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Breeding behaviour and cluster breeding of the Goosander (*Mergus merganser*) in urban environment

*Hniezdne správanie a skupinové hniezdenie potápača veľkého (*Mergus merganser*) v urbánnom prostredí*

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Abstract. *Urbanization leads to the biotic homogenization. Some species adapt, others do not tolerate the changes caused by urbanization and disappear. One of the more tolerant species seems to be the Goosander* Mergus merganser. *In 2019–2023 (during 755 days/checks in February–May), we analyzed its breeding behaviour, abundance, location of nests, breeding phenology and breeding success in the Spa Park of Piešťany in western Slovakia (n=20 nests on nine trees). Pair behaviour prior to copulation and incubation and adult food were described. Copulations started on February 11 (n=11 pairs), the mean 1st egg date was recalculated on March 11 (n=9 nests), young (average number 10.7/ nest, n=9 nests) left the cavity on average April 24, which is earlier as in the north of the species range. All the nests (n = 20) were located on nine* Populus nigra *poplars at an average height of 19.5 m, when the mean distance of nest from the nearest operating building was 46 m and its mean distance from the water level 117.5 m. Predation of young by crows and gulls, and tolerance to hetero- and homospecific nesting on the same tree were also described. In the diet of adults, mainly smaller fish (< 10 cm length) were found, e.g.* Alburnus alburnus *(80%), more rarely bigger fish >20 cm, e.g.* Rutilus rutilus *(7%), small freshwater mussels <3cm (10%), and the aquatic plants only seldom (3% of observations).*

Key words: *water birds, urbanization, phenology, breeding biology, food, Slovakia*

Introduction

The continuous increase in the human population causes an increase in urbanization and dramatic changes in the urban environment (Grimm et al. 2008). Animals sometimes adapt to this trend, which is often associated with a change in behaviour and breeding biology (Croci et al. 2008). Birds are excellent indicators of the quality and diversity of the urban environment. The varied environment of the city (alleys, parks, gardens, orchards, buildings with plenty of cavities and various niches, as well as water bodies and streams) is a prerequisite for a rich diversity of birds (Marzluff 2008).

A condition for the breeding of aquatic bird species in an urban environment is the presence of bodies of water and streams and sufficient riparian vegetation, and several species nesting in trees and in cavities require trees with sufficient niches. The Goosander *Mergus merganser* belongs to such species (Kajtoch et al. 2014), whose breeding has rarely been documented in urban environment (e.g. Bauer & Glutz 1969, Tomiałojć 2007, Šťastný et al. 2021), e. g. also in parks (Křenek 2017). It has a typical Holarctic and Boreal breeding distribution, in Europe it

breeds in England, and then in a strip from SW France to Scandinavia and has been spreading in the last 30 years to the Southeast (Keller et al. 2020). In Slovakia, the species is a relatively recent breeder, the first breeding was documented only in 2007, in the middle course of the Hron River (Lešo & Kropil 2007). Since then, it has spread throughout the entire country, when the breeding population is estimated on 80–120 breeding pairs in 2023 (Ridzoň J. in prep.), wintering population reached 1,207–1,714 individuals in January 2019–2022 (Baláž et al. 2023). The breeding habitat is mainly riparian vegetation of rivers and water bodies, but occasionally it can nest even 1 km from the water's edge, in parks and in city centres, sometimes also in rocks and buildings (Bauer & Glutz von Blotzheim 1969). The choice of nesting cavity is determined by the female. Females often circle above treetops where there are suitable hollows and where they plan to nest. At the same time, four to ten females may nest in cavities on one tree, or in under-roof spaces (Weber 1946, Bauer & Glutz 1969, Cramp & Simmons 1977). Breeding in an urban environment in Slovakia has not yet been known and published. The cluster breeding of the species is known within its range, while groups of up to 10–12 nests have been found in suitable stands with enough cavities (Weber 1946). Due to the fact that there is a lack of data on the breeding behaviour of the species in Slovakia, but also in Central and Eastern Europe, we focused on the breeding of the species in the Považie area in western Slovakia. The breeding of the species in the area of Piešťany town has been recorded by the first author since 2015. Its wintering there has been known for a long time, but the first known published data are from the 60s of the last century (Kubán & Duffek 1971). It winters there mainly on the Sĺňava water reservoir (e.g. 147 ex. February 26, 1968, Kaňuščák 1975), on the Váh River and on the Teplé rameno bypass, which borders on the eastern side the Spa Park - the study site. It winters there in groups, males and females spend the night together, using cooperative fishing and tolerate each other until they form pairs.

Here we analyze the breeding of the species during five years in an urban environment, namely in the Spa Park of the Piešťany town. We focused on breeding behaviour, abundance, location of nests (type of wood, height of the nest cavity above the ground, distance from water and buildings), repeated use of cavities, breeding phenology, as well as the breeding success.

Material and methods

Study area

The Spa Park in Piešťany is a national cultural monument (under the protection zone of the Regional Monument Institute of Trnava) and began to emerge with the construction of the Spa about 130–150 years ago on the site of former riparian forests near Váh River (Režná 2010). It is located to the east of the city centre of Piešťany and the City Park, on a Spa island on the left bank of the Váh River, its eastern border is the Teplé rameno bypass (Fig. 1). It covers an area of about 40 ha (48.5891850 N, 17.8449531 E, 169 m a.s.l.). The oldest trees there are about 120 years old. About 3,000 trees of 15 species grow in the park, the oldest being poplars, maples and sycamores. Poplars (60%, mainly *Populus nigra*), maple (20%), and the rest mainly sycamore, pine, larch, fir, spruce and others (20%) are the most represented (Hanusová A., in litt.). There are about 25 trees suitable for the Goosander breeding. An important element of the site from the point of view of the breeding of the species is that the park is located in contact with the main stream of the Váh River and Teplé rameno bypass, which is 2,400 m long (Fig. 1) and lies about 2 km north of the Sĺňava Water Reservoir (400 ha).

Data collection

The first author began to focus on the species breeding from 2015, regularly in the years 2019–2023. In 2019–2020, the site was checked 15 times in February (mostly 7.30 a.m.–12.00 p.m. and 2.00 p.m.–4.00 p.m.), in March and April

20 times (5.30 a.m.–12.00 and 14.00–18.00). In 2021–2023, there were 20 visits in February (7.00 a.m.–12.00 p.m. and 2.00 p.m.–6.00 p.m.), from March to May 15 there were visits daily (5.30 a.m.–12.00 p.m. and 2.00 p.m.–7.00 p.m.–9.00 p.m). We recorded the breeding behaviour as well as the absolute number of nests. For each nest, the breeding phenology was also registered (date of nest finding, recalculated date of laying of the 1st egg, date of hatchlings leaving the nest), breeding success, and, if possible, the number of hatchlings, homo- and heterospecific relationships and predators. The date of the laying of the 1st egg was recalculated based on the knowledge that the female incubates the clutch for 30–35 days, lays eggs every day, incubation begins from the penultimate egg. After the young hatch, the female remains with the young in the cavity for 36–48 hours, then the young and the female leave the cavity (cf. Bauer & Glutz von Blotzheim 1969, Cramp & Simmons 1977), which we documented in 9 cases by direct observation. The behaviour was observed covertly from a safe distance (mostly 15–25 m) without disturbing the behaviour of the birds. Data on the location of the nest included the type of wood, height of the cavity above the ground, distance from the water, distance from the nearest operating building. The food was also marginally analyzed (n = 150 observations/photos).

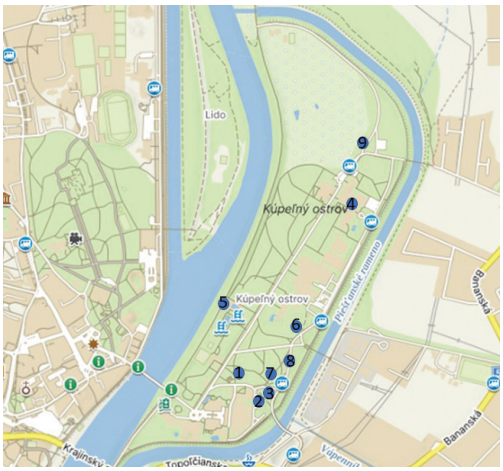

Fig. 1. Location of nine nesting trees in the Piešťany Spa Park in 2019–2023.
***Obr. 1**. Lokalizácia 9 hniezdnych stromov v Kúpeľnom parku Piešťany v r. 2019 – 2023.*

Results

We recorded the first breeding in the vicinity of Piešťany town, outside the city, on Váh River on May 11, 2015, when the first author observed a female leading 3 young (about 10 days old), i.e. without finding a nest cavity. The first breeding with the finding of a nest hollow in urban environment in the Spa Park was found on May 2, 2019 (cavity no. 1, Table 1), which was also the first documented breeding in an urban environment in Slovakia. Altogether 20 occupied cavities (1–8 per year) were found on nine trees in 2019–2023 (Table 1, Fig. 1).

The formation of pairs in the Piešťany area since 2015 was recorded by the first author in Slňava first on February 4, when in a group of 12 ind. (7 females and 5 males) the males were aggressive, attacked each other and protected the selected females. On Teplé rameno bypass in study site, the same behaviour was first recorded on February 8, when already formed pairs swam together, separately from other pairs. The distance between individual pairs was ≥5 m, and if it was smaller, there was always aggressive behaviour of the resident male towards the intruder. Resident females less often reacted aggressively to the intruder, and only if their distance was less than 2 m.

Copulations at the study site (Teplé rameno) were recorded at the earliest on February 11, and after this date in February during each control (n = 11 pairs in different years). Courtship starts with the male swims around the female in contact distance, the female lies down on the water after a short while and copulation takes place (Fig. 2; n = 43 observations in 16 pairs). If the female flew away from the water surface, the male always followed her. Similarly, when flying to the study site, if the female did not land on the water surface, neither did the male (n = 211 records).

When searching for nest cavities suitable for nesting, the female always flew first, always

Table 1. Phenology, breeding success and location of 20 Goosander nests in Piešťany Spa Park (W Slovakia). *nest finding date = first record of female in nest cavity with following egg laying, i.e. staying in cavity minimum 30–50 minutes; ** 1. egg date = recalculated date from the date when the young left the cavity; tree numbers, see Fig 1; Height = height of the nest above the ground, House = distance of the nest from the nearest house, Water = distance of the nest from the nearest water plot.
Tab. 1. *Fenológia, úspešnosť a lokalizácia 20 hniezd* Mergus merganser *v kúpeľnom parku Piešťany (Z Slovensko). *nález hniezda = záznam 1. záletu samice do dutiny a následné kladenie vajec, t.j. zotrvanie samice na hniezde min. 30 – 50 minút; ** dátum znesenia 1. vajca = prepočítaný dátum od dátumu vyskakovania mláďat; čísla stromov, pozri obr. 1; Výška = výška hniezda nad zemou, Dom = vzdialenosť hniezda od najbližšieho domu, Voda = vzdialenosť hniezda od najbližšej vodnej hladiny.*

Nest *Hniezdo*	Year *Rok*	Nest finding date *Dátum nálezu hniezda**	1. egg date *Dátum znesenia 1. vajca***	Chick leaving date *Dátum vyskakovania mláďat*	No. chicks *Počet mláďat*	Height *Výška*	House *Dom*	Water *Voda*	Tree No. *Strom č.*	Reoccupied nest from *Opakované z roku*
1	2019	2.5.	?	?		24	70	190	1	
2	2020	10.4.	9.3.	20.4.	9	24	70	190	1	2019
3	2020	13.4.	?	?		17	16	80	2	
4	2020	5.3.	?	?		15	16	80	2	
5	2021	5.3.	8.3.	22.4.	12	24	70	190	1	2019, 2020
6	2021	17.3.	?	?		22	70	190	1	
7	2021	27.2.	6.3.	19.4.	11	12	25	70	3	
8	2021	9.3.	?	?		23	18	60	4	
9	2022	9.3.	?	?		24	70	190	1	2019, 2020,2021
10	2022	11.3.	15.3.	25.4.	8	28	80	10	5	
11	2022	13.3.	?	?		18	50	80	6	
12	2022	7.3.	10.3.	23.4.	12	17	40	70	7	
13	2023	27.2.	?	?		24	70	190	1	2019, 2020,2021,2022
14	2023	1.4.	?	?		22	70	190	1	
15	2023	8.4.	19.3.	3.5.	11	18	70	190	1	
16	2023	7.3.	25.2.	9.4.	10	17	16	80	2	2020
17	2023	28.2.	?	?		15	16	80	2	2020
18	2023	3.3.	15.3.	1.5.	13	16	19	70	8	
19	2023	4.4.	?	?		12	25	70	3	2021
20	2023	9.3.	22.3.	7.5.	10	18	40	80	9	
mean / *priemer*			11.3.	24.4.	10.7	19.5	46	117.5		

accompanied by the male. Unmated females also flew behind the created pair (n = 9 pairs and 211 observations), no other male ever flew with them. They flew in circles above the potential breeding site, females quite often landed on trees even if there was no cavity on them. Only exceptionally, the male also landed, mostly on a neighbouring tree, for a short time (about 20 seconds), then flew away and flew over the tree where the female had landed. If the female left the tree, the male immediately joined her and together they descended to the water surface (n = 347 cases). If the females found a suitable nest cavity, at the beginning, after checking and inspecting it, they flew away within a maximum of two minutes. After five days after finding the cavity, the stay of the female in the cavity was extended up to 6 minutes. The female accompanied by the male never flew directly to the cavity, but they circled the cavity several times before the female flew inside the cavity. We observed a maximum of 7 such arrivals/day. This was observed in 9 different pairs and in 294 cases. After 7 days after occupying the cavity, the fe-

Fig. 2. Copulation of the Goosander on Teplé rameno in Piešťany (February 11, 2023, Photo by J. Kočí).
Obr. 2. *Kopulácia* M. merganser *na Teplom ramene* v *Piešťanoch (11. 2. 2023, Foto J. Kočí).*

Fig. 3. The Goosander female at the nest cavity entrance (March 22, 2023, Photo by J. Kočí).
Obr. 3. *Samica* M. merganser *vo vchode hniezdnej dutiny (22. 3. 2023, Foto J. Kočí).*

males stayed inside for 35 to 53 minutes, from which it can be assumed that they had already laid eggs. We thus recalculated the start of laying the 1st egg to February 25–March 22 (average March 11, n = 9, Table 1).

During the apparent laying of the first eggs by the female before incubation, the males did not fly around the cavity, but flew to the Teplé rameno water surface, where they waited for the arrival of the females. After the females left the cavity, they landed on the water in the place where the males was waiting for them, they were fishing together, bathed, preened their feathers, rested and often the females slept in the constant and close presence of their males. Breeding pairs often flew to fish to the Váh River or Sĺňava reservoir, where they were fishing, and after 2–3 hours they returned together and landed on the surface of Teplé rameno, where they rested. Individual pairs landed on the water surface of the Teplé rameno to the site which was always closest to the nest, i.e. practically perpendicular to the location of the cavity (n = 277 cases). They did not spend the night on Teplé rameno, but they flew to Sĺňava Reservoir and Váh River. In the morning, couples returned to Teplé rameno individually, in March between 6.00 and 7.30 a.m. in April from 5.30 a.m. and after landing on the Teplé rameno after >30 minutes, the females, accompanied by their males, again flew into the cavities, and the males returned back, where they waited for the arrival of the females (n = 39). After the females had laid a complete clutch, the males left Teplé rameno and the breeding site and were not registered there later during the breeding season and summer months, despite multiple checks during the day, neither in the wide vicinity of the site nor on Váh River or Sĺňava Reservoir.

Some cavities in which the birds bred had large inlets visible from a great distance even after the trees had leafed out (Fig. 3), some cavities were visible only before the trees had leafed out, and the entrances to some cavities were not visible. During the incubation phase, the females regularly flew out of the occupied cavities to the surface of the Teplé rameno within two hours of sunrise, where they swam, bathed, rarely hunted, and within 15 minutes they flew back.

The breeding success could only be determined by frequent inspections of the nest sites and by direct observation of the hatchlings jumping out of the cavities, and their registration on the Teplé rameno on the day they left the nests. In this way, we found a total of 8–13 jumping chicks in 9 nests (average 10.7 chicks/nest, Table 1). However, even in these cases, it is questionable whether the young lived to the age of fledging. In four cases (when it was possible to observe the chicks leaving the nest), the fe-

Fig. 4. The Hooded Crow *Corvus cornix* short before predation of the Goosander young (May 1, 2023 Photo by J. Kočí).
Obr. 4. *Vrana popolavá* Corvus cornix *pred predáciou mláďat* M. merganser *(1. 5. 2023, Foto J. Kočí).*

Fig. 5. Predation of the Goosander chick by the Hooded Crow (May 1, 2023, Photo by J. Kočí).
Obr. 5. Predácia mláďaťa M. merganser *vranou popolavou (1. 5. 2023, Foto J. Kočí).*

males, after bringing the chicks to the surface of Teplé rameno 70–190 m from the nest (Table 1), immediately took them along the water surface to Váh River and from there swam upstream or downstream on Sĺňava Reservoir. In the other five cases, when we observed females already leading chicks in water surface of Teplé rameno, they behaved in the same way. We explain the rapid abandonment of Teplé rameno by the greater risk of the site in terms of predation and disturbance than the sites on Sĺňava Reservoir and Váh River.

Predation is a significant problem for the final breeding success of the species. Two species of predators are particularly important right on the breeding site in the Spa Park: Beech Marten *Martes foina* and the Hooded Crow *Corvus cornix*. Crows capture and consume young Goosanders after leaving the nests before they can reach the water. The young leave the nests after the female jumps out of the cavity, descends vertically under the nest tree and starts calling the young. After the first experience, when the female was observed standing and vocalizing on

Fig. 6. The Goosander female leading young from nesting tree to the water plot of Teplé rameno (May 1, 2023, Photo by J. Kočí).
Obr. 6. *Samica* M. merganser *odvádzajúca mláďatá od hniezdneho stromu* k *vode Teplého ramena (1. 5. 2023, Foto J. Kočí).*

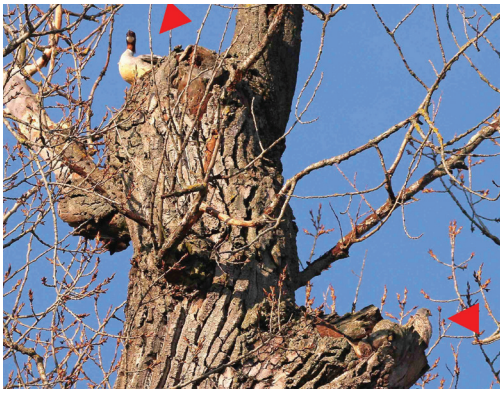

Fig. 7. Parallel breeding of the Goosander and Kestrel at the same tree 2.5 m apart (March 19, 2023, Photo by J. Kočí).
Obr. 7. *Paralelné hniezdenie* M. merganser *a* F. tinnunculus *na rovnakom strome 2,5 m od seba (19. 3. 2023, Foto J. Kočí).*

the ground under the nest tree, it was obvious that the young would leave the cavity within a few minutes, which we confirmed in all four cases. Females were never observed sitting on the ground under the nest for any other reason during the entire study period. However, not only the young react on the female call, but also the around occurring crows, which immediately react to the female's vocalizations under the tree. In one nest, when the young Goosanders jumped from the nest tree, the crows immediately flew in, and caught four Goosander young and flew away with them to another more distant place in the park, minimum 60–80 m from the place of catching. In such cases, the female is probably not able to defend her young, despite her efforts, because if she defends against one crow that has already caught one young, other crows fly in and hunt other scattered young. In one case (despite the 1st author's attempt to scare away the crows), the crows kept coming back and caught four out of 13 hatchlings (Figs. 4, 5). After scaring off the crows, the 1st author slowly walked the female and the young at a distance of about 5 m to the water surface of Teplé rameno (Fig. 6), which he did in the case of four nests, thereby protecting the offspring of the divers on land. After the chicks have been successfully brought to water from the nest, begins the risk of their predation by large species of gulls (*Larus cachinnans, Larus michahellis*) that nest on the island of Sĺňava reservoir. In 2019, altogether 42 pairs of *L. cachinnans* bred there, and in 2023 up to 137 pairs of *L. cachinnans* and 4 pairs of *L. michahellis* (Benko Š., in litt.). We also observed predation by gulls (hunting and immediately carrying off young divers) on Teplé rameno, as well as on Váh River and Sĺňava reservoir in six cases. In this way, these gulls also hunt young ducks of other species, which are led by females on Sĺňava Reservoir and Váh River (26 records). Even the very aggressive Egyptian Goose *Alopochen aegyptiaca* could not protect its young from predation by gulls, which we observed in two cases with two different pairs.

In regard to breeding phenology, the first hatchlings were recorded on April 9 (2023), at the latest on May 7 (2022), average on April 24

Fig. 8. Location of two Goosander nests nearby operated buildings (March 5, 2023 Photo by J. Kočí).
Obr. 8. *Lokalizácia dvoch hniezd* M. merganser *v blízkosti prevádzkovaných budov (5. 3. 2023 Foto J. Kočí).*

Fig. 9. The Goosander male preying on Common Roach > 25 cm (March 17, 2017, Photo by J. Kočí).
Obr. 9*. Samec* M. merganser s úlovkom *plotice* Rutilus rutilus *> 25 cm (17.3.2017, Foto J. Kočí)*

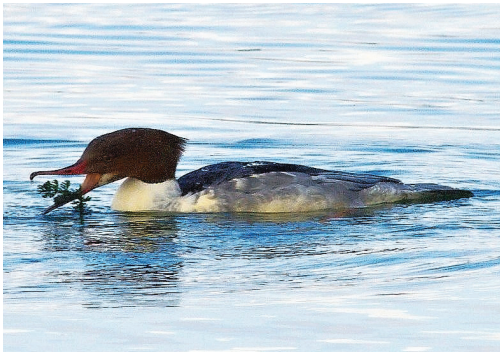

Fig. 10. The Goosander only rarely consumes aquatic plants (*Myriophyllum verticillatum*) (May 9, 2019, Photo by J. Kočí).
Obr. 10. M. merganser *len vzácne konzumuje vodné rastliny (*Myriophyllum verticillatum*) (9.5.2019, Foto J. Kočí).*

(Table 1). From this, it was calculated that the date of laying the 1st egg, was on the site between February 25 and March 22 (mean March 11). As for the nesting neighbours, in one case the Kestrel *Falco tinnunculus* bred in a cavity 2.5 m from the cavity of the Goosander on the same tree. They often sat by their nests, ignoring each other (Fig. 7). To a certain extent, the number of breeding Goosander pairs is limited also by the occupation of cavities by other species of cavity nesters (e.g. *Strix aluco* and *Anas platyrhynchos*), which also nest at the site. In one tree, maximum three pairs of Goosanders bred synchronic in one year (2023), whose cavities were 2.5 m, 6 m, and 5 m apart, and two trees each had two occupied cavities at a distance of 6 and 7 m. Otherwise, the aerial distances of Goosanders' nesting trees in the same breeding period were 2.5–1025 m.

Regarding the location of the nest cavities in particular years, the height was 12–28 m above the ground (average 19.5±4.4 m). The average distance from the operating buildings was 46 m, the smallest distance was 16 m (Fig. 8), the largest 80 m. The distance of the nests from the nearest water surface was 10–190 m (mean 117.5 m, Table 1). All the nests were on old poplars *Populus nigra* (20 nests on 9 trees), while one cavity was occupied during all five monitored years, another during four years, one during three years, four during two years and the rest a year (Table 1).

The most common food in the breeding season was small fish up to the size of the bill length (80%, n = 150), e.g. the Common Bleak *Alburnus alburnus*, significantly less fish with double the bill length >20 cm (up to 7%), e.g. the Common Roach *Rutilus rutilus* (Fig. 9), small frewshwater mussels < 3 cm (10%), and only in four cases (3%) was consumption of aquatic plants also observed, e.g. genus Watermilfoil *Myriophyllum* (Fig. 10). They fish regularly by diving, more rarely by swimming on the water surface with their heads submerged, and when they register a fish they immediately dive and catch it. When there is a lack of food, after catching a fish, they attack each other trying to take the food that the other individual has caught.

Discussion

In this study, for the first time in Slovakia, we discovered the breeding of the species in an urban environment. We also described the species cluster breeding and breeding behaviour during different phases of the breeding cycle (20 breeding attempts in total) on an area of 25 ha of the most distant nest convex polygon of the Spa Park in Piešťany town. Our observations show that conspicuous pair formation begins at the beginning of February, copulations start on February 11, incubation period begins after 7 days of regular visits to the cavity by the female. We confirmed that the male stops caring for the female after the completion of the clutch and at the beginning of incubation, and the males are not active even during caring for the young and leave the breeding territories and the locality, which is a known fact from other parts of the area as well (Bauer & Glutz von Blotzheim1969, Cramp & Simmons 1977). In our cases, the female led the young to the water alone, elsewhere it is known that she mostly carries them to the water on her back (Bauer & Glutz von Blotzheim 1969).

From the analysis of breeding phenology in the literature, it follows that we found a similar or earlier egg laying date than in the past and in the north of the species range. The laying of the first egg in our urban study area took place on average on March 11, and the chicks left the nest on April 24 in average. The species bred 60–100 years ago mainly in northern Europe (Cramp & Simmons 1977), where laying of the 1st egg usually started later (in late March and early April), and the first young appeared after 26 April. For example, in Denmark, egg laying began on March 20, in Finland until the end of April, beginning of May (Hildén 1964 ex Bauer & Glutz 1969). In 9 nests, we found an average of 10.7 jumping chicks/nest, what is similar as in other parts of the range. For example, in the Czech Republic, an average of 8.1 young/nest was found (Šťastný & Hudec 2016), Finland 10.8 (Cramp & Simmons 1977), in Italy 6.9 (Bordignon et al. 2018).

We found that predators are an important factor in final breeding failure, mainly crows when chicks leaving the nest in its vicinity on land, and mainly large gulls on water. Predation by gulls is also known in other parts of the area (Young & Titman 1986), predation by crows has not yet been described. The nests were located similarly to other parts of the area, in the cavities of old trees (Cramp & Simmons 1977, Šťastný & Hudec 2016), in our case in relatively busy parts of the park, near the operating buildings (on average only 46 m). In the past, nesting was found even 1 km from water (Cramp & Simmons 1977), in the Czech Republic, e.g. 460 m from the water (Šťastný et al. 2021), we found a maximum of 190 m from the water. The same cavities can be occupied repeatedly by a species for up to 40 years (Bauer & Glutz von Blotzheim 1969, Šťastný & Hudec 2016). We confirmed the regular repeated use of the same cavity (maximum 5 years), what corresponds with the length of the study.

As the nesting trees, the Goosander inhabits oaks, poplars, beeches, chestnuts, sycamores, lindens, willows and alders, at a height of 2.5–18 m, on rock walls up to 50 m above the water level (Bauer & Glutz von Blotzheim 1969). For example, in the Czech Republic nest were mostly in the height above 15 m (Šťastný & Hudec 2016), we found nests only on poplars 12–28 m high (average 19.5 m). We have confirmed that the food in the study area consists mainly of smaller fish up to 10 cm in length according to the local supply, aquatic invertebrates are rarely fed mainly to juveniles (Bauer & Glutz von Blotzheim1969, Šťastný & Hudec 2016).

In the future, the number of breeding pairs on the site will be influenced and limited by the number of suitable cavities for nesting. Reconstructions are being made in the park, during which the fallen trees, or the side branches in which there are cavities are removed. Therefore, it is important to support nesting using the nest boxes, which can contribute to an increase of breeding success (Marchowski et al. 2022).

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Súhrn

Urbanizácia vedie k biotickej homogenizácii. Niektoré druhy sa prispôsobujú, iné zmeny spôsobené urbanizáciou netolerujú a miznú. Jedným z tolerantnejších druhov sa zdá byť potápač veľký *Mergus merganser*. V rokoch 2019 – 2023 (počas 755 dní/kontrol vo februári – máji) sme analyzovali jeho hniezdne správanie, početnosť, lokalizáciu hniezd, fenológiu hniezdenia a hniezdnu úspešnosť v Kúpeľnom parku mesta Piešťany na západnom Slovensku u 20 hniezd na 9 stromoch. Opísalo sa párové správanie predchádzajúce kopulácii a inkubácii vajec a potrava adultov. Kopulácie boli pozorované najskôr 11. februára, začiatok hniezdenia (dátum znesenia 1. vajca) bol priemerne 11. marca (n = 9), mláďatá (priemerný počet 10,7/ hniezdo, n = 9 hniezd) opúšťali dutinu priemerne 24. apríla, čo je skôr ako na severe areálu. Všetky hniezda (n = 20) boli lokalizované na 9 topoľoch čiernych *Populus nigra* priemerne vo výške 19,5 m, priemerne 46 m od najbližšej prevádzkovanej budovy a priemerne 117,5 m od hladiny vody. Opísala sa aj predácia mláďat vranami a čajkami, a tolerancia k hniezdeniu rovnakých i odlišných druhov na jednom strome. V potrave adultov boli zistené hlavne menšie rybky < 10 cm, napr. *Alburnus alburnus* (80 %), vzácnejšie ryby v dvojnásobnej dĺžke zobáka > 20 cm, napr. *Rutilus rutilus* (7 %), malé korýtka < 3 cm (10 %), a iba vzácne (3 % pozorovaní) vodné rastliny.

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