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ORIGINAL ARTICLE

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The kestrel (*Falco tinnunculus* L.) in Berlin: investigation of breeding biology and feeding ecology

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Abstract Approximately 200–250 pairs of kestrels (*Falco tinnunculus*) breed in Berlin, preferentially in nest boxes. From 2002 to 2004, ten monitoring sites (breeding sites) characterised by different housing structure, land utilisation, vegetation cover and degree of building density were studied in Berlin: four in the city centre, three in a mixed zone and three in the outskirts. All pairs bred in nest boxes, so the reproductive success could easily be determined. Pellets, and feathers of bird prey species, were collected during the breeding seasons, and the food spectrum was determined based on these remains. There was no significant difference in the reproductive success of the kestrels between the three zones. Data on the number of fledged young indicated a sufficient food supply. In total, 9 species of mice and shrews, 23 bird species and 31 beetle species were identified as prey of kestrels. Urban kestrels specialise in hunting birds if mice and shrews are not readily available, with the house sparrow (*Passer domesticus*) as the favoured prey bird. Of note are anthropogenic food items, such as cutlet bones, that were found only in the city centre. This shows that the kestrel can adapt itself to humans with regard to its diet. There was no urban gradient with regard to reproductive success, but there was with the composition of food, such as the domination of bird prey in the city centre. The number of individual items of bird prey decreased from the centre to the outskirts. In conclusion, the results show that the kestrel is an opportunistic species which survives well anywhere in the city of Berlin.

Keywords Berlin · Breeding biology · Feeding ecology · Kestrel · Metropolis

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Introduction

One of the projects within the interdisciplinary postgraduate research and study program "Perspectives on Urban Ecology—The Example of the European Metropolis of Berlin" (GRK 780) is termed "Feeding ecology of birds along an urban gradient". The general aim of this project (dissertation) is to understand how birds are involved in urban nutrition networks. Four bird species were investigated in detail, one of them the kestrel (*Falco tinnunculus*).

The kestrel is the most common bird of prey species in Berlin with approximately 200–250 breeding pairs. It breeds on buildings and gets support from the Arbeitsgruppe Greifvogelschutz Berlin/Bernau, which maintains approximately 300 nest boxes on church towers, power plants and other high buildings throughout the city (Kupko et al. 2005). The majority of the Berlin kestrels breed in these nest boxes. In order to determine if this species has adapted well to a life in a metropolis, we focussed on the following research questions:

- Are there differences in reproductive success between more urban and less urban sites?
- Do kestrels in the city centre have problems with a sufficient food supply—in comparison to kestrels in the outskirts?
- Do kestrels take advantage of the vicinity of humans or are they disadvantaged?

It was already known kestrels feed to an increasing degree on birds in the city (e.g. Galanos 1991; Rejt 2001; Salvati et al. 1999), but the possible existence of an urban gradient, through the accurate characterisation of

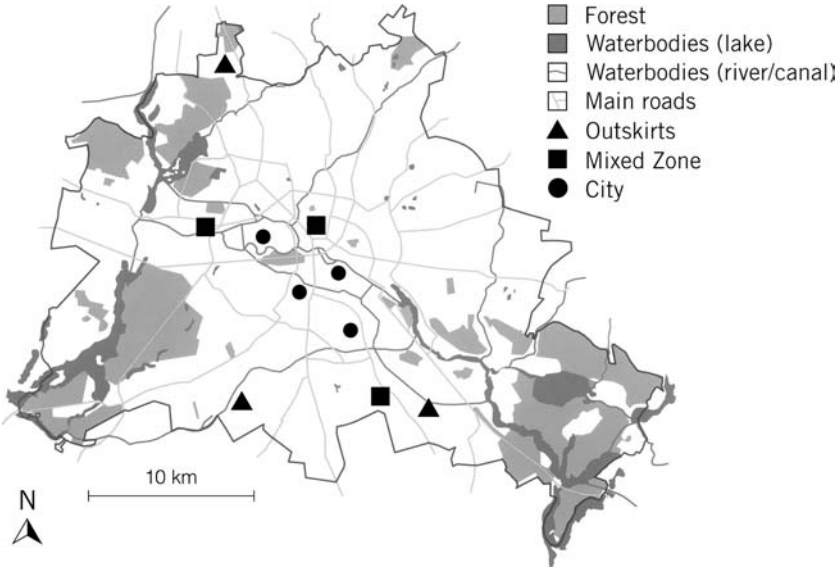

Fig. 1 Ten monitored kestrel (*Falco tinnunculus*) breeding sites in Berlin

Table 1 Characteristics of the ten kestrel (*Falco tinnunculus*) breeding sites and the three zones in Berlin

Zones	Name of the breeding site	Degree of building density within the hunting range of 3 km^2 ($r = 1$ km)	Dominating housing structure, land utilisation (3 km^2, $r = 1$ km)
City	City 1 City 2 City 3 City 4	75–95%	Highly concentrated residential and mixed use zone
Mixed zone	Mixed zone 1 Mixed zone 2 Mixed zone 3	45–60%	Apartment building area, industrial area, urban green, fallow land, garden plots, detached family housing
Outskirts	Outskirts 1 Outskirts 2 Outskirts 3	25–40%	Detached family housing, industrial area, urban green, garden plots, fallow land, villas with huge gardens

the breeding sites in connection with the food spectrum, had not yet been investigated.

Methods

Study sites

To evaluate the breeding biology and feeding ecology of kestrels along an urban gradient, we monitored ten breeding sites in the city of Berlin characterised by different degrees of building density, housing structure and land utilisation: four [1] in the city centre, three in a mixed zone, and three in the outskirts (Fig. 1). We estimated a hunting range of approximately 3 km^2, following Beichle (1980), who reported a range of 0.9–3.1 km^2, and our own observations [2]. Characteristics of the ten sites are given in Table 1.

[1]Because of construction work at one site, there was no kestrel brood in 2004, so we had to choose an alternative, similar breeding site in the city centre in this breeding season

[2]Kestrels in Berlin seldom fly a greater distance for hunting (own observations), but it seems obvious that kestrels have a "main hunting range" within a radius of 1 km around their breeding site. Definite data on this could only be gained with the help of telemetry, which was not possible with this project

Observation methods and data collection

Data on breeding biology were collected from April to August 2002–2004. All pairs bred in nest boxes, so the reproductive success could easily be determined (holes in the boxes permitted easy observation). Since 1986, kestrels in Berlin have been ringed by the Arbeitsgruppe Greifvogelschutz Berlin/Bernau, so that a high proportion of the breeding birds have one ring from the Radolfzell Ringing Centre and one coloured ring for the year of birth. We tried to identify the ring numbers and the colour to get information about the breeding birds at the ten sites.

During the breeding seasons 2002–2004, pellets as well as feathers of bird prey species were collected both inside the boxes and from the immediate surroundings. After the young had fledged, the entire contents of the nest boxes were taken to the laboratory. Thus, no distinction was made between the pellets of the nestlings and those of the adults. Bird prey species were determined from an analysis of the plucked feathers and the number of individuals estimated. In the few cases where rings of birds were found, the ZZF-Ringstelle was asked for information. The pellets were carefully dissected and the prey remains classified to family and species if pos-

Table 2 Mean and median (bracketed) of laying date, clutch size, and number of hatched young and fledged kestrels

Zones	Date of first egg laying	Clutch size	Hatched young	Fledged young
City	01 May (30 April)	5.1 (5)	4.9 (5)	4.8 (5)
Mixed zone	28 April (30 April)	5.3 (5)	5.1 (5)	4.8 (5)
Outskirts	28 April (29 April)	4.9 (5)	4.7 (5)	4.6 (5)

sible. The number of individual mice and shrews was determined by the number of lower and upper jaws found. It should be noted, however, that the number of prey individuals found in kestrel pellets under represents the true number of prey animals because of the more complete digestion process of the kestrel in contrast to, e.g., owls. The presence of earthworms was not proved, as it would have been necessary to look for chitin bristles with the aid of a microscope and the sample size was too large to use this method (in a quantitative analysis).

Statistics

For statistical analysis, the results of the 3 years were pooled per zone and we tested the differences between the zones.

Results

Breeding biology

Every brood was successful during the period of our observations. The minimum number of fledged young was two, the maximum six. The median of the clutch size, and number of hatched young and fledged young, was five in all three zones (Table 2). Differences in mean between the three zones were not significant (Kruskall–Wallis test: clutch size: $P = 0.73$; hatched young: $P = 0.9298$; fledged young: $P = 0.9938$). Thus, there was no difference in the reproductive success between the three zones. From all three zones together, there were 127 fledged young from 138 eggs, with a fledgling rate of 92%. The average number of fledged young per breeding pair was 4.7.

Ringed birds

A total of 20 of the 54 breeding birds could be identified by their rings. Two birds (♀) bred in their first year of life, while the oldest kestrel (♂) was 8 years old. Four kestrels (2♂ and 2♀) bred at the same site in all 3 years, two birds (1♂ and 1♀) for 2 years. All ringed birds were reared in Berlin.

Feeding ecology

A total of 2,144 pellets was analysed: 619 in the city, 695 in the mixed zone and 830 in the outskirts. As a first step we distinguished between seven types of pellets:

- mice and shrews,
- birds,
- insects,
- mice and shrews/birds,
- mice and shrews/insects,
- birds/insects,
- mice and shrews/birds/insects (Fig. 2).

In the city, 70% bird pellets and 18% mixed pellets with a high proportion of birds, were recorded. In contrast, in the outskirts, most pellets contained mice and shrews (78% mice and shrews and 14% mixed but with a high proportion of mice and shrews) (Fig. 2). In

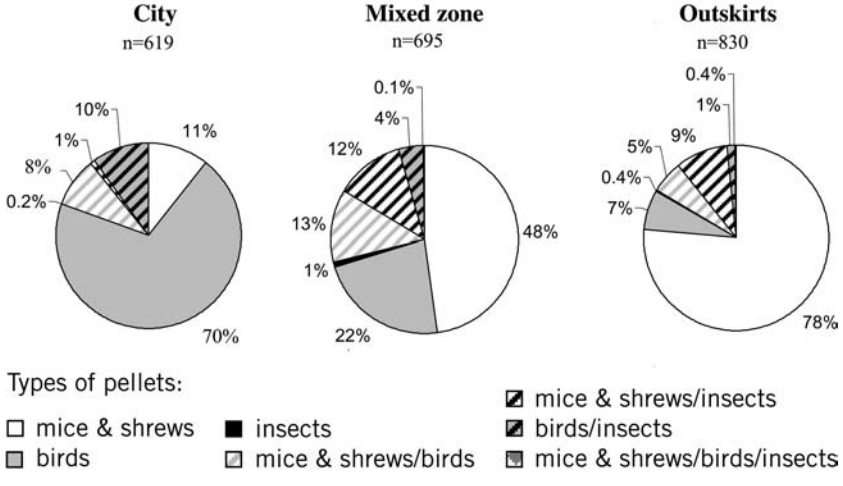

Fig. 2 Composition and proportions of kestrel pellets from three zones in Berlin

Table 3 Mice and shrews as prey of kestrels in three zones of Berlin

Prey species	City	Mixed zone	Outskirts	Total
Microtus sp.	9	61	137	207
Common vole (*Microtus arvalis*)	1	34	70	105
Apodemus sp.	3	12	27	42
Yellow-necked mouse (*Apodemus flavicollis*)	–	3	2	5
Field vole (*Microtus agrestis*)	–	1	3	4
Common shrew (*Sorex araneus*)	–	1	2	3
Lesser white-toothed shrew (*Crocidura suaveolens*)	–	2	1	3
Bicolored shrew (*Crocidura leucodon*)	–	–	2	2
Soricidae indet.	–	–	1	1
Bank vole (*Clethrionomys glareolus*)	–	–	1	1
Water vole (*Arvicola terrestris*)	–	–	1	1
Striped field mouse (*Apodemus agrarius*)	–	1	–	1
Total of individuals	13	115	247	375
Number of species	2	6	8	9

Table 4 Summary of the individual numbers of prey animals for kestrels from three zones in Berlin

	City	Mixed zone	Outskirts
Number of pellets	619	695	830
Mice and shrews/10 pellets	0.2	1.7	3.0
Insects/10 pellets	1.1	1.8	1.1
Birds (total)	319	135	86

Table 5 Birds as prey of kestrels in three zones of Berlin

Prey species	City	Mixed zone	Outskirts	Total
House sparrow (*P. domesticus*)	236	76	36	348
Greenfinch (*C. chloris*)	27	10	8	45
Tree sparrow (*P. montanus*)	8	10	15	33
Great tit (*Parus major*)	10	10	5	25
Swift (*Apus apus*)	9	4	–	13
Blue tit (*Parus caeruleus*)	8	2	2	12
Starling (*Sturnus vulgaris*)	–	8	3	11
Black redstart (*Phoenicurus ochruros*)	2	4	3	9
Budgerigar (*M. undulatus*)	6	1	1	8
Sky lark (*Alauda arvensis*)	–	1	5	6
Exotics indet.	4	1	–	5
House martin (*Delichon urbica*)	5	–	–	5
Goldfinch (*C. carduelis*)	1	3	–	4
Blackbird (*Turdus merula*)	1	1	–	2
Redstart (*Phoenicurus phoenicurus*)	–	1	1	2
Pied wagtail (*Motacilla alba*)	–	1	1	2
Barn swallow (*Hirundo rustica*)	–	–	2	2
Canary (*S. canaria*)	1	–	–	1
Chaffinch (*Fringilla coelebs*)	–	1	–	1
Lesser whitethoat (*Sylvia curruca*)	–	–	1	1
Whitethroat (*Sylvia communis*)	1	–	–	1
Feral pigeon (*Columa livia*)	–	1	–	1
Crested lark (*Galerida cristata*)	–	–	1	1
Alaudidae indet.	–	–	1	1
Bird indet.[a]	–	–	1	1
Total of individuals	319	135	86	540
Number of species	13	16	15	23

[a] This bird was definitely none of the species already mentioned, so it has been assessed as an additional species. It was probably a nuthatch (*Sitta europaea*)

all three zones, insects were present in the pellets, but in very low proportions. The three zones differed significantly in regard to the numbers/proportions of pellet types (χ^2-test: $P < 0.001$), whereas the insect pellets and the mice and shrews/birds/insects pellets were not included in the statistical analysis because of the small sample size. This significant difference arises from the increasing proportions of mice and shrews pellets from the city zone to the outskirts and from the decreasing proportions of birds pellets and birds/insects pellets from the city to the outskirts.

In the next step, prey species were, as far as possible, determined and the number of individuals were counted. A total of nine different species of mice and shrews were

Table 6 Beetles as prey of kestrels in three zones of Berlin

Prey species	Family	City	Mixed zone	Outskirts	Total
Amphimallon solstitiale	Scarabaeidae	38	56	21	115
Carabidae indet.	Carabidae	3	12	9	24
Amara sp.	Carabidae	3	8	11	22
Harpalus sp.	Carabidae	–	3	11	14
Anomala dubia	Scarabaeidae	–	4	5	9
Geotrupes sp .	Geotrupidae	1	3	4	8
Spondylis buprestoides	Cerambycidae	4	2	2	8
Otiorhynchus sp .	Curculionidae	1	4	2	7
Dytiscidae indet.	Dytiscidae	1	2	3	6
Curculionidae indet.	Curculionidae	–	3	3	6
Pterostichus sp .	Carabidae	2	2	1	5
Poecilus versicolor	Carabidae	–	2	2	4
Ilybius fuliginosus	Dytiscidae	1	2	1	4
Histeridae indet.	Histeridae	–	2	2	4
Coleoptera indet.		3	1	–	4
Necrophorus sp.	Silphidae	–	1	2	3
Colymbetes sp.	Dytiscidae	1	2	–	3
Prosternon tesselatum	Elateridae	–	1	1	2
Byrrhidae indet.	Byrrhidae	–	1	1	2
Colymbetes fuscus	Dytiscidae	1	1	–	2
Melolontha melolontha	Scarabaeidae	–	–	1	1
Coccinellidae indet.	Coccinellidae	–	–	1	1
Rhagium mordax	Cerambycidae	1	–	–	1
Gastroidea sp.	Chrysomelidae	–	1	–	1
Phyllobius sp.	Curculionidae	–	1	–	1
Hylobius abietes	Curculionidae	–		1	1
Elateridae sp.	Elateridae	–	1	–	1
Monochamus galloprovincialis	Cerambycidae	1	–	–	1
Buprestidae indet.	Buprestidae	–	–	1	1
Typhoeus typhoeus	Geotrupidae	–	–	1	1
Onthophagus sp.	Scarabaeidae	1	–	–	1
Phosphuga atrata	Silphidae	–	–	1	1
Hydrophilidae indet.	Hydrophilidae	–	1	–	1
Ilybius ater	Dytiscidae	–	1	–	1
Carabus sp.	Carabidae	1	–	–	1
Carabus auratus	Carabidae	–	–	1	1
Carabus granulatus	Carabidae	–	1	–	1
Carabus nemoralis	Carabidae	1	–	–	1
Total of individuals		64	118	88	270
Number of species		12	20	21	31

found (Table 3). There was a large difference in the number of individuals caught in the three zones: 13 in the city, 115 in the mixed zone and 247 in the outskirts, with 0.2, 1.7 and 3.0 mice and shrews per ten pellets, respectively (Tables 3, 4). The three zones differed highly significantly (χ^2-test: $P < 0.001$). The most abundant prey species was the common vole (*Microtus arvalis*).

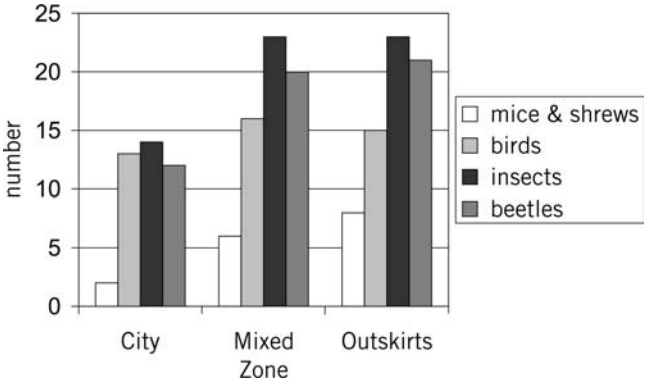

Fig. 3 Number of species within each prey group for kestrels in three zones of Berlin

A total of 23 bird species was found as prey (Table 5). For the number of individuals in the three zones (319 in the city, 135 in the mixed zone and 86 in the outskirts), the difference between the three zones was highly significant (χ^2-test: $P < 0.001$). The most common prey bird was the house sparrow (*Passer domesticus*), followed by the greenfinch (*Carduelis chloris*), and the tree sparrow (*Passer montanus*) (Table 5). The highest proportion of house sparrows (73%) was recorded in the city. The highest number of individuals caught in one breeding season at one site was 46 house sparrows (in the city zone in 2004). The proportion of greenfinches, the second numerous species caught, was 8% in the city. Exotics were sometimes included in the prey of kestrels, e.g. several budgerigars (*Melopsittacus unclucatus*) and a canary (*Serinus canaria*) (Table 5).

The most common insects were beetles. In all, 31 different species of beetles were found. The numbers of individuals found in the three zones were 64 in the city, 118 in the mixed zone and 88 in the outskirts (Table 6).

The difference between the city zone and the outskirts was not significant (χ^2-test), whereas the mixed zone differed significantly from the other two zones ($P < 0.01$). The most numerous beetle caught was the summer chafer (*Amphimallon solstitiale*) (Table 6). In addition, eight grasshoppers, five lizards, two bees, one sphinx moth (*Sphingidae* sp.) and one *Hymenoptera* sp. fell prey to kestrels.

Generally the number of prey species was lowest in the city, while the number of prey species was frequently higher in the outskirts than in the mixed zone (Fig. 3). Anthropogenic food was found only in nest boxes of kestrels from the city zone (Table 7). The biggest bone was 17.5 cm long.

Discussion and conclusions

Breeding biology

For two sites, the reasons for the low reproductive success are known. At one site in the mixed zone two young died in 2004 because of infection with numerous chewing lice (*Mallophaga*, *Laemobothriidae*). At one site in the outskirts, also in 2004, the kestrels were disturbed by peregrine falcons (*Falco peregrinus*) and so the female started egg laying very late.

The average of 4.7 fledged young/clutch we report for the kestrels in nest boxes in Berlin in this research project, is similar to or a little higher than data from literature: Kupko et al. (2000) found a mean of 4.3 fledglings/pair ($n = 416$, broods in nest boxes) at a Berlin monitoring site; in the metropolis of Frankfurt/Main, an average of 4.3 fledglings/clutch ($n = 80$, ledges, nest boxes, miscellaneous) was found (Galanos 1991); in Bielefeld, there were 4.0 fledglings/successful pair ($n = 388$, breeding sites on buildings) (Hasenclever et al.1989); in Warsaw, 3.1–4.8 fledglings/pair were recorded (ledges, miscellaneous) (Rejt 2001); in Rome, there were 3.0 ± 0.7 fledglings/successful pair ($n = 43$, ledges, miscellaneous) (Salvati et al. 1999); and in the whole of Germany, 3.8 fledglings/pair were found ($n = 1{,}016$, all kinds of nesting sites) (Mammen and Stubbe 2001). In this context, it has to be noted that breeding success is generally higher in nest boxes than for ledge or tree broods.

Although the reproductive success of Berlin kestrels is high, we doubt if there is an abundance of young kestrels. It is clear that many kestrels die within their first months of life. On the one hand, young kestrels in Berlin are very rarely prey of predators such as the northern goshawk (*Accipter gentilis*) (Altenkamp, personal communication), in contrast to the situation in the countryside, but on the other hand, life in a city has other and numerous dangers. Examples are collisions with cars, aeroplanes, windows, and getting lost in (large) chimneys, while some kestrels are victims of power supply lines. In addition, young fledged kestrels can lose their parents because of the complexity of the urban habitat (and perhaps noise), which results in starvation because of their inexperience. For example, 52% of the dead kestrels found in Berlin ($n = 112$) were aged 3 months or younger (Kupko et al. 2005).

A very low immigration rate from the countryside and almost no emigration and establishment of Berlin kestrels in the countryside have been detected so far (see also Kupko et al. 2005). Thus, it is quite certain that the Berlin population is self-sustaining. Although the Berlin kestrel population shows annual fluctuations of up to 30%, the population has been stable over a period of years (see Kupko et al. 2005).

Ringed birds

The breeding birds at the ten investigated sites were quite old in comparison to the total Berlin kestrel population. Normally, almost a third of all breeding birds breed at the age of 1 year (Kupko et al. 2005), but at our ten sites we found only two 1-year-old birds, 10% of the identified birds. Some kestrels bred for some years at the same nesting site, but total constant commitment to the breeding site was not observed. It has to be considered that the type of prey does not only depend on the hunting site, but also on the hunting attitude of the individual bird.

Feeding ecology

The analysis of the pellets and the plucked feathers did not give the exact numbers of prey animals, because the

Table 7 Anthropogenic food found in the nest boxes

Sites	Year	Anthropogenic food
City 1	2002	Few cutlet bones
	2003	Few cutlet bones
	2004	One chicken bone (17.5 cm long)
City 2	2002	One cutlet bone, few chicken bones
	2003	Sausage skins, few cutlet bones
	2004	One cutlet bone
City 3	2002	Remains of roll with minced meat
	2003	One cutlet bone
City 4	2004	Remain of a cutlet bone

number of individuals are underestimated by these methods. However, the analysis we carried out allowed a meaningful comparison between the three zones, because the underestimation should be the same at each site.

The different numbers of individuals and species of mice and shrews reflect the dispersion and frequency of these animals in Berlin. In the outskirts (rural areas), there are the most species in the highest individual numbers—in contrast to the city centre.

The house sparrow is the most common prey bird, because there is a large population of this species (100,000–200,000 breeding pairs) in the city of Berlin (Otto and Witt 2002). The different number of individual house sparrows in the diet of the kestrel reflects the dispersion of this species in Berlin. The house sparrow clearly favours built-up areas (see Böhner et al. 2003), because it depends strongly on buildings as nest sites and, in addition, benefits from food provided by humans. Fortunately, there is no decline of house sparrows in Berlin, unlike in many other European cities (Böhner et al. 2003). The largest recorded number of house sparrow prey at one breeding site of the kestrel was 46 in one breeding season. The real number could, however, be far higher. It is easy to estimate that a pair of kestrels with five young would consume at least 250 house sparrows during the nestling period of 35 days [3].

Although normally classed as a ground hunter the kestrel has been recorded as preying upon birds in several cities (e.g. Beichle 1980; Galanos 1991; Krampitz 1948, 1949; Kurth 1970; Rejt 2001; Salvati et al. 1999). Salvati et al. (1999) found that kestrels in Rome city centre preyed upon birds (~29%) during the breeding season, and Rejt (2001) reported that, in Warsaw, birds were a main constituent of prey (28% of items, captured mostly in July and January).

In general, the kestrel uses diverse hunting strategies: perched-hunting, flight-hunting, including hover-hunting, and, rather seldom, ''hunting per food'' (invertebrates), hover-hunting easily distinguishing the kestrel from other European raptors (Village 1990). We observed the following hunting strategies: birds were caught during flight (e.g. blue tits *Parus caeruleus*), captured from their nest boxes or from nests on buildings. Sparrows were often preyed upon on the ground, the kestrels preferring inexperienced young birds. Perched-hunting outweighs hover-hunting in the city, presumably because the structure of the city, particularly building development, usually does not allow a wide view, yet offers numerous perches. Some information on perched-hunting in the city is also given by Beichle (1980). Successful pursuit of flying birds as well as plundering of nests is also described by Piechocki (1991). Catching birds during flight is noteworthy, because the kestrel's anatomy with strong legs and short digits characterises the species as being adapted to catch prey on the ground.

In this study, 23 prey bird species were found. Over the whole of Europe, however, approximately 60 species have been recorded (Glutz von Blotzheim and Bauer 1989). Nevertheless, following Piechocki (1991), the kestrel should not be called a bird hunter, because hunting birds only occurs under certain exceptional conditions. Living in the metropolis of Berlin can certainly be considered as an ''exceptional condition''.

The summer chafer, the most commonly caught beetle, occurs frequently during the breeding season of the kestrels. Some kestrels were observed to catch them during flight. The occurrence of *Dytiscidae* in the pellets was remarkable. How do kestrels catch these (mainly) nocturnal and aquatic beetles? We suggest that the water beetles fly at night to floodlights, for example on churches and power plants, where they are subsequently picked by the kestrels during the daytime. In general, it is clear that beetles have a lower nutritional value than mice, shrews and birds. In Berlin, beetles and insects are, in regard to the number caught, of low importance for the kestrel.

It has to be noted here that the availability of food affects the choice of food (e.g. Kostrzewa and Kostrzewa 1993; Village 1990). Thus, the food spectrum is also different through the seasons, which it was not possible to study during this research project.

The collecting of anthropogenic food shows that the kestrel also adapts itself to humans with regard to its diet (beside its use of human buildings as breeding sites). In addition, it proves that the kestrel does not only take live prey. To what extent the collection of waste as food, which so far is only minor, is advantageous or disadvantageous, is not clear. On the one hand, waste as a nutrition source can be unhealthy (Meyer et al. 2003). On the other hand, waste is an easily accessible and rich source of nutrition, which the kestrel so far only makes use of in the city centre, and in a limited way. This behaviour by the kestrel has not previously been described in the literature, except for Berlin (Kupko et al. 2000). It might be interpreted as increasing urbanisation or, to use a more precise term, as increasing synurbisation (for the exact definition of this term, see Luniak 2004).

Our results clearly show that the kestrel survives well anywhere in Berlin. However, there is a need for further research on pollutant analyses to clarify whether the urban kestrel is ''really well''. Furthermore, telemetry would be valuable, because more detailed statements could be made regarding mobility behaviour and the way that urban kestrels live.

[3] Food supply of five nestlings in their first 35 days of life: approx. 310 house sparrows (1–7 days old: 1/day/nestling; 8–35 days old: 2/day/nestling). Food supply of the adults in 35 days: approximately 140 house sparrows (2/day/adult bird). Together this would be 450 house sparrows, but since, from the pellet analysis of 70% bird pellets and 18% mixed pellets with high proportions of birds (see Fig. 2) , one can estimate that kestrels in the city centre feed on c. 80% birds and c. 70% of those are house sparrows, the adjusted figure is 252.

Zusammenfassung

Der Turmfalke (*Falco tinnunculus* L.) in Berlin: Untersuchungen zur Brutbiologie und zur Nahrungsökologie

In Berlin brüten ca. 200-250 Turmfalkenpaare, vorzugsweise in Nistkästen. Von 2002 bis 2004 wurden zehn Monitoringstandorte (Brutplätze) mit unterschiedlicher Baustruktur, Flächennutzung, Vegetationsanteil und Versiegelungsgrad auf dem Berliner Stadtgebiet untersucht: Vier im Stadtzentrum, drei in einer Mischzone und drei in einer ländlichen Zone. Alle Paare brüteten in Nistkästen, so dass der Reproduktionserfolg leicht zu bestimmen war. Während der Brutperioden wurden Gewölle und Rupfungsreste gesammelt, so dass das Nahrungsspektrum anhand von Beutetierresten bestimmt werden konnte. Es gab keinen signifikanten Unterschied hinsichtlich des Reproduktionserfolges der Turmfalken in den drei Zonen. Die Anzahl der flüggen Jungvögel indizierte eine ausreichende Nahrungsversorgung. Insgesamt wurden 9 Mäuse- und Spitzmausarten, 23 Vogelarten sowie 31 Käferarten als Beute des Turmfalken festgestellt. Urbane Turmfalken spezialisieren sich auf die Vogeljagd, wenn Mäuse und Spitzmäuse nicht leicht zu haben sind, wobei der Haussperling (*Passer domesticus*) die bevorzugte Vogelbeute darstellt. Auffallend sind anthropogene Nahrungsreste, wie zum Beispiel Kotelettknochen, welche nur im Stadtzentrum gefunden wurden. Dies zeigt, dass sich der Turmfalke auch hinsichtlich seiner Nahrung an den Menschen anpasst. Hinsichtlich des Reproduktionserfolges war kein urbaner Gradient zu erkennen, dafür aber hinsichtlich der Nahrungszusammensetzung, so wie zum Beispiel die Dominanz von Vogelbeute im Stadtzentrum. Die Individuenzahl der erbeuteten Vögel nahm von der City zur ländlichen Zone hin ab. Die Ergebnisse zeigen, dass der Turmfalke eine opportunistische Art ist, die überall im Berliner Stadtgebiet gut zurecht kommt.

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