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Amphibians of Słupsk

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Abstract: The study on the occurrence of amphibians in the city of Słupsk (NW Poland) was conducted during their breeding season in 40 water bodies located in a built-up area, at a forest edge, and in a ruderal area of the city. Breeding amphibians were recorded from 27 water bodies, or 67.5% of them. The number of amphibian species varied between 0 and 7, with an average of 2.2, depending on the location and the degree of modification of the water bodies. The average number of breeding species was 1.2 in the built-up area, 2.8 at the forest edge, and 2.3 in the ruderal areas. Breeding amphibians avoided human-modified water bodies, where only 0.6 species were noted as compared with 2.6 species in natural ones. In total, 9 species of amphibians were recorded from Słupsk. The most frequently observed were the common frog and the common toad, less frequently green frogs, the smooth newt, and the moor frog. Infrequently occurred: the common spadefoot, the natterjack toad the fire-bellied toad.

Key words: amphibians, urban ecology, habitat changes

INTRODUCTION

Among vertebrates, amphibians are the most threatened with extinction, so their protection is one of the priorities of contemporary ecology. The disappearance of amphibians is observed all over the world, also in natural habitats far from human habitations (Whitfield et al. 2007, Zhou et al. 2008). The possible causes of the world-wide decline of amphibians include habitat loss (transformation and fragmentation), diseases, environmental contaminants, and climatic changes. Hamer & McDonnell (2008) argue that the major source of negative factors is landscape urbanization. This process will be growing with time. Nonetheless, species diversity of amphibians also depends on their geographical range, dispersal, and capability of adapting to environmental variation. The studies conducted so far showed a clear dependence of the spatial distribution of amphibians on habitat changes caused by urbanization. Habitat fragmentation and disappearance of water bodies significantly reduced the abundance of amphibians in urbanized areas (Löfvenhaft et al. 2004). Moreover, the intensive vehicle traffic in cities contributes to a high mortality of amphibians during their migration to water bodies for breeding (Najbar et al. 2006a,b, Hetmański et al. 2007). As a consequence of many factors related with urbanization, the batrachofauna is impoverished.

The occurrence of amphibians was examined in many cities, including Rome (Ensabella et al. 2003), Stockholm (Löfvenhaft et al. 2004), and in Poland: in Warsaw (Mazgajska 1998), Białystok (Siwak et al. 2000), Kraków (Guzik et al. 1996), and Lublin (Chobotow & Czarniawski 2007). Not only the species composition of batrachofauna was monitored, but also its susceptibility to urban pressure.

The amphibians of Central Pomerania are poorly known, and little is known about the ranges of individual species (Głowaciński & Rafiński 2003). The common tree frog *Hyla arborea* (Linnaeus, 1758) can serve here as an example. Only the recent study by Ożgo & Hetmański (2008) has shown that a rather abundant population of this species exists near natural water bodies located in crop fields near the town of Ustka in the Baltic coastal zone. The occurrence of amphibians in the Słowiński National Park is reported by Rybacki (1987), and in the village of Łazy on the Baltic coastland by Masiakowski (1970). There are also unpublished materials from this region (M. Ogielska – personal communication).

The purpose of the study was to determine the species composition of amphibians breeding in water bodies of Slupsk, their frequency and habitat preferences, including the type of water bodies. We wanted to identify the species resistant and those sensitive to urban pressure. Moreover, the study was focused on the identification of water bodies particularly valuable for breeding amphibians to preserve them and protect against further development of the city of Slupsk.

Study area

The study was conducted in Slupsk, a medium-size city (about 100 000 inhabitants), located in north-western Poland (54° 28`N, 17°02` N). With respect to its size, this is the third city in the Pomeranian Province. It is located 18 km from the Baltic Sea. Due to the vicinity of the Baltic, it is influenced by the maritime climate. The city lies in the Slawieńska Lowland and covers an area of 43.15 km^2. Built-up area occupies 21 km^2 (49%), hay meadows, pastures and forests 5.7 km^2 (13%), arable land and gardens 11.9 km^2 (27.6%), and waters 0.28 km^2 (0.7%). The built-up area consists of the closely built-up city center, housing estate with blocks of flats and villas, and also an industrial estate. The city is crossed by the Słupia river, the valley of which is covered with extensive meadows, also in the administrative boundaries of the city. The southern part of the city is occupied by the Southern Forest, and the north-western part by the Northern Forest. These are mixed forests with tall tree stands.

Amphibians were surveyed in 40 water bodies located in the administrative boundaries of Slupsk. They accounted for about 90% of the water bodies in this area. Of the water bodies under study, 16 (40%) were human modified. The bottom was deepened, or the shores were regulated and strengthened. In the built-up area there were water bodies nos. 17, 18, 19, and 20 (Appendix 1). The first one at R. Traugutt Street, and the other three at E. Orzeszkowa St. Also in the built-up area, there were water bodies 8 and 9, both at Rafał Krajewski St., and 36, 37, 38, and 39 at Krzysztof Arciszewski

St. The remaining water bodies were located at the boundary between the urban area and the forest or open areas. The border parts of the two forest complexes are situated in Slupsk. These are the Southern Forest in the southern part of the city and the Northern Forest in the north-eastern part. At the beginning of the Northern forest, along K. Arciszewski St. there were water bodies 1, 2, 3, 5, and 6, at Sosnowa St. water body 4, and at Gdyńska St. water body 7 (Appendix 1). In the Northern Forest, there were water bodies 21, 23, and 24 (Kaszubska St.), and about 100 m apart, in the forest, water body 22. Also in this part of the city, at Kaszubska St. and Na Skarpie St., there was water body 25 in an inactive gravel-pit. In open ruderal areas, little human-modified, there were water bodies 10 (at Krakusa St.), 11, 12, 13, 14, 15, and 16 (at the railways towards the city of Gdańsk), 26, 27, 28, 29, and 35 (at the railways towards Ustka), and 30, 31, 32, 33, and 34 (Fabryczna St.). All of them were located in close vicinity to built-up areas and industrial areas. The water body 40 was formed by temporary, extensive spillover of water from the Slupia river that flooded meadows in spring. In summer, water remained only in ditches.

Methods

The study was conducted in 2005–2006 during two breeding seasons of amphibians. The survey was started in March, immediately after the appearance of the first active individuals in water bodies and during migration. The water bodies were monitored every five days until the end of May, and then once a week through June. Based on the visual observations of amphibians and on mating calls of males, we estimated the abundance of different species. Three classes of numbers were considered: first, no more than 20 individuals, second, from 21 to 100, and third, more than 100. Numbers were estimated from the maximum number of individuals in the water body. Numbers of newts were estimated based on the observation of males and females swimming in the littoral zone of the water body. We also used sweeping nets for catching newts. The net was most often used in the littoral with luxuriant aquatic vegetation. Displaying amphibians were observed in the afternoon, when air temperatures and the activity of males were the highest. In addition, in May and June, the water bodies were monitored at night to record the calls of males of the species calling more intensively at night (the common tree frog the natterjack toad *Bufo calamita* (Laurenti, 1768), and the green toad *Bufo viridis* Laurenti, 1768).

The water bodies were described in terms of their surface area, character of the shore, and aquatic vegetation. The degree of the human-modification of the shore was assessed (e.g. reinforced with bars, or covered with concrete). The surroundings of the water bodies were also described. With regard to the habitat type they were classified as located in 1) low, scattered housing, 2) suburban forests, and 3) open ruderal areas, little human modified. As it was difficult to identify green frogs to species (Berger 2008), they were considered as one group *Rana esculenta* complex (Appendix 1). Nonetheless, in some water bodies where this was possible, the taxon of individuals was determined.

Results

Nine species of amphibians were recorded from the water bodies of Slupsk: the common frog *Rana temporaria* Linnaeus, 1758, moor frog *R. arvalis* Nilsson, 1842, common water frog *R. esculenta* Linnaeus, 1758, pool frog *R. lessonae* Camerano, 1882, common toad *Bufo bufo* (Linnaeus, 1758), natterjack toad, common spadefoot *Pelobates fuscus* (Laurenti, 1768), fire-bellied toad *Bombina bombina* (Linnaeus, 1761) and smooth newt *Triturus vulgaris* (Linnaeus, 1758) (Appendix 1). Breeding amphibians were found in 27 (67.5%, n = 40) water bodies. None of them was noted from 32.5% of the water bodies. The number of amphibian species in particular water bodies varied from 0 to 7, with an average of 2.2. In the water bodies occupied by amphibians there were 3.1 species, on the average. The greatest species richness was revealed in two water bodies located in the inactive gravel-pits. These were shallow water bodies, very warm, covered with aquatic plants. Amphibians did not occur, or sparsely occurred, in water bodies heavily modified by humans, that is, with steep, or concrete-covered shores, without vegetation (Appendix 1).

The number of species in human-modified water bodies, e.g. with concrete-covered shores, or reinforced with bars, was significantly lower than in water bodies with natural shores – on the average, 0.6 species and 2.6 species, respectively (Mann-Whitney test, $U = 2.883$, $p = 0.004$). The lowest number of species was noted in the water bodies located in the built-up area, 1.2 ± 1.14, on the average. Twice as many species were noted in forest water bodies (2.8 ± 2.30) and in ruderal areas (2.3 ± 2.06), but the difference was not statistically significant (Kruskal-Wallis test, $H = 3.098$, $p = 0.212$, $n = 40$).

The most frequent species in Slupsk was the common frog (Table 1 and Appendix 1). It was recorded from 57.5% of the water bodies. It occurred in water bodies of almost each kind, except for those heavily human-modified, the shores of which were steep, covered with concrete, strengthened with bars, and devoid of aquatic vegetation. Groups of displaying males typically occurred in shallow coves of larger and smaller water bodies. Especially preferred were shallow littorals and flood waters. Common frogs were also observed in shallow, temporary waters that were formed in the old bed of the Slupia river during spring overflow. Temporary flood waters finally dried up, and so did spawn and tadpoles. Small groups of displaying individuals also occurred in the built-up area in water bodies with natural shores.

The next abundant species was the common toad. It occurred in 55% of the water bodies. Each year, toads were breeding in the same places of the water bodies, that is, in the littoral zone covered with vegetation, including the common reed or the cattail. This species also occurred in water bodies of built-up areas. It was not found in ponds with artificial borders, without aquatic vegetation.

Also "green frogs" were relatively abundant in Slupsk (Table 1 and Appendix 1). It is difficult to tell the species of "green frogs", but two species are likely to occur in Slupsk: the pool frog and the common water frog. So, it may be suggested that nine species of amphibians occur in Slupsk. We did not find any indications of the presence of the marsh frog *Rana ridibunda* Pallas, 1771. This species mainly prefers larger water bodies. The great majority of the study water bodies was small. "Green frogs" did not occur in water

Table 1. Number and percentage of water bodies occupied by amphibians in different classes of their abundance.

	Species	Number (and percentage) of water bodies occupied (N = 40)	Number of water bodies in classes of amphibian abundance		
			1–20	21–100	> 100
1	*Rana temporaria*	23 (57.5)	9	8	6
2	*Rana arvalis*	5 (12.5)	1	3	1
3	*Rana esculenta* complex	18 (45)	6	8	4
4	*Pelobates fuscus*	2 (5)	2		
5	*Bombina bombina*	1 (2.5)	1		
6	*Bufo bufo*	22 (55)	9	10	3
7	*Bufo calamita*	3 (7.5)	2	1	
8	*Triturus vulgaris*	14 (35)	13	1	

bodies with borders covered with concrete or reinforced with bars. They were fairly abundant in well insolated water bodies overgrown with aquatic vegetation.

The next species frequently seen in the water bodies of Slupsk was the smooth newt. Although newts were difficult to notice, we observed at least single individuals in one-third of the water bodies. These data are likely to be underestimated because of the method applied, and the smooth newt could have been more common. Most individuals were observed in the littoral zone, where they displayed in the vegetation.

The moor frog was uncommon. Displaying males were found only in 5 (12.5%) of the 40 water bodies. They occurred in small groups, each year at the same sites of the water bodies, most often in small coves. Only in water body 13 they were more abundant (Appendix 1) and the number of displaying males exceeded 100 individuals.

The natterjack toad and the common spadefoot were also rare. Both these species preferred shallow, insolated and warm water bodies that were scarce in Slupsk. These amphibians, however, nowhere formed large groups (Table 1). The fire-bellied toad was noted in only one large water body, but we failed to confirm the presence of this species in the second year of the study.

When monitoring amphibians in Slupsk, we noticed a high mortality of the two most abundant species, the common frog and the common toad, at Arciszewski St. in the southern part of the city. They migrated from the old river bed of Slupia towards forest water bodies located across the street. Over 1000 individuals of the two species were killed by motor vehicles along a 1.5-km section of the street.

Discussion

During the two-year study period we revealed nine species of amphibians in the administrative boundaries of Slupsk. In other towns and cities of Poland, the number

of species was typically higher, for example, 12 in Lublin, (Chobotow & Czarniawski 2007), 11 in Kraków (Guzik et al. 1996), 11 in Olsztyn (Nowakowski et al. 2008), 10 in Wrocław (Kierzkowski & Ogielska 2001). According to Głowaciński & Rafiński (2003), 12 species of amphibians may occur in Central Pomerania. In Slupsk we did not find the crested newt *Triturus cristatus* Laurenti 1968, green toad, common tree frog, and marsh frog. But these species occur in this part of the country. The crested newt was recorded from a water body near the town of Ustka in the coastland (M. Ożgo, personal information), the green toad was observed in the Coastland Landscape Park (M. Ogielska, personal communication), and the common tree frog in the Protected Landscape Area "Coastland Belt east of Ustka" (Ożgo & Hetmański 2008). Of the species recorded in Slupsk, most abundant were common frogs and common toads. Both these species were also abundant in the Słowiński National Park (Rybacki 1987). They are widely distributed in Poland and Europe (Głowaciński & Rafiński 2003) due to their great ability to colonize water bodies (Beebee 1997). Because of their vast distribution they can be exposed to heavy human impact, e.g. collisions with motor vehicles. "Green frogs" and smooth newt were also fairly common in Slupsk. "Green frogs" are especially demanding for the quality of water bodies. They avoid water bodies that are overshadowed and overgrown with aquatic vegetation. They prefer water bodies with insolated northern border where they can bask in the sun and freely hunt (Berger 2008). We did not find the marsh frog. This species shows preference for large water bodies, lakes and fishponds (Berger 2008). Our water bodies were small, and probably did not satisfied the habitat requirements of this amphibian. However, the marsh frog occurs in this part of the country as it was observed near the village of Łazy on the Baltic Coastland (Masiakowski 1970) and in the Słowiński National Park (M. Ogielska, personal communication). Rare species in Slupsk consist of the moor frog, fire-bellied toad, natterjack toad, and common spadefoot. It is difficult to explain why the moor frog, the species rather common in lowlands, is uncommon. A similar situation was noted by Rybacki (1987) in the Słowiński National Park, where the moor frog was much less abundant than the common frog. The natterjack toad occurred only in warm places, that is, in water bodies situated in gravel pits with steep, sandy borders. It also occurred in the Słowiński National Park (Rybacki 1987). Miaud & Sanuy (2005) analyzed habitat preferences of this species, and found that most often it occupied escarpments and stone embankments, and avoided cropland or urban habitats. The natterjack toad occurred also in the city of Bialystok (Siwak et al. 2000), but it was not recorded from Warsaw (Mazgajska 1996), Wroclaw (Kierzkowski & Ogielska 2001) and Wałbrzych (Bałuka 2000).

Scarce occurrence of the common spadefoot toad in Slupsk could be an effect of its habitat requirements. It prefers sandy soils and very warm water bodies, and most of the water bodies under study did not meet these conditions. The breeding success of this species was largely dependent on the occurrence of macrophytes (Nyström et al. 2007).

The fire-bellied toad occurred in only one place which was a large shallow water body. We heard only single calls of males, so presumably it was not numerous. This

is in agreement with Mosiakowski (1970) and Rybacki (1987), who did not find fire-bellied toads in Central Pomerania. This species is threatened by degradation of small and medium water bodies, and by drying land for agriculture (Rybacki & Maciantowicz 2006).

We did not record the common tree frog from the city, but this species occurs in this part of the country. Recent studies by Ożgo & Hetmański (2008) revealed a population of the common tree frog north of Slupsk, near Ustka, in shallow, warm water bodies overgrown with aquatic vegetation, situated in crop fields. Such water bodies were absent from Slupsk.

We did not find the green toad in Slupsk. This is a synanthropic species preferring water bodies located in urban areas (Juszczyk 1987). It was common, for example, in water bodies of central parts of Warsaw (Mazgajska 1998) and Poznań (Pawłowski 1993). There are some indications of its occurrence in Central Pomerania, but it is probably rare over there. It was recorded on the Baltic coast near Łazy (Masiakowski 1970).

The species composition of the batrachofauna of Slupsk is determined by the quality of the natural habitat, and it probably depends on the geographical range of some amphibians. As data from other not urbanized areas of Central Pomerania are scarce, it is difficult to determine the effect of geographical range on the occurrence of amphibians in Slupsk. Although it abounds in water bodies, we did not observe a high species richness of the batrachofauna. It should be added that the city is located in a lowland, and surrounded mainly with forests and meadows of the Slupia valley. Some species of amphibians have specific habitat requirements, and the water bodies under study may not satisfy these conditions. But the results of other studies show that human pressure is an important factor, and it often determines the distribution and numbers of amphibians. Modification and disturbance to natural environment reduce numbers of amphibian populations (Pough et al. 1998). Under such conditions, an isolation effect may appear that can finally lead to population extinction. Then, only mobile and opportunistic amphibians can persist in urban habitats (Ficetola & De Bernardi 2004).

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Streszczenie

[Płazy Słupska]

Badania nad występowaniem płazów w mieście Słupsku (NW Poland) przeprowadzono w okresie ich rozrodu w 40 zbiornikach wodnych. Zbiorniki znajdowały się w obrębie zwartej zabudowy, na pograniczu zabudowy i lasu oraz na terenie ruderalnym miasta. Rozmnażające się płazy stwierdzono w 27 zbiornikach, co stanowiło 67,5% przebadanych. W pozostałych 13 (32,5%) nie zanotowaliśmy ani jednego gatunku. Liczba gatunków płazów w badanych zbiornikach wynosiła od 0 do 7, średnio 2,2. Zależała ona od lokalizacji i stopnia przekształcenia zbiorników. W zbiornikach zlokalizowanych na terenie zabudowanym rozmnażało się średnio 1,2 gatunki, a na skraju lasu 2,8 i na terenach ruderalnych 2,3. Płazy unikały rozmnażania się w zbiornikach przekształconych przez człowieka, zanotowano tam tylko średnio 0,6 gatunku, a w naturalnych 2,6. Zaobserwowano występowanie 9 gatunków płazów. Najczęściej notowano żabę trawną i ropuchę szarą, mniej liczniej żaby zielone, traszkę zwyczajną, i żabę moczarową. Rzadko występowały grzebiuszka ziemna, ropucha paskówka i kumak nizinny.

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Appendix 1. Characteristics of studied water bodies in Slupsk with data on occurrence of amphibians. Periodicity – permanence of the water body: + – permanent, S – seasonal, drying up in summer; Bottom: + – bottom covered with concrete, – – bottom not covered with concrete.

Bodies of water description								Amphibian species								
No.	Coordinates	Area [ha]	Periodicity	Bottom	Location	Banks type	Aquatic plants	*Rana temporaria*	*Rana arvalis*	*Rana esculenta* complex	*Pelobates fuscus*	*Bombina bombina*	*Bufo bufo*	*Bufo calamita*	*Triturus vulgaris*	Σ
1	54°27'00 N 17°02'22 E	0.8	+	-	Southern Forest	aquatic plants + grass	*Phragmites communis*, *Carex* sp. *Typha* sp. *Lemna* sp.	+		+			+		+	4
2	54°26'46 N 17°02'20 E	0.2	+	-	Southern Forest	reinforced with bars + aquatic plants	*Phragmites communis*						+			1
3	54°26'42 N 17°02'17 E	0.6	+	-	Southern Forest	reinforced with bars + aquatic plants	*Phragmites communis*, *Carex* sp.	+					+			2
4	54°26'53 N 17°02'41 E	1.1	+	-	Southern Forest	trees + grass	*Phragmites communis*, *Typha* sp.	+		+			+			3
5	54°26'27 N 17°02'12 E	0.6	+	-	Southern Forest	aquatic plants + trees + grass	*Typha* sp., *Carex* sp., *Lemna* sp.	+	+	+			+		+	5
6	54°26'26 N 17°01'57 E	0.1	S	-	Southern Forest	trees	*Carex* sp.	+					+			2
7	54°26'40 N 17°03'09 E	0.4	+	-	Southern Forest	willow thicket	*Carex* sp., *Typha* sp., *Lemna* sp.	+	+	+			+		+	5
8	54°27'18 N 17°02'45 E	0.2	S	-	built-up	grassy		+						+	+	3
9	54°27'23 N 17°02'55 E	0.003	+	-	built-up	grassy	filamentous algae								+	1
10	54°28'44 N 17°02'00 E	0.04	+	-	wasteland	grassy + aquatic plants	*Typha* sp., *Phragmites communis*,	+		+			+			3

11	54°28'46 N 17°01'59 E	0.2	S	-	wasteland	grassy	filamentous algae						+			1
12	54°28'52 N 17°02'05 E	0.07	+	-	wasteland	aquatic plants	*Typha* sp.	+		+					+	3
13	54°28'53 N 17°01'49 E	0.07	+	-	wasteland	willow thicket	*Carex* sp.	+	+	+					+	4
14	54°28'52 N 17°01'50 E	0.2	+	-	wasteland	willow thicket	filamentous algae									0
15	54°28'53 N 17°01'44 E	0.1	+	-	wasteland	grassy	*Typha* sp., *Carex* sp.	+		+			+		+	4
16	54°28'57 N 17°01'57 E	6	+	-	wasteland	willow thicket	*Typha* sp., *Phragmites communis*	+		+		+	+		+	5
17	54°28'27 N 17°01'55 E	1.5	+	-	built-up	concrete covered	filamentous algae									0
18	54°28'33 N 17°02'09 E	0.04	+	-	built-up	grassy	*Carex* sp.	+		+						2
19	54°28'32 N 17°02'05 E	0.2	+	-	built-up	reinforced with bars	filamentous algae									0
20	54°28'33 N 17°02'17 E	0.05	+	-	built-up	reinforced with bars		+					+			2
21	54°28'31 N 17°02'31 E	0.1	+	-	Northern Forest	reinforced with bars										0
22	54°28'36 N 17°02'54 E	0.05	+	-	Northern Forest	trees		+		+			+		+	4
23	54°28'33 N 17°02'28 E	0.03	+	-	Northern Forest	reinforced with bars	filamentous algae									0
24	54°28'33 N 17°02'30 E	0.02	+	-	Northern Forest	reinforced with bars	filamentous algae									0
25	54°28'38 N 17°02'42 E	0.3	S	-	Northern Forest	aquatic plants	*Typha* sp., *Phragmites communis*, *Carex* sp.	+	+	+	+		+	+	+	7
26	54°28'49 N 17°01'17 E	0.9	+	-	wasteland	grassy	*Typha* sp., *Phragmites communis*, *Carex* sp.	+		+			+		+	4
27	54°28'58 N 17°00'55 E	0.1	+	-	wasteland	grassy	*Phragmites communis*	+					+			2

Continued on the next page

Bodies of water description								Amphibian species								
No.	Coordinates	Area [ha]	Periodicity	Bottom	Location	Banks type	Aquatic plants	*Rana temporaria*	*Rana arvalis*	*Rana esculenta* complex	*Pelobates fuscus*	*Bombina bombina*	*Bufo bufo*	*Bufo calamita*	*Triturus vulgaris*	Σ
28	54°28`57 N 17°00`57 E	0.05	+	-	wasteland	grassy	*Phragmites communis*,									0
29	54°28`57 N 17°00`58 E	0.2	+	-	wasteland	grassy	*Phragmites communis*	+								1
30	54°28`57 N 17°00`53 E	0.02	+	-	wasteland	grassy		+					+			2
31	54°28`57 N 17°00`53 E	0.03	+	-	wasteland	grassy		+					+			2
32	54°28`56 N 17°00`51 E	0.04	+	-	wasteland	grassy										0
33	54°28`54 N 17°00`49 E	0.1	+	-	wasteland	grassy										0
34	54°28`53 N 17°00`49 E	0.1	+	-	wasteland	grassy										0
35	54°28`51 N 17°00`39 E	1.5	+	-	wasteland	willow thicket	*Typha* sp., *Phragmites communis*, *Carex* sp.	+	+	+	+		+	+	+	7
36	54°27`28 N 17°02`25 E	0.9	+	-	built-up	grassy	*Nymphaea alba*			+			+			2
37	54°27`33 N 17°02`26 E	0.7	+	-	built-up	grassy	*Nymphaea alba*			+			+			2
38	54°27`24 N 17°02`24 E	0.1	+	-	built-up	steep border										0
39	54°27`23 N 17°02`31 E	0.2	+	+	built-up	concrete-covered										0
40	54°27`09 N 17°02`21 E	20	S	-	wasteland	grassy	*Typha* sp., *Phragmites communis*, *Carex* sp.	+		+			+		+	4