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European Habitats and their status in surroundings of Lake Žuvintas

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The distribution, characteristics, and status of habitat types listed in Annex I of EU Habitats Directive, occurring in the vicinities of Lake Žuvintas, are discussed. In the study territory, 12 types of freshwater, grassland, mire and woodland habitats were found, with the total area of 5561.45 ha. The plant communities occurring within these habitats represent 8 syntaxonomic classes. Anthropogenic changes of vegetation structure were observed in 82.1% of habitat sites. Disturbance of hydrological regime was recognized as the main reason of habitat transformation. The habitats were also greatly impacted by eutrophication and management changes, while the impact of peat extraction and fires was not so important. Recommendations for habitat protection and restoration are proposed.

Key words: European habitats, plant communities, favourable conservation status, anthropogenic change, management, Žuvintas Biosphere Reserve

INTRODUCTION

The EU Habitats Directive[1] with its Annexes (particularly Annex I[2] and Annex II[3]) and the EU Birds Directive[4] are the most important legal acts which have to guarantee the protection of biodiversity in the member states of the European Union. These acts provide the background for establishing Special Areas of Conservation (SACs) and Special Protected Areas (SPAs), which all together form the European network of nature conservation (NATURA 2000).

The Žuvintas Biosphere Reserve is one of the NATURA 2000 territories, which has been established in order to provide a favourable conservation status (FCS) for the following habitat types listed in Annex I of the Habitats Directive: *3140 Hard oligo-mesotrophic waters with benthic vegetation of Chara spp., 3160 Natural dystrophic lakes and ponds, 6410 Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae), 6430 Hydrophilous tall herb fringe communities of platins, 6450 Northern boreal alluvial meadows, 6510 Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis), 7110 Active raised bogs, 7120 Degraded raised bogs still capable of natural regeneration, 7140 Transition mires and quaking bogs, 7160 Fennoscandian mineral-rich springs and spring fens, 7230 Alkaline fens, 9050 Fennoscandian herb-rich forests with Picea abies, 9080 Fennoscandian deciduous swamp woods, 9160 Sub-Atlantic and medio-European oak or oak-hornbeam forests of the Carpinion betuli, 91D0 Bog woodlands, 91E0 Alluvial forests***.** The following species listed in Annex II of the Habitats Directive have been found present in the territory: two animal species (*Hypodryas maturna, Lutra lutra*) and two plant species (*Liparis loeselii, Saxifraga hirculus*)[5]**.**

The establishment process of NATURA 2000 territories is mostly an issue of the state politics and administration. Nevertheless, the selection of potential territories should be based on the scientific expertise, as defined in Article 4 of the Habitats Directive. The results of scientific investigations are also important for defining the FCS parameters, indicators and thresholds for natural habitat types and species.

The aim of the present research was to evaluate the conservation status of European natural habitats in particular areas of the Žuvintas Biosphere Reserve, to ascertain their diversity, areas and distribution and to reveal their disturbances and hazards.

Such local evaluations of the habitat conservation status provide important information which can serve as a basis for the estimation of Favourable Conservation Status of European habitat types on the country level, as well as on the level of a biogeographic region.

[1] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

[2] Natural habitat types of community interest, whose conservation requires the designation of special areas of conservation.

[3] Animal and plant species of community interest, whose conservation requires the designation of special areas of conservation.

[4] Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds.

[5] The Orders of Minister of Environment of the Republic of Lithuania No. D1-223, April 29, 2004, and No. D1-302, June 15, 2005.

MATERIALS AND METHODS

Field investigations of habitats were performed in June and July 2005. The study territory covered the Žuvintas Strict Nature Reserve and the neighbouring territories of the Žuvintas Biosphere Reserve, except Bukta forest. According to the administrative division of Lithuania, the study territory included the Alytus and Lazdijai municipalities of Alytus County and the Marijampolė municipality of Marijampolė County. Some investigation areas were pre-selected according to the unpublished data on potential sites of European habitats, which was stored at the Žuvintas Biosphere Reserve. The distribution of other sites with a high biodiversity was also taken into account.

During the field investigations:

I. Identification of habitat types has been ascertained. The habitat types included into Annex I of EU Habitats Directive (hereafter European habitats) were identified according to their general characteristics and typical species (Anonymous, 1995; Rašomavičius, 2001).

II. Connections among the habitat types and the plant communities occurring within these habitats have been defined. The plant communities were described using J. Braun-Blanquet approach to vegetation survey and classification (Braun-Blanquet, 1964).

III. European habitats were mapped and their areas calculated. The habitat boundaries were ascertained during field trips using orthophoto maps and the GPS point data. The digital map layers of habitats were compiled and the areas were calculated using ESRI ArcGIS software.

IV. The status of habitats was evaluated according to the untypical habitat characteristics and indicators of anthropogenic impact. Habitat stability was estimated using the following scale:

1) stable – habitats with no indicators of anthropogenic impact. Large-scale changes of habitat quality and area are not expected in the next 10 years, if the current conditions remain;

2) relatively stable – habitats with indications of a minor anthropogenic impact. If the current conditions remain, minor negative changes of habitats can occur in 10 years;

3) unstable – habitats with indications of a moderate to major anthropogenic impact. If the current conditions remain, significant negative changes of habitats can occur and their area can decrease in 10 years;

4) threatened – habitats with indications of a major anthropogenic impact. If the current conditions remain, the area of habitats can decrease significantly or transform into other types in 10 years.

DISCUSSION

1. European habitat types in surroundings of Lake Žuvintas

In the surroundings of Lake Žuvintas, 67 sites were identified as matching the criteria of European habitats. They represent 12 types of freshwater, grassland, mire and woodland habitats (Table 1). The majority of European habitat sites concentrate in the territory of Žuvintas Strict Nature Reserve (Fig. 1.). However, some sites were found in the other zones of Žuvintas Biosphere Reserve, including Kiaulyčia botanical-zoological reserve and Liepakojai botanical reserve, as well as in the ecologic protection priority zones. The total area of European habitats covers 5561.45 ha. The area of different habitats varies from 0.36 ha to 1855.49 ha (Table 1).

The distinguishing of *7110 Active raised bogs* and *91D0 Bog woodland* was the most difficult step in habitat type interpretation and site identification, mainly because of: a) lack of distinctive identification criteria, b) transitional character of both habitat types, c) anthropogenic changes of species composition and particularly structure. The intensifying succession of plant communities, induced by disturbance of the hydrological regime of the mires, has been revealed in a more or less intensive growth of shrubs and trees. Such overgrown sites are usually ascribed to bog woodland habitats. However, the impact of draining and the subsequent expansion of ligneous vegetation are uneven in different sites of a raised bog. In extensively drained sites, *7110 Active raised bogs* have transformed into a dense bog woodland (*Ledo-Pinetum sylvestris*) with closed canopies (coverage 60–90%) and a particularly thick layer of semi-shrubs (coverage 80–95%), where *Ledum sylvestris* usually dominates. Such sites should be ascribed to the *91D0 Bog woodland*.

Other bog sites are characterised by a sparse tree layer dominated by ecological forms of *Pinus sylvestris*,

Table 1. **Area occupied by European habitats in Lake Žuvintas surroundings**

Habitat type group	Habitat type	Area of habitat type (ha)
Freshwater habitats	3160 Natural dystrophic lakes and ponds	0.8
Meadow habitats	6410 Molinia meadows on calcareous, peaty or clayey-silt-laden soils	13.37
	6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	0.36
	6450 Northern boreal alluvial meadows	55.24
	6510 Lowland hay meadows	7.36
Mire habitats	7110 *Active raised bogs	1855.49
	7140 Transition mires and quaking bogs	375.52
	7160 Fennoscandian mineral-rich springs and springfens	2.74
	7230 Alkaline fens	59.6
Woodland habitats	9080 *Fennoscandian deciduous swamp woods	420.54
	91D0 *Bog woodland	2771.23

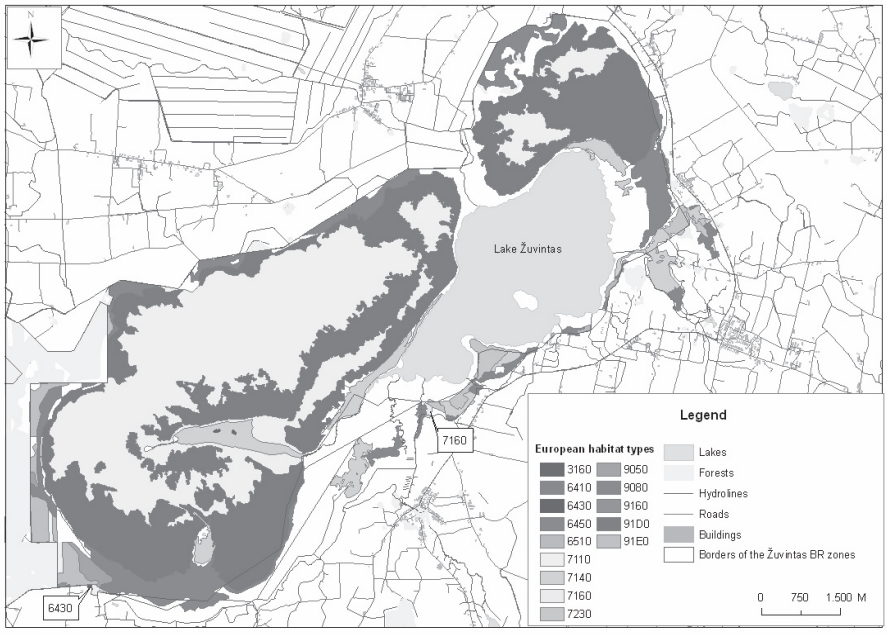

Fig. 1. Distribution of European habitat types in Lake Žuvintas surroundings

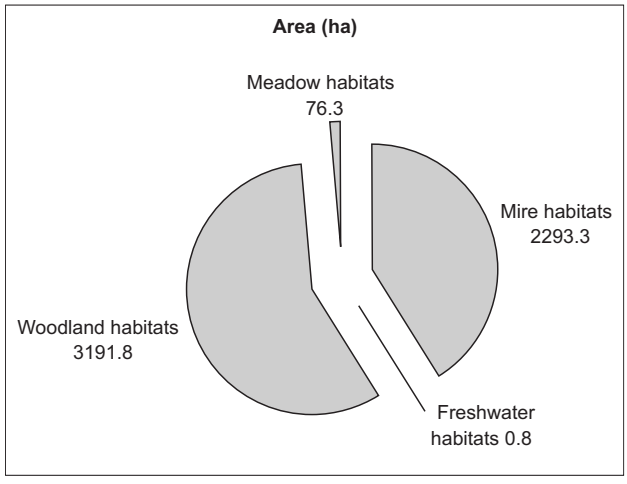

Fig. 2. Areas (ha) occupied by groups of European habitat types in Lake Žuvintas surroundings

which are typical of open raised bogs. Only some trees show an intensive growth at such sites, which also have a lower density of semi-shrub vegetation (coverage below 60%). *Ledum palustris* is absent or not abundant, and its coverage does not exceed 10%. Hummock vegetation is represented by communities of *Sphagnetum magellanici* Sukopp 1959 ex Neuhäusl 1969. These sites include also hollows devoid of *Calluna vulgaris* and *Ledum palustre* and dominated by the communities of *Rhynchosporion albae* W. Koch 1926. Such semi-open sites have been identified as *7110 Active raised bog* habitats. Hence, presence of a tree layer cannot be the main criterion for distinguishing bog woodland and active raised bog habitats, because the specific ecologic forms of *Pinus sylvestris* are also characteristic of natural raised bogs (Weber, 1902). Successful identification of these habitat types is possible only after a thorough evaluation of different habitat characteristics, e. g., the coverage of trees, presence of different *Pinus sylvestris* ecologic forms, density and species composition of semi-shrub layer, distribution of microrelief forms and their vegetation. This approach has been used for identification of active raised bogs and bog woodland habitats which prevail in the surroundings of Lake Žuvintas.

Woodland habitats cover the largest area in the study territory (Table 1, Fig. 2), but the grasslands and mires harbour the largest number of habitat types. All the woodland habitats are developed in sites with a high groundwater level. Though mire and grassland habitats are represented by the equal number of types, the area covered by grasslands is particularly small. In the surroundings of Lake Žuvintas, relatively natural grasslands have survived only in the lowest and wettest areas where farming conditions are unfavourable.

2. Vegetation diversity in the European habitat types of surroundings of Lake Žuvintas

Plant communities occurring in the surroundings of Lake Žuvintas are quite diverse. They represent 8 vegetation classes: *Utricularietea intermedio-minoris* Den Hartog et Segal 1964 em. Pietsch 1965, *Oxycocco-Sphagnetea* Br.-Bl. et R. Tx. 1943, *Scheuchzerio-Caricetea nigrae* (Nordhagen 1936) R. Tx. 1937, *Phragmito-Magnocaricetea* Klika in Klika et Novák 1941, *Molinio-Arrhenatheretea elatioris* R. Tx. 1937, *Galio-Urticetea* Passarge ex Kopecky 1969, *Alnetea glutinosae* Br.-Bl. et R. Tx. 1943, and *Vaccinio-Piceetea* Br.-Bl. in Br.-Bl. et al. 1939 (Table 2).

Forest habitats cover the largest area (Fig. 2), but include a limited number of plant communities (Table 2). *91D0 Bog woodland* is dominated by *Ledo-Pinetum sylvestris*. Large areas of these communities surround the habitats of *7110 Active raised bogs* or form islands and belts within open bog areas. *Ledo-Pinetum sylvestris* is replaced by communities of *Vaccinio uliginosi-Pinetum* in bog complex areas affected by draining ditches. Narrow belts of *Vaccinio uliginosi-Betuletum pubescentis* Libbert 1933 form in the transition area between *91D0 Bog woodland* and *9080 Fennoscandian deciduous swamp woods*. The recent habitat type is usually represented by the communities of *Carici elongatae-Alnetum*, which usually develop in slightly drained laag areas.

Table 2. **Plant communities occurring in European habitats in Lake Žuvintas surroundings**

Habitat type code	Plant communities occurring in the habitat type
3160	Ass. *Sphagnetum cuspidato-denticulati* R. Tx. et v. Hübschmann 1958 hoc loco
6410	Ass. *Molinietum caeruleae* W. Koch 1926
6430	Ass. *Urtico-Aegopodietum podagrariae* R. Tx. ex Görs 1968
6450	Ass. *Caricetum distichae* (Steffen 1931) Jonas 1933; Ass. *Peucedano-Calamagrostietum canescentis* Weber 1978; Ass. *Phalaridetum arundinaceae* (W. Koch 1926) Libbert 1931
6510	All. *Calthion palustris* R. Tx. 1937 em. Lebrun et al. 1949; All. *Alopecurion pratensis* Passarge 1964; All. *Molinion caeruleae* W. Koch 1926
7110*	Ass. *Sphagnetum magellanici* Sukopp 1959 ex Neuhäusl 1969; Ass. *Sphagno tenelli-Rhynchosporetum albae* Osvald (1923) em. Dierssen 1982
7140	Ass. *Caricetum lasiocarpae* Osvald 1923 em. Dierssen 1982; Ass. *Scorpidio-Caricetum diandrae* Osvald 1923; Ass. *Sphagno-Caricetum rostratae* Osvald 1923 em. Steffen 1931; *Sphagnum fallax – Eriophorum angustifolium* communities
7160	Ass. *Caricetum nigrae* Braun 1915
7230	Ass. *Caricetum paniceo-lepidocarpae* W. Braun 1968
9080*	Ass. *Carici elongatae – Alnetum* W. Koch 1926 ex R. Tx. 1937
91D0*	Ass. *Ledo-Pinetum sylvestris* R. Tx. 1955; Ass. *Vaccinio uliginosi-Pinetum sylvestris* (Hueck 1925) Kleist 1929

Open mire habitats are notable for a large diversity of plant communities, which is determined by different hydrological and trophic conditions in the sites. However, each habitat type includes a rather small set of communities. *7110 Active raised bogs* consist mostly of *Sphagnetum magellanici* and *Sphagno tenelli-Rhynchosporetum albae*. These communities form a mosaic which reflects the differences of ecological conditions on particular forms of micro-relief. The area ratio among different community types depends on the habitat quality. In more intensively drained outskirts of the raised bog, hummocks usually dissolve among each other and dominate the habitat. The *Sphagnetum magellanici* communities prevail in such sites. The central areas of the raised bog are less affected by draining; therefore the hollows are more abundant and larger. Hollows are usually covered with *Sphagno tenelli-Rhynchosporetum albae* communities.

7140 Transition mires and quaking bogs are dominated by the *Caricetum lasiocarpae* and *Scorpidio-Caricetum diandrae*. These communities cover large areas in various parts of the raised bog. The *Sphagno-Caricetum rostratae* and the *Sphagnum fallax-Eriophorum angustifolium* communities are found only in the quaking bogs formed along the Rudė rivulet. Although *7160 Fennoscandian mineral-rich spring and springfens* cover a very small area (2.74 ha), they harbour a large diversity of plant communities. In the source area of the Versmė rivulet, *Carex rostrata* swards are distributed, in which bryophyte species characteristic of fens prevail. In water-percolated areas, communities of *Equisetum fluviatile* occur. The *Carex rostrata* beds are usually surrounded by *Caricetum nigrae* communities, which in turn are replaced by the grasslands of the *Calthion palustris* alliance distributed further from springs.

7230 Alkaline fens are distributed unevenly in the territory. They occur only in the eastern side of Lake Žuvintas surroundings. The largest areas are neighbouring with the *6450 Northern boreal alluvial meadows* and *7140 Transition mires and quaking bogs* and some smaller fragments are scattered within these two types of habitats. In the areas of alkaline fens, *Caricetum paniceo-lepidocarpae* communities dominate.

Grassland habitat types show a relatively higher diversity of plant communities, but usually cover very small areas and are highly fragmented. Such fragmentation is probably related with the differences in hydrology and trophic conditions dependent on the microrelief features. The highest diversity is characteristic of *6510 Lowland hay meadows* (*Alopecurus pratensis, Sanguisorba officinalis*). These habitats are scattered in small fragments, not only mixed with other habitat types, but also forming small patch mosaic of different grassland communities which belong to *Calthion palustris*, *Alopecurion pratensis*, and *Molinion caeruleae* alliances. *6450 Northern boreal alluvial meadows* are the largest, usually covering several hectares. Their spatial structure is more uniform. This habitat type is dominated by *Caricetum distichae* communities. Only several areas include small fragments of *Peucedano-Calamagrostietum canescentis* and *Phalaridetum arundinaceae*.

6430 Hydrophilous tall herb fringe communities of plains and of montane to alpine levels cover small areas (0.36 ha) and their vegetation is usually not diverse. These habitats are represented by a community of *Urtico-Aegopodietum podagrariae*, which closer to the ditch is replaced by species-rich ecotone community of tall helophytes.

6410 Molinia meadows on calcareous, peaty or clayey-silt-laden soils distinguish themselves by uniform vegetation represented by species-rich *Molinietum caeruleae* communities.

3160 Natural dystrophic lakes and ponds bear only *Sphagnetum cuspidato-denticulati* communities, yet they form a broad belt up to several metres wide. Broad vegetation belts and the high coverage of *Sphagnum* species indicates an intensive succession of plant communities.

3. Anthropogenic changes in European habitats

The quality of European habitats occurring in the territory is uneven. In the majority of sites, which make 82.1%

Table 3. **Hazards influencing favourable conservation status of European habitats in surroundings of Žuvintas**

Hazard	Habitat type	Number of influenced plots (%)	Changes in the habitat type
Changes of hydrological conditions	6410	100.0	Overgrowth with shrubs
	6430	100.0	Overgrowth with shrubs
	6450	71.4	Overgrowth with shrubs
	6510	28.6	Overgrowth with shrubs
	7110	100.0	Intensive growth of pine, Overgrowth with birch
	7140	53.3	Overgrowth with trees and shrubs and *Phragmites australis*
	7160	100.0	Overgrowth with shrubs
	7230	83.3	Overgrowth with shrubs
	9080	83.3	Changes of structure and flora composition of communities
	91D0	42.8	Changes of structure and flora composition of communities
Collection of berries	7140	13.3	Disturbance of moss cover
Peat extraction	7140	6.7	Destruction of vegetation typical of habitat
Eutrophication	6430	50.0	Changes in flora composition of communities
	6450	14.3	Changes in flora composition of communities
	7140	13.3	Overgrowth with *Phragmites australis*
Changes of usage	6410	100.0	Overgrowth with shrubs
	6450	71.4	Overgrowth with shrubs
	6510	57.1	Overgrowth with shrubs
	7140	33.3	Overgrowth with shrubs
	7230	100.0	Overgrowth with shrubs
Fire	91D0	14.3	Intensive growth of birch

of the total habitat area, vegetation changes of different intensity have been observed. Only in one site these changes could be evoked by a natural disturbance (wildfire) which could also be of artificial origin. All the rest of changes are unambiguously induced by anthropogenic activities. Larger or smaller anthropogenic changes have been found in almost all types of European habitats, except *3160 Natural dystrophic lakes and ponds* (Table 3). Disturbance of hydrological regime is the main factor affecting the habitats.

The study territory is drained by ditches which have been dug in various periods. During 1920–1940, the surrounding of Lake Žuvintas were drained by shallow ditches up to 1 m deep (Милюс et al., 1993). In 1970s, an extensive agricultural melioration project was implemented in the watershed of the Dovinė river. Deep channels were dug and underground drainage systems were installed in the territories surrounding Lake Žuvintas (Povilaitis, 2006). A large part of the perimeter of Žuvintas Strict Nature Reserve (43%) was surrounded with deep channels which affected wetlands in the zone up to 150–300 m wide (Милюс et al., 1993).

The effects of drainage were prominent in almost all types of the study habitats. In drained habitats of *7110 Active raised bogs*, trees and shrubs grow more intensively, and quantitative and qualitative changes of bryophyte layer structure have been observed. The sites most affected by draining are distributed in the outskirts of the raised bog, closer to the ditches. According to the results of a complex research performed in 1979–1985 (Бумблаускис, 1993), radial growth of trees increased up to 8% in the raised bog at a distance of 150–200 m from the ditches. Such increase of ligneous plant growth causes a rapid shrinking of open bog habitats. Peripheral areas of *7110 Raised bogs* transform into *91D0 Bog woodland*. During investigations performed in 2005, it has been established that patches of raised bog communities with a typical structure start appearing at a distance of 200–400 m from the ditch. At approximately 500 m from the ditch, all the area of the raised bog regains typical features.

In 2005, it was established that drained areas of *7140 Transition mires and quaking bogs* overgrow with *Betula pubescens*, *Salix* spp., and *Phragmites australis*. *Rhynchosporion albae* communities overgrow mostly with trees (*Betula pubescens*) and of *Caricion lasiocarpae* are intensively invaded with *Salix* spp. According to Bumblauskis (Бумблаускис, 1993), the radial growth of trees increases by up to 43–71% in transition mires at a distance of 200–300 m from the ditches. The most possible reason for such growth is an increase of available nutrients in the soil.

The overgrowth of the transition mires was also induced by landuse changes after World War II. In the territory of Žuvintas Strict Nature Reserve, all the management, including mowing and grazing of mires and grasslands, had been prohibited until the year 2002 when it was decided to restore the degraded habitats (Kundrotas, 2002).

Other disturbing factors (e. g., trampling by berry pickers and peat mining) have affected the transition mires to a lesser extent. The impact of trampling was observed in local sites, and old pits of manual peat extraction are found only in the north-eastern part of the mire complex.

Because of draining and changes of landuse, overgrowing with ligneous vegetation has also intensified in all the types of grasslands and mires. Grassland habitats usually overgrow with *Salix* spp. Different overgrowth types have been observed. In the grasslands with a high

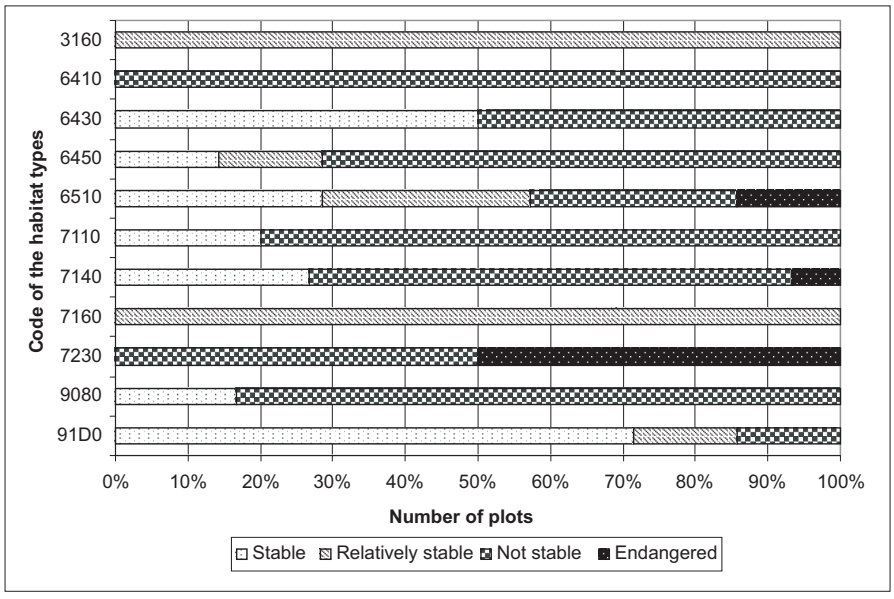

Fig. 3. Status of plots of European habitat types in Lake Žuvintas surroundings

ground water level, shrubs are concentrating along the draining ditches. In drier grasslands, single shrubs and their groups appear in all the area of habitats or concentrate in naturally drier margins.

Similarly to grasslands, habitats of *7230 Alkaline fens* are also overgrowing due to the draining and landuse changes, but they show a in higher diversity of ligneous vegetation. Besides *Salix* spp., *Frangula alnus* and *Betula pubescens* usually occur. It should be noted that ligneous plants are particularly abundant and spreading fast in this type of habitats. Trees and shrubs cover 5–30% of the total alkaline fen area.

In the habitats of *7160 Fennoscandian mineral-rich springs and springfens*, shrubs are thriving only in the near vicinity of the ditches. Further spreading is probably limited due to the high level of ground water.

The habitats of *91D0 Bog woodland* are more disturbed in the sites close to the ditches, where succession processes of forest communities have intensified. On the banks of deep channels, belts of the *Molinio-Pinetum* W. Mat. et J. Mat. 1973 or *Vaccinio uliginosi-Betuletum pubescentis* occur, which have developed from the degraded *Ledo-Pinetum sylvestris*. Due to intensive mineralization of the peat layer and vegetation changes, these communities are not distinguished as bog woodland habitats. Further from channels, belts of *Vaccinio uliginosi-Pinetum* usually stretch, which also evolve from the slightly drained communities of the *Ledo-Pinetum sylvestris*. Although they are included into *91D0 Bog woodland* habitat type, subsequent structural changes would induce the loss of their typical characteristics. At a greater distance from the ditches, less degraded types of *Ledo-Pinetum sylvestris* are gradually replaced by communities with a typical structure in which characteristic ecological forms of *Pinus sylvestris* prevail in the canopies. Large areas of bog woodland are in a favourable conservation status, yet their areas would decrease if the hydrological regime is not restored in the territory.

9080 Fennoscandian deciduous swamp woods usually develop in the drained laag areas of the raised bog, and only some of these habitats maintain a typical structure and species composition. The rest of these forests will gain more typical features in near future and the habitats neighbouring upon the draining ditches can transform into other types of vegetation.

4. Evaluation of the habitat status and recommendations for general management

The quality of habitat types was evaluated according to the apparent anthropogenic changes and possible trends of vegetation development (Fig. 3). Obviously, all habitat types include more or less degraded areas. *7230 Alkaline fen* habitats are in the poorest state. Half of their area is unstable due to intensive overgrowth with shrubs. If the current trends continue, the quality and area of these habitats can decrease significantly in the next 10 years. The other half of alkaline fens are in an extremely bad condition and in the next 10 years can be lost because of overgrowth and transformation into wetland scrub. The peripheral part of the alkaline fen complex has already developed into wetland shrub communities. The monitoring of *Liparis loeselii* populations, started in 1997, revealed that the quality of alkaline fens had significantly worsened because of overgrowth during 10 years at the north-eastern border of Žuvintas Strict Nature Reserve (Balsevičius, 1998; 2000). Investigations of the same monitoring site were performed in 2005 and showed that the fen community had been lost completely to the shrubs and *Liparis loeselii* had been extinct there. Special management measures, such as removal of ligneous vegetation and mowing or grazing, are necessary in order to restore and maintain these habitats. Management also can be applied in grassland and mire areas the *Caricion lasiocarpae* communities. Shrubs should be removed from the sites of *6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels.*

The areas of *7110 Active raised bo*gs and *91D0 Bog woodland* decrease because of the intensifying succession of vegetation, induced by draining. These habitats should be protected by restoring or at least stabilizing the hydrological

regime. For this purpose, the channels at the western side of the raised bog complex, as well as the ditches leading from Lake Polymas and the south-eastern part of the bog woodland complex should be blocked. In the habitats of *7110 Active raised bogs* birch trees should be removed, because they evaporate large amounts of groundwater and negatively affect the hydrological regime.

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EUROPINĖS BUVEINĖS IR JŲ BŪKLĖ ŽUVINTO APYEŽERĖJE

Santrauka

Žuvinto apyežerėje nustatytos 12 tipų buveinės, atitinkančios ES Buveinių direktyvos I priedo buveinių kriterijus: *3160 natūralūs distrofiniai ežerai, 6410 melvenynai, 6430 eutrofiniai aukštieji žolynai, 6450 aliuvinės pievos, 6510 šienaujamos mezofitų pievos, 7110 *aktyvios aukštapelkės, 7140 tarpinės pelkės ir liūnai, 7160 nekalkingi šaltiniai ir šaltiniuotos pelkės, 7230 šarmingos žemapelkės, 9080 *pelkėti lapuočių miškai, 91D0 *pelkiniai miškai*.

Buveinės užima 5561,45 ha. Jose aptinkamos bendrijos priskirtinos 8 augalijos klasėms: *Utricularietea intermedio-minoris* Den Hartog et Segal 1964 em. Pietsch 1965, *Oxycocco-Sphagnetea* Br.-Bl. et R. Tx. 1943, *Scheuchzerio-Caricetea nigrae* (Nordhagen 1936) R. Tx. 1937, *Phragmito-Magnocaricetea* Klika in Klika et Novák 1941, *Molinio-Arrhenatheretea elatioris* R. Tx. 1937, *Galio-Urticetea* Passarge ex Kopecky 1969, *Alnetea glutinosae* Br.-Bl. et R. Tx. 1943, *Vaccinio-Piceetea* Br.-Bl. in Br.-Bl. et al. 1939.

Teritorijoje aptinkamų europinės svarbos buveinių būklė nevienoda. Daugumoje buveinių plotų (82,1%) konstatuoti didesni ar mažesni augalijos struktūros pokyčiai. Didesnių ar mažesnių antropogeninių pokyčių yra nustatyta beveik visų tipų europinės svarbos buveinėse – jų nenustatyta tik *3160 natūraliuose distrofiniuose ežeruose*. Buveinėms daugiausia įtakos turintis veiksnys yra hidrologinio režimo sutrikdymas. Didelę įtaką buveinėms turi ir eutrofizacija bei ūkinės veiklos pokyčiai. Durpių kasimo ir gaisrų įtaka nėra labai reikšminga, nes konstatuota nedideliuose plotuose, o trypimo įtaka uogaujant yra nedidelė.

7110 aktyvių aukštapelkių buveinių ir *91D0 pelkinių miškų* buveinių plotams, kuriuose dėl pablogėjusių hidrologinių sąlygų paspartėjusi augalijos sukcesija, išsaugoti svarbu atkurti arba bent nebloginti hidrologines sąlygas. Iš šių buveinių patartina šalinti beržus. Nendrėmis ir krūmais apaugančias *7140 tarpines pelkes ir liūnus*, krūmais apaugančias *7230 šarmingas žemapelkes* ir pievų buveines (*6410, 6450, 6510*) patartina šienauti, o plotus, kuriuose vasaros viduryje vandens lygis būna giliai, – ir ganyti. Iš *6430 eutrofinių aukštųjų žolynų buveinės* rekomenduojama šalinti krūmus.

Raktažodžiai: europinė buveinė, augalų bendrija, palanki apsaugos būklė, antropogeninės kaitos, buveinių apsauga, tvarkymo priemonės, Žuvinto biosferos rezervatas