

## Data Paper

### Spider assemblages (Arachnida, Araneae) in urban grassland patches in Karlsruhe (Baden-Württemberg, Germany)

Tobias BAUER & Hubert HÖFER, Staatliches Museum für Naturkunde Karlsruhe, Erbprinzenstr. 13, D-76133 Karlsruhe, Germany; E-Mails and ORCIDs: [tobias.bauer@smnk.de](mailto:tobias.bauer@smnk.de), <https://orcid.org/0000-0001-8007-1703>; [hubert.hoefer@smnk.de](mailto:hubert.hoefer@smnk.de), <https://orcid.org/0000-0003-3962-151X>,

Jens SCHIRMEL, iES Landau, Institute for Environmental Sciences, University of Kaiserslautern-Landau (RPTU), Landau, Germany, E-Mail and ORCID: [jens.schirmel@rptu.de](mailto:jens.schirmel@rptu.de), <https://orcid.org/0000-0003-0330-3376>

#### Introduction

The original study was initiated to investigate the arthropod diversity and effects of management intensities, urbanization and local environmental parameters on urban grassland patches in the city of Karlsruhe, Germany. Grassland patches embedded in an urban matrix can harbour a significant number of spider taxa, including rare and endangered species. Karlsruhe was one of the first cities in Central Europe that adopted biodiversity friendly mowing regimes to benefit urban biodiversity. The city manages over 850 hectare of green spaces in various intensities and has a long-standing, nearly 50-year-old tradition in extensive grassland management. Many of those extensively managed grassland patches within the city border are known to harbour comparably extensive pollinator diversity (Rennwald et al. 2002, Warzecha et al. in prep.). However, data on epigeic arthropod diversity and species inhabiting the herb layer were lacking so far. In addition, different management intensities and their effect on local arthropod diversity were never directly compared. Spiders were sampled in 27 grassland plots (18 with 1-2 cuts, 9 with 3-5 cuts with four pitfall traps per plot, approximately 7 m apart, operated for a total of 48 days in May/June and August/September 2018. Traps were filled with propylene glycol with a drop of odourless dish detergent and protected by white plastic roofs. Sweep netting was performed once in May 2018. Spiders were determined by using Nentwig et al. (2024) and additional literature (Grimm 1985, 1986; Jantscher 2001; Logunov 2001; Roberts 1987; Tongiorgi 1966) as well as comparative material from the collection of the SMNK, mainly sampled in a study by Hemm et al. (2012). The dataset includes 8973 adult spiders of 86 species in 21 families.

**Keywords:** diversity, dry grassland, endangered species, management, urban habitats

## METADATA

**Data set identity.** Data on spider assemblages (Arachnida, Araneae) in public urban grassland managed with two different intensities (1-2 cuts or 3-5 cuts per year) in Karlsruhe, Germany

### Overall project description

**Objectives of original study.** 1. Study the effects of urbanization, local environmental variables and management on arthropod assemblages in an urban setting; 2. Revealing local species occurrences and overall diversity in the city of Karlsruhe

**Principal Investigator(s)/Verantwortlicher Wissenschaftler:** Tobias Bauer

**Involved persons/Beteiligte Personen:** Jens Schirmel, Hubert Höfer, Andreas Kleinsteuber, Daniela Warzecha

**Source of funding/Geldgeber:** Friedrich-Ebert Stiftung e.V.

**Data Source Institution/Datenliefernde Institution:** Staatliches Museum für Naturkunde Karlsruhe, Erbprinzenstraße 13, 76133 Karlsruhe

**Period of study or time extent/Zeitraum der Untersuchung:** April to June 2018 (48 days) and August to September 2018 (14 days)

### Survey design

**Site description.** All grassland plots (Tab. 1) were located in the city area of Karlsruhe, Germany, and represented public greenspaces managed by the Gartenbauamt Karlsruhe. Nine sites (\*) were intensively managed (3-5 mulch cuts), 18 were extensively managed (1-2 cuts, biomass removed). Conditions and aspects ranged from humid and dense meadows along the river Alb to dry, sandy sites with low and sparse vegetation. See also Bauer et al. (2024) for further local variables.

**Table 1: Studied grassland plots in the city of Karlsruhe, Germany (coordinates in decimal degrees, WGS 84, \*intensively managed site)**

location	latitude	longitude	EUNIS
ERW6	48.9964	8.3751	E2
EW11*	49.0050	8.3538	E3
NE1	49.0326	8.3643	E2
NE2	49.0376	8.3678	E2
NE3	49.0376	8.3860	E5
NI1*	49.0315	8.3647	E2
NI2*	49.0375	8.3683	E2
NI3*	49.0365	8.3892	E2.64
OE1	49.0235	8.4484	E2
OE2	49.0239	8.4529	E2
OE3	49.0403	8.4556	E1
OI1*	49.0248	8.4473	E1
OI2*	49.0240	8.4527	E2.64
RW10	48.9812	8.4006	E3
RW11	48.9892	8.3684	E1
RW12	49.0346	8.4431	E1
RW15*	49.0410	8.4603	E2.64
RW2	49.0045	8.3440	E3
RW3	49.0033	8.3488	E2
RW4*	49.0020	8.3487	E3
RW5	49.0070	8.3532	E1
RW7	48.9914	8.3848	E2
RW8	48.9901	8.3902	E2
RW9	48.9850	8.3974	E3
WE2	48.9999	8.3433	E1
WE3	48.9929	8.3405	E2
WI3*	48.9938	8.3417	E1

**Methods of data collection.** 4 pitfall traps per location (white plastic cups with 6.5 cm diameter in pre-installed tubing) with a distance of approximately 7 m in a linear transect. Traps were protected against rain with white plastic lids mounted on a nail of 20 cm length. Traps were active from end of April until June, 20 2018. In May, they were usually emptied every 2 weeks. In the third period until the beginning of mowing operations, traps were active for 20 days. Traps were active for a fourth period of 2 weeks from end of August into September 2018. Sweep netting was performed on May, 30 2018 (30 blind sweeps over a linear transect). At

three locations (NI3, RW7, WE2) a single trap was destroyed during one sample period, probably due to crows removing the cups.

**Methods of sample processing, storage and identification.** Samples were transferred into 75 % ethanol in the field and sorted in the laboratory. Spiders were determined by T. Bauer using Nentwig et al. (2024) and additional literature (Grimm 1985, 1986; Jantscher 2001; Logunov 2001; Roberts 1987; Tongiorgi 1966). Nomenclature follows World Spider Catalog (2024).

**Vouchers/Material deposited.** Voucher specimens are deposited in the collections SMNK-ARA and SMNK-STUD of the State Museum of Natural History Karlsruhe.

**Significance of data set.** Bauer et al. (2024) published main results of the study. The dataset contains records on 86 spider species (8973 adult specimens). 1731 sampled juvenile specimens are not part of the dataset, because they cannot be determined to species level. Given the frequent disturbances on many plots, including mowing operations, and the limited capture period, the species number is surprisingly high. In addition, the dataset contains records of several species of conservation concern despite the localization of all plots in a highly urbanized region. Seven species are either endangered or otherwise of conservation concern (cc) in Germany, 18 species are regionally endangered or otherwise of cc in the federal state of Baden-Württemberg. The majority of species of cc prefer xerothermic conditions. This corresponds to grassland plots that are characterized by sandy soils and vegetation typical for dry conditions (for more details see Bauer et al. 2024). Two females of *Pardosa wagleri* (Hahn, 1822) were sampled at one location, marking the northernmost record of this species in Germany (Arachnologische Gesellschaft 2024). This species of gravelly river banks might spread along railroads due to the subgrade and ballast material used for construction, which is close to the natural habitat of the species. Railroads were in immediate proximity of the location. Two females and two males of *Cheiracanthium campestre* Lohmander, 1944, a European species with an insufficiently known distribution, were sampled at three locations. These records are located at the western border of its known distribution (Nentwig et al. 2024). Several records of species that were not expected to occur in urban grassland plots are remarkable: *Arctosa lutetiana* (Simon, 1876), a red-listed species in some other federal states of Germany and inhabitant of warm open habitats, was recorded at eight locations and sampled in high numbers at one. *Ozyptila claveata* (Walckenaer, 1837), a species with large record gaps in Germany and frequently associated with extensively managed dry grassland in lowland areas (Arachnologische Gesellschaft 2024) was found at several locations throughout the city. *Aulonia albimana* (Walckenaer, 1805), the only member of the lycosid subfamily Venoniinae in Central Europe, was recorded from nearly every location in partly very high numbers, demonstrating that this species copes well with urbanization and disturbance.

## DATA SET STATUS AND ACCESSIBILITY

## Status

**Data submitted:** 2024-09-30, **Data accepted:** 2024-10-14

**Academic editor:** Alexander Bach

**Data editor:** Florian Raub

**Latest data update:** October 2024

**Latest metadata update:** October 2024

## Accessibility

**Storage location and medium.** Metadata and data files are stored by Arachnologische Gesellschaft, data are included in the ARAMOB database using the database framework Diversity Workbench (<https://diversityworkbench.net/>), data are accessible via <https://aramob.de/en/data/data-exploitation/> Filter: Project ARAMIT\_Bauer2024

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**DOI:** 10.30963/aramit6801

**Citation.** Bauer T, Höfer H & Schirmel J 2024 Data Paper. Spider assemblages (Arachnida, Araneae) in urban grassland patches in Karlsruhe (Baden-Württemberg, Germany). – Arachnologische Mitteilungen 68: 1

## DATA STRUCTURAL DESCRIPTORS

### Data Set Files

Bauer2024\_obsdata.csv, 593 KB, spider abundance data set

Bauer2024\_plotdata.csv, 6 KB, locations of the sampling sites (decimal coordinates, WGS84)

### Authentication procedures

MD5 hash checksums generated by WinHash v.1.6.6787:

Bauer2024\_obsdata.csv: D01ED152590ABB9F15CCA9A23F351E3F

Bauer2024\_plotdata.csv: 682B6B19B5DBA83E524410CC79B3981C

## SUPPLEMENTAL DESCRIPTORS

**Publications using the data set:** Bauer T, Höfer H & Schirmel J 2024 Dry grasslands in urban areas can harbour arthropod species of local conservation concern and should be prioritised for biodiversity-friendly mowing regimes. *Insect Conservation and Diversity* 1-15, <https://doi.org/10.1111/icad.12746>

### Acknowledgements

We are very grateful to Daniela Warzecha for help with study design, Andreas Kleinsteuber for diversity assessments of the vegetation at each plot and Teagan Wernicke for help sorting the material. The Gartenbauamt Karlsruhe kindly provided information on the plots and management. Tobias Bauer was supported by a scholarship of Friedrich-Ebert-Stiftung e. V.

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