

What we learn from the dead: post-mortem wolf research and monitoring in Germany



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AN DER FORSCHUNGSVERBUND BERLIN E.V.

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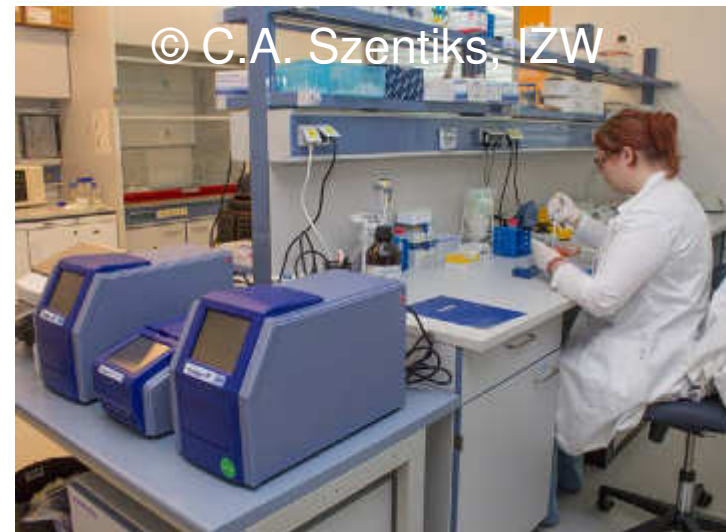
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Mission of the IZW

To understand and –where appropriate –improve the adaptability of wildlife to (anthropogenic) global change

- **Understand:** Interdisciplinary research on evolutionary adaptations of wildlife and its limits, particularly diseases, and the relationship between wildlife and its habitat and environment
- **Improve:** contribute to the scientific basis of biological conservation in order to assist the protection of threatened wildlife



Research on wolf health & causes of death

- ❖ Initiated a research & monitoring programme on health of German wolves
- ❖ *Post mortem* investigations since 1999
- ❖ Collect evidence for forensic investigation
- ❖ Wide range of diagnostic methods
- ❖ Programme combines both invasive and non-invasive methods
 - computed tomography
 - necropsy
 - histology
 - parasitology
 - virology
 - bacteriology
 - electron microscopy
 - toxicology
 - stable isotope ecology
 - morphology



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Health monitoring of wolves: aims

→ Cause of death

- ❖ Car accidents
- ❖ Natural causes
- ❖ Illegal killing





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Health monitoring of wolves: aims

→ Cause of death

- ❖ Car accidents
- ❖ Natural causes
- ❖ Illegal killing

→ assessment of health and condition

- ❖ Body condition, nutritional state
- ❖ Infectious diseases (viruses, bacteria...)
- ❖ Parasite load
- ❖ Environmental pollutants





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Health monitoring of wolves: aims

→ Cause of death

- ❖ Car accidents
- ❖ Natural causes
- ❖ Illegal killing

→ Stable isotope analysis

- ❖ Geographical origin
- ❖ Diet over a longer period

→ assessment of health and condition

- ❖ Body condition, nutritional state
- ❖ Infectious diseases (viruses, bacteria...)
- ❖ Parasite load
- ❖ Environmental pollutants



Health monitoring of wolves: aims

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- ❖ Parasite load
- ❖ Environmental pollutants

→ stable isotope analysis

- ❖ Geographical origin
- ❖ Diet over a longer period

→ development of diagnostics

- ❖ Fast morphological separation of wolves from domestic dogs



Health monitoring of wolves: Process

→ 1. Delivery of / collecting wolf bodies

❖ From freshly dead to rotten to bones and bits of skeleton





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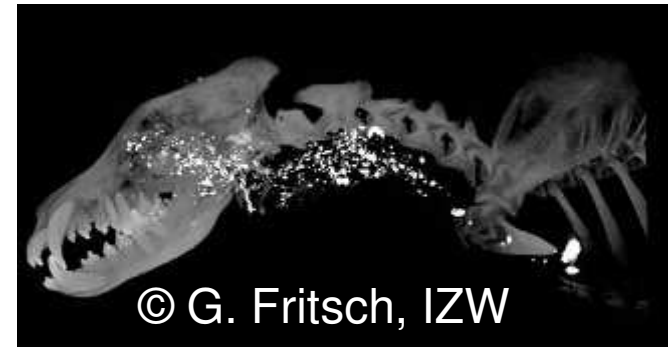
Health monitoring of wolves: Process

→ 1. Delivery of / collecting wolf bodies

- ❖ From freshly dead to rotten to bones and bits of skeleton

→ 2. Computed tomography

- ❖ First assessment
- ❖ Location of bullet (fragments)
- ❖ Fractures
- ❖ Unusual soft tissue presentation
- ❖ Bone density





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Health monitoring of wolves: Process

→ 3. Necropsy / dissection

- ❖ Identity: sex, age (category), body measurements, body mass





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Health monitoring of wolves: Process

→ 3. Necropsy / dissection

- ❖ External examination
- ❖ Documentation and collection of forensic evidence and traces
 - fibres
 - car paint particles
 - entry points of bullets
 - DNA



Health monitoring of wolves: Process

→ 3. Necropsy / dissection

❖ Collection (and identification) of ecto-parasites



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♂ *Dermacentor
reticulatus*

♀ *Ixodes ricinus*

♂ *Chaetopsylla
trichosa*

*Lipoptena
cervi*

Health monitoring of wolves: Process

→ 3. Necropsy / dissection

- ❖ Dissection
- ❖ Internal examination
- ❖ Extraction of organs
- ❖ diagnostics
- ❖ Extraction & collection of projectiles
- ❖ Extraction of samples

shot pellets



bullet



Health monitoring of wolves: Process

→ 4. Lab processing

- ❖ histology
- ❖ bacteriology
- ❖ virology
- ❖ parasitology
- ❖ toxicology
- ❖ electron microscopy
- ❖ stable isotope analysis

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Health monitoring of wolves: Process

→ 4. Lab processing

❖ Infectious disease diagnostics

- Parvovirus
- Coronavirus
- Canine Distemper Virus
- Canines Adenovirus-1 (HCC)
- Rabies Virus
- Pseudorabies Virus (AK)
- Polyomaviruses
- Herpesviruses
- *Brucella*
- *Francisella tularensis*
- *Leptospira*
- Intestinal parasites
- *Trichinella*
- *Dirofilaria*



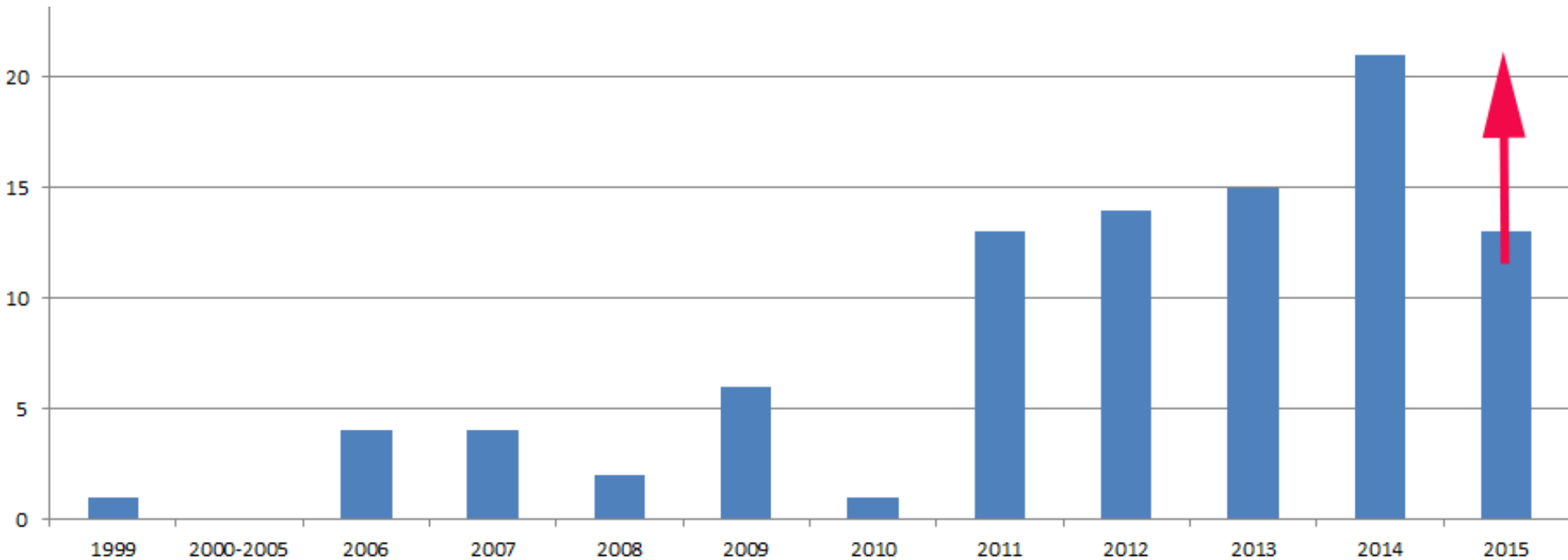


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Health monitoring of wolves: Results

❖ Currently **103** dead wolves





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Health monitoring of wolves: Results

→ Causes of death: traffic accidents



area of lost skin
due to traffic
accident

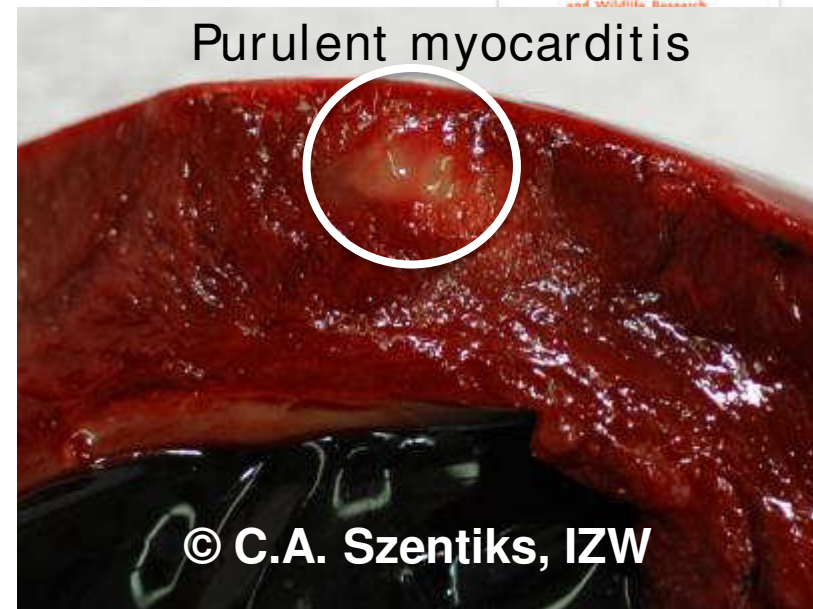
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Health monitoring of wolves:

→ Causes of death: natural causes

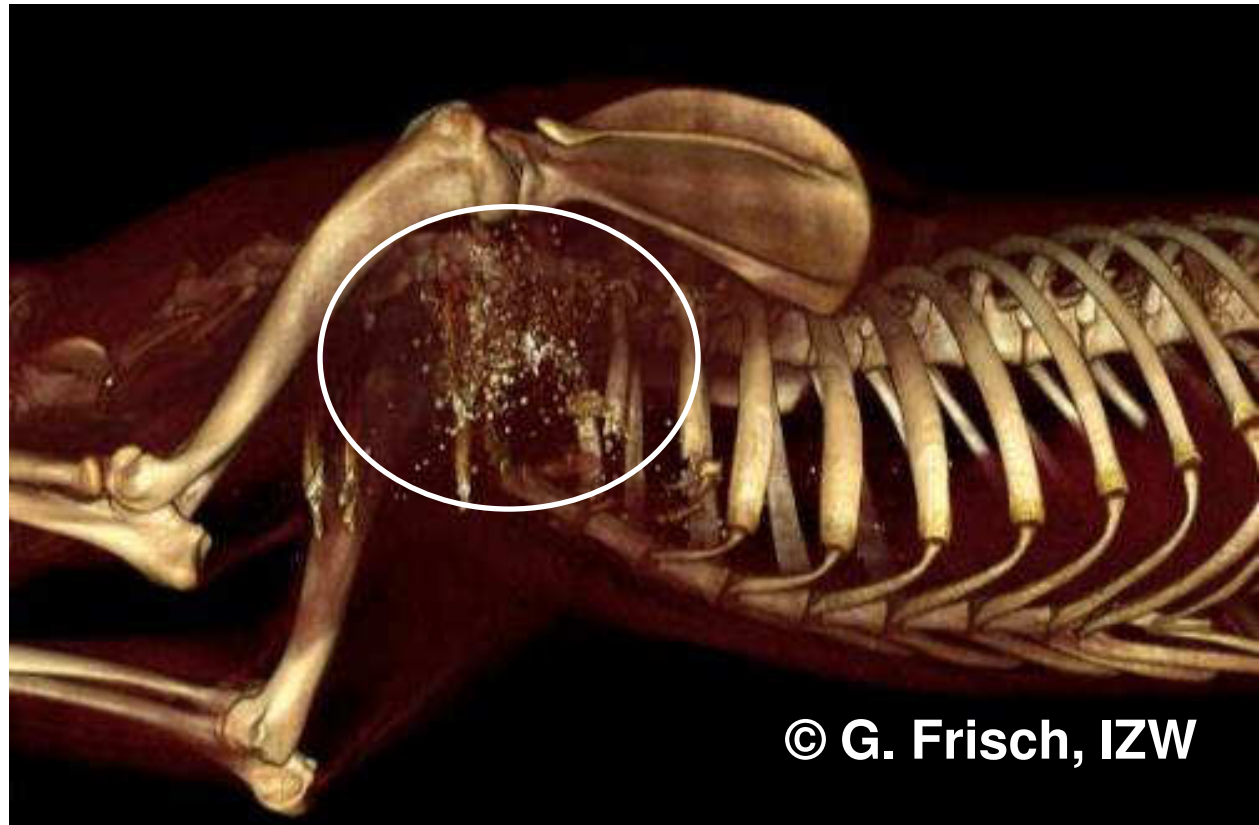
❖ Natural causes

- Fights (wolves wild boar)
- Canine distemper
- septicaemia
- Mange & starvation
(cachexia)



Health monitoring of wolves: Results

→ Causes of death: illegal killing



Projectile particles

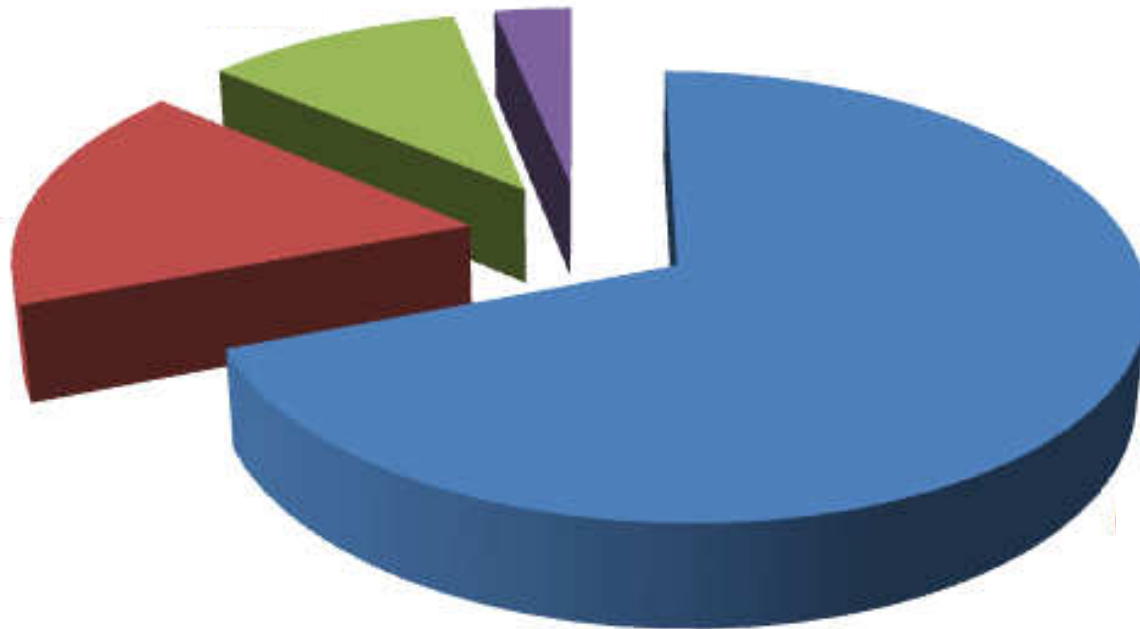


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Health monitoring of wolves: Results

Results: cause of death



- traffic accident
- illegal killing
- natural causes
- unknown



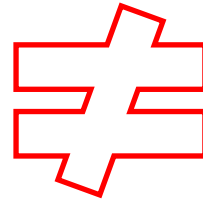
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Health monitoring of wolves: Results

Cause of death vs health status

Cause of death



Underlying diseases



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Health monitoring of wolves: Results

- ❖ Detected diseases / infections which were not fatal
 - Canine distemper virus infection

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Enamel hypoplasia



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Health monitoring of wolves: Results

- ❖ Detected diseases / infections which were not fatal
 - Mange



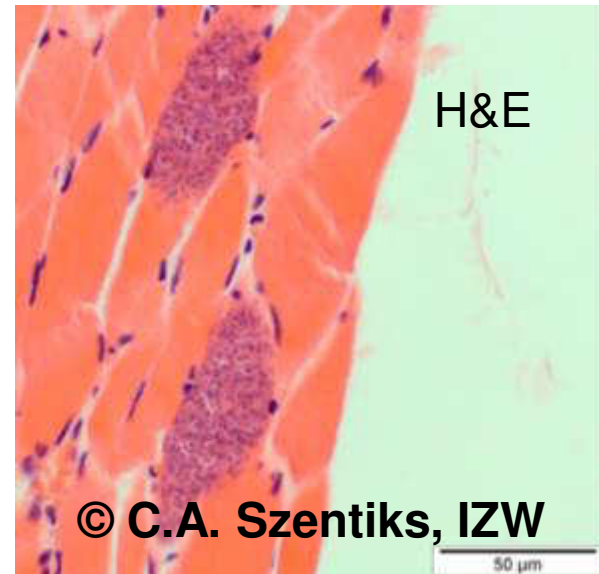
Health monitoring of wolves: Results

- ❖ Detected diseases / infections which were not fatal
 - Infection with trichinae, *Echinococcus multilocularis*, other endoparasites such as *Sarcocystis*, helminths, protozoans

tape worms



Sarcosporidiosis





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Health monitoring of wolves: Results

❖ Not detected

- Rabies
- Pseudo rabies
- Parvovirus
- Hepatitis contagiosa canis



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Research on health of wolves: summary

- ❖ Most wolves are healthy: few have underlying diseases
- ❖ Most die from encountering people (traffic accidents; illegal killing)
- ❖ Research into and monitoring of health should be intensified
 - Identify potential wolf-driven risks of infections in wildlife & domestic animals
 - Risk of zoonotic infection for humans
 - Exposure to environmental toxins
- ❖ An intensification of health research and monitoring of German wolves
 - would address concerns of various stakeholder groups
 - would contribute to a German and central European integrated conservation management plan
 - would assist in preparing responses if health issues arise

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