WINGSPAN CONFERENCE
NOVEMBER 04, 2026
BERLIN

Final Conference – LIFE EUROKITE (LIFE18 NAT/AT/000048)

RED KITE MORTALITY ON INFRASTRUCTURE



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DR. MAXIMILIAN RAAB
CSO, TB RAAB GMBH

Europe-Wide Red Kite Mortality

(Peer review, Panter et al.)

Unprecedented Dataset

Analyzed 2,346 GPS-tracked Red Kites tagged across 14 European countries (2013–2022), documenting 979 mortality events and 624 conclusive adult/subadult cause-of-death cases.

Dominance of Anthropogenic Drivers

Human-caused mortality accounts for 69.1% of all Red Kite deaths—more than double the proportion of natural causes (30.9%).

Consistent Multi-Year Pressure

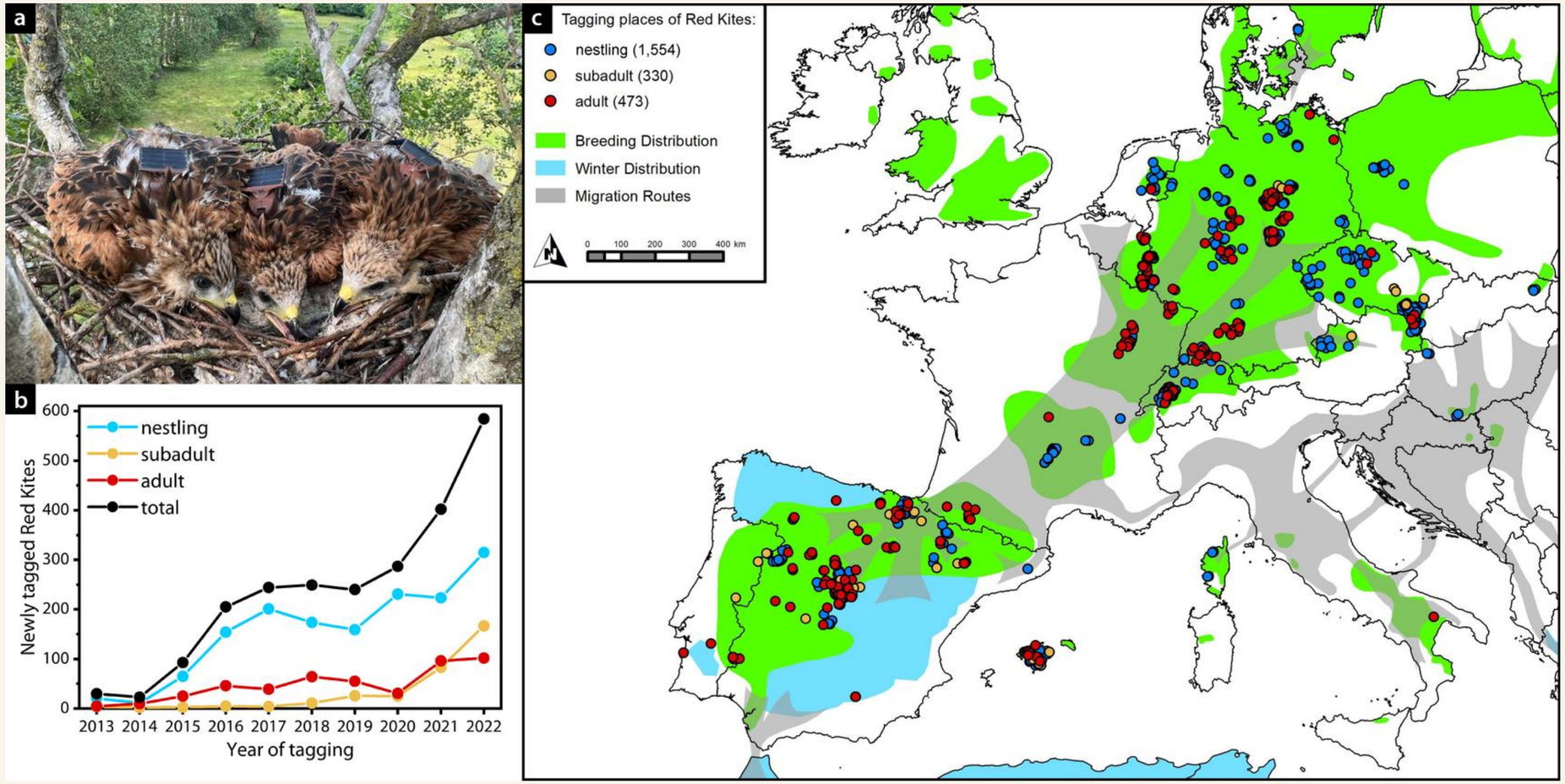
Relative anthropogenic mortality rates remained consistently high across all 10 study years (2013–2022).

Europe-Wide Cause-of-Death Hierarchy

- Illegal Poisoning: 25.2% (leading human-caused threat).
- Natural Predation: 25.3% (primarily top predators like Eagle Owls and Goshawks).
- Traffic Collisions: 16.3% combined (10.9% road, 5.4% rail).
- Power Line Hazards: 9.9% (7.5% electrocution, 2.4% collisions).
- Illegal Shooting / Trapping: 8.7%.
- Wind Turbine Collisions: 3.8%.

Age-Class Dynamics

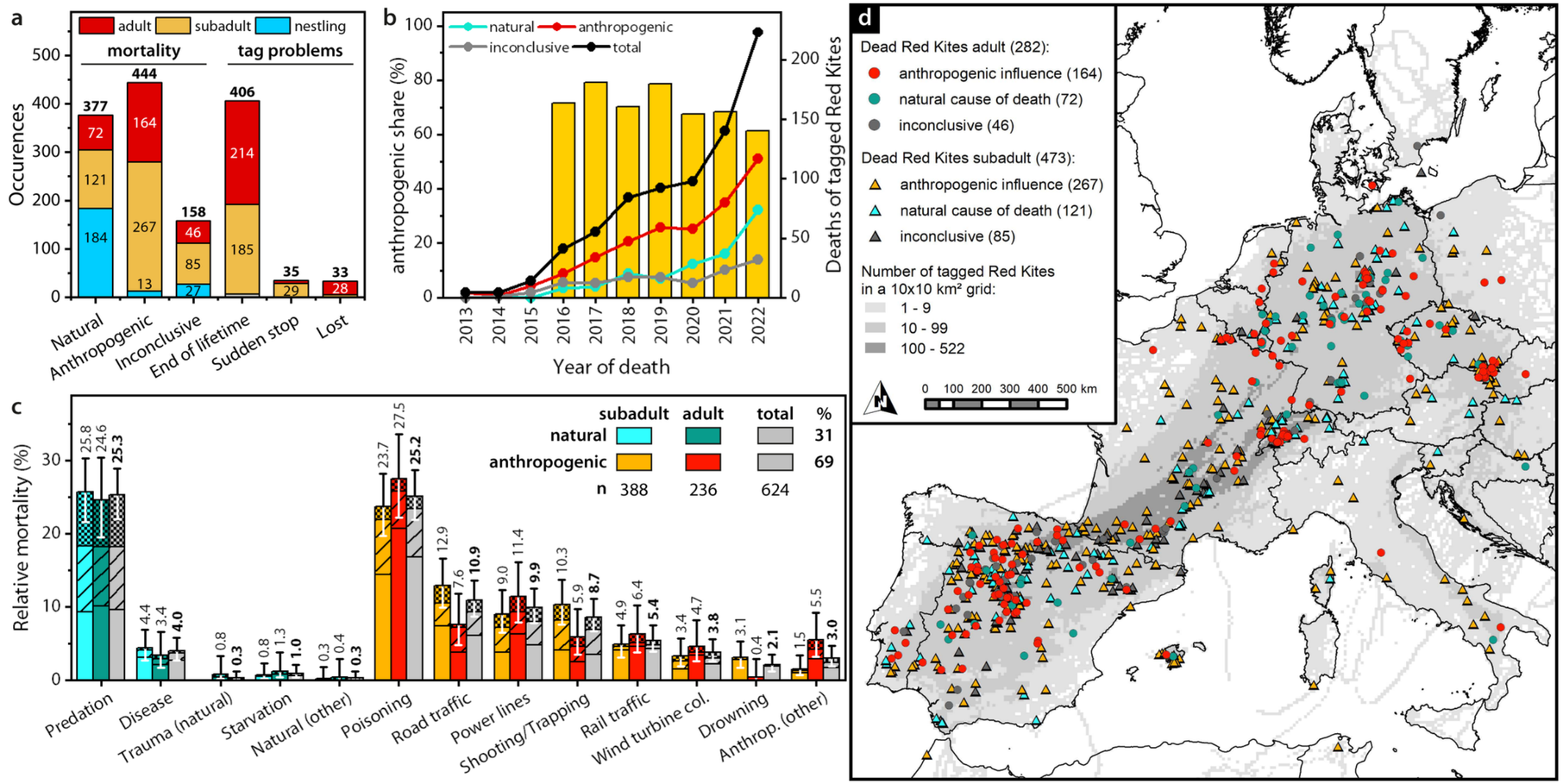
Subadult floaters experience a 26% higher annual mortality risk than adults due to wide-ranging dispersal behavior.



(a) Red kite nestlings fitted with solar-powered GPS tags.

(b) Number of kites tagged 2013 – 2022, totalling 2,346 individuals. Different colours according to age classes at tagging. The 'nestlings' category includes all nestlings and fledglings.

(c) Tagging locations (points). The breeding (green) and wintering distribution outside of the breeding distribution (blue) and migration routes (grey) based on Mattsson et al. Black lines represent country borders and coastlines (OpenStreetMap).



(a) data summary ('mortality': and 'tag problems'). The 'nestlings' category includes all nestlings and young fledglings that have not yet gained their full flight capability.

(b) Number of mortality events (lines) for subadults and adults, and the proportion of anthropogenic causes between 2013 – 2022 (barplots).

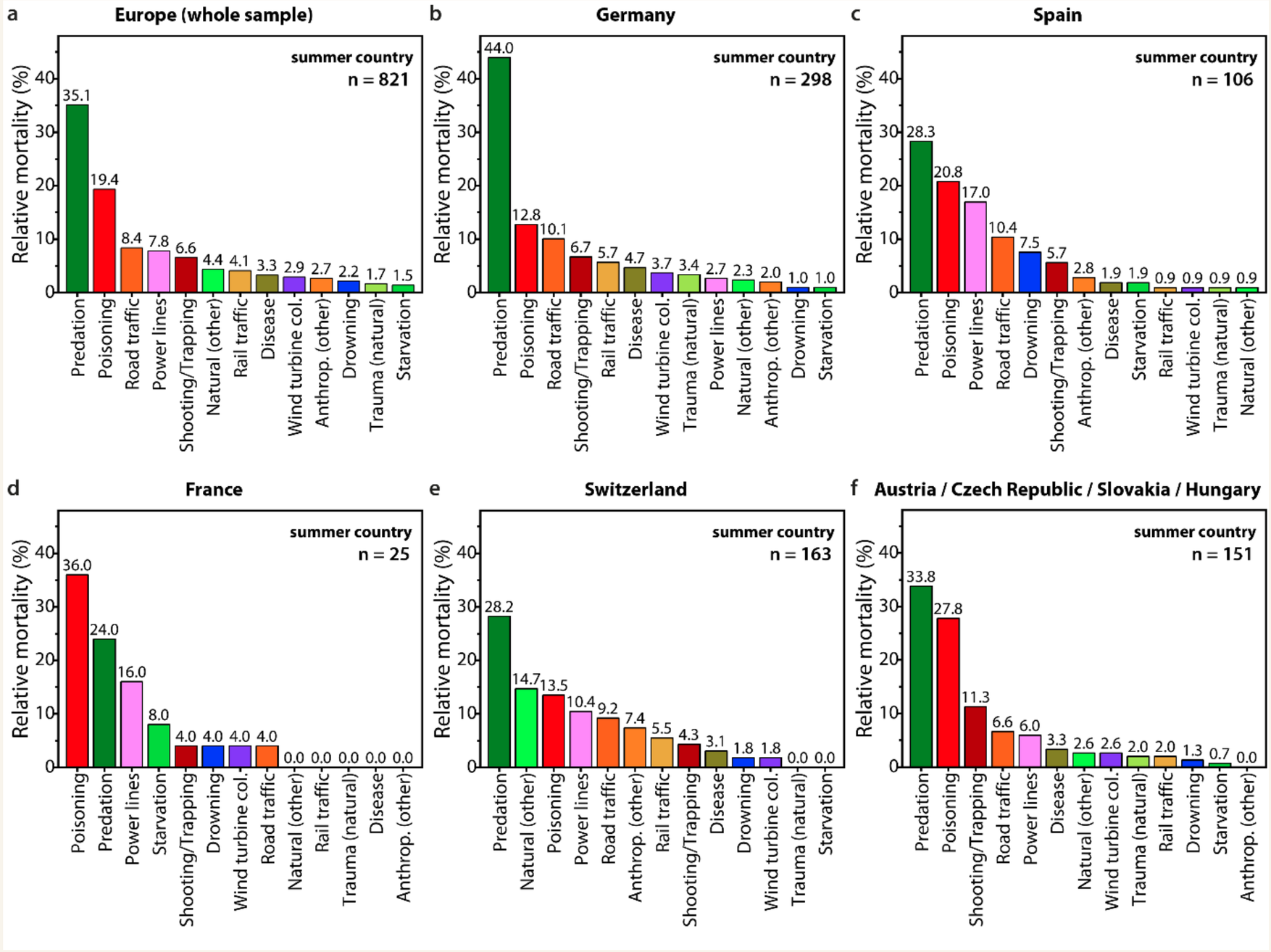
(c) Proportion of different mortality categories for different age classes. Within bar pattern shows certainty (solid: 'certain', hashed: 'probable', grated: 'possible'). Numbers indicate the total proportion, error bars are 95% confidence intervals.

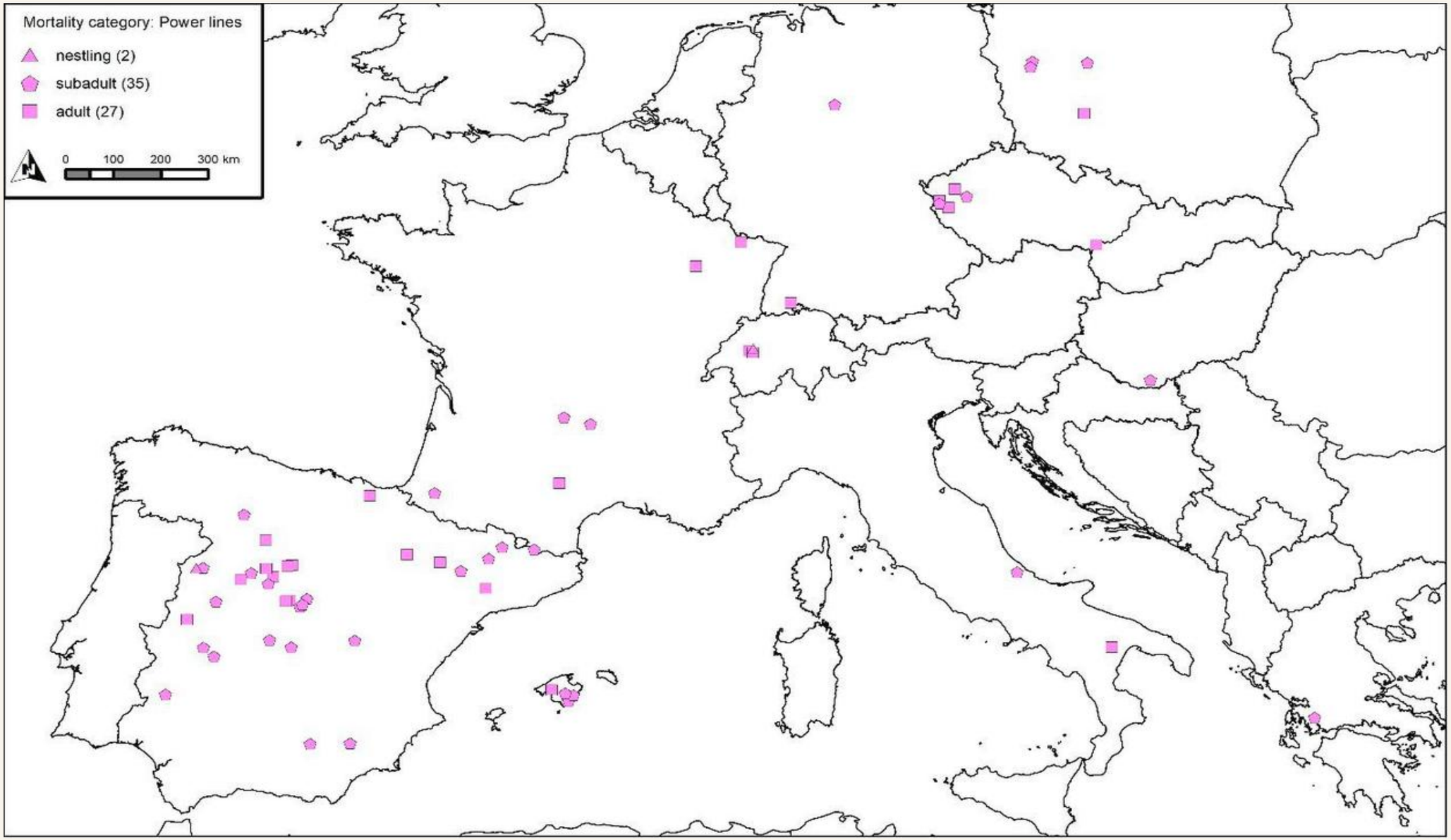
(d) Locations of mortality events for subadults and adults. Grey areas show the density of tracked individuals in this study at a 10 km² resolution.

Mortality causes in red kites (Milvus milvus) across Europe, where all age classes (nestling, subadult, adult) and certainty classes (certain, probable, possible) are pooled. The causes are ordered by occurrence for each summer country of the deceased individuals:

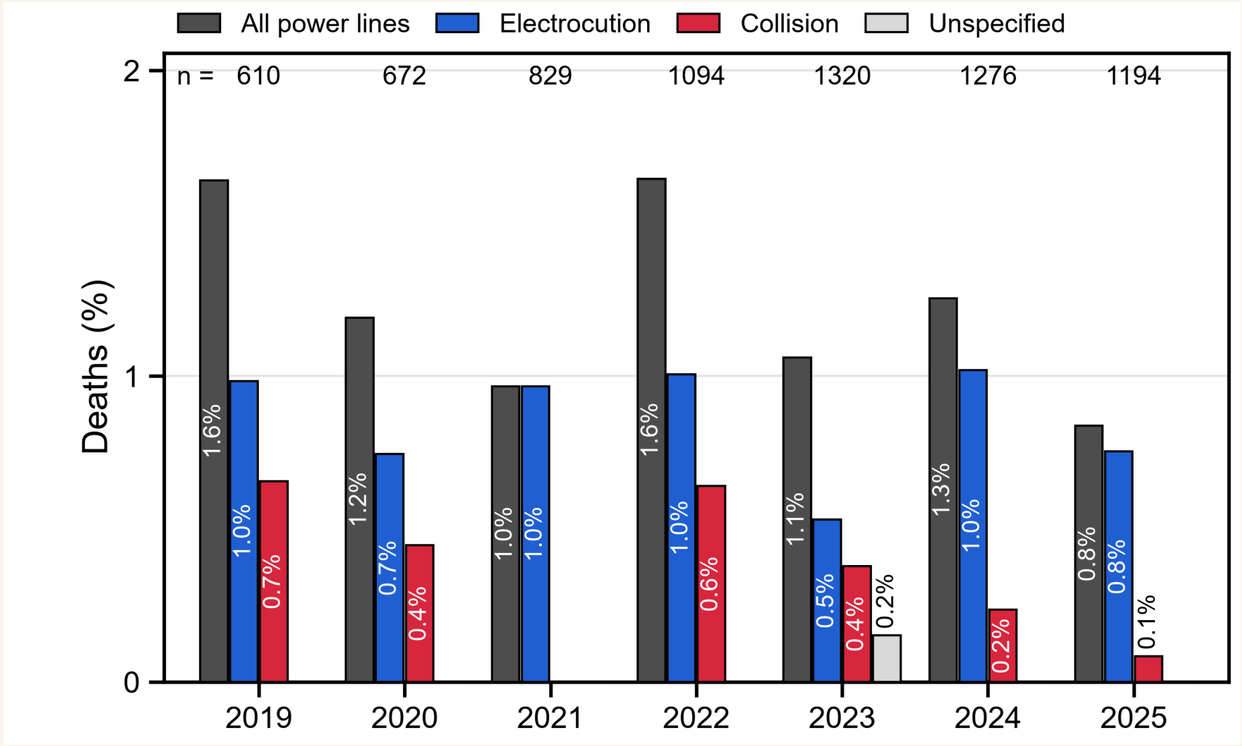
(a) the whole sample (Europe),
(b) Germany,
(c) Spain,
(d) France,
(e) Switzerland, and
(f) Austria, the Czech Republic, Slovakia and Hungary (AT/CZ/SK/HU).

Colours highlight differences in rank orders of mortality categories among summer countries.



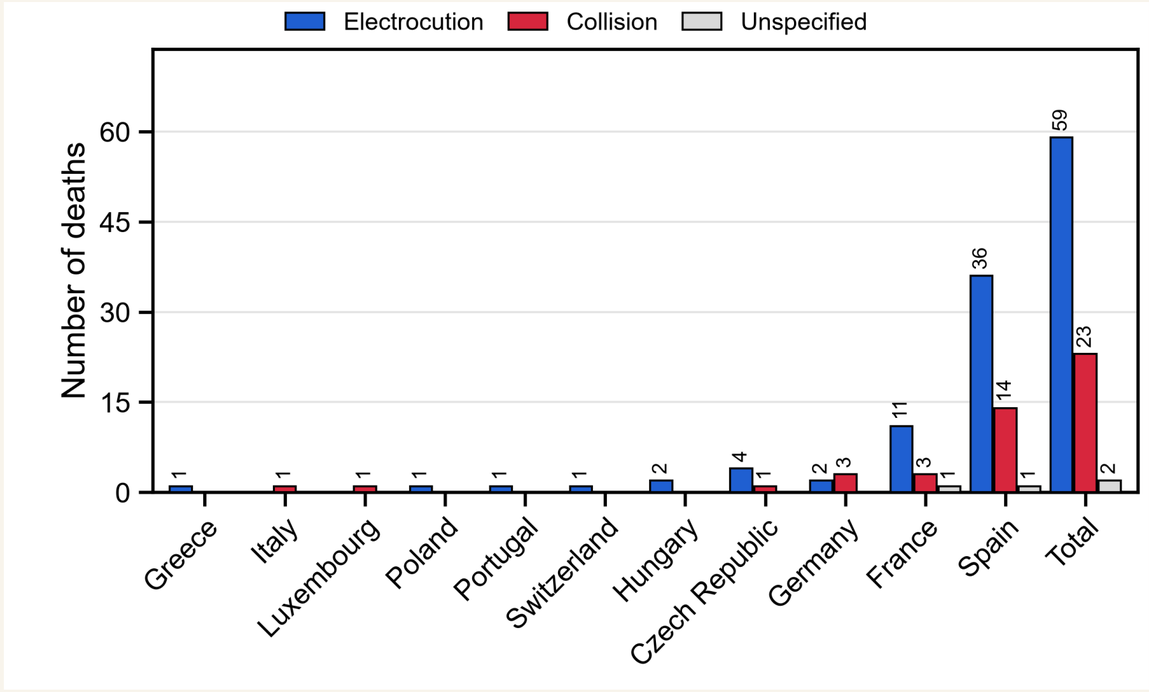


Mortality cases from power lines for nestlings, subadults and adults (2013-2022).



Red kite mortality caused by power lines, categorised as electrocution and collision, from 2019 to 2025.

Red kite mortality caused by power lines, categorised as electrocution and collision, per country from 2019 to 2025.



Infrastructure Hazards: Electrocution, Collisions & Spatial Risks



Roadkill
© LIFE EUROKITE

Power Lines (9.9% of Total Mortality):

- ***Electrocution*:** Represents ***75.8% of power line deaths*** (7.5% of overall mortality) when birds perch on uninsulated medium-voltage pylons.
- ***Collisions*:** Mid-flight impacts with conductor cables account for ***24.2% of power line deaths*** (2.4% of overall mortality).

Transportation Infrastructure (16.3% of Total Mortality):

- ***Roads (10.9%)*** and ***railways (5.4%)*** attract scavenging Red Kites to roadkill, making young floaters especially vulnerable.

Renewable Wind Energy (3.8% of Total Mortality):

- ***Wind turbine collisions represent 3.8%*** of European mortality. Mitigating collision risks through proper site selection and predictive/automated curtailment is vital as wind capacity expands under the EU Green Deal.

Geographic Variations in Grid Risk:

- Annual power line mortality risk is significantly lower in Germany ***(0.4%)*** compared to Central Europe (***2.8%*** in AT/CZ/SK/HU) and Spain ***(4.2%)***, reflecting the success of statutory retrofitting laws.

Safer Networks: Central European Power Line Retrofitting

Large-Scale European Targets:

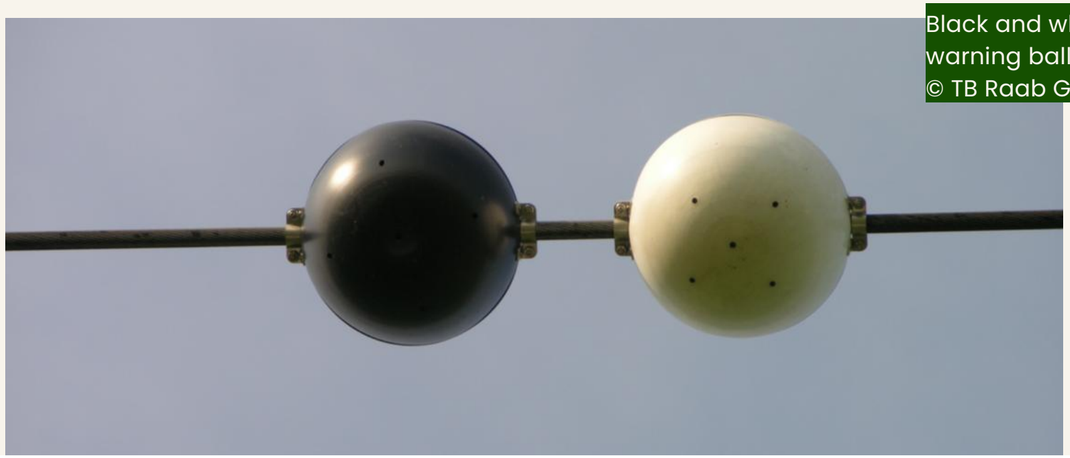
- Installed over 3,000 technical pylon modifications (bird-safe brackets, protective caps, and insulation sleeves).
- Upgraded over 117 km of overhead power lines along critical migratory flyways and core breeding zones.

Key Partner Grid Highlights:

- **Czech Republic (EG.D / E.ON):** Installed **1,040 certified "Claw/Birdsafe" brackets** and renewed **94.5 km** of overhead distribution lines.
- **Slovakia (ZSD):** Retrofitted **942 distribution poles** with protective insulation, converting dangerous perches into safe vantage points.
- **Austria (APG):** Mounted high-visibility bird flight diverters along transmission corridors to mitigate mid-flight collision risks.
- **Spain (AMUS):** Modified **over 1,000 hazardous electric pylons** and corrected **>23 km of high-risk lines** in southwestern Spain



Replacing unprotected components with bird-safe devices
© EG.D



Black and white bird warning balls
© TB Raab GmbH





Underground cabling in Austria
© TB Raab GmbH; Peter Ujfalusi

Underground Cabling: Permanent Infrastructure Risk Elimination

The Ultimate Conservation Measure:

Replacing medium-voltage overhead lines with underground cabling ***completely eliminates*** both electrocution and collision hazards.

Targeted Deployment in Hotspots:

Grid operators (including Netz Burgenland and Netz Niederösterreich) focused undergrounding projects in high-density breeding and roosting corridors in eastern Austria.

Permanent Landscape Restoration:

Completely removes physical flight obstacles from core habitats, creating safe flyways for Red Kites and other soaring raptors.

Coordinating beneficiary

EUROKITE

The TB Raab GmbH was commmissioned to implement the LIFE EUROKITE project after a pan-European public tender.

TB Raab Technisches Büro für Biologie

MEGEG

Project partner

AMUS Acción por el Mundo Salvaje

Austrian Power Grid APG

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Co-financiers

Bundesministerium Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie

Baden-Württemberg MINISTERIUM FÜR UMWELT, KLIMA UND ENERGIEWIRTSCHAFT

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MINISTÈRE DE LA TRANSITION ÉCOLOGIQUE Liberté Égalité Fraternité

SACHSEN-ANHALT Ministerium für Umwelt, Landwirtschaft und Energie

niederösterreich naturschutz

This project is co-financed by the LIFE Nature Programme of the European Union

NATURA 2000

Cooperation partner

Additional cooperation partners for specific research questions in the field of renewable energy

This project is co-financed by the LIFE Nature Programme of the European Union

Thank you for your attention!

Safer infrastructure. Safer skies for red kites.

Dr. Maximilian Raab
CSO, TB Raab GmbH

maximilian.raab@tbraab.at · www.life-eurokite.eu · www.tbraab.at



Red Kite
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