



36th European
Mustelid
Colloquium

6-9 October 2026
Białowieża, Poland



36th European Mustelid Colloquium Book of Abstracts

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Wildlife Trust

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Mammal Research Institute
Polish Academy of Sciences
Białowieża



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Welcome

Welcome to the 36th European Mustelid Colloquium in collaboration with the Białowieża Ecology Conference

It is our great pleasure to welcome researchers, conservation practitioners, wildlife managers, students, and enthusiasts from across Europe and beyond to this year's gathering. The European Mustelid Colloquium continues a long-standing tradition of bringing together the community dedicated to advancing our understanding and conservation of mustelids and their ecosystems. This year we are thrilled to be hosting in the Mammal Research Institute, Polish Academy of Sciences in Białowieża.

The diverse programme reflects the breadth of contemporary mustelid research. From ecology, behaviour, and population dynamics to conservation management, genetics, and human-wildlife interactions, presentations at EMC36 demonstrate the efforts being taken to address the challenges facing mustelid species in a rapidly changing world.

Scientific meetings such as this provide a valuable opportunity to share new findings, exchange ideas, develop collaborations, and strengthen the networks that support effective research and conservation. We hope that the presentations, discussions, and informal conversations throughout the Colloquium will inspire new perspectives and foster partnerships that continue well beyond the conference.

We would like to thank all authors, presenters, reviewers and organisers whose dedication and hard work have made this Colloquium possible. Thank you to all participants for contributing their expertise, enthusiasm, and commitment to the study and conservation of mustelids. We wish you an enjoyable 36th European Mustelid Colloquium and hope that your time here proves both professionally rewarding and personally memorable.

The Organising Committee

36th European Mustelid Colloquium and Białowieża Ecology Conference

Committees

Organising committee

- **Steve Carter** Vincent Wildlife Trust
- **Katherine McBride** Vincent Wildlife Trust
- **Julia Bracewell** Vincent Wildlife Trust
- **Andrzej Zalewski** Mammal Research Institute, Polish Academy of Sciences
- **Anna Wereszczuk** Mammal Research Institute, Polish Academy of Sciences
- **Joanna Łapińska** Mammal Research Institute, Polish Academy of Sciences

Scientific committee

- **Prof Andrzej Zalewski** Mammal Research Institute, Polish Academy of Sciences
- **Dr Anna Wereszczuk** Mammal Research Institute, Polish Academy of Sciences
- **Prof Izabela Wierzbowska** Jagiellonian University, Poland
- **Dr Tim Hofmeester** Swedish University of Agricultural Sciences, Sweden
- **Morten Elmeros** Aarhus University, Denmark
- **Dr Steve Carter** Vincent Wildlife Trust, UK
- **Dr Jenny MacPherson** Vincent Wildlife Trust, UK
- **Dr Samantha Bremner-Harrison** Vincent Wildlife Trust, UK

Important information

The Colloquium venue

Mammal Research Institute, Polish Academy of Sciences,
Stoczek 1, 17-230 Białowieża

Welcome evening: Main Hall of Mammal Research Institute PAS

Poster session: First floor of Mammal Research Institute PAS

Presentations: Conference Hall of Mammal Research Institute PAS

Conference banquet: Karczma Biesiadna, located in the gardens of Hotel Białowieski,
ul. Stoczek 218 B, 17-230 Białowieża PL

Registration

Please register on arrival. The registration desk will be open in the entrance of the Main Hall of the Mammal Research Institute from 17:00 and throughout the poster session.

Registration desk opening hours:	Tuesday 6 October	17:00-20:00
	Wednesday 7 October	08:15-08:50
	Friday 9 October	08:15-08:50

Colloquium Welcome Reception and Poster Session

17:00-20:00 Tuesday 6 October

Main Hall of Mammal Research Institute

If you are presenting a poster, please bring it with you to the First Floor of the Mammal Research Institute **before** 17:00 on Tuesday 6 October. Poster boards, fixing materials and helpers will be available to help you set your poster up from 16:00.

The poster session and welcome evening will officially start at 17:00. Drinks and light snacks will be available during the evening and authors are encouraged to spend some time by their posters during the evening to discuss their work with attendees.

Important information

Field Trip information

Thursday 8 October

There are two field trips happening on Thursday 8 October. **The field trip to the Białowieża National Park Strict Reserve is included in all delegates' conference fee.**

Białowieża National Park Strict Reserve Meet at the wooden gate on the northern edge of Palace Park (52.709123, 23.843760). Group starts will take place at ten minute intervals starting from 8:00 with the last group leaving at 9:40.

Lunch will be available for all delegates at Gospoda pod Żubrem after returning from the Strict Reserve and is included in the conference fee. Serving times will be staggered according to field trip group assignments made at registration.

The optional additional field trip excursion to the European Bison Show Reserve is not included in every delegate's conference fee. This field trip is only available to delegates who have already paid an additional fee to attend the Bison Show Reserve. Due to transport to the reserve, last-minute additions to this field trip cannot be made during the conference.

European Bison Show Reserve Meet at Gospoda pod Żubrem at 14:00.

Please wear suitable clothing and footwear for walking. You are also advised to bring drinking water and any additional snacks you require.

Colloquium Dinner and Raffle

Thursday 8 October 19:00-22:00

Hotel Białowieski

We are delighted to host this year's conference dinner as a Bonfire Banquet. Join us for an evening of great food, locally brewed beer, traditional music and the legendary Mustelid Colloquium raffle as we gather around the bonfire at Karczma Biesiadna, located in the gardens of Hotel Białowieski (<https://www.hotel.bialowieza.pl/>).

We would like to encourage you to bring a small donation for the raffle — items of a mustelid nature are particularly welcome, or items from your home country. Money raised from the raffle funds the next Colloquium's student travel bursaries. The raffle will be held during the banquet with a variety of fun prizes (donated by delegates) for winners to choose from. Raffle tickets will be available to purchase (from 1 Euro) from raffle ticket sellers throughout the welcome evening and poster session and day 1 of the conference presentations. Please bring a small amount of cash with you to purchase your tickets!

Student Prizes

We will be awarding prizes for the best student presentations and runners up (for oral and poster presentations) at the end of the conference. Prizes have been kindly donated by the Mammal Research Institute.

We are honoured to be able to award the prize for the best student talk in memory of **Dr Aoibheann Gaughran**, who tragically passed away at the end of 2021. Aoibheann researched the ranging behaviour of badgers in Ireland and had previously shared her work at the European Mustelid Colloquium. She was awarded the best student talk at the Colloquium in Lyon in 2017, and was later awarded her PhD at Trinity College Dublin in 2018.

Keynote speaker biographies



Dr Jenny MacPherson

Dr. Jenny MacPherson is the Principal Scientist at Vincent Wildlife Trust. Prior to joining VWT, she was based at Royal Holloway University of London for ten years, carrying out research on the ecology and behaviour of a range of mammal species including pine marten, dormouse, red squirrel, hedgehog, water vole and mink. She joined Vincent Wildlife Trust at the beginning of 2011 and led VWT's Pine Marten Recovery Project from 2014, having been involved with species reintroduction programmes in Britain and elsewhere since 1997.

Jenny also holds a number of honorary positions including Visiting Fellow University of Exeter, Member of DEFRA Reintroductions Task Force, Associate Editor Ecological Solutions and Evidence, Director of the International Martes Working Group and member of IUCN Small Carnivore Specialist Group.

She has co-written more than 50 papers, reports and book chapters and is the author of the book *Stoats, Weasels, Martens and Polecats* published in 2024 by Harper Collins in the New Naturalist series.



Dr Tim Hofmeester

Dr. Tim Hofmeester is an Associate Professor and Researcher at the Department of Wildlife, Fish and Environmental Studies at the Swedish University of Agricultural Sciences in Umeå, Sweden, as well as a board member of the Small Mustelid Foundation. His research focuses on the use of conservation technology and citizen science to foster human-wildlife coexistence, with a particular focus on small mustelid conservation.

He is particularly interested in how environmental change affects species occurrence and density, and in how we can use participatory methods and technological solutions to study small wildlife species. Since he was a student, he worked on a range of mustelid species, with a particular focus on the smaller ones: pine marten, polecat, stoat and weasel. Two particular focus areas have been the development of various camera-trapping methods to study and monitor small mustelids and the use of observational data and habitat suitability modelling to examine how small mustelid distributions respond to environmental change. He also dabbled in population genetics and parasitology.

As part of his research, Tim also puts a lot of emphasis on communicating about small mustelids to stakeholders and the general public.

Tim is the author or co-author of more than 70 scientific papers, book chapters and technical reports – and he is associate editor of two peer-reviewed journals: *Remote Sensing in Ecology and Conservation*, and *Mammalian Biology*.

Keynote speaker biographies



Dr Karol Zub

Dr Karol Zub is an Associate Professor at the Mammal Research Institute of the Polish Academy of Sciences and a world-leading expert in weasel ecology. His research bridges fundamental ecological theory with applied wildlife management and conservation.

His main research interests include the ecology, physiology, genetics and population dynamics of small mustelids and their prey species, with particular emphasis on: energy expenditure; effect of body mass and metabolic rates variation on winter survival; quantitative genetics (heritability of body mass and metabolic rates); genetic structures of small mammal populations; and population dynamics of weasels and voles. His current work also focuses on the eradication of stoats from the Orkney Islands.

Karol is the author or co-author of more than 70 scientific papers, book chapters and technical reports and he is Editor-in-Chief of the international journal, *Mammal Research*.

Colloquium programme — 6-9 October 2026

Registration and Welcome Reception — Tuesday 6 October

Venue: Main Hall and first floor of Mammal Research Institute PAS

17:00-20:00 Welcome Reception and Poster Session

Day 1 — Wednesday 7 October

Venue: Main Hall of Mammal Research Institute PAS

08:15-08:50 Registration

08:50 Welcome

SESSION 1 Population restoration

09:00-09:35	Keynote Lecture 1 Dr. Jenny MacPherson Vincent Wildlife Trust	Recovery and Restoration: parallel pathways of pine martens and polecats in Britain
09:35-09:55	Karen Keegan	The recovery of European pine marten in Britain; the relevance of genetics in future conservation efforts
09:55-10:15	Jess Stevens	Enhancing monitoring of reintroduced pine martens using a custom drone-based radio-tracking system
10:15-10:35	Ali North and Daniel Brown	Initial post release dispersal and habitat selection of pine marten (<i>Martes martes</i>) translocated to the southwest of England
10:35-11:05	COFFEE BREAK	
11:05-11:25	Yoann Bressan	European mink (<i>Mustela lutreola</i>) reintroduction in France – first-year results of radio-telemetric monitoring
11:25-11:45	Luuk Zwartenkot	Goodbye American mink, welcome European mink! Working towards a reintroduction in the Netherlands

SESSION 1 Lightning Talks

11:45 - 11:50	Christelle Bellanger	Using pre-release enclosure for European mink (<i>Mustela lutreola</i>) reintroduction in France – first-year feedback
11:50 - 11:55	Veronika Koch	Habitat Suitability Index for the Eurasian otter (<i>Lutra lutra</i>) in Germany
11:55 - 12:00	Ellie Scopes	Individual-based models reveal population recovery and impacts of woodland creation on pine martens (<i>Martes martes</i>) in Britain
12:00 - 12:05	Lucy Nord and Victoria Chanin	The contribution of volunteers to the recovery of pine martens in Britain
12:05-12:15	Lightning Talk questions	
12:15-13:30	LUNCH	

SESSION 2: Monitoring — methods, challenges and insights

13:30-14:05	Keynote Lecture 2 Dr. Tim Hofmeester Department of Wildlife, Fish and Environmental Studies at the Swedish University of Agricultural Sciences	Small Carnivores, Big Data: unveiling mustelid biology through technology
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Colloquium programme — 6-9 October 2026

SESSION 2: Lightning Talks 1

14:05-14:10	Jeroen Mos	From elusiveness to evidence: seasonal dynamics in common weasel (<i>Mustela nivalis vulgaris</i>)
14:10-14:15	Victoria Knight	Mapping the Irish stoat: insights from a two-year citizen science survey
14:15-14:20	Franziska Sommer	Publishing the unsuccessful – are failures in monitoring methods for martens (<i>Martes spp.</i>) underreported?
14:20-14:25	Pallavi Ghaskadbi	Monitoring pinemartens (<i>Martes martes</i>) across Sweden: a multi-site camera-trap study of reproductive timing and population demography

14:25-14:35 Lightning Talk Questions

14:35-14:55	Umrah Viqar	Ecological insights into the yellow-throated marten (<i>Martes flavigula</i>): habitat use and dietary pattern in the Reserved Forest of Ranikhet, Kumaon Himalayas
14:55 - 15:30	COFFEE BREAK	
15:30 - 15:50	Emily Currie	It's not always black and white: using thermal imaging to monitor badger populations
15:50 - 16:10	Irene Weinberger	How many? Estimating the number of bridges required for otter surveys
16:10 - 16:30	Teun Smink and Wender Bil	When legislation meets reality: can we reliably assess the conservation status of highly dynamic mustelid populations using trapcams? A power analysis using occupancy modelling
16:30 - 16:50	Kutlu Alkan	Monitoring mustelids in mountainous terrain: comparison between snapshot Europe and ENETWILD protocols in Babia Góra National Park, Poland

SESSION 2: Lightning Talks 2

16:50-16:55	Michał Strączyński	Implications and insights from meso-carnivore monitoring using a systematic approach for camera trapping
16:55-17:00	Katherine McBride	Masked bandits of Britain: insights from the National Polecat Survey 2024-2025
17:00-17:05	Benjamin Szydlowski	Estimating fisher (<i>Pekania pennanti</i>) survival and space use following a population decline in New Hampshire, US
17:05-17:10	Izabela Stachowicz	TRAPPER AI – a scalable, open-source camera trap data infrastructure for professional and citizen-science projects

17:10-17:20 Lightning Talk Questions

17:20 Closing Remarks

Day 2 — Thursday 8 October Field Trip to Białowieża National Park's Strict Nature Reserve and Conference Dinner with raffle (all included in Colloquium fee)

08:00-13:30	Fieldtrip to Białowieża National Park's Strict Nature Reserve <i>Lunch will be served at Gospoda pod Żubrem, with serving times staggered according to field trip group assignments made at registration. Lunch is included in the conference fee.</i>
14:00-17:00	Optional excursion to European Bison Show Reserve (not included in conference fee but available for those with paid tickets)
19:00-22:00	Conference dinner and bonfire Venue: Karczma Biesiadna (garden of Białowieski Hotel)

Colloquium programme — 6-9 October 2026

Day 3 — Friday 9 October

Venue: Main Hall of Mammal Research Institute PAS

08:55-09:00

Welcome

SESSION 3: Threats and solutions

09:00-09:35

Keynote Lecture 3
Dr. Karol Zub
Mammal Research Institute
of the Polish Academy of
Sciences

Traps, cameras, drones and dogs — monitoring progress of stoat eradication in the Orkney Islands

09:35-09:55

Vasco Valdez

Too hot to handle: climate-driven northwards shift in Iberian mustelids' distribution

09:55-10:15

Sirma Zidarova

Marbled polecat (*Vormela peregusna*) in the Balkans — distribution, habitat preferences, pressures and future threats in Bulgaria and Romania

10:15-10:35

Orus Ilyas

The underappreciated apex: reviewing the ecological role and conservation status of the yellow-throated marten (*Martes flavigula*) across the Himalayan and East Asian bioregions

10:35-11:05

COFFEE BREAK

11:05-11:25

Kristel Nemvalts

The role of the EEP in European mink conservation

11:25-11:45

Louison Blin

Badger vaccination as a complementary tool for controlling bovine tuberculosis: eco-epidemiological analyses of a trial in low-to-medium-density contexts in France

SESSION 3 Lightning Talks 1

11:45-11:50

Marco Granata

A requiem for the winter games mascot: snow loss and prey mismatch threaten alpine stoats

11:50-11:55

Stephanie Johnstone

What is the future for the *Martes* complex (*Guloninae*) in the face of climate change and ecological breakdown

11:55-12:00

Enrico Mirone

Mink in the mist: a novel eDNA Assay for early detection of an invasive mustelid

12:00-12:10

Lightning Talk questions

SESSION 3 Lightning Talks 2

12:10-12:15

Michiel Stas

The impact of otter grids in fykes on the European Water Framework Directive metrics

12:15-12:20

Samantha
Bremner-Harrison

Using the Conservation Standards to plan, implement and monitor conservation of threatened mustelids

12:20-12:25

Jasja Dekker

Mitigation translocation of polecat (*Mustela putorius*)

12:25-12:35

Lightning Talk questions

12:35-13:45

LUNCH

Colloquium programme — 6-9 October 2026

SESSION 4: Behaviour, ecology and evolution		
SESSION 4 Lightning Talks 1		
13:45-13:50	Andrin Dürst	Population structure of stoats in Switzerland using genome-wide sequencing
13:50-13:55	Marie Eggers	Stoat (<i>Mustela erminea</i>) dynamics in a changing Arctic: responses to shifting lemming cycles in northeast Greenland
13:55-14:00	Emiliano Manzo	Sharing space, avoiding time: How Martes coexist with humans and domestic cats
14:00-14:10 Lightning Talk Questions		
14:10-14:30	Pieter Otte	Stoats at scale: unravelling orders of habitat selection in the Netherlands
14:30-14:50	Nadia Rocco	Understanding interspecific interactions of small mustelids in mountain communities using structural equation modelling
14:50-15:10	Ekaterina Rostovskaya	Do not use my den: mustelids and large carnivores in the Gorce Mountains, southern Poland
15:10-15:45 COFFEE BREAK		
SESSION 4 Lightning Talks 3		
15:45-15:50	Alejandra Zarzo-Arias	Enhancing biodiversity predictions by integrating biotic interactions in Species Distribution Models for the European mink in the Iberian Peninsula
15:50-15:55	Luís Miguel Rosalino	Mesocarnivore movement across exotic forestry plantations in Mediterranean Europe
15:55-16:00	Morten Elmeros	Temporal activity patterns of pine marten and stone marten in anthropogenic modified landscapes
16:00-16:10 Lightning Talk Questions		
16:10-16:30	Andrzej Zalewski	Spatial variation and ecological drivers of pine marten density across Europe
16:30-16:50	Patrick White	Seasonal patterns of breeding Eurasian otters studied from crowd-sourced citizen science and professional data
16:50-17:10	Malin Aronsson	Wolverine reproductive chronology in relation to individual characteristics and resource availability
17:10	Student Prize Giving and Closing Remarks	

Colloquium Abstracts

Population restoration



Recovery and Restoration: parallel pathways of pine martens and polecats in Britain

Jenny MacPherson

Vincent Wildlife Trust, 3-4 Bronsil Courtyard, Eastor, Ledbury, Herefordshire, UK HR8 1EP

jenny.macpherson@vwt.org.uk

Keywords: *carnivore recovery; biology; behaviour; landscape connectivity, natural recolonisation; active translocation*

Carnivore recovery in Britain offers a compelling natural experiment in how species respond differently to landscape change, protection and conservation intervention. Pine martens *Martes martes* and polecats *Mustela putorius* were both driven to near extinction by persecution and habitat loss in the 19th and early 20th centuries. Yet their subsequent recoveries have followed strikingly different pathways, revealing how species ecology, landscape structure and historical legacies shape the balance between natural recolonisation and active restoration.

Pine martens persisted primarily in the Scottish Highlands, where low human density and remnant woodland provided refuge. However, despite legal protection and gradual woodland recovery, martens showed little natural expansion beyond the Scottish border for decades. Their recovery was constrained by low population density, limited long-distance dispersal, and the lack of suitable or permeable habitats in the landscape between Scotland, northern England and Wales. As a largely arboreal, woodland-dependent carnivore with relatively slow reproductive output, the species lacked both the demographic momentum and the connectivity required for rapid recolonisation. Active translocations from Scotland to Wales and then southern England overcame these barriers, accelerating range expansion and demonstrating how targeted restoration can unlock ecological recovery where natural spread stalls.

Polecats present a contrasting trajectory. Surviving in a Welsh refugia, they expanded steadily across England following legal protection. As a habitat generalist with high reproductive potential, flexible diet and strong dispersal capability, particularly among males, polecats have been more able to exploit agricultural mosaics and human-modified landscapes. Yet their recovery, too, has limits. Northern expansion into Scotland has been slow and remains incomplete. Factors likely include geographic distance from core populations, historical bottlenecks, hybridisation with feral ferrets, road mortality, and the absence of stepping-stone populations that might facilitate progressive colonisation.

Comparing these species highlights that legal protection alone does not guarantee recovery at a national scale. Woodland specialists with low densities may require assisted restoration even when habitat appears suitable. Conversely, adaptable generalists may recolonise extensively without intervention yet still fail to achieve full range recovery where landscape structure, demography, or genetic factors impose constraints.

This keynote explores what these different pathways reveal about the mechanisms of carnivore recovery in modern Britain. By contrasting natural expansion and conservation-led translocation, we can better understand when to rely on ecological resilience and when to intervene. Ultimately, the stories of pine martens and polecats illustrate that recovery is not a single process, but a spectrum shaped by biology, behaviour, landscape connectivity, and time.

The recovery of European pine marten in Britain; the relevance of genetics in future conservation efforts

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Keywords: *European pine marten; Britain; translocations; genetic diversity, runs of homozygosity*

The European pine marten *Martes martes* is a native species to Britain, but has faced severe declines from habitat loss and intense persecution during the 19th and early 20th century. They are now listed as *Critically Endangered* in both England and Wales (Mathews & Harrower, 2020). Translocation of individuals to southern Britain from one of the last remaining British strongholds for European pine martens, the Scottish Highlands, has been implemented to aid recovery. Several translocations have occurred, as well as the development of a long-term strategic plan for recovery (MacPherson & Wright, 2021).

However, given the historic population bottleneck of this species, translocations and long-term monitoring plans require improved understanding of genetics. Using three molecular approaches – mitochondrial haplotype analysis, reduced-representation sequencing (ddRAD) and whole genome resequencing (WGRS) – we sought to understand genetic/genomic diversity for this recovering species in Britain. The dataset included predominantly wild living individuals across Scotland (N = 17), England (N = 10) and individuals translocated to Wales from Scotland (N = 49), with individuals from the Republic of Ireland (N = 40) used as a comparative dataset.

Haplotype analysis supported previous findings – individuals sampled in Britain carried the single haplotype Mm28, part of the central-northern European (CNE) phylogroup, while individuals in Ireland all carried the single haplotype Mm20, part of the Mediterranean (MED) phylogroup (Ruiz-González *et al.*, 2013). Both ddRAD and WGRS indicated high levels of relatedness across all individuals in Britain and WGRS showed both historic (< 1Mb length) and recent (2-11Mb length) inbreeding via runs of homozygosity (ROH). An additional preliminary SNP panel, consisting of 200 SNPs, was generated to aid in individual identification of European pine martens in Britain. The low levels of genetic diversity found in this study highlights the importance of using genetics to identify source populations for future translocations.

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Enhancing monitoring of reintroduced pine martens using a custom drone-based radio-tracking system

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Keywords: *pine marten; telemetry; radio-tracking; drone; UAV*

Reintroduction projects for pine marten *Martes martes* in England often rely on post-release radio telemetry to quantify movement patterns, survival, and habitat use. However, ground-based tracking can be limited by forest cover, topography, and site accessibility, creating a need to explore alternative methods that can improve monitoring efficiency.

This study evaluates the use of a custom drone-mounted radio telemetry system developed by Northern Arizona University to improve monitoring efficiency. The system combines a lightweight VHF receiver and omni-directional antenna mounted on an unmanned aerial vehicle (UAV), enabling precise detection of radio-collared animals over a wider area than is typically achievable on foot.

Field trials were conducted across a mixed landscape of woodland, farmland, and upland habitats. The study assessed detection success and location accuracy using both live radio-collared pine marten and test collars placed in strategic locations to simulate animal positions. Initial field tests focused on evaluating system efficiency and identifying optimal flight patterns for signal detection, while minimising disturbance.

Results showed that the UAV system increased signal detection and range in areas of dense vegetation and mountainous terrain where ground-based methods were constrained. The drone also enabled location estimates in areas of complex topography that were not achievable using standard ground-based equipment, with positional accuracy typically within 30m of the transmitter location. In addition, the UAV allowed simultaneous scanning for multiple transmitters where traditional tracking methods are limited to one signal at a time.

Limitations included weather-related constraints and operational considerations such as battery life and flight regulations. Despite these challenges, drone-assisted telemetry proved to be a valuable complement to traditional methods, enabling the detection of martens that were missed by conventional ground-based tracking.

These findings suggest that UAV-based radio tracking can provide a practical addition to monitoring programmes for pine marten and other elusive species in complex landscapes.

Initial post release dispersal and habitat selection of pine marten (*Martes martes*) translocated to the southwest of England

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Keywords: *conservation; translocation; pine marten; reintroduction; radio-telemetry*

Pine marten *Martes martes* populations are classified as Critically Endangered in England and Wales (UK), and conservation translocations have been identified as a key strategy for their recovery¹. Robust post-release monitoring is essential to evaluate the success or failure of such interventions².

In 2024 and 2025, 34 wild, radio-collared pine martens were translocated from Scotland to southwest England (Dartmoor and Exmoor). This study investigated initial post-release dispersal, settlement and habitat use, with the aim of improving understanding of survival, movement behaviour and landscape-scale dynamics of translocated individuals. These insights are intended to inform future conservation translocations and guide targeted habitat restoration efforts.

‘Broken-stick’ linear regression models applied to radio telemetry data were used to distinguish between dispersal and settlement phases. Settled territories were defined using 90% minimum convex polygons and formed the basis for subsequent analyses. Habitat preferences were assessed by comparing habitat composition and configuration within territories to that of the surrounding landscape³, focusing on woodland extent, core area, edge density and connectivity.

Preliminary results indicate that individuals took, on average, six days to reach initial settlement (SD = 7.3), dispersing a mean distance of 10km (SD = 5.2) from release sites at an average rate of 3.9km per day (SD = 3.1). Monitoring beyond 100 days suggests that several individuals underwent a secondary phase of dispersal and settlement, although data collection is ongoing.

Territories were highly variable in composition but contained more coniferous woodland than expected. On average, they comprised 47.5% grassland (SD = 20.2%), 42.0% woodland (SD = 25.5%), and 11.4% shrubland (SD = 12.3%).

Overall, the findings suggest that pine martens can occupy landscapes with a broad range of woodland availability and structural characteristics. Rather than exhibiting clear thresholds in core area, edge density or connectivity, individuals appear to demonstrate considerable ecological flexibility in habitat use.

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European mink (*Mustela lutreola*) reintroduction in France — first-year results of radio-telemetric monitoring

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Keywords: *European mink; Mustela lutreola; reintroduction; telemetry; conservation*

During summer 2025, the French reintroduction programme of European mink *Mustela lutreola* began in France with the release of ten captive-born individuals. To assess the success of the operations, it is essential to know what happens to the released animals during the first year — whether dispersion, survival or reproduction.

Young mink were released after 15 days of acclimatisation in pre-release enclosures (see relevant communication) and we chose to monitor all of them by radio-telemetry, using intraperitoneal VHF transmitters. We faced many challenges and two different strategies were implemented to adapt the radiotracking protocol to mink's behaviour — for the five first released mink, three daytime locations by triangulation were made from the release, but animals were lost after three days and were never found again despite intensive searches. So, for the next five mink, 24 hours of continuous monitoring was conducted during the first weeks after the release, followed by a decreasing intensity until a single location every day.

We observed different movement behaviours depending on the individuals: some travelled long distances a few days after release (up to 10km in a day), even far from rivers and wetlands; others stayed closer to their release site and to the rivers. However, due to the loss of the first five mink and the death of three others between two and 12 days after release, only two individuals were monitored for a longer period — from September to January and March 2026. Nevertheless, important ecological data to assess their adaptation were collected thanks to the location of their daily resting sites.

These first results allow us to adapt our release and monitoring protocols for the coming years to improve the potential success of the reintroduction programme, which plans to release around 100 individuals until 2031. It also confirmed the need for flexibility in planning and protocols at each step.

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Goodbye American mink, welcome European mink! Working towards a reintroduction in the Netherlands

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Keywords: *European mink; Mustela lutreola; American mink; reintroduction; the Netherlands*

As one of the most critically endangered mammals in Europe, the European mink *Mustela lutreola* needs urgent conservation actions to ensure its survival. Following the ban on American mink *Neogale vison* farms in the Netherlands during the global outbreak of SARS-CoV-2, wild populations of American mink declined rapidly, and the species is now virtually extinct in the country (La Haye & Janssen, 2025). Small founder populations, combined with intensive muskrat *Ondatra zibethicus* trapping, are likely responsible for this. With the European mink's primary threat 'accidentally' removed, a unique opportunity has emerged for a reintroduction in the Netherlands. The European mink could also provide an ecological service by preying on invasive American crayfish.

Over the past years, the Dutch Mammal Society/Mammal Conservation Netherlands has explored a potential reintroduction. A feasibility study concluded that most threats to the European mink in the Netherlands have been mitigated (Lange, 2024). A subsequent habitat suitability analysis (Zwartenkot *et al.*, 2025) identified a considerable number of suitable areas, although their suitability varies depending on factors such as habitat fragmentation and muskrat control intensity. Wetland areas in the north and west of the Netherlands were generally identified as the most suitable for a reintroduction.

The most significant remaining obstacles are remaining muskrat traps and potential challenges related to public perception. A European mink working group has now been established to advance the development of a reintroduction plan. This plan will include the further ecological groundwork for the reintroduction, an extensive stakeholder analysis and the design of a breeding programme. Contacts have been established with zoos, NGOs and land management organisations that have expressed keen interest in the initiative. A European strategy would help to define the Netherlands' responsibility in the recovery of the European mink.

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Using pre-release enclosure for European mink (*Mustela lutreola*) reintroduction in France — first-year feedback

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Keywords: *European mink; Mustela lutreola; behavior; pre-release enclosure; monitoring*

During summer 2025, ten captive-born European mink *Mustela lutreola* were reintroduced into the wild in France. This operation is the first step of a long-term reintroduction project that plans to release around 100 individuals until 2031, in order to initially reconnect the two known residual populations.

The French strategy for European mink reintroduction is to 'soft-release' young mink immediately after separation from their mother, by using pre-release enclosures placed directly on the release sites. Five enclosures of 24m² were built and equipped with a basin (750ml), two artificial shelters and enhanced with natural elements like wood, each receiving only one E. mink at a time. Each enclosure was monitored by camera traps and a daily visit by the French wildlife agency. All mink were released after around 15 days of acclimatisation.

For each European mink, this period in pre-release enclosure was important to check their health and behaviour to ensure their swimming, catching and hunting live prey abilities. Analysis of videos gave us first information about active periods and improvement of movement abilities for young individuals in learning without their mother. Furthermore, few behaviour differences were observed between individuals, with sometimes adaptations needed in the daily feeding protocol or in the release management (eg, access to the pre-release enclosure, food supplies after release).

This first experience gives us a lot of perspectives to improve our pre-release enclosures and also methods and protocols for the next years to maximise the chances of success to European mink adaptation into the wild and so the success of the French reintroduction programme.

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Habitat Suitability Index for the Eurasian otter (*Lutra lutra*) in Germany

[Student Talk]

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Keywords: *conservation, habitat assessment, recolonisation*

Following near extirpation, the endangered Eurasian otter *Lutra lutra* has been gradually recolonising Germany since the 1990s, making robust assessments of habitat quality and connectivity crucial for effective conservation. This is particularly critical given that only 8% of freshwater ecosystems meet the ‘good’ to ‘very good’ ecological status required by the Water Framework Directive (WFD), which poses a significant constraint for otters that depend on high-quality habitats. As an umbrella species, the conservation of the otter and its habitat benefits numerous other species and freshwater ecosystem services, thereby enhancing overall biodiversity.

Within the nationwide project ‘Germany, Otterland again’, which aims to improve ecological continuity and river connectivity, we developed a Habitat Suitability Index (HSI) for the otter in Germany. The HSI integrates data on aquatic and terrestrial habitat characteristics as well as anthropogenic pressures. Habitat data are derived in accordance with the WFD, ensuring compatibility with established freshwater assessment frameworks. The index is based on published literature on otter habitat requirements and was validated using habitat and otter occurrence data from approximately 1,500 sites, supported by generalised linear models, multivariate analyses and sensitivity analyses.

The positive relationship between otter occurrence and HSI values suggests that the index effectively captures key habitat requirements of the species. However, recolonisation from formerly isolated source populations remains spatially uneven, resulting in patchy and heterogeneous distribution patterns – while some regions approach carrying capacity, others remain still sparsely occupied despite suitable habitat conditions. These findings highlight the importance of considering both habitat quality and population processes when assessing species distributions. The HSI provides a practical and flexible tool for ecological monitoring and conservation planning, supporting multiple survey methods and enabling real-time habitat assessment in the field. It will be integrated into a planning tool to support habitat assessments and identify and prioritise restoration and connectivity measures.

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Individual-based models reveal population recovery and impacts of woodland creation on pine martens (*Martes martes*) in Britain

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Keywords: *reintroduction, woodland creation, individual-based models, pine marten*

Pine martens *Martes martes* are recovering across Britain following legal protection, habitat creation and several successful reintroduction projects to England and Wales. Further habitat creation, in the form of woodland planting, could continue to aid pine marten dispersal and population increases.

In this study, we use an individual-based model to explore the spread of pine martens from reintroduction locations in southwest Britain, and whether woodland creation can be designed to facilitate pine marten dispersal. We calibrated the model using a recently developed method (Malchow *et al.*, 2024) and field data from the reintroductions to ensure we created a robust model for understanding pine marten population dynamics. Our model reveals the success of the reintroduction programme in Britain at a local scale, with some reintroduced populations able to coalesce within 150 years.

Although we explore several woodland creation scenarios, we found that none of them increase the abundance of pine martens or their dispersal capacity. Instead, the biggest factor influencing outcomes is the proportion of woodland in the landscape. Our results suggest that realistic tree planting, in particular patch size, is insufficient to benefit pine martens and highlights the need to protect existing woodlands. Other reintroduction projects could use a similar methodology to predict population coalescence and mitigate habitat connectivity issues.

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The contribution of volunteers to the recovery of pine martens in Britain

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Keywords: *pine martens; volunteering; engagement; carnivore recovery*

Many organisations in the conservation sector rely heavily on volunteers to help achieve their objectives and volunteer engagement is often crucial to overcoming limited resources and a lack of long-term funding availability.

Through the Martens on the Move project, Vincent Wildlife Trust (VWT) volunteers play an instrumental role in supporting pine marten *Martes martes* recovery efforts in Britain, including den box installation, monitoring and maintenance, bait station monitoring and habitat restoration. Volunteers participate in activities local to them, but they contribute to pine marten conservation work being managed at a landscape scale, across county and country borders.

Advancements in technology allow greater participation by volunteers in non-invasive monitoring of an elusive protected carnivore, enabling large datasets on distribution, population establishment, breeding success and behaviour to be gathered.

Empowering volunteers to be confident and self-sufficient, and fostering and supporting their sense of local stewardship, helps ensure a sustainable project legacy. This is achieved through effective training, ongoing support and regular feedback on how their continued contributions are invaluable to wider conservation efforts.

Colloquium Abstracts

Monitoring — methods, challenges and insights



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Keywords: *technology; Mustelidae; citizen science; camera trapping*

Technology is rapidly transforming how we perceive and interact with the natural world. With the advent of the internet, digital cameras and artificial intelligence, we can now collect and share data at unprecedented speeds and spatial scales. These technological advances have greatly enhanced our ability to study mustelids (family Mustelidae), generating new biological insights and expanding opportunities for their conservation.

In this talk, I will highlight two key technological developments. First, I will discuss how digital platforms, smartphones and affordable cameras have enabled the public to document mustelid observations and contribute to scientific research. Such citizen-generated data provide valuable large-scale information that is otherwise difficult to obtain. Drawing on my own work, I will present examples illustrating how the distribution and phenology of weasel *Mustela nivalis*, stoat *Mustela erminea*, and polecat *Mustela putorius* are influenced by snow conditions.

I will then focus on camera trapping, presenting three approaches that I use to monitor these species, as well as pine marten *Martes martes* at a landscape scale. I will describe the development of these methods and demonstrate recent applications that help disentangle the effects of landscape variables and intraspecific interactions on species occurrence.

Finally, I will reflect on how continued advances in artificial intelligence may further revolutionise our ability to study mustelids, opening new avenues for ecological research and conservation.

From elusiveness to evidence: seasonal dynamics in common weasel (*Mustela nivalis vulgaris*)

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Keywords: *Mostela*, monitoring, camera trap, population dynamics, detection probability

Small mustelids play an important role in ecosystems as specialist predators of rodents. However, due to their small size and elusive behaviour, observing small mustelids is difficult, and our knowledge about their population dynamics is still limited and largely based on indirect indices. The development of enclosed camera-trap systems, like the Mostela (Mos & Hofmeester, 2020), has changed these conditions, and long-term non-invasive studies of small mustelid populations are now possible.

From August 2022 until February 2026, we conducted a study on the population dynamics of common weasel *Mustela nivalis vulgaris* in the Central East part of the Netherlands. Our main aim was to study how the relative abundance of weasels in the area developed over time. We placed 17 Mostelas in linear landscape features, on average 275m apart, and checked and supplied fish oil lures to the traps every two weeks.

In total, we obtained more than 1,480 weasel observations. Our results confirm earlier studies showing that daily detection probabilities of weasels in Mostelas are highest at the end of summer/beginning of autumn. Using Royle-Nichols models, we were able to disentangle these fluctuations in detection probability from seasonal changes in relative abundance. This resulted in evidence of seasonal fluctuations in the relative abundance of weasels, which differed between years (shorter or longer peaks), most likely due to differences in field conditions.

Slowly but surely, we are revealing the mysterious ecology of the smallest of predators. We therefore encourage others to start up similar long-term monitoring studies of weasels, ideally as a collaborative network with different researchers within Europe.

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Mapping the Irish Stoat: insights from a two-year citizen science survey

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Keywords: *citizen science, habitat suitability model, species distribution, conservation monitoring*

The Irish stoat, *Mustela erminea hibernica*, is a legally protected subspecies endemic to Ireland and the Isle of Man. Despite this, there is a lack of reliable data on population size, trends and distribution. Stoats are elusive, leave few field tracks and signs, and often avoid the standard monitoring methods used for other mammals. Previous research on the Irish stoat has been limited, primarily in localised, short-term studies.

The Irish Stoat Survey was a two-year citizen science initiative conducted between February 2023 and February 2025. The aim of the survey was to generate baseline data on stoat distribution throughout the island of Ireland. The survey invited the public to report sightings of live or dead stoats, resulting in 1,080 records of Irish stoats submitted, of which 816 were validated.

Analyses assessed potential biases in the dataset by examining correlations with variables such as human population density, distance to settlements, and road networks. Presence data were used to develop habitat suitability and ecological niche models. These models identified key habitats, including bogs and agricultural land, and revealed seasonal variation in habitat preferences. Despite taking urban-area bias into account during analysis, the apparent importance of these areas, alongside the reduced significance of traditionally recognised habitats such as woodlands and open countryside, suggests that sampling bias linked to human activity may have influenced the results.

Further modelling highlighted areas with high predicted suitability but few recorded sightings, indicating priorities for future survey effort and targeted outreach. While citizen science has proven effective for large-scale data collection and public engagement, challenges remain regarding sampling bias. Future studies should focus on validating and refining models using a subsample of survey sites with high habitat suitability but few or no records.

Publishing the unsuccessful — are failures in monitoring methods for martens (*Martes spp.*) underreported?

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Keywords: *pine marten, camera trapping, density estimation, genetic sampling, literature review*

Reliable monitoring methods are essential for understanding the distribution and density of elusive carnivores such as martens *Martes spp.* Camera trapping, often combined with baiting, is widely applied and frequently reported as an effective non-invasive approach. However, its performance may be more context-dependent than the literature suggests.

We applied a baited camera trap setup using elevated platforms (approximately 1.5m above ground) to estimate the density of pine martens *Martes martes* in forest habitats in Germany. Across four study areas (500ha each), 20 camera trap sites per area were deployed between May and December 2025 and checked weekly. In three of the four study areas, a single individual was detected. Other institutions in Germany indicated similar experiences, reporting greater success using alternative approaches.

To contextualise these findings, we analysed the abstracts from the European Mustelid Colloquium from 2013-2024 (N = 233 contributions) for studies addressing density estimation in *Martes* species. The contributions (N = 12) revealed a strong focus on genetic approaches (scat: N = 6; hair: N = 6), while camera-based methods were less frequently represented (camera with individual identification: N = 4; without: N = 2), with several contributions applying multiple methods.

In addition, a search query developed with AI assistance, combining *Martes* species names, density-related terms, and methods was used to conduct a systematic literature search in Web of Science (N = 529 records). These records are currently being screened and classified. The aim is to quantify the distribution of applied methods and the proportion of studies reporting successful applications.

Our findings suggest a potential underrepresentation of unsuccessful or less effective study results. Greater transparency in reporting both successes and failures are essential to avoid the repeated application of ineffective methods and to improve study design across projects and regions.

Monitoring pine martens (*Martes martes*) across Sweden: a multi-site camera-trap study of reproductive timing and population demography

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Keywords: *pine marten; camera trapping; reproductive phenology; individual identification; Sweden*

Understanding reproductive timing and habitat use is essential for the effective and ethical management of wildlife species, particularly those subject to seasonal hunting. In Sweden, the European pine marten *Martes martes* is subject to seasonal hunting, but its reproductive phenology remains insufficiently documented. Much of the available information comes from older studies in one study site or research conducted outside the country. This lack of current, region-specific data complicates the establishment of appropriate hunting periods, particularly when aiming to avoid hunting during lactation and juvenile dependence for ethical reasons.

To address these knowledge gaps, we conducted a multi-site, non-invasive monitoring study using baited camera traps across three geographic zones spanning a latitudinal gradient in Sweden. Cameras were deployed systematically and baited with peanut butter to increase detection probability for this elusive species. Over the study period, we collected spatiotemporal presence data, behavioural observations, and seasonal visitation patterns. These data were used to identify potential indicators of reproductive timing, including repeated visits by females during breeding and rearing periods.

In addition, we explored the potential for individual identification using the distinctive bib marks of pine martens visible in camera trap videos. This approach enabled non-invasive individual recognition and contributed to estimates of population demography. We linked these population metrics to differences in latitude and local climate. The resulting dataset provides a valuable baseline for detecting potential phenological shifts under changing environmental conditions.

This study demonstrates the utility of camera trapping for investigating both reproductive ecology and demography in a cryptic mammal species. By combining geographically distributed fieldwork with non-invasive methods, the project contributes to addressing key knowledge gaps and supports evidence-based wildlife management and policy in Sweden.

Ecological insights into the yellow-throated marten (*Martes flavigula*): habitat use and dietary pattern in the Reserved Forest of Ranikhet, Kumaon Himalayas [Student Talk]

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Keywords: *Yellow-throated marten; Martes flavigula; diet; camera trapping; Kumaon Himalayas*

The yellow-throated marten *Martes flavigula* is a key meso-carnivore in the Himalayan ecosystem, yet its ecological importance as a facultative predator and seed disperser is understudied in human-dominated landscapes. This study investigates the distribution patterns, habitat suitability, and diet of the species within the Ranikhet region of the Kumaon Himalayas, Uttarakhand. Systematic fieldwork commenced in November 2025, using an integrated multi-method approach.

The research work is being carried out within the 2×2 km² grid frame, across 50km² of mixed oak-pine forest at 1800-2100m elevation. Methods included camera trapping 32 stations over 120 trap-nights, systematic scat collection, and direct observations. Study sites encompassed a gradient of human disturbance from relatively pristine forest to areas with moderate anthropogenic activity.

Yellow-throated marten presence was confirmed through camera trap detection at 1 station, 28 direct sightings and indirect evidences (18 scats). Scat analysis revealed a diverse dietary profile with 90% of samples dominated by hair of small mammals including *Muridae* (mouse and rat), *Soricidae* (shrew), and *Leporidae* (India hare), and 10% of samples included bones, feathers and vegetative matter (grass). Martens were detected across an elevation range of 1400-2100m, concentrated in habitat type of mature oak forest with dense canopy cover and minimal human disturbance.

The ongoing analysis includes micro-histology and morphological identification of scats to determine diet composition, alongside the development of a Habitat Suitability Model (HSM) and a Habitat Quality Model (HQM) to quantify the impacts of anthropogenic pressures.

This presentation will discuss the initial distribution trends and the challenges of monitoring a highly mobile, arboreal mustelid in a complex topographical terrain. The final results, incorporating data through June 2026, will provide a comprehensive understanding of how martens persists amidst increasing human encroachment in the Kumaon region, offering vital insights for the conservation of mustelids in the mid-altitude Himalayas.

It's not always black and white: using thermal imaging to monitor badger populations [Student Talk]

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Keywords: *thermal binoculars; thermal drones; badger; Meles meles; density estimation*

Reliable and accurate estimates of wildlife densities are fundamental for effective management, particularly for species at the centre of human-wildlife conflicts. *Meles meles*, the European badger is an example of one such species, acting as a wildlife reservoir for *Mycobacterium bovis*, the causative agent of bovine tuberculosis. Rigorous population data are essential to inform management interventions, and the advent of high quality, affordable thermal imaging technology offers an alternative to indirect population assessments, which can be limited. The aims of this study were to i) investigate and compare the utility of novel population density estimations with traditional methods; ii) provide contemporary population estimations of badgers across sites in Northern Ireland and iii) create and refine a thermal imaging methodology for such population assessments.

An intensive study in a relatively well-enclosed study site with a focal badger population was completed, camera-trap Random Encounter Models (REM); camera-trap distance-sampling; thermal binocular point-transect distance-sampling; thermal binocular viewshed counts and thermal drone counts were compared. Within this site, estimated badger densities varied 18-fold among methods from 1.02 badgers/km² using camera-trap REM to a minimum number alive of 18 badgers/km² using thermal imaging drone surveys. Thermal binocular densities revealed a significant negative relationship between density and viewshed area, a survey area of 0.32km² was found to be optimal to equate to drone estimates. Thermal equipment consistently recorded higher detections and reliable counts, a pattern that continued across an extensive survey completed across 12 additional sites where a mean badger density of 25-30 badgers/km² was captured using thermal binoculars across sites dominated by farmland, a density that is 5-6 times higher than expected based on the last badger survey carried out using indirect methods that was completed in 2012 (Reid *et al.*). We thus show that thermal imaging technology maximises detectability, proving itself as a rapid and effective non-invasive method.

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How many? Estimating the number of bridges required for otter surveys

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Keywords: *Lutra lutra*; survey methods; spraints

Since 2000, the IUCN standard method to survey the Eurasian otter *Lutra lutra* is being used throughout Europe. By applying this method, a grid of 10x10km cells is set and within each cell four transects of 600m length along the riverbank are surveyed for otter signs, eg, spraints. Traditionally, the transects are evenly distributed, eg, one in each of the subdivided 5x5km cells. As spraints are often overlooked on transects, some surveys rely exclusively on searches underneath bridges, representing a deviation from the standard survey protocol. To date, the survey effort required for this method is not known.

We aimed to estimate the number of bridges in 5x5km cells required to be surveyed to verify otter presence. In 63 cells covering areas in Switzerland and neighboring areas where otter presence was known, all bridges were identified using QGIS. Bridges over waterbodies of less than 0.8m width or in/above slopes of more than 30° were excluded. The remaining 2,235 bridges were visited and evaluated for their suitability as otter marking sites, resulting in 685 suitable bridges. Within each cell, all suitable bridges were then examined on the same day but independently by a human observer and a detection dog team for spraints and footprints. Site occupancy models were used to estimate the required number of surveyed bridges for humans and detection dogs.

Mean detection probability of spraints with constant estimated occupancy underneath bridges was 0.75 (SD=0.021) for humans and 0.98 (SD = 0.007) for detection dogs. By considering occupation and detection probability, our results enable us to calculate a range of number of bridges that is needed to detect otters in occupied 5x5km cells. With this, our study contributes to a potential standardisation the otter survey relying exclusively on bridge searches.

When legislation meets reality: can we reliably assess the conservation status of highly dynamic mustelid populations using trapcams? A power analysis using occupancy modelling

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Keywords: *trapcam; Mustela, conservation status, power analysis, occupancy model*

Background Small mustelids (*Mustela* sp.) are elusive, not only in the field but also in conservation assessments. In the Netherlands, the weasel, stoat and European polecat are strictly protected at the national level, while provinces are responsible for implementing and enforcing these protections locally. To grant exemptions, provinces must demonstrate that a ‘favourable conservation status’ is maintained. To support this requirement and allow for exemptions where mustelid protection conflicts with meadow bird conservation, the province of Friesland initiated a large-scale monitoring scheme based on a camera trap grid, targeting small mustelids. Since 2021, 166 camera traps have been deployed annually between mid September and early November.

Aim Using the resulting dataset, we assessed whether this monitoring approach is sufficient to detect changes in population distribution that are required to evaluate conservation status.

Methods We quantified yearly dynamics in the distribution of these species based on observations collected between 2021 and 2024. Using this data, we simulated a range of population trends, from mild to extreme long-term changes, while incorporating the observed annual fluctuations. We then applied occupancy modelling to estimate the probability of correctly detecting these trends after monitoring periods of 10 and 20 years.

Results/Findings Our power analysis shows that short-term population dynamics, which are linked to vole cycles, strongly limit the detectability of long-term trends of small mustelids, where even intensive monitoring is unlikely to reveal realistic changes. Only extreme shifts (exceeding 10% annual changes in distribution) become detectable with sufficient confidence, and only after many years.

Conclusions/Implications Real-world mustelid populations are highly dynamic, in a direct response to a highly dynamic environment. Our findings indicate that generally accepted methods for estimating a population’s conservation status may fall short in establishing reliable numbers on the fine scale that legislators need for species management.

Monitoring mustelids in mountainous terrain: comparison between snapshot Europe and ENETWILD protocols in Babia Góra National Park, Poland [Student Talk]

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Keywords: *camera trapping; spatial sampling bias; mustelids*

Camera trap (CT) deployment strategies significantly influence estimates of animal abundance and spatial distribution. In rugged terrains like dense mountainous forests, flexible deployment protocols from Snapshot Europe (Max Planck Institute of Animal Behavior [MPI-AB], 2025) offer major logistical advantages by granting researchers the freedom to select accessible locations. Conversely, systematic, grid-based designs like from ENETWILD (ENETWILD-consortium *et al.*, 2022) impose strict spatial requirements that can be difficult to deploy in such landscapes. We aimed to evaluate how this practical trade-off between deployment flexibility and systematic sampling affects estimates of relative abundance index (RAI) and naive occupancy for two mustelid species: the pine marten *Martes martes* and the European badger *Meles meles* (Greco *et al.*, 2025).

The research was conducted in Babia Góra National Park, a mountainous region (1071-1725m a.s.l.) with 85% forest cover. From 2021 to 2024, we applied the flexible Snapshot Europe protocol (N=10-19 locations annually), which frequently resulted in clustered deployments. To determine if this random sampling design led to spatial bias, we adopted the systematic ENETWILD methodology in 2025, expanding coverage across the entire park area (N=36 locations).

While the 2024 Snapshot Europe design yielded high detection rates in active locations (overall RAI=6.67; 11 sites), it lacked spatial coverage. Conversely, the 2025 systematic ENETWILD methodology detected mustelids at 16 unique locations, causing naive occupancy to drop from 0.73 in 2024 to 0.44 in 2025. Species-specific trends mirrored this pattern, with RAI peaking in 2024 and dropping in 2025 for both the pine marten (4.76 to 2.19) and European badger (1.90 to 1.02).

This indicates that the unbalanced CT distribution produces spatial sampling bias, whereas a grid distribution is more robust. For future research, we recommend the use of systematic sampling for deploying camera traps.

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Implications and insights from meso-carnivore monitoring using a systematic approach for camera trapping [Student Talk]

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Keywords: *pine marten; mustelids; REM*

The aim of the study was to monitor wildlife in Niepołomice Forest in southern Poland, using the EOW standardised protocol within the ENETWILD international collaboration. The protocol allows for faster camera trap data processing and animal densities estimation using the Random Encounter Model (REM).

The fieldwork was conducted in July-August 2024 and 2025 at 40 fixed locations arranged on a 1.5km grid using systematic sampling, avoiding trails. Cameras were calibrated for distance and angle to support movement and density estimation. Data were processed using the Europe V4-5 AI model on the Agouti platform, manually verified, and animal movements were digitally tracked. Analyses of movement (direction, speed) and activity levels were performed in R using *camtrapDensity* and *camtrapr* packages.

A total of 727 captures were recorded in 2024 and 1537 in 2025. Ungulates dominated, with red deer *Cervus elaphus* comprising 45% of records. Mesocarnivores accounted for 9%, and mustelids – pine marten *Martes martes* and European badger *Meles meles* – for 6% of total records. Trap rates for all species increased between years, with pine marten capture rates increasing from 0.02 to 0.04 and for badger from <0.001 to 0.03 respectively. Density estimates increased from 0.10 to 0.17 individuals/km² for pine marten and from <0.001 to 0.84 individuals/km² for badger. Other meso-carnivores included red fox *Vulpes vulpes* (n=65 records) and raccoon dog *Nyctereutes procyonoides* (n=16 records, recorded only in 2025).

The captures of mesocarnivores increased and shifted towards the northeastern part of the study area between the years. The temporal analysis showed martens were most active during the day and dusk, while badgers were active at dusk and night. There was also an increased spatial overlap between martens and red foxes from 2024 to 2025. Higher mustelid capture rates indicate a healthy, viable population. Future continuation of the research would help us in understanding the long-term population trends.

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Keywords: *polecat; Mustela putorius; citizen science; monitoring scheme; recovery*

Vincent Wildlife Trust's (VWT) National Polecat Survey uses a citizen science-driven approach to collecting data on the European polecat *Mustela putorius*, an elusive and under-studied small carnivore still recovering from historical persecution and near extinction in Britain. The survey aimed to map the current distribution of polecat, hybrid polecat-ferret *Mustela putorius x Mustela furo* and feral ferret *Mustela furo* in Britain by appealing to members of the public to report sightings of polecat-type animals. Starting in the 1990s, the survey is repeated every ten years to monitor polecat recovery and update current knowledge of the species' distribution and conservation status. Reported sightings were collated from several communication channels and underwent a verification process using information provided by the recorder.

VWT's three previous National Polecat Surveys successfully demonstrated the value of citizen science data collection and mapping a species that is otherwise difficult to detect using traditional methods, particularly at a landscape scale. A total of 2,362 records were collected, verified and analysed during the most recent survey. The types of records received significantly changed – live sightings contributed to over half of records in this survey, replacing road casualties as the most common record type in previous surveys. The number of hectads (10x10km squares) containing polecat records increased by 13% since the last survey in 2014-2015. The proportion of polecat, polecat-ferret, feral ferret and undetermined (unclassified) records were similar to the previous survey, but changes were observed in the proportion of polecats vs hybrids in each British Vice County [described as Polecat Purity Zones (Croose, 2016)]. The survey has once again demonstrated further polecat range expansion in Britain since the previous survey ten years prior, and the value of citizen science in monitoring an 'elusive' mammal.

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Estimating fisher (*Pekania pennanti*) survival and space use following a population decline in New Hampshire, US [Student Talk]

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Keywords: *fisher; survival; radio-collar; mortality; rodenticide*

Fisher *Pekania pennanti* are an important game species and can serve as a bioindicator for the structure, function and health of northern temperate and boreal forests. In the last 100 years, populations of fisher in New Hampshire, USA, have fluctuated, with data from harvested fisher showing a substantial decline in the last two decades. Other regional studies have suggested that fisher declines may be caused by predation, vehicle collisions, disease and/or toxicity from anti-coagulant rodenticides.

To better understand New Hampshire's fisher decline, we conducted the first statewide fisher survival study by live trapping and deploying GPS radio-collars on 49 individuals from August 2024 to March 2026. We used a Cox proportional hazards model to evaluate the effects of sex and region on survival. The model estimated annual survival rate was 0.52 (CI: 0.35-0.76). Annual survival rate of males was 0.54 (95% CI: 0.35-0.84), slightly higher than that of females at 0.50 (CI: 0.28 -0.86). Annual survival of northern fisher was 0.43 (CI: 0.23-0.80), and lower than fisher in the south at 0.59 (CI: 0.40-0.89).

These results suggest that New Hampshire fisher populations are maintaining a low but stable population density statewide, indicating that the population may be in a trough. This research contributes to the understanding of mortality and space use in a low-density fisher population and will help inform ongoing management, including harvest regulation.

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TRAPPER AI — a scalable, open-source camera trap data infrastructure for professional and citizen-science projects

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Keywords: *big data; GBIF; camera traps*

Camera trapping has become a vital tool in ecological research, but the exponential growth of camera trap data presents significant challenges in managing, analysing, and sharing large and complex datasets. To address these challenges, we have been developing TRAPPER (Bubnicki *et al.*, 2016) for the last ten years, an innovative, fully open-source web application tailored to the demands of modern biodiversity monitoring.

TRAPPER supports the analysis of both videos and images, incorporates advanced spatial filtering and webmapping tools, and allows flexible implementation of custom data protocols to meet diverse project needs. Its newly designed, user-friendly dashboard welcomes and actively engages citizen scientists, making participation intuitive and accessible.

TRAPPER supports three storage options: widely available cloud storage, secure local storage for institutional needs, and portable, pre-configured field micro-servers to improve access in low-resource environments. A standout feature of TRAPPER is its integration of AI tools like MegaDetector for automated detection of animals, humans, vehicles, and empty frames, alongside support for custom species-specific models such as DeepFaune.

Additionally, the platform provides robust human annotation functionalities, enabling high-precision data validation. TRAPPER is designed to streamline data sharing and interoperability by implementing the Camtrap DP standard, a key framework for standardised data exchange in camera trap projects, already utilised by GBIF. TRAPPER's multi-user and role-based structure facilitates collaborative work on camera trapping projects among researchers, NGOs, and empowering citizen scientists.

The platform has already been widely adopted by institutions and organisations across Europe, with increasing uptake in America. By addressing critical challenges in data management and promoting open science practices, TRAPPER offers a transformative solution for advancing biodiversity research and conservation efforts.

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Colloquium Abstracts

Threats and solutions



Traps, cameras, drones and dogs — monitoring progress of stoat eradication in the Orkney Islands

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Keywords: *invasive predator; AI-assisted thermal cameras and drones; monitoring techniques*

The Orkney Archipelago, situated off the northern coast of Scotland, is renowned for its unique wildlife. The arrival of stoats in 2010 presented a profound threat to indigenous species that had persisted in the absence of mammalian predators. In response to this concern, Scottish Natural Heritage (now NatureScot) and the Royal Society for the Protection of Birds initiated the Orkney Native Wildlife Project in 2016, aiming to eradicate stoats across the archipelago to preserve native biodiversity. As one of the largest invasive predator removal programmes globally, it entails the near-synchronous deployment and maintenance of around 8,000 humane lethal traps. Intensive trapping operations began in Orkney in 2019 and are projected to persist until 2029.

Trapping serves as the primary data source for monitoring eradication progress, providing not only stoat capture numbers but also demographic insights into the population's sex ratio and age structure. These data can inform statistical models that yield direct estimates of population size. Public sightings of stoats, reported via a dedicated website, supplement this information.

The Orkney Native Wildlife Project has deployed Europe's first team of stoat-detection conservation dogs, trained specifically to identify stoat signs or scents, enabling confirmation of stoat presence or absence. The presence of trap-reluctant individuals can also be verified using camera-traps, AI-assisted thermal cameras and drones. Additional efforts leverage individual variation to enhance detection probability, such as through sensory attractants in baits or floating bait stations.

These monitoring techniques serve not only to track eradication progress but also as components of biosecurity protocols, thereby preventing stoat incursions onto new islands and their recolonisation following successful eradication. In addition, the integration of advanced detection methods is essential for detecting elusive stoats and bolstering monitoring efficacy, thereby enabling targeted response trapping for individuals that evade the standard trap network. Moreover, citizen science fosters community engagement, which is essential for long-term ecological restoration, as multi-stakeholder environmental management demands local involvement to minimise the risk of reinvasion from unmanaged areas.

The Orkney Native Wildlife Project represents the world's largest stoat eradication effort in an inhabited landscape, constituting a pioneering effort in numerous respects. Accordingly, it serves as a testing ground for diverse monitoring techniques with potential applicability elsewhere in invasive species management.

Too hot to handle: climate-driven northwards shift in Iberian mustelids' distribution [Student Talk]

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Keywords: *mustelids; climate change; suitability; SDM; shift*

Climate change is a significant threat to biodiversity, impacting a diverse range of species across various ecological scales. Mesocarnivores are particularly affected due to bottom-up and top-down cascading effects (Marneweck *et al.* 2022). Many mustelids found in the Iberian Peninsula at the edge of their European range, are facing new challenges linked to environmental shifts and anthropogenic pressures, making these populations of conservation interest (Perrier *et al.* 2026). Some mustelids are expected to decrease their range due to climate change, and there are few studies regarding this shift in Europe (Valdez *et al.* 2025).

We modelled the suitability of six mustelid species *Martes foina*, *Martes martes*, *Meles meles*, *Mustela erminea*, *Mustela nivalis* and *Mustela putorius* using spatially nested species distribution models, accounting for niche truncation (Mateo *et al.* 2024). We collected presence records from available databases and ongoing research. Our approach consisted of an ensemble of gradient boosting, random forest and maximum entropy models. We built a bioclimatic global-scale model that was hierarchically integrated into a regional-scale model calibrated using only land-use and topographic variables. Then, we projected these species' suitability in the Iberian Peninsula until the end of the current century, for two different high-emission scenarios (SSP 3.70 and 5.85).

For all species, climate had a strong influence on their future projected suitability. Within Iberia, species already geographically restricted will see their range further shrink northwards – especially the pine marten. For all Iberian mustelids, suitability will decrease until the end of the century, in both scenarios. The Iberian Peninsula is predicted to experience longer drought periods and warmer seasons, mainly in the centre and southern regions (Andrade *et al.* 2021). As such, it is of the utmost importance to understand where these species can find refuge in the near future and where conservation efforts should tackle their actions.

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Marbled polecat (*Vormela peregusna*) in the Balkans — distribution, habitat preferences, pressures and future threats in Bulgaria and Romania

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Keywords: *dry grassland-specialist; mustelids; roadkill mortality; Variable Renewable Energy; conservation*

The Balkan sub-population of *Vormela peregusna* is one of only two isolated European sub-populations of the species. Despite its vulnerability, conservation measures for this mustelid are still insufficient due to lack of data on its present distribution, ecological requirements or threats in this part of its range.

We used data from 163 recent records of the species from Bulgaria (N=92) and Romania (N=71) to map its current distribution on a territory representative of the Balkan sub-population. The regional habitat preferences of the species have been revealed by using GIS. The presence points were intersected with layers with the chosen environmental parameters.

Six types of open area and one forest type were identified as most preferred by the marbled polecat, non-irrigated arable land being with the highest share. Based on our analysis, we argue that road infrastructure, solar and wind power plants are among the most important factors threatening the survival of *V. peregusna* populations in our region. The temporal distribution of the species' records suggests an increase in activity/density during the spring-summer period, with a peak in July. Roadkill mortality is concentrated in July and September. Approximately half of the species' registrations (47%) and almost a third of the roadkills (28.9%) were registered inside protected areas.

The large share of data on the species' presence and anthropogenic mortality outside protected areas indicates relatively weak protection of its population in the region. Joint efforts of the scientific, government and non-governmental communities from all Balkan countries are needed to develop a comprehensive and effective strategy for the conservation of the Balkan subpopulation of *V. peregusna*.

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The underappreciated apex: reviewing the ecological role and conservation status of the yellow-throated marten (*Martes flavigula*) across the Himalayan and East Asian bioregions

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Keywords: *yellow-throated marten; Martes flavigula; protected areas; human footprint; spatial analysis*

The study aimed to assess comprehensive distribution and conservation status of yellow-throated marten *Martes flavigula*, Asia's largest arboreal mustelid. We compiled 1,678 occurrence records from the GBIF across 17 countries of Asia. Additionally, we synthesised (49) published studies (2000-2025) to assess research effort, threat patterns and conservation priorities. Using QGIS software, we conducted spatial analyses overlaying occurrence data with the World Database on Protected Areas, Human Footprint Index and digital elevation models.

Literature synthesis revealed concentrated research effort in China, India and South Korea with 7, 6 and 15 studies respectively, with geographic bias towards the Himalayan arch and the Northern edge. Primary research studies included camera trapping (20.8%) and diet studies (16.6%). Only a couple of studies have worked on the threats that are mainly the effect of climate change, habitat loss and illegal hunting. Spatial synthesis via QGIS exposed a stark conservation disparity: with 90.4% (n=1,380) of occurrence records outside Protected Area (PA) networks. National-level protection varied significantly with highest (27.1%) coverage in Indonesia. Kernel Density Estimation (KDE) identified three core bioregional hotspots – the Eastern Himalayas, Mainland Southeast Asia and the Taiwan-Eastern China corridor – which harbour 63.9% of all records despite representing only 23.6% of the potential range.

The species exhibited remarkable altitudinal plasticity (0-5,569m), yet the high density of occurrences in lowland habitats (41.3%) coincides with elevated Human Footprint Index values (mean = 12.3). The significantly lower anthropogenic pressure recorded within PAs (10.2) suggests that existing networks act as critical refugia, yet they remain insufficient to safeguard the species lowland populations. We conclude that current 'Least Concern' listings mask significant regional vulnerabilities and priority must be given to expanding PA networks and intensifying survey efforts in the neglected tropical lowlands of Southern Asia to mitigate the threats of habitat loss and climate change.

The role of the EEP in European mink conservation

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Keywords: *conservation breeding, translocation, adaptive management, metapopulation*

In response to the critical conservation status in the wild of the European mink *Mustela lutreola*, and under the European Association for Zoos and Aquaria European Ex situ Programme (EEP), Tallinn Zoo started a conservation breeding programme for the species more than 25 years ago with the aim to serve as a reservoir to prevent extinction and to support conservation translocation actions. With few isolated and declining populations in the wild (fewer than 5,000 individuals estimated today) captive-breeding and conservation translocations are critical to the survival of this species. From the first releases in Estonia (in Hiiumaa island), the EEP has grown to include three other dedicated breeding centres (one in Germany and two in France) that actively support reintroductions there, as well as expanding release projects within Estonia (to Saremaa island).

Here we focus on the Estonian project to showcase results of long-term efforts since the first releases, covering adaptation of captive-bred individuals in the wild to population establishment, trends and conservation management. We provide an overview of the successes and challenges experienced, highlighting the roles of continuous (adaptive) management and research to ensure that conservation translocations sourcing captive-born European mink are a useful component of the toolkit for maintaining this species in the wild. Long-term coordination effort and investment are required to apply the One Plan approach across the different breeding programmes and release operations, and create an effective metapopulation linking ex situ and in situ populations and all conservation interventions under one roof to ensure the survival of the European mink in the wild and avoid further long-term irreversible damage.

Badger vaccination as a complementary tool for controlling bovine tuberculosis: eco-epidemiological analyses of a trial in low-to-medium-density contexts in France [Student Talk]

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Keywords: *Meles meles*; *Mycobacterium bovis*; wildlife vaccination; disease control; field trial

In areas surrounding bovine tuberculosis (TB) outbreaks in cattle, European badgers *Meles meles* can significantly contribute to *Mycobacterium bovis* circulation within multi-host systems (Delahay *et al.* 2001). Once infected, badgers may shed *M. bovis* into the environment, posing a risk of reinfection in cattle. If France is still an official TB-free country with less than 0.01% of bovine herds infected, the prevalence in badger population may be quite high in some bovine infected areas (Calenge *et al.* 2024).

Control measures include reducing badger population densities around pastures from affected herds. These culling measures have notable epidemiological, operational, ecological and ethical limitations. Thus, vaccination emerges as a promising tool, in addition or as alternative for culling, to reduce the circulation of *M. bovis* in endemic areas, as demonstrated in the Republic of Ireland, England and Northern Ireland (Aznar *et al.* 2017 ; Smith *et al.* 2020 ; Arnold *et al.* 2021).

From 2023 to spring 2026, a study evaluating the use of injectable vaccination as a complementary measure in controlling TB in badger populations was conducted in two endemic areas in southwest France. The final goal was to develop a strategy combining the targeted culling of infected badgers with the vaccination of the remaining population. Specific objectives included assessing operational feasibility, estimating implementation costs and measuring the effects on badger and cattle infection rates over four years.

We will present a comprehensive review of the project, including trapping efforts, associated costs, vaccination coverage rates achieved and main challenges encountered. Given that the ecological, epidemiological and operational conditions of the project differ from those in Great Britain and Ireland, we will outline how vaccination strategies can be adapted and extended to a wider range of contexts, which could prove useful for potential other European partners.

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A requiem for the winter games mascot: snow loss and prey mismatch threaten alpine stoats [Student Talk]

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Keywords: *climate change, Alps, mismatch, camouflage, predator-prey*

Climate change is profoundly reshaping mountain ecosystems, forcing cold-adapted species to shift upslope as suitable climatic conditions retreat to progressively higher elevations. These climate-driven range shifts may differentially affect predators and prey, potentially disrupting tightly linked ecological interactions. In this study, we investigated the potential impact of climate change on the stoat *Mustela erminea*, a small mustelid whose seasonal white coat relies on snow cover for camouflage, and its specialized prey, the snow vole *Chionomys nivalis*, in the Italian Alps.

Using occurrence records and an ensemble of Species Distribution Models, we projected current and future distributions under the high-emission IPCC scenario RCP 8.5 to 2100. Snow cover duration and snow vole presence emerged as the most influential predictors of stoat distribution, together explaining over 64% of model variance. Our results forecast a severe 36% contraction in the stoat's range, primarily driven by declining snow cover and reduced spatial overlap with its prey, accompanied by an average upward shift of approximately 200m in elevation. In contrast, the snow vole is projected to expand its range by 77%, particularly in the northern sectors of the Alps, while showing only limited altitudinal displacement, thereby resulting in an increasing spatial mismatch between predator and prey.

These findings suggest that, despite its current Least Concern status in Italy, the stoat may warrant reclassification as Vulnerable under IUCN Criterion A3c. More broadly, our results highlight how climate-driven environmental changes can disrupt trophic interactions and threaten moulting species that rely on seasonal camouflage in mountain ecosystems. We recommend the implementation of long-term monitoring programmes and the use of innovative tools to improve stoat data collection. Conservation strategies should prioritise high-elevation habitats and address broader anthropogenic pressures to support the persistence of stoats in a rapidly warming alpine landscape.

What is the future for the Martes complex (*Guloninae*) in the face of climate change and ecological breakdown

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Keywords: *biodiversity loss, climate change, global heating, mitigation, reforestation*

The climate and ecological emergency (CEE) is impacting the natural world with increasing severity, with likely serious consequences for the Martes Complex (*Guloninae*) including range contraction and fragmentation, ecosystem collapse and disrupted inter-species relationships. We assessed the relative vulnerability of each species of *Guloninae* to the CEE based on IUCN listings, threats to preferred habitat, habitat specificity, global range size, and the nature and number of Köppen-Geiger climate zones occupied. This assessment indicated that ten of the eleven *Guloninae* are moderately or highly vulnerable to the impacts of the CEE, and only the stone marten *Martes foina* is of relatively low vulnerability.

We explored biotic and abiotic factors to identify the range of known and likely impacts upon *Guloninae*, with deforestation and wildfires as recurring themes. Mitigation for *Guloninae* should focus on landscape-scale efforts to expand and connect suitable forested habitat, ideally on a north-south axis so as to facilitate predicted range shifts. In anticipation of reduced funding for wildlife research and conservation in an increasingly unstable geopolitical context, the best opportunities for mitigation will likely depend upon influencing the forestry industry and national carbon capture reforestation policies.

Mink in the mist: a novel eDNA assay for early detection of an invasive mustelid

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Keywords: *American mink; IAS; environmental DNA; new assay*

The American mink *Neogale vison* is a widely established invasive alien predator in Europe, originating from escapes and releases from fur farms. Due to its severe impacts on native fauna – particularly predation on ground-nesting wetland birds and amphibians, and competition with the European mink – it is currently included among species of Union Concern under the EU regulation 1143/2014 (Bonesi, L., & Palazon, S., 2007; Tedeschi, L., *et al.*, 2022).

Monitoring this elusive carnivore remains challenging, as traditional survey methods are often labour-intensive, costly and highly dependent on field expertise, especially during the early stages of invasion. Environmental DNA (eDNA), consisting of genetic material released by organisms into their surroundings, provides a non-invasive and cost-effective alternative for detecting rare or cryptic species (Taberlet, P. *et al.*, 2012; Thomsen, P. F., & Willerslev, E., 2015). We developed a species-specific TaqMan quantitative PCR (qPCR) assay to support early detection and monitoring of the American mink across European freshwater systems.

The assay was first evaluated *in silico* to verify amplification efficiency and to exclude potential cross-amplification with other European mustelids. Subsequent *in vitro* validation was conducted using tissue samples from the target species and sympatric mustelids inhabiting the same freshwater habitats. Finally, field testing (*in situ*) involved eDNA extracted from water samples collected at six sites of ascertained presence in Sardinia, alongside additional eDNA samples from sites hosting other mustelids to assess specificity.

Positive amplification was obtained at three of the four tested sites, with no evidence of cross-amplification, confirming both the sensitivity and specificity of the assay. Further validation was carried out in potential areas of occurrence in Molise and in the Foreste Casentinesi National Park, obtaining one new record of occurrence. Overall, the assay represents a robust and promising tool for the early detection and monitoring of *N. vison*, with potential application across European freshwater ecosystems.

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The impact of otter grids in fykes on the European Water Framework Directive metrics

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Keywords: *otter (Lutra lutra); stop grids; fyke; European Water Framework Directive*

The use of fykes for fishing is prohibited in Belgium. However, under certain conditions they are allowed for research purposes such as scientific monitoring for the assessment of Ecological Quality Ratio (EQR) indices, representing the ecological status of surface waterbodies, as mandated by the European Water Framework Directive. Currently otters are slowly returning to Belgium, yet only a handful of individuals have settled. At this stage any accidental mortality of an otter in a fish fyke is problematic, representing a significant conservation concern.

Methods exist to modify fish fykes in order to avoid accidental by-catch of otters such as escape mechanisms in the cod-end or grids to prevent entry. Escape mechanisms have been proven successful under controlled conditions (Reckendorf *et al.*, 2023) although, they may weaken fyke structure and complicate maintenance. It remains uncertain what the impact on a wild otter might be when one is struggling to escape a net. Preventing otters from entering fykes all together by placing an exclusion grid at the entrance may therefore be a more reliable approach.

To exclude otters, grids with a mesh size of 85x85mm can be installed at the entrance. However, a grid of that size, also prevents larger fish from entering the fykes and consequently affect standardised monitoring and reporting for the Water Framework Directive. Field trials comparing fykes with and without exclusion grids evaluate differences in fish species assemblages, biomass and length-frequency distributions. This data will be used to convert catches to ecological quality standards required for reporting for the European Water Framework Directive. This approach will determine whether otter safe fykes could be implemented without compromising required ecological assessments.

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Using the Conservation Standards to plan, implement and monitor conservation of threatened mustelids

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Keywords: *best practice; adaptive management; theory of change; conservation interventions; Conservation Standards*

Effective conservation requires robust planning, monitoring, review and adaptive management to facilitate success. Strategic processes to help achieve project planning and delivery are customary in other sectors – however, using a clearly defined systematic planning and review process within the conservation sector is less commonplace.

Developed by the Conservation Measures Partnership, the Conservation Standards are an adaptive management framework that bring together common concepts, approaches and terminology for conservation project design, management and assessment. The aim is for the provision of an open-source approach that encourages best practices for conservation work. This five-step system aims to guide conservationists through assessing the current situation, determining the best courses of action through developing theories of change, followed by ongoing monitoring of progress and impact, then using adaptive management to adjust approaches where required.

Vincent Wildlife Trust has adopted use of the Conservation Standards across the organisation. Here we share the process undertaken to plan our approach for species requiring conservation interventions, such as pine martens *Martes martes*, polecats *Mustela putorius* and European mink *Mustela lutreola*, and for data-deficient species such as stoats *Mustela erminea* and weasels *Mustela nivalis*. We will also illustrate how using the Conservation Standards is facilitating the tracking of achievement of our short- and long-term objectives and outcomes for these species.

Mitigation translocation of polecat (*Mustela putorius*)

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Keywords: *mitigation translocation, meadow bird conservation, open landscapes*

The black-tailed godwit *Limosa limosa*, a ground-breeding meadow bird, has been declining rapidly and faces an increasing risk of extinction. Monitoring of over 5,500 nests using camera traps, combined with GPS tracking of stone martens and meadow bird chicks, showed us that in some areas polecats *Mustela putorius* are responsible for a substantial proportion of nest losses. While other predator species may be managed under specific conditions, such measures are not appropriate for the polecat, as it is itself threatened and listed as Vulnerable on the Red List of threatened mammals.

As a pilot study, an alternative approach, mitigation translocation, was tested. Three male polecats were captured in areas of high conservation value for meadow birds, fitted with GPS loggers and translocated via cold release to an area of lower conservation value. As a reference group, three additional polecats were tagged and monitored in meadow bird habitats but were not translocated. The study aimed to assess site fidelity after release, compare spatial behaviour between groups and evaluate differences in space use and habitat selection.

All translocated individuals left the release site rapidly and moved towards open meadow habitats resembling their original capture locations. In these open landscapes, polecats used ditch banks, often lined with reed, as well as road ditches and human paths for movement. The animals did not avoid farmyards. However, data collection was limited as collars were shed after two weeks, and in one case within a few hours.

Colloquium Abstracts

Behaviour, ecology and evolution



Population structure of stoats in Switzerland using genome-wide sequencing

[Student Talk]

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Keywords: *stoat; population genomics; conservation genetics; monitoring; connectivity*

The stoat *Mustela erminea* is an elusive small mustelid whose population ecology remains poorly understood due to the challenges associated with conventional monitoring approaches. In Switzerland, knowledge of its population status and trends is therefore largely based on expert opinion, highlighting the need for complementary methods to improve inference. Genetic approaches offer a powerful addition to existing monitoring tools by enabling the assessment of population structure, connectivity and demographic processes that are otherwise difficult to quantify.

In this study, we investigate the population genetics of stoats across Switzerland using genome-wide sequencing data. We assembled a nationwide collection of over 90 recent tissue samples through a combination of citizen science initiatives, collaboration with practitioners and museum collections. DNA was extracted and sequenced to generate genome-wide single nucleotide polymorphism data.

Using these data, we assess genetic differentiation among regions, test for population structuring and evaluate patterns of connectivity across the landscape, including the potential role of major geographic features such as the Alps. In addition, we examine isolation by distance and explore signals of demographic history to provide context for current population patterns.

This work represents the first population genomic assessment of stoats in Switzerland and contributes to a growing body of research applying genetic tools to small mustelids. Ultimately, these findings will help inform conservation and management strategies in human-dominated landscapes.

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Stoat (*Mustela erminea*) dynamics in a changing Arctic: responses to shifting lemming cycles in northeast Greenland [Student Talk]

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Keywords: *long-term monitoring; predator-prey dynamics; arctic tundra*

This study evaluates long-term predator-prey dynamics and monitoring approaches for stoats *Mustela erminea* in a High Arctic ecosystem in Northeast Greenland. Using a unique dataset spanning 1988-2026 from the Karupelv Valley, the study aims to assess changes in lemming population cycles and to identify environmental drivers of stoat winter nest use.

Lemming winter nest counts of the collared lemming *Dicrostonyx groenlandicus* were analysed to estimate population dynamics and their influence on stoat predation. Spatial analyses incorporated topography and vegetation data across a 15km² study area. Generalised linear and zero-inflated negative binomial models were applied to identify predictors of stoat-occupied nests.

Results show that historically strong four-year lemming cycles collapsed around 2000, likely linked to climate change, followed by a period of reduced and irregular fluctuations. Since 2010, cycles have partially re-emerged with lower amplitudes. Stoat dynamics closely tracked lemming abundance, showing delayed numerical responses. At the spatial scale, the number of lemming nests was the primary predictor of stoat nest occurrence. Vegetation effects were secondary, with *Dryas* heath positively associated with predation, while elevation, floodplain vegetation and sand dunes showed weak negative effects.

These findings highlight the vulnerability of Arctic mustelid populations to climate-driven prey cycle disruption and demonstrate the value of long-term monitoring for detecting ecosystem-level change. The study advances predictive modelling of stoat distribution and supports the development of scalable, non-invasive survey methods relevant to mustelid conservation in remote environments.

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Sharing space, avoiding time: how *Martes* coexist with humans and domestic cats

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Keywords: *mesocarnivores; camera trap; interspecific interactions; forest; occupancy*

Understanding how small carnivores persist in landscapes increasingly influenced by humans is central to their conservation and management. Across Europe, the expansion of human activities and the presence of domestic animals are requiring species to adapt their spatial use and temporal behaviour. Large-scale coordinated monitoring initiatives, such as the Snapshot Europe initiative, provide a unique opportunity to investigate coexistence mechanisms across diverse ecological contexts.

We investigated spatial co-occurrence and temporal overlap in activity patterns of *Martes* spp., humans and domestic cats *Felis catus* using camera-trap data collected across 12 study areas and monitored over two consecutive years in 11 European countries within the Snapshot Europe survey during 2021-2022. Detection/non-detection data were analysed using multi-species occupancy models to estimate species-specific occupancy and pairwise co-occurrence while accounting for imperfect detection. Temporal activity patterns were modelled using trigonometric hierarchical models to quantify diel partitioning among species while accounting for sampling effort and site variability. We also assessed whether detection rates were associated with anthropogenic pressure, quantified as the Human Footprint Index (HFP-100).

Multi-species occupancy models showed no evidence of spatial avoidance between *Martes* spp. and either humans or domestic cats. Estimated occupancy probabilities were moderate for *Martes* spp. and domestic cats, and high for humans. Pairwise co-occurrence estimates were also moderate, suggesting spatial independence. Detection rates of *Martes* spp. were not associated with HFP-100, indicating stable spatial use across the anthropogenic gradient.

In contrast, activity pattern analyses revealed marked temporal segregation between *Martes* spp. and humans, with *Martes* detections being predominantly nocturnal and human detections largely diurnal. Hierarchical models supported moderate temporal shifts in *Martes* activity in response to human presence. *Martes* spp. and domestic cats exhibited substantial nocturnal overlap, with no evidence of temporal partitioning. These results suggest that temporal segregation is a key and general mechanism facilitating coexistence with humans across European landscapes.

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Stoats at scale: unravelling orders of habitat selection in the Netherlands

[Student Talk]

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Keywords: *Mustela erminea*; distribution; abundance; telemetry; movement

Understanding how animals select habitats across spatial scales provides crucial information about both ecology and conservation. Habitat selection is often considered a hierarchical process consisting of different orders, ranging from broad geographical distributions to fine-scale habitat and resource selection. Here, we present preliminary results from an ongoing project on habitat selection of stoats *Mustela erminea* across multiple scales in the Netherlands, a country where stoat populations are thought to be declining and where the species recently became red listed.

Using a variety of methods and analyses, we study the first, second and third orders of selection as defined by Johnson (1980). For the first order, we used species distribution models (SDMs) combined with current and historical observation records and land-use data to identify how the distribution of stoats across the Netherlands has been shaped both temporally and spatially. For the second order, we deployed enclosed and unenclosed camera traps in a grid design in two agricultural areas to identify how landscape composition, prey availability, and predator presence shape stoat density. Lastly, for the third order, we applied Very High Frequency (VHF) radio-tracking combined with Automated Radio-Tracking Systems (ARTS) to quantify home ranges and fine-scale habitat use, revealing how individual stoats select resources within their home ranges.

By integrating these complementary approaches, this project aims to build a multi-scale understanding of stoat habitat requirements in the Netherlands. These insights will contribute to the growing recognition of stoats as sentinels of environmental change and inform future conservation and management strategies for this declining mustelid.

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Understanding interspecific interactions of small mustelids in mountain communities using structural equation modelling [Student Talk]

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Keywords: stoat; weasel; small mustelids; interspecific interactions; structural equation modeling

Understanding interspecific interactions among mammalian carnivores is essential for conservation biology, yet their drivers are often complex and challenging to disentangle. Small mustelids play a crucial role as specialised predators of rodents but are themselves vulnerable to predation by larger carnivores. Despite their ecological importance, they remain poorly studied, and their strategies for navigating interspecific interactions are still largely unknown. We used structural equation modeling (SEM) to investigate the network of interactions involving the stoat *Mustela erminea*, the least weasel *Mustela nivalis*, their potential predators and competitors, their primary prey and relevant environmental variables in the Alpi Marittime Natural Park (northwestern Italy).

Based on previous research, we surveyed 60 grid cells (1×1km) across open alpine habitat (above 1,600m a.s.l.) with unbaited Alpine Mustelas, an enclosed camera-trap system specifically designed to enhance detection of alpine small mustelids, and 60 cells across closed-forest habitat (below 1,600m a.s.l.) with baited external camera traps (bait: salmon oil). Based on the two environments and sampling approaches, we developed two ecological models.

In open habitats, the stoat was positively associated with the stone marten *Martes foina* and rock cover and negatively associated with the garden dormouse *Eliomys quercinus*. In forest habitats, the least weasel was negatively associated with the pine marten *Martes martes* and the red fox *Vulpes vulpes*, while positively associated with the stone marten. The positive associations between small mustelids and the stone marten may indicate spatial coexistence in areas of high prey availability and potential temporal niche partitioning to reduce predation risk. In contrast, negative associations between the least weasel and larger mesocarnivores in forested habitats likely reflect both intraguild predation and competition for rodent prey. Our findings highlight the importance of interspecific interactions in shaping the occurrence of small mustelids across mountain habitats and emphasise the need to account for complex multispecies interactions when assessing mesocarnivore communities.

Do not use my den: mustelids and large carnivores in the Gorce Mountains, southern Poland [Student Talk]

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Keywords: *pine marten; European badger; co-occurrence; avoidance*

Habitat fragmentation affects both distribution and abundance of species, as well as interspecific interactions. It alters ecosystem dynamics, especially within carnivore communities, where mustelids are involved in complex relationships, including intraguild predation, competition and commensalism. The aim of this study was to assess spatial and temporal interactions between apex predators, lynx *Lynx lynx* and wolf *Canis lupus*, and mesopredators, European badger *Meles meles*, pine marten *Martes martes* and red fox *Vulpes vulpes*, in the protected Gorce National Park in southern Poland.

Camera trap data was collected in 2020-2023 across 16 locations for 11,158 camera trap days. Out of 6,489 recordings, 38.4% (n=2,493) belonged to carnivores, including n=857 with mustelids. Out of n=955 carnivore detections after 30-minute filter, 31.2% (n=298) belonged to European badger, pine marten and weasel *Mustela nivalis*.

Spatially, badgers and martens were more frequently recorded in locations regularly visited by lynx, than those visited by wolves. Annual average number of detections per location was n=16.4 for badgers and 4.2 for martens at the sites where lynx was regularly recorded; whereas co-occurrence of both species with wolves was low, in those locations there were 0.3 badger and 1.0 marten detections.

We tested temporal avoidance metric by time intervals between species detections at the same locations. Badgers appeared sooner after lynx and marten visits; and did not visit the location for longer time after wolf. Martens visited the area sooner after badgers and lynx; and avoided the most the locations which wolves visited. Interestingly, temporal activity overlap was higher between marten and wolf ($\Delta_4=0.91$), than with lynx (0.77), while badger had average overlap with both apex predators (0.67 and 0.65 respectively).

Considering that both mustelids had lower spatial overlap with wolves, our findings reveal that badger and marten avoided the apex predators: wolves in space and lynx in time.

Enhancing biodiversity predictions by integrating biotic interactions in Species Distribution Models for the European mink in the Iberian Peninsula

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Keywords: *Species Distribution Models; interaction; mink; invasive; conservation*

Accurately predicting species' responses to global change requires tools that capture the full complexity of their ecological niches. Species Distribution Models (SDMs) are widely used to estimate potential distributions and guide conservation (Elith & Leathwick, 2009), but traditional approaches often consider only abiotic factors, overlooking biotic interactions (Tylianakis *et al.*, 2008). This omission limits their ability to represent realised niches and reduces conservation effectiveness, particularly for carnivores and mesocarnivores dependent on prey and facing interspecific competition (Milanesi *et al.*, 2022). As key drivers of ecosystem structure and function, carnivores regulate prey populations and influence trophic dynamics, amplifying the consequences of inaccurate predictions (Winne Jr & Creel, 2017).

This study aims to enhance SDMs by integrating biotic interactions and applying them to the European mink *Mustela lutreola*, one of Europe's most endangered mammals (Rosalino *et al.*, 2023), across the Iberian Peninsula. We first characterised the habitat drivers of the invasive American mink *Neogale vison*, the main competitor of European mink and an important factor for its decline, identifying altitude, moderate natural cover, and tolerance for artificial areas as determinants of its spread. Building on this, we developed interaction-informed SDMs for the European mink, incorporating abiotic variables and the American mink's habitat suitability model. European mink showed strong sensitivity to artificial areas and road density, with substantial habitat overlap with American mink, highlighting competition as a major constraint.

Our results and the R package *sabinalSDM* we developed to account for these interactions demonstrate that incorporating biotic variables improves the predictive accuracy and ecological realism of SDMs, providing robust tools for conservation planning. This approach allows identification of priority areas for management, including control of invasive species, and supports evidence-based strategies to protect the European mink and other carnivores in the Iberian Peninsula. By combining expert knowledge with advanced modelling, interaction-based SDMs offer a practical framework to anticipate species' responses under global change and strengthen biodiversity conservation.

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Mesocarnivore movement across exotic forestry plantations in Mediterranean Europe

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Keywords: *eucalyptus plantations; Portugal; stone marten; Martes foina, spatial ecology*

Exotic Eucalyptus plantations *Eucalyptus globulus* are the dominant forest cover in Portugal, particularly across much of the central region. This human-modified landscape can challenge native wildlife by reducing habitat structural complexity, connectivity and resource availability, with ecological consequences that remain insufficiently understood (Messier *et al.*, 2019). Mesocarnivores, given their large spatial requirements, may be especially affected through constrained movement, increased energetic costs and shifts in habitat selection (Gálvez *et al.*, 2021).

Here, we provide the first assessment of the spatial ecology and energy expenditure of three mesocarnivores species in a landscape dominated by exotic Eucalyptus plantations: one stone marten *Martes foina*, two red foxes *Vulpes vulpes*, and one common genet *Genetta genetta*. Individuals were monitored using GPS telemetry coupled with tri-axial (3D) accelerometers to quantify space use, movement and activity-related energy expenditure. Stone martens and genets selected native vegetation and structurally complex habitats, where they spent more time and expended less energy, while avoiding plantation stands. In contrast, red foxes showed a less consistent selection pattern: they frequently moved through plantation areas, yet still relied on native patches and conservation zones within plantations for resting and foraging.

Although preliminary and based on a small sample size, our results suggest that remnants of native vegetation – including conservation zones embedded within plantation matrices – can play a critical role in supporting mesocarnivore persistence by providing refuge, resources and energetically efficient movement routes that plantation's stands do not (Calvino-Cancela *et al.*, 2012). These findings underscore the importance of maintaining and protecting native habitat patches within exotic plantation landscapes to enhance functional connectivity and habitat quality (Matias *et al.*, 2026).

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Temporal activity patterns of pine marten and stone marten in anthropogenic modified landscapes

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Keywords: *Martes foina*; *Martes martes*; camera survey; diel activity patterns

Segregation of temporal activity or habitat use may promote coexistence between closely related species competing for the same resources. The stone marten *Martes foina* and pine marten *Martes martes* are sympatric throughout most of their European range, including in Denmark. However, on some islands only the stone marten is present.

The aim of the study was to elucidate the general activity patterns of stone marten and pine marten in anthropogenic modified landscapes, and to examine if stone marten activity pattern is affected by the presence of pine martens. We deployed wildlife cameras at 129 sites in 45 forests collecting data for more than 22,000 camera days in three regions; in two regions (Zealand and Jutland) where the two species occur sympatrically and a region (Funen) where only stone marten occurs.

As expected, both the stone marten and the pine marten had a strong nocturnal activity pattern. However, while the pine marten diel activity varied across the season, likely due to the changing light conditions, the stone marten diel activity showed only a trend to vary across seasons. Pine marten diel activity did not differ between Zealand and Jutland but showed significant differences between forest sites. No differences between regions and forests were observed for stone marten, ie, no effect of presence of pine marten on stone marten diel activity pattern.

We observed a tendency for higher likelihood of pine marten observations with higher density of buildings but no effect of the percentage of forest cover. Forest cover had a negative effect on stone marten observations. In addition to the forest coverage effect, higher pine marten activity levels at camera sites also negatively related stone marten activity, suggesting stone martens may avoid forests with pine marten.

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Keywords: *Martes martes*; centre–periphery hypothesis; climatic determinants; mesocarnivore ecology

Species densities often vary across their geographic ranges, typically reaching higher values near the centre and declining toward the range margins. These spatial patterns are generally driven by gradients in environmental suitability, habitat availability and biotic interactions. The pine marten *Martes martes* is a widespread mesocarnivore inhabiting a variety of forest ecosystems across Europe and its population density varies markedly among regions, potentially reflecting spatial heterogeneity in environmental conditions.

In this study, we investigate spatial variation in pine marten density across Europe and identify the main ecological factors shaping these patterns. Our results indicate that climatic variables play an important role in determining pine marten density, while reproductive output shows an opposite trend relative to density. Finally, we explore how pine marten density may change under different climatic conditions in future warming scenarios. Understanding the drivers of spatial variation in density can support more effective management strategies and contribute to the long-term conservation of this forest-dependent carnivore.

Seasonal patterns of breeding Eurasian otters studied from crowd-sourced citizen science and professional data

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Keywords: *rescue centre; Lutra lutra; cubs; natal holt; growth curve*

With low reproductive rates and long parental care, protecting Eurasian otter *Lutra lutra* mothers and cubs is crucial for their conservation. Breeding dens and holts are protected under EU legislation (European Commission 2007). Otters can breed in any season. Some regions across Europe have shown varying seasonal biases, but data are limited (reviewed by Chanin 2003). Better understanding of seasonal breeding could (i) improve targeting of surveys to identify natal holts, or (ii) inform mitigation to minimise breeding holt disturbance.

The value of increasingly ubiquitous crowd-sourced images/footage has been demonstrated for diverse ecological research objectives including species' diet (Panter and Amar 2021) and vegetation phenology (Silva *et al.* 2018). Footage of otter females and cubs is regularly recorded and shared by amateur and professional camera-trappers and wildlife photographers. This offers potential to understand breeding timing over very large spatiotemporal (even continental) scales but is not centrally collated.

To test this, we used social media to request images and footage from professional and amateur photographers and ecologists across the UK. We also contacted rescue centres and searched news articles for reports of rescued cubs. Cubs stay with mothers for a long period after emergence, so we estimated their age from images and footage to estimate birth seasons. To test our age classification, we developed a novel method to estimate age class (<3 months, 3-6 months, 6+ months) from images of mothers with cubs. We developed relative-length growth curves (emergence to 7 months) from our own camera-trapping at a natal holt.

We will present the findings of this study showing that there appear to be stronger seasonal biases in some regions than others. With international collaboration within the mustelid research and conservation community, this approach has the potential to be applied across the species' European range to look at breeding seasonality patterns and response to environmental gradients and change.

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Wolverine reproductive chronology in relation to individual characteristics and resource availability

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Keywords: *wolverine, reproductive chronology, denning*

Reproduction is a key component of individual fitness and directly linked to population dynamics. As reproduction is associated with high energetic cost, especially for mammals, reproductive chronology is influenced by both external and internal factors. The wolverine *Gulo gulo* is adapted to a life in cold and unpredictable environments of the tundra and taiga in Eurasia and North America. Wolverines have a unique reproductive chronology as they give birth earlier than most other northern carnivores that do not hibernate. Their reproductive rate is generally low, influenced by age, reproductive costs and winter food availability. However, detailed knowledge about wolverine reproductive timing and denning behaviour is still limited.

Here we use data from 20 GPS-collared wolverine females, representing 38 reproductive events during 2004-2014. In 10 of these events, females were equipped with intraperitoneal body temperature loggers. We assess dates of implantation, gestation and parturition, and investigate denning behaviour, including temporal changes in time spent at den sites, movement patterns, den shifts and distances between consecutive den sites.

Parturition date ranged from January 29 to March 12, with a mean date of February 16. Implantation occurred from early January to early February, and the mean gestation length was 36 days. Parturition date varied substantially among years, with differences of up to 12 days between earliest and latest years, indicating strong interannual variation. After accounting for this, females that successfully reproduced the previous year gave birth earlier than those that did not, with an average difference of approximately 4 days. Females remained in their natal den for about 6 days after parturition, but by mid-March they resumed movement across their territory. On average, females changed den site 9 times during the denning season, although variation was large, and both the number of den site shifts and distances between den sites increased from mid-April.

Colloquium Posters



The Alpine Mostela: a promising camera-trap system for investigating predator-prey dynamics at high altitudes [Student Poster]

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Keywords: stoat; snow vole; *Mostela*; camera trapping; alpine mammals

The stoat *Mustela erminea* acts as a specialised predator of the snow vole *Chionomys nivalis* in the Italian Alps. However, their predator-prey dynamics in alpine ecosystems remain poorly understood due to their cryptic behaviour and the logistical constraints of conducting fieldwork at high elevations. This study aims to evaluate the performance of the Alpine Mostela, an enclosed camera trap specifically designed to monitor small mustelids at high elevations, in detecting stoats and snow voles by comparing its outputs with data obtained from external cameras and live-trapping, and to assess its potential for describing small mammal communities in alpine environments.

Fieldwork was conducted from June to October 2025 in the Alpi Marittime Natural Park (southwestern Alps), across three areas located at 1800m, 2100m and 2400m a.s.l. In each area, four Alpine Mostelas and four external camera traps were deployed at paired stations spaced approximately 250m apart. Monthly live-trapping sessions targeting small mammals were carried out using 50 Sherman traps per area arranged at 10m intervals. Method performance was compared using occupancy models to evaluate differences in detection probability among survey techniques. Activity patterns of stoats and snow voles and small-mammal community composition inferred from camera-trap data were also analysed.

Alpine Mostelas detected stoats more frequently than external cameras (66 vs 26) and recorded substantially higher detections of snow voles (228 vs 25), with detection probabilities for both species slightly higher than those obtained with external cameras. Stoats showed a predominantly diurnal activity patterns, whereas snow voles were mainly nocturnal, resulting in a low-moderate temporal overlap. Alpine Mostelas detected seven small mammal species, compared with five recorded through live trapping. Overall, Alpine Mostelas proved effective for detecting stoats, snow voles and other small mammals at high elevations, although integrating multiple survey methods may improve estimates of species occurrence in alpine environments.

Moving beyond the dots in management of carnivores: the impact of commercial forest management on pine marten occupancy [Student Poster]

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Keywords: *Pine marten; occupancy; forest management; commercial plantations, carnivore recovery*

Forests contribute just 11% to the land cover of the island of Ireland, making it one of the least forested regions in Europe. In Northern Ireland (NI), commercial conifer plantations are the only remaining large-scale woodland, constituting 75% of forest cover. Despite this, European pine martens *Martes martes*, a semi-arboreal mustelid, traditionally associated with old-growth forests, are recolonising their historic range.

There is limited research on the impact of forest management practices on pine martens in commercially managed plantations. Understanding how they respond to the rotation cycles of timber harvesting, as well as the subsequent degradation and fragmentation of forest habitat is fundamental to supporting their recovery. This is of particular importance for the island of Ireland, where human-modified landscapes dominate the pine martens' range.

We investigated the impacts of forest management practices on pine marten occupancy of commercial forestry within the Ring of Gullion in Co. Armagh, NI. Beginning in 2017 and repeated in 2021 and 2024, camera trap surveys were undertaken and the results were used to develop occupancy models. These will examine how timber harvesting impacts pine marten occupancy in the landscape.

Given that 95% of forests in the European Union (EU) are managed, regional and international agreements (eg, New EU Forest Strategy for 2030, United Nations 2030 Sustainable Development Goals) are driving sustainable forest management practices. There is a need to ensure these ambitions are not met at the cost of biodiversity. Understanding how species respond to management actions is therefore key to meeting global targets of sustainable forestry practices and promotion of forest biodiversity.

Summer tourism reshapes activity patterns and roadkill risk in alpine small carnivores [Student Poster]

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Keywords: *activity patterns; Alps, mustelids; outdoor recreation; roadkill risk*

Recreational non-consumptive activities can significantly affect wildlife by influencing behaviour, reshaping ecological interactions and increasing mortality risk. However, studies highlighting these impacts remain scarce, particularly in mountain environments. Using trail cameras and Alpine Mostelas, we investigated the effects of summer tourism on small carnivores of an alpine protected area: the least weasel *Mustela nivalis*, the stoat *Mustela erminea*, the pine marten *Martes martes*, and the stone marten *Martes foina*. Specifically, we compared diel activity patterns in competitive and predator-prey interactions, as well as variation in roadkill risk under two disturbance scenarios.

We used daily vehicle and hiker counts to classify days as low- or high-impact, then quantified changes in temporal niche and calculated activity overlap coefficients between target species, their potential prey and competitors under both scenarios. Lastly, we estimated roadkill risk for martens as the number of vehicles potentially encountered by target populations.

While stone martens and stoats showed no significant changes in activity patterns between the two scenarios, pine martens exhibited a marked temporal shift under high disturbance, concentrating their activity around sunrise. Estimates of roadkill risk revealed a strong increase in potential vehicle encounters during high-impact days for both stone martens (+183%) and pine martens (+133%).

Pine martens' activity shift under the high-disturbance scenario reduced temporal overlap with humans and competitors but resulted in a pronounced mismatch with key prey species, suggesting suboptimal foraging conditions. Roadkill risk emerged as a relevant pressure for both marten species. While pine martens experienced greater overall exposure to traffic, stone martens exhibited a greater relative increase in potential vehicle encounters under high-impact conditions, suggesting a limited ability to rapidly adjust to sudden increases in traffic intensity. Overall, these findings underscore the need for targeted mitigation measures and long-term monitoring programmes, particularly in mountain landscapes exposed to high tourist pressure.

Nocturnal thermal drone surveys indicate European badger (*Meles meles*) densities may be higher than traditional surveys affecting bovine tuberculosis control policy [Student Poster]

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Keywords: *human-wildlife; conflict; badger; Meles meles; thermal drone; Bovine tuberculosis*

Effective resolution of human-wildlife conflict requires robust ecological evidence and its translation into policy. Conflicts arise where disease control objectives intersect with conservation legislation, public opinion and animal welfare concerns. The European badger *Meles meles*, protected under the Bern Convention, is a recognised wildlife reservoir of *Mycobacterium bovis*, the causative agent of bovine tuberculosis (bTB) in cattle. In UK and Ireland, bTB is projected to cost €418 million in 2026 (Northern Ireland Assembly, 2025; Financial Budget, 2026; Defra, 2025) intensifying the need for evidence-based management. Badger population estimates currently rely on indirect indicators, eg, sett surveys, combined with statistical inference – true density remains unknown. This study applied rapid, non-invasive thermal aerial drone technology (DJI Matrice 30T and 4TD platforms) to directly count minimum numbers above ground across 50×1km² survey squares throughout Northern Ireland. Nocturnal surveys compared (i) land-cover classes, (ii) seasonal variation (spring versus autumn), (iii) livestock presence and type and (iv) landowner reported badger hotspots.

Preliminary findings suggest that drone surveys reveal high-density areas supporting 2-6 times more badgers (Currie, E. 2026) than estimated previously using traditional survey methods, with local densities reaching 12 badgers per km². This density is significantly higher than in European countries affected by the Bern Convention where badger numbers are controlled – such as Germany, which reports a highest density of 5.9 per 1km². Badgers (Keuling, G. *et al.* 2009) occurred across both the lowlands and uplands and had significant differences in density between counties.

Density was higher in autumn than spring. By providing direct density estimates this study strengthens the ecological evidence base underpinning bTB policy, contributing to species conservation planning, and supporting informed resolution of human-wildlife conflict.

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Evaluating stone marten (*Martes foina*) culling as a conservation measure for meadow birds in Fryslân, the Netherlands

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Keywords: *stone marten; meadow bird conservation; population management*

The stone marten population in Fryslân, the Netherlands, has been increasing rapidly since 2000. Ground breeding meadow birds such as Godwit *Limosa limosa* are declining and under threat of extinction. Monitoring the nest success of more than 5,500 meadow bird nests using camera traps, and gps-tracking of stone martens and meadow bird chicks showed that the stone marten can locally be a significant predator of nests and chicks of meadow birds. For this reason, a 2018 a pilot of culling of stone martens as a conservation tool was started. Culling was only done at sites where conservation measures in landscape management and agricultural practice are already taken, where camera evidence showed that the other main predators – fox and black crow – were already culled or did not play a significant role in nest predation, but stone marten did.

Camera monitoring of nests showed that culling had a positive effect on nest success when performed optimally: the average proportion of nests that hatched was 50% in the year before stone marten management and 78% during the culling years. Vole peaks had an additional effect on nest success.

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Keywords: *small mustelids; trophic plasticity; frequency of occurrence; spatio-temporal analysis; prey composition*

The stoat *Mustela erminea* is a small mustelid with a natural circumboreal distribution and an invasive presence in Oceania (King, C. M. 1993). Despite extensive regional research, a global synthesis of its dietary ecology remains lacking. Here, we conducted a literature review spanning the last century to characterise the species' global diet, assess geographic variation in prey use across native and invasive ranges, and evaluate how stoat diet has been studied across regions and time.

Using keyword-based searches in major scientific repositories (Web of Science, Elsevier, Google Scholar, and JSTOR), we compiled data from 118 studies. From each study, we extracted information on geographic location, ecosystem type, methodological approach, and prey consumption. Prey items were classified at the finest possible taxonomic resolution and grouped into broad functional categories. Broad-scale dietary patterns were analysed using Linear Mixed Models, complemented by PERMANOVA and SIMPER analyses.

Research effort showed a heterogeneous spatiotemporal distribution. Studies from Oceania (n = 37) peaked between 1990-2010, whereas European studies (n = 53) have been more evenly distributed since 1970. Asian data (n = 14) are largely historical, and North American records (n = 14) remain sparse. Globally, the stoat's diet was dominated by small mammals (mean %FO = 15.4%), followed by invertebrates (11.7%), birds (11.5%) and medium mammals (9.9%), confirming its predominantly mammal-oriented diet while revealing substantial trophic breadth. Clear geographic differences emerged between native and invasive ranges. In the native range, stoats preyed mainly on *Cricetidae* (eg, *Microtus montanus*, *Chionomys nivalis*) (Hernández & Zaldívar, 2016; Martinoli *et al.*, 2001), whereas in invaded regions such as Oceania, *Muridae* (eg, *Rattus* spp.) dominated alongside substantial contributions of birds (*Procellariiformes* spp. and *Passeriformes* spp.), invertebrates (mainly *Anostostomatidae*), and *Leporidae* mammals (Martinoli *et al.*, 2001; Smith *et al.*, 2005). Multivariate analyses confirmed significant continental differences (PERMANOVA, $p < 0.001$), with SIMPER identifying birds, arthropods and small mammals as key contributors.

This study provides the first global synthesis of stoat trophic ecology, highlighting strong geographic variation and increased dietary diversification in invasive contexts.

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Evidence of widespread anticoagulant rodenticide exposure of semi-aquatic mustelids in southwestern France

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Keywords: *Lutra lutra*; *Mustela sp.*; rodenticide; indicator species; conservation

As part of both French national action plans for Eurasian otter *Lutra lutra* and European mink *Mustela lutreola*, sentinel studies aim at assessing the health status of populations of semi-aquatic mustelids and existing anthropogenic pressures. They are carried out through the necropsy of specimens found dead accidentally in the natural environment, or killed as invasive alien species like the American mink *Neogale vison*. In addition to determining the direct cause of death and assessing the age and the reproductive status, liver samples are systematically tested for the presence of 7 anticoagulant rodenticides (AR) of first and second generation.

Results on 66 Eurasian otters, 42 American mink and a few European mink and polecats *Mustela putorius* from southwestern France showed high levels of exposure to AR in all species (40 to 80% of the specimen tested), with an increase over time in both the exposure rate and the proportion of multiples exposures to several molecules. It is accepted that exposure to AR can potentially reduce the general condition and alertness of animals, that could increase their vulnerability to other causes of death. Moreover, multiple exposures increase the risk of coagulation disorders. In our study, in a few cases, AR poisoning was the direct cause the mortality of the animals. These data suggest an important environmental contamination and are particularly alarming for vulnerable or critically endangered species such as the European mink, which is already facing numerous anthropogenic pressures. The use of these different molecules is discussed in order to assess the possibilities for implementing mitigation measures.

Will climate change alter the distribution of pine marten on the island of Ireland?

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Keywords: *Martes martes*; species distribution modelling; climate change

Pine marten *Martes martes* are undergoing a phase of expansion across the island of Ireland. They have returned to approximately 50% of their historical range after major historical declines due to persecution and habitat loss. Habitat loss remains a threat for this woodland habitat specialist in one of the least forested regions of Europe. In addition, climate change is predicted to change seasonal temperature and rainfall patterns in this region.

We examined the distribution of pine marten across the island and identified areas of habitat suitability using species distribution modelling (SDM). SDM fits a statistical relationship between species observations with geospatially referenced environmental variables (ie, climate) before projecting these relations in both current and future geographic space. Presence only distribution data were combined with landcover data and the latest Irish TRANSLATE climate data at a 1km scale. SDM was used to project the current and future (RCP45 and RCP85 2070) distributions of pine marten across the island.

Initial results indicate that in the short-term, pine marten distribution is not projected to expand much beyond its current range. Future climate change scenarios suggest a range contraction, particularly in the southwest of the range. Habitat restoration may help to mitigate the impacts of climate change for this species.

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Re-establishment of native top-predator suppresses invasive competitor in coastal Norway [Student Poster]

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Keywords: *competition; exclusion; camera trapping; Lutra lutra; Neogale vison*

Invasive predators are among the leading drivers of biodiversity loss worldwide, but their impacts may be mitigated by native intraguild competitors. The recovery of the Eurasian otter *Lutra lutra* in Europe has laid the foundation for numerous studies on the competitive effects of a dominant native predator on an invasive inferior, the American mink *Neogale vison*. Much of the past work on this topic has relied on indirect indicators such as scat surveys to infer species presence, activity and competition. However, recent studies have questioned the reliability of such methods, citing issues in detection probability of scent marking (Harrington *et al.* 2020). As such, the impact of recovering otter populations on mink remains unclear.

Here, we exploited the otter's natural expansion southwards along the coast of Norway to establish control and impact areas by which we could test if otters influence mink activity, site occupancy and behaviour via camera trapping over one continuous year. Mink site occupancy was significantly lower in the area where otters have re-established (impact region), and daily detections were 72% lower than in the otter-free area (control region). There was no evidence of mink diel activity pattern shifts in response to otters. However, mink in the impact region showed significantly more investigatory behaviour, which declined according to time since last otter detection. Preferred daily weather conditions overlapped heavily for both species, which could lead to increased encounter rates and is a possible explanation for decreased mink activity where sympatric with otters.

Our study supports that native apex predators can exert top-down control on invasive competitors, and we emphasise the wider implications of this finding in light of global management challenges.

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Keywords: *badger; Meles meles; forestry; protected species*

European badgers *Meles meles* are a common species found throughout woodland across the UK. Within the UK badgers and their setts (underground sleeping chambers) are protected by law, making it an offence to cause damage to a sett or to cause disturbance to a badger within its sett. Yet as setts are commonly located within woodland, it is often necessary to conduct forestry operations in the presence of a badger sett. Forestry operations, such as felling and extracting trees, relies upon the use of heavy machinery. To enable such operations to proceed, guidance documents are in place that provide details to operational staff on how, when and where to conduct forestry whilst preventing disturbance to badgers or damage to their setts.

Since the guidance was developed in the 1990s, it has not been updated and the scientific evidence upon which it was based is limited. Furthermore, the guidance has been interpreted differently across England, Scotland and Wales leading to confusion amongst operators. In attempting to update the guidance document we have highlighted key areas of research that are needed to improve future guidance documents, such as understanding the depth and extent of setts and how badgers respond to nearby anthropogenic noise. This presentation will outline the work that is underway to fill some of these knowledge gaps and how the results will feed into future updated guidance documents. We will also outline how the same methods could be applied to other protected mustelid species inhabiting woodland, such as pine marten *Martes martes* and otter *Lutra lutra*, and therefore also exposed to forestry operations.

Evaluation of camera trapping methods for the detection and monitoring of European polecats (*Mustela putorius*) in Switzerland

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Keywords: *Mustela putorius*; monitoring; camera trap; lure

Monitoring small mustelids is challenging, particularly because they are elusive, often nocturnal and solitary, and occupy large home ranges. The European polecat *Mustela putorius* is classified as vulnerable (VU) on the Swiss Red List. However, its distribution and population status in Switzerland remain poorly understood. Camera traps offer promising non-invasive methods for detecting this species. Notably, Hofmeester *et al.* (2024) developed a tube-based camera-trapping system ('Polecam') that enabled individual identification of polecats in Sweden based on their facial mask patterns.

In this pilot study, we evaluated the feasibility of detecting European polecats using modified Polecam systems compared with standard wildlife camera traps in Switzerland. Over a 12-month period, we deployed camera setups across ten 1km² squares. In each square, we installed two modified Polecams (white flash) and two standard camera traps (infrared flash), with each modified Polecam paired with a nearby standard camera trap. Modified Polecams were baited with tuna, whereas a stick treated with mustelid lure was placed in front of the standard camera traps to attract polecats.

Polecats were successfully detected using both our modified Polecams and standard camera traps. Here, we present the results of analyses examining:

- a) differences in the detection frequency of European polecats between modified Polecams and standard camera traps;
- b) the potential for individual identification of European polecats in Switzerland based on facial mask patterns; and
- c) temporal patterns in mustelid detection rates following lure application.

We also discuss the implications of these findings for improving polecat and mustelid monitoring approaches.

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Habitat use of stone martens in meadow landscapes and coastal areas in the Netherlands

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Keywords: *stone marten; telemetry; habitat use; open landscapes*

In recent decades, the stone marten *Martes foina* has significantly expanded its distribution into the open landscapes of the Netherlands. However, there is a lack of scientific research concerning the species' ecology in open and water-rich coastal environments. In this study, we employed high-resolution GPS telemetry to systematically investigate the habitat selection and home range characteristics of stone martens in these novel environments.

Home range sizes exhibited substantial inter-individual variation, with certain GPS-tagged stone martens demonstrating exceptionally large spatial extents. Notably, some individuals were frequently observed swimming, indicating behavioural adaptation to aquatic environments. Utilisation of intertidal salt marsh areas was minimal. Most resting sites were identified within the roofs of agricultural buildings, underscoring the species' reliance on anthropogenic structures for shelter within these open landscapes.

New records and range shifts of mustelids in the southern Urals and adjacent areas

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Keywords: *craniological collection, Mustela lutreola, Mustela putorius, range shifts, Russia*

We report recent records and distributional shifts of mustelids in the Southern Urals and adjacent parts of the Ural region, with particular emphasis on the European mink *Mustela lutreola* and the European polecat *Mustela putorius*, and assess these observations in the context of ongoing climatic change. Because no systematic monitoring of mustelids has been conducted in recent years, available data are fragmentary and opportunistic. We analysed taxonomically verified material from the craniological collection of the Museum of the Ilmeny State Nature Reserve, including skulls obtained from hunted animals, and compiled camera-trap records from protected areas. Recent observations were compared with published information on historical range boundaries.

The craniological collection currently contains skulls of *Martes martes* (N = 110), *Martes zibellina* (n = 100), *Neogale vison* (N = 10), *M. lutreola* (N = 3), and *Mustela eversmanii* (N = 2). Among material obtained from hunters during the winter season of 2025-2026, a skull of *M. lutreola* was identified from Tuzhinsky District, Kirov Oblast, on one of the tributaries of the Tuzha River. Additional reports of *M. lutreola* have also been received from the Republic of Bashkortostan, although these require further verification.

Camera-trap data indicate broader range dynamics, as in 2024, *Gulo gulo* was recorded in Zyuratkul National Park, approximately 300km south of its usual range limit, whereas *M. putorius* was recorded 230-270km north of its previously known range boundary and was also documented in the Visim State Nature Reserve after an absence of approximately 100 years. Similar shifts were reported for *Vulpes corsac* (120km north) and *Apodemus flavicollis* (100km northeast).

These observations indicate ongoing faunal reorganisation in the Urals. The detected shifts are consistent with regional warming trends. In the Southern Urals, mean annual temperature has increased by approximately 1.8°C in less than 100 years, especially during winter, and the frost-free period has lengthened by 86 days, now averaging 205 days.

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Nationwide airborne laser scanning data reveal habitat associations of pine marten, stoat and least weasel across Finland [Student Poster]

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Keywords: *Martes martes*; *Mustela erminea*; *Mustela nivalis*; remote sensing; occupancy modelling

Small and medium-sized mustelids play a key role in boreal ecosystems, where their habitat use is closely linked to prey dynamics and forest structure. In Finland, population trends differ among species: while the pine marten *Martes martes* has remained relatively stable at the nation scale but shows strong regional variation, populations of stoat *Mustela erminea* and least weasel *Mustela nivalis* show noticeable long-term declines. Large-scale studies of mustelid habitat associations across entire countries remain rare.

We examined how forest structural features influence the occurrence of three mustelids across mainland Finland, using nationwide airborne laser scanning (ALS) data. We combined mustelid snow-track records from 2013-2022 with environmental spatial data and ALS-derived forest metrics from 173 flight campaigns covering the entire country. Occurrences were then modelled using spatial hierarchical generalised linear mixed models.

Forest structure strongly influenced pine marten and stoat occurrence, but with clear species-specific patterns. Pine martens were most likely to occur in structurally complex forests characterised by tall, dense canopies and low human land use. Stoats were associated with heterogeneous forest landscapes combining a developed overstory and dense ground-layer vegetations, consistent with their use of diverse habitats supporting vole populations. In contrast, least weasel occurrence showed weaker associations with ALS-derived canopy metrics and was primarily linked to herbaceous-layer cover and climatic conditions, suggesting a stronger dependence on fine-scale habitat structures that are only partly captured by ALS data.

Our results demonstrate, for the first time, that national ALS datasets can be used to study species-specific habitat associations of mustelids at the scale of an entire country. This approach provides new opportunities for integrating forest structural information into large-scale conservation and management planning.

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From existing to optimised method: handling, identifying and vaccinating unanaesthetised restraint-caught badgers

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Keywords: *Meles meles*; *Mycobacterium bovis*; wildlife vaccination; conscious animal handling, France

The European badger *Meles meles* is one of the wild species that, in bovine-infected areas, can contribute to the circulation of bovine tuberculosis (TB) within a multi-host system (Canini *et al.* 2023). The population-level efficacy of vaccination combined with culling of infected badgers has been demonstrated in trials conducted in England and Ireland (Aznar *et al.*, 2017; Smith *et al.*, 2020), notably by limiting excretion levels following infection. A similar pilot project was launched in France in 2023.

At present, oral vaccination is not available and vaccination campaigns therefore require the capture and handling of animals for blood test and vaccine injection. Until now, animals have been anaesthetised prior to injection, but several limitations have emerged when considering large deployment: the handling of veterinary products is regulated in many countries and restricted to trained professionals, anaesthetic agents are costly, anaesthetic risk is not negligible for animals in poor physiological condition or suffering from bad weather conditions, and finally the procedure can be lengthy due to the monitoring of the recovery time.

To address these limitations, British teams developed methods for handling conscious animals (Smith *et al.* 2021) using restraint cages. The protocol is functional and safe and appears more respectful of animal welfare during the pre- and post-handling phases (Colloff *et al.* 2024). However, two limitations appeared for its implementation in France. The British protocol involves transferring animals from trap cages into restraint cages, whereas in France most badgers are caught using stopped restraints. In addition, the venous access site described proved insufficiently reliable for sufficient and rapid sampling.

We therefore adapted the protocol to our operational constraints by designing a restraint cage compatible with restraint-caught animals, improving venous access reliability, and integrating individual identification with transponder. We present the resulting protocol and the first results of its implementation.

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Diel and seasonal activity patterns of the weasel (*Mustela nivalis*) in relation to thermoregulatory constraints

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Keywords: *mustelid, activity rhythm, thermoregulation, radio-tracking*

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The weasel *Mustela nivalis*, the smallest extant carnivore, is a small-bodied predator in which thermoregulatory demands may influence activity patterns. Its small size, elongated morphology and high metabolic rate implies high energetic costs which can contribute to context-dependent behavioural adjustments. Quantifying the links between activity and thermal conditions provides a useful baseline for interpreting behavioural responses in changing climatic regimes.

We investigated daily and seasonal activity of weasels using radio-tracking in the Regional Natural Reserve of Lungo and Ripasottile Lakes, in the province of Rieti, central Italy. Between February 2003 and June 2004, twelve individuals were radio-tracked, yielding 1844 fixes collected under a 15-min sampling schedule.

Weasels showed a predominantly diurnal activity pattern, with significantly higher activity during daylight compared to night and twilight phases. Seasonal variation was pronounced, with lowest activity in summer and highest in winter. Activity increased with rising ambient temperature in all seasons except winter.

Our results suggest that, under humid conditions and in the absence of stable snow cover, limitations related to heat retention may be particularly relevant for resting behaviour. Increased winter activity may reflect a compensatory response to heat loss during rest. Overall, the local climatic context may influence behavioural responses to temperature, providing relevant evidence on the ecology of small mammals in changing climatic conditions.

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Scent-marking behaviour in the common weasel (*Mustela nivalis vulgaris*)

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Keywords: *Mustela nivalis vulgaris*; *Mustela*, territorial behavior; communication

Scent-marking plays an important role in communication among mustelids, yet systematic behavioural observations of marking in the wild remain limited for most species. Especially for the smaller mustelids from the genus *Mustela*, which show a very hidden lifestyle, there seem to be only anecdotal examples from captivity that reported two types of marks: body rubbing and anal drag.

In this study, we screened videos from a field study from August 2022 until February 2026 with enclosed camera traps in a study site in the Netherlands. At 182 occasions, we were able to document consistent and repeated marking behaviour at 15 out of 17 locations. Weasels showed the following types of marking: defecation, abdominal rubbing, anal dragging, chin rubbing, body rubbing and urinating regularly in different combinations. The most prominent marking was urinating, which took up almost 50% of the markings that were observed.

Our findings provide the first visual evidence of year-round structural marking behavior in common weasels, suggesting that these behaviours serve a clear communicative function related to territory use and/or social signaling. This study expands current knowledge of chemical communication in mustelids and contributes to a broader understanding of scent-marking strategies within the family *Mustelidae*.

Human–mustelid relationships in Japan and China: a comparative review of folklore, medicine and material use

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Keywords: *folklore; traditional medicine; kuroyaki; ethnozoology; East Asia*

This study examines traditional human-mustelid relationships in Japan and China through a comparative review of folklore, medicinal use, dietary use and material use. It aims to clarify how mustelids were culturally interpreted and practically utilised in different East Asian contexts.

A qualitative review of documentary materials concerning mustelids in both countries was conducted. Japanese sources were analysed primarily for folklore, vernacular beliefs and local utilitarian practices, whereas Chinese sources were examined mainly for medicinal and practical uses. The collected descriptions were classified into thematic categories, including omens and symbolic meanings, medicinal applications, dietary use, and the use of fur and other body parts.

The reviewed materials reveal both regional contrasts and a shared pattern of close, long-term human engagement with mustelids. In Japan, mustelids appeared in rural folklore and vernacular beliefs, particularly in relation to road-crossing omens, directional fortune, misfortune, injury and fire. They were also used as sources of kuroyaki, food and fur. In contrast, the Chinese records examined here place stronger emphasis on medicinal utilisation. Several mustelid species were described as sources of meat, brain, fat, liver and other body parts employed in traditional remedies for convulsions, poisoning, burns, cough, bleeding and weakness.

Collectively, these records indicate that mustelids were understood not merely as wild carnivores, but as animals situated at the intersection of symbolic meaning, therapeutic value and everyday subsistence. Traditional knowledge concerning mustelids in Japan and China constitutes an important body of biocultural evidence, and comparative synthesis of such records can broaden mustelid studies by incorporating ethnobiological, historical and conservation-oriented perspectives.

Genetic insights into the Eurasian otter (*Lutra lutra*) in Fennoscandia

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Keywords: *Eurasian otter; population genetics; Fennoscandia; monitoring*

The Eurasian otter *Lutra lutra* is currently considered as Near Threatened at a global scale by the IUCN. While populations seem to be making a comeback in some regions, including in Sweden, there remains a critical lack of knowledge on population size and genetic health in many regions including Fennoscandia.

To address this knowledge gap, we have developed a panel of Single Nucleotide Polymorphisms (SNPs) that are highly informative for individual identification intended for use over time as a monitoring tool. SNPs were ascertained from 93 tissue samples from otters mortally wounded in traffic accidents spanning all of Fennoscandia, making the panel useful across political boundaries where populations are continuous. Using the original Fennoscandian-wide samples, we explored population and genetic health including genetic diversity, effective population size, inbreeding, and population structure which can indicate barriers to dispersal.

Long-term monitoring of Fennoscandian otter populations will focus on non-invasive sampling relying only on environmental spraint (faecal) sampling. Our findings, and ongoing monitoring facilitated by the SNP panel, will play a key role in guiding conservation strategies and ensuring the long-term viability of the Eurasian otter in Fennoscandia.

Too small to matter? A call to action for European small mustelid research

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Keywords: *conservation; Mustela; perspectives; research network*

Weasels *Mustela nivalis* and stoats *Mustela erminea* are important specialist predators suspected to be declining across Europe. Their short lifespan, unique position within the food web and broad ecological versatility give them excellent potential to function as sentinel species, yet they remain relatively understudied. In recent years, research on weasels and stoats has gained momentum, with a surge in research efforts across Europe. In June 2025, we organised the first ‘European small mustelid meeting’ in the Netherlands to discuss the current state of weasel and stoat research and to identify priorities for the future.

Here, we propose six key research directions: 1) the optimisation of monitoring techniques and data collection protocols; 2) the upscaling of species distribution models to a continental level; 3) the ecological role of small mustelids within the food web; 4) the influence of climate change on their moulting phenology; 5) the impact of environmental contaminants on small mustelids; and 6) the gathering of genetic material to analyse genetic diversity across Europe. Together, we hope these directions will provide crucial insights into their ecology and enable a robust assessment of the conservation status of weasels and stoats across Europe.

Do you work on or plan future work on these fascinating small predators? We invite you to join our collaborative effort to advance research and conservation of stoats and weasels across Europe. Come and join the European Weasel Gang (<https://europeanweaselgang.eu/>)!

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Understanding angler–otter interactions: social perceptions in a recovering species

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Keywords: *Eurasian otter (Lutra lutra); recreational anglers; human–wildlife interactions; human perceptions*

Human-wildlife interactions are increasing worldwide due to the expansion of human activities, climate change and the recovery of wildlife populations. Among semi-aquatic carnivores, the Eurasian otter *Lutra lutra* is recolonising large portions of its former range, raising new challenges for coexistence with human activities. While conflicts with commercial fisheries and aquaculture are relatively well documented, little is known about interactions with recreational anglers.

We developed an online questionnaire to investigate the perceptions of recreational fishers towards the Eurasian otter in Spain, where the species is currently expanding. The survey was distributed through social networks and angling associations. Questions addressed knowledge of the species, perceived impacts on fishing activity and attitudes towards otter conservation. Preliminary results indicate that most respondents report a good level of knowledge about the species. Although many fishers perceive some level of impact on their fishing activity, the majority do not consider the otter a significant source of damage. Overall attitudes towards the species appear relatively neutral to positive. These findings contrast with patterns observed in commercial fisheries, where otters are often perceived negatively due to economic losses.

Our results suggest that coexistence between Eurasian otters and anglers be more achievable than previously assumed. In line with previous studies, perceived conflicts may not necessarily reflect actual ecological or economic impacts, highlighting the importance of addressing human perceptions in conservation strategies. Understanding the social dimension of human-otter interactions will be essential to support long-term coexistence in increasingly shared freshwater ecosystems.

Fleshy fruit seed dispersal by carnivores, mostly mustelids, in Ireland and elsewhere

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Keywords: *adaptation to frugivory; nutrition; vaccination applications; setts and dens*

Fleshy fruits can be dispersed by carnivorous mammals. This is, however, confined to those that evolved to taste sweetness and this excludes cats, which are obligate flesh eaters. We list the available fruits in Ireland, with studies of fruit consumption by carnivores, mostly mustelids, in Ireland and relevant studies from Europe and North America of those carnivores that are now extinct in Ireland.

We examine the significance of carnivores in fruit dispersal, the roles fruits play in carnivore diet and health and the practical applications of such information. These include finding badgers' setts and nutritional aspects of fruit consumption.

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Keywords: *Ukraine; expansion; forest belts; artificial forests; hunting*

The pine marten *Martes martes* lives permanently in coniferous, mixed and deciduous forests in the Polissya, Forest-Steppe and Carpathian regions. Between 1947 and 1962, more than 34,000 of its skins were harvested in Ukraine and in 2019, the population numbered 34,724 individuals. This is an underestimate due to hunters' disregard for record-keeping and reduced demand for fur.

After the creation of field-protecting forest strips in the steppe zone (1949-1965: 53,500 hectares) and artificial forests, and once they reached middle age, martens began to colonise these biotopes. Its characteristic polyphagy, with a diet dominated by rodents and plant food, became an additional factor contributing to the spread of this forest species.

In the 1950s-1970s, the southern border of the forest marten's range shifted to the forest-steppe, and some individuals penetrated the steppe zone. In 1982, the forest marten was recorded in the floodplain forests of the Dnieper near Nova Kakhovka; in 1998 – in the lower reaches of the Dniester; in 2004-2005 – in some forest belts of the Bilyayivka and Rozdilnyanskyi districts of the Odesa region; and in 2000 – on the Kinburn Peninsula. In 1834-1949, 84,000 hectares of forests were planted in the Kherson and Mykolaiv regions with Scots pine *Pinus silvestris* and Crimean pine *P. pallasiana*, which were gradually colonised by the forest marten. In 1997, this animal was hunted in the Velyko-Anadolsky Forest (Donetsk region); in 1999-2001 – in the field protection forest belts of Zaporizhzhia and Vilnianskyi; and in 2010 – in the Bilmaksky district of Zaporizhzhia region. The destruction of the Kakhovka Hydroelectric Power Plant dam by Russian occupiers on 6 June 2023 led to the transformation of the Kakhovka Reservoir (2,155 square kilometres) into a collection of channels and lakes with deciduous forest-covered banks. As a result, the forest marten gained a lot of new habitat, which it will colonise in the coming years.

Reassessing the distribution and habitat suitability of the southernmost stoat, (*Mustela erminea nippon*), by integrating citizen science, MaxEnt modeling and field surveys [Student Poster]

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Keywords: *Mustela erminea nippon*; occurrence record; GIS; MaxEnt; camera trap

Mustela erminea nippon is a subspecies endemic to Honshu, Japan, and is listed as Near Threatened (NT) in the Japanese Ministry of the Environment Red List 2020. This subspecies represents the southernmost natural distribution of *M. erminea* and has traditionally been regarded as a cold-adapted alpine species, inhabiting high-elevation areas of central and northern Honshu. Due to its remote habitats and elusive behavior, large-scale studies on its distribution and ecology have been limited. Recently, alpine species including *M. e. nippon* have been concerned about influences by climate warming and the upward expansion of deer *Cervus nippon* and macaques *Macaca fuscata*. In addition, some records from mid- to low elevation areas (below 1,400m) suggest that *M. e. nippon* may have a wider range of environments than previously recognised.

In this study, we aimed to clarify the distribution and ecological characteristics of *M. e. nippon* and to develop efficient survey methods for its conservation. A total of 1,207 occurrence records collected nationwide between July 1953 and January 2026 were compiled from literature, hiking apps, questionnaires and field surveys. Based on these records, the latest distribution maps were created using QGIS, and species distribution models were developed using MaxEnt. Occurrence records declined in the Tohoku region, raising concerns about fragmentation among suitable habitats. In addition, habitats around 1,500m, consisting of natural forests and grasslands with a mean annual temperature below 10°C, were identified as the most suitable environments.

Furthermore, camera-trap surveys using bait were conducted in the foothills of Mt. Norikura, Gifu Prefecture (1,000-1,400m). Seasonal detection rates were relatively high in autumn and winter. Another interesting finding was that the timing of seasonal moulting has become delayed and shortened compared with 20 years ago. Because survey days during midwinter were limited by snow, improving the survey method remains a challenge.

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