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NATURAL AND HABITAT CONDITIONS OF MEADOW COMMUNITIES IN THE NORTHERN POLDER IN THE “UJŚCIE WARTY” NATIONAL PARK

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Abstract: Research on natural and functional values of grassy and reed phytocenoses in the “Ujście Warty” National Park in the Northern Polder, was carried out in 2013–2019. They showed that the formation of grass communities, their richness and floristic diversity, as well as natural and agricultural values, is mainly influenced by moisture, which results from the mosaic of habitats and the intensity of use. The aim of the study was to assess the floristic diversity, natural values and utility of grass communities in leasehold complexes in the “Ujście Warty” National Park in the Northern Polder in the Natura 2000 area. One of the methods of protection and renaturation of naturally valuable meadow communities is the introduction of extensive forms of mowing and pasture use. The aim of such activities is, among others, to improve floristic diversity and prevent unfavorable transformations of protoecosystems, especially in relation to areas covered by the Natura 2000 area. Single, annual mowing during the growing season, through the implementation of agri-environmental programs, does not cause significant changes in the botanical composition of the sward, but it is conducive to restoring the most valuable natural habitats as a potential habitat for bird species endangered on a national and European scale. The distinguished communities have a diversified economic and use value of Lwu ranging from 1.1 to 7.4, and some are wastelands. The calculated floristic diversity (H') is varied and ranges from 1.3 to 3.9, and the obtained yields are sm. range from 2.8 to 14.8 t·ha⁻¹.

Key words: communities grassy, biomass, national parks, wetlands, floristic composition, floristic diversity, natural values, utility value.

INTRODUCTION

The Ujście Warty National Park was established on July 1, 2001. It is located at the western border of Poland, in the part of the Toruń – Eberswald glacial valley, called the Gorzowska Valley, in the Kostrzyn retention reservoir (Lubuskie Voivodeship). Its area is 8074.0 ha and it is the youngest National Park in Poland. It is one of the most valuable ornithological areas in the country (Kałamucka 2009). It is one of the most attractive ecosystems with significant natural, utilitarian and cultural, recreational and even aesthetic values (Gotkiewicz 2014; Humphreys et

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al. 2014). Over 270 species of birds have been found in the area of the Park, of which 174 have been recognized as breeding birds so far. A dozen or so of them are listed in the Polish Red Book of Animals, e.g. bittern, shelduck, teal, little gull, and curlew. As one of the most valuable water and mud ecosystems in Poland, it is a major natural and tourist attraction. In 2004, the area of the entire National Park was covered by the RAMSAR convention and protection under the Natura 2000 "Warta Mouth" program with the PLC code 080001 and a special bird protection area – SPA and a special habitat protection area – SOO with an area of 33,297 ha were designated.

The Warta River flowing through the center of the Park divides it into two protection zones: the Northern Polder, located in the area of the Witnica commune – between Witnica and Dąbroszyn, apart from the embankment, where water level fluctuations are relatively small here, and a semi-natural floodplain on the southern bank of the Warta located in commune of Słońsk. The Northern Polder is separated from the direct influence of the Warta waters by a flood embankment built parallel to the river bed. As a result of drainage works carried out in the mid-twentieth century, the groundwater level was significantly lowered. In the 1980s and 1990s, as a result of many years of neglect in maintenance works, the capacity of drainage ditches, as well as the main receiver, the so-called "Old Warta" – basic melioration canal, activity of beavers, overgrowing ditches with rush vegetation, there was a lack of effective water drainage. In most meadows, the water level is relatively low throughout the growing season and they rarely occurred processes floodplains. This is undoubtedly changing thanks to the modernization and adaptation of the drainage infrastructure through the implementation of the Life 09 NAT/PL/000257 Project financed by the European Commission – LIFE+ and the National Fund for Environmental Protection and Water Management.

The area discussed in the study is a complex of wetlands, a mosaic of meadows, pastures, reeds and sedges. Plant communities occurring in the Park depend mainly on the humidity of the area and the type of soil. According to Mikołajczak et al. (2008) for agricultural purposes in the Park, meadow communities play an important role: great manna grass (*Glyceria maxima* Holmb), reed canary grass (*Phalaris arundinacea* L.) and creeping bent (*Agrostis stolonifera* L.). Abandonment of mowing or grazing meadows led to a rapid succession of rush communities and willow thickets, and to a significant reduction of many plant species in grassy and herbaceous communities, which resulted in a significant reduction in the number of some species of birds nesting in meadow conditions (Zarzycki and Korzeniak 2013). Therefore, maintaining extensive meadow and pasture management by mowing and grazing with cattle and horses, improving the quality of the natural environment, and in particular maintaining and restoring the condition of the most valuable natural habitats as a potential habitat for bird species endangered on a national and European scale, through the implementation of agricultural environmental (Humphreys et al. 2014) is the main goal and one of the most important tasks of the "Warta Mouth" National Park in the North Polder. Cows lived to see their holiday in the "Ujście Warty" National Park – "Cow Festival", to emphasize the great importance of extensive grazing in conservation.

Management on permanent grasslands is subject to certain restrictions, and many of the bans apply to all packages that include meadows and pastures (Wasilewski 2009). Thus, the main threat to wetland vegetation is changes in water conditions and the disappearance of mowing (Grzelak et al. 2021).

The scientific hypothesis was the assumption that areas mowed annually (at least once a year) retain a constant species composition over a longer period of time. On the other hand unmowed areas undergo unfavorable changes 331 in the species composition of the meadow sward, especially the appearance of grasses of low fodder value.

The aim of the study was to assess the floristic diversity, natural values and utility of grass communities in leasehold complexes in the "Ujście Warty" National Park in the Northern Polder in the Natura 2000 area.

MATERIAL AND METHODS

The results of geobotanical research from 2013–2019 conducted in the Natura 2000 area in the “Ujście Warty” National Park in the Northern Polder were subjected to scientific analysis. Exact research was carried out in the commune of Witnica in the area of two cadastral precincts: Krześniczka (240 and 243), with an area of 110.18 ha and Kamień Mały (787 parts) with an area of 97.16 ha and (791) with an area of 216.76 ha. On the above-mentioned plots, the method of use and the list of basic flora species were defined (Table 1). In total, about 170 phytosociological records were analyzed using the Braun-Blanquet (1951) method. Only patches (10 m × 10 m) with a clear dominance of the species characteristic of the community were selected for the study. The distinguished syntaxa were identified and classified into the phytosociological system according to Matuszkiewicz (2014) and the floristic differentiation of the distinguished communities was determined (Table 2), as well as the moisture differentiation of syntaxonomic units.

Plant samples were taken from an area of 1 m² from individual plots in 3 replications. Using the drying-weighing method, the percentage content of dry matter in the collected plant material was determined. The yield of dry matter was calculated by multiplying the yield of fresh matter by the percentage of DM in the sample and expressed in t per ha. On the basis of the species composition of the sward, the value in use was calculated according to Filipek’s scale (1973). Then, the meadow communities were subjected to natural valorization, in which the assessment of natural values was carried out on a 10-point scale: average valorization number, natural values and valorization class, according to the method of Oświt (2000) and on the basis of the floristic diversity index (H') by Shannon (1948).

Table 1. A summary of the area of plots and the method of use of the examined lease complexes of the Northern Polder in the “Ujście Warty” National Park

Itemization	Registration precinct		
	Krześniczka div. 240, 243	Kamień Mały div. 787 (part)	Kamień Mały div. 791
Surface	110.18 ha	97.16 ha	216.76 ha
Use – mowing AOB	package 5, variant 5.1	package 5, variant 5.1	package 5, variant 5.1

AOB – agri-environmental ornithological block.

RESULTS AND DISCUSSION

The species diversity of grassland ecosystems depends primarily on the diversity of habitat conditions. In the case of river valley ecosystems, the most significant factor that distinguishes them from others is the horizontal movement of water in the channel. Individual plant species are not arranged randomly, but form characteristic groupings, differing in habitat conditions, natural and utility values (Grzelak et al. 2022). An overview of the most important plant communities in the Northern Polder of the “Ujście Warty” National Park does not exhaust all possible teams and their groups. However, it gives some idea of the extraordinary natural diversity of the discussed riverside areas.

Species diversity

In the Northern Polder, according to the syntaxonomic classification, rush communities from the union dominate *Magnocaricion*: flooded large sedge grass rushes and meadow-rush vegetation and *Phragmition*: grassy rushes of stagnant and slow-flowing waters, developing in

places that are deeply and permanently flooded and flooded, as well as high and low rushes. In addition, vegetation of wet meadows and pastures from the *Agropyro-Rumicion* association is quite common in the Polder. *Agropyro-Rumicion crispi*, ruderal communities from the *Bidention union tripartite* and wet meadows partly marshy and flooded from the *Calthion union* and *Alopecurion pratensis* (Table 2).

Reed canary rush *Phalaridetum arundinaceae* (Grzelak 2004) dominates on all the studied plots, especially plot no. 787 in Kamień Mały, where the flood depth is quite significant and reaches 50–60 (100) cm. Its share in the yield is over 70%. It forms extensive patches of this community on flooded and heavily hydrated peat-mineral soils, also subject to drying in the summer period. Throughout the years of the study, despite annual mowing, no decrease in the share of rushes in the yield mass was found. A common community in the Polder is also poor in species manna rush (*Glycerietum maximae*). Large-area patches of this community often form a mosaic with sedge or grass rushes, overgrowing shallow places, near watercourses, or directly bordering them.

Meadow and reed vegetation is a periodically flooded marshy sedge with a shallow (<10 cm), low-intensity flooding, but also with a slight (20–30 cm) subsidence of groundwater in the summer. The most common is the *Caricetum* pointed sedge complex *gracilis*, found in organic soils. Reeds of this type are located in the marginal parts of the valley, on not very intensively flooded areas. In turn, from the community – *Caricetum acutiformis* and *Caricetum ripariae* occur most often within small eutrophic reservoirs, with *Caricetum acutiformis* always well-moistened, while *Caricetum ripariae* usually develops in places with long-term, deep flooding and with a much lower tendency to drop the groundwater level in the summer. The physiognomy of these two types of communities is very similar, in both it is one species of sedge forming stands, with a small admixture of other reed plants (Janyszek-Sołtysiak et al. 2021).

In the "Ujście Warty" National Park *Phragmites Australia* it is often found in patches of various sizes, creating high rush communities (Mikołajczak et al. 2007). The distinguished rushes proper of the *Phragmition* association belong to high communities with a small number of species (Table 2). Among the distinguished communities, the most typical form is *Phragmitetum australis typicum* and *Glycerietum maximae typicum*. Dominance of rushes from the *Phragmitetea* class in some areas of the Park, it affects the relative poverty of the flora of the National Park. Common reed *Phragmites dominates the community australis*, growing even in water to a depth of 1.5 m, often separating manna rushes from the watercourse, and with less intensity there is a broad-leaved cattail (*Typha latifolia*), narrow-leaved cattail (*Typha angustifoliae*) and numerous hydrophytes. Of the reed species, *Sparganium* has a greater share *erectum* and *Scirpetum lacustris* and *Rorippa amphibian*, taking up small areas. In the floristic composition of the *Eleocharitetum ensembles palustris* and *Equisetetum fluviatilis* species characteristic of the class *Phragmitetea* predominate.

Horsetail rush (*Equisetetum fluviatilis*) develops mainly in eutrophic, organic habitats with relatively shallow slow-flowing or stagnant waters, and the *Eleocharitetum rush palustris* is abundant in local depressions and is often submerged by surface waters.

Agropyro-Rumicion association is noteworthy *crisp*, which emphasizes the floodplain nature of these meadows. A community of creeping bentgrass (*Agrostis stolonifera*) occurs in places of long water retention. Its share increases with the end of the growing season, and its use very often depends on the humidity in a given year. Wet meadows are mainly phytocoenoses similar to foxtail meadows *Ranunculo repentis-Alopecuretum pratensis* with the meadow foxtail dominant in the sward (*Alopecurus pratensis*).

Arrhenatherion association occur infrequently within the borders of the discussed Polder. These are mostly non-hierarchical *Poa communities pratensis-Festuca rubra*, and some

patches can be classified as impoverished forms of the *Arrhenatheretum complex elatoris*. Small patches of herbaceous plants were also found within numerous springs from the *Philipendulion union* with dominant meadowsweet (*Filipendula ulmaria*), with the participation of species from the *Calthion alliance* – mainly *Scirpus sylvaticus*.

Fresh meadows are subject to unfavorable transformations and disappearance as a result of opposing processes related to changes in land use.

Analysis of floristic diversity

Analyzing the number of species in the distinguished communities, the largest number was recorded in the association *Magnocaricion* (Table 2), in the *Phalaris association arundinacea typicum*, in which the share of grasses is as much as 83.2% and is higher only in *Phalaris arundinacea typicum* var. *Glycerietosom maximae*, a least in *Eleocharitetum palustris* and *Equisetetum fluviatilis*. In most communities, the presence of cultivated grasses and legumes was not recorded (Table 2). The smallest number of sedges was found in the *Polygonum association hydropipe typicum* var. *Phalaris arundinacea*, only 2.1% and *Phragmitetum australis typicum* var. *Typha latifoliae* 2.3%. Herbs and weeds are a group of plants found in all bands but *Magnocaricion* the largest % share is recorded in *Phalaris arundinacea* var. *Urtica dioica* (35.1%), and in *Phragmition* in *Typhetum latifoliae* (77.3%) and *Scirpetum lacustris* (71.7%). A significant percentage of the crop weight is made up of herbs and weeds found on elevated surfaces. They have a varied floristic composition, playing a significant role in the nutrition of ruminants.

Table 2. Phytosociological classification and floristic diversity of featured communities in the “Ujście Warty” National Park

Assemblage plants Plant community	Number of plants species	Herbaceous <i>Monocotyledonous</i>		Dicotyledons <i>Dicotyledonous</i>	
		grasses	sedges and others	Legumes (<i>Fabaceae</i>) <i>Papilionaceae</i> and <i>Leguminosae</i>	herbs and weeds
Ch. All., Ass. <i>Magnocaricion</i>					
Ch. Ass. Rushes grassy flooded					
<i>Phalaris arundinacea typicum</i>	32	83.2	3.9	0.0	12.8
var. – with <i>Glycerietosom maximae</i>	28	86.8	8.9	0.0	4.3
var. – with <i>Caricetosum gracilis</i>	24	65.7	27.9	0.0	6.4
var. – with <i>Alopecuretum pratensis</i>	28	79.8	12.3	0.0	7.9
var. – with <i>Urtica dioica</i>	33	58.4	2.6	3.9	35.1
Ch. Ass. Meadow and rush vegetation					
<i>Caricetum gracilis typicum</i>	24	13.8	73.7	0.0	12.5
var. – with <i>Glyceria maxima</i>	32	33.6	57.8	0.0	8.6
<i>Caricetum acutiformis</i>	17	5.9	77.8	0.0	9.2
<i>Caricetum ripariae</i>	14	18.9	87.3	0.0	7.8
Ch. All., Ass. <i>Phragmition</i>					
Ch. Ass. Rush of stagnant or slowly flowing waters					
<i>Phragmitetum australis typicum</i>	16	75.8	4.8	0.0	19.4
var. – with <i>Typha latifoliae</i>	13	66.7	2.3	0.0	31.0
<i>Glycerietum maximae typicum</i>	16	59.9	15.8	0.0	24.3
var. – with <i>Agrostis stolonifera</i>	21	73.4	3.8	2.3	20.5
<i>Typhetum latifoliae</i>	7	4.8	17.9	0.0	77.3
<i>Typhetum anquistifoliae</i>	12	28.8	7.6	19.9	43.7
<i>Scipetum lacustris</i>	11	13.8	7.6	6.9	71.7

Assemblage plants Plant community	Number of plants species	Herbaceous <i>Monocotyledonous</i>		Dicotyledons <i>Dicotyledonous</i>	
		grasses	sedges and others	Legumes (<i>Fabaceae</i>) <i>Papilionaceae</i> and <i>Leguminosae</i>	herbs and weeds
High rush					
<i>Equisetum fluviatilis</i>	7	11.8	15.6	0.0	72.6
Low rush					
<i>Eleocharitetum palustris</i>	6	25.6	14.7	9.8	40.9
Ch. All., Ass. <i>Agropyro-Rumicion crispi</i>					
Wet meadows and pastures					
cong. <i>Agrostis stolonifera</i>	23	67.3	2.9	4.3	25.5
Ch. All., Ass. <i>Bidention tripartite</i>					
A ruderal community of banks and ditches	11	29.9	09	6.7	62.5
<i>Polygonum hydropipe typicum</i>	16	16.7	4.3	8.5	70.5
var. – with <i>Rumex crispus</i>	14	56.7	2.1	8.8	32.4
var. – with <i>Phalaris arundinacea</i>					
Ch. All., Ass. <i>Calthion</i>					
Wet meadows partly swampy					
<i>Scirpetum sylvatica</i>	19	16.7	5.8	7.9	69.6
Ch. All., Ass. <i>Alopecurion pratensis</i>					
Flooded meadow					
<i>Alopecuretum pratensis</i>	29	45.8	13.7	11.6	28.9

Natural values

The phytosociological diversity of the studied meadow areas influenced their natural values, which was reflected, among others, in the number of recorded plant species and the value of the valorization index (Table 3). The highest average valorization number was characteristic of rushes communities of stagnant and slow-flowing waters from the *Phragmition* from 3.7 to 4.3. These communities were also characterized by a high valorization class from VIIC to VIIC, which, according to the assessment of Oświt (2000), means that they are communities of high natural value, with the exception of rushes *Caricetum gracilis typicum* var. *Glyceria maxima*.

Low natural values and low valorization class calculated for *Scirpetum sylvatici* – 1.4 and for the *Equisetetum community fluviatilis* – 1.3. The other distinguished communities have moderate natural values. Some of them form quite monotonous aggregations of one species, as in the case of the *Phalaris community arundinacea* (Grzelak 2004). Among others, there are communities of little structural diversity, with water-loving and hydrophilic vegetation with aquatic and rush species, but also multi-species communities. The vegetation of these communities is often naturally developed from various classes (Grzelak and Bocian 2006). Due to the natural or semi-natural nature of the habitats, these communities are distinguished by the richness of flora and fauna, although some patches are characterized by species poverty and facies diversity in the form of almost single-species clusters of only some species. An exception is the multi-species community of *Equisetum* marsh horsetail *fluviatile*, as noted by Żukowski and Jackowiak (1995).

The sward of some communities, as the anthropogenic pressure decreases, is characterized by greater natural values, which was noticed by Grzelak and Bocian (2006). They can be a source of obtaining herbal plants, as well as a benefit for bees (Sawicki 2006), and having a specific microclimate and natural landscape values, they create recreational and tourist opportunities (Trzaskoś et al. 2002).

Table 3. Natural values of the identified plant communities

Assemblage plants Plant community	Average valorization number mean evaluation number	Natural qualities	Class valorization evaluation category	H'
Ch. All., Ass. <i>Magnocaricion</i>				
Ch. Ass. Rushes grassy flooded				
<i>Phalaris arundinacea typicum</i>	3.2	great moderate	VI(B)	3.4
var. – with <i>Glycerietosum maximae</i>	3.5	great	VII(C)	3.2
var. – with <i>Caricetosum gracilis</i>	3.4	great moderate	VI(B)	2.9
var. – with <i>Alopecuretum pratensis</i>	3.2	great moderate	VI(B)	3.3
var. – with <i>Urtica dioica</i>	3.2	great moderate	VI(B)	2.1
Meadow and rush vegetation				
<i>Caricetum gracilis typicum</i>	4.2	very high	VIII(C)	1.5
var. – with <i>Glyceria maxima</i>	3.7	great	VII (c)	1.7
<i>Caricetum acutiformis</i>	4.1	very high	VIII(C)	1.9
<i>Caricetum ripariae</i>	4.2	very high	VIII(C)	1.3
Ch. All., Ass. <i>Phragmition</i>				
Ch. Ass. Rush of stagnant or slowly flowing waters				
<i>Phragmitetum australis typicum</i>	4.2	very large	VIII(C)	1.5
var. – with <i>Typha latifoliae</i>	4.1	very large	VIII(C)	1.3
var. – with ssp. <i>Artemisietea</i>	3.7	large	VII(C)	2.7
<i>Glycerietum maximae typicum</i>	3.7	large	V(B)	1.6
var. – with <i>Agrostis stolonifera</i>	4.3	very large	VIII(C)	1.9
<i>Typhetum latifoliae</i>	3.7	large	VII(C)	1.3
<i>Typhetum anquistifoliae</i>	4.0	very large	VIII(C)	2.6
Rush high				
<i>Equisetum fluviatilis</i>	3.8	large	VII(C)	1.3
Rush short				
<i>Eleocharitetum palustris</i>	3.3	average moderate	VI(B)	2.9
Ch. All., Ass. <i>Agropyro-Rumicion crispi</i>				
Wet meadows and pastures				
<i>Agrostis stolonifera</i>	3.5	great	VII(C)	2.5
Ch. All., Ass. <i>Bidention tripartite</i>				
A ruderal community of banks and ditches				
<i>Polygonum hydropiper typicum</i>	3.8	great	VII(C)	–
var. – with <i>Rumex crispus</i>	2.8	average moderate	V(B)	–
var. – with <i>Phalaris arundinacea</i>	2.8	average moderate	V(B)	–
Ch. All., Ass. <i>Calthion</i>				
Wet meadows partly swampy				
<i>Scirpetum sylvatica</i>	2.6	moderate	IV(B)	1.4
Ch. All., Ass. <i>Alopecurion pratensis</i>				
Flooded meadow				
<i>Alopecuretum pratensis</i>	3.6	great	VII(C)	3.9

H' – Floristic diversity index according to Shannon-Wiener; Shannon-Wiener floristic diversity index

Economic and utility value

The distinguished communities show not only diverse natural values, but also diverse economic and utility value. Excessive moisture of most habitats in the study area results in the fact that most of the naturally valuable communities have poor or mediocre sward value, and only a few are good (Table 4). Communities developed in optimal habitat conditions and sustainable use are characterized by high yields. They include a high-yielding community dominated by *Phragmites australis*, *Phalaris arundinacea*, *Glyceria maxima* and *Alopecurus pratensis*, yielding re-

spectively: 8.2–14.8; 7.0–11.0; 6.4–9.8; 5.9–6.2 (t·ha⁻¹). High but little lower yielding characterizes myself vegetation meadow and rush. Communities these according to the number of use value Lwu (Filipek 1973), they usually have a small use value.

The moisture conditions of the communities in question, characterized by plant indices using the phytoindication method, indicate habitats with a high mosaic of moisture conditions, which ranged from highly humid, wet, marshy and even water, and only communities with the dominance of *Alopecurus pratensis* was counted as fresh.

Table 4. Moisture content variability of syntaxonomic units and yield and utilitarian value number of natural plants communities

Assemblage plants Plant community	Humidity habitat	Crop Yield (t·ha ⁻¹ DM)	Uvn	Value of sward
Ch. All., Ass. <i>Magnocaricion</i>				
Ch. Ass. Rushes grassy flooded				
<i>Phalaris arundinacea typicum</i>	strongly moist and strongly wet moist and wet	7.0–11.0	6.8	good
var. – with <i>Glycerietosum maximae</i>				
var. – with <i>Caricetosum gracilis</i>				
var. – with <i>Alopecuretum pratensis</i>				
var. – with <i>Urtica dioica</i>				
Meadow and rush vegetation				
<i>Caricetum gracilis typicum</i>	swampy, withered borderlands occasionally drying	5.1–7.9	2.5	poor
var. – with <i>Glyceria maxima</i>		5.0–6.9	1.9	
<i>Caricetum acutiformis</i>		5.4–8.8	1.7	
<i>Caricetum ripariae</i>		4.0–5.8	1.8	
Ch. All., Ass. <i>Phragmition</i>				
Ch. Ass. Rush of stagnant or slowly flowing waters				
<i>Phragmitetum australis typicum</i>	strongly moist	8.2–14.8	1.1	poor
var. – with <i>Typha latifoliae</i>				
var. – with ssp. <i>Artemisietea</i>	swampy, periodically drained occasionally drying	6.4–9.8	2.8	poor
<i>Glycerietum maximae typicum</i>				
var. – with <i>Agrostis stolonifera</i>				
<i>Typhetum latifoliae</i>	water aquatic	–	2.0	poor
<i>Typhetum anquistifoliae</i>				
Rush high			1.6	poor
<i>Equisetum fluviatilis</i>	wet	2–8	2.2	poor
Rush short				
<i>Eleocharitetum palustris</i>	strongly moist	4.7	1.8	poor
Ch. All., Ass. <i>Agropyro-Rumicion crispi</i>				
Wet meadows and pastures	wet	5.2		good
<i>Agrostis stolonifera</i>				
Ch. All., Ass. <i>Bidention tripartiae</i>				
Ruderal reservoirs, banks and ditches				
<i>Polygonum hydropiper typicum</i>	strongly moist and wet	–	–	wet moderate
var. – with <i>Rumex crispus</i>		–		average
var. – with <i>Phalaris arundinacea</i>		6.4		moderate
Ch. All., Ass. <i>Calthion</i>				
Wet meadows partly swampy				
<i>Scipetum sylvatica</i>	wet	4.6	3.0	mediocre
Ch. All., Ass. <i>Alopecurion pratensis</i>				
Flooded meadow				
<i>Alopecuretum pratensis</i>	fresh	5.8–6.2	7.4	good

Uvn – number values usable sward according to Filipek.

CONCLUSIONS

The floristic composition of grass communities is the result of improper use and indicates the need to take action to stop their processes degradation. The formation of grass communities, their richness and floristic diversity, as well as natural and agricultural values are mainly influenced by moisture, which results from the mosaic nature of habitats, and the intensity of their use. Excessive humidity of the majority of habitats in the study area results in the fact that most of the naturally valuable communities have a mediocre economic and utility value, and some are wastelands. Plant communities in the Park are characterized by high biodiversity. The large diversity of the cover is evidenced by numerous plant associations, which are largely natural. Grass and rush communities in the valleys of the Noteć Leniwa and Bystra rivers represent diverse natural values, creating valuable ecosystems of great landscape value. The calculated floristic diversity (H') is varied and ranges from 1.3 to 3.9, and the economic and utility value of the researched areas depends mainly on the conditions and varied use, as evidenced by the DM yields obtained (from 2.8 to 14.8 t·ha⁻¹) and a Lwu value of (1.1 to 7.4).

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NATURALNE UWARUNKOWANIA PRZYRODNICZO-GOSPODARCZO-SIEDLISKOWE ZBIOROWISK ŁĄKOWYCH NA POLDERZE PÓŁNOCNYM W PARKU NARODOWYM „UJŚCIE WARTY”

Streszczenie. Badania walorów przyrodniczych i użytkowych zbiorowisk trawiastych i szuwaro-wych w Parku Narodowym „Ujście Warty” na Polderze Północnym przeprowadzone zostały w latach 2013–2019. Wykazały one, że na wykształcanie się zbiorowisk trawiastych, ich bogactwo i różnorod-ność florystyczną, walory przyrodnicze oraz rolnicze istotny wpływ ma przede wszystkim uwilgotnie-nie, które wynika z mozaikowości siedlisk i intensywności użytkowania. Celem pracy była ocena zróżnicowania florystycznego, walorów przyrodniczych oraz użytkowych zbiorowisk trawiastych na kompleksach dzierżawnych w Parku Narodowym „Ujście Warty” na Polderze Północnym na obszarze Natura 2000. Jednym ze sposobów ochrony i renaturyzacji cennych przyrodniczo zbiorowisk łąko-wych jest wprowadzanie ekstensywnych form użytkowania kośnego i pastwiskowego. Taki sposób

działania ma poprawić różnorodność florystyczną oraz zapobiec niekorzystnym przekształceniom prądów, zwłaszcza w odniesieniu do obszarów włączonych do sieci Natura 2000. Jednokrotne, coroczne koszenie w okresie wegetacyjnym, poprzez realizację programów rolno-środowiskowych, nie powoduje istotnych zmian w składzie botanicznym runi, ale sprzyja przywracaniu najcenniejszych siedlisk przyrodniczych jako potencjalnego miejsca bytowania zagrożonych w skali krajowej i europejskiej gatunków ptaków. Wyróżnione zbiorowiska mają zróżnicowaną wartość gospodarczą i użytkową Lwu, wynoszącą od 1,1 do 7,4, a niektóre są nieużytkami. Wyliczona różnorodność florystyczna (H') jest zróżnicowana i wynosi od 1,3 do 3,9, a uzyskiwane plony s.m. wynoszą od 2,8 do 14,8 t·ha⁻¹.

Słowa kluczowe: zbiorowiska trawiaste, biomasa, parki narodowe, tereny podmokłe, skład florystyczny, różnorodność florystyczna, walory przyrodnicze, wartość użytkowa.