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FIELD NOTE

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Occurrence of fairy shrimp (*Chirocephalus croaticus*) in the lake Petelinjsko jezero during the 2008–2014 period

Pojavljanje kraškega škrgonožca *(Chirocephalus croaticus)* v Petelinjskem jezeru v obdobju 2008–2014

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The lake Petelinjsko jezero is the second largest, lowest lying and longest lasting of the Pivka intermittent lakes (SW Slovenia). In this particular lake, a small fairy shrimp crustacean *Chirocephalus croaticus* (Crustacea, Anostraca) lives, adapted to temporary wetlands. Although this species is declared endemic to the lake Petelinjsko jezero, it also occurs in large numbers in puddles of Jeredovce (Pipan 2005).

Brancelj & Gorjanc (1999) gave a detailed morphological description of the species in Slovenia, together with its ecology. The species does not survive in stagnant waters inhabited by fish. For its normal development it requires a certain period of time during which the thick-shelled eggs are exposed to drought and low temperatures (Brancelj & Gorjanc 2000).

Chirocephalus croaticus has the status of a vulnerable species (VU) in the IUCN Red list of Threatened Species (Sket 1996). It is also a rare species (R) in the Red List of lower crustaceans of Slovenia and is one of the protected species. It is included in the list of animal species listed in Annex 2, the habitats of which are protected under the Decree on protected wild animal species (Ur. l. RS 2002, Ur. l. RS 2004). Its population is potentially threatened by mechanical interventions and/or pollution (including fertilization of meadows) (Brancelj & Gorjanc 2000).

Based on multi-year sampling at different seasons (Tab. 1), the population appears to be stable. Under favourable conditions, the species occurs in large numbers (Brancelj & Gorjanc 2000). In addition to its occurrence, Jeklar (2019) studied the average size and sex ratio of *C. croaticus*, and how physical and chemical parameters of the water and air affect its population prevalence and size (Tab. 1).

During several years of our field observations of the lake Petelinjsko jezero (Kirn 2016), we occasionally noticed *C. croaticus*. It had never been observed in other Pivka intermittent lakes, while the lakes in Krajnikov dol and Jeredovce were not inspected. We observed fairy shrimps in the lake Petelinjsko jezero every year from 2008 to 2014 in ten periods when the lake was filled with water (Tab. 1). During our fieldtrips, we found fairy shrimps in all seasons; they were spotted throughout the spring until early summer, after which they were inspected only in late autumn and winter. Since fairy shrimps are difficult to spot during high water levels, our field data cover only the time when the lake water level was dropping. For example, in the December 2009–April 2010 period, when the lake basin was filled with water, fairy shrimps were spotted only in April, while their previous occurrences remain unknown. In general, the monthly occurrence of *C. croaticus* has changed over the years, depending on the lake dynamics.

The time when the lake basin is filled with water affects the occurrence of fairy shrimps. In the small lake, which was partially filled with water in June 2012 (Fig. 1), fairy shrimps appeared smaller and their density was lower than at the time when the lake was larger. In June 2010, however, fairy shrimp did not occur in the lake, reaching only the first filling phase and lasting for less than a week.

At high water levels, fairy shrimps are difficult to spot when individual specimens were observed in November 2010, specifically in the streambed leading from Jeglenk. Otherwise, fairy shrimps were observed in a puddle at the bottom of the Jeglenk sinkhole, which dries up before the main lake. Apparently, fairy shrimps at Jeglenk first separate from those in the main lake, and as this lake dries up, the population is divided further. Fairy shrimps appear longest at the bottom of the lowest parts of the lake Petelinjsko jezero, i.e. in the basin under estavelles in the southeastern part of the lake, as well as at the lowest section of the main cart track and in holes of the central basin. Their density increases with the water decrease.

Table 1. Time of occurrence of *Chirocephalus croaticus* (Crustacea, Anostraca) in the lake Petelinjsko jezero according to literature and our field data. Exact dates are given if available in the literature.
Tabela 1. Čas pojavljanja kraškega škrgonožca *Chirocephalus croaticus* (Crustacea, Anostraca) v Petelinjskem jezeru iz literature in naših terenskih podatkov. Natančni datumi so navedeni, če so na voljo v literaturi.

Month	**Brancelj & Gorjanc 1999*, Brancelj & Gorjanc 2000** (autumn 1999–spring 2000)	**Jeklar 2019** (spring 2018–spring 2019)	**Our observations in 2008–2014, when the lake was filled with water** (indicated in parentheses**)
Jan	2000: 20.1.		2013: 20. 1. (October 2012–January 2013)
Feb			2011: 12. 2., 19. 2. (September 2010–February 2011)
Mar			2009: 15. 3., 24. 3. (December 2008–March 2009)
Apr	1998: 17. 4., 23. 4., 30. 4. 2000: 19. 4.	2018: 11. 4., 13. 4., 17. 4., 20. 4., 23. 4., 25. 4.	2010: 13. 4., 21. 4., 24. 4. (December 2009–April 2010) 2011: 5. 4. (March–April 2011)
May	1998: 5. 5., 8. 5.	2018: 2. 5., 5. 5.	2008: 23.5. (March–May 2008) 2009: 2. 5., 3. 5., 5. 5., 6. 5. (March–May 2009) 2010: 28. 5., 30. 5. (May 2010) 2014: 4. 5., 17. 5. (till May 2014)
Jun		2019: 10. 6., 18. 6.	2012: 23. 6. (Jun 2012)
Jul			
Aug			
Sep			
Oct			
Nov		2018: 13. 11.	2010: 14. 11. (September 2010–February 2011)
Dec			

* Sampling was performed once or twice per year for a few years before 1998 and weekly in 1998, but the exact dates are given only for the late spring 1998. Colour scale: blue – winter, green – spring, yellow – summer, orange – autumn
** The time when the lake was filled with water is not given by exact dates – the period is defined monthly.
* Vzorčenje je bilo nekaj let pred letom 1998 opravljeno enkrat ali dvakrat na leto, leta 1998 pa tedensko. Datumi so navedeni le za pozno pomlad 1998. Barvna lestvica: modra – zima, zelena – pomlad, rumena – poletje, oranžna – jesen
** Trajanje pojavov jezera ni podano z natančnimi datumi – obdobje je opredeljeno mesečno.

Figure 1. The Petelinjsko jezero basin with smaller water surface (photo: Tina Kirn).
Slika 1. Kotanja Petelinjskega jezera ob nastanku manjšega jezera (foto: Tina Kirn).

The fairy shrimps were initially observed in the shallows of the flooded cart track (in the extent of the smaller lake) along the northern edge of the central basin. Some specimens were found dead on the dry cart track along the southern edge of this basin (May 2014). We believe that they were washed up on the lakeshore. As the water level dropped, only the lower part of the lake basin was flooded. During this time, the initially single lake splits into two smaller lakes. The fairy shrimps were found in the lake shallows of the flooded cart track at the bottom of the central basin, as well as in holes and small basins along the lake. Before the disappearance of the lake, we observed fairy shrimps only in the lowest parts of the lake bottom. Thus, after drying, the patches of dead fairy shrimps remained there. If there are filamentous algae in the lake, the dead fairy shrimps are pressed into the algae paper that remains at the dried up bottom (Fig. 2). We believe that based on the number and size of the patches we could check/track the state of the fairy shrimp population (stable, increasing, decreasing) in the lake.

To conclude, *C. croaticus* occurs in the lake Petelinjsko jezero regularly and in large numbers, as already stated by Brancelj & Gorjanc (2000) and Jeklar (2019). We observed fairy shrimps in all seasons, but were the commonest in spring.

Figure 2. Examples of finds of fairy shrimps (*Chirocephalus croaticus*) in the lake Petelinjsko jezero (photo: Tina Kirn).
Slika 2. Primeri najdb kraškega škrgonožca *(Chirocephalus croaticus*) v Petelinjskem jezeru (foto: Tina Kirn).

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