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**THE STRUCTURE AND ABUNDANCE DYNAMICS OF AMPHIBIAN  
COMMUNITIES IN THE FARMLAND OF IŃSKO LANDSCAPE PARK  
(POMERANIAN LAKELAND)**

**Abstract**

The paper presents results of a study conducted in Ińsko Landscape Park in the years 2002 and 2003. The study has confirmed the occurrence of 11 amphibian species, which coincides with results obtained previously by other researchers. The presence of two amphibian species from the “Red List of Threatened Species in Poland”, namely *Triturus cristatus* and *Bombina bombina* has been confirmed. Another important result of the study is the confirmation of the occurrence of *Bufo calamita* in the studied area. Finally, the paper presents the dynamics of occurrence of selected species.

**Keywords:** *Triturus cristatus*, *Bombina bombina*, *Bufo calamita*, amphibian communities, farmland, Ińsko Landscape Park

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## **Introduction**

For several years significant changes have been observed in the farmland landscape. First and foremost, these changes are connected with the methods of land management. As recently as twenty years ago, most farmland was utilized in some way, whether it was arable land or grassland.

Towards the end of 1980s, agriculture ceased to be profitable. The land which had been cultivated before, sometimes at a very high level, has turned into brownfields. Discontinuation of land cultivation affects both flora and fauna inhabiting an area. Ditches and other elements of land amelioration do not play their original role any more. Small water bodies crop up randomly. In an ameliorated field such a water body, together with its surroundings, becomes a real refugium for fauna (the authors' own observations as well as that of other researchers). A crucial role played by brownfields in the existence of a whole community of organisms has been described by Tryjanowski (1990) on the example of Wolsztyn surroundings.

In 2004 the system of direct farming subsidies was introduced for land-cultivating farmers. This resulted in mass attempts to cultivate land which had previously been turned into brownfields and entailed yet another change for the natural environment, since any change in the method of using land entails changes in the species composition of both its flora and fauna (e.g. Rybacki 2002). Such a situation has also been observed in Ińsko Landscape Park.

Several other studies had been devoted to the fauna of amphibians inhabiting Ińsko Landscape Park (e.g. Górska et al. 1987; Górska & Bebel 1988; Górski et al. 1991). All these studies had been conducted from the point of view of faunistics.

The aim of the present work was to confirm the species composition of batrachofauna of Ińsko Landscape Park, identify more locations inhabited by species threatened with extinction and investigate mating dynamics of selected amphibian species, which may change due to changes in land management methods.

## Research area

The research was conducted in several dozen small water reservoirs (Fig. 1) located within the area of Ińsko Landscape Park. The park area is 17 663 ha and its buffer zone is 26 240 ha. Due to differences in their character, the reservoirs were classified as two types of sites. Both types of sites were located in the buffer zone of Ińsko Landscape Park.

A short characteristics of research sites (numbers as in Fig. 1):

1. Mid-field water holes located between the villages of Storkowo and Studnica (Ińsko commune). The research encompassed two water holes situated closest to the village of Storkowo and a channel which connected them. Vegetation growing in the research area included (names quoted after Rutkowski 1998): *Phragmites australis*, *Lemna trisulca*, *Lemna minor* and sporadically also other plant species. Total area of both water reservoirs and the channel equaled ca. 1 ha.
2. Puddles at the bottom of a gravel pit<sup>1</sup> (on the border of two communes: Ińsko and Węgorzyno). The research was conducted in the part of the excavation situated on the right side of the road from the village of Storkowo to the local road no. 149 (between Węgorzyno and the village of Ginawa). The studied water bodies were completely devoid of vegetation. They were small and most of them were very shallow (5–10 cm).

As for the anthropopressure, in the case of the first site, the area did not have any economic value for local inhabitants but was strongly polluted with domestic sewage. On a nearby meadow, which at the same time was a bank of one of the studied water reservoir, there was an outlet of a sewer pipe. The other site was located in the excavation of a working mine, which meant continuous presence of people and machines.

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<sup>1</sup> Szczecin Pits of Mineral Raw Materials, Storkowo Pit.

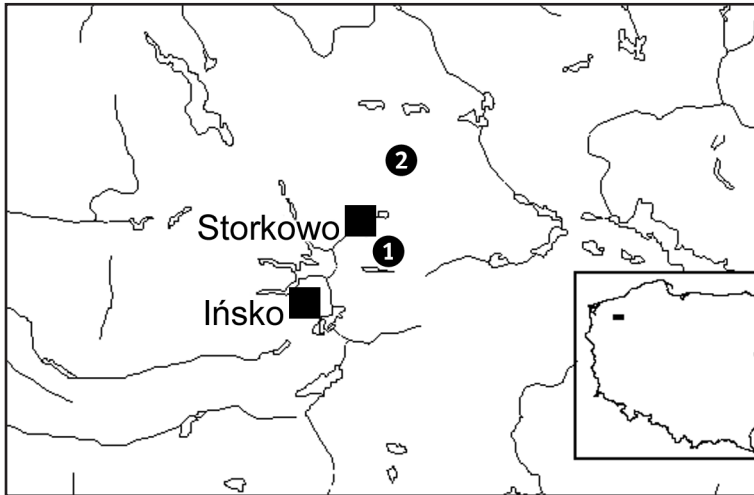


Fig. 1. Location of research sites (■ – towns; ①, ② – research sites)

## Material and methods

The research was divided into two stages. The purpose of the first stage was to make an inventory of the amphibian community and took place in 2002. Two controls were conducted in March, three in April, three in May and two in June. The second stage of the research took place in 2003. Its purpose was to confirm the species structure of the amphibian community and to learn about the breeding dynamics of selected species. The number of controls and the intervals at which they were conducted were the same as in the previous year. The abundance of amphibians was measured by means of commonly applied methods (e.g. Łoban et al. 2004): appraisal from the banks of the water reservoirs, whenever it was possible, on the basis of the voices of mating males of tailless amphibians (apart from green frogs) and catching specimens (of both tailed and tailless amphibians). Regular catching of specimens was also applied in the case of common toad *Bufo bufo* (L.). At twilight, two persons were walking around the reservoirs and catching all specimens of the species. The next day they were released back to the respective reservoirs.

Furthermore, from each comparatively large group of mating amphibians twenty specimens were collected with the aid of a hydrobiological sweep net, in order to confirm the identification of the species. In all samples collected in such a way there were found some individuals which could not be identified as belonging to any particular species. There were from 1 to 3 unidentified individuals per sample, which amounted to 5–15% of all collected amphibians. Species were identified on the basis of a study by Berger (2000).

## Results and discussion

The occurrence of 11 species of amphibians was recorded in the course of the research (Tab. 1). The most amphibian species were recorded, as had been expected, in site 1, namely ten species. In site 2 only two species were encountered.

The number of recorded species confirmed the results that had been obtained by Górska et al. (1987), Górska & Bebel (1988) and Górski et al. (1992). Apart from that, the above mentioned team of researchers had also encountered *Rana ridibunda* Pallas in Ińsko Landscape Park, but at a site situated outside the area which was investigated for the purposes of the present study.

It is surprising, however, that Hofman & Szymura (1998), did not record the presence of fire-bellied toad (*Bombina bombina*) in that area since the species still is among the most abundant ones in there. Probably the reason for that omission was the absence of faunistic data regarding the area in question.

Study results confirmed the occurrence of natterjack toad (*Bufo calamita*) in Ińsko Landscape Park. Typical locations for this species included small water bodies with sandy bottoms, characterized by quickly warming water (Juszczyk 1987), found in the gravel pit excavation. It was an interesting fact that the species was also recorded nearby in a small inwood peatbog and in a pond which had formed itself on a flooded meadow (observations: G.M.).

It should also be mentioned, as an oddity, that in 1999 one of the authors encountered, in the neighbourhood of the gravel pit, an amplexus of a common spadefoot and a common frog.

Table 1. A list of amphibian species found in the research sites on the farmland of Insko Landscape Park in the years 2002 and 2003 (numbers as in text and in Fig. 1)

		2002		2003	
		Site		Site	
No.	Species	1	2	1	2
1.	<i>Triturus vulgaris</i> (L.)	0–5 <sup>1</sup>	0	1–12	0
2.	<i>Triturus cristatus</i> (Laur.)	0–1	0	0–3	0
3.	<i>Bufo bufo</i> (L.)	0–90	0	0–112	0–2
4.	<i>Bufo calamita</i> (Laur.)	0	3–40	0	5–25
5.	<i>Bombina bombina</i> (L.)	0–75	0	0–85	0
6.	<i>Pelobates fuscus</i> (Laur.)	0–2	0	0–1	0
7.	<i>Hyla arborea</i> (L.)	0–5	0	0–8	0
8.	<i>Rana esculenta</i> L.	0–245	0	0–200	0
9.	<i>Rana lessonae</i> Came.	0–200	0	0–205	0
10.	<i>Rana arvalis</i> Nilsson	5–255	0	2–330	0
11.	<i>Rana temporaria</i> L.	0–1	0	0–1	0

The results obtained with regard to peaks of activity of selected species (Fig. 2) did not substantially differ from data provided by Juszczak (1987). There was observed a decade shift (delay) of the peak of activity of green frogs in comparison to results obtained in Olsztyn by Majewski & Nowakowski (2001). On the other hand, the same results as theirs were obtained regarding a common toad and a European fire-bellied toad.

The dynamics of activity differed from one species to another, which was caused by differences in breeding behaviour of particular species.

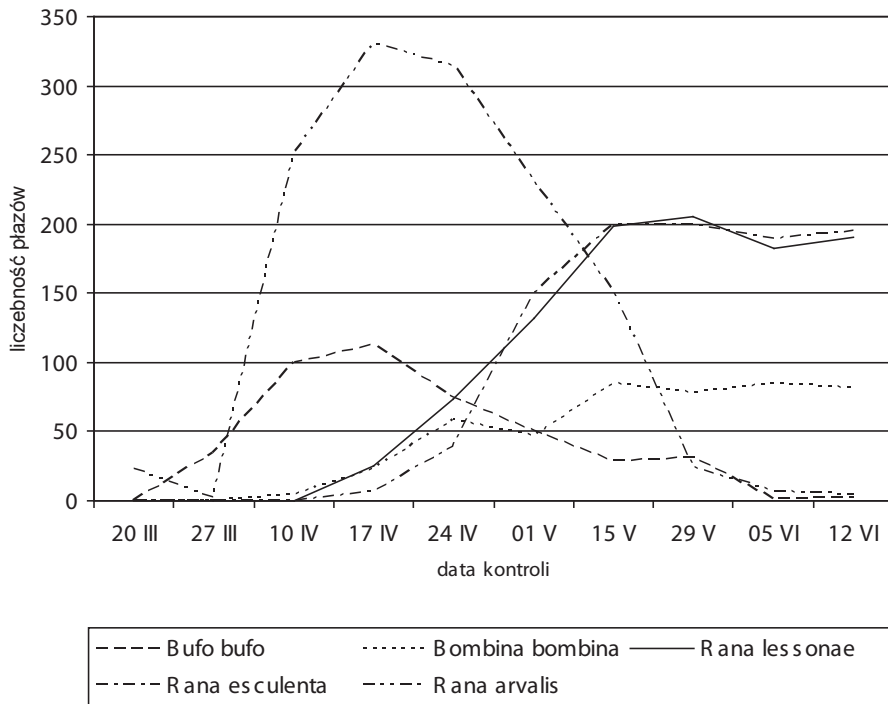


Fig. 2. Seasonal dynamics of chosen amphibian species in the farmland of Ińsko Landscape Park

Habitats of amphibians in the studied research sites were found typical for respective species and did not differ from habitat characteristics provided by subject literature (e.g. Głowaciński & Rafiński 2003).

## Conclusions

1. The presence of 11 amphibian species has been recorded (over 61% of Polish fauna).
2. Two species encountered in the studied amphibian community are listed in the “Red List of Threatened Species in Poland”, namely great crested newt and European fire-bellied toad.
3. Natterjack toad population in the aggregate mine requires that protective measures be taken. Water levels on its breeding ground are subject to very high fluctuations, and sometimes the area even dries out completely. What is

more, a “recultivation” of the excavation is being planned, which will consist in filling it up (this process has already been initiated in the oldest part of the excavation).

4. Because of the wastewater being released into research site 1, the whole community of amphibians inhabiting the site is endangered.

The research was conducted only on adult specimens. No specimen was killed in the course of the study.

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**STRUKTURA I DYNAMIKA LICZEBNOŚCI ZESPOŁU PŁAZÓW  
KRAJOBRAZU ROLNICZEGO IŃSKIEGO PARKU KRAJOBRAZOWEGO  
(POJEZIERZE ZACHODNIOPOMORSKIE)**

**Streszczenie**

W artykule zaprezentowano wyniki badań płazów krajobrazu rolniczego na wybranym terenie Ińskiego Parku Krajobrazowego w latach 2002 i 2003. Stwierdzono występowanie na tym terenie 11 gatunków płazów, w tym 2 gatunki – *Triturus cristatus* i *Bombina bombina* – figurujące na „Czerwonej liście gatunków zagrożonych w Polsce”. Dla wybranych gatunków przedstawiono dynamikę liczebności w okresie godowym.

**Słowa kluczowe:** *Triturus cristatus*, *Bombina bombina*, *Bufo calamita*, płazy w krajobrazie rolniczym, Iński Park Krajobrazowy

