

NEW LOCALITY OF VULNERABLE BIVALVE SPECIES *PISIDIUM OBTUSALE* (LAMARCK, 1818) (SPHAERIIDAE) WITH NOTES ON ITS ECOLOGY AND CONSERVATION STATUS IN WIELKOPOLSKA REGION (WESTERN POLAND)

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Abstract: *Pisidium obtusale* is a bivalve species known from the area of entire Poland. It is known as a typical inhabitant of temporary water bodies, described as dominant in malacocenoses of small ponds and wetlands. Due to the decline in its habitats, it has been red-listed and is regarded as vulnerable in Poland. During the last 50 years the species has been reported from 102 localities in Wielkopolska province. In the last decade however, a significant decline in the localities described can be noted. The authors describe a new locality of *Pisidium obtusale* and give some remarks on its ecology based on comparison with 29 adjacent waterbodies, where this species was absent. Furthermore, the data are compared with information from the literature (from 22 publications) describing localities of the species in the Wielkopolska province during the last 50 years.

Keywords: temporary waters, threatened species, agricultural landscape, desiccation tolerance, freshwater malacocenoses

INTRODUCTION

The Polish fauna contains 19 species of the genus *Pisidium*. Some of them are numbered among the rarest molluscan species in Poland and seven are included in the *Polish Red Data Book of Animals* (Głowaciński 2002). Most of them are endangered by the decline of their natural habitats caused by eutrophication of water bodies and landscape transformation observed primarily in the agricultural landscape of the majority of Poland.

One of the red-listed *Pisidium* species is *P. (Cyclas) obtusale* (Lamarck, 1818). According to Abraszewska-Kowalczyk (1986), the species is typical for small, temporary bodies of water like astatic ponds, ditches and wetlands. The species is well adapted to the conditions occurring in small pools: it is tolerant to desiccation and prefers waters with low pH value (Klimowicz 1959, 1962). According to Piechocki and Dyduch-Falniowska (1993), the range of the species is Palearctic, and it is known from the area of almost entire country, including mountain localities up to 1100 m above sea level. According to Kasprzak (1975), *P. obtusale* is one of the dominant species among *Pisidium* communities of ponds and temporary water bodies ecosystems of central and northern Poland.

The authors of the Red List of Threatened Animals in Poland (Dyduch-Falniowska, Zajac 2002) consider *P. obtusale* as vulnerable mainly because of the known decline in its habitats and underline that the number of its known localities is low, probably because of low intensity of studies conducted in such habitats. Nevertheless, the habitats like small ponds, turf peats and wetlands in general are rapidly disappearing in the area of Polish lowlands and all the species characteristic for such ecosystems are per se threatened with extinction.

Such decline in the number of temporary water bodies is especially visible in Wielkopolska region (Western Poland). The landscape of this area has been shaped during the last glaciation and dominated by the forms typical for ground moraine. Especially abundant are deep ground depressions created during thawing of ice blocks when the glacier was withdrawing at the end of the glaciations. Until recently such depressions were a place where precipitation water gathered and constituted a dense network of small pools, called kettle holes, abundant in the landscape of the region. Intensive melioration and general lowering of the ground water level observed in Wielkopolska for the last 70 years (Urbański 1957) caused such ponds to disappear from the agricultural landscape of the region. In this way one can observe a shrinkage of habitats essential for a number of endangered animal species, including amphibians (Tryjanowski et al 2003), large branchiopod crustaceans (Gołdyn et al. 2007) as well as some leach and molluscs species (Gołdyn 2005).

In this paper the authors describe a new locality of *P. obtusale* in Wielkopolska region. The data comes from an extensive study on the molluscan assemblages of small ponds in agricultural landscape and therefore the authors are able to evaluate the habitat preferences of the species and give some ecological remarks on its occurrence. We also try to assess the conservation status of *P. obtusale* in Wielkopolska based on literature data on the occurrences of the species reported in the literature during the last fifty years.

MATERIAL AND METHODS

In the years 2002–2003 thirty ponds in the vicinities of Kaźmierz and Młodasko (Western Wielkopolska) were investigated with respect to the ecological factors shaping the structure of molluscan assemblages. The ponds were sampled semi quantitatively, with the use of a hand net with a cutting edge of fixed width (20 cm), towed along the bottom for 0.5 m (area of such sample = approximately 0.1 m²). Five such samples were collected from each microhabitat available in the ponds, summing to at least 15 samples for each pool (approximately 1.5 m²).

RESULTS AND SUMMARY

The first preliminary qualitative research in 2001 did not indicate the presence of *P. obtusale* in any of the 60 investigated waterbodies. During the quantitative research of *P. obtusale*, 193 individuals were found in one of the field ponds – *Trzciniak* – in samples collected from open water zone (3 in May 2002, 185 in autumn 2002, and 5 in spring 2003). The density of investigated bivalve species was 5 individuals per square meter in spring 2002. In autumn (of the same year) there were 123 individuals per square meter and in spring 2003 – 10 individuals per square meter. In zoocenological analysis *P. obtusale* was subrecent in spring 2002 and recent in autumn 2002 and spring of the next year.

With respect to the number of known localities in the region of Wielkopolska, *P. obtusale* belongs to relatively frequent *Pisidium* species. During the last 50 years it was reported from 102 localities. A mean number of localities for all 17 species, known from the region in the same period, is 70 (minimum 3; maximum 207). The presence of the examined species was noted in 24 lakes in the region of Wielkopolska. It was also found on wetlands (17 sites), in ponds (17 localities), rivers (9 localities), streams (4 sites), turf pits (2 localities) and a clay pit, but the bivalve was found most often in ditches (28 localities), in forests, on meadows and in villages (see Nizio 2010 and cited). The decline in the number of localities is clearly seen, especially referring to wetlands and ditches. The bivalve species was occurring mostly in lakes and rivers. One of possible explanations of this fact is that its habitats were degraded or dried out. In comparison to the majority of bivalve species known from the Wielkopolska region, *P. obtusale* occurred quite often during the entire period of investigation. In the 1960s 39 localities of investigated species were described, in the 1970s – 21, in the 1980s – only 2, but in the 1990s – 27. In the first two years of the new century 4 localities of *P. obtusale* were described. According to previous and present studies, we strongly agree that *P. obtusale* is an endangered species due to the degradation and loss of its habitats.

CHARACTERISTICS OF THE BIVALVE HABITAT

GPS coordinates: 52° 29.6404' N; 16° 32.9432' E

Area: 900 m²

Total catchment area: 21.2 ha

Direct catchment area: 4 ha

Maximal depth: 1.5 m

This pond has an “open shore”. Near the shore, the bottom descends softly, while in the central part quite steeply (probably due to the animals excavating

this place after this body of water dries). The pond dries periodically – water evaporates in the end of July and refills in October. In the central part of this body of water, a muddy puddle (excavated by boars) remains for the entire dry period. Water constantly flows through this pond from three shallow ditches, which are draining water from meadows and one ditch connected to *Turzyce* waterbody. Besides meadows, the catchment includes cropland. Before the dry period, purple bacteria blooming (*Rhodobacter*) was noted.

On the surface of the waterbody *Trzciniak* two microhabitats were distinguished: open water zone (area: 35 m², in early summer this area is covered with *Lemna sp.*) and “reed” (area: 865 m², overgrown by *Phragmites australis*).

The temperature of water in the pond with *P. obtusale* was close to the average for all the pools studied; pH was also mean (2002: 7.37 vs. mean for the 30 waterbodies = 7.46; 2003: 7.02 vs. 6.84); dissolved oxygen content was low when compared to other ponds (2002: 0.5 vs. 4.65; 2003: 4 vs. 5.8 mg*l⁻¹); water conductivity was higher than average (2002: 1101 vs. 456; 2003: 1096 vs. 525 μS*cm⁻¹), ammonium nitrogen contents higher than average (2002: 3.47 vs. 2.93; 2003: 2.34 vs. 1.83) and total phosphorus slightly lower (1.93 in 2002 and 3.75 in 2003) than average for all the ponds studied (2002: 2.24; 2003: 1.79).

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Streszczenie

Pisidium obtusale jest gatunkiem małża, występującym na całym obszarze Polski. Gatunek ten zasiedla okresowe zbiorniki wodne, dominuje w malakocenozach małych stawów i terenów podmokłych. W związku ze spadkiem liczby siedlisk typowych dla tego mięczaka, traktowany on jest jako zagrożony wyginięciem w Polsce i wciągnięty na „czerwoną listę”. W ciągu ostatnich 50 lat gatunek ten był notowany ze 102 lokalizacji w województwie Wielkopolskim. Widoczny jest jednak spadek liczby opisywanych siedlisk w ostatniej dekadzie. Poniżej opisujemy nowe lokalizacje populacji tego gatunku oraz prezentujemy komentarz na temat jego ekologii na podstawie porównania z 29 zbiornikami wodnymi w pobliżu opisanych siedlisk, w których nie występował *P. obtusale*. Ponadto dane zostały porównane z informacjami z literatury (z 22 publikacji) opisującymi siedliska tego małża w Wielkopolsce z ostatnich 50 lat.