

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

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).

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

Ana Katalinić, Conservation Manager
Public Institution Vransko jezero Nature Park,
Petra Svačića 2
HR - 23210 Biograd
Republic of Croatia
tel: +385 23 383 181
fax: +385 23 386 453
e-mail: pp-vransko-jezero@zd.t-com.hr

Eugen Draganović
Ministry of Environmental and Nature Protection
Nature Protection Directorate
Republike Austrije 14
HR - 10000 Zagreb
Republic of Croatia
tel.. +385 1 4866 110
fax. +385 1 4866 100
e-mail: eugen.draganovic@mzoip.hr

Jasminka Radović
State Institute for Nature Protection
Trg Mažuranića 5
HR - 10000 Zagreb
Republic of Croatia
tel. +385 1 5502 931
fax. +385 1 5502 902
e-mail: jasminka.radovic@dzzp.hr

Jelena Kralj
Institute of Ornithology
Croatian Academy of Sciences and Arts
Gundulićeva 24
HR-10000 Zagreb
Republic of Croatia
tel. +385 1 4825 401
fax +385 1 4825 392
e-mail: zso@hazu.hr

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Designation date

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Site Reference Number

2. Date this sheet was completed/updated:

30 July 2012

3. Country:

Croatia

4. Name of the Ramsar site:

Vransko Lake ("Vransko jezero")

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

This RIS is for:

- 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:

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

see Appendix 1 (hard copy) and Appendix 3 (CD with JPEG and GIS file)

- 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:

The boundary is identical to existing protected area (nature park).

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

North corner: longitude 15°32'42,3", latitude 43°57'10.6"

West corner: longitude 15°30'36", latitude 43°55'30"

South corner: longitude 15°38'25", latitude 43°50'16.8"

East corner: longitude 15°39'39,8", latitude 43°51'5"

Approximate central coordinate: longitude 15°35'20', latitude 43°53'27"

9. General location:

Vransko Lake lies in the coastal part of the country, in northern Dalmatia. It belongs partly (74%) to the County of Zadar, and partly (26%) to the County of Šibenik-Knin. The nearest bigger towns are Zadar (30 km northwest, 81,000 inhabitants) and Šibenik (24 km southeast, 56,000 inhabitants). Nearest smaller town is Biograd na moru (5 km northwest, 5,000 inhabitants). The Park's border crosses the areas of 4 municipalities: Pakoštane and Stankovci (Zadar County), as well as Pirovac and Tisno (Šibenik-Knin County).

10. Elevation:

Minimum: -3 m (lake bottom)

Maximum: 303 m (Standarac hill)

11. Area:

5,747.51 ha

12. General overview of the site:

Vransko Lake is the largest natural lake in Croatia, situated in a shallow karst bed and separated from the Adriatic Sea by a narrow karst ridge. Significant seasonal variations in water level and changes in salinity due to intrusion of sea water through permeable karst, create conditions for development of very specific habitats. The shallowest northwest part of the Ramsar site area is characterized by reedbeds, floodplain and seasonally flooded arable land; the hills lining the eastern coast are covered by typical Mediterranean macchia and garrigue, while the lower western coast gives a more rocky appearance. Vransko jezero marsh is a remaining of what used to be a much larger Vrana swamp, drained by melioration canals in 18th century. Still it represents one of only two significant wetlands in the Mediterranean part of Croatia. This is a nesting, wintering and resting area for many threatened waterbirds.

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:**Criterion 1**

Vransko Jezero Lake is a permanent water body, brackish natural lake, the only one in the coastal part of Croatia, and one of only two larger wetlands in this region (the other being the Neretva Delta). The karst coastline that dominates in Croatia is very poor in wetland habitats, and Vransko Jezero Lake represents the largest natural lake in Croatia, enriched by permanent and seasonal brackish marsh areas, including seasonally flooded grazed meadows and pastures. Compared to the Neretva Delta, open-water species are far more numerous at Vransko Jezero Lake.

Criterion 2

Many bird species inhabiting the area are threatened at the national or international level. Three vulnerable and nine near threatened species at global level have been registered for the site (IUCN, 2012), five of them being regularly occurring. Two species are endangered at the EU level and 12 are vulnerable (BirdLife International, 2004), with these species carrying the same status for Europe, plus one more endangered species (Burfield and van Bommel, 2004). 73 birds are listed in Annex I of the Bird Directive, 59 species in Annex II. At the national scale, the populations of 14 bird species registered for Vransko jezero are critically endangered, 21 are endangered and 19 are vulnerable (Tutiš et al., 2010).

Out of plant species 2 are critically endangered, 6 endangered and 9 are vulnerable at the national scale. One is listed in Annex II and IV of Habitat Directive. There is also 2 endangered and 1 vulnerable

species of dragonflies (*Odonata*) on the national level and 1 listed in Habitat Directive (Annex II and IV), as well as 2 critically endangered, 2 endangered and 2 vulnerable species of ground beetles (*Carabidae*) at the national scale. Out of cave invertebrates, one is critically endangered and one vulnerable on the national level. One mollusk species is listed in Habitat Directive (Annex II and IV), as well as 1 fish species. One fish species is endangered and 2 are vulnerable at the national scale, while 1 is critically endangered and 1 vulnerable at the European and global level. 4 amphibian species are listed in the Habitat Directive (all in Annex IV and only 1 of them in Annex II) as well as 11 reptile species (all in Annex IV but only 4 of them in Annex II). Populations of bats using the area consist of 2 endangered and 1 vulnerable species at the national scale, 2 vulnerable at the European level and one vulnerable at the global level, amongst 15 listed in the Habitat Directive (all in Annex IV but only 7 of them in Annex II).

Complete list of species registered for Vransko Jezero Lake with threat status is presented as [Appendix 2](#).

Criterion 3

Vransko Lake is a “hotspot” for biological diversity in the area, with 255 recorded bird species. It hosts the last heron colony in the Mediterranean region of Croatia and is the only stable nesting site in Croatia for the population of the Pygmy Cormorant (*Phalacrocorax pygmaeus*).

Several endemic species of reptiles and amphibians are found: Dalmatian Algyroides (*Algyroides nigropunctatus*) and Balkan Whip Snake (*Coluber gemonensis*) are endemics of the Eastern Adriatic coast, while the Sharp Snouted Lizard (*Archaeolacerta oxycephala*) and the subspecies of the Yellow-bellied Toad (*Bombina variegata kolombatovici*) are Dalmatian endemics, all contributing to the biological diversity of the Mediterranean biogeographic region. The Adriatic endemic fish *Knipowitschia panizzae* is listed in the Annex II of the Habitat Directive, while the European eel (*Anguilla anguilla*) is protected by the Barcelona convention (Annex III of the SPAMI Protocol - species whose exploitation is regulated), by the CITES Convention and the EU wildlife trade legislation (ban on import in EU and export from EU).

Vransko Lake wetland area also supports habitat types that are rare in the Mediterranean and recognized as NATURA2000 habitats. The most significant are: Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp., Mediterranean temporary ponds, Eastern sub-mediterranean dry grasslands (*Scorzonneratalia villosae*), Mediterranean tall humid grasslands of the *Molinio-Holoschoenion* and Sub-Mediterranean grasslands of the *Molinio-Hordeion secalini* (the latter was included in the NATURA2000 habitats list in 2011 according to the proposal of Croatia).

Criterion 4

Apart from the Neretva Delta, Vransko Lake is the largest wetland and supports the largest reedbed on the eastern Adriatic coast, sustaining existence of many songbirds, especially warblers. This reedbed is the last breeding site for herons and the only breeding site for the Pygmy Cormorant (*Phalacrocorax pygmaeus*) in coastal part of Croatia.

It also supports 4 species of rails and crakes in their sensitive nesting period - including Baillon's Crake (*Porzana pusilla*) that is considered rare on European and EU level. Out of 37 species of waders recorded for the area, 23 of them regularly use muddy shores and shallow flooded zone of the Vransko Jezero Lake as a resting place during autumn and spring migrations. Four of recorded waders are near threatened at global level: Black-winged Pratincole (*Glareola nordmanni*), Great Snipe (*Gallinago media*), Black-tailed Godwit (*Limosa limosa*) and Curlew (*Numenius arquata*). 3 of these species are considered vulnerable, and 1 endangered at the European and EU level. Due to its position on the junction of at least three important migration routes, Vransko Jezero Lake has a tremendous importance in bird migrations. The lake surface never freezes and with its plentitude of food and mild climate represents a winter refuge for large populations of coots (*Fulica atra*), 17 species of ducks (among them 1 considered vulnerable and 1 endangered at European and EU level, and one also near threatened at the global level), 4 species of geese and 6 species of divers (1 considered vulnerable at European level).

Criterion 5

Vransko Lake is an important wintering site for the Coot (*Fulica atra*) with yearly numbers between 40,000 and 195,000 birds. Apart from Coot, many ducks, grebes, cormorants and divers overwinter, so that total number of wintering waterbirds is always higher than 40,000.

Criterion 6

The most numerous waterbird species at Vransko Lake is the Coot (40,000-195,000 wintering birds). The Mediterranean-Black Sea wintering population is estimated at 2,500,000 birds (Wetlands International, 2006), so that (depending on the year) at least 1.6% and as much as 7.8% of the population winters at this site. The Mediterranean-Black Sea wintering population of Coot is considered to be threatened and it is included in Annex II of Bern Convention.

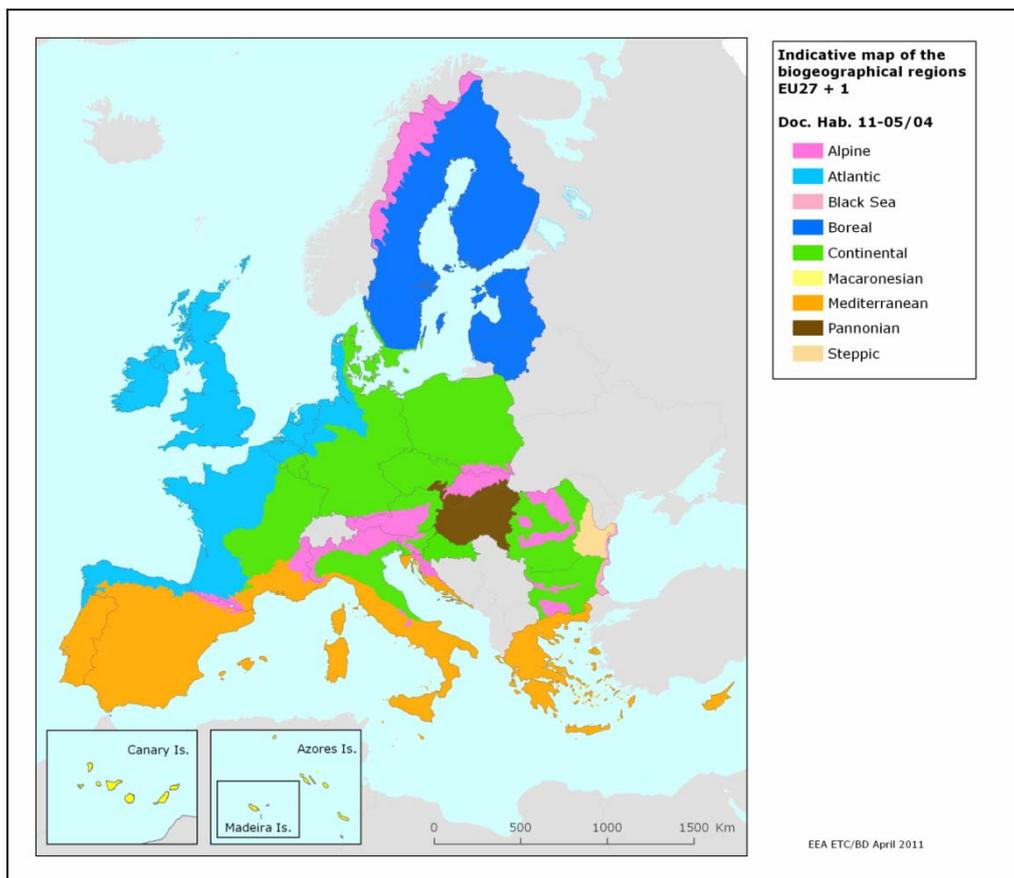
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15. Biogeography (required when Criteria 1 and/or 3 and /or certain applications of Criterion 2 are applied to the designation):

a) **biogeographic region:** Mediterranean biogeographic region of EU and Europe

b) **biogeographic regionalization scheme** (include reference citation):

EU biogeographic regionalization, in accordance with the Habitat Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora). Reference: European Commission (2011): Map of EU biogeographic regions EU 27+1, Doc.Hab. 11-05/04



16. Physical features of the site:

Vransko Lake is the biggest lake in Croatia, 13.6 km long, 1.4-3.4 km wide, with surface of 29.8-30.02 km² (depending on water level). It is separated from the sea with an 800-2,500 m wide, partially permeable karst ridge. The lake is a cryptodepression with the lake bottom at -3 m, and therefore represents the lowest point of a broad catchment area. Fresh water runs into the lake from many springs and creeks, and man-made melioration canals. The lake is connected to the sea through a 8 m wide, 4-5 m deep and 875 m long, man-made canal Prosika dug through the karst ridge at the end of 18th century for purposes of melioration.

Vransko Jezero Lake is a shallow flooded alluvial plain, formed in Cretaceous, partly covered with eocenian nummulitic limestone and quaternary sediments. The lake bottom is covered in thick limestone mud, which is continuously sediments. Lake's bottom is at -3 m, sand reaches down to -13 m, clay is sedimentated between -13 m and -23 m, clay with gravel prevails between -23 m and -30 m, and below -30 m is rocky substratum. The bottom is mainly flat, with a small inclination towards southeast. Lake shores are rocky and not very steep in the northwest where vast and flat alluvial field Vransko polje is situated.

The lake is bordered by the Crna gora hill (303 m top) on the northeastern side, and Modravica (68 m) and Miličevac (71 m) hill on the southwestern side next to the sea.

Main soil types in the site are red soil on the surrounding hills and karst areas ("terra rossa"- poor in nitrogen and phosphate, characteristic of Mediterranean karst), and alluvial silt covering the Vransko polje field as well as the bottom of the lake. Northeastern coast is lined mainly by rocky hills, with several caves and pits investigated in this area, and southeastern coast is karst ridge with pebble beaches.

According to scientific theory, Vransko jezero exists as a permanent lake for only 2700 years, when the sea level rose above -3 m (today lake's bottom). This allowed inflowing water to stay in the depression and form permanent lake. Before this time Vrana depression was a periodically flooded valley. Today the lake surface is almost always above the sea level, due to significant water inflow from surface and underground natural springs, as well as melioration channels. Three underground springs are situated in the very lake (Živača, Prizidina, Procip). Average water level is about 83 cm, but can reach up to 2.20 m in winter. The salt water protrudes through permeable karst areas northwest of the lake, and makes lake water constantly brackish, with salinity of 0,16-0,86 ‰. During strong southern winds in summer and autumn when lake level is low, the sea level rises above the lake level and salt water comes into the lake through Prosika canal and permeable karst ridge next to the canal. Long-term period of no rainfall can raise the salinity up to 8‰.

Small depth makes the lake well enlightened and productive, which accelerates the eutrophication and sedimentation processes. The lake is polymictic due to strong winds, and no stratification occurs. Lake water quality is now between oligotrophic and mesotrophic, with a light eutrophication occurring, due to lake's production, introduced cyprinid species influence, and excess input of nutrients due to agricultural land fertilization.

Water pH is normally between 7.5 and 8.5, making the water slightly alkaline. Water hardness is moderate, with CaCO₃ values between 140-215 mg/L. High electrical conductivity and high chloride concentration is due to intrusion of the sea into the lake, and varies seasonally and spatially. Oxygen concentrations vary according to season (6-10 mg/L), and lower values are related to warmer season. From inorganic factors, only phosphates can reach values higher than expected, due to sporadic inflow of waste water.

Because of small water depth, water temperature varies greatly: from 25.2 °C in July to 2.9 °C in February. Rarely, due to polar air masses breakthrough, surface water and shore freezes. Canals' deltas and spring areas never freeze, because the spring waters temperature varies from 9.2 °C -17 °C.

According to Thornthwait classification climate is humid to subhumid, and according to Köppen warm, moderate climate of the Mediterranean coast, with at least three times more rainfall in the most humid winter month than in the driest summer month. This type of climate is also called "olive climate" and it is characterized with evergreen vegetation of *Quercus ilex*. The climate generally corresponds to the climate of the whole catchment area.

17. Physical features of the catchment area:

The catchment of Vransko Lake is a karst draining system of Ravni kotari area, with surface of around 515 km², divided into 4 subcatchment areas: Kotarka (131 km²), Tinj-Kakma-Stabanj (122 km²), Kličevica (50 km²), Pećina-Biba Živača (167 km²). It spreads from Zemunik, Benkovac and Perušić settlements on the northwest to Sukošan, Biograd and Pirovac on the southeast. The karst fields of the catchment areas are represented by Nadinsko blato and Polačko polje in the upstream area, Kulsko-Korlatsko polje and Benkovačko polje fields in the northwest, and Stankovačko polje field in the eastern part. The terrain is made mostly from eocenic and Cretaceous limestone, and upper Cretaceous dolomites. While carbonates make morphologically more prominent features of the landscape, eocenic flysch and quaternary sediments cover the bottom of karst fields and depressions. Considering the underground waterflow, carbonates are permeable, dolomites present relative barriers and flysch sediments present complete barriers. Catchment waters are mainly rainfall, water from springs (Biba, Kakma, Subiba, Begovača, Škorobić and Pećina) and underground water that forms springs in the very lake (Živača, Prizidina, Procip). Surface water is brought to the lake through numerous streams and creeks, the biggest ones being Kotarka canal that collects water from main melioration channels (Borelovica, Lemešac, Vrbica and Jablanac), and Lateral channel that collects surface water from the northern part of Vransko polje. Natural streams collect water from the northern part of the catchment (Škorobić stream which enters into the Lateral canal) and from Kulsko-Korlatsko polje, Nadinsko blato and Polačko polje (Kličevica stream).

Soil types in the catchment area are mostly “terra rossa” and alluvial sediments, combined with rendzina, regasol, lithosol, brown soil and others. Alluvial silts in Vransko polje form very fertile substrate for agriculture.

The climate is typical Mediterranean, dry and warm summers, wet and mild winters, with maritime water regime. Average annual precipitation is 870-980 mm (minimum 560 mm, maximum 1,500 mm). Average evaporation is 1,403 mm per year, least in winter, most in July. The difference between precipitation and evaporation makes 483 mm of rainfall a year. Average annual humidity is from 66% to 72% (maximum in winter, minimum in July). Daily air temperature vary from -10 °C to 32 °C, with the highest being in July (24 °C on average) and lowest in January (5.6 °C on average). Average daily insolation is cca 340 cal/cm² (from 110 cal/cm² in December to 600 cal/cm² in July), with number of sun hours being 2,450-2,600 yearly. Yearly overcast is 4.7, and fog days are rare (6 yearly). Snow appears in 5.2 days a year. The catchment area is dominated by strong and cold northeastern winds (bura), or warm and humid southeastern ones (jugo). Mild northwestern wind coming from the sea (maestral) is typical of summertime.

18. Hydrological values:

Vransko Lake is the biggest reservoir of fresh water in this region of Croatia. In 1970-ties there have been plans for building accumulation of fresh water in Vransko Jezero Lake and its usage for water supply, but the idea was abandoned due to problem of salinization. Springs from Vransko jezero's catchment (Kakma, Biba, Škorobić, Turanjsko jezero, Kutijin stan) are, however, regularly exploited for water supply, and Begovača seasonally. Springs Tinj, Mali Stabanj, Veliki Stabanj, Pećina are used for irrigation of arable land. During rainy season Vransko jezero's marsh prevents high waters from destroying the dikes and intruding the fields outside of the flood zone. The reedbeds are excellent in purifying waters that enter the lake through melioration canals, carrying fertilizers that could enhance lake eutrophication.

19. Wetland Types
a) presence:

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:

Q - permanent brackish lake, Vransko Jezero Lake (47.07 %)

Zka - coastal karst (44.50 %)

Sp – permanent brackish marshes (4.85 %)

Ss – seasonal brackish marshes/pools (1.78 %)

4 – seasonally flooded agricultural land (1.36 %)

Ts – seasonal freshwater marshes (flooded meadows) (0.85 %)

9 - canals and drainage channels (<0.01)

N – seasonal irregular stream (<0.01)

Y - freshwater springs (<0.01)

Although the wetlands of Vransko Lake mainly belong to inland wetland types, this lake is situated in the coastal region of Croatia, very close to Adriatic Sea.

20. General ecological features:

Vransko Lake is positioned at the transition from the Mediterranean climate zone, with the *Fraxino orni - Quercetum ilicis* vegetation community, to the Sub-Mediterranean climate zone, with the *Quercus - Carpinetum orientalis* vegetation community. This position, in combination with hydrological and land use factors, allows development of different habitats in a relatively small area. Wet habitats are more or less clearly distinguished from dry habitats. The open water habitat, which accounts for the largest part of the lake, is not very rich in diversity of macrophytes, but there is a well developed and ecologically valuable community of stoneworts (*Characeae*), with a periodical (especially during high salinity periods) dominance of Sago Pondweed (*Potamogeton pectinatus*), followed by few other *Potamogeton* species and Spiny Naiad (*Najas marina*.) Along the mildly sloped northeast and northwest coast of the lake, and especially in the area of Ornithological Reserve, vast reed beds dominated by Common Reed (*Phragmites australis*) and Triangular Club-rush (*Scirpus triqueter*) present an exceptional habitat for birds, vital for sustenance of the colony of herons as well as of Pygmy Cormorant (*Phalacrocorax pygmeus*) breeding colony. Periods with low water level are suitable for emergence of the muddy shores and pebbly beaches on the border of the reedbeds, the main feeding habitat for migrating waders. Behind the reedbeds in the Reserve lies the flooding zone, which in combination with sporadic grazing activities allows development of the rare Mediterranean wet grassland vegetation (*Molinio-Holoschoenion* and *Molinio-Hordeion secalini*). The southwest coast of the lake is mostly covered by arable land, a small patch of the Aleppo Pine (*Pinus halepensis*) forest and Modrave area covered by traditional olive groves surrounded with stony walls. Habitat patches of calcareous rocks with chasmophytic vegetation (including the endemic Littoral Corydalis (*Corydalis acaulis*) and intermittent pools are habitats small in size but not negligible in the context of diversity. The northern coast of the lake is lined with hills. Only a small part of it is managed by grazing, supporting the dry Mediterranean and Sub-Mediterranean grasslands. The rest of the hills are characterized by thermophilic vegetation (due to southern exposure and steep slopes), mainly covered in Mediterranean macchia and garrigue (with species Rock Rose (*Cistus creticus*)). Cave habitats are scarce in the Park's area, only 2 smaller caves inside its borders exist, but there is proposed NATURA2000 cave in the Park's immediate vicinity, its bat population regularly using the lake as a feeding ground.

21. Noteworthy flora:

Geographic position of Vransko Lake at the border of the Eu-Mediterranean and Sub-Mediterranean and great variety of habitats influence the diversity of flora. Recent investigations (Boršić et al, 2007) have recorded up to 707 plant species inside the Ramsar site. Data on mosses and lichens is scarce, while macrophytic algae community consists of 5 species of *Characeae*. Out of flora recorded, 147 species are threatened and/or protected at the national level, 16 species are Illyrian-Adriatic endemics, such as the Illyrian Iris (*Iris illyrica*) which grows on drained, dry grounds in the area of Dalmatia and northwest Balkans. Vransko jezero's marsh is habitat for many wetland species, such as the nationally endangered Badgeworth Buttercup (*Ranunculus ophioglossifolius*) and Persian Clover (*Trifolium resupinatum*) and critically endangered Marsh Pennywort (*Hydrocotyle vulgaris*). Dry grasslands and garrigue support growth of the

endangered Four-spotted Orchid (*Orchis quadripunctata*) and the Three-toothed Orchid (*Orchis tridentata*). Wet meadows in the flooding zone are habitat of the Dinaric endemic species Amethyst Meadow Squill (*Chouardia litardierei*), listed in the Annex II of the Habitat Directive.

A complete list of species registered for Vransko Lake with threat status is presented as [Appendix 2](#).

22. Noteworthy fauna:

INVERTEBRATES: Vransko Lake and its wetland is a highly productive area, supporting great diversity of not only birds, but other fauna as well.

Insects (*Insecta*) are particularly well adjusted to the ecotone between the dry and the wet habitats of the flooding zone Vransko Jezero Lake site is home to 42 species of butterflies (*Lepidoptera*), 2 of which are protected by the national law - the Old World Swallowtail (*Papilio machaon*) and the Green-Underside Blue (*Glaucopsyche alexis*). Out of 33 recorded species of dragonflies (*Odonata*) 9 is protected by the national law, and 1 - the Bladetail (*Lindenia tetraphylla*) is listed in the Annex II of the Habitat Directive. Out of 77 species of groundbeetles (*Carabidae*) 23 are threatened in Croatia.

One cave in the Vransko Jezero Lake area is habitat of endemic species of the genus *Spelaeobates* and the *Psyllipsocus ramburii*. For these species this was the first finding in Croatia.

One species of Crustaceans (*Crustacea*) is listed in the Annex II of the Habitat Directive - the White-clawed Crayfish (*Austropotamobius pallipes*), as well as one species of molluscs - the Ramshorn Snail (*Anisus vorticulus*), also strictly protected by the national law.

FISH: Most of the fish species were introduced in 20th century, so present ichthyofauna of Vransko Jezero Lake mainly consists of allochthonous freshwater species (cyprinids and their predators). Nevertheless, the established balance between the introduced fish and the fish-eating bird species allows for the autochthonous species to prosper as well: the Caucasian Dwarf Goby (*Knipowitchia panizzae*) – HD Annex II species, the endemic (*Rutilus rutilus*), the Freshwater Blenny (*Salaria fluviatilis*) and the European Eel (*Anguilla anguilla*) that is strictly protected in Vransko jezero Nature Park.

AMPHIBIANS: Importance of wetlands in sustaining amphibian populations is well known, so the Vransko Jezero Lake site lists 8 species of Amphibia, all protected by Croatian law. The one listed in the Annex II of the Habitat Directive is the Yellow-bellied Toad, in this area presented by endemic subspecies *Bombina variegata kolombatovici*. This particular subspecies, inhabiting middle and south Dalmatia, is especially endangered by meliorations, pesticides and changes in water regime.

REPTILES: Reptiles (Reptilia) are presented by 19 species in the Vransko Jezero Lake area, all protected by national law. Four of them are listed in the Annex II of the Habitat Directive: the European Pond Turtle (*Emys orbicularis*), the Hermann's tortoise (*Testudo hermani*), the Four-lined Snake (*Elaphe quatorlineata*) and the Leopard Snake (*Elaphe situla*). The three endemic species are mentioned in the explanation of Criteria. There is also the Dice Snake (*Natrix tessellata*), strictly protected in Croatia.

BIRDS: Birds are the greatest treasure of the Vransko Jezero Lake area. In total 255 species are recorded and 102 are breeding there. As much as 129 species are listed in the Bird Directive, 73 on the Annex I, 59 on the Annex II and 18 on the Annex III. Globally, three species are vulnerable: Dalmatian Pelican (*Pelecanus crispus*), Greater Spotted Eagle (*Aquila clanga*), Aquatic Warbler (*Acrocephalus paludicola*), while 7 are near threatened: Ferruginous Duck (*Aythya nyroca*), Red Kite (*Milvus milvus*), Rock Partridge (*Alectoris graeca*), Great Snipe (*Gallinago media*), Black-tailed Godwit (*Limosa limosa*), Curlew (*Numenius arquata*) and Roller (*Coracias garrulus*).

Vransko Jezero Lake is important site for 8 Birds Directive Annex I that represent qualification species for proposed NATURA 2000 and IBA site. Vransko Jezero Lake is the only nesting site for the critically endangered Pygmy Cormorant (*Phalacrocorax pygmaeus*) for many years in Croatia, where 10-22 pairs nest each year enlarging the nesting population and it supports the only nesting colony of herons in the Mediterranean part of Croatia, consisting of 5-10 pairs of the Purple Heron. Moreover, 100-150 pairs of the Little Bittern (*Ixobrychus minutus*) breed in reed beds.

Species with important wintering populations are Pygmy Cormorant (*Phalacrocorax pygmaeus*), Little Egret (*Egretta garzetta*), Merlin (*Falco columbarius*), Coot (*Fulica atra*) and Moustached Warbler (*Acrocephalus melanopogon*).

Vransko Jezero Lake is important stopover site and feeding area for many species during migration and wintering. Lake regularly supports $\geq 20,000$ Coots, belonging to Mediterranean-Black-Sea wintering population.

There are **8 bird species** listed in Annex I of the Birds Directive that represent trigger species (**bold**) of proposed NATURA 2000 (SPA) and IBA site **Vransko jezero and Jasen area**. Populations of BD Annex I species are estimated as follows (Institute of Ornithology, 2010):

Species	Common name	Status			Breeding Min. - Max.		% of nat.pop.	Wint. min-max		% of nat.pop.
Acrocephalus melanopogon	Moustached Warbler			W				500	600	13.3
Alcedo atthis				W						
Alectoris graeca		B			15	20	0.25			
Anthus campestris		B			3	4	0			
Ardea purpurea	Purple Heron	B			5	10	4.1			
Ardeola ralloides			S							
Botaurus stellaris		B	S	W	2	3	5			
Bubo bubo		B*			4	5	0.5			
Calandrella brachydactyla		B			0	5				
Caprimulgus europaeus		B			30	60	0.46			
Chlidonias niger			S							
Circaetus gallicus		B			1	1	0.91			
Circus aeruginosus		B		W	1	2	2.5			
Circus cyaneus				W				4	7	0.4
Circus pygargus		B			1	1	1.6			
Egretta alba		B	S	W	0	1		10	15	0.6
Egretta garzetta			S	W				1	2	2.5
Erithacus svecica			S							
Falco columbarius				W				1	2	2
Gavia arctica				W				0	13	0
Gavia stellata				W				0	3	1
Himantopus himantopus			S							
Ixobrychus minutus	Little Bittern	B			100	150	8.33			
Lanius collurio		B			200	300	0.07			
Lanius minor		B			4	5	0.17			
Lullula arborea		B			4	6	0.04			
Nycticorax nycticorax			S							
Phalacrocorax pygmaeus	Pygmy Cormorant	B		W	10	22	100	250	800	35.7
Philomachus pugnax			S							
Platalea leucorodia			S							
Plegadis falcinellus	Glossy Ibis		S							
Porzana parva	Little Crake	B			2	6	2.5			
Porzana porzana	Spotted Crake	B			2	3	6.6			
Porzana pusilla	Baillon's Crake	B			1	2	8.3			
Sterna hirundo			S							
Thalasseus sandvicensis				W				0	20	0
Tringa glareola			S							

Status: B – breeding; S – staging; W - wintering

*Ramsar site contains only parts of territories

MAMMALS: Only bats have been more thoroughly investigated: 12 species have been recorded in literature for the caves in and around the site, all of them using Vransko Jezero Lake for feeding. Recent surveys confirmed 8 of these species (one remained determined only to the level of echolocation group) and added 3 newly recorded species to the list. The Long-fingered Bat (*Myotis capaccinii*) and the Mediterranean Horseshoe Bat (*Rhinolophus euryale*) are globally considered vulnerable and are listed in the Annex II of the Habitat Directive, while the Greater Horseshoe Bat (*Rhinolophus ferrumequinum*), the Lesser Horseshoe Bat (*Rhinolophus hipposideros*), the Greater Mouse-eared Bat (*Myotis myotis*), the Lesser Mouse-eared Bat (*Myotis blythii*) and the Schreiber's bat (*Miniopterus schreibersii*) are listed in the Annex II of the Habitat Directive.

23. Social and cultural values:

Vransko Lake area has a long history of being inhabited by human populations, due to its significance as a freshwater resource, but also due to fact that it has been often at the borderline of cultural and political happenings. Some archeological remains include the preromanic church at Crkvine locality which is currently being researched, peninsula Babin skoj with remains of Neolithic graves, Liburnian fortifications, refuge from the Late Antique period, Venetian sentry box. Romans had also left a trace of their technical skills, in the form of a 30 km long aquaduct from Vrana springs all the way to Zadar. Remains of an old Croatian village have been discovered next to the lake shore, obviously abandoned after the invasion of Turks at the beginning of the 16th century. The "han" built by a local admiral of the Turkish army presents the most western monument of civil Otoman architecture, and stands today next to the Vrana fortress, which was the most important Templar fort from 11th century.

Throughout history the site has been used mainly for agriculture and fishing, and it was because of enlarging of the agricultural land that the Vrana field hydromelioration system was built in the 18th century. During 20th century lake was considered for building accumulation for water supply, but these plans have been abandoned due to increasing salinization of the lake and the growing awareness of the need for lake protection as a nature reserve.

Today the lake's springs are used directly for water supply only in the drought periods but many springs and partly the underground karst aquifer upstream of the lake are used for water supply on regular scale. Agriculture is the main economic activity in the lake area, slowly being followed by tourism. The common path of agriculture, tourism and nature protection is seen in the implementation of environmentally friendly agricultural techniques, and creation of the Nature Park brand for products grown in the area. Commercial fishing is forbidden, so fishing has become a popular mode of recreation, followed by cycling, boating, walking.

24. Land tenure/ownership:

a) within the Ramsar site:

Most of the site is owned by the state, particularly state agencies for natural resources management: the water, together with the reedbeds, is managed by the state enterprises "Croatian Waters", and the karst areas with macchia and pine forests are managed by the "Croatian Forests". Around 10 ha of olive groves are privately owned mostly by inhabitants of Murter island, agricultural land in the Reserve and on the southwest corner of the Park are owned by inhabitants of Pakoštane municipality. Most of the flooded meadows and marsh area are owned by the state.

(b) in the surrounding area:

Combination of state (mostly "Croatian Forests") or municipality owned, with smaller privately owned particles (mostly for agriculture). Drained fields of Jasen (natural part of flood zone) in the catchment are owned by a single private owner.

25. Current land (including water) use:

a) within the Vransko Jezero Lake site:

The Vransko jezero Nature Park area is not inhabited. About 5,000 inhabitants live in villages on the site borders, and the villagers of Vrana are most oriented towards the area in their livelihood. Small part of the village inside the Ramsar site borders is planned in the spatial documentation as an eco village, in

reality designed more as an apartment area. There is the camping site (capacity for cca 200 person) inside the site borders, and facilities for recreational riding. About 10-15 tourist agencies use the area for excursions. Recreational fishing and cycling are most frequent individual tourist activities. The Nature Park's management runs two information centers for educational purposes.

Current land use in the Vransko jezero Nature Park is visiting primarily and agriculture and cattle grazing. A cattle grazing is sporadic and extensive, helpful in conservation of the Mediterranean wet grasslands and meadows. Agriculture consists of 70% traditionally cultivated olive groves and 30% vegetables, grown on small plots in mosaic, but with intensive use of pesticides and fertilizers.

The water is used mostly for recreational fishing, and small amounts are used for irrigation of the arable land. In summer period the spring Begovača is used for additional water supply for the nearby villages.

b) in the surroundings/catchment:

The land in the catchment area is mostly used for intensive agriculture on medium-size plots. As the land is not very fertile due to salinization, it is not cultivated regularly, which is in favor of maintaining good water quality of the lake. There are several springs in the catchment used for water supply, and also springs and canals used for irrigation of the land.

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:

Past threats to Vransko Lake site (referring to the period before the establishment of the protected area, and in the first few years after) include frequent reed burning, illegal fishing with nets and other non-recreational tools, illegal hunting on protected birds, penetration inside reed beds and making paths, legal hunting of waterfowl, illegal garbage deposition and non-existence of facilities for waste water treatment. All these threats caused disturbance to the birds and/or habitat deterioration. Most of these threats are eliminated or at least diminished since the lake has been protected as a Nature Park. Some illegal burning of reed occurs, but with a decreasing trend due to education of local community about the benefits of nature protection. Constant surveillance is organized to prevent illegal fishing and penetration of poachers inside the Park. Hunting of birds is no longer an issue. Waste water and illegal garbage disposal are still problems but the municipalities have plans for solving them in coming years. The pollution from these sources is therefore expected to decrease.

b) in the surrounding area:

Interventions in the past in the catchment area affected significantly the ecological character of the Ramsar site. The first human interventions were construction of the Prosika canal and other melioration canals starting in the 18th century, which resulted in drainage of a large part of the wetland northeast of the lake. Out of 570 ha of former Vrana Swamp as much as 410 ha has been meliorated, while only 160 ha remained in the natural flooding regime.

Out of 31 karst springs in the catchment, 5 are used for public water supply, 7 for irrigation of agricultural fields, and 4 are used locally (for water supply or individual field irrigation). In addition to this, illegal landfills have been made in the agricultural fields, from which the land owners pump the water out. The total annual pumping estimates amount 1.9×10^6 m³ for water supply and about 1.0×10^6 m³ for melioration.

These anthropogenic influences are worsened by the climatic change factor. Recent trends in rise of the sea level for 0.13 mm/year (detected for the period since 1969), combined with the regional decrease in rainfall and increase in water uptake, cause salinization of Vransko Jezero Lake and subsequent change in habitats.

Potential risk lies in the County's plans for advanced irrigation in the catchment area.

27. Conservation measures taken:

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

The Vransko Lake area has been protected by the national law in the category of the Nature Park since 1999. The 881.23 ha large wetland area in the northwest of the site (15.3% of the site area) has been even more strictly protected in the form of the Special Ornithological Reserve since 1983. In 1983, the international importance of the area was recognized and the lake was proclaimed an Important Bird Area of Europe.

The actual wetland area is larger than the area legally protected. The area of Jasen is a natural part of the flooding zone and encompasses additional 160 ha outside the borders of the Vransko jezero Nature Park.

The entire wetland area with Jasen is included in the National Ecological Network proclaimed in 2007 as area important for birds while the Ornithological Reserve with Jasen is designated for other species and habitat types (see the map of ecological network in Appendix 2).

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

The Nature Park corresponds to the category V, while the Ornithological Reserve corresponds to the category IV. Strictly protected zone of the Reserve corresponds to Ia category.

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

The Management Plan for the Nature Park was proclaimed in 2010 and since then being implemented by the Public Institution Vransko jezero Nature Park. Monitoring of the Management Plan is conducted by the Public Institution and the State Institute for Nature Protection and shows good percentage of implemented activities towards planned activities. Ministry of Environmental and Nature Protection is responsible for overall monitoring of the Management plan implementation.

d) Describe any other current management practices:

Building in the Vransko Jezero Lake area is limited and regulated through the Vransko jezero Nature Park Spatial Plan (2012). Hunting and fishing are forbidden in the Ornithological Reserve. Commercial fishing is forbidden in the entire area. Hunting of all bird species is forbidden in the entire area. Cattle grazing and ecological agriculture are encouraged by the Nature Park programs.

The area is divided in three zones: strictly protected zone (7.4 % of the total site area) where no entry is allowed except for surveillance and research, active management zone which comprises the most (91.8 %) of the site and requires active protection efforts and the usage zone (0.78 %) which encompasses the tourist infrastructure and inhabited areas.

28. Conservation measures proposed but not yet implemented:

The entire Vransko jezero site together with Jasen area is in the proposal for NATURA 2000 (as Site of Community Importance and Special Protected Area), to be proposed to European Commission upon accession of Republic of Croatia to EU.

Recommendation is made by the State Institute for Nature Protection for proposal of the site as a SPAMI (Special Protected Area of Mediterranean Importance) but has not yet been officially endorsed.

29. Current scientific research and facilities:

The natural values of the Vransko Lake site have been well documented: flora and fauna inventoried, cadaster of cultural and historical heritage available, map of habitats on the scale 1:5,000 ready. Current research is focused mainly on hydrology and geohydrology of the lake and its catchment, as well as on influence of hydrological cycles on ecological processes and trophic state of the lake. Some research on the impact of human activities (agriculture) on water and sediment of the lake is also being conducted. Annual monitoring activities include monitoring of water quality, ornithofauna (wintering and breeding), bird ringing camp (monitoring of migratory ornithofauna), macrophytes (including the algae *Characeae*),

several endangered habitats (Mediterranean wet grasslands and meadows listed in NATURA 2000) and bat fauna. Additional three-annual monitorings include fish, amphibians and reptiles, dragonflies, phytoplankton, zooplankton and benthos of the lake. Every autumn a comprehensive bird ringing camp is organized in order to monitor the role of Vransko Lake in bird migrations. The Ornithological Station with an observation hide is built in the Ornithological Reserve exactly for this purpose.

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

In the park's area there are two visitors' centers: Prosika harbor with the info point, souvenir shop, refreshment point, observation hide, educational trail on fishing and traditional usage of the area and a berth facility for fishermen; and Kamenjak sightseeing point with the info point, souvenir shop, refreshment point and a botanic educational trail. A third visitors' centre is planned at Crkvine locality, to be consisted of a large observation hide designed to accept groups of visitors. In the usage zone on the border of the Ornithological Reserve there is an ornithological educational trail for individual visitors, equipped with two hides. School visits are accepted at Prosika harbor, which is suited for educational programs. Several information booklets are available, including tourist map, educational brochures on natural values of the Ramsar site, and a detailed guide of the Park's ornithofauna.

31. Current recreation and tourism:

The lake is used mostly for recreational fishing, with the fishermen being the most abundant group of visitors (average 2,200 visitors/year). The area is also popular for cycling (individual cyclists from April to October and a cycling marathon once a year), and there is occasional interest in kayaking and sailing. Tourism activities are not intensive, and mostly in the form of sightseeing and birdwatching (which is the only tourist activity taking place in the Reserve). Larger groups of visitors are accepted at visitors' centre away from the Ornithological Reserve. Total average number of visitors is about 9,000 visitors/year.

32. Jurisdiction:

Territorial jurisdiction:

Zadar County
Božidara Petranovića 8
HR-23000 Zadar
tel: +385 23 350 350
fax: +385 23 350 319
e-mail: zupanija@zadarska-zupanija.hr
web: <http://www.zadarska-zupanija.hr/index.php/kontakti>

Šibenik – Knin County
Trg Pavla Šubića I. br. 2
HR-22000 Šibenik
tel: +385 22 460 701
fax: +385 22 469 750
e-mail: zupan@sibensko-kninska-zupanija.hr
web: <http://www.sibensko-kninska-zupanija.hr/index.asp>

Sectoral jurisdiction:

Ministry of Environmental and Nature Protection
Ulica Republike Austrije 14
HR-10 000 Zagreb
tel: +385 1 3782 111
fax: +385 1 3717 149
e-mail: pr@mzopu.hr
web: <http://www.mzoip.hr/>

33. Management authority:

Public Institution Vransko jezero Nature Park
 Kralja Petra Svačića 2
 HR-23 210 Biograd na moru
 e-mail: pp-vransko-jezero@zd.t-com.hr
 web: www.vransko-jezero.hr

34. Bibliographical references:

- Bedek, J., Gottstein-Matočec, S., Jalžić, B., Ozimec, R., Štamol, V. (2006): Catalogue of cave type localities of Croatian fauna. *Natura Croatica* 15. Supl 1: 1-154.
- BirdLife International (2004) Birds in the European Union: a status assessment. Wageningen, The Netherlands: BirdLife International
- Boršić, I., Katalinić, A., Milović, M., Ozimec, S., Stančić, Z., Vojnić Rogić, I., Vuković, N., Zrnčević, Z., Zupan, D. (2007): Inventarizacija i kartiranje vaskularne flore Parka prirode Vransko jezero (Inventarization and mapping of vascular flora of the Vransko jezero Nature Park). Public Institution Vransko jezero Nature Park and Croatian Botanical Society, unpublished report
- Burfield, I. and van Bommel, F. (2004): Birds in Europe. Population estimates, trends and conservation status. BirdLife International
- European Commission (2011): Map of EU biogeographic regions EU 27+1, Doc.Hab. 11-05/04
- Faculty of Agronomy, University of Zagreb (2006): Plan navodnjavanja za područje Zadarske županije (Plan of irrigation in Zadar County), strategic plan (team leader D. Romić), Zadar County, Croatia, unpublished
- Fortis, A. (1984): Put po Dalmaciji (Journey through Dalmatia), Globus, Zagreb, p. 303
- Fritz, F (1984): Postanak i starost Vranskog jezera kod Biograda na moru (The origin and age of the Vransko jezero near Biograd na moru). *Geološki vjesnik* 37: 231-243.
- Grlica, J. (2010): Izvještaj o istraživanju vodenih makrofita u Parku prirode Vransko jezero 2010. Godine (Report on investigations of aquatic macrophytes in Vransko jezero Nature Park in 2010), Public Institution Vransko jezero Nature Park, unpublished
- Hrvatsko društvo za biološka istraživanja (2010): Istraživanje učestalosti i ekologije autohtonih vrsta riba JU PP Vransko jezero (Investigations of frequency and ecology of autochthonous fish of Vransko jezero Nature Park), Public Institution Vransko jezero Nature Park, unpublished
- IGI - Institute of Geological investigations (1995): Geological map of Croatia (authors I. Velić and J. Velić), Proc. of 1st Croatian Geological Conference, Institute for Geological investigations and Croatian Geological Society
- Institute for Ornithology (Sanja Barišić, Davor Ćiković, Jelena Kralj, Goran Sušić, Vesna Tutiš), Dragan Radović, Ivan Budinski, Robert Crnković, Antun Delić, Dubravko Dender, Vlatka Dumbović, Ivan Darko Grlica, Luka Jurinović, Davor Krnjeta, Krešimir Leskovar, Duje Lisičić, Ivica Lolić, Gordan Lukač, Kristijan Mandić, Krešimir Mikulić, Tibor Mikuska, Gvido Piasevoli, Andrej Radalj, Zlatko Ružanović, Vlatka Ščetarić, Mirko Šetina, Adrian Tomik) (2010): Estimations of bird populations for proposed SPA's in Croatia. Report for the State Institute for Nature Protection. Zagreb
- IUCN (2012): The IUCN Red List of Threatened Species. <http://www.iucnredlist.org/>
- Katalinić A., Rubinić, J., Buselić, G., (2007): Hydrology of two coastal karst cryptodepressions in Croatia: Vransko jezero vs Vransko jezero. Proc. of the 12th World Lake Conference Taal 2007, Jaipur, Ministry of Environment & Forests Government of India, 732-743
- Mihoković, N. (2010): Istraživanje raznolikosti faune vretenaca Vranskog jezera (Research on dragonfly fauna diversity in Vransko jezero Nature Park), Croatian Odonatological Society Platycnemis and Public Institution Vransko jezero Nature Park, unpublished
- Kralj, J. (2008): Nature Park Vransko jezero & Jasen site. Faunal report. Institute of Ornithology, Croatian Academy for Sciences and Arts

- Mrakovčić, M., Mišetić, S., Plenković-Moraj, A., Grlica, J.R., Mihaljević, Z., Čaleta, M., Mustafić, P., Kerovec, M., Pavlinić, I., Zanella, D., Buj, I., Brigid, A., Gligora, M. i Kralj, K. (2004): Kategorizacija i inventarizacija florističkih i faunističkih vrijednosti Parka prirode Vransko jezero (Categorization and inventarization of flora and fauna of the Vransko jezero Nature Park), Faculty of Natural Sciences, University of Zagreb and Public Institution Vransko jezero Nature Park, unpublished
- Odluka o donošenju Prostornog plana Parka prirode Vransko jezero (Decision on Vransko jezero Nature Park Spatial Plan Declaration), Narodne novine 58/12 (Official Gazette of the Republic of Croatia 58/12), 2012
- Plan upravljanja Parkom prirode Vransko jezero (Vransko jezero Nature Park Management Plan), 2010, Public Institution Vransko jezero Nature Park, unpublished
- Radović, D. (2005): Katastar prirodne baštine Parka prirode Vransko jezero (Cadaster of natural values of Vransko jezero Nature Park). Croatian Ornithological Society and Public Institution Vransko jezero Nature Park, unpublished
- Stanković, I. (2010): Istraživanje alga iz porodice Characeae (Research on Characeae), Association for Biological Research BIOM and Public Institution Vransko jezero, unpublished
- State Institute for Nature Protection: NATURA 2000 GIS database
- Tutiš, V. et. al. (2010): The Reed Book of Birds of Croatia. Institute of Ornithology. In prep.
- Uredba o proglašenju ekološke mreže (Act on proclamation of National Ecological Network), Narodne novine 109/07 (Official Gazette of the Republic of Croatia 109/07), 2007
- Wetlands International (2006): Waterbird Population Estimates – 4th Edition. Wetlands International, Wageningen, the Netherlands. <http://www.wetlands.org>
- Zadar County Department for Spatial Planning (2005): Zadar County Spatial Planning Documentation
- Zakon o proglašenju Parka prirode Vransko jezero (Act on Vransko jezero Nature Park Proclamation), Narodne novine 77/99 (Official Gazette of the Republic of Croatia 77/99), 1999.
- Žvorc, P. i Hamidović, D. (2008): Inventarizacija faune šišmiša parka prirode Vransko jezero. Unpublished report. Hrvatsko biospeleološko društvo
- http://ec.europa.eu/environment/nature/legislation/birdsdirective/index_en.htm
- http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm
- http://europa.eu/legislation_summaries/environment/water_protection_management/l28084_en.htm
- <http://natura2000.dzrp.hr/natura/>
- <http://vransko-jezero.hr/cms>
- <http://www.iucnredlist.org/>
- <http://www.dzrp.hr/ekoloska-mreza/ekoloska-mreza-rh/ekoloska-mreza-rh-339.html>

Please return to: **Ramsar Convention Secretariat, Rue Mauverney 28, CH-1196 Gland, Switzerland**
Telephone: +41 22 999 0170 • Fax: +41 22 999 0169 • e-mail: ramsar@ramsar.org

APPENDIX 1 – Maps

1. Boundaries of Vransko Lake Ramsar site on topographic map 1: 25,000
2. Map with location of Vransko Lake in Croatia
3. Map of the site of National ecological network Vransko i Jasen on topographic map 1: 100,000
4. Land use map of Vransko Lake Ramsar site (Corine Land Cover)

APPENDIX 2 – Lists

1. List of recorded mammals in Vransko Lake Ramsar site
2. List of recorded birds in Vransko Lake Ramsar site
3. List of recorded reptiles in Vransko Lake Ramsar site
4. List of recorded amphibians in Vransko Lake Ramsar site
5. List of recorded fishes in Vransko Lake Ramsar site
6. List of recorded Odonata in Vransko Lake Ramsar site
7. List of recorded Lepidoptera in Vransko Lake Ramsar site
8. List of recorded Carabidae in Vransko Lake Ramsar site
9. List of recorded cave invertebrates in Vransko Lake Ramsar site
10. List of recorded Mollusca in Vransko Lake Ramsar site
11. List of recorded plants in Vransko Lake Ramsar site
12. List of recorded macrophytic algae in Vransko Lake Ramsar site
13. List of recorded habitat types in Vransko Lake Ramsar site
14. List of mapped classes of land use in Vransko Lake Ramsar site (Corine Land Cover)