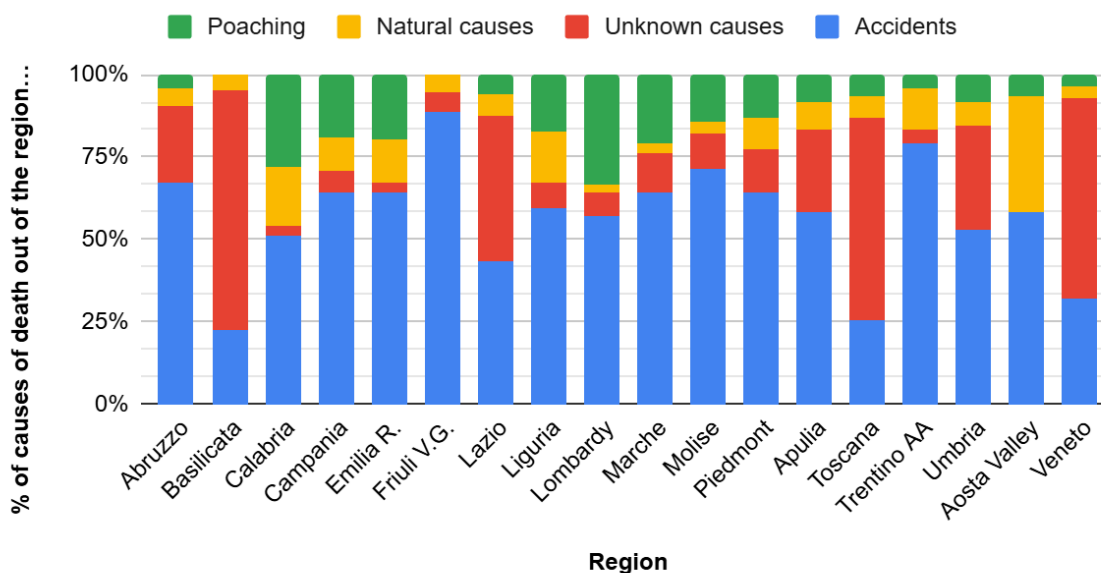
Table 2 Percentage breakdown of causes of death by region in the period 2019-2023

Regione	Poaching	Natural causes	Unknown causes	Accidents
Abruzzo	4,04%	5,51%	23,18%	67,27%
Basilicata	0%	4,55%	72,73%	22,72%
Calabria	28,20%	17,94%	2,56%	51,28%
Campania	19,36%	9,67%	6,46%	64,51%
Emilia R.	19,92%	12,78%	3,20%	64,28%
Friuli V.G.	0%	5,56%	5,56%	88,88%

Lazio	6,15%	6,15%	44,63%	43,07%
Liguria	17,30%	15,38%	7,69%	59,61%
Lombardy	33,33%	2,39%	7,15%	57,14%
Marche	20,80%	2,89%	12,15%	64,16%
Molise	14,28%	3,57%	10,73%	71,42%
Piedmont	13,21%	9,28%	13,57%	63,92%
Apulia	8,34%	8,33%	25%	58,33%
Tuscany	6,44%	6,42%	61,46%	25,68%
Trentino AA	4,16%	12,50%	4,18%	79,16%
Umbria	8,43%	7,22%	31,32%	53,01%
Aosta Valley	6,46%	35,49%	0%	58,06%
Veneto	3,57%	3,57%	60,72%	32,14%

Percentage distribution of causes of death on a regional scale

Wolf mortality in Italy in the period 2019-2023 - edited by Io non ho paura del lupo APS

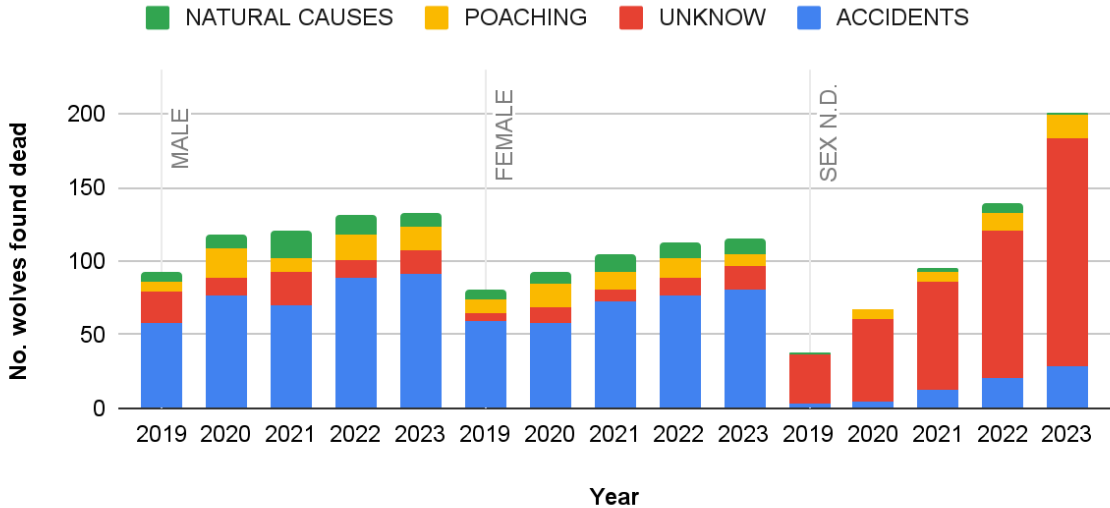


The table and graph **highlight marked differences in the percentages of the various causes of mortality**. In some regions (Friuli and Basilicata), the percentage of individuals who died due to poaching is zero, while in others (Lombardy and Calabria) it is around 30%. It should be noted that in some regions (Emilia-Romagna and Calabria) the percentage of individuals killed by undetermined causes is very low (less than 4%), a figure that could reflect particularly effective procedures in the management of carcasses, from the moment of their discovery to the performance of diagnostic tests.

The following table shows the breakdown of the number of specimens **found dead by gender (male, female, sex undetermined), by year and by cause of death**.

Wolves found dead by gender, broken down by year and cause of death

Wolf mortality in Italy in the period 2019-2023 - edited by Io non ho paura del lupo APS



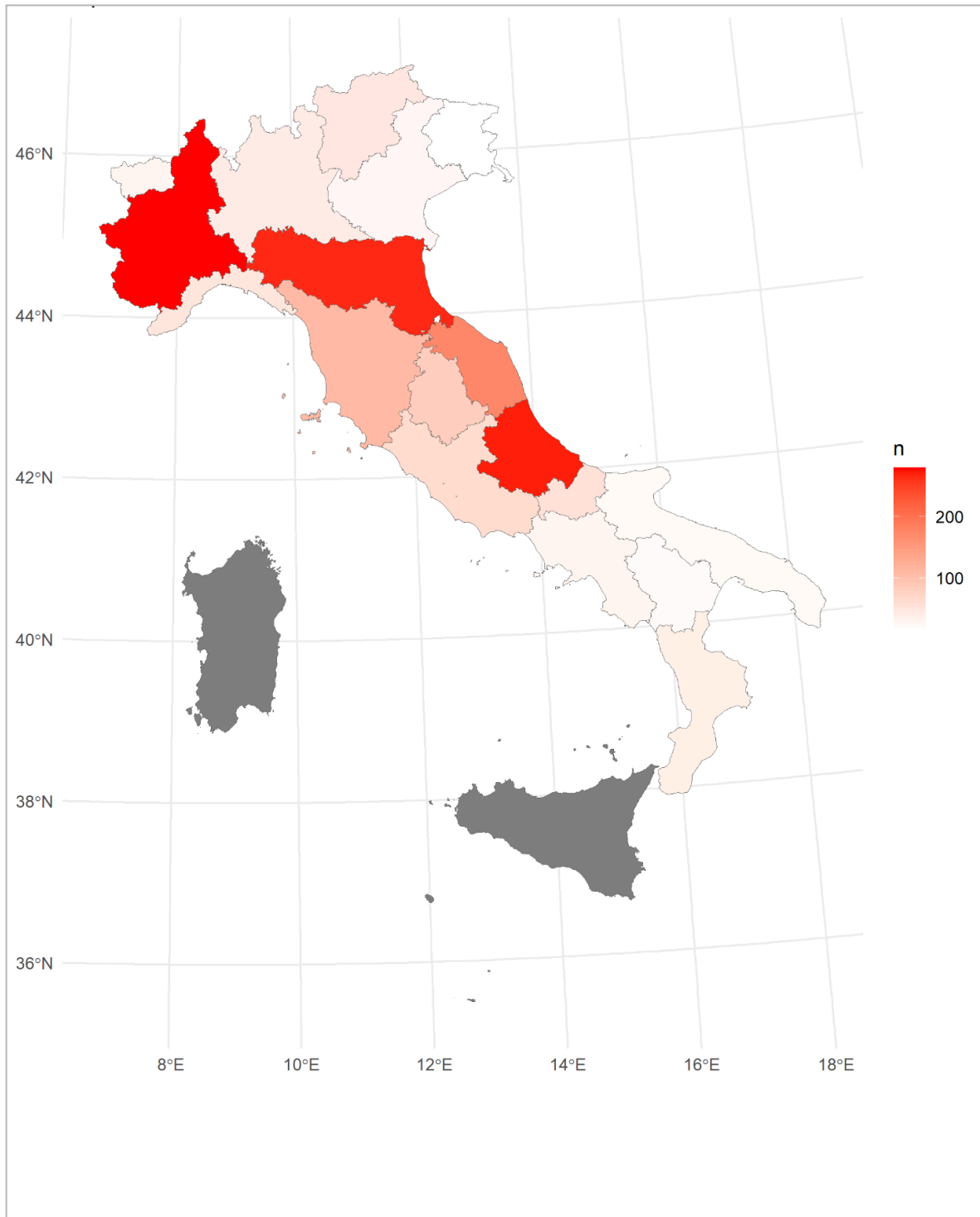
The graph, which analyzes the distribution of individuals between males, females, and those of undetermined sex, broken down by year and cause of death, **shows similar proportions over the years between the number of males and females with respect to causes of death.** For individuals of undetermined sex, on the other hand, there is an ever-increasing rise in those who died from undetermined causes, highlighting the lack of an autopsy at the conclusion of the procedure for handling the findings.

4. In-depth analyses

4.1 Focus on regions/areas with a higher number of dead wolf discoveries

Analysis of the data collected clearly shows that the number of wolves found dead in the period 2019-2023 varies significantly between different Italian regions. Some areas, in particular, stand out for their significantly higher numbers: **Piedmont (280 specimens), Abruzzo (272), and Emilia-Romagna (266)** are, in fact, the regions with the highest number of recorded cases. Alongside these, three other regions also have significant numbers: **Marche (173 specimens), Tuscany (109 specimens) and Umbria (83 specimens)**. In the remaining Italian regions, however, the figures are significantly lower, with fewer than **60 wolves found dead** over the five-year period considered. To interpret these differences correctly, it is also necessary to take into account the different territorial extensions of the regions. For this reason, in the following paragraph, the data will be presented eliminating the effect of surface area.

Regional geographical distribution of wolves killed in the period 2019–2023



4.2 Density of wolves found dead at the regional scale

Considering the territorial surface area of each region, it emerges that the number of wolves found dead in relation to the regional surface area (density) is as follows:

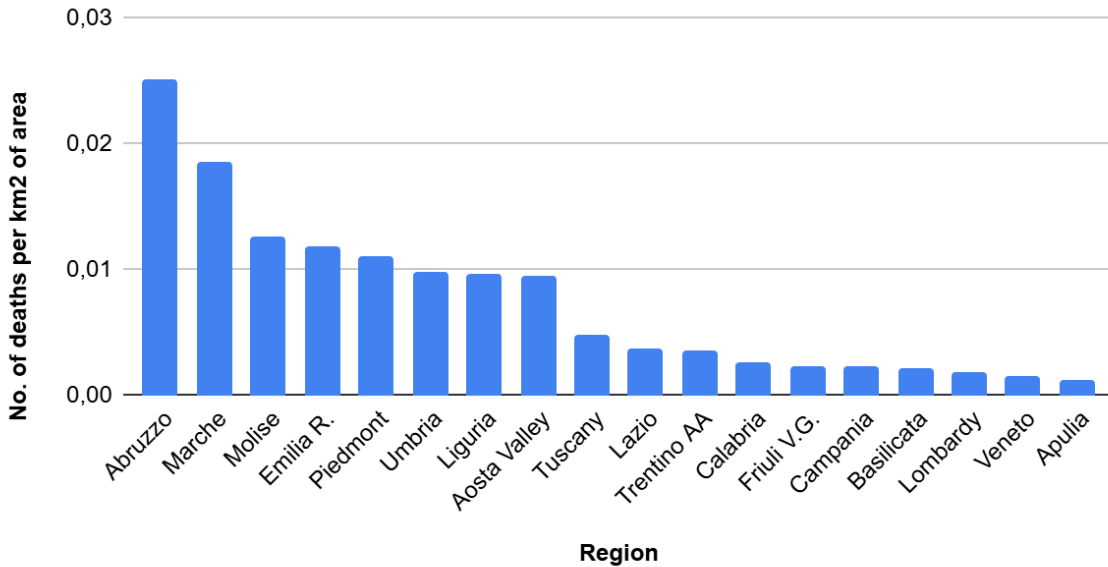
Tab. 2: Number of wolves found dead per unit of regional surface area.

Region	Area in square kilometers	Density of wolves killed in traffic accidents	Density of wolves killed due to poaching	Density of wolves killed by natural causes	Density of dead wolves, causes undetermined	Total density of dead wolves
Abruzzo	10.828,9	0,01690	0,00102	0,00139	0,00582	0,02511
Marche	9.401,4	0,01181	0,00383	0,00053	0,00223	0,01851
Molise	4.460,6	0,00897	0,00179	0,00045	0,00135	0,01255
Emilia R.	22.452,8	0,00762	0,00236	0,00151	0,00036	0,01185
Piedmont	25.387,1	0,00705	0,00146	0,00102	0,00150	0,01102
Umbria	8.464,3	0,00520	0,00083	0,00071	0,00307	0,0098
Liguria	5.416,2	0,00572	0,00166	0,00148	0,00074	0,0096
Aosta Valley	3.260,9	0,00552	0,00061	0,00337	0,00000	0,0095
Tuscany	22.987,0	0,00122	0,00030	0,00030	0,00291	0,00474
Lazio	17.232,3	0,00162	0,00023	0,00023	0,00168	0,00377
Trentino-A.A.	13.605,5	0,00279	0,00015	0,00044	0,00015	0,00352
Calabria	15.221,9	0,00131	0,00072	0,00046	0,00007	0,00256
Friuli-V.G.	7.862,3	0,00204	0,00000	0,00013	0,00013	0,00227
Campania	13.670,90	0,00146	0,00044	0,00022	0,00015	0,00226
Basilicata	10.073,30	0,00050	0,00000	0,00010	0,00159	0,00218
Lombardy	23.863,70	0,00101	0,00059	0,00004	0,00013	0,00176
Veneto	18.407,40	0,00049	0,00005	0,00005	0,00092	0,00152

Apulia	19.540,90	0,00072	0,00010	0,00010	0,00031	0,00122
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Total wolf mortality density on a regional basis

Wolf mortality in Italy in the period 2019-2023 - edited by Io non ho paura del lupo APS



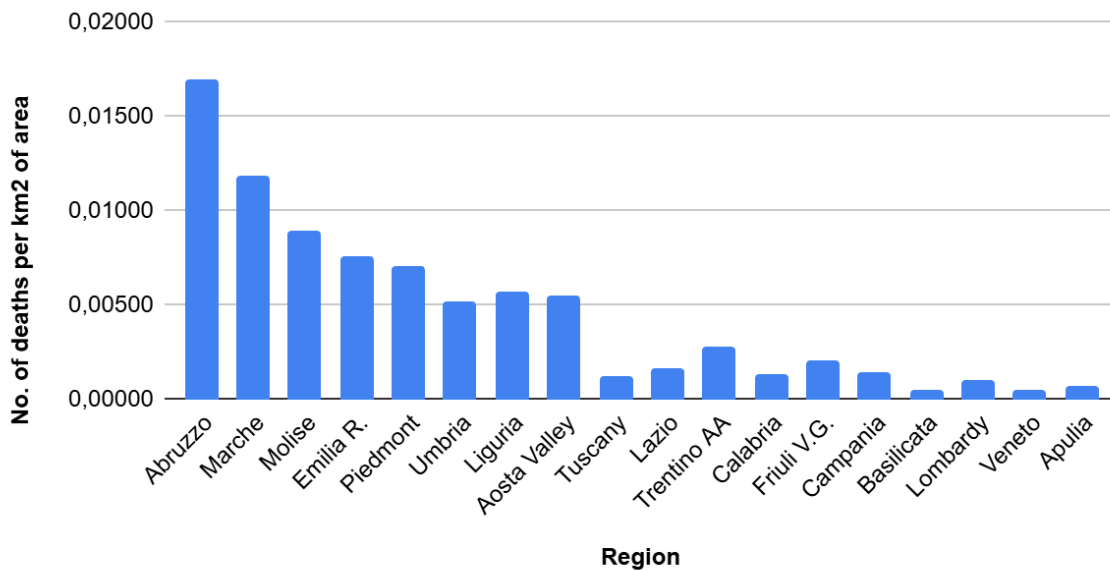
The number of wolves killed in relation to the regional area expresses their density. This parameter, which is not affected by the size of the area, provides an even more realistic picture of the mortality of the species on a regional basis. Comparing the values between different regions, it emerges that **in some regions the density is higher in a relevant manner than in others**. This difference can be explained by several factors, **such as population size, but also the adoption of a more comprehensive and structured data collection methodology**, which allows for more accurate identification, recording,

and cataloging of dead specimens found in the field, ensuring more efficient and effective overall information flow management.

The following table shows **the density of dead wolves on a regional basis, broken down by cause of death.**

Density of wolves killed in traffic accidents on a regional basis

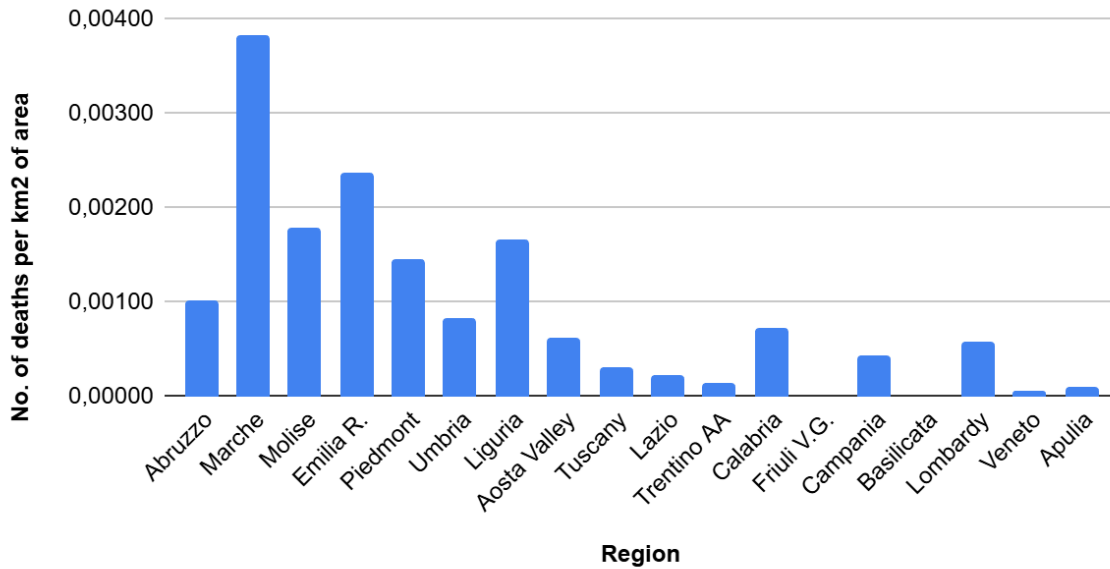
Wolf mortality in Italy in the period 2019-2023 - edited by Io non ho paura del lupo APS



The density of wolves killed in road accidents is proportionally consistent with the density of total wolf deaths. This parameter therefore also confirms that road accidents are, in general, **the leading cause of death for this species in our country.**

Density of wolves killed by poaching on a regional basis

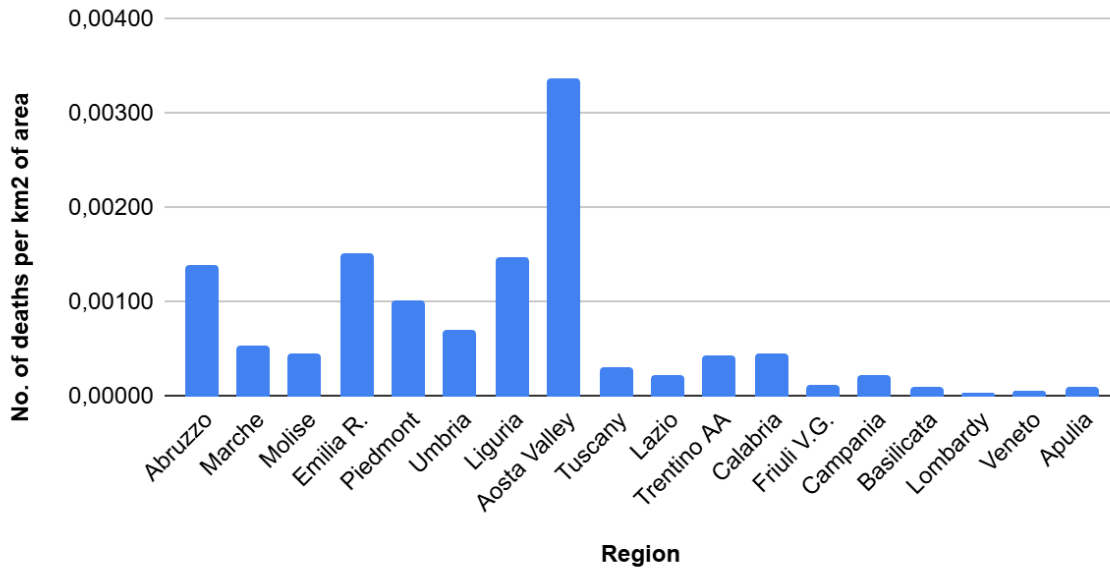
Wolf mortality in Italy in the period 2019-2023 - edited by Io non ho paura del lupo APS



The density of wolves killed by poaching on a regional basis, on the other hand, shows values that are proportionally different from those of the total density of dead wolves. This parameter, therefore, representing this cause of mortality without the effect of surface area, brings to light precisely those situations of particular criticality and severity that need to be thoroughly analyzed and addressed at the local level.

Density of wolves that died of natural causes on a regional basis

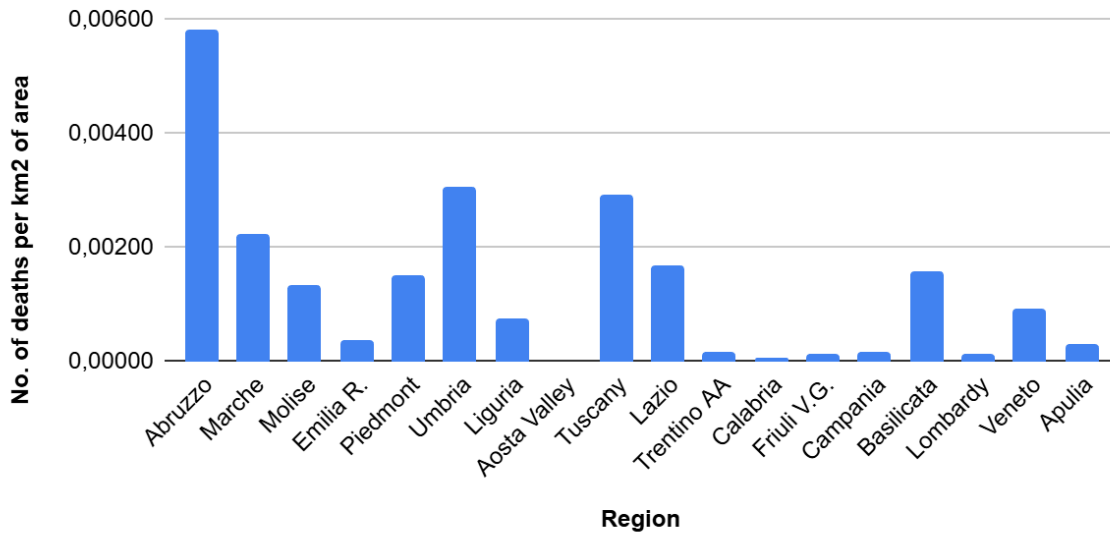
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The density of wolves that died of natural causes on a regional basis also shows values that are proportionally different from those of the total density of dead wolves. The reasons for this could be traced back to differences between numerous factors, such as the area of unpopulated territory and the extent of the road network, as well as the size of the population itself.

Density of wolves killed by undetermined causes on a regional basis

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Finally, **the density of wolves that died from undetermined causes** on a regional basis presents values that correspond proportionally to those of the total density of dead wolves only for some regions, for which it represents the predominant cause, since the discovery of dead specimens is not followed by systematic autopsy examination.

5. Conclusions

5.1 Summary of the main findings

Between 2019 and 2023, **1,639 dead wolves** were found across Italy, with an **annual average of 327.8 specimens**. This is a significant figure, which clearly reflects the scale of the phenomenon. Analysis of the temporal trend also shows an **overall upward trend**, which could reflect, at least in part, a similar increase in the wolf population in Italy. The causes of death recorded can essentially be divided into four macro categories: **indirect anthropogenic causes (59.7%)**, **undetermined causes (19.0%)**, **direct anthropogenic causes (12.8%)** and **natural causes (8.5%)**.

Regarding this specific investigation, paragraph 2.3 provides an in-depth analysis, for each region/autonomous province, of all the data made available by the authorities, with the relative limitations and critical issues. **In summary, it can be said that, overall, almost no authority holds all the available data on the discovery of dead wolves in its territory.** This emerged from the careful comparison, record by record, of the data provided by different authorities, referring to corresponding territories and periods. **This aspect highlights the absence of standard procedures within each individual region and even more so at the national level.**

In general, a comparative analysis of the database reveals the following:

- **Inconsistencies between sources in the methodology used to collect and store the data** associated with each record (date, location, sex, age, weight, cause of death).
- In almost all cases, a comparison between different sources reveals that **the data** held by each of them **is incomplete**.
- In different databases, there are **inconsistencies in the cataloging of individual data** (for the same record, different causes of death or different locations or different sex and age groups are indicated, etc.).

Therefore, at present, it can certainly be said that **Italy does not have a single, standardized, and comprehensive recording and archiving system** for collecting data on the deaths of *Canis lupus*.

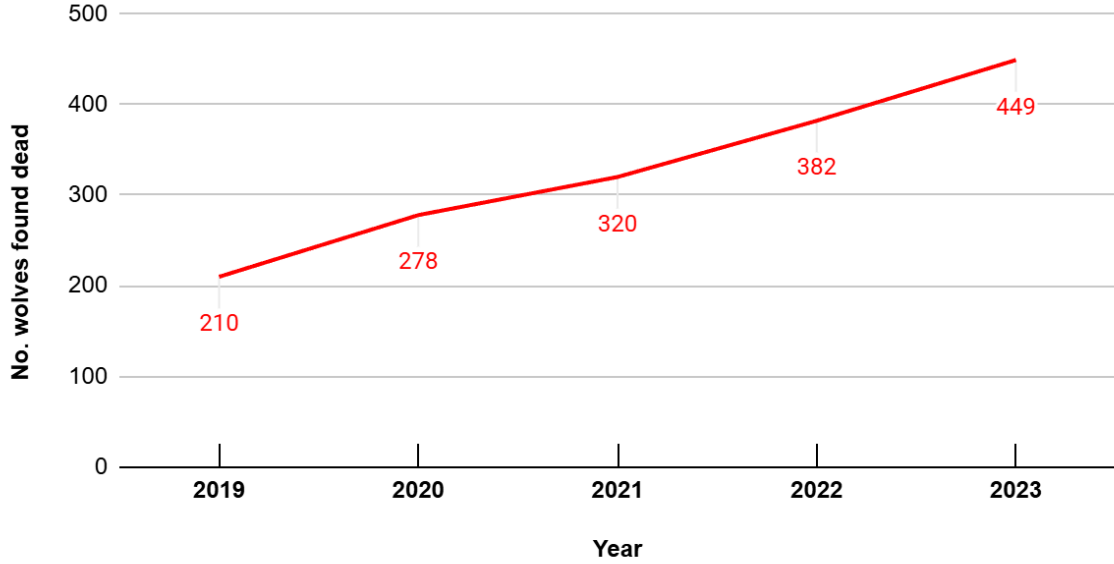
5.2 Temporal trends: increase, decrease, or stability

If we look at the year-on-year trend, the data clearly show that **overall mortality has been on the rise during the period analyzed** (see section 3.1). In particular, the number of wolves found dead rose **from 210 in 2019 to 449 in 2023, an increase of +114% compared to 2019**. However, a more detailed analysis, based on the geographical distribution and breakdown of data for each year and for each region, shows a more complex picture. The increase in mortality **is not uniform across the entire country**: while some regions show a marked increase in line with the general trend, in other areas, especially those characterized by a lower overall number of findings, the figures remain essentially stable over time, without significant variations.

This territorial heterogeneity suggests that **the phenomenon of wolf mortality in Italy is influenced by a variety of factors, including aspects such as population trends and anthropogenic pressure, but also the type and quality of monitoring carried out**.

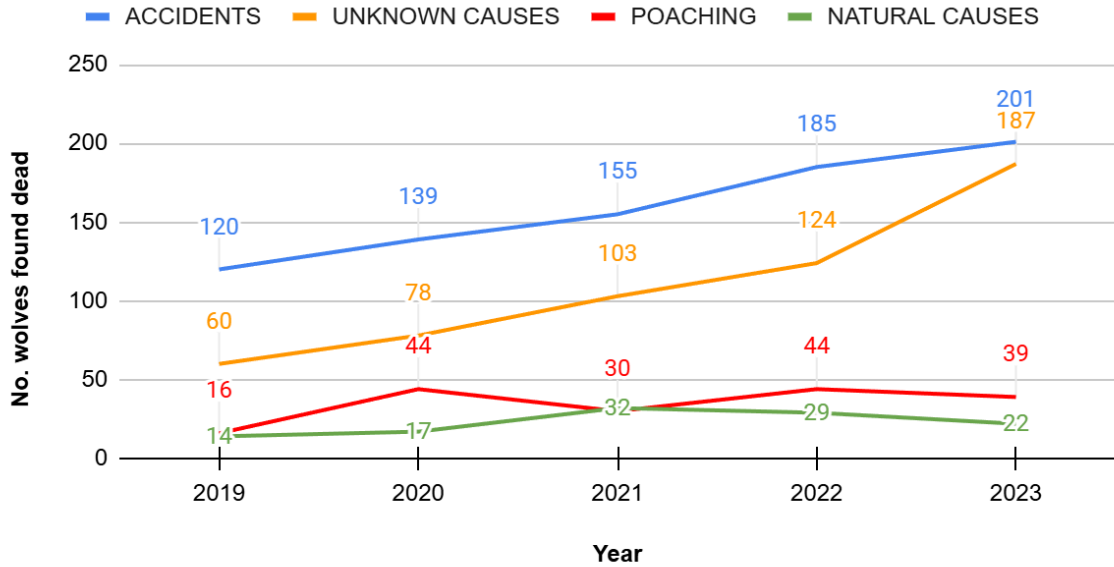
Trend in dead wolves in Italy 2019 - 2023

Wolf mortality in Italy in the period 2019-2023 - edited by lo non ho paura del lupo APS



Trend in wolf mortality causes in Italy 2019-2023

Wolf mortality in Italy in the period 2019-2023 - edited by lo non ho paura del lupo APS



The graph showing trends in the number of wolves killed over the years, broken down by cause, clearly shows a steady increase in those killed by vehicles and from undetermined causes, which is likely to be related to population trends. The number of individuals killed by poaching and natural causes, on the other hand, remains relatively constant over the period considered, highlighting how this type of mortality is extremely difficult to detect without specifically dedicated studies such as telemetry. Poaching is, in fact, a cryptic phenomenon, and natural mortality is difficult to detect as it occurs mostly in areas with little human activity.

5.3 Considerations on wolf mortality in Italy

Taking **2023** as the reference year, the available data indicate the discovery of **449 dead wolves in Italy**, however, it should be noted that this is most likely an underestimate. In fact, data collection has revealed **relevant discrepancies between different Italian regions**: some administrations have developed structured and relatively uniform monitoring systems, while many others show **relevant shortcomings in the recording and transmission of information**.

This fragmentation suggests that **in many territorial contexts the phenomenon is not monitored efficiently and that, therefore, the actual mortality of the species is significantly underrepresented**.

It is important to note, however, that the process leading to the collection of a substantial part of this data (deaths due to poaching and natural causes) is based on the random discovery of carcasses. Although, among the established causes, **roadkill** is an important component of mortality, it is necessary to remember that this data **is certainly an underestimate**, albeit not quantifiable, since animals injured by vehicles can travel considerable distances before dying, often in marginal or difficult-to-access areas, with consequent difficulties in detecting and recording their deaths.

As regards **mortality directly attributable to illegal actions**, in 2023 **at least 39 confirmed cases of poaching or poisoning** were documented. However, international scientific literature highlights that these numbers should be considered minimal (Liberg et al. 2011; Liberg et al. 2020; Sunde et al. 2021; Barber-Meyer et al. 2021; Person et al. 2008; Santiago-Avila et al. 2020). There are many reasons for this, which are inherent in the very nature of the illegal phenomenon: **deliberate concealment of carcasses** by

those responsible, **death of animals in remote or inaccessible areas**, and **difficulty in determining the cause of death with certainty**.

Based on these considerations, **it can reasonably be assumed that the number of wolves killed illegally in 2023 alone is significantly higher than the 39 specimens found** and, therefore, the overall mortality of wolves in Italy for the year 2023 can also be **reasonably considered to be well above the 449 individuals recorded**, with a relevant proportion directly or indirectly attributable to **causes of human origin**.

Similarly, mortality from natural causes, occurring in areas with little human presence or that are difficult to access, could also be significantly underestimated (Liberg et al., 2020; Barber-Meyer et al., 2021). In 2023, the number of individuals found dead from natural causes was 22, but it could be much higher, which also contributes to the underestimation of the overall annual figure.

5.4 Considerations on data collection, monitoring, and management strategies

From the examination of the above paragraphs, a structural criticality clearly emerges: the **lack of a unified procedure at the national level** that clearly and bindingly defines all the phases, from the discovery of carcasses to their analysis, to the recording and transmission of data. Currently, in fact, there is no uniform operating procedure for managing the phases of the process: the collection of carcasses is carried out by the local health authorities, while the analysis is carried out by the regional health authorities.

The data collected is then transmitted to the national health authorities, which are responsible for its processing and dissemination.

Currently, in fact, there is no uniform operating procedure for managing the stages of the process: (I) procedures for reporting discoveries, (II) the delivery of specimens to the relevant zooprophyllactic institutes, (III) the performance of necropsy examinations, and (IV) methods for archiving and centralizing information.

The consequences of this absence are clear: in some regions, the discovery and management of dead wolves is more efficient and better structured, as it has been regulated at the regional level by specific ad hoc provisions, while in others there are no defined and uniform procedures, with a direct impact on the **completeness and reliability of the national dataset**. This imbalance produces an incomplete and inconsistent picture at the national level, compromising the possibility of conducting robust, long-term analyses. It is clear, in fact, that in the territories of the regions that have issued specific procedures, data collection and recording is much more effective and efficient, allowing for the detection of a high number of dead wolves.

Therefore, the priority is to make this data collection process as uniform as possible throughout the country. First of all, it is necessary to encourage the reporting of findings, for example by launching **awareness campaigns aimed at the main users of the territory** (hikers, sports enthusiasts, hunters, fishermen, mushroom pickers, truffle hunters, etc.), in order to ensure that reports are directed to a single, recognized entity for each region, which must therefore be identified by each administration. This phase should be followed by the **prompt recovery of carcasses** and their transfer to the competent local zooprophyllactic institutes.

The time between death and the determination of the causes is, in fact, a critical variable: the longer it is, the less likely it is that the cause of death can be accurately determined. It would also be advisable for **all carcasses found to undergo a complete necropsy**, including

those of animals presumed to have died in road accidents, since the impact with a vehicle may be a secondary event triggered by another primary cause, such as poisoning or gunshot wounds.

Zooprophyllactic Institutes could therefore play a central role in the process, acting as regional hubs for the systematic collection of information, the standardization of diagnostic methodologies, and data storage, as is already the case in some regions that have proceduralized all stages. On behalf of the Ministry of Health, the Experimental Zooprophyllactic Institute of Lazio and Tuscany, with the support of the National Reference Center for Veterinary Forensic Medicine, has developed a portal that allows Zooprophyllactic Institutes to enter data on wolves found dead in their territory of competence and makes the data on findings available to the public starting from 2021 (<https://deadwolftracker.izslt.it/>).

However, for the system to be effective, all the information collected at the peripheral level must subsequently be **centralized and**, above all, **made available for future management policies** that may affect the Italian wolf population, filling important gaps in our knowledge of population dynamics, which are fundamental, especially **in light of recent legislative changes that have modified the level of protection of the wolf in Europe with the aim of facilitating legal culling of the species.**

6. Proposals

6.1 Replication of the national monitoring and establishment of a database

In order to plan management interventions for a species, it is essential to start from knowledge of the size and dynamics of the population. In Italy, between 2018 and 2022, the first **National Wolf Monitoring program** was carried out, coordinated by **ISPRA** on behalf of the **Ministry of Ecological Transition (MiTE)**, with field activities concentrated in the years 2020-2021. This wide-ranging project, which involved thousands of operators in research activities in the field, made it possible for the first time to estimate the abundance and distribution of the species at the national level (La Morgia et al., 2022), (Aragno et al. 2022). The estimated national wolf population was therefore 3,307 individuals (range 2,945-3,608), with 946 (822-1,099) in the Alpine regions and 2,388 (2,020-2,645) in the peninsular regions of Italy. More than four years after the surveys (at the date of publication of this report), there is a clear need to **update the available data**. The recent downgrading of the species under the **Bern Convention** and the **Habitats Directive** makes it essential to ensure that **any culling measures are compatible with maintaining a favorable conservation status**. For this reason, population size is an **essential baseline data point**. As already highlighted in paragraph 5.3, it is also essential to establish a single national database, accessible to the public and

managed by a single entity such as **ISPRA**, which collects information on population size, mortality rates, and related causes.

At the same time, it appears necessary to **improve, modernize, and invest in scientific monitoring**, to make it an increasingly effective and up-to-date tool to support management decisions. It also appears essential to **publish the telemetry data** collected on wolves in projects developed in Italy in recent years and to channel them to a single entity responsible for their collection and analysis.

In fact, although the studies already carried out and currently underway have certainly produced a considerable volume of information, **much of the satellite telemetry data has not yet been published or made accessible**, even though it was sometimes obtained through public funding.

This information is of great scientific and management value and is essential for estimating fundamental demographic parameters with greater accuracy.

6.2 Concrete actions for the prevention of avoidable deaths

As reported in paragraph 3.4.1, **road accidents** are the main cause of wolf mortality in Italy in the period 2019-2023, with an annual average of 327.8 individuals killed. Although this figure is often perceived as **inevitable**, as it is linked to the widespread presence of road infrastructure in the species' range, it is in fact a **highly critical issue**. In addition to the serious risk to the safety of motorists, the sudden and unnatural death of a breeding individual can profoundly destabilize the social structure of the pack, sometimes to the point of causing its disintegration (Cassidy et al. 2023). This can lead, as an indirect consequence, to **a greater propensity for wolves to turn to domestic prey**, which is easier to capture even by individual wolves, thus increasing conflicts with livestock farming activities. **However, these deaths should not be considered as inevitable consequences of anthropization.** Numerous European and international experiences demonstrate the effectiveness of infrastructure dedicated to wildlife passage, such as **ecoducts, green bridges, and underpasses**, in drastically reducing the risk of collisions with vehicles (Ascensão et al. 2021; Huijser et al. 2016; Littlefield et al. 2024; Brennan et al. 2022; Sijtsma et al. 2020; van der Ree et al. 2007). These interventions improve not only road safety but also **biodiversity protection**, considering that the most dangerous road sections for wolves are often also dangerous for other species, particularly ungulates, which account for most of the road accident victims. Analysis of the data also reveals the **significant incidence of poisoning and poaching**, which in the period considered resulted in the death of an average of 34.6 individuals per year. With regard to poisoning, it is necessary to distinguish between **deliberate poisoning**, which is a clear act of poaching, and accidental poisoning, which is often attributable to secondary poisoning resulting from **rat extermination campaigns**. The widespread use of second-generation

anticoagulant rodenticides (ARs) has an impact not only on target species, but on **the entire food chain**: since the action of these substances occurs several days after ingestion, they cause the death of numerous diurnal and nocturnal birds of prey every year, as well as many mesocarnivores (Musto et al. 2024; Cerri et al. 2023; Berny et al. 1997; Elmeros et al. 2018; Oliva-Vidal et al. 2022; Garcês et al. 2023; Carrera et al. 2024). To reduce the extremely negative impact of these products, it would be advisable to favor, especially in rural and peri-urban areas, the use of **mechanical capture methods**, now available in technologically advanced and effective versions, such as multiple-capture electronic traps. Finally, to effectively combat the phenomenon of poaching, which **remains a hidden and widely underestimated phenomenon** (par. 5.3), **it is essential to work on the social acceptance of the presence of the wolf by all categories involved in its coexistence.**

It is not enough, in fact, to address only farmers and livestock operators, who are most exposed to direct damage: it is also necessary to include the hunting community, often perceived as competing with large carnivores for wildlife resources, and users of natural environments, such as hikers, tourists, and local communities who frequent or live in areas where the species is present. In this context, it is essential to **adopt prevention tools that are widely available**, following the example of those regions that have already implemented virtuous practices. These include the free distribution, through loan agreements, of effective protection systems, or the launch of calls for tenders to finance their purchase, which are concrete solutions that reduce the risk of predation and strengthen the **perception of safety among local communities.**

At the same time, only when prevention is guaranteed on a large scale can a system of **rapid, fair, and efficient compensation** for residual damage truly help to mitigate

discontent and curb illegal practices that result in incidents of poaching. Involving the hunting community and users of natural environments in this process is a crucial step: the former because they can become **key players in the sustainable management of wildlife** and the dissemination of good practices of coexistence, the latter because, through correct and conscious behavior, they can **avoid feeding dynamics** and contribute to reinforcing a cultural model of respect and coexistence. Only an integrated approach, which considers **all the** social and economic **actors** linked to the territories where wolves are present, can guarantee the reduction of conflicts and create the conditions for a stable and lasting coexistence.

6.3 Improvement of institutional communication

Coexistence with key species for ecosystem balance, such as large carnivores, is a complex process that requires time, patience, and constant commitment. It is not simply a matter of tolerating their presence, but of achieving **true social acceptance**, a goal that can only be reached through structured work with local communities and all stakeholders. This process is not immediate, as it touches on deep issues related to **risk perception, cultural habits, and the management of economic activities**, particularly livestock and rural activities.

From this perspective, the role of **Public Administrations** becomes central and irreplaceable. They therefore bear a primary social and moral responsibility: on the one hand, to intervene decisively and promptly in the rare cases of truly problematic animals, those individuals that display abnormal and potentially dangerous behavior, representing only a minimal percentage of the overall population; on the other hand, to **promote correct communication**, based on solid scientific data, capable of reassuring the public and disseminating good behavioral practices that make peaceful and lasting coexistence with these species possible.

It should not be forgotten that international scientific literature highlights how almost all attacks on humans recorded in Europe and North America can be traced back to **situations of food conditioning**, whether voluntary or involuntary. Animals that become accustomed to finding food sources near human settlements develop altered behaviors that can degenerate into risky interactions (Carricondo-Sanchez et al., 2020; Linnell et al., 2002; Linnell et al., 2021). The causes of this habituation process are often linked to **incorrect but unfortunately widespread practices**: the presence of improperly disposed **food waste**, the mistaken and dangerous habit of **intentionally**

feeding wild animals, and the inadequate management of **livestock or slaughter waste**. All these factors, if not decisively addressed, contribute to creating situations in which the wolf (as well as other carnivores) loses its natural wariness of humans and becomes progressively more prone to problematic and potentially dangerous behaviors. It is in this context that **information, awareness-raising, and educational actions** aimed at citizens take on fundamental value (Ostermann-Miyashita et al., 2025; Carter et al., 2021; Arbieu et al., 2019; Arbieu et al., 2021; Arbieu et al., 2024; Hansen et al., 2022; Konopka et al., 2025; European Commission: Directorate-General for Environment; Jarý et al., 2019; Marin et al., 2021; Pettersson et al., 2023). The spread of a culture of correct relationships with wildlife must be the cornerstone of any coexistence strategy: only an informed, aware, and responsible population can actively contribute to reducing conflicts and ensuring the protection of large carnivores. **Public Administrations**, in this process, can act as **multipliers of good practices**, also enhancing and supporting initiatives promoted by the third sector. An example is represented by the project “Conoscere il lupo” (“Knowing the Wolf”), promoted by the association Io non ho paura del lupo, which offers free outreach and awareness-raising activities both to citizens and schools. Such initiatives, if integrated into a broader institutional strategy and coordinated at local and national levels, can become **fundamental tools to gradually build a stable coexistence model**, based on knowledge, shared responsibility, and mutual respect between human communities and wildlife.

Appendix Comparisons with previous data or with other European countries

A publication entitled “*Men and wolves: Anthropogenic causes are an important driver of wolf mortality in human-dominated landscapes in Italy*” (Musto et al., 2021) examined in depth the causes of wolf mortality in Italy, with reference to the regions of Tuscany and Emilia-Romagna, in the period between 2005 and 2021. Over these sixteen years, **212 wolf carcasses** were collected and subjected to necropsy, allowing for a detailed picture of the main anthropogenic threats. Of the samples analyzed, **104** individuals were found to have died following vehicle **collisions**, thus representing the predominant cause. Another **45** individuals were victims of **poisoning**, while **24** wolves showed **lesions consistent with gunshot wounds**. Cases of greater cruelty were also documented: **4 animals struck with blunt objects** and **2 individuals hanged**. The temporal analysis of the data showed that, over the period considered, the proportion of illegally killed wolves **did not increase over time**. However, it was observed that most episodes of direct persecution occurred between October and February. An important aspect of the study is that variables commonly considered potential predictive factors—such as the density of sheep farms, the number of livestock depredations, or human population density—**were never associated with the probability of finding illegally killed wolves** at the municipal scale. This shows that the conventional correlates of the human–wolf conflict, combined with a supposedly high proportion of non-retrieved carcasses, fail to predict illegal wolf killings in areas where the species have become ubiquitous. The widespread spatial distribution of illegal killings indicates that persecution probably arises from **multiple kinds of conflicts with humans**, beyond those with husbandry. The authors emphasize that wolf conservation in Italy should thus address cryptic wolf killings with

multi-disciplinary approaches, such as shared national protocols, socio-ecological studies, the support of experts' experience and effective sampling schemes for the detection of carcasses.

Turning to the international context, several studies exist on mortality rates and related causes in different wolf populations. An article published in 1997 entitled "*Population Dynamics of a Recolonizing Wolf Population*" (Pletscher et al., 1997) analyzed recolonization dynamics in Montana and British Columbia after human eradication in the 1930s, from the settlement of a pair that reproduced in 1982 up to the mid-1990s, when the population reached 3–4 reproducing packs. **Annual adult survival was 80% and was higher among resident wolves (84%) compared to dispersers (66%).** Dispersal among radio-collared wolves was 44%, and the population showed an annual growth rate of 20% from 1982 to 1995.

An article published in 2010 entitled "*Meta-Analysis of Relationships between Human Offtake, Total Mortality and Population Dynamics of Gray Wolves (*Canis lupus*)*" (Creel et al., 2010), through a meta-analysis of 21 gray wolf populations in North America, revealed a **strong correlation between human offtake (hunting and trapping) and total mortality rates.** Contrary to common belief, the study found that human-caused mortality added to or even amplified natural mortality, meaning that increased human offtake did not simply replace natural deaths but raised overall mortality. Furthermore, the analysis showed that wolf population growth declined even at relatively low levels of offtake, **suggesting that management policies implemented in that environment may be unsustainable.**

An article published in 2017 entitled “*Poaching regulates the legally hunted wolf population in Finland*” (Suutarinen et al., 2017) illustrates the results of a study carried out in Finland using telemetry to determine the poaching rate, analyzing the factors influencing wolf population size between 1998 and 2016. These fluctuations could not be explained solely by legal harvests and other known causes of mortality. Data from **130 radio-collared wolves** showed that **91 died during the study, 97% of them from anthropogenic causes (52 illegal killings, 29 legal culls, 4 road accidents)**. Thus, **poaching** was the **primary cause of death**, followed by legal hunting. Over the years, the poaching rate varied from as low as 9–13% to as high as 31–43%.

An article published in 2011 entitled “*Shoot, shovel and shut up: Cryptic poaching slows restoration of a large carnivore in Europe*” (Liberg et al., 2011) monitored 104 wolves between December 1998 and April 2009 in Scandinavia, representing 10–15% of the population. Using a hierarchical state-space model combined with multiple data sources, it was possible to obtain rigorous estimates of poaching compared to other mortality causes, showing that **poaching accounted for about half of total mortality, and that more than two-thirds of total poaching was not detected by conventional methods.**

An article published in 2020 entitled “*Poaching-related disappearance rate of wolves in Sweden was positively related to population size and negatively to legal culling*” (Liberg et al., 2020) used monitoring and population research data to analyze the rate and risk of unexplained disappearance of territory-holding wolf pairs (n = 444) in Sweden between 2000/01 and 2016/17. Known deaths included **legal killings** (n = 103), **natural causes** (n = 23), **road accidents** (n = 8), and verified **poaching** (n = 20), but most wolves (n =

189) disappeared **without a known cause**. Careful evaluation of alternative explanations confirmed the hypothesis that **poaching was the most likely reason for most of these disappearances**.

An article published in 2021 entitled “*Where have all the young wolves gone? Traffic and cryptic mortality create a wolf population sink in Denmark and northernmost Germany*” (Sunde et al., 2021) analyzed mortality and disappearance rates of 35 wolves through genetic monitoring in intensively cultivated and densely populated areas. Of the monitored individuals, **3 dispersed to other areas, 9 died** (7 from road accidents, 1 from disease, 1 killed illegally), and **14 disappeared**. The study concluded that the primary cause of death was cryptic mortality, most likely due to **illegal killings**, representing an unsustainable pressure on the population under investigation.

An article published in 2008 entitled “*Correlates of Mortality in an Exploited Wolf Population*” (Person et al., 2008), covering the periods 1993–1995 and 1999–2004, investigated the influence of habitat use on the risk of death by legal harvest and trapping in 55 radio-collared wolves belonging to a controlled population in Alaska. During the study, of the **55 wolves monitored, 39 died: 18 were legally harvested, 16 were illegally killed, and 5 died from natural causes**. Legal harvest and poaching accounted for 87% of the mortality of radio-collared wolves.

A study published in 2021 entitled “*The importance of wilderness to wolf (*Canis lupus*) survival and cause-specific mortality over 50 years*” (Barber-Meyer et al., 2021) evaluated the survival of **756 radio-collared wolves** between 1968 and 2018 in Minnesota. Over the 50-year period, mortality was recorded in 261 individuals, divided as follows: **102 wolves died of natural causes** (51 from intraspecific conflict, 41 from

malnutrition/disease, 6 from undetermined natural causes, and 4 from other natural causes); **111 from anthropogenic causes** (67 from illegal killings, 17 from road accidents, 14 from legal harvests, 8 from other anthropogenic causes, and 5 from unknown anthropogenic causes); and **48 from unknown causes**.

An article published in 2020 entitled “*Liberalizing the killing of endangered wolves was associated with more disappearances of collared individuals in Wisconsin, USA*” (Santiago-Ávila et al., 2020) analyzed the effect of lethal control policies on poaching between 1979 and 2012, examining data from 486 radio-collared wolves plus 27 additional individuals immigrating from Michigan, where they had been collared. Of the total 513 wolves, 242 were recovered dead. Data analysis showed that during periods of liberalized culling, there was a 24% decrease in poaching events but an 11–34% increase in the number of wolves that disappeared.

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