

Current Topics in

# ANIMAL ECOLOGY

02



RED FOX

*Vulpes vulpes*

ADMIRAL BUTTERFLY

*Vanessa atalanta*



LESSER WHITETHROAT

*Sylvia curruca*



WILD BOAR

*Sus scrofa*



# IMPRINT

## Editor

Institut für Landschaftsökologie  
AG Tierökologie  
Dr. Nadja Pernat  
Heisenbergstraße 2  
48149 Münster  
Tel: +49(0)251-83 33 996  
Fax: +49(0)251-83 38 338  
nadjapernat@uni-muenster.de

## Editor-in-Chief

Lea Foitzik  
Mia Görbing  
Luise Hüsemann  
Lisa Nordbeck  
Moana Ritterbecks  
Jens Friso Wenning

## Content designer

Lea Foitzik  
Mia Görbing  
Luise Hüsemann  
Lisa Nordbeck  
Moana Ritterbecks  
Jens Friso Wenning

## Layouter

Lea Foitzik  
Lisa Nordbeck

## Supervisor

Nadja Pernat

## Cover photo ©

Berlin city fox,  
with kind permission of  
Johannes Brinkmann, Berlin-Karow

\*All images that are not explicitly marked as copyrighted are taken from course participants or from sources that do not require the author to be marked.

# Table of **Contents**

<b>Editorial</b>	<b>04</b>
<b>News</b>	<b>05</b>
<b>How to behave as an urban mammal</b> To survive the unstoppable urbanization	<b>09</b>
<b>Even the smallest crack in the ground can be a habitat for some</b>	<b>11</b>
<b>Savage gardens: A solution to the biodiversity crisis?</b>	<b>13</b>
<b>Image Gallery</b>	<b>17</b>
<b>Urban rooftops as nesting sites</b> Why the shorebird Eurasian Oystercatcher uses them more frequently	<b>21</b>
<b>Great tits in the city – can we talk evolution yet?</b>	<b>23</b>
<b>Urban Biodiversity in Germany</b> Expert perspectives on the five most common wildlife species in cities	<b>25</b>

A close-up photograph of a wet beaver sitting on a large, textured rock. The beaver's dark brown, wet fur is highly detailed, with water droplets visible. It is looking towards the right. The rock is partially submerged in water, creating a clear reflection of the beaver's head and upper body. The background is a soft-focus natural setting with more rocks and water.

Welcome!

CANADIAN BEAVER  
*Castor canadensis*

# Editorial

Dear readers,

in the course of our study project in the winter semester 2024/25, we dealt with current topics in animal ecology, specifically with ecological novelty and urban biodiversity, one of the research focuses of the animal ecology working group at the University of Münster.

In this day and age, cities are an integral part of the landscapes all around the world and are rapidly growing. Therefore, ecosystems are constantly changing and adapting to urbanisation.

Cities often seem like a threat to animals but in reality, they become a novel habitat for many species. From even the smallest insect to bigger mammals, cities can provide many beneficial qualities. We have also addressed various questions such as how do urban locations become a better habitat and how humans and animals are able to positively influence each other's lives.

We hope to inspire you to become more aware of your environment in the city and to support a sustainable co-existence of people and nature.

Have fun reading  
Your editorial team



# NEWS

## Goldenrod is still goldenrod, after all

The threats posed by invasive species to biodiversity and species richness are becoming an increasingly important focus in nature conservation. However, alongside their negative impacts on ecosystems, potential benefits are less explored—for example, whether invasive plant species could provide advantages for pollinator diversity in areas where native plants are becoming increasingly scarce.

In her bachelor's thesis, Jasmin Ruthemeyer investigated whether pollinator activity differed between the invasive *Solidago canadensis* and the native *Solidago virgaurea* in northwestern Germany, focusing on an urbanization gradient in the city of Osnabrück. Her hypothesis: pollinators would show different preferences for the two plant species.

To test this, she selected five urban and five rural sites, placing one native and one invasive *Solidago* plant one meter apart at each location. Over 45-minute observation periods, she recorded pollinator interactions and classified the species into groups. Contrary to her expectations, the interactions did not differ significantly—neither between the plants nor between urban and rural sites. The results suggest that *Solidago canadensis* also serves as a viable food source for native pollinators.

However, when assessing invasive species, it is essential to consider more than just their potential as an additional food supply. Broader ecological interactions, such as the influence of urban stressors, must also be taken into account. These findings highlight the need for further studies on invasive plants to better understand their effects on native ecosystems. Negative impacts must be carefully weighed, and a targeted, well-considered management approach for invasive species is essential.



## Return of the bogs

Restoration causes distinct arthropod communities and promotes specialist species

Natural bogs are invaluable for nature conservation, harboring numerous specialist species and serving as vital carbon sinks. However, they are among the most sensitive and endangered ecosystems. Across Northern Europe, bogs face severe degradation, caused by factors such as habitat mismanagement, succession, and nutrient influx from intensive agriculture.

Fortunately, restoration projects are on the rise, though assessing their success remains a challenge. Timo Schlüter took on this challenge by employing a multi-taxa approach to compare the species richness and communities of a restored bog with those of an active raised bog and a quaking bog in Sweden's Store Moss National Park. Between May and July 2023, he traversed the Scandinavian landscape, sampling across 15 sites in the three habitats and trapping more than 2,000 arthropods.

In the lab, he identified 107 species, including spiders, dragonflies, damselflies, and diurnal butterflies. While the three bogs supported distinct species communities, they hosted similar numbers of typhophil (peatland-loving) and hygrophil (water-loving) species. The findings suggest that a bog's return to its natural condition can take decades—or even centuries—or that restoration may lead to the development of entirely novel ecosystems.

Nevertheless, a variety of specialist arthropods, including key indicator species, returned to the restored bog, confirming its success as a conservation project. The results also underscore the critical role of a pristine surrounding landscape and intact habitat conditions as sources for recolonization by bog-specialist species.

# NEWS

## Maintenance Measures for Heather Habitats

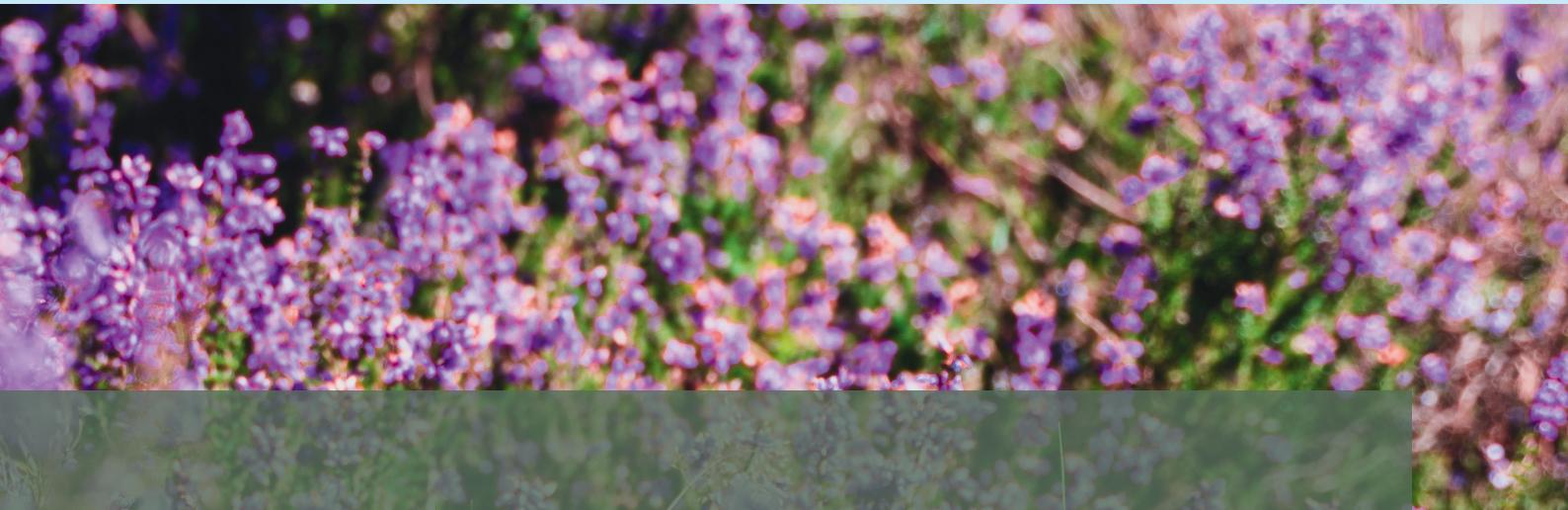
### Black Grouse benefits from disc harrow usage

In the Lüneburger Heide nature reserve, the disc harrow is employed as a maintenance tool for heather management. This method is intended to mimic the soil-disturbing effects of tank tracks found in military training areas. Till Neuhaus analyzed the effects of this soil-altering measure on avifauna, with a particular focus on the black grouse (*Lyrurus tetrix*) as an umbrella species. He aimed to compare whether traditional measures such as grazing could achieve similar habitat effects. Areas with low maintenance intensity were included as controls.

Between March and May the avifauna was surveyed using a point-stop count across three treatments: "disc harrow," "intensive grazing," and "low maintenance intensity." Black grouse usage was assessed by detecting droppings (gestures) through line transect surveys. Although the treatments did not significantly influence the overall bird species composition, the number of black grouse droppings was significantly higher on plots treated with the disc harrow compared to the other two treatments. Open ground cover positively impacted the number of black grouse gesture points, whereas lichen cover had a negative influence.

These results suggest that the increased proportion of open ground on disc-harrowed plots is a key factor driving higher black grouse activity. While earlier studies indicated that large open ground areas tend to be avoided by black grouse, this investigation highlights the importance of a mosaic structure—small patches of open ground interspersed with neighboring vegetation—as a crucial habitat feature for this species.

For effective black grouse conservation, greater emphasis should be placed on creating these fine-scale structures in heather habitats. The disc harrow has demonstrated its potential to create such conditions and could play an even more significant role in future conservation efforts.



## Canine Conservation

### Can dogs save the European adder?

The European adder (*Vipera berus*), critically endangered in Germany due to habitat loss, relies heavily on the conservation of key habitats, particularly hibernacula (overwintering places). Rewetting peatlands and construction in secondary habitats often destroy these vital winter refuges, leading to high mortality. Traditional survey methods, such as visual searches and telemetry, are invasive, costly, and time-intensive.

Madita Schemel explored in her Master thesis the potential of a trained detection dog to locate adders and their hibernacula using scent cues. She not only trained the dog but also tested the dog's ability to detect adder odours from shed skins and cloacal swabs in controlled line-up experiments and field settings. Variables such as scent depth, sample type, and environmental factors were analyzed. In a pilot test, the dog was tasked with transferring odour recognition to live adders equipped with telemetry tags.

Results showed that the dog effectively detected both scent types, with slightly higher accuracy for shed skins. In depth-variable tests, the dog identified odours buried up to 1.2 meters, though success declined with depth. Notably, environmental conditions did not impact search accuracy or speed. During the pilot, the dog successfully located live adders in their hibernacula, demonstrating that odour samples can be used for non-invasive training.

Her thesis highlights the potential of detection dogs to revolutionize adder conservation by improving hibernacula localization while reducing invasiveness and cost. Future work should involve more dogs, larger sample sizes, and expanded field tests to refine search strategies and increase detection efficiency. Detection dogs offer a promising, effective, and non-invasive tool for conserving this threatened species, ensuring better protection of their critical habitats.

# How to behave as an urban mammal

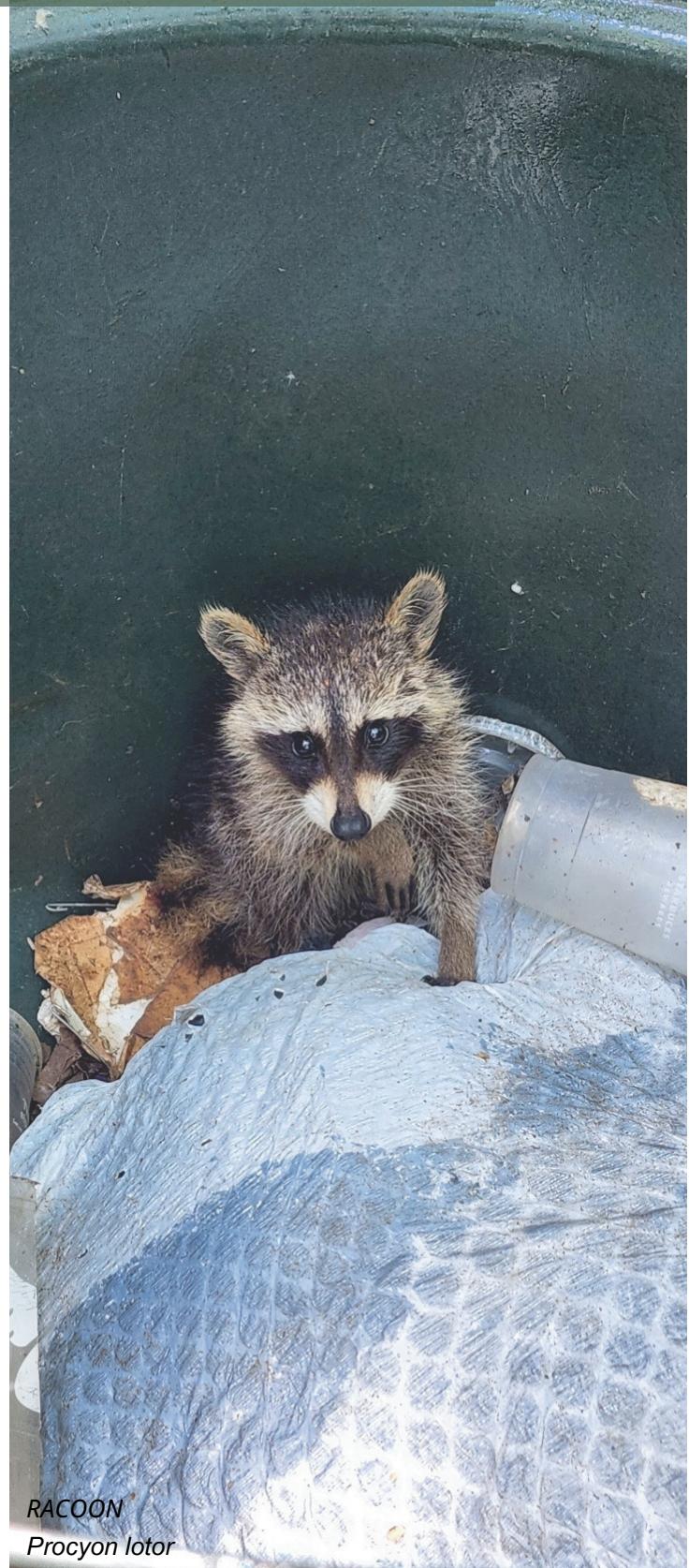
## To survive the unstoppable urbanization

The lives of mammals are increasingly influenced by humans – and nowhere is this influence as strong as in a city. Urban animals have to cope with changing habitats and resources at a rapid rate: by 2050, 68% of the world's population will live in cities, which will have a huge impact on ecosystems and wildlife. It is therefore important to understand how urban mammals deal with and adapt to changing conditions. This is the only way to protect species and reduce human-animal conflicts in the city.

### Change to survive

Urban mammals adapt to city life by changing their behavior. This becomes clear in comparison to their rural conspecifics. The behavioral changes, also called adaptive responses, can be classified into three categories: There are short-term responses (regulatory), medium-term adaptations (acclimatory) and long-term changes (developmental), which may even be evolutionary. However, behavioral adaptations are not always uniform. Even within a species, different behavioral responses can occur. It seems to depend on the specific environmental influences.

These are the key findings of a systematic literature review on studies from 1987 to 2020 about behavioural changes of mammals in response to urbanisation. In total, the authors Katae Ritzel and Travis Gallo investigated 83 scientific articles and found 166 observations with 44 different behaviours.



RACOON  
*Procyon lotor*

## Nocturnal, bold and flexible?

The examined behaviors can be divided into eight categories (Figure 1). The majority (93%) of the behaviors were different from those of their rural counterparts. The most common adaptive response is acclimatory. This includes, for example, a reduction in territory size, increased nocturnal activity and changes in food preference and resource utilization. The second most common adaptation is regulatory responses, which contain a change in vigilance and caution as well as a reduced flight distance. The developmental responses include syndromic behaviors such as increased boldness and exploration.

Interestingly, some mammals show the ability to modulate their behavior based on certain environmental factors. For example, the eastern gray squirrel in Massachusetts can orient itself more towards visual rather than acoustic signals in noisy environments. Gray squirrels in New York can increase their escape distance when people approach them and move off the sidewalk and decrease it when humans stay on the sidewalk. And the Australian fur seal seems to have learned the legal approach distance of ships and changes its alarm behavior depending on the type of ship and distance. The described behavioral modulations may indicate both, individual differences and adaptations due to repeated urban stimuli. In any case, they could provide an explanation for the differences in adaptive responses within a species.

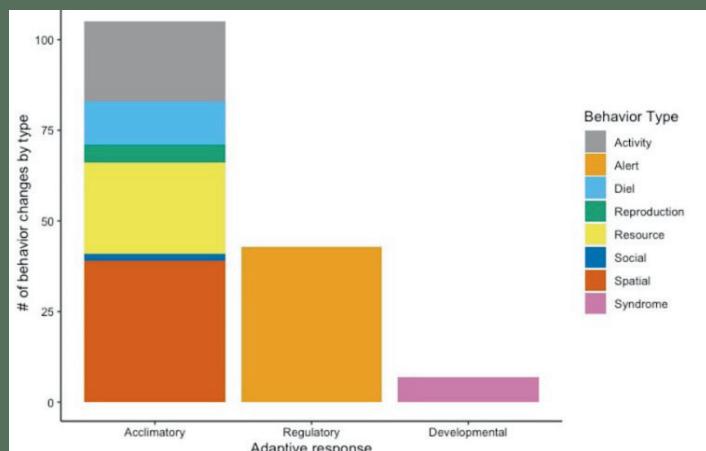


Fig. 1: The eight types of behavior changes observed in urban mammals from 1987 to 2020 by adaptive response

## Bridging research gaps for coexistence

The results show that behavioral changes show differences according to region, species and environmental influence. This points to complex mechanisms that should be investigated further. It is important to note that the research is not evenly distributed across the regions of the world. For example, a good half (52%) of the research comes from North America and only 2% from South America. The situation is similar for the animal species studied. Divided into ten orders, 43% of the studies were concerned with carnivores alone. A third of the studies examined squirrels and coyotes, while other species were underrepresented. For that, it seems important to carry out long-term studies in as many regions and with as many animal species as possible. In face of the unstoppable urbanization it seems unavoidable to create a deeper understanding of the needs of urban animals. Not only to protect species, ecosystems and biodiversity, but also to provide solutions for wildlife management and a harmonious coexistence of the increasing urban population of both – human and animals.

# Even the smallest crack in the ground can be a habitat for some

HONEY BEE  
*Apis mellifera*



In order to save the bees, there are many efforts to build insect hotels, but what about ground nesting bees and other insects? Where do they live and what do they need to survive in the city? In these novel habitats, ground nesting insects are quite resourceful in finding a proper home.

## What did the researchers discover?

In the summers of 2021 and 2022, researchers in Berlin sampled 2 km of pavement traditionally and by eDNA for wild bees. In total, 66 species were identified. Ten of those species are on the German red list and six species are specifically on the red list for Berlin. Surprisingly, also the golden digger wasp was found, even though it is considered extinct according to the Berlin red list. Additionally, the presence of flower gardens was found to significantly increase species-richness and number of insects, while the green coverage was shown to not have as much of an impact on the diversity of pavement dwelling insects. Furthermore, the nest entrances were proven to be dependent on the presence of flower gardens, because out of the 6301 nest entrances, almost half were discovered on insect-friendly sites.

Therefore, flower gardens are necessary for insects because they provide pollen, nectar and prey as nourishment. These findings underline the importance of greenspaces such as wild gardens, street trees, green roofs or other vegetation patches in urban environments.

“

**Ground-nesting  
insects are  
important for the  
ecosystem**

”

## The researchers' procedures

The two sampling approaches used by the researchers showed quite different results: with traditional monitoring the 66 species were collected, while eDNA only detected three Hymenoptera species. The comparison of the classical monitoring and the eDNA showed that the classical monitoring technique still works very well, while the eDNA method still has grounds for improvement.

## Why should we protect the insects?

To raise awareness for and protect the ground nesting insects, their habitats should be included when it comes to planning cities. Old pavement is often replaced by large tiles or concrete, which leads to a decrease of quality and quantity regarding the habitats for those insects. Even though most people know a lot more about cavity nesting insects, ground nesting insects are equal in importance to the ecosystem, because they can provide certain ecosystem services, such as their role when it comes

BEE WOLF  
*Philanthus triangulum*



to the permeability of the pavement. Considering the findings of this study, including and respecting the novel habitats of these insects in the planning process of cities would increase awareness regarding ground nesting insects and could improve the wellbeing and health of not only the insects themselves but of the human residents of the cities as well.

FOUR-BANDED FLOWER-BEE  
*Anthophora quadrimaculata*

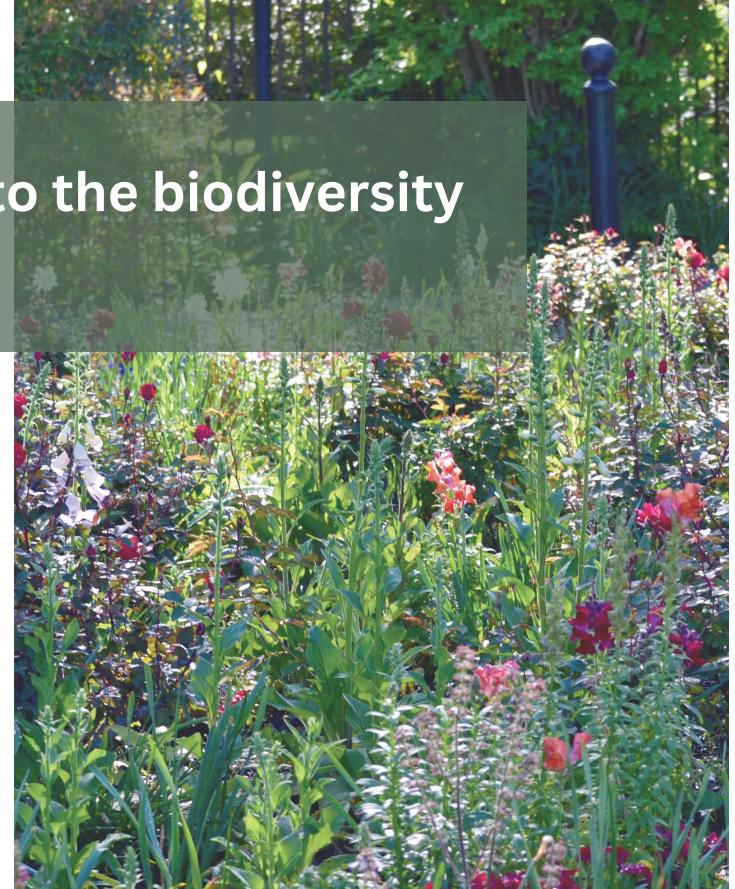


# Savage gardens: A solution to the biodiversity crisis?

In view of the global biodiversity crisis and the worsening effects of climate change, the importance of designing urban spaces and gardens is constantly increasing. Home gardens are often labor- and effort-intensive, aesthetically ordered places with a potential that can go beyond their conventional applications. But to what extent can the concept of “wild gardens” be an answer to the challenges of the biodiversity crisis?

## The concept of the savage garden

Savage gardens originated in the 18th century as an alternative to formal gardens. In this concept, gardens were divided into three main types: Gardens adjoining a park, decorative farms and savage gardens. However, the term “savage” was critically questioned because of its colonial and historical significance. Nowadays, the term is being reinterpreted and is mainly used for the study of wilderness in urban contexts. The idea of the “fourth nature” plays an important role in the design of private gardens.



## The fourth nature

In this concept, the various developments of urban landscapes are categorized into four main types, taking human influence into account: The first category includes parts of untouched nature. This includes, for example, wetlands or forests. The second category describes areas for agriculture or forestry. The third category refers to designed green spaces, such as gardens and parks. The fourth category, on the other hand, refers to new types of urban ecosystems that arise from natural imbalances. This category also includes savage gardens. Due to their order and design, private gardens are traditionally often subordinated to the third category. In the concept of the fourth nature, however, a dynamic approach is pursued in which ecological changes and natural development are considered. The aim is to create flexible and resilient landscapes that differ significantly from the aesthetics of traditional gardens and in which there is more room for unforeseen developments and wildness.



## Conserving resources through adapted garden maintenance

In the context of climate change, wild gardens are becoming increasingly relevant. Especially in times of increasing droughts, they offer a sustainable solution to both protect the environment and promote biodiversity. They reduce the urban heat island effect by alleviating the warming of the environment by absorbing the sun's rays from sealed surfaces. Native plants require less water and care due to their adaptability to local environmental conditions, which helps to conserve resources. In conventional gardens in particular, irrigation plays a huge role, especially in summer. This can further exacerbate water scarcity in times of climate change. In addition, dispensing with high-maintenance lawns can help to strengthen the ecological resilience of urban areas. Regular gardening activities such as mowing also contribute to CO<sub>2</sub> emissions and electricity consumption using gasoline or electricity.

## The importance of gardens for biodiversity

Gardens are far more than just decorative elements in urban areas. Even in densely populated areas, they can contribute to increasing biodiversity and serve as important habitats that are endangered by increasing urbanization and the loss of natural areas. They also contribute to habitat connectivity by enabling the migration and reproduction of many living organisms. The selection of native plants and the creation of habitats for local animals and insects actively help to promote biodiversity. Non-native plants, on the other hand, promote the homogenization of species and the destruction of natural habitats.

Savage gardens, which are less cultivated and more natural in design, offer even more space for greater biodiversity, which cannot develop in traditional, heavily cultivated gardens. Differently designed areas are a decisive factor here. Pollen-rich plants and fruit-bearing shrubs are important resources for wildlife. Providing watering holes and hiding places can also help with wildlife-friendly design.



## Cultural and aesthetic challenges

Despite their ecological advantages, savage gardens often meet with resistance. This is particularly due to cultural norms and aesthetic preferences. Well-maintained gardens are often seen as a sign of appreciation and care, while more natural, less tidy gardens are perceived as less appealing and messy. This attitude makes it difficult to accept alternative garden concepts that focus on biodiversity and sustainability. The challenge is therefore to support this change by educating people about a conscious approach to nature. Another aspect that prevents many people from creating their own wild garden is biophobia. It describes an increasing fear of natural elements and has its origins in other phobias, such as arachnophobia (the fear of spiders).



These can give the impression that near-natural gardens could attract even more of these “undesirable” animals.

### **Savage gardens for a sustainable future**

Savage gardens not only offer ecological benefits, but are also key to promoting a sustainable, resilient urban landscape. To counteract the biodiversity crisis and the effects of climate change, cities and their residents need to rethink their gardening practices. Promoting wild gardens as part of urban green infrastructure is an important step towards a future where people and nature live together in harmony. Education, political support and acceptance of new aesthetics can effectively drive this change. Educational work can help to explain the ecological benefits, reduce cultural reservations and reduce biophobia. Another approach is the CTC concept (Cues to Care). This concept helps to bridge the gap between aesthetic views and ecological goals by using targeted design elements to make savage gardens appear well-tended and cultivated. In addition, community gardens can help to make the benefits and positive changes brought about by wild gardens visible and promote their acceptance.

“

**The importance of  
designing urban spaces  
and gardens is  
constantly increasing**

”



# Image Gallery

COOT  
*Fulica atra*



Photo by Luise Hüsemann

ALPINE MARMOT  
*Marmota marmota*



Photo by Sebastian Fischer

ZILPZALP  
*Phylloscopus collybita*



Photo by Sebastian Fischer

ELEPHANT HAWK-MOTH  
*Deilephila elpenor*



Photo by Moana Ritterbecks

SMALL TORTOISESHELL BUTTERFLY  
*Aglais urticae*

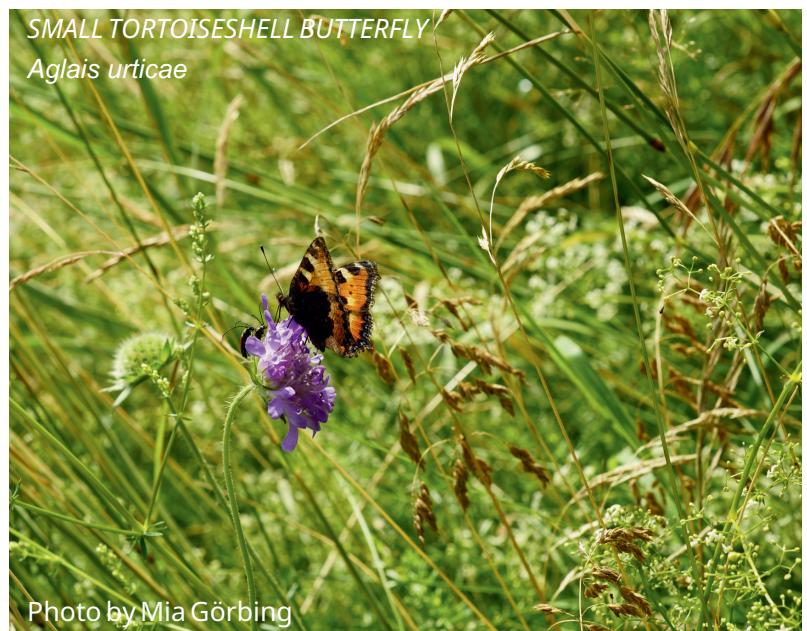
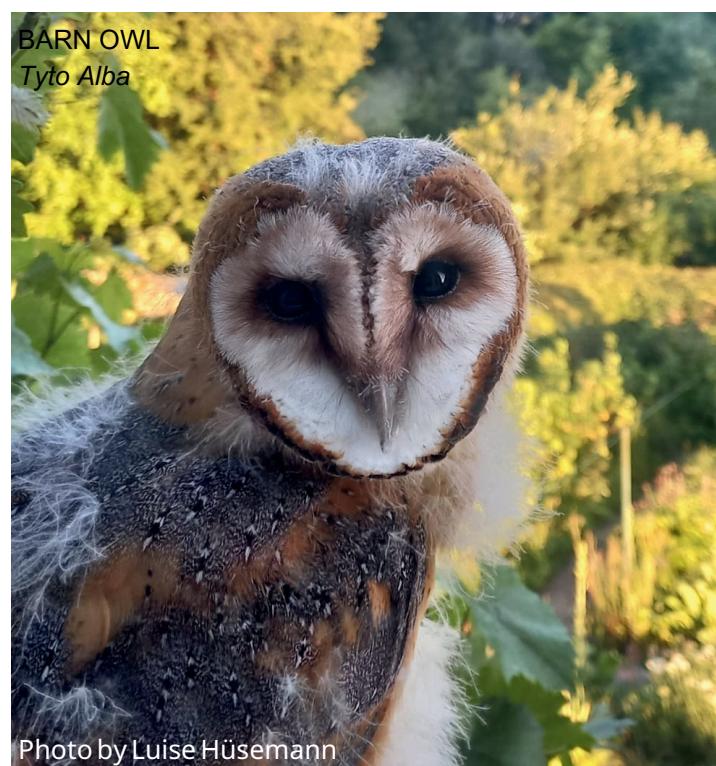


Photo by Mia Görbing



CORN BUNTING  
*Emberiza calandra*



Photo by Sebastian Fischer

ALPINE NEWT  
*Ichthyosaura alpestris*



Photo by Lisa Nordbeck

GRAPEVINE SNAIL  
*Helix pomatia*



Photo by Lisa Nordbeck

# Urban rooftops as nesting sites

Why the shorebird Eurasian Oystercatcher uses them more frequently



EURASIAN OYSTERCATCHER  
*Haematopus ostralegus*

Nowadays the state of conservation of the Eurasian Oystercatcher (*Haematopus ostralegus*) is at an alarming level: populations at coastal landscapes are decreasing with a high pace. The newest research from a team consisting of Franz Löffler, Jonas Brüggeshemke, Felix Maximilian Freienstein, Steffen Kämpfer and Thomas Fartmann examined the shifting nesting preference for Oystercatcher towards inland nesting sites and discovered: urban rooftops can provide a safe space for Oystercatchers.

## Of gravel rooftops and sport pitches

Urban gravel rooftops have several positive effects: On the one hand, they provide more protection from ground-active mammals such as Red Foxes (*Vulpes vulpes*), who search Oystercatcher nests for a food opportunity. On the other hand, they also provide more protection from the ground itself – because of the elevated position of the roof - which helps to increase chick survival compared to agricultural and coastal nesting sites. Additionally, human disturbance and noise is reduced due to the higher elevation and limited public access to urban rooftops. Oystercatchers need to find enough food to raise their chicks, especially during the breeding season.

Because of the soil texture and moist of sport pitches, earthworms are very common and serve therefore as a food source. And speaking of food, the researchers also reported, that nearby landscape structures influence the occurrence of the Oystercatcher. Other green spaces, such as parks, lawns or even road verges, can also provide food if they are moist enough and have short grass. However, there are also some problems with the Oystercatcher's choice of raising a family on the top floor: They tend to use the same breeding site for years and are not likely to change their territory. The local loyalty of the birds makes them vulnerable to environmental changes, for example to drier climate.

## The surrounding landscape matters

In total 24 Oystercatcher pairs were observed in the city of Münster and more than half (58%) of these pairs successfully bred. All of the recorded nestings were found on flat roofs, and most of these sites had gravel (88%). Unsuccessful breeding was observed on rooftops without gravel, the surrounding landscape also made a difference. The researchers found out that occupied nesting sites in industrial areas and urban lawns had higher breeding success. In addition, the height and size of the roofs did not seem to affect the Oystercatchers chick survival. Lastly, nesting sites were also located closer to the next sport pitch, which turns out to be a main factor for breeding success. Surprisingly, sport pitches had higher foraging activity and success compared to agricultural grasslands and urban lawns.



## How to catch an Oystercatcher

Münster with its many gravel roof tops is the ideal place to monitor Oystercatchers. The monitoring in 2020 detected 36 territories. Weekly investigations of the sites were made between 6 and 10 a.m. during sunny weather. To associate the breeding success with environmental parameters, the researchers measured size, elevations above ground and the substrate of every rooftop. Additionally, land-cover types were used to describe the surrounding landscape.

## Why a shorebird on a roof?

The Oystercatcher is a shorebird, who tends to prefer coastal landscapes and wetlands. Due to this: Why has the Oystercatcher changed his behavior to become more common in cities? And what are the benefits for this species of breeding on urban rooftops? Evidence of roof nesting Oystercatchers has been observed across the world. This could be because gravel rooftops and natural shingle beaches – the common breeding sites – are similar. The authors reveal the ecological value of urban landscapes to provide new habitats for Oystercatchers and recommend conservation options and habitat management, as well as ecological an urban planning, should be considered. They suggest that, because of the ecological benefits, buildings with flat roofs should be preferred for urban planning. Nesting Oystercatchers on urban rooftops are not able to regulate the decline in the number of Oystercatchers along the shoreline, but there is a chance that these local areas could help the species to survive. More research and large-scale surveys are needed to understand more about the potential and effects of urban rooftops as ways of protecting species.

# Great tits in the city – can we talk evolution yet?

Phenotypic changes in animals living in urban environments have been observed for some time now. Whether this is due merely to phenotypic plasticity, or if this is an example of genetic selection – evolution observable on a human timescale- was largely unclear. Researchers investigated the genetic information of 192 great tits (*Parus major*), a common and well understood songbird across nine cities in Europe to answer this question.

## On urban and rural great tits

Common in most of Europe, the great tit is often found living alongside humans in their cities. Compared to their rural counterparts, these urban birds have shown a variety of adaptations to their human-dominated habitat. They lay smaller clutches, and do so earlier in the year. They react more quickly to stress and explore their habitats more swiftly. Some scientists also found that, compared to rural specimens, city-dwelling great tits are more likely to peck the person researching them. In order to investigate the underlying drivers of behavior changes, the authors chose 18 sites, one each urban and rural across nine cities in Europe: Gothenburg, Glasgow, Malmö, Paris, Munich, Milan, Barcelona, Madrid, and Lisbon. Each urban site was located within city limits, in areas with many houses and roads, as well as no natural green spaces. The rural sites paired with those urban ones were chosen to be in natural or semi-natural forests that contained minimal development.



GREAT TIT  
*Parus major*

With sequenced genomes from birds across Europe now in hand, the team analyzed blood samples from at least ten individual great tits per site searching for so called ‘selective sweeps’. Selective sweeps occur when a mutation establishes itself rapidly enough that nearby genes can ‘hitchhike’ and become established as well.

These sequences are detectable by their uniformity, as normal evolutionary processes would allow random variance to remain in the absence of positive selective pressure. Finding evidence of selective sweeps in a population would thus indicate that a beneficial mutation established itself recently, likely in response to new selective pressures such as a novel environment.

### Is the great tit evolving into *Parus major urbanus* in the cities?

Out of over half a million analyzed Single Nucleotide Polymorphisms (SNPs) the authors were able to isolate 34 that they call “core urbanisation SNPs”, as they are common in urban great tits across all urban sites, and uncommon in the rural populations. As mutations in other parts of the genome did not correlate with the animal’s genetic distance or their geographical separation, it is unlikely that these adaptations originate from a shared ancestor great tit, but rather were selected for independently in disjunct populations to adapt to similar environmental pressures. The authors also found that recent or even ongoing selective sweeps outnumber older ones, highlighting that these birds are under stronger selective pressure now than in the past.

The adaptation to urban environments is clearly visible in the genome of European great tits. The team of researchers showed that this adaptation happened independently in multiple populations, and consequently, that the process of urbanization for the great tit requires it to adapt in similar ways to different kinds of European cities. With the process of adaptation still ongoing, each of these cities is well on its way to hosting a distinct variant of the future urban great tit (*Parus major urbanus*), each perhaps with their own behavior and pecking habits.



# Urban Biodiversity in Germany

## Expert perspectives on the five most common wildlife species in cities

The paper, "The Frequent Five: Insights from Interviews with Urban Wildlife Professionals in Germany," published in the journal *People and Nature* in 2024, investigates how urban wildlife professionals perceive and address interactions between humans and wildlife in urban areas.

### Focus on five mammal species

Red foxes, wild boars, raccoons, stone martens, and Eurasian beavers: these were the five key species, which pose benefits and challenges in cities across Germany as the primary causes of human-wildlife conflicts. The researchers framed their study within the context of human-wildlife interactions, acknowledging both the prospects and hurdles associated with urban wildlife. The results are intended to contribute to a toolkit for cities facing similar animal management challenges.

### Impacts of urban wildlife

In order to develop this "toolkit", 36 urban wildlife professionals from German cities, including Berlin, Hamburg, Munich, and Cologne, were interviewed to understand their perspectives on wildlife impacts and management strategies. The study identified both positive and negative impacts of urban wildlife. Positives included fostering biodiversity, reconnecting people with nature, and providing ecosystem services, such as pest control. Negatives focused on property damage, public health concerns (e.g., diseases), and safety risks and



overshadowed the animals' positive impact. Wild boars and raccoons were seen as the most controversial urban wild mammals. The wild boars for example are linked with injuries or being viewed as hazardous and raccoons seem to have no one championing their cause. Furthermore, the association between foxes and rabies persists in common understanding, which is why experts emphasized the need to better inform the public about foxes.

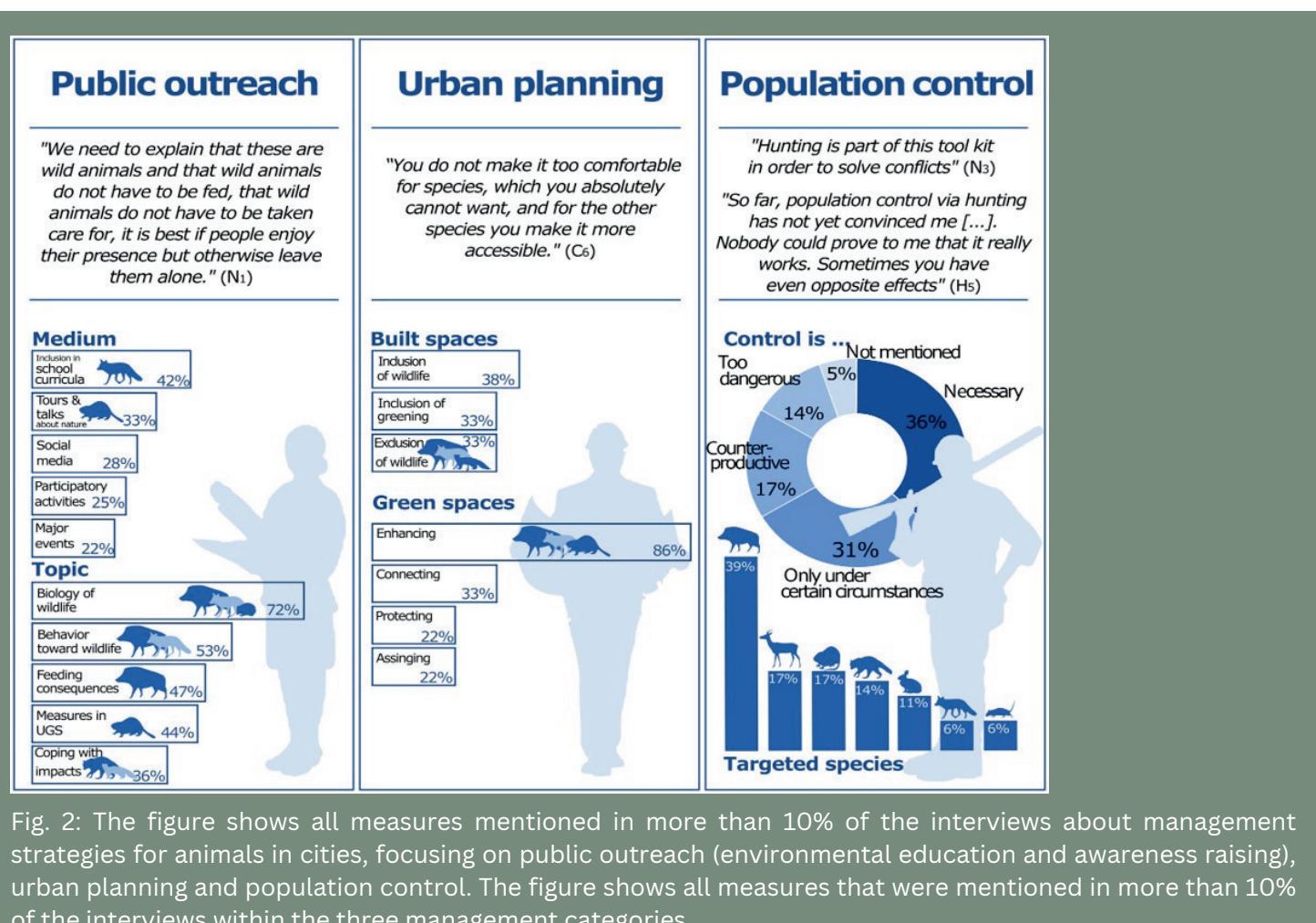
### Management strategies

The experts interviewed also had differing opinions on how wildlife and related conflicts in the city should be managed. Suggestions comprised public outreach to educate citizens, urban planning to accommodate or deter specific species, and population control through hunting as a last resort. Specific recommendations included integrating wildlife considerations into city planning, improving green space designs,

establishing clear points of contact for wildlife issues, and enforcing stricter regulations on human behavior, such as feeding bans. The management toolkit could therefore include raising awareness to shift perception of wildlife from being a problem to being valued, or, as a last resort, removing wildlife from residential areas to prevent negative encounters. A respective urban planning shall also integrate wildlife needs through multi-species approaches such as incorporating creating intentionally wild spaces, wildlife-friendly gardening or strategies to prevent wildlife intrusion into houses. In addition, centralized points of contact for questions about human-wildlife interactions would help to mitigate conflicts.

## The future outlook of living together

Based on the study, the future outlook for urban wildlife management strategies in Germany emphasizes the need for a comprehensive and balanced approach. A shift in perception from viewing urban animals as problems to appreciating them as integral parts of the urban ecosystem is crucial in terms of the increasing urbanization. The research highlights several key points regarding future management strategies and the importance of developing a toolkit, not only for Germany but worldwide. It would provide a structured, evidence-based approach of shaping future strategies for sustainable urban ecosystems.



Full citation of the article:

Moesch, S. S., Jeschke, J. M., Lokatis, S., Peerenboom, G., Kramer-Schadt, S., Straka, T. M., and Haase, D. (2024). The frequent five: Insights from interviews with urban wildlife professionals in Germany. *People and Nature*, 6: 2091-2108. <https://doi.org/10.1002/pan3.10697>



Thanks for reading!