ABSTRACT

Ornamental tropical fish are kept in home aquaria for many decades. It is often that fish that grown too big or are unwanted by the owner are released into natural environment. Most tropical fish have zero chance for survival in polish natural water bodies not only through the winter, but in many cases even through summer months. There are several reports of non-native fauna species in our waters. Successful introductions took places in few artificial canals with thermally polluted waters namely pumpkinseed *Lepomis gibbosus* (Linnaeus, 1758) in warm canal of Odra river, dramatically changing local ecosystems. Object of this paper is Silver arowana (*Osteoglossum bicirrhosum*) caught in hand aquarium net in Powsinkowskie Lake. The lake is one of the most important water reservoir in most urbanized part of Poland – its capital Warsaw. Because of its location in highly urbanized area it is the reservoir of intense uncontrolled introduction of unwanted fish. Most tropical alien species may not be able to survive in our local waters but may cause severe local ecosystem imbalances for example they may possibly be hosts to pathogenic organism that our fish have no immune system tuned to. Therefore places...
like Powsinkowskie Lake is a good place for scientist to perform periodic inventory to determine the species composition, fish numbers and condition.

**Keywords**: alien species, aquarium, ornamental tropical fish, introduction, Powsinkowskie Lake, Vistula river, *Osteoglossum bicirrhosum*, *Lepomis gibbosus*

1. INTRODUCTION

Freshwater ornamental fish are believed to be the most invasive species in aquatic ecosystems around the globe. Many of them establish populations outcompeting local fauna (Kudhongania et al. 1990; Latini and Petrere, 2004; Rixon et al. 2005; Singh and Lakra 2011). Though tropical fish prefer warmer waters, thanks to the milder winters in recent years they successfully expand their territories in European countries water bodies, not limiting their habitats to the Southern boundaries of European continent only. In many cases they are introduced in thermally polluted waters – that may serve as the form of acclimatisation to lower temperatures in winter season (Koščo et al. 2010; Jourdan et al. 2014; van der Veer and Nentwig, 2015).

Diversity of ornamental, tropical fish in European water bodies among other things is a result of their availability on the market (Strayer, 2010). Their unique colours, behaviours or anatomy make them attractive for aquarists. Unfortunately high costs related to keeping fish, lack of knowledge of maximum body sizes of some species, problems with resale or simply fact of being bored with the aquarium promote uncontrolled introductions by irresponsible aquarists, mostly to waters of highly urbanized areas. Some of the fish are able to cross thermal barriers and start populating new areas (Duggan et al. 2006).

Silver arowana (*Osteoglossum bicirrhosum*) quite popular in home aquariums is indigenous to warm South American waters (Moreau and Coomes, 2006), where it preys mostly on avifauna - insects and spiders falling down on the water surface (Goulding, 1980). In Asian cultures this species is associated as a symbol of luck both in private life and in business (Ng and Tan, 1997). Nevertheless there is no shortage of reports of introduction into local water bodies (Ng and Lim, 1997, Xiong et al. 2015), much of them unsuccessful (Ishikawa and Tachihara, 2014).

In this contribution we present first data of confirmed presence of the Silver arowana (*Osteoglossum bicirrhosum*) in water ecosystem in Poland

2. MATERIAL AND METHODS

The work was part of the initial environmental inventory of the Powsinkowskie Lake region as part of the educational activities run by Faculty of Animal Sciences, Warsaw University of Life Sciences in 2016 year.

**Locality**

Powsinkowskie Lake is a water reservoir with an area of about 14 ha and an average depth of about 1.5 m, it makes it one of the largest aquatic ecosystems in Warsaw (Mazovia Province,
Poland). It is an integral part of Vistula floodplain terrace, a belt of oxbow lakes of Vistula being part of the Warsaw Protected Landscape Area. The water course that it is part of has a length of about 12 km. It starts from Bielawskie Lakes (Konstancin-Jeziorna Municipality), through Lisowskie Lake, Pod Morgami Lake, Powsinkowskie Lake and ending on Wilanowskie Lake (Wilanów Commune of the Capital City of Warsaw), which together with natural watercourses (partly the Wilanowka River), as well as also artificial, unnamed watercourses form one of the local ecological corridors enabling the migration of organisms associated with the water environment, including the open waters of the Vistula River. As a result of lowering surface water level due to melioration activities, exploiting the bottom of the neighboring Vistula section (obtaining gravel), supplying Siekierki Plant in water and lack of proper supervision over maintaining the condition of reservoirs in recent years, Powsinkowskie Lake is constantly exposed to strong overgrowing, and consequently shallowing (increasing level of mud and bottom sediments), as well as limited flow between individual tanks and possible lower oxygen content in water, especially during the summer. The waters of the Powsinkowskie Lake are not thermally contaminated. In summer season their water temperature does not exceed 18 °C, while in winter the entire surface of the reservoir is covered with ice. Due to its location, Powsinkowskie Lake is one of the most important places for rest and recreation of the inhabitants of southern Warsaw, as well as attractive among anglers.

Photo 1. Middle fragment of the Powsinkowskie Lake in June 2016.

Fish detection and identification

As part of inventory operations, regular inspections (150 minutes) were carried out during the day and at night in the period from May to July 2016, which involved counting representatives of particular species and their catches for identification. On the basis of consultations with local anglers, on June 15, 2016, the area of unidentified exotic fish was
identified, which was observed in the reservoir for two days. On the same day, the fish were caught using aquarium netting and after initial consultations with the aquarists, they were subject to observation and identification using the available scientific literature (Ferraris Jr, 2003, Ardura et al. 2010).

3. RESULTS AND DISCUSSION


Photo 3. Clearly visible mechanical damages on the body of the collected individual.
Photo 3 (continue). Clearly visible mechanical damages on the body of the collected individual.

The specimen collected has been identified as Silver arowana *Osteoglossum bicirrhosum* (Cuvier, 1829, Ferraris Jr, 2003). The collected individual had a total body length of 41 cm (Photo 2). It was floating at the surface of the water a few meters from the shore, most likely due to hypothermia. Conducted observations revealed numerous mechanical damages of the body, such as lack of individual scales, scratches, abrasions, and clouding of the eyes (Photo 3). Particulated fins, especially the caudal fin, looked like had been bitten by other fish in the reservoir, possibly perch (Wisniewolski and Ligięza, 2011). The gills of the fish were free of foreign bodies.

During the entire period of the activities carried out, no other exotic fish species were collected in the reservoir.

4. CONCLUSIONS

Silver arowana (*Osteoglossum bicirrhosum*) is a species of tropical fish whose temperature optimum is much higher than the maximum temperature reached by the waters of Powsinkowskie Lake in summer. In nature arowana inhabits the floodplains of the Amazon, Rupuruni and Oyapock rivers. It is most commonly found among partially flooded trees. The tree crowns serve as protection against direct sunlight. Without their shielding effect, temperature of these relatively shallow and sluggishly flowing flood waters could warm up to a level that would disturb the biological balance of this ecosystem. Tree tops are also the place of residence of innumerable representatives of class Insecta and birds which constitute a
significant share in the diet of the species (Goulding, 1980), which can be inferred through its anatomic adaptation in the form of a large, upper mouth. There are trees in the vicinity of Powsinkowskie Lake, however, their occurrence is limited only to a small part of the shoreline.

The Powsinkowskie Lake, like most of the natural water reservoirs of Poland, is much less biodiverse environment than the natural places of occurrence of Silver arowana. This has a direct impact on the considerable impoverishment of the diet of a species such as arowana in Polish waters. While floodplains can be found (mainly in spring), the annual temperature amplitudes are far too high for tropical species such as Arowana silver to thrive. The maximum temperature of Powsinkowskie Lake is much lower than the temperature optimum for this species, which is on a scale of 24 - 28 ° C. The metabolism slowed down by the relatively cool water may contribute to immunity system malfunctioning, reducing feeding activity, and finally to death.

It can be assumed that this was a single case of uncontrolled introduction, which resulted in the death of the fish as a result of excessive hypothermia and resulting damage.

References


