

1st & 2nd WORLD JACKAL DAY *PROCEEDINGS*

19.04.2023 and 19.04.2024





Impressum

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www.worldjackalday.com

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Editorial

Dear readers,

it is with great pleasure that we present the Proceedings of the *1st* and *2nd* *World Jackal Day*. These events brought together researchers, conservationists, wildlife managers, and stakeholders from across the globe to share knowledge and perspectives on one of the most adaptable and widely distributed mesocarnivores – the jackals.

The *World Jackal Day* was established as a platform for international dialogue and collaboration, recognizing the increasing ecological, scientific, and societal importance of jackals in a rapidly changing world. From ecology, behaviour, and genetics to conflict mitigation, management, and policy, the contributions collected here reflect both the diversity of ongoing research and the urgency of addressing coexistence between jackals and humans.

The *1st World Jackal Day* marked the beginning of a global conversation, highlighting baseline research, emerging challenges, and opportunities for cooperation. The *2nd World Jackal Day* built upon this foundation, expanding both the geographical scope of participation and the thematic range of topics covered. Together, these proceedings showcase the progress achieved in just a short period, while also identifying critical knowledge gaps and future research priorities.

We thank all authors for their valuable contributions and the scientific committee for their effort. Our gratitude also extends to the institutions and partners who supported the events, enabling an open and constructive exchange across disciplines and borders.

It is our hope that these proceedings will serve not only as a record and chronicle of the two events, but also as a resource for ongoing research. Most importantly, we see them as an

invitation: to continue the dialogue, strengthen international collaboration, and foster innovative approaches to ensure a sustainable future of ecosystems.

We wish all readers much enjoyment and inspiration in engaging with the contributions collected here and hope meeting you at the upcoming *World Jackal Days*,

Jennifer Hatlauf & Robert Krickl
Vienna (Austria), 05.05.2024



About World Jackal Day

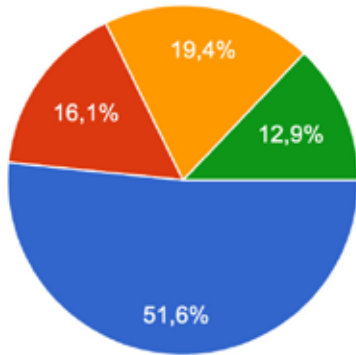
The following section contains a brief outline on the background, history, character and objectives of *World Jackal Day*.

Brief history

„Jackals“ are among the most adaptable and widely distributed canids, occupying diverse habitats around the world. Their ecological roles make them important components of ecosystems, while their increasing overlap with human activities brings challenges for coexistence. Despite their wide distribution and growing scientific interest, jackals have long received less attention compared to other wildlife.

Recognizing the need for greater visibility and coordinated dialogue, the idea of a dedicated *World Jackal Day* was born. Starting in 2021, the initiative aimed to create a platform for scientists, conservationists, wildlife managers, and stakeholders to share knowledge, discuss research findings, and promote international collaboration on jackal ecology and management. On the other hand, it mainly serves as a tool for science communication to the general public. Many commemorative days exist all around the world for very different topics to raise special awareness, that are last but not least gratefully received by the media.

Therefore, a date for *World Jackal Day* had to be selected. In the years 2022 and 2023, potential options were collected. Experts and interested researchers working on canids across the world were invited to provide their opinion through a questionnaire. Inter alia, discussions took place at the 3rd *International Jackal Symposium* in Hungary. It was suggested to choose the date on a biological background. With regard to available dates in the already existing international calendar of



- 19.04.
- 07.05.
- 11.05.
- 18.05.

Results of the final vote on the date of World Jackal Day on 04.02.2023.

focus or commemorative days, most opted for the 19th of April. This day marks the time of the year, when the new generation of golden jackals (the most widespread jackal species worldwide and the „etymologically oldest“ jackal species) is born in Europe (the region of most recent expansion causing multiscale challenges). So this already yields educational information. After implementation in the international calendar of commemorative days, the first *World Jackal Day* took place on 19. April 2023. Though the idea was „born“ in Austria by the authors, it was an international idea right from the start.

What is a „jackal“?

Jackals are small to medium sized canids, grouped more by historical naming traditions than by strict taxonomy. On almost every continent, there is an animal traditionally referred to as „jackal“: the „golden jackal“ (*Canis aureus*) in Europe and Asia, the „black-backed jackal“ (*Lupulella mesomelas*), the „side-striped jackal“ (*Lupulella adusta*), the „African wolf/jackal“ (*Canis lupaster*), and the „Ethiopian wolf/jackal“ (*Canis simensis*) in Africa, the „coyote/American jackal“ (*Canis latrans*) in North America, and the „Andean jackal“ (*Lycalopex culpaeus*) in South America. Although scientific studies have shown that these species are less closely related than



previously thought, they all share the characteristics of being small to medium-sized canids with similar appearances and comparable ecological niches. Wherever they occur, they play an important role not only in human folklore and mythology but also in ecosystems. Today, much research is being conducted on these animals, as some regions are experiencing significant declines, while in others, a highly interesting expansion of their range has been observed in recent years. This can create potential conflicts with various interest groups, making research and interdisciplinary collaboration essential.

The objectives of *World Jackal Day*

World Jackal Day now highlights this fascinating group of animals and their close relatives by scientifically dispelling common prejudices and providing the latest information on all aspects of these creatures: their diet, spatial use, general behaviour, and the human dimension concerning hunting and



coexistence. *World Jackal Day* was founded with following primary objectives:

- Knowledge exchange – To provide a regular international forum for presenting new research, national updates and monitoring progress in jackal studies.
- Collaboration – To strengthen cross-border and cross-disciplinary cooperation among researchers, conservationists, and other stakeholders.
- Communication – To provide sound scientific information and newest data to the public.
- Awareness – To shape the profile of jackals as ecologically and socially relevant carnivores, ensuring they are considered in management and conservation planning.

World Jackal Day traditionally consists of two parts: 1.) A common, international scientific meeting and 2.) individual regional outreach activities. The scientific meeting is held in the form of an online conference so that researches from all



over the world are able to attend. It features a program of scientific talks and presentations providing national updates and current research on various jackal species. Furthermore, it offers a discussion forum for networking, collaboration and exchange of experience.

The public outreach activities are organized individually on a regional, mostly national, to international scale by local institutions. They may comprise talks, guided tours, exhibitions, media coverage and any other measures of communication.

The *World Jackal Day* is organized and communicated via www.worldjackalday.com. If you want to join in the scientific meeting or want to showcase and advertise your activities, please get in touch.

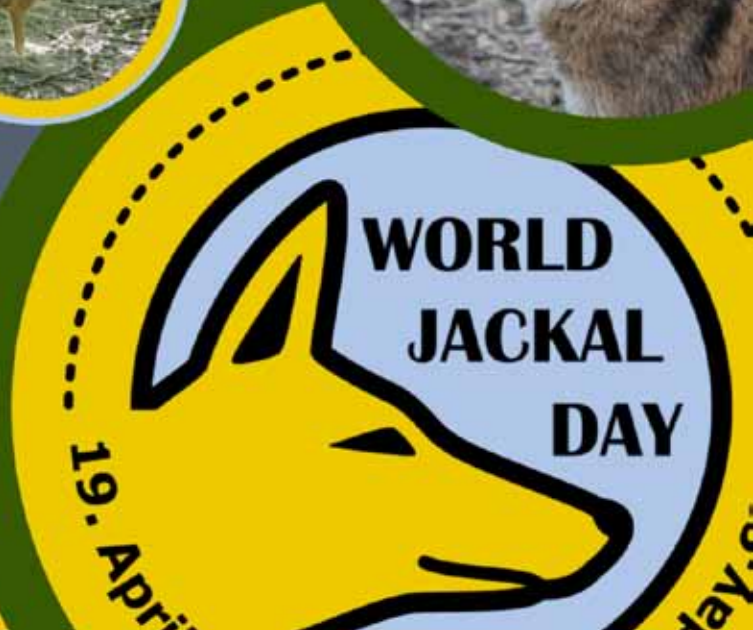
www.worldjackalday.com →



1st WORLD JACKAL DAY

SCIENTIFIC PROGRAM

19.04.2023



Scientific Meeting & Get-Together 2023

Since jackals can be found on almost every continent, numerous jackal researchers are spread across the globe. The latest online conference technology made it possible for them to come together for the first time in a joint networking meeting to exchange current reports and the latest research findings. Hosted in a ZOOM webinar room provided by *BOKU University* and moderated by the co-founder of *World Jackal Day* Jennifer Hatlauf, the program started at 10:00 CET and was originally planned to finish at 12:00 CET – however, in reality, it took considerably longer, not least because of the very extensive exchange of information and the readily used discussion forum with a desire for dialogue.

Program of talks

SESSION 1

Jennifer Hatlauf (AT):

Intro – About the World Jackal Day

Arie Trouwborst (NL):

The world's jackals as protected, game, pest or alien species: the varying role of law regarding human-jackal conflict and coexistence

Ovidiu Banea (RO):

Golden jackals in Romania

Evgeniy Raichev and Stanislava Peeva (BG):

Behavioral patterns and coexistence of jackals and other representatives of the family Canidae in Bulgaria

Suvi Viranta (FI):
Crossing the Arctic circle: golden jackals of Finland

Aleksandra Penezić (RS):
Golden jackals in Serbia

Mauro Belardi (IT):
Golden jackals in Italy (news)

SESSION 2

Nuno Guimaraes (SK):
Golden jackals in Slovakia

Keith Sommerville (UK):
The irrepressible black-backed jackal

Sampath Seneviratne and Uthpala Jayaweera (LK):
The vanishing howl of Sri Lanka's outback

Stefano Pecorella (IT):
The first record of allunursing in golden jackal (example from Italy)

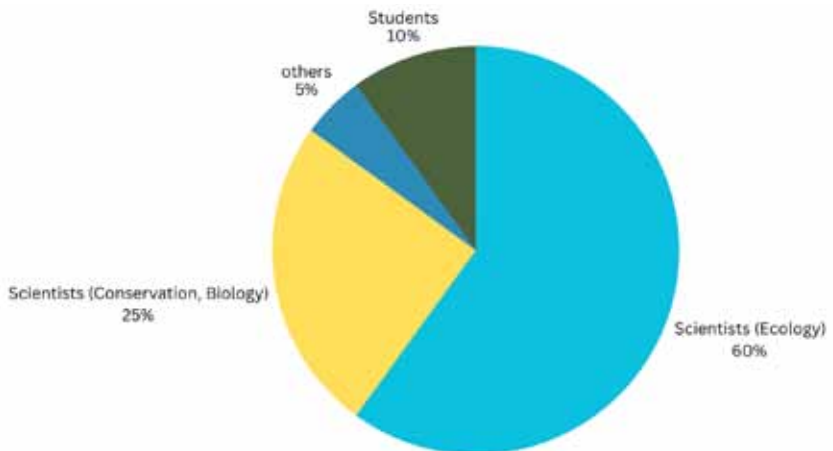
Milomir Stefanovic (PL):
*Genome-wide diversity and demographic history of golden jackals (*Canis aureus*) across Eurasia*

Jennifer Hatlauf (AT):
Update about golden jackals in Austria/ Germany (and Switzerland)

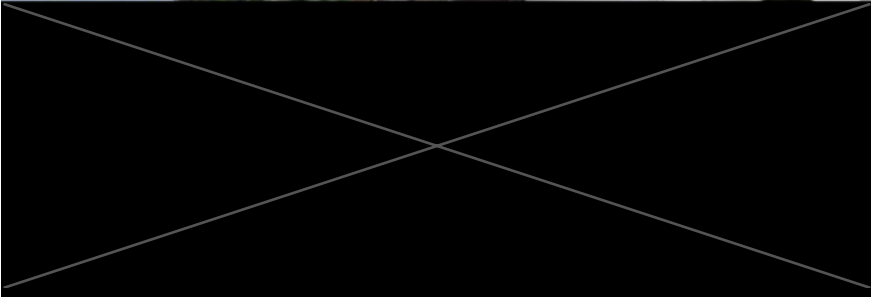
Summary, Outcomes and Discussion

The morning opened with an introduction to the idea and history of *World Jackal Day*, followed by a series of short presentations (planned 8-10 minutes each). The first session explored the diverse contexts in which jackals are perceived and managed. Arie Trouwborst (Netherlands) outlined the complex role of legal frameworks, showing how jackals are alternately treated as protected species, game animals, pests or alien species depending on national contexts. Then followed regional updates on golden jackal (*Canis aureus*) occurrence and research in Europe: Ovidiu Banea (Romania) presented on golden jackals in Romania, Evgeniy Raichev and Stanislava Peeva (Bulgaria) discussed behavioural patterns and coexistence of jackals with other canids, Suvi Viranta (Finland) reported on the expansion of golden jackals north of the Arctic Circle, Aleksandra Penezić (Serbia) provided an update from the Balkans, and Mauro Belardi (Italy) shared the latest news from Italy.

The second session continued with further regional and thematic contributions. Nuno Guimaraes (Slovakia) presented the status of golden jackals in Slovakia, while Keith



Disciplines of scientific participants in the first scientific Get-Together.

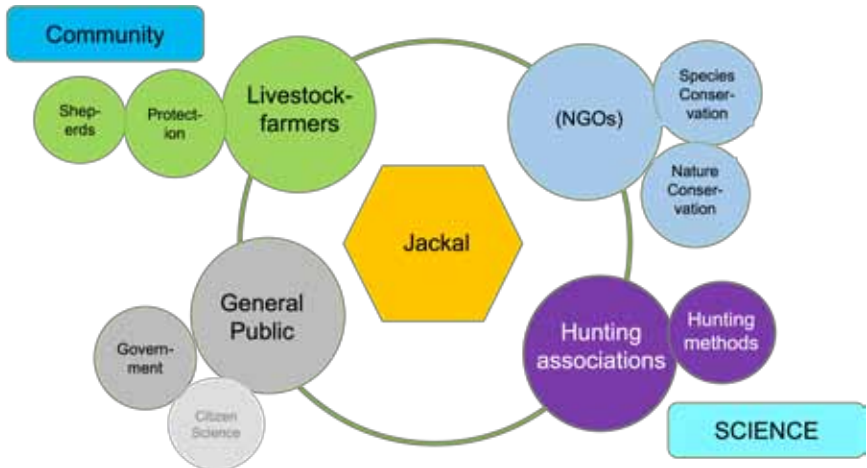


Some participants of the scientific meeting from all across the globe, cheering in the group picture for the first World Jackal Day.

Sommerville (UK) offered insights into the adaptability of the black-backed jackal (*Lupulella mesomelas*) in Africa. From Sri Lanka, Sampath Seneviratne and Uthpala Jayaweera highlighted the conservation challenges facing the island's golden jackal populations in their talk. Stefano Pecorella (Italy) reported on the first record of allonursing in golden jackals, and Milomir Stefanovic (Poland) presented genome-wide analyses of golden jackals across Eurasia. The session closed with an update from Jennifer Hatlauf (Austria) on the status and distribution of golden jackals in Austria, Germany, and Switzerland.

Together, these contributions demonstrated the remarkable adaptability of jackals across diverse ecological and cultural landscapes, while also underscoring the importance of legal, ecological, and social perspectives for understanding and managing their expanding ranges.

The discussion platform was readily and extensively used. Among others, the following topics were addressed: differences in legal status and management of jackals between countries, regional rise (e.g. Hungary, Slovenia,...) and decline (Sri Lanka,...) of population numbers, harvest quotas,...



Dialogue result: potential stakeholders interested in jackal research, as discussed in the course of World Jackal Day 2023.



1st WORLD JACKAL DAY

REGIONAL ACTIVITIES
AND OUTREACH

19.04.2023



Austria: Postage Stamp

A special postage stamp was emitted on the occasion of the *World Jackal Day* in Austria – as a tool for communicating the topic to a wider audience and as a souvenir for commemoration of the event. While sticking to a general design, the motif will be changed on an annual basis: In 2023, the first year of *World Jackal Day*, a picture of a golden jackal (*Canis aureus*) taken by Jennifer Hatlauf (*BOKU University*) was chosen to draw attention to the geographically most widespread jackal species and the only one in Europe (as reverence to the origin of *World Jackal Day* and the majority of scientific contributions).

The postage stamps were emitted as personalized stamps by the *Austrian Post* in a limited number of 120 pieces of a postage value of € 1 respectively. Special envelopes were produced for “first day covers” that were sent on the particular day of the event on April, 19th. Mint postage stamps or “first day covers” on the respective *World Jackal Day* can be acquired via the website www.worldjackalday.com.



Austrian postage stamp commemorating the first World Jackal Day.

Austria: Stickers

As a measure for outreach, stickers with the *World Jackal Day* logo were produced. They were distributed at conferences, invited talks and on many other occasions.



Austria: T-Shirts, mugs, bags,...

For advertising *World Jackal Day* and jackal research in general, various products were manufactured showing the logo and golden jackals. The earnings are supporting the organization of the event and production of the proceedings. Everyone interested in one of them is invited to get in contact via email to office@goldschakal.at.



Austria: Promotion Activities and Media

In the course of many scientific talks on golden jackals in Europe, the option of participating in the World Jackal Day webinars was presented to a broad audience (hunting associations, nature conservation agencies, general public,...). Following a press release from *BOKU University* and *Austria Press Agency*, many newspapers and online media reported on *World Jackal Day*. It was observed that this was picked up and shared by several international websites and social media accounts.

The *Mineral of the Year 2023* – apatite $\text{Ca}_5[(\text{F},\text{Cl},\text{OH})(\text{PO}_4)_3]$ (hexagonal) – also provided an opportunity for related activities in other disciplines, because crystals of this structure type are important biominerals. Golden jackal crania and teeth were used as examples for bone material, connected with advertisement for the *World Jackal Day*. Prominent examples of related usage in outreach activities include inter alia articles of the *Austrian Mineralogical Society* or display items for the public event of the international conference *MinWien2023* of the Mineralogical Societies of Germany, Slovakia and Austria in September 2023 at the *University of Vienna*.



Austria, Germany, Switzerland: Public Webinar

For the general public in the German speaking countries, an open access webinar on the golden jackal (*Canis aureus*) was organized at 16:00 – 19:00 CET. *BOKU University* in Vienna provided a platform via *ZOOM* for the event. A series of presentations gave insights into the species' distribution, ecology, and food choices, with a particular focus on its presence in Austria and neighbouring countries.

The webinar was opened and moderated by co-founder of *World Jackal Day* Dr. Robert Krickl, who provided an overview on jackal species and guided the audience through the diverse and informative agenda. The event organizer, Dr. Jennifer Hatlauf (*Goldschakalprojekt Österreich*), opened with a comprehensive overview of the spread and current distribution of the golden jackal across Europe. This was followed by a



Slide of the webinar showing the program.



Group picture of the presenters of the webinar for German speaking countries.

regional perspective from Tzt. Anna Moser (*Amt der Tiroler Landesregierung*), who reported on the latest developments in Tyrol. The program then broadened its scope beyond Austria: on behalf of Felix Böcker, MSc. (*FVA-Wildlife Institute*), Jennifer Hatlauf presented the situation in Germany and Ursula Sterrer, MSc. (*KORA*) discussed the newest records from Switzerland. As a special invited talk for an international audience (given in English), Dr. Nuno Guimaraes (*Technická univerzita vo Zvolene*) shared insights from Slovakia on the sympatric occurrence of the golden jackal, wolf, bear and lynx. A hallmark of the event was its interactive design: participants engaged in live polls, contributed questions and exchanged views with the speakers. At the beginning of the event, a survey revealed broad participation of different stakeholders, including livestock owners, hunters, nature and wildlife conservation organizations, scientists and interested members of the general



Partners of the outreach activities and webinar of World Jackal Day.

public. By the end, many participants were able to correctly identify key distinguishing features (e.g., short tail, light-colored legs) in a final quiz, demonstrating the effectiveness of the knowledge transfer. The active involvement underscored the growing public interest in the golden jackal and highlighted the value of *World Jackal Day* as a platform for both scientific exchange and outreach.



Scientific Meeting & Get-Together 2024

After the great success of the premiere, the scientific Get-Together was institutionalized to serve as a joint meeting for exchange of current reports and the latest research findings in the course of the second *World Jackal Day* in 2024. Hosted in a ZOOM webinar room provided by *BOKU University* and moderated by the co-founder of *World Jackal Day* Jennifer Hatlauf, the program started at 10:00 CET and was finished at 15:00 CET.

Program of talks

Jennifer Hatlauf (AT):

Introduction – About the World Jackal Day

Hubert Potocnik (SI) and Jennifer Hatlauf (AT):

Dispersal and settlement of a golden jackal in an Alpine environment: Preliminary report

Marjeta Konec (SI):

Investigation of Dalmatian ancestry in golden jackals in Slovenia's neighbouring countries

Emiliano Mori (IT):

Den use by the European golden jackal: an update on the ongoing research project in North-Eastern Italy

Peep Mannil (EE):

Country update: Estonia

Jennifer Hatlauf (AT):
Country update: Austria

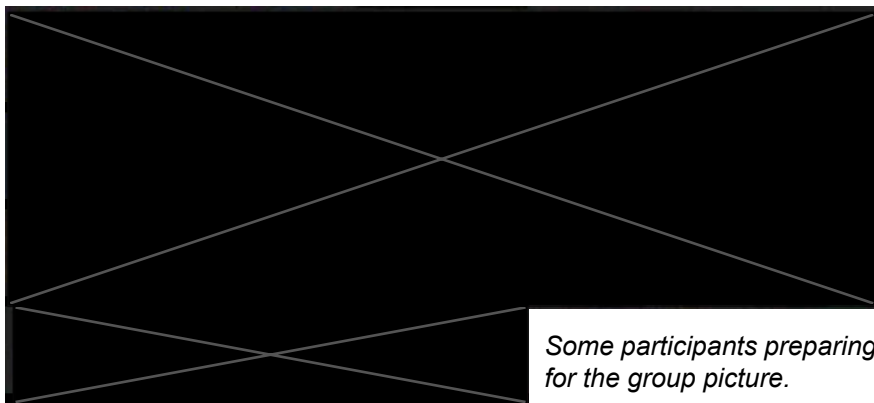
Jonas Custer (BE):
Individual recognition of golden jackals on Samos, Greece

Miha Krofel (SI):
A human shield protects golden jackals from grey wolves across Europe

Open Discussion / open updates from countries

Summary, Outcomes and Discussion

During the scientific session, participants were invited to identify and discuss the most pressing research topics concerning jackals. Using a word cloud poll, experts from various disciplines highlighted key priorities spanning ecological, behavioural, and socio-economic dimensions. The results emphasize three dominant research foci: jackal-livestock conflict, human conflict, and ecological impact.





Results of a live poll in the course of the scientific meeting of World Jackal Day 2024 on the posed question: „What are the most important topics for future golden jackal research?“.

These themes reflect a growing consensus that jackal research must integrate both ecological and human dimensions to understand their rapid range expansion, adaptive behaviour, and emerging interactions with humans and other species. Additional topics such as niche overlap, predation, hybridization, and jackals as competitors underline the importance of assessing interspecific relationships and trophic roles within changing ecosystems. Social and behavioural aspects – including human attitudes, social impact, and the human dimension – were also prominently mentioned, highlighting the need for transdisciplinary approaches that link natural and social sciences. Overall, the outcome of the session underscores a shared



From behind the scenes: Giving a talk to the international audience in the scientific meeting of World Jackal Day 2024.

scientific direction: advancing evidence-based coexistence strategies that balance biodiversity conservation, livestock protection, and public perception. The discussions set the stage for collaborative international research frameworks, with a focus on integrating ecological data, conflict mapping, and stakeholder perspectives to guide effective management of jackal populations.

The following pages provide abstracts of the given presentations →

Investigation of Dalmatian ancestry in golden jackals in Slovenia's neighbouring countries

Tamara Kovačič¹, Marjeta Konec^{2*}, Tihomir Florijančič³,
Hubert Potočnik⁴, Maja Jan⁴, Alexandros A. Karamanlidis⁵,
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Keywords: *Canis aureus*, Slovenia, Dalmatia, gene flow, spatial genetic structure

The range of the golden jackal (*Canis aureus*) has expanded rapidly in the past decades. Recent research in Slovenia, Croatia, Serbia and Hungary found two genetic clusters: the Dalmatian population on the Adriatic Coast of Croatia, and the Pannonian population in the remainder of the study area. The smaller, isolated Dalmatian population showed less genetic diversity, suggesting limited gene flow. A contact zone between these two populations has been found in southwestern Slovenia

and northeastern Italy. In recent surveys in Slovenia, where the species was first recorded in the 1950s, no jackals were assigned to the Dalmatian population, but a few individuals showed partial Dalmatian ancestry. There has been occasional long-distance gene flow from Dalmatia to eastern Italy (Fabbri et al., 2014) and Slovenia (Stronen et al., 2021) in the past. The aim of this study was to further investigate extent and direction of gene flow between the Dalmatian and Pannonian populations. We analysed 73 samples, centered on recent samples from Croatia (13), Italy (6), Austria (3) and Greece (5). In Croatia, the samples came from the islands of Krk (11) and Dugi otok (1) on the Adriatic Coast and from Plitvice National Park in the interior (1). These new samples were compared with existing profiles from Slovenia (24) and Dalmatia (22), including two jackals of known Dalmatian-Pannonian admixed ancestry sampled in western Slovenia (Stronen et al., 2021). We performed population genetic analyses using genetic profiles from 25 microsatellite loci and various statistical methods. These included principal component analysis (PCA), spatial PCA (sPCA) and discriminant analysis of principal components (DAPC) in R. We also examined population genetic structure using STRUCTURE, and the results were visualised using QGIS. PCA showed a differentiation between jackals from Dalmatia and those from other areas. STRUCTURE analysis supported these two population clusters, and only a few of the individuals sampled outside Dalmatia showed partial ancestry from this population. Using the POPINFO-setting in STRUCTURE, we identified additional individuals with partial Dalmatian ancestry: one in Italy and one from Dugi otok. DAPC provided similar results, with one sample from Italy and the single Dugi otok jackal showing admixed Dalmatian-Pannonian ancestry. Finally, sPCA also differentiated between Dalmatian and Pannonian jackals, but did not indicate any additional population structure. Overall, the results support the genetic differentiation between Dalmatian individuals and jackals in

other parts of our study area. We have identified two genetic clusters in our study area, the Dalmatian and the Pannonian population. Moreover, we detected a small number of jackals with partial Dalmatian ancestry, which were sampled in western Slovenia, eastern Italy and in the single sample from Dugi otok (Croatia). Our results demonstrate the continued existence of a contact zone between the two populations. Further analyses, including samples from the southeastern Balkan region and the southern Adriatic Coast, are recommended to explore broader population genetic structure and gene flow, including the possible presence of additional genetic clusters.

Acknowledgments:

We sincerely thank all contributors for their assistance in providing samples and their valuable input for this research, and we acknowledge the Styrian hunting association (Steirische Landesjägerschaft), the Bernd Thies Foundation, the UK Wolf Conservation Trust, and Plitvice Lakes National Park.

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Den use by the European golden jackal: an update on the ongoing research project in North-Eastern Italy

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In its European range, the golden jackal *Canis aureus* coexists with a number of semi-fossorial mammal species, including the European badger *Meles meles* and the red fox *Vulpes vulpes*. Jackals, foxes and badgers have been reported to use the same complex burrow systems, in different periods or, in the case of foxes and badgers, at the same time. Nonetheless, observations of den sharing and den use by these species have been largely restricted to anecdotal information until recent times, due to the predominantly nocturnal activity of the majority of burrows occupants. The golden jackal is a canid of European conservation concern, which is showing a remarkable range expansion in the western part of its extent of occurrence, thus entering in contact with populations of native species. In all its European range, the information available on reproductive biology and den use by this species is scarce, as well as its biological interactions with other European carnivores. We conducted our study in North-Eastern Italy, along the lower Isonzo River basin, which has been recently colonized by the golden jackal. We collected data on jackal presence and den use, between 2021 and 2024. Local

population abundance of the golden jackal was calculated by combining bioacoustic monitoring methods with opportunistic camera trapping (trapping effort = 90 camera-trap days). The den use was then analysed by investigating a total of 27 burrows with 1–3 camera-traps per site, in Mar-June 2021–2023. We recorded five jackal groups, and we estimated a population density of 0.53–0.65 groups / 10 km². Jackals were detected on 15 burrows during the 2021–2023 monitoring program. Amongst those, 5 burrows were inspected by pregnant / lactating females and two of these burrows were occupied by jackal pairs with offspring, as confirmed by camera traps. One of these two burrows was occupied for two consecutive years (2022 and 2023). The use of burrows previously occupied by the European badger (primary excavator) was documented in all three cases, suggesting a potential facilitation by the badger towards the golden jackal (secondary modifier). We recorded badgers and foxes ceasing the use of dens during their use by jackals with their offspring. Our data suggest that in our study area, jackals may outcompete badgers and foxes from previously occupied dens, but further data are needed to support this hypothesis.

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Dispersal and settlement of a golden jackal in an alpine environment – preliminary report

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Keywords: alpine ecology, wildlife dispersal, spatial analysis, conservation biology

The golden jackal (*Canis aureus*) is expanding its range into new areas in northern and western Europe, including alpine environments previously thought unsuitable for its settlement. This study investigates the ecological factors influencing this expansion and the settlement of GPS-collared golden jackal Maj. This young male, appr. 1,5-year-old individual was caught as a bycatch in a project focused on wolves, in June 2023. The tracked journey of Maj provides insights into the dispersal behaviors of the species across international borders – highlighting the need for cross-border collaboration. Despite natural barriers and human settlements, Maj has demonstrated the capability of golden jackals to adapt and traverse many landscapes, suggesting their high potential to settle in new environments far from their origin. At the moment Maj has settled in the Austrian province of Carinthia, in alpine settings, almost 100 km away from his capture. The steep terrain of its new territory lies among sheep farms and within a highly used tourist area. However, there are enough hiding places and most likely a mating partner. After the release, the jackal roamed on the pre-Alpine plateau Pokljuka in the Julian Alps

(Slovenia) and formed small adjacent/transient home ranges, but in mid-November its movement changed to a directional linear movement, indicating the beginning of dispersal. On its route, the jackal soon entered Austria, following valleys, and crossing mountain ridges at altitudes of up to 1950 m a.s.l. On its way north, it successfully crossed the A11 highway several times at viaducts and underpasses. The greatest distance in a straight line from his predispersal HR was 96 km when he reached Katschberg at the area of ski centre. It finally settled on the northern slopes at the entrance to the Malta Valley, west of Gmünd after 14 days (27.11.2023), with a cumulative distance of 346 km between recorded GPS positions. Over the winter it established a HR, but in February 2024 it made three 2-4 day trips. Although the presence of other jackals in the area is known, it is not known whether it has joined or formed a breeding group to date. In recent decades, the range of the golden jackal has expanded considerably, probably due to human-induced landscape and climate changes and the persecution of competing predators. The opportunity to study in detail the spatial behavior and possible adaptations of jackals to climatic and environmental constraints and features of the alpine/cold environment, such as cold temperatures and deep snow, could reveal the mechanisms that have facilitated their rapid spread across Europe.

Individual identification of golden jackals on Samos Island, Greece - preliminary results

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Keywords: social behaviour, camera-trapping, individual identification, social network analysis

Golden jackals live in close family groups consisting of a monogamous dominant pair and their offspring (Macdonald 1979). By engaging in intimate social interactions, group members reinforce their social bonds and establish the social hierarchy. They cooperatively secure food sources and fend off strangers from their group's territory. Adolescents are known to remain at the nest as helpers for some time, meaning that they aid their parents in raising subsequent generations of offspring before dispersing (Macdonald 1979; Wandrey 1975; Lanszki et al. 2018). Many aspects of the intricate social behaviour of golden jackals are still unknown and detailed studies are lacking, especially in Europe. To narrow this research gap, we studied the social system of golden jackals living on Samos, consisting of three interrelated components: social organisation, mating system, and social structure (Kappeler et al., 2013). Here we present the preliminary results of our study. We monitored one golden jackal group in Potami Mesokampos, Samos (Greece) over the course of five months (From January until April) using four camera traps and analysed the data using an ethogram established based on observations on zoo-housed golden jackals (Wandrey 1975). We identified individuals based on

coat colourations and determined intra-observer reliability by calculating Cohen's Kappa (Cohen 1968). We used both a descriptive summary and conducted social network analysis (SNA) to reveal new aspects of their social lives. All statistical analyses were conducted using R statistical software (R Core Team 2020). Individuals were found to considerably vary in coat colouration, making individual identification possible. We reached a substantial intra-observer reliability score ($\kappa = 0.804$). We found that the studied group had a relatively stable composition over the course of five months. Two clearly dominant individuals were identified, one male and one female. We observed both these individuals engaging in pre-copulatory behaviour with each other. Both the dominant individuals occupied the most central roles within the social networks, showing their influential position within the network (Eigenvector Centrality Scores ≈ 1). Modularity in all networks was below the threshold of 0.3, indicating only weak community structure. Using a limited number of camera traps we successfully identified individual group members for the first time in Europe, and revealed their social relationships and group composition throughout five months. Our approach has successfully provided us with results that give us some more insight into the understudied social behaviour of the golden jackal. In the future, it would be desirable to repeat a similar study over a continuous period using more camera traps. In addition, using molecular techniques would allow us to reveal the relatedness of the group members.

Acknowledgments:

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Ecology and conservation of an insular population of golden jackal in Sri Lanka

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Keywords: golden jackal, Sri Lanka jackal, ecology, taxonomy

The Sri Lanka Jackal (*Canis aureus nariya*) is the only prominent insular subspecies of the Eurasian Golden Jackal (*C. aureus*) across its range. The Sri Lankan subspecies inhabits a different ecological context compared to other subspecies as it stands as the sole wild canid of Sri Lanka and ranks as the third-largest carnivore of the island. However, most aspects of its biology have not been studied, including its taxonomic status, which remains unclear. We conducted a study to determine its diet, vocalization, geographical distribution, and the nature of human-jackal interaction to fill this knowledge gap. Through our research, we provide the first detailed description of the ecology of this island subspecies of the Golden Jackal. The taxonomic history of the species was reviewed using major museums such as the Natural History Museum of Colombo, the Museum of the Bombay Natural History Society, and the Natural History Museum of London museum collections. Road kills and museum specimens were used for biometric measurements. Scat samples in the wild and stomach contents obtained from road-kills was analyzed to determine the diet. The diet composition of the jackal was calculated in two ways: percentage frequency of occurrence and percentage biomass consumed. To record jackal vocalizations provoked by using playback acoustic method, an Omni-directional microphone

fitted to a parabolic reflector and a Marantz solid-state recorder were used. The recordings were then subjected to spectrometric analysis using Raven Pro (v. 1.6.3) software. Different syllable types and vocal types were identified based on differences in selected acoustic properties. We used a questionnaire survey across the country and sighting reports were used to determine the geographical distribution, current status, and the nature of human-jackal interaction in the country. The taxonomic history of the jackal has been changing over the past century. The Sri Lankan Jackal is considered an endemic subspecies to the island: *C. a. lanka* (Ellerman & Morrison-Scott, 1951) and (Philips, 1984), and a subspecies endemic to both Southern India and Sri Lanka: *C. a. nariya* (Wroughton, 1916). It is even considered an endemic species (*Canis lanka*) to the island by Philips (1935). Four food types were identified in the jackal diet: small mammals, birds, plant materials, and invertebrates. The principal food type in terms of percentage biomass consumed is small mammals (64.1%), whereas plant materials (60%) are the main food items in terms of percentage frequency of occurrence. Jackal's vocal repertoire is comprised of five vocal types. The group yip-howl serves as its group vocal display as well as its major vocal type in the repertoire. Our findings revealed that the jackal occurs throughout the island except the higher hills above the elevation of 1500m, and their population density in the dry zone is slightly higher than in the wet zone. There has been a marked decline in their population in Sri Lanka over the past two decades. Human-Jackal conflict is negligible and the reported few cases were a result of a few animals contracting rabies or a few animals raiding chicken coops in the rural sector.

We summarize these results as a monograph aimed at Sri Lankan public, titled, 'The Way of the Jackal: The Untold Story of the Sri Lankan's Wild Dog'. We hope that the knowledge will be better disseminated to the public through this book. Our findings emphasize the jackal's potential as a keystone

species, an important meso-carnivore and a high-value species in wildlife tourism on the island. We stressed the importance of molecular phylogenetic studies on this population to clarify taxonomic ambiguity.

Acknowledgments:

We acknowledge the Wildlife and Nature Protection Society of Sri Lanka for publishing the monograph.

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A human shield protects golden jackals from grey wolves across Europe

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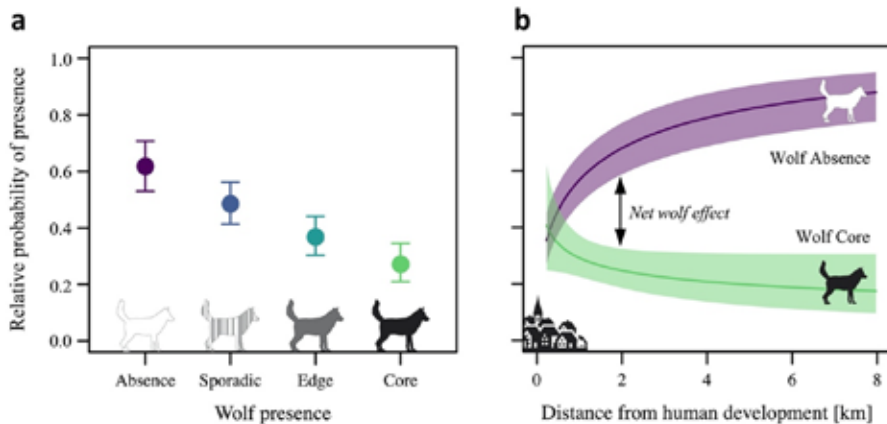
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Keywords: distribution model, interspecific interactions, human shield, Canis aureus, Canis lupus

The structure of ecological communities has been conventionally thought to be primarily shaped by relationships among organisms within the community. The direct impacts of anthropogenic climate and land-use changes on species distributions worldwide are well characterized; by contrast, the large-scale influence of biotic interactions and the modulation of these interactions by people remain largely overlooked. Here, we take advantage of the ongoing, continental-scale expansion of a generalist mesocarnivore to evaluate how human-modified biotic interactions influence the large-scale distribution of species. The large-scale expansion of the golden jackal (*Canis aureus*; hereafter jackal) is one of the most dramatic range shifts among native mammals currently observed worldwide is across Europe. This provides us with a rare opportunity to witness the range expansion process of a wild, native carnivore at a continental scale, and to improve our understanding of large-scale changes in the carnivore guild within human-dominated landscapes. We used a transnational dataset of acoustic surveys to disentangle the effect of the proposed ecological and human-related factors driving the expansion of jackals in Europe. We applied these insights to predict the potential for future colonization of the species, and to evaluate the large-scale consequences of

human-mediated interspecific interactions. We analyzed the collected data using an autocovariate generalized mixed effects model (complementary log-log link; survey transects as random effect) that included biologically-plausible predictors of both jackal group presence and detectability. We included in the model the intensity of wolf presence, classified as absence, sporadic presence and permanent presence (edge and core), and its interaction with the distance from nearest human development. Additionally, we considered other potential drivers of expansion presented in studies of jackal presence at local to regional scales such as land use (forest cover, distance from nearest water body), climate (snow cover duration) and controlled for country-level effects and the species expansion dynamics. We used an information-theoretic approach (Bayesian Information Criterion) for model selection and assessing quantifying the importance of covariates. Wolf presence was the single most important ecological variable influencing the probability of presence of jackal territorial groups. Jackals were more likely to be present where wolves are absent, than in areas of sporadic, permanent edge or permanent core wolf presence. These results suggest that, after controlling for key environmental and anthropogenic covariates as well as jackal expansion dynamics, wolves are indeed a fundamental constraint to jackals. However, the human shield reduces the effect the ongoing wolf recovery has on jackals in human-dominated Europe, where we predict 72% of the continent to be currently suitable for jackal colonization. Our research demonstrates profound influence that humans have on species distributions through altered biotic interactions, and how cascading anthropogenic impact can hamper the ecological benefits provided by apex predator recovery. Results also add support to the mesopredator-release hypothesis, that suggests the decline of wolves in Europe as the main trigger for the jackal expansion in Europe.



Acknowledgments:

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Monitoring of the golden jackal in the Hainich National Park

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Keywords: single sole resident, detection, evidence, detectability

The 7.500 ha Hainich National Park (HNP) is part of a forested limestone ridge 200-500 m a.s.l. (annual mean temperature 7-8°C, precipitation 600-800 mm) embedded in an intensive agricultural landscape in the centre of Germany in western Thuringia. The HNP is structurally heterogeneous, covering c. 2.500 ha of open lands on former military training ground (c. 750 ha of semi-natural grassland with GAP-supported mowing or sheep, goat, cattle and horse grazing, and c. 1.750 ha of unmanaged scrub and young forest succession), and c. 5,000 ha of beech and deciduous mixed forest. Grey Wolf (*Canis lupus*) only occurs occasionally on passage. A single Golden Jackal (GJ) was first recorded by camera trap in August 2019 and seems resident since. The opportunity of this single individual in a large area was used to trial different detection and monitoring methods. Between 01/08/2019 and 18/04/2024 we applied 3 standard GJ monitoring methods (cf. Hatlauf and Böcker 2021): (i) Camera trapping with up to 112 trail cams (CT) (Models: Cuddeback C series, Reconyx Hyperfire 2 Covert IR): 71 permanent CT distributed in a 1 x 1 km grid across HNP, initially with adjacent scale bars, plus 10-41 temporary CT installed unsystematically at varying promising locations. In the south of HNP where GJ CT records occurred more regularly, we further applied: (ii) Bioacoustic Monitoring (BAM) at 3 sites, respectively, in January 2021, February

2024, and March 2024 (total 8 different sites). (iii) 2 Wildlife Detection Dog teams (WDD): Dog 1 walked a total of 29 km on 08-12/01/2021, dog 2 47 km on 20-24/07/2023 and 37 km on 03-07/01/2024. Furthermore, in 2021 we tested attractants (cod liver oil and / or fish oil versus no treatment) at 28 CT systematically distributed in a 1 x 1 km grid. In February/March 2024, at 2 CT we installed hair traps and used “Wildmagnet®” as olfactory attractant. CT yielded 69 records of 1 single GJ (34 C1 and 35 C2 according to SCALP criteria; cf. Hatlauf and Böcker 2021), last on 05/03/2024. 1 of the CT events (17/12/2023) likely depicted a marking male. BAM, WDD, or attractants yielded no record. GJ has been present in the Hainich NP from at least August 2019 to March 2024. There are no indications (e.g., body size or fur markings) suggesting more than 1 individual. Thus, we presume a single solitary male being resident for at least 4 years and 7 months. Detection or monitoring of this individual in a large, structurally rich area proved challenging: Of 3 standard monitoring methods applied, only CT yielded regular records, and CT images may allow sexing via behaviour. BAM, WDD, and three olfactory attractants did not work in our case.

Acknowledgements:

For assistance during fieldwork I thank Denny Juchem (HNP staff) and the research intern Johann Thieme. Thanks also for cooperation to Jennifer Hatlauf (BOKU University), Felix Böcker (Forest Research Institute Baden-Württemberg, FVA), Hannah Weber (FVA), Doris Kriegsherr (Naturschutzhunde Austria), Markus Handschuh, and the Thuringian State Office for Environment, Mining, and Nature Conservation, especially Tina Buchmann.

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Austria: Promotion Activities and Media

A station at the *Long Night of Research* in Wiener Neustadt (Lower Austria) also addressed the topic of golden jackals and promoted *World Jackal Day*. In the course of various scientific talks on golden jackals in Europe, the option of participating in the World Jackal Day webinars was presented to a broad audience (hunting associations, nature conservation agencies, general public,...). Following a press release from *BOKU University* and *Austria Press Agency*, many newspapers and online media reported on *World Jackal Day*. It was observed that this was picked up and shared by several international websites and social media accounts.



Austria: Postage Stamp

A special postage stamp was emitted on the occasion of the *World Jackal Day* in Austria – as a tool for communicating the topic to a wider audience and as a souvenir for commemoration of the event. While sticking to a general design, the motif is changed on an annual basis: In 2024, the second year of *World Jackal Day*, a picture of an African wolf (*Canis lupaster*) – historically also addressed as „Egyptian jackal“ – taken by Jahla Yadvendradev (India) was chosen. This corresponded to the guest talk by Tariku Mekonnen Gutema (Ethiopia) in the public webinar for the German speaking countries. The postage stamps were emitted as personalized stamps by the *Austrian Post* in a limited number of 60 pieces of a postage value of € 0.95 respectively. Special envelopes were produced for “first day covers” that were sent on the particular day of the event on April, 19th. Mint postage stamps or “first day covers” on the respective *World Jackal Day* can be acquired via the website www.worldjackalday.com.



Austria, Germany, Switzerland: Public Webinar

After the great success of the premiere in the year before, the open access webinar for the general public in German speaking countries was institutionalized to be held every year. In 2024, the first part of the webinar focused on the current status and distribution of golden jackals in the German-speaking region. An exciting feature included the latest updates on Maj, a golden jackal from Slovenia equipped with a transmitter, who has embarked on its journey to Austria. Following this, a new study comparing the diets of foxes and golden jackals was presented. Additionally, the discussion explored how these two species adapt to each other in certain regions (and even coexist? – as illustrated by a case in Germany). A panel discussion on the legal status of the golden jackal concluded the German-speaking segment, and participants were encouraged to actively engage with questions.

The poster is divided into two main sections. The left section features a dark blue background with yellow and white text. It reads: "2. INTERNATIONALER TAG DER SCHAKALE" in large yellow letters, followed by "19. April 2024" and "PROGRAMM" in red. Below this, it says "Deutschsprachiger Raum". There are three circular images: a golden jackal in a red circle, a fox in a yellow circle, and a jackal in a yellow circle. At the bottom left is the BOKU logo. A large yellow jackal head silhouette is at the bottom right with the text "WORLD JACKAL DAY" and "19. April".

The right section has a light blue background and lists the schedule:

16:00 -19:00

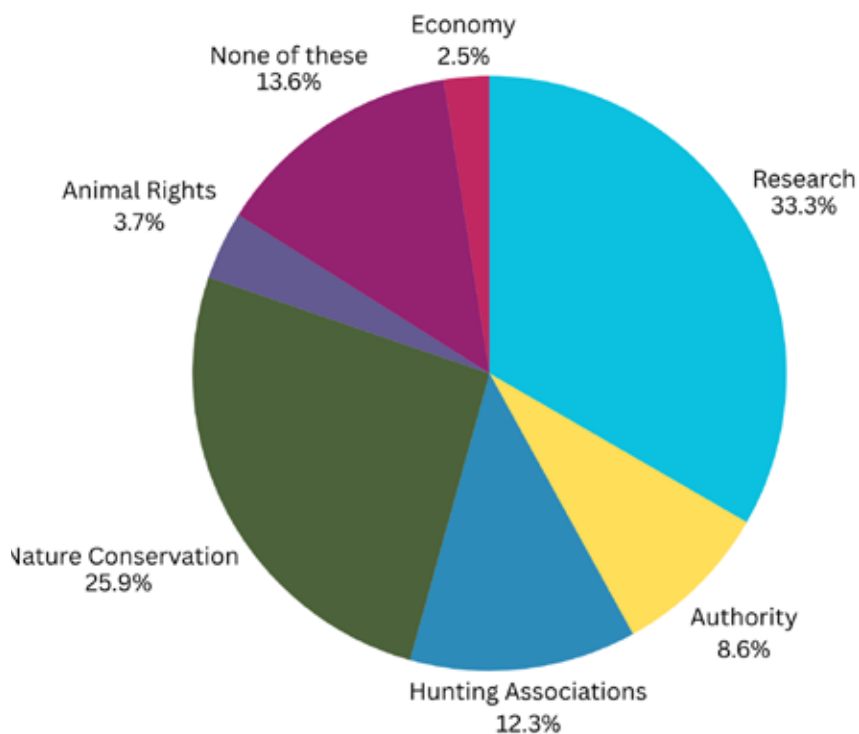
- Einführung und Übersicht über die „Schakale der Welt“**
Moderation: Robert Erniel
- Der Goldschakal in Europa**
Referent: Johann Haidlauf, BOKU Wien, Österreich
- Der Goldschakal in Deutschland**
Referent: Hannah Weber, FVA-Wildtierinstitut, Deutschland
- Monitoring des Goldschakals im Nationalpark Hainich**
Referent: Alisa Kiemer, Nationalparkverwaltung Hainich, Deutschland
- Rechtstatus des Goldschakals in Österreich**
Vortrag und Podiumsdiskussion (inkl. Clemens Purtscher)
Referent: Nadja Zrinski, Eisenberger Rechtsanwälte, Österreich
- Was frisst der Goldschakal? (in Ungarn und Österreich)**
Referent: Karin Lanzensattel, BOKU Wien, Österreich
- What does the golden jackal feed on? (in Serbia) (english)**
Referent: Aleksandra Penzic, Belgrade University, Serbia
- Ecology of the African - and Ethiopian "jackals" (english)**
Referent: Tarku Makonnen Getem, Jimma University, Ethiopia

Abschluss

Below the text is a world map with a yellow circular logo overlaid on it, showing the distribution of golden jackals.

Again, the webinar culminated in invited talks (given in English language) to provide international insights: Aleksandra Penezić (University of Belgrade) presented on the dietary choices of golden jackals in Serbia, offering significant insights into their potential impact on biodiversity. A special highlight was the lecture by Tariku Mekonnen Gutema from Jimma University in Ethiopia, who shared his research on „Ethiopian wolves“ (*Canis simensis*) and „African wolves“ (*Canis lupaster*). The latter species was also featured on this year’s special postage stamp for *World Jackal Day*.

The webinar aimed at a broad audience, including nature enthusiasts, hunters, students, academics, and conservation professionals. It turned out – again – to be an unique opportunity for knowledge exchange.



Distribution of participants of the webinar.



Group picture of presenters of the webinar for German speaking countries.

Program

16:00 – Robert Krickl (*Krickl Research*):
Introduction and overview of the 'jackals of the world'

16:10 – Jennifer Hatlauf (*BOKU University*):
Golden jackal in Europe

16:30 – Hannah Weber (*FVA*):
Goldschakal in Deutschland

16:45 – Alisa Klamm (*Nationalparkverwaltung Hainich, Sachgebiet Naturschutz und Forschung*):
*Monitoring of the Golden Jackal (*Canis aureus*) in Hainich National Park [cf. abstract page 48]*

17:00 – Nadja Zrinski (*Eisenberger Rechtsanwälte*):
Legal Status of the Golden Jackal in Austria – Presentation and Panel Discussion

17:30 – Kian Lanzenstiel (*BOKU University*):
What does the Golden Jackal eat? – Focus on Hungary and Austria

17:45 – Alexandra Penezić (Belgrade University):
What does the Golden Jackal Feed on? – Focus on Serbia

18:15 – Tariku Mekonnen Gutema (Jimma University):
Ecology of the African and Ethiopian “Jackals”

18:45 – Final discussion

Summary, Outcomes and Discussion

The public webinar was also used to gather spontaneous perceptions and expectations from attendees. Several interactive polls provided valuable insights into the public image, knowledge gaps, and future interest topics.

1. Public perceptions of the golden jackal: The first question (“What comes to your mind spontaneously when you think of the golden jackal?”, see below) revealed a predominantly positive and curious attitude towards the species. The most frequent



Result of a live poll in the course of the webinar on the question: „What comes to mind spontaneously when you think of the golden jackal?“.



Result of a live poll in the course of the webinar on the question: „What topics (or guests) would you like to see at the next World Jackal Day?“.

associations included “exciting”, “monitoring”, “fascinating newcomer”, and “secretive new arriver”. Participants described jackals as “intelligent”, “beautiful”, “harmless”, and as “highly adaptable species”, reflecting an emerging understanding of their ecological adaptability. At the same time, terms such as “prejudices” and “ignorance” highlighted the persistence of public misconceptions and the need for continued education. Overall, the tone of the responses reflects fascination, openness, and a growing willingness to understand the species through evidence-based communication.

2. Desired topics for future events: In the second poll (“Which topics (or guests) would you like to see at the next International Jackal Day?”, see above), participants proposed a wide range of topics. The most frequently mentioned suggestions focused on: Clarifying legal and conservation frameworks, public education and awareness, scientific insights into ecology and behaviour, comparative and international perspectives and global change topics. These results underscore the public’s interest in balanced, cross-sectoral dialogue – connecting

science, policy, and society. Participants particularly expressed a desire for knowledge exchange between researchers and hunters, suggesting that coexistence-oriented communication is central. The key takeaways were:

- The golden jackal is increasingly perceived as an intriguing, adaptable, and (non-threatening) newcomer to Europe's fauna.
- There is a strong public demand for transparent monitoring, legal clarity, and accessible education on the species' role in ecosystems.
- Future events should foster collaboration among scientists, wildlife managers, and the hunting community to strengthen mutual understanding and evidence-based management.

The success of *World Jackal Day* demonstrates the value of combining scientific discussion and public participation, reinforcing awareness and fostering coexistence.

International coverages

Several newspapers around the world picked up the opportunity of *World Jackal Day* to report on jackals. To give two examples: attention was brought to us on a coverage from the Taiwanese online platform designed specifically for primary school children *KidsMedia*, or an informative article of the Indian newspaper *Hindustan Times*.

Call for action:

World Jackal Day serves as a tool for communication on the subject of jackals. Please report any activities so that they can be distributed via www.worldjackalday.com and documented and chronicled here.

Event announcement

**4th International Symposium on jackals
and related species**

Letter from the Organisers:

We are happy to announce the 4th International Symposium on Jackals and Related Species, to be held between October 7th and 10th, 2026, in Crişan, Danube Delta Biosphere Reserve, Romania.


Join us for an enriching experience where we'll discuss, collaborate, and learn together about these incredible jackals and related species! We invite students, scholars, researchers, game managers, naturalists, and wildlife photographers to dive into the captivating world of jackals at the upcoming 4th International Jackal Symposium (4IJS)!

From monitoring and conservation to the fascinating realm of human-jackal conflicts, population dynamics, genetics, and movement ecology, we'll cover it all. Explore the intricacies of community ecology, delve into the social dynamics of carnivores, and uncover strategies for disease control and prevention.

4IJS is endorsed by IUCN Canid Specialist Group.

Dr. Marian Tudor, Environmental Ecologist, Director of the National Institute of Danube Delta Research and Development, 4IJS Director

Dr. Ovidiu Banea, Environmental Ecologist at Crispus NGO Sibiu, 4IJS Manager



4th International Symposium on jackals
and related species

DANUBE DELTA,
ROMANIA
7-10 OCTOBER 2026

4IJS Websites and Contact: Danube Delta National Institute
for Research and Development

<https://ddni.ro>

4IJS News Corner:

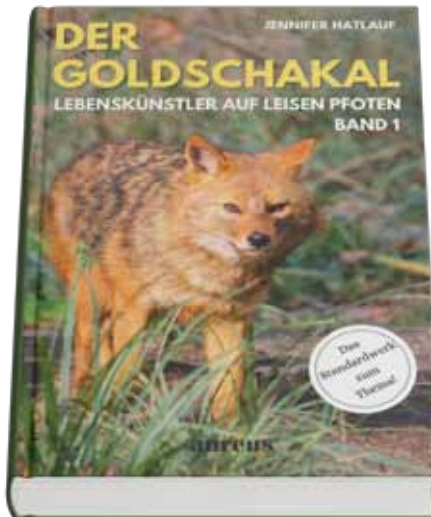
<https://www.jackalecology.eu/4ijs-news-corner>

Contact Us: 4ijs@jackalecology.eu

Literature announcement

Der Goldschakal – Lebenskünstler auf leisen Pfoten

Coming up: a monography on the golden jackal in two volumes by Jennifer Hatlauf – find all information at www.aureus.co.at



Follow this link for information and ordering

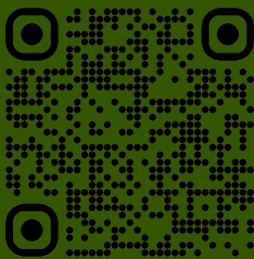
Notes

Looking forward to meeting you at the next World Jackal Day!



www.worldjackalday.com →





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