

Systematic monitoring: Gray wolf autopsy findings since the species' comeback to Germany

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Examination of a dead wolf at the Leibniz-IZW pathology unit. Credit: Marielle van Uitert

At the turn of the millennium, gray wolves returned to Germany after

150 years and subsequently established territories in many parts of the country. But coexistence harbors challenges—for both humans and animals. Since 2006, almost all gray wolves found dead in Germany have been examined at the Leibniz Institute for Zoo and Wildlife Research (Leibniz-IZW) in order to assess their health status and determine the cause(s) of death.

Recently, the 1000th wolf lay on the dissecting table at the Leibniz-IZW. The female animal died as a result of a road accident—by far the most common unnatural cause of death for [gray wolves](#) in Germany. The case speaks volumes about the successful but challenging return of gray wolves.

After gray wolves returned to Germany shortly after the turn of the millennium, the Leibniz-IZW began analyzing the health status and causes of death of the wolves. For almost 20 years, every gray wolf found dead in Germany underwent this "dead wolf monitoring" in order to assess the health status of the established population and the causes of death.

Initially, only a few animals were found, but now a three-digit number of wolves end up on the dissection table of the wildlife pathology unit at the Leibniz-IZW every year. There are now so many that only every second wolf that dies in road traffic accidents can be examined. The latest case, a pregnant female wolf that died in a road traffic accident, brings the total to 1000 since the program began.

"These figures alone show that the return of the gray wolves is a success story from an ecological perspective," says Prof Dr. Heribert Hofer, Director of the Leibniz-IZW. "The many dead wolves found in various parts of Germany demonstrate that wolf territories have been established in many places."

The examinations also show that the population is healthy. The female wolf, which was the 1000th case to arrive at the Leibniz-IZW, was pregnant with six cubs, which symbolizes the successful reproduction of the carnivores, says Hofer.

The female wolf died as a result of a road accident. "This is by far the most common cause of death. Our data show that around three quarters of dead wolves we dissect die in traffic collisions, mostly with cars on rural roads or motorways," says Dr. Claudia Szentiks, pathologist in charge of the wolf project at the Leibniz-IZW.

Gray wolves live in large territories that are criss-crossed by numerous roads and railway lines in the German landscape, which the animals have to cross almost daily. Young wolves that disperse from their parent pack in search of their own territory and move through areas unknown to them are particularly frequently killed by vehicles.

"In addition to road deaths, we also repeatedly find other anthropogenic causes of death," says Szentiks. According to the veterinary pathologist, around one in ten dead animals brought in has been illegally shot. "In fact, we even find evidence of a criminal offense such as illegal shooting in 13.5% of all wolves examined, so the animals do not always die as a consequence of the shots being fired at them."

The figures from the recorded illegal killings of wolves show that they have always been hunted in secret since their return 25 years ago, says Hofer. However, a look into the distant past—before the wolves disappeared in Germany—does not show how coexistence can be organized and how it can succeed.

"We have to learn how to deal with the conflicts as there was no tried and tested recipe for this in the past either, as the systematic eradication of the wolf population by the middle of the 19th century shows. We

really need an approach that takes the interests of all parties into account in order to find a solution that is sustainable for all sides in the long run," Hofer explains.

Natural causes of death of wolves, which are being investigated at the Leibniz-IZW, are far less frequent than causes of death attributable to human activity. The natural causes of death include fights with other wolves in a good third of cases, gastrointestinal ruptures (caused by sharp bone fragments in the diet), emaciation often linked to mange mite infections, but also infections with the distemper virus, the parvovirus or adenoviruses as well as individual cases of *Yersinia*, *Listeria* and red leg syndrome infections.

Co-infections of different pathogens are also often detected. However, pathogens such as Aujeszky's disease and rabies have not been detected. Germany is considered rabies-free since 2008. In individual cases, gray wolves also died from injuries inflicted by potential prey such as wild boar.

The dead, pregnant female wolf provided a further insight: In her stomach, the team found a pregnant nutria (*Myocastor coypus*), a rodent species from South America which is invasive in central Europe. This shows that the wolves have a certain flexibility with regard to their diet and may also affect populations of invasive species.

However, by far the most common food is native roe deer, wild boar, red deer and fallow deer, which make up over 90% of their prey, as diet analyses at the Senckenberg Museum für Naturkunde Görlitz (SMNG) have shown. At the SMNG, the feeding habits of wolves are researched using fecal analyses and the examination of prey remains, and the age of wolves is determined using skull traits.

"However, the diet of German gray wolves also includes livestock,

primarily domestic sheep and domestic goats," says Hofer.

"Even if these are exceptional cases, accounting for a mere 1.6% of the diet, the conflict with livestock grazing is real and practical solutions must be found. At the Leibniz-IZW, we have learned in other contexts, for example, in the conflict between cheetahs and cattle farmers in Namibia, how important an integrative, collaborative approach is to find solutions.

"Based on [scientific data](#) and findings, it was possible in Namibia to develop a common perspective on the predator-livestock conflict with all the parties involved and to take all interests into account. This must also be the way forward here in Germany with the gray wolf."

The Leibniz-IZW is responsible for analyzing the [health status](#) and the causes of death of gray wolves found dead and provides information on the possible occurrence of relevant diseases such as rabies, mange or distemper. If wolves have been illegally killed, the Leibniz-IZW forwards forensic data to the police and the public prosecutor's offices; the responsible authorities in each federal state are responsible for providing the public with information on the causes of death.

"Ideally, the animals are delivered to the Leibniz-IZW fresh and not frozen. The first step is to scan the wolf with our research computer tomograph in order to obtain non-invasive and precise information about possible injuries or alien objects in their bodies. Forensic evidence is then secured, including photo documentation and measurements of the carcass," explains Szentiks.

During the subsequent necropsy, samples are taken for further analyses in histology and microbiology. Once the necropsy has been completed, the initial findings are sent to the responsible authority in the federal state where the wolf was found. After necropsy, the wolf carcasses are

returned to the relevant state for further research or educational purposes.

Since 2016, the Leibniz-IZW has been monitoring dead animals as part of the "Federal Documentation and Consultation Center on Wolves (DBBW)" project. In addition to the Leibniz-IZW, the closely cooperating scientific consortium of the DBBW includes the SMNG, the LUPUS Institute for Wolf Monitoring and Research in Germany and the Conservation Genetics Group at the Senckenberg Research Institute and Natural History Museum at the Research Station Gelnhausen, which acts as a reference center for wolf genetics.

A genetic sample from each dead wolf is examined by the Conservation Genetics Group in order to clarify the identity and origin of the animal. The LUPUS Institute advises the federal and the state nature conservation authorities on all wolf-related issues and compiles the monitoring data of the states at the national level. The SMNG coordinates the cooperation of the DBBW and carries out fecal and stomach content examinations for food analysis as well as craniological examinations (skull analyses) of dead wolves.

More information: The results of the dead wolf and genetic analyses are published on the DBBW website (<https://www.dbb-wolf.de/wolf-occurrence/dead-wolf-finds>) and in the annual status reports on gray wolves in Germany (<https://www.dbb-wolf.de/more/literature-download>—only in German).

Provided by Leibniz Institute for Zoo and Wildlife Research (IZW)

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