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FUSCOCEPHALOZIOPSIS CATENULATA (HUEBENER) VÁŇA ET L. SÖDERSTR. – A LIVERWORT NEW TO WIGRY NATIONAL PARK (NORTH-EASTERN POLAND)

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Abstract. This paper presents the distribution of *Fuscocephaloziopsis catenulata* in Wigry National Park (north-eastern Poland) based on studies conducted during 2014–2015. This species is new to the flora of that area and was documented at 25 inventory sites in eight near-natural forest complexes.

Key words: *Fuscocephaloziopsis* (= *Cephalozia*) *catenulata*, rare species, primeval forest relics, Wigry National Park

INTRODUCTION

Fuscocephaloziopsis catenulata (Huebener) Váňa et L. Söderstr. (= *Cephalozia catenulata* (Huebener) Lindb.) is a suboceanic-mountainous species (Düll 1983). To date, its localities in Poland have been reported in almost all mountain massifs and in the northern (primarily north-eastern) part of the country (Szweykowski 2006). In the southern part, this liverwort has been reported from the Izerskie Mountains, the Karkonosze Mountains, the Sowie Mountains, Kotlina Jeleniogórska Basin, Beskid Śląski Range, Beskid Żywiecko-Orawski Range, the Babia Góra Massif, the Tatra Mountains (and Podtatrze), the Gorce Mountains, the Beskid Sądecki Range and the Bieszczady Mountains (Szweykowski 1958, 1960, Mamczarz 1977, Mierzeńska 1994, Klama 1996, 2004, 2008, Szweykowski & Buczkowska 1996, Staniaszek-Kik 2010, Górski & Váňa 2014). Lowland localities of *F. catenulata* are found in the Pojezierza and Pobrzeża Południowobałtyckie regions as well as in Pojezierza Wschodniobałtyckie Lakelands, Nizina Północnopodlaska Lowland and Wyżyna Kielecka Upland (the Świętokrzyskie Mountains) and Roztocze region (Szweykowski 1958, Klama 2002a, b, Górski 2013, Górski in Stebel et al. 2013, Górski & Pawlikowski 2014, Górski in Fudali et al. 2015). A map of the *F. catenulata* distribution in Poland based on data in the literature is given in Figure 1.

Fuscocephaloziopsis catenulata is an epixylic species found in near-natural forests with characteristics of a virgin forest (Cieśliński et al. 1996). Based on studies in the Puszcza Białowieska primeval forest, this plant was classified as a so-called primeval forest relic (Klama in Cieśliński et al. 1996, Klama 2002b). Aside from *F. catenulata*, this group also includes liverworts i.e., *Anastrophyllum michauxii* (F. Weber) H. Buch, *Crossocalyx hellerianus* (Nees ex Lindenb.) Meyl., *Lophoziopsis longidens* (Lindb.) Konst. et Vilnet, *Barbilophozia lycopodioides* (Wallr.) Loeske and *Plagiochila asplenioides* (L. emend. Taylor) Dumort. (Klama 2002b). To date, within this group *C. hellerianus* and *P. asplenioides* have been reported in the flora of Wigry National Park (Wiśniewski & Rejment 1935). These plants are still found in the analysed area. It must be stressed that despite the relatively large number of bryological studies in Wigry National Park (Wiśniewski & Rejment 1935, Rejment-Grochowska & Mickiewicz 1962, Mickiewicz et al. 1963, Bloch et al. 1979, Karczmarz & Sokołowski 1981, 1985, Wierzcholska et al. 2010), *F. catenulata* has not been recorded there. In view of the near-natural character of certain forest complexes in the park and

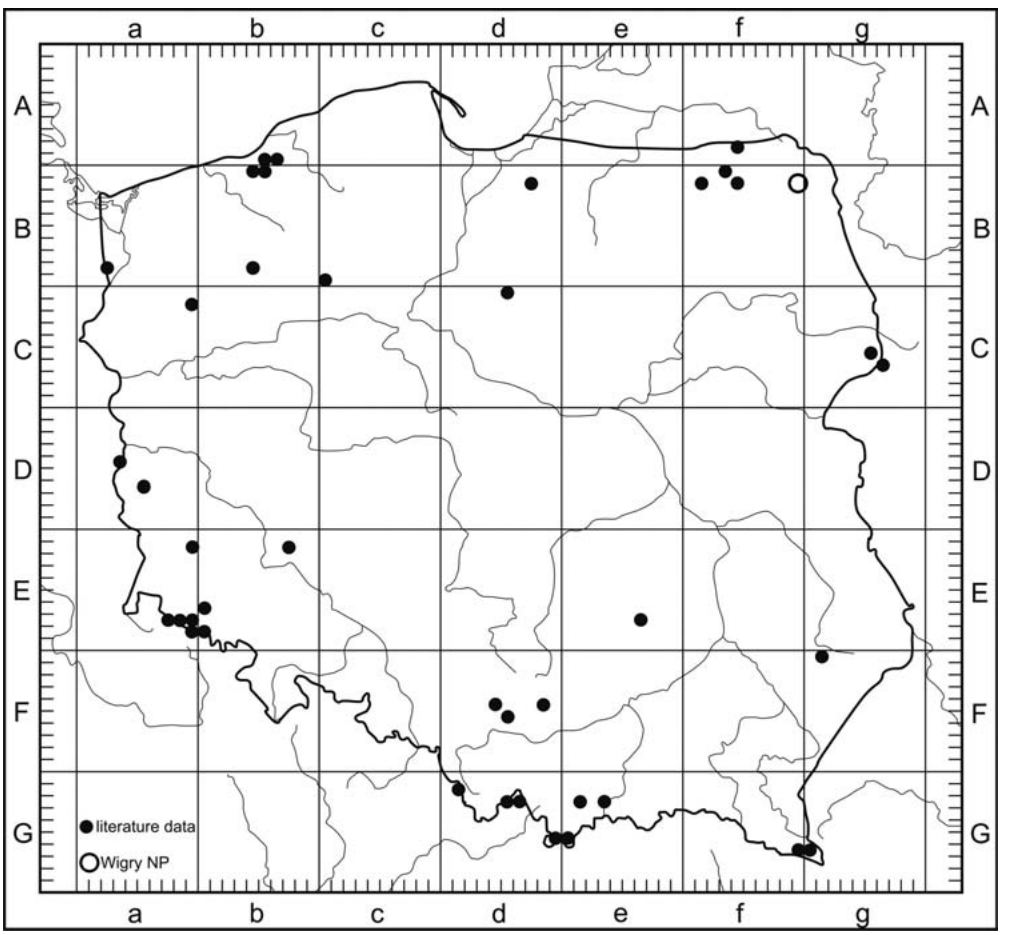

Fig. 1. Distribution of *Fuscocephaloziopsis catenulata* (Huebener) Váňa et L. Söderstr. in Poland based on literature data

the documented presence of this plant in north-eastern Poland (Klama 2002a, b, Górski & Pawlikowski 2014), the occurrence of *F. catenulata* in this area was considered to be highly likely.

It must be stressed here that *F. catenulata* is a rare species in Poland. Despite the relatively high number of localities (compare Fig. 1), most of them were documented before 1960. In some regions of the country, repeated inventories indicated the disappearance of localities of this plant (e.g., in the Śląsk Opolski region or in the Bieszczady Mts; Stebel 2006, Klama 2013). It is a threatened species on a national scale – category V (vulnerable; Klama 2006). The primary threat to this species is associated with the disappearance of large primeval forest complexes in the landscape. In West Pomerania, *F. catenulata* also is found, although rarely, in peat bogs and bare peat (Warnstorf 1885, Winkelmann 1893, Górski 2013).

CHARACTERISTICS OF RESEARCH AREA

Wigry National Park was established on 1 January 1989. It is one of the larger national parks in Poland, with an area of 150.8 km^2. It is located in north-eastern Poland in the province of Podlaskie. In terms of geology, the park is situated in the Suwalsko-Mazurski elevation, a part of the East-European plate. This area represents an early post-glacial landscape that developed during the Würm glaciation. Geographically, this region is a part of Lithuania Lakeland. The early post-glacial land relief is the effect of extreme habitat variation. The part of the park located to the north (from the southern part of Lake Wigry) is geomorphologically greatly varied, with numerous moraine landforms, kames, eskers, subglacial meltwater channels and dead ice depressions, and it is a part of East Suwałki Lakeland (Pojezierze Wschodniosuwalskie). South of Lake Wigry is an outwash plain constituting the northern end of Augustów Plain (Równina Augustowska). In terms of climate, the region of Wigry National Park is strongly influenced by the continental block of Eurasia, which produces the most severe climatic conditions in the lowland part of Poland. The region is located in the so-called rain shadow of the Szeskie Hills (Wzgórza Szeskie), resulting in lower annual precipitation totals, with a multi-annual mean of 593 mm.

Wigry National Park is composed of 42 lakes, including many dystrophic reservoirs, and they jointly cover 22% of the park area. The main river flowing through the park is the Czarna Hańcza, belonging to the Niemen basin. Other smaller rivers and streams,

such as the Wiatrołuża, Kamionka, Gremzdówka and Samlanka, also flow through the park.

Forests predominate in the landscape of Wigry National Park, accounting for 60% of its area. The dominant forest communities are *Serratulo-Pinetum* and *Tilio-Carpinetum*. A characteristic feature of the Wigry National Park forests is a considerable share of coniferous forests and swamp forests, primarily *Sphagno girgensohnii-Piceetum*, *Dryopteridi thelypteridis-Betuletum pubescentis*, *Vaccinio uliginosi-Pinetum* and *Ribeso nigri-Alnetum*. The most valuable non-forest communities in the park include various forms of peatbogs, mainly transition mires and quaking bogs (7140), raised bogs (7110), alkaline fens with bog springs, sedges and mosses (7230) and calcareous fens (7210).

Considerable geomorphological variation in the land relief results in highly diverse habitat and microhabitat conditions, which is reflected in the great richness and diversity of natural resources of Wigry National Park. In turn, the unique climatic conditions of the park result in the floristic uniqueness of the area compared to the rest of lowland Poland.

Wigry National Park is protected within the framework of the Natura 2000 network as a special area of conservation (SAC PLH200004 Ostoja Wigierska) and a special protection area (SPA PLB200002 Puszcza Augustowska). In 1975, Lake Wigry was added to the list of the most valuable water bodies in the world by the International Union for Conservation of Nature (IUCN) within the Aqua Project. In 2002, Wigry National Park, by virtue of the Ramsar Convention, was classified as a wetland area of international importance.

MATERIAL AND METHODS

Studies were conducted during 2014–2015. The entire area of Wigry National Park was surveyed (Fig. 2). All forest complexes of the park were investigated, including both those on peatland and on mineral subsoils. Forest phytocoenoses with large shares of spruce and pine, whose decaying wood is a substrate for *Fuscocephaloziopsis catenulata*, were studied thoroughly. A disproportion between the number of surveyed sites in the northern and southern parts of the park is a consequence of the geomorphological and habitat diversity of the study area.

RESULTS

GENERAL CHARACTERISTICS

In Wigry National Park, *Fuscocephaloziopsis catenulata* was reported in 25 survey sites located in eight forest or forest-peatland complexes (Fig. 3). The most abundant locality, as manifested in the number of decaying logs overgrown by that species, is situated at Jezioro Rzepiskowe Lake in phytocoenoses of boreal spruce forests on the western lake shore. Another area of greater accumulation of *F. catenulata* localities is associated with spruce coniferous forests in the Czarna Hańcza valley, both north and south of that river.

In the investigated area, almost all localities of *F. catenulata* are associated with decaying wood of pine or spruce logs. An exception in this respect is one locality in the Suche Bagno peat bog, where this species overgrew bare peat on an animal trail crossing the bog. Almost all localities of *F. catenulata* are located in phytocoenoses of the boreal spruce forest *Sphagno girgensohnii-Piceetum*.

LIST OF LOCALITIES

1. Forest section 276c, Suche Bagno peat bog, 54.003021°N, 23.147120°E, MGRS: 34UFE4072285991, *Vaccinio uliginosi-Pinetum*, bare peat, animal trail, 2014.07.11 (PG 78/2014)
2. Forest section 135k, between Suchar Zachodni, Suchar Wschodni and Jezioro Wigry Lake, 54.042205°N, 23.060491°E, MGRS: 34UFE3491890181, *Sphagno girgensohnii-Piceetum*, decaying log, 2014.08.11 (PG 97/2014)
3. Forest section 157g, Suchar Wielki, 54.026579°N, 23.060269°E, MGRS: 34UFE3495488442, *Vaccinio uliginosi-Pinetum*, decaying log, 2014.08.12 (PG 117/2014)
4. Forest section 165d, west of Jezioro Rzepiskowe Lake, 54.025722°N, 23.069961°E, MGRS: 34UFE3559288366, *Sphagno girgensohnii-Piceetum*, decaying log, 2014.08.12 (PG 124/2014)
5. Forest section 165d, west of Jezioro Rzepiskowe Lake, 54.025774°N, 23.069893°E, MGRS: 34UFE3558788371, *Sphagno girgensohnii-Piceetum*, decaying log, 2014.08.12 (PG 125/2014)
6. Forest section 165f, west of Jezioro Rzepiskowe Lake, 54.025114°N, 23.070396°E, MGRS: 34UFE3562288299, *Dryopteridi thelypteridis-Betuletum pubescentis*, decaying log, 2014.08.12 (PG 126/2014)
7. Forest section 165d, west of Jezioro Rzepiskowe Lake, 54.025349°N, 23.071592°E, MGRS: 34UFE3570088327, *Dryopteridi thelypteridis-Betuletum pubescentis*, decaying log, 2014.08.12 (PG 127/2014)
8. Forest section 165f, west of Jezioro Rzepiskowe Lake, 54.025531°N, 23.071295°E, MGRS: 34UFE3568088347, *Dryopteridi thelypteridis-Betuletum pubescentis*, decaying log, 2014.08.12 (PG 128/2014)
9. Forest section 165d, west of Jezioro Rzepiskowe Lake, 54.026336°N, 23.071080°E, MGRS: 34UFE3566388436, *Dryopteridi thelypteridis-Betuletum pubescentis*, decaying log, 2014.08.14 (PG 166/2014)

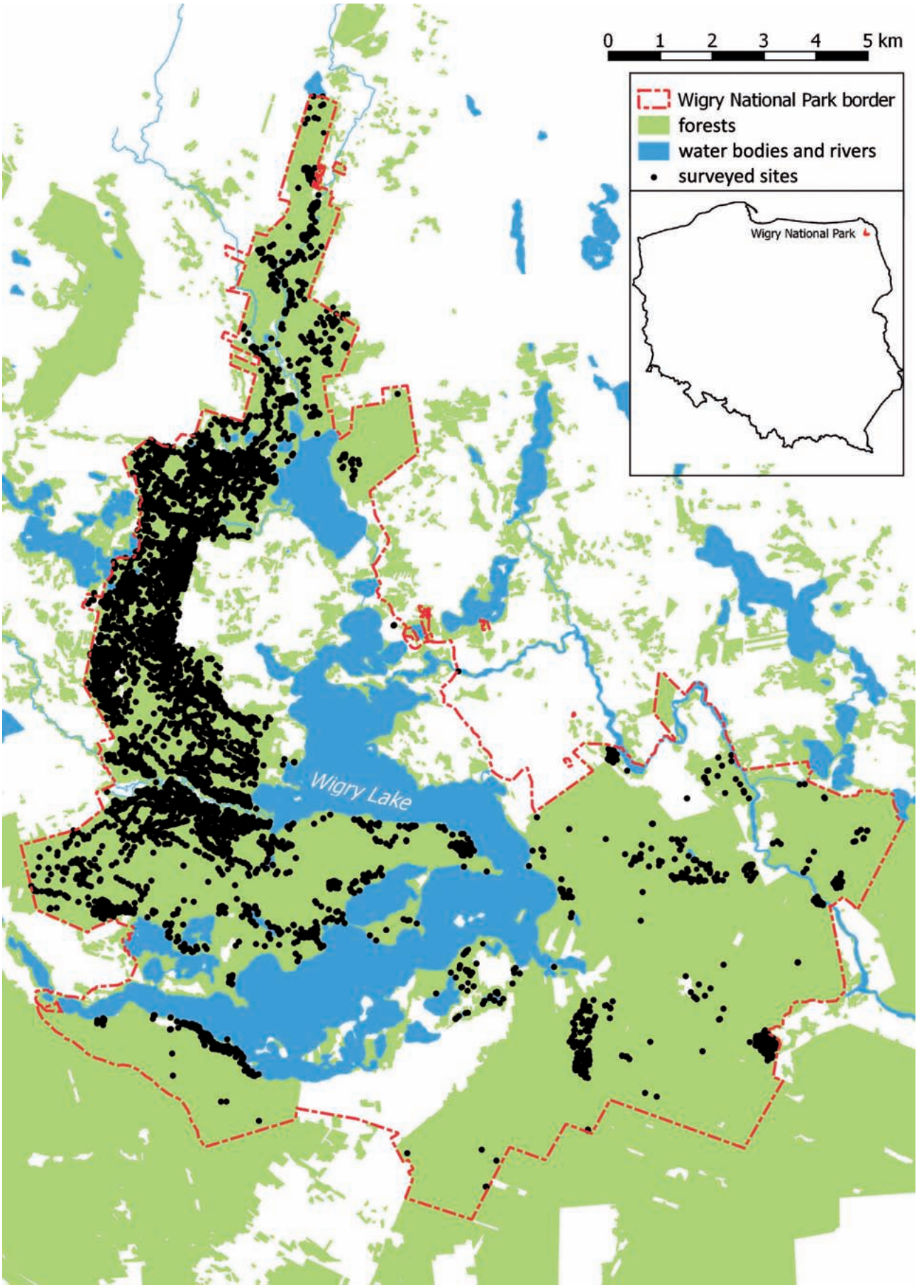

Fig. 2. Distributions of sites where liverworts were observed in the area of Wigry National Park

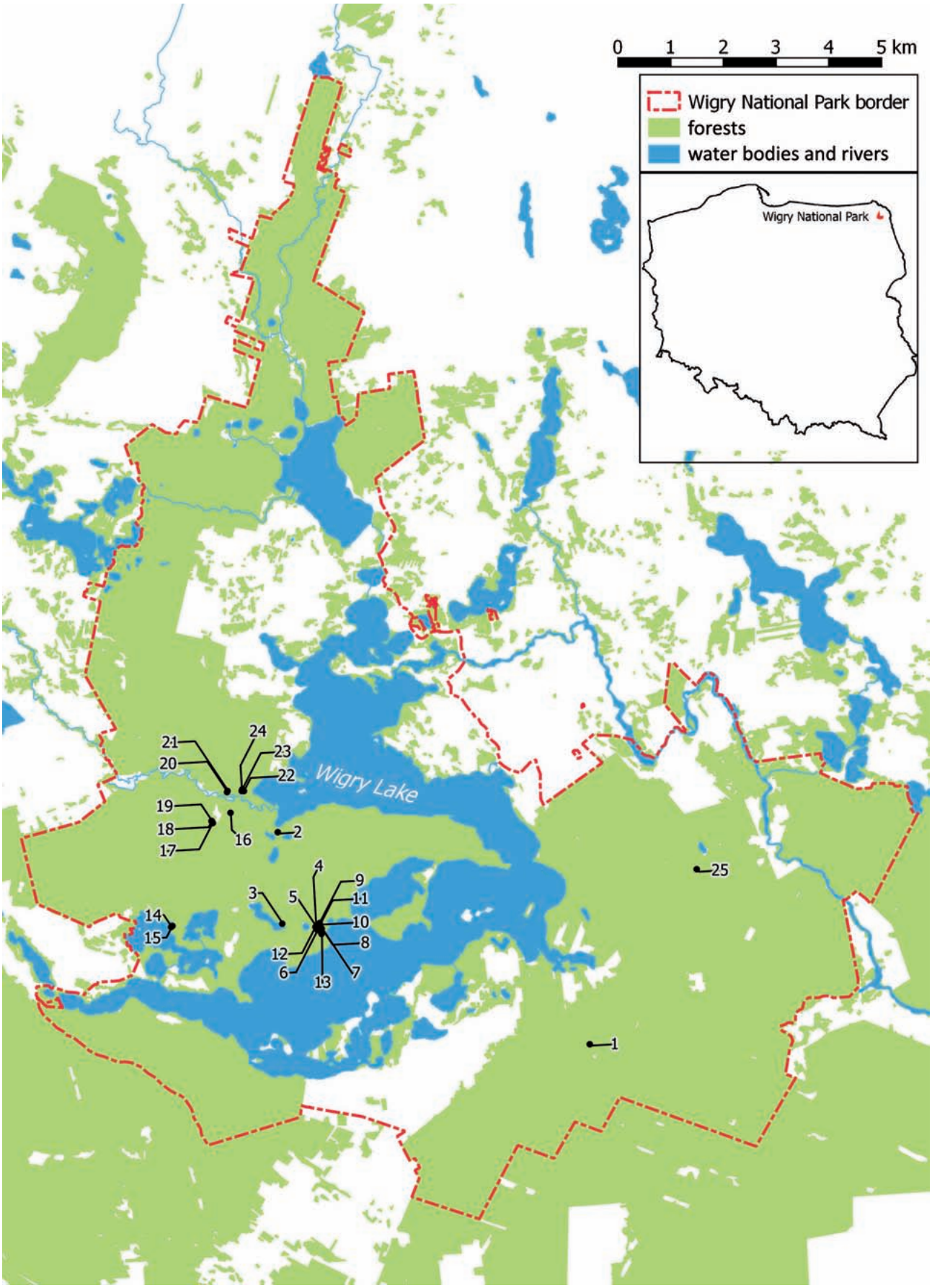

Fig. 3. Distribution of *Fuscocephaloziopsis catenulata* (Huebener) Váňa et L. Söderstr. in Wigry National Park (for details of the sites represented by nos 1–25 see list of localities)

10. Forest section 165f, west of Jezioro Rzepiskowe Lake, 54.026173°N, 23.071052°E, MGRS: 34UFE3566288418, *Dryopteridi thelypteridis-Betuletum pubescentis,* decaying log, 2014.08.14 (PG 167/2014)
11. Forest section 165f, west of Jezioro Rzepiskowe Lake, 54.026026°N, 23.071181°E, MGRS: 34UFE3567188402, *Dryopteridi thelypteridis-Betuletum pubescentis,* decaying log, 2014.08.14 (PG 168/2014)
12. Forest section 165d, west of Jezioro Rzepiskowe Lake, 54.025695°N, 23.069829°E, MGRS: 34UFE3558388362, *Sphagno girgensohnii-Piceetum,* decaying log, 2014.08.14 (PG 169/2014)
13. Forest section 165d, west of Jezioro Rzepiskowe Lake, 54.024448°N, 23.071449°E, MGRS: 34UFE3569388227, *Dryopteridi thelypteridis-Betuletum pubescentis,* decaying log, 2014.08.14 (PG 170/2014)
14. Forest section 134f, between Jezioro Muliczne Lake and Jezioro Długie Lake, 54.027097°N, 23.028083°E, MGRS: 34UFE3284488439, *Sphagno girgensohnii-Piceetum,* decaying log, 2014.08.15 (PG 171/2014)
15. Forest section 134f, between Jezioro Muliczne Lake and Jezioro Długie Lake, 54.027269°N, 23.028484°E, MGRS: 34UFE3287088459, *Sphagno girgensohnii-Piceetum,* decaying log, 2014.08.15 (PG 186/2014)
16. Forest section 129d, valley of the Czarna Hańcza river, south of the river, east of a peat-bog in the vally, 54.045976°N, 23.047148°E, MGRS: 34UFE3403290575, *Sphagno girgensohnii-Piceetum,* decaying log, 2014.07.07 (PG 8/2014)
17. Forest section 122o, valley of the Czarna Hańcza river, south of the river, 54.044394°N, 23.041853°E, MGRS: 34UFE3369190389, *Sphagno girgensohnii-Piceetum,* decaying log, 2015.07.28 (PG 19/2015)
18. Forest section 122o, valley of the Czarna Hańcza river, south of the river, 54.044755°N, 23.041590°E, MGRS: 34UFE3367290429, *Sphagno girgensohnii-Piceetum,* decaying log, 2015.07.28 (PG 22/2015)
19. Forest section 122o, valley of the Czarna Hańcza river, south of the river, 54.044752°N, 23.041511°E, MGRS: 34UFE3366790428, *Sphagno girgensohnii-Piceetum,* decaying log, 2015.07.28 (PG 24/2015)
20. Forest section 128a, valley of the Czarna Hańcza river, north of the river, 54.049525°N, 23.046467°E, MGRS: 34UFE3397690969, *Sphagno girgensohnii-Piceetum,* decaying log, 2015.07.29 (PG 53/2015)
21. Forest section 128a, valley of the Czarna Hańcza river, north of the river, 54.049725°N, 23.046640°E, MGRS: 34UFE3398790991, *Sphagno girgensohnii-Piceetum,* decaying log, 2015.07.29 (PG 54/2015)
22. Forest section 121d, valley of the Czarna Hańcza river, north of the river, near Zatoka Hańczańska, 54.049544°N, 23.051392°E, MGRS: 34UFE3429990980, *Sphagno girgensohnii-Piceetum,* decaying log, 2015.09.12 (PG 177/2015)
23. Forest section 121d, valley of the Czarna Hańcza river, north of the river, near Zatoka Hańczańska, 54.049852°N, 23.050927°E, MGRS: 34UFE3426791013, *Sphagno girgensohnii-Piceetum,* decaying log, 2015.09.12 (PG 178/2015)
24. Forest section 121d, valley of the Czarna Hańcza river, north of the river, est of synoptic weather station, 54.049574°N, 23.050734°E, MGRS: 34UFE3425690982, *Sphagno girgensohnii-Piceetum,* decaying log, 2015.09.12 (PG 180/2015)
25. Forest section 267c, 54.031748°N, 23.181000°E, MGRS: 34UFE4284489254, Area of Strict Protection (in Polish: Obszar Ochrony Ścisłej) "Parowy", between *Serratulo-Pinetum* and *Ribo nigri-Alnetum,* decaying log, 2015.09.08 (PG 116/2015).

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