

Information Sheet on Ramsar Wetlands (RIS) – 2009-2012 version

Available for download from http://www.ramsar.org/ris/key_ris_index.htm.

Categories approved by Recommendation 4.7 (1990), as amended by Resolution VIII.13 of the 8th Conference of the Contracting Parties (2002) and Resolutions IX.1 Annex B, IX.6, IX.21 and IX. 22 of the 9th Conference of the Contracting Parties (2005).

Notes for compilers:

1. The RIS should be completed in accordance with the attached *Explanatory Notes and Guidelines for completing the Information Sheet on Ramsar Wetlands*. Compilers are strongly advised to read this guidance before filling in the RIS.
2. Further information and guidance in support of Ramsar site designations are provided in the *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance* (Ramsar Wise Use Handbook 14, 3rd edition). A 4th edition of the Handbook is in preparation and will be available in 2009.
3. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers should provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of all maps.

1. Name and address of the compiler of this form:

Estonian Wetland Society
Pärnu mnt 40, Häädemeeste, 86001 Pärnumaa, Estonia
Kai Kimmel (kkimmel@hotmail.ee)

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Designation date

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Site Reference Number

2. Date this sheet was completed/updated:

20 February 2012

3. Country:

Estonia

4. Name of the Ramsar site:

The precise name of the designated site in one of the three official languages (English, French or Spanish) of the Convention. Alternative names, including in local language(s), should be given in parentheses after the precise name.
Endla

5. Designation of new Ramsar site or update of existing site:

This RIS is for (tick one box only):

- a) Designation of a new Ramsar site ; or
b) Updated information on an existing Ramsar site

6. For RIS updates only, changes to the site since its designation or earlier update:

a) Site boundary and area

The Ramsar site boundary and site area are unchanged:

or

If the site boundary has changed:

i) the boundary has been delineated more accurately ; or

- ii) the boundary has been extended ; or
- iii) the boundary has been restricted**

and/or

If the site area has changed:

- i) the area has been measured more accurately ; or
- ii) the area has been extended ; or
- iii) the area has been reduced**

** **Important note:** If the boundary and/or area of the designated site is being restricted/reduced, the Contracting Party should have followed the procedures established by the Conference of the Parties in the Annex to COP9 Resolution IX.6 and provided a report in line with paragraph 28 of that Annex, prior to the submission of an updated RIS.

b) Describe briefly any major changes to the ecological character of the Ramsar site, including in the application of the Criteria, since the previous RIS for the site:

7. Map of site:

Refer to Annex III of the *Explanatory Note and Guidelines*, for detailed guidance on provision of suitable maps, including digital maps.

a) A map of the site, with clearly delineated boundaries, is included as:

- i) a **hard copy** (required for inclusion of site in the Ramsar List): ;
- ii) an **electronic format** (e.g. a JPEG or ArcView image) ;
- iii) a **GIS file providing geo-referenced site boundary vectors and attribute tables** .

b) Describe briefly the type of boundary delineation applied:

e.g. the boundary is the same as an existing protected area (nature reserve, national park, etc.), or follows a catchment boundary, or follows a geopolitical boundary such as a local government jurisdiction, follows physical boundaries such as roads, follows the shoreline of a waterbody, etc.

The boundary is the same as an existing protected area (Endla Nature Reserve)

8. Geographical coordinates (latitude/longitude, in degrees and minutes):

Provide the coordinates of the approximate centre of the site and/or the limits of the site. If the site is composed of more than one separate area, provide coordinates for each of these areas.

58° 52' N, 26° 09' E

9. General location:

Include in which part of the country and which large administrative region(s) the site lies and the location of the nearest large town.

The wetland is located in central Estonia, in Jõgeva, Järva and Lääne-Viru Counties, 20 km north-west of Jõgeva, 70 km north-west of Tartu.

10. Elevation: (in metres: average and/or maximum & minimum)

average 80 m; max 88 m, min 73 m

11. Area: (in hectares)

10 110 ha

12. General overview of the site:

Provide a short paragraph giving a summary description of the principal ecological characteristics and importance of the wetland.

The site is the best preserved central part of the large Endla mire system (total area of about 25 000 sq.km) on the southern slope of Pandivere Upland. The site is one of the most important freshwater systems in Estonia representing a complex of karst springs, rivers, freshwater lakes, mires and swamp forests supporting rich diversity of species.

13. Ramsar Criteria:

Tick the box under each Criterion applied to the designation of the Ramsar site. See Annex II of the *Explanatory Notes and Guidelines* for the Criteria and guidelines for their application (adopted by Resolution VII.11). All Criteria which apply should be ticked.

1 • 2 • 3 • 4 • 5 • 6 • 7 8 • 9

14. Justification for the application of each Criterion listed in 13 above:

Provide justification for each Criterion in turn, clearly identifying to which Criterion the justification applies (see Annex II for guidance on acceptable forms of justification).

Criterion 1

The site is a good representative of natural and near-natural non-forested peatlands (bogs and fens), forested peatlands (peatswamp forests), paludifying forests, freshwater lakes, permanent rivers as well as the whole mosaic wetland complex, characteristic of the Boreal Biogeographical region. The copious karst spring area laying on the territory of approximately 30 sq.km with more than 30 springs is unique for the Boreal biogeographical region.

Wetland habitats occurring in Endla Nature Reserve and listed in Annex I Habitat Directive are active raised bogs (*7110), transition mires and quaking bogs (7140), bog woodland (*91D0), Fennoscandian deciduous swamp woods (*9080), lakes (Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp. - 3140, Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* — type vegetation - 3150, Natural dystrophic lakes and ponds - 3160), rivers and streams (Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation - (3260), Fennoscandian mineral-rich springs and spring fens (7160), petrifying springs with tufa formations (*7220) and alkaline fens (7230) .

The wetland complex plays a substantial hydrological, biological and ecological role in the region and it is identified both as an IBA and Natura 2000 site.

Criterion 2

The site is a part of wilderness area in densely populated agricultural Central Estonia and it supports a number of rare, vulnerable and endangered species of plants and animals which are under protection or listed in the Red Data Book of Estonia: White-tailed Eagle *Haliaeetus albicilla*, Golden Eagle *Aquila chrysaetos*, Osprey *Pandion haliaetus*, Lesser-spotted Eagle *Aquila pomarina*, Black Stork *Ciconia nigra* of I protection category, 20 bird species of II protection category; 31 protected plant species, and several protected species of mammals.

Of bird species of EU conservation interest, listed on Annex I of Council directive 2009/147/EEC it supports: Red-throated Diver *Gavia stellata*, Black-throated Diver *Gavia arctica*, Bittern *Botaurus stellaris*,

Black Stork *Ciconia nigra*, Bewick's Swan *Cygnus columbianus bewickii*, Whooper Swan *Cygnus cygnus*, Smew *Mergus albellus*, Osprey *Pandion haliaetus*, White-tailed Eagle *Haliaeetus albicilla*, Marsh Harrier *Circus aeruginosus*, Montagu's Harrier *Circus pygargus*, Lesser-spotted Eagle *Aquila pomarina*, Golden Eagle *Aquila chrysaetos*, Merlin *Falco columbarius*, Crane *Grus grus*, Corncrake *Crex crex*, Golden Plover *Pluvialis apricaria*, Little Gull *Larus minutus*, Black Tern *Chlidonias niger*, Kingfisher *Alcedo atthis*, Red-backed Shrike *Lanius collurio*.

Criterion 3

The site supports populations of plant and animal species important for maintaining the biological diversity of the Boreal Biogeographical Region.

Plants: Lady's Slipper *Cypripedium calceolus* (Annex II of EU Habitats Directive), Coralroot Orchid *Corallorhiza trifida*, White Adder's Mouth *Malaxis monophyllos*, Lesser Clubmoss *Selaginella selaginoides*, Arctic Bramble *Rubus arcticus*, endemic Alpine Saw-wort *Saussurea alpina* subsp. *esthonica*, Sphagnum *sp.* etc.

Birds: Golden Eagle *Aquila chrysaetos*, Crane *Grus grus*, Red-necked Grebe *Podiceps griseigena*, Spotted Crake *Porzana porzana*, Wood Sandpiper *Tringa glareola*, Bittern *Botaurus stellaris*, Montagu's Harrier *Circus pygargus*, Black tern *Chlidonias niger*, etc.

Mammals: Wolf *Canis lupus*, Brown Bear *Ursus arctos*, Lynx *Lynx lynx*, Beaver *Castor fiber*, Otter *Lutra lutra* (Annexes II and IV of EU Habitats Directive) and Elk *Alces alces*.

Criterion 4

The site supports animal species at a critical stage in their life cycles as refuge for animals with large habitat requirements, especially Wolf *Canis lupus* and Brown Bear *Ursus arctos*.

15. Biogeography (required when Criteria 1 and/or 3 and /or certain applications of Criterion 2 are applied to the designation):

Name the relevant biogeographic region that includes the Ramsar site, and identify the biogeographic regionalisation system that has been applied.

a) biogeographic region:

A: Boreal Biogeographic region according to the EEA

B: terrestrial area Sarmatic mixed forests

freshwater area Southern Baltic Lowlands temperate floodplain rivers and wetlands

b) biogeographic regionalisation scheme (include reference citation):

A: EEA, European Environment Agency,

http://www.eea.europa.eu/publications/report_2002_0524_154909

B:

Olson, D. M., E. Dinerstein, E.D. Wikramanayake, N.D. Burgess, G.V.N. Powell, E.C. Underwood, J.A. D'amico, I. Itoua, H.E. Strand, J.C. Morrison, C.J. Loucks, T.F. Allnutt, T.H. Ricketts, Y. Kura, J.F. Lamoreux, W.W. Wetengel, P. Hedao, & K.R. Kassem. 2001. Terrestrial Ecoregions of the World: A New Map of Life on Earth. - *BioScience* 51:933-938.

Abell, R., Thieme, M. L., Revenga, C., Bryer, M., Kottelat, M., Bogutskaya, N., Coad, B., Mandrak, N., Contreras Balderas, S., Bussing, W., Stiassny, M., Skelton, P., Allen, G., Unmack, P., Naseka, A., Ng, R., Sindorf, N., Robertson, J., Armijo, E., Higgins, J., Heibel, T.J., Wikramanayake, E., Olson, D., Lopez, H. L., Reis, R. E., Lundberg, J.G., Sabaj Perez, M.H., Petry P., 2008, Freshwater Ecoregions of the World: A New Map of Biogeographic Units for Freshwater Biodiversity Conservation. - *BioScience* 58: 403-414.

16. Physical features of the site:

Describe, as appropriate, the geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth, water permanence; fluctuations in water level; tidal variations; downstream area; general climate, etc.

The site of natural origin is located on the slope of bedrock upland and represents an undulating plain with extensive mire system in ancient lake basin and its surroundings. There are 11 groups of karst springs fed by the rainfall seeping in the karstified upland. The springs are of various depths, regime and water characteristics. The bedrock consists of Silurian limestones and dolomites and is covered by thin cover of Quaternary deposits (mainly boulder- and clay- rich moraine and fluvioglacial sediments). Lake marl, gyttja and peat (with maximum thickness of up to 8 m) are widely spread. Eutric and Dystric Histosols dominate.

The site is situated in the transition zone from the sub-maritime to the sub-continental climate.

The coldest month is February (-7,5°C in average), the warmest month is July (16,5°C). Mean annual temperature is 4.2°C. The mean annual precipitation is 670 mm per year (68% during the warm period). The number of rainy days is 170-180. Relative humidity of the air is relatively high through the whole year. The number of humid days with relative humidity more than 80% is 145-150.

The snow cover lasts in average about 130 days.

17. Physical features of the catchment area:

Describe the surface area, general geology and geomorphological features, general soil types, and climate (including climate type).

Main part of the catchment area (ca 800 sq.km) lies on the Pandivere Upland. The bedrock is formed by Ordovician and Silurian limestones, dolomites and marls and is covered by thin layer of till. Karstified upland (the area belongs to one of the largest karst areas in Eastern Europe) is the main infiltration area in Estonia where ground water forms. Dominating brown soils (Calcaric Cambisols) and pseudopodzolic soils (Calcaric Luvisols) are the most fertile ones in Estonia. The region with intensive agriculture is densely populated.

Climate is transitional from sub-maritime to sub-continental type.

18. Hydrological values:

Describe the functions and values of the wetland in groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.

The site belongs to hydrogeologically complicated region of the Pandivere Upland where the ground- and surface water is connected through karst phenomena. It has important role in the recharge and discharge of surface and ground water as well as in maintenance of water quality (mire system acts as the natural purification system for waters derived from agricultural upland area).

19. Wetland Types

a) presence:

Circle or underline the applicable codes for the wetland types of the Ramsar "Classification System for Wetland Type" present in the Ramsar site. Descriptions of each wetland type code are provided in Annex I of the *Explanatory Notes & Guidelines*.

Marine/coastal: A • B • C • D • E • F • G • H • I • J • K • Zk(a)

Inland: L • M • N • O • P • Q • R • Sp • Ss • Tp • Ts • U • Va •
Vt • W • Xf • Xp • Y • Zg • Zk(b)

Human-made: 1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • Zk(c)

b) dominance: Xp U O Tp M Ts Xf W Y 9

List the wetland types identified in a) above in order of their dominance (by area) in the Ramsar site, starting with the wetland type with the largest area.

20. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site, and the ecosystem services of the site and the benefits derived from them.

Eight bog complexes surrounding large and shallow Endla Lake are separated by rivers and wet forests. The bogs typical for East-Estonia are characterized by their convex form and by a marked contour parallel system of pools, hollows and long-streched *Sphagnum* hummocks. Leatherleaf *Chamaedaphne calyculata* not growing in the West-Estonian bogs is characteristic here. Lake Endla and Lake Sinijärv and four smaller relic lakes (remnants of the Great Endla Lake) are shallow and plant-rich, with large reed-bed areas.

21. Noteworthy flora:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 14. Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

461 species of vascular plants and 165 of moss species (among them 24 *Sphagnum* species) have been noted. 32 vascular plant species are listed as nationally protected (I, II and III category), among them 18 species of wild orchids. Most noteworthy are rare and endangered Nodding Waternymph *Najas flexilis*, Bog Orchid *Hammarbya paludosa*, White Adder's Mouth *Malaxis monophyllos*, Coralroot Orchid *Corallorhiza trifida*, Lady's Slipper *Cypripedium calceolus*, Arctic Bramble *Rubus arcticus*, Selaginella *Selaginella selaginoides*, Water Lily *Nymphaeae sp.*

22. Noteworthy fauna:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 14. Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc., including count data. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

The bird fauna includes 182 species, 153 of them are breeding birds.

The wetland is the breeding area for Bittern *Botaurus stellaris* (1-3 pairs), Goldeneye *Bucephala clangula* (5-10 pairs), Marsh Harrier *Circus aeruginosus* (2-5 pairs), White-tailed Eagle *Haliaeetus albicilla* (1 pair), Golden Eagle *Aquila chrysaetos* (1 pair), Hazel Hen *Bonasa bonasia* (10-50 pairs), Capercaillie *Tetrao urogallus* (5-10 pairs), Black Grouse *Tetrao tetrix* (50-100 pairs), Spotted Crake *Porzana porzana* (10-20 pairs), Common Crane *Grus grus* (10-15 pairs), European Golden Plover *Pluvialis apricaria* (10-20 pairs), Wood Sandpiper *Tringa glareola* (30-50 pairs), Northern Lapwing *Vanellus vanellus* (20-30 pairs), Eurasian Curlew *Numenius arquata* (10-15 pairs), etc.

Mammals: 34 species of mammals have been counted. The area belongs to the best habitats in Estonia for big carnivores such as Lynx *Lynx lynx*, Wolf *Canis lupus* and Brown Bear *Ursus arctos*, and also for Otter *Lutra lutra*.

The local fauna of dragonflies is very rich.

23. Social and cultural values:

a) Describe if the site has any general social and/or cultural values e.g., fisheries production, forestry, religious importance, archaeological sites, social relations with the wetland, etc. Distinguish between historical/archaeological/religious significance and current socio-economic values:

The site is important for scientific studies (since 1910 the essential part of scientific research into the mires in Estonia has been performed here) and for nature education.

b) Is the site considered of international importance for holding, in addition to relevant ecological values, examples of significant cultural values, whether material or non-material, linked to its origin, conservation and/or ecological functioning?

If Yes, tick the box and describe this importance under one or more of the following categories:

- i) sites which provide a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland:
- ii) sites which have exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland:
- iii) sites where the ecological character of the wetland depends on the interaction with local communities or indigenous peoples:
- iv) sites where relevant non-material values such as sacred sites are present and their existence is strongly linked with the maintenance of the ecological character of the wetland:

24. Land tenure/ownership:

a) within the Ramsar site: mostly state owned, about 10 % in private ownership

b) in the surrounding area: state and private lands

25. Current land (including water) use:

a) within the Ramsar site: the wetland is practically uninhabited (3 inhabitants) and extensively used for nature tourism - sport fishing, berry picking. The forest use is limited (only in one quarter of the area)

b) in the surroundings/catchment: intensive agriculture (Pandivere Upland is the most important agricultural region in Estonia), forestry

26. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects:

a) within the Ramsar site: No big threats are posed to ecological character of the wetland due to the protection regime and appropriate management activities. Nevertheless the site is influenced by ancient drainage and lowering of lake water tables, small-scale forestry, fishing, nature tourism, small amount of waste waters coming from the catchment and possible agricultural pollution in the catchment area.

b) in the surrounding area: agricultural pollution from the Pandivere Upland spreading by rivers and ground water, waste waters from villages located on the catchment area upstream of the wetland, drainage, hunting

27. Conservation measures taken:

a) List national and/or international category and legal status of protected areas, including boundary relationships with the Ramsar site:

In particular, if the site is partly or wholly a World Heritage Site and/or a UNESCO Biosphere Reserve, please give the names of the site under these designations.

In 1980 the area was taken under local (municipal) protection, in 1981 mire conservation area was established, since 1985 nature reserve covers the wetland. The Protection Rules were approved by the Estonian Government in 1997 (area 8050 ha). New protection rules were approved in 2005 and the area of the reserve was extended to 10 110 ha.

On 77 % of the territory economic activities are prohibited. Forestry, fishing, hunting and also access in several parts of the reserve is regulated.

The area is identified an Important Bird Area and Natura 2000 site (both a SCI and a SPA).

b) If appropriate, list the IUCN (1994) protected areas category/ies which apply to the site (tick the box or boxes as appropriate):

Ia ; Ib ; II ; III ; IV ; V ; VI

c) Does an officially approved management plan exist; and is it being implemented?:

The management plan for 2002-2005 has been implemented. The second officially approved management plan for the period 2007-2015 is currently implemented.

d) Describe any other current management practices:

28. Conservation measures proposed but not yet implemented:

e.g. management plan in preparation; official proposal as a legally protected area, etc.

29. Current scientific research and facilities:

e.g., details of current research projects, including biodiversity monitoring; existence of a field research station, etc.

The centre of the Environmental Board located at Tooma village can be used also as a simple field station.

The environmental and biological monitoring is carried out mainly in the framework of the Estonian Environmental Monitoring Programme. The stations of several monitoring programs are located in wetland including meteorological monitoring, monitoring of groundwater and inland waters, monitoring of rare and protected plant communities, mire bird monitoring and also the monitoring of bird communities of Lake Endla. The only specialised hydrometeorological station in Estonia is operating in Endla since 1950.

The site belongs also among the permanent landscape satellite monitoring sites in Estonia.

Several research projects concerning mire ecology are carried out.

30. Current communications, education and public awareness (CEPA) activities related to or benefiting the site:

e.g. visitors' centre, observation hides and nature trails, information booklets, facilities for school visits, etc.

The centre of the Environmental Board located at Tooma operates also as the visitors' center. The permanent exhibition introduces Estonian mires and main habitats of the site. Information booklets are available in Estonian, English and German. There are good facilities for school visits (rooms for seminars).

There are 2 systems of nature trails (one in spring region, another introducing mire and lake communities) and 2 watching towers.

3000-4000 people annually visit the site, including 45-55 groups of pupils.

Since 2009 the visiting management is the responsibility of the State Forest Management Centre.

31. Current recreation and tourism:

State if the wetland is used for recreation/tourism; indicate type(s) and their frequency/intensity.

No good facilities for recreation. The only sport activity is sport fishing (lakes Endla and Sinijärv). Nature tourism is regulated by the Environmental Board.

32. Jurisdiction:

Include territorial, e.g. state/region, and functional/sectoral, e.g. Dept of Agriculture/Dept. of Environment, etc.

Territorial: Jõgeva and Pajusi Parish of Jõgeva County; Koeru Parish of Järva County; Rakke Parish of Lääne-Viru County.

Functional: Environmental Board under the Ministry of Environment (Narva mnt 7a, 15172 Tallinn, ESTONIA)

33. Management authority:

Provide the name and address of the local office(s) of the agency(ies) or organisation(s) directly responsible for managing the wetland. Wherever possible provide also the title and/or name of the person or persons in this office with responsibility for the wetland.

Environmental Board, Jõgeva-Tartu Region (Aleksandri 14, 51004 Tartu, Estonia).

Mr. Rainis Uiga (rainis.uiga@keskkonnaamet.ee), director of the Jõgeva-Tartu Region of Environmental Board

34. Bibliographical references:

Scientific/technical references only. If biogeographic regionalisation scheme applied (see 15 above), list full reference citation for the scheme.

Aaviksoo, K. 1995. Vegetation of Endla Nature Reserve classified on the basis of LANDSAT TM data. - In: Consortium Masingii. *Scripta Botanica* 9. Tartu University, pp. 27-36.

Aber J.S., Aaviksoo, K., Karofeld, E. & Aber S.W. 2002. Patterns in Estonian bogs as depicted in color kite aerial photographs. *Suo* 53 (1), pp. 1-15

Eesti Loodus 10. 1997. Special issue devoted to the Endla Nature Reserve. In estonian with english summaries.

Frezel, P. & Karofeld, E. 2000. CH₄ emission from hollow-ridge complex in a raised bog: The role of CH₄ production and oxidation. *Biogeochemistry* 51, pp. 91-112.

Ilomets, M. 1988. Vertical distribution and spatial pattern of Sphagnum communities in two Estonian treeless bogs. In: M. Zobel (Ed.) Dynamics and ecology of wetlands and lakes in Estonia. Tallinn, pp. 24-39.

Ilomets, M., Punning, J.-M. & Yevdokimova, A. 1992. Heavy metal contents in *Sphagnum*, acrotelm and peat in the Männikjärve Bog, Estonian S.S.R. In: Bragg, O., Hulme, P.D., Ingram, H.A.P. & Robertson R.A. (ed-s) Peatland Ecosystems and Man: An Impact Assessment. Univ. of Dundee, pp. 196-199.

Karofeld, E. 2001. Transplantation experiment to study the development of mud-bottoms. Proc.Estonian Acad.Sci.Biol.Ecol., 50, 4, 256-268.

Karofeld, E. & Toom, M. 1999. Mud-bottoms in Männikjärve Bog, central Estonia. Proc. Estonian Acad. Sci.Biol. Ecol., 48, 3, 216-235.

Kimmel, K. 1998. Mire research traditions in Endla Nature Reserve. Estonia Maritima 3, pp. 179-186

Leito, A., Tammur, E. 1991. On the bird fauna of the Endla State Nature Reserve and its changes. - Loodusevaatlusi. 1989, 1. 27-42 (in Estonian with English summary).

Lõhmus, A., Kalamees, A., Kuus, A., Kuresoo, A., Leito, A., Leivits, A., Luigujõe, L., Ojaste, I., Volke, V. 2001. Bird species of conservation concern in the Estonian protected areas and important bird areas. Hirundo Supplementum 4: 37-167.

Masing, V. 1998. Vegetation of Endla bogs. - Yearbook of the Estonian Naturalist's Society, Vol. 78, pp. 27-48 (in Estonian with English summary)

Valgma, Ü. 1998. Impact of precipitation on the water table level of different ombrotrophic raised bog complexes, central Estonia. *Suo* 49 (1), pp. 13-21.

Valgma, Ü. 1998. The role of hollows in the regulation of the bog water balance: Männikjärve bog, central Estonia. In: Wheater, H. & Kirby, K. (ed-s). Hydrology in a Changing Environment. John Wiley & Sons, pp. 465-471.

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