# Country:
# Republic of North Macedonia

## Site name:

## Lake Ohrid

September 2020

### Offline IS Word form

Th purpose of this form is to help in collecting data on a Ramsar Site for the completion of an online Ramsar Information Sheet (RIS) at https://rsis.ramsar.org. It can be circulated between the National Focal Point, RIS compilers and other national data collectors. However, it is not accepted by the Ramsar Secretariat for submission of a Site update or new Site designation. The data collected through this form must be transferred to the online form by the National Focal Point or an authorized online RIS compiler.

All fields marked with an asterisk (*) are required.

For more information on how to use this form, please refer to the document

How to use the offline RIS Word form.

# Summary

## 1.1 Summary description

*Please provide a short descriptive text summarising the key characteristics and internationally important aspects of the site. You may prefer to complete the four following sections before returning to draft this summary.*

Summary *(This field is limited to 2500 characters)*


Lake Ohrid is an ancient oligotrophic inland freshwater with between 1.3 and 1.9 million years of continuous existence. It is the oldest and deepest lake by average depth in Europe and a World Heritage Site since 1979. Hosting 1,200 species, over 200 of them endemic, it displays one of the highest rates of biodiversity of any inland water on Earth when measured by surface area. While some of its world-unique species are relicts whose relatives exist only as fossils in other locations, many have evolved in-lake over its long, isolated natural history

Part of the reason for Lake Ohrid's exceptional flora and fauna is that underground karst channels supply over 50% of its water via subaquatic and terrestrial springs. These springs are chemically individual, creating specific micro-habitats that contain globally singular species within tight natural boundaries. Beyond the springs, oxygen-rich conditions and a wide photic zone furnish vertical habitats to depths of 150m too, supporting endemic taxa throughout the food web from phytoplankton to predatory fish.

Banked east and west by the Galichica and Jablanica/Mokra Mountains, Lake Ohrid moderates climate, allowing refugium habitats in the local region, which enjoys elevated floral diversity matched by variety in many species categories. With a single outflow, the River Black Drim ultimately flowing to the Adriatic Sea, Lake Ohrid is also a major component of the species-rich Drim Basin

Studenchishte Marsh, a remnant of previously extensive shoreline wetlands, furthers Lake Ohrid's biological diversity, containing wet meadows, alkaline marshes and fens; the largest lowland peat histosol range in Macedonia; and relict plant associations with nationally protected fauna within. It supports water clarity and quality of the wider lake area through nutrient-filtering, thereby contributing to the maintenance of Ohrid's once-in-a-world ecosystems

Both Lake Ohrid and Studenchishte provide important paleoenvironmental archives within peat layers and sediment. The latter has already produced extensive sediment cores that, combined with the lake's peculiar flora and fauna, are providing insight into climate history and the relationship between biological and geological evolution.

People have settled Lake Ohrid for up to 8,000 years. The region therefore contains numerous archaeological sites, some underwater, and constitutes an important resource for understanding human and wetland coexistence over several millennia.

Lake Ohrid and Ohrid Region are included into several development and strategic documents adopted by Macedonian Government and Macedonian Parlament:

- Spatial Plan of Republic of Macedonia (2004-2020),

- Spatial Plan for Ohrid –Prespa Region (2005-2020),

- Sectoral Study of Natural Heritage for preparation Spatial Plan of RM (2004-2020),

- National Strategy for Biodiversity and Action Plan (2018-2023),

- National Strategy for Nature and Action Plan (2017-2027).

# Data & location

## 2.1 Formal data

### 2.1.1 Name and address of the compiler of this RIS

#### Compiler 1

Name

MINISTRY OF ENVIRONMENT AND PHYSICAL PLANNING

Institution/agency

Administration of Environment

Postal address *(This field is limited to 254 characters)*

Square ,,Presveta Bogorodica" No 3

1000 Skopje

Republic of North Macedonia

E-mail *(The online RIS only accepts valid e-mail addresses, e.g. example@mail.com )*

infoeco@moepp.gov.mk

Phone *(The online RIS only accepts valid phone numbers, e.g. +1 41 123 45 67 )*

+389 2 3251 403

Fax *(The online RIS only accepts valid phone numbers, e.g. +1 41 123 45 67 )*

#### Compiler 2

Name

Citizan Inicijative Ohrid SOS

Institution/agency /

Postal address *(This field is limited to 254 characters)*

E-mail *(The online RIS only accepts valid e-mail addresses, e.g. example@mail.com )*

ohridsos@gmail.com

Phone *(The online RIS only accepts valid phone numbers, e.g. +1 41 123 45 67 )*

Fax *(The online RIS only accepts valid phone numbers, e.g. +1 41 123 45 67 )*

### 2.1.2 Period of collection of data and information used to compile the RIS

From year *(The online RIS only accepts numeric values)*

2002

To year *(The online RIS only accepts numeric values)*

2020

### 2.1.3 Name of the Ramsar Site

Official name (in English, French or Spanish)* *(This field is mandatory)*

Lake Ohrid

Unofficial name (optional)

## 2.2 Site location

### 2.2.1 Defining the Site boundaries

*The site boundaries must be clearly delineated on both: a) a GIS shapefile and b) a digital map/image:*

*-> To define the site boundaries please complete field 2.2.1 a1), 2.2.1 a2) and 2.2.1 b) via the online form.* **- UPLOAD via online form-**

Boundaries description *(This field is limited to 2500 characters)*

The boundary of Ramsar site - Ohrid Lake follows the shore line of lake, include area of Studenchishte Marsh, locality Sveti Naum and parts of wetlands near the Lake.

Ramsar Site - Ohrid lake is within both the UNESCO World Heritage Site designated as Natural and Cultural Heritage of the Ohrid Region and the UNESCO Transboundary Biosphere Reserve Ohrid-Prespa, and overlaps with parts of National Park Galichica, The biodiversity hot spots localities identified in the boundaries of UNESCO World Heritage Site designated as Natural and Cultural Heritage of the Ohrid Region is also include into to the boundaries of Ramsar site-Ohrid Lake.

The proposed Ramsar Site ,,Ohrid Lake" is protected at national level as Monument of nature ( III category IUCN) and is also proposed as an Emerald Site (Bern convention). According law on Nature protection Ohrid lake should be re-proclaim.

Within the GEF / UNEP Project "Achieving Biodiversity Protection through the Creation and Effective Management of Protected Areas and Biodiversity Maintenance in Land Use Planning" (STAR 5) in coordination with the MoEPP in cooperation with UNEP and IUCN ENCARO and local experts, in 2020 started acitvities for preparation of Study for valorisation and Draft Management Plan for Monument of Nature Ohrid lake.

Also, Study for valorization of Studenchishko Marsh was developed. Pursuant to the Law on Nature Protection, based on the study, the Ministry of Environment in September 2020 initiated a procedure for declaring Studenchishko Marsh as a protected area in category IV - Nature Park.

Ohrid Lake is identified as future Natura 2000 site (SPA - Special Protected Area) according to Birds Directive 2009/147/EC and the site is adjacent to the Albanian IBA site "Lake Ohrid" (AL002, Heath & Evans 2000).

### 2.2.2 General location

a) In which large administrative region does the site lie?

Ohrid Municipality, Struga Municipality and Debarca Municipality

b) What is the nearest town or population centre?

1) Ohrid 2) Struga

### 2.2.3 For wetlands on national boundaries only

a) Does the wetland extend onto the territory of one or more other countries?

[x] Yes / [] No

b) Is the site adjacent to another designated Ramsar Site on the territory of another Contracting Party?
[ ] Yes / [x] No

c) Is the site part of a formal transboundary designation with another Contracting Party?

[ ] Yes / [x] No

d) Transboundary Ramsar Site name:

N/A

### 2.2.4 Area of the Site

*If you have not established an official area by other means, you can copy the area calculated from the GIS boundaries into the 'official area' box.*

Official area, in hectares 25 205 (ha): *(The online RIS only accepts numeric values)*

Area, in hectares (ha) as calculated from GIS boundaries

### 2.2.5 Biogeography

*Please provide the biogeographic region(s) encompassing the site and the biogeographic regionalization scheme applied:*

Biogeographic regions

The site belongs to the alpine biogeographical region .

| Regionalisation scheme(s)[1] | Biogeographic region |
|---|---|
| Freshwater Ecoregions of the World (FEOW) | 420: Southeast Adriatic Drainages |
| European Union Biogeographical Regions | Alpine |

Other biogeographic regionalisation scheme *(This field is limited to 2500 characters)*

[1] Marine Ecoregions of the World (MEOW) | Udvardy's Biogeographical Provinces | Bailey's Ecoregions | WWF Terrestrial Ecoregions | EU biogeographic regionalization | Freshwater Ecoregions of the World (FEOW) | Other scheme (provide name below)

# Why is the Site important?

## 3.1 Ramsar Criteria and their justification

*Tick the box against each criterion applied to the designation of the Ramsar Site. All criteria which apply should be ticked. Please explain why you selected a criterion by filling in the relevant fields on this page, on the three other pages of this section 'Criteria & justification' and on the 'Wetland types' page of the section 'What is the site like?'.*

### [✓] Criterion 1: Representative, rare or unique natural or near-natural wetland types

*To justify this Criterion, please select at least one wetland type as representative, rare or unique in the section What is the site like? > Wetland types and provide further details in at least one of the three boxes below.*

Hydrological services provided *(This field is limited to 3000 characters)*

Source of the River Black Drim, ancient, oligotrophic Lake Ohrid is a major component of the Drim Basin, supplying freshwater to hundreds of thousands of regional residents and visitors for recreational, agricultural and every-day purposes alike. By average depth, it is the deepest lake in Europe. It is also the oldest continuously existing inland water on the continent (Wagner et al, 2017).

Around 50% of Lake Ohrid's water enters via underground karst channels in the Mount Galichica massif from both sibling Lake Prespa and atmospheric precipitation that has been absorbed into the ground (Jordanoska, 2012). These channels filter and stabilize water conditions to produce varied micro-habitats at sublacustrine and surface feeder springs (Matzinger et al, 2006; Jordanoska et al, 2010; Matter et al 2010), supporting exceptionally clear, high-oxygen conditions in the lake proper, which has protected and evolved endemic species at every layer of the food chain (Albrecht & Wilke, 2008).

Studenchishte Marsh, a coastal wetland with alkaline marshes and fens, supplies water through groundwater discharge and regulates for the ecosystem services of the wider Lake Ohrid region by retaining nutrients, thereby buffering water clarity and quality against eutrophication pressures (Apostolova et al, 2016; Society of Wetland Scientists, 2018). This contributes to maintenance of both water for human needs and Lake Ohrid's world-unique freshwater ecosystems such as by helping to secure the deep photic zone required by native phytoplankton.

Other ecosystem services provided *(This field is limited to 3000 characters)*

With some of the oldest human settlements in Europe upon its shore, Lake Ohrid has furnished humanity with food, water and shelter during climate extremes for approximately 8,000 years. Even the characteristic local architecture has developed under the influence of the way light reflects from the water's surface (Jovanovic-Popovic et al, 2012), and archaeological sites indicate pre-Christian water-worship. It is therefore significant for the study of human interaction with wetlands over several millennia.

Derived from its unique ecosystem and sediment records stretching hundreds of thousands of years, Lake Ohrid is a key site for paleoenvironmental, paleoclimate and speciation research as well as the study of interplay between biological and geological evolution (Wagner, 2017). Its specific characteristics as a relatively small, accessible ancient lake with exceptional species richness make it almost uniquely suited to the function of a natural laboratory (Hauffe et al, 2011).

Beyond the capital Skopje, the Lake Ohrid region is the major attraction of the growing Macedonian tourism industry that contributes 6.6% to national GDP (World Travel and Tourism Council, 2018).The lake's exceptionally clear waters with Secchi depths of 7-15m in the pelagic zone (Wagner et al, 2017) support diverse recreation with significant combined contribution to the local economy including general beach activities, swimming, scuba-diving, sailing, fishing,

canoeing, paddleboarding and at least one professional sport event: the Ohrid Swimming Marathon, part of the FINA UltraMarathon Swim Series.

Fisheries, most notably for carp and Ohrid trout, continue to contribute both to residents' sustenance and the regional economy (GiZ, 20017).

Studenchishte Marsh, the final fully functioning remains of previously extensive coastal wetlands at Lake Ohrid, offers a paleoenvironmental archive of its own right through its stratified peat layers; constitutes a blueprint from which other regional wetlands can be rehabilitated; functions as a spawning ground for three commercially important fish taxa; and contributes to carbon capture via 300cm histosol peatlands, which are the largest remaining lowland peat histosols in the Republic of North Macedonia (Apostolova et al, 2016; Society of Wetland Scientists, 2018).

Other reasons *(This field is limited to 3000 characters)*

Lake Ohrid buffers temperature and dryness extremes in the wider region and interplays with the surrounding mountain relief to produce a microclimate that has served as a refugium for plants including the continual presence of trees across hundreds of thousands of years of glacial advances and contractions, a contributory reason for regional floral diversity of continental significance in the present day (Sadori et al, 2016). As the most long-lived lake in Europe, it provides this climate mitigation on timescales that cannot be approached by the vast majority of inland waters worldwide.

Lake Ohrid's moderating influence upon climate additionally enabled glacial remnant coastal wetlands to survive in the Ohrid region when warming temperatures and drying conditions in the post-glacial era caused Balkan valleys to desiccate and pushed such habitats northwards (Spirovska et al, 2012). With several similar wetland refugiums drained in the past century, Studenchishte Marsh on Lake Ohrid's north-east coast is therefore rare and representative in its own right, holding 50% of the marsh associations known for North Macedonia (Apostolova et al, 2016), including unusual floral combinations established during the glacial retreat (Spirovska et al,

2012). Indeed, Studenchishte now displays one of the few remaining examples of a lowland peatland in the Republic of North Macedonia (Spirovska et al, 2012).

### [✓ ] Criterion 2: Rare species and threatened ecological communities

*To justify this Criterion, please give details below on:*

*- relevant plant species in the section Criteria & justification> Plant species (3.2)*

*- relevant animal species in the section Criteria & justification> Animal species (3.3)*

*- relevant ecological communities in the section Criteria & justification> Ecological communities (3.4)*

Optional text box to provide further information *(This field is limited to 3000 characters)*

Alongside numerous formally threatened species at regional, European and global levels, Lake Ohrid supports many endemics such as Salmo letnica that would likely trigger threatened status if sufficient IUCN-relevant data for population and trends were available. It additionally contains several taxa on the Republic of North Macedonia's List of Protected Wild Species and List of Strictly Protected Wild Species, which offer an indication of conservation interest in the absence of complete Red Lists for the country. In total, according to the IUCN Global Red List, Lake Ohrid harbors 26 species assessed as vulnerable; 17 as endangered; and 11 as critically endangered.

Important flora species of Lake Ohrid, at locality Kalishta are: *Nufar lutea*, *Nymphaea alba*, strictly protected species at national legislation.

The adjacency of Studenchishte Marsh's alkaline marshes and fens to an ancient lake with over a million years' continuous existence elevates its international significance and rareness as an ecotone, as does the presence of endemic diatoms and invertebrate taxa, relict plants, several species of waterbirds, and reptiles and amphibians that are protected/strictly protected on a national level. It is worth to metion the presennece of the Blakan whip snake (*H.gemonensis*). This species distribution is rectricted to Prespa region, Ohrid Lake region and River Drim valley. Therefore throughout the National Red List assessment it is recognized as endangered (EN).

Also very important locality for natural ecological character of Lake Ohrid is green belt of fragmites, at localite Podmolje, and fragments with *Alnus glutinosa* and Tamarix spp., near coastal (rivers and lake).

### [✓ ] Criterion 3 : Biological diversity

*To justify this Criterion, please give details in the box below. If you want to name any specific species, please give details on:*

*- relevant plant species in the section Criteria & justification> Plant species (3.2)*

*- relevant animal species in the section Criteria & justification> Animal species (3.3)*

Justification *(This field is limited to 3000 characters)*

Lake Ohrid has been identified as one of two hotspots of aquatic biodiversity in Europe (Neubauer et al (2015). As the deepest (average) and oldest continuously existing European inland water, its comparatively stable conditions over hundreds of thousands of years have enabled both the preservation of relict species and the evolution of entirely new taxa, resulting in probably the highest ratio of endemism to surface area of any lake on Earth (Albrecht and Wilke, 2008), with at least 212 endemic species (182 animals) among 1,200 native taxa. These natives have adapted to Lake Ohrid's oligotrophic conditions, which are supported both by karst springs and the Studenchishte Marsh wetland (Apostolova et al, 2016).

Lake Ohrid is a major contributor to biodiversity in the Southeast Adriatic Drainages, one of the leading ecoregions globally for freshwater fish species density with >8 taxa for every $10^4$ $km^2$ (Hales, 2015). Predominantly balanced between cyprinid and salmonid fish, Lake Ohrid ichthyofauna is represented by 21 native species, 15 of which are characteristic for the Western Balkans, 13 for the Southeast Adriatic Drainages, and 8 endemic to Lake Ohrid.

To date, the adjusted rate of endemicity for Lake Ohrid stands at 36% for all species and 34% for animals. Noteworthy are 72 gastropod species of which 78% cannot be found anywhere else on the planet. Other taxa demonstrate impressive endemism too: ciliophora (91% endemism among 34 native species overall), amphipoda (90% among 10), porifera (80% among 5), isopoda (75% among 4), tricladida (79% among 29), ostracoda (63% among 52) and hirudinea (54% among 26) (Albrecht and Wilke, 2008). 88 species of birds related to the lake's ecosystem have been formally recorded, a number expected to rise with improved monitoring.

Recent studies of microflora have unveiled 789 diatom taxa for Lake Ohrid (Levkov and Williams, 2012), which will boost species totals even further. 117 are thought to be endemic and 15 relict. The lake is known as a hotspot of charophyte biodiversity (Albrecht & Wilke, 2008) with threatened species including *Chara ohridana* and *Chara kokeilli*, the former of which is known only for a small number of Balkan lakes.

The flora and fauna of Studenchishte Marsh is distinct from that of Lake Ohrid and therefore contributes substantially to the overall biodiversity of the site. Approximately 350 species are recorded for the marsh, 125 of which are rare and/or endemic (Spirovska et al, 2012). This is far from exhaustive as several important species groups (such as mammals) have not been thoroughly investigated but includes 79 bird species, 9 amphibian (Sterijovski & Arsovski 2019), 15 reptile (Sterijovski & Arsovski 2019), 15 fishes species, 46 beetle, 34 odonata and 9 Ohrid-endemic planarian taxa. From diatoms, 11 Ohrid-endemics from a total of 89 species have so far been identified (Spirovska et al, 2012). Throughout the National Red List Assesment of amphibians and reptiles, Studencishte Marsh is on of the HOT-SPOTS of amphibian diversity (Sterijovski & Arsovski 2019). Moreover, although many Studenchishte species are more cosmopolitan than those in-lake, it yet contains plant associations such as *Caricetum elatae*, relicts of glacial wetlands that once abounded in Macedonia's former lacustrine valleys.

Related to the Lake Ohrid microclimate that preserves humidity and averts temperature extremes, the mountain massif on the lake's east coast, protected as National Park Galichica, further supports over 3,000 vascular plants and several endemic species. A complex fauna has developed within this rich plantlife, notably over 1,500 *Lepidoptera* taxa.

### [✓ ] Criterion 4 : Support during critical life cycle stage or in adverse conditions

*To justify this Criterion, please give details below on:*

*- relevant plant species in the section Criteria & justification> Plant species (3.2)*

*- relevant animal species in the section Criteria & justification> Animal species (3.3)*

*and explain the life cycle stage or nature of adverse conditions in the accompanying 'justification' box.*

Optional text box to provide further information *(This field is limited to 3000 characters)*

For 212 in-lake endemic species, Lake Ohrid a priori supports during all critical life cycle stages and adverse conditions.

A large freshwater that never freezes, it additionally supports birds and other animals during harsh winters when other locations become unsuitable. On a more regular basis, avifauna from adjacent mountains moves to the shores of Lake Ohrid during the annual colder months (Vasic, 2010). In recent years, South East Europe's small, isolated population of *Mergus merganser* (goosander), which may indicate a Pleistocene refugium, has depended upon the lake increasingly for breeding and wintering (Catsadorakis, 2016). *Mergus merganser* (>1% of the population for the biogeographic region) additionally uses the site for moulting, as do *Podiceps cristatus*, *Microcarbo pygmaeus* and *Fulica atra*.

As an ancient lake with a constant presence over timescales measured in tens, hundreds and even thousands of millennia, Lake Ohrid maintains aquatic fauna that is unable to survive in less stable freshwater environments, a function it has performed through successive periods of glaciation. Thus, several of its endemic species are also relicts, and the lake is thought to have never experienced a major extinction event (Jovanovska et al, 2015).

Due to the lake's moderating influence on temperature and dryness extremes, this refugium capability extends to the terrestrial habitats surrounding the lake, including Studenchishte Marsh, whose species are in-part conserved by the comparative stability of the regional climate (Spirovska et al, 2012; Sadori et al, 2016). By tempering heat and dryness, the same function can be expected to continue in the Lake Ohrid region during the current climate change period. Also, throughout the National Red List Assesment of amphibians and reptiles, Studencishte Marsh is representing vital reproductive center for amphibians and therefore it is recognized as a HOT-SPOTS of amphibian diversity (Sterijovski & Arsovski 2019).

Separated from Lake Ohrid by the Mount Galichica massif, Lake Prespa, an existing Ramsar Site, has similar functions. However, since it is relatively shallow and differs hydrologically, chemically and ecologically, the species and ecosystems it supports diverge significantly. Taken together, the two lakes' pastiche of aquatic habitats combined with coastal wetlands at Ezerani, Nakolec, Stenje and Studenchishte offer numerous niches to harbour a diverse range of plants and animals during periods of adversity.

[✓ ] **Criterion 5 : >20,000 waterbirds**

*To justify this Criterion, please give details below on:- the total number of waterbirds and the period of data collection - relevant waterbird species, and if possible their population size, in the section Criteria & justification> Animal species (3.3)*

Overall waterbird numbers* *(This field is mandatory)*

| | |
|---|---|
| 2010 | 10,108 |
| 2011 | 17,902 |
| 2012 | 24,230 |
| 2013 | 24,621 |
| 2014 | 21,919 |
| 2015 | 23,610 |
| 2016 | 14,497 |
| 2017 | 26,981 |
| 2018 | 11,086 |
| 2019 | 38,243 |
| AVG | 21,319.7 |

Start year* *(This field is mandatory)*

2010

End year* *(This field is mandatory)*

2019

Source of data:

International Waterbird Census, Lake Ohrid Macedonia, performed by Macedonian Ecological Society

Optional text box to provide further information *(This field is limited to 3000 characters)*

The division of Lake Ohrid between Republic of North Macedonia and Albania causes waterbird counts to be split. Hence, the importance of the site may be underestimated both for overall waterbird numbers and for supporting a significant fraction of waterbird populations for specific species, i.e. Criterion 6.

[✓ ] **Criterion 6 : >1% waterbird population**

*To justify this Criterion, please give details on relevant waterbird species and their population size in the section Criteria & justification> Animal species (3.3)*

Optional text box to provide further information *(This field is limited to 3000 characters)*

International Waterbird Census figures from 2010-2016 indicate that average *Netta rufina* (3.3%), *Microcarbo pygmaeus* (1.03%) *and Mergus merganser* (45%) populations at Lake Ohrid cross the 1% threshold for the Black Sea and East Mediterranean biogeographic region in the former two cases and the Balkans biogeographic region for the latter (Wetlands International, 2018). Data from this period has been chosen based on the availability of species breakdowns from the overall International Waterbird Census figures.

[✓ ] **Criterion 7 : Significant and representative fish**

*To justify this Criterion, please give information in the box below and details of relevant fish species in the section Criteria & justification> Animal species (3.3)*

Justification *(This field is limited to 3000 characters)*

According to Talevski et al (2009), the rate of endemism among the Lake Ohrid ichthyofauna is 33.3%, calculated on the basis of 21 native fish taxa, 7 of which are endemic to Lake Ohrid: *Salmo ohridanus* Steindachner 1892, *Salmo aphelios*, Kottelat,1997, *Salmo balcanicus* Karaman, 1928, *Salmo letnica* Karaman, 1924, *Salmo lumi* Poljakov, Filip & Basho 1958, *Barbatula sturanyi* (Steindachner, 1892), and *Gobio ohridanus*, Karaman, 1924. However, since then a genotypic and phenotypic evaluation has indicated *Rutilus ohridanus* as endemic to the lake (Milosevic et al, 2011) as well, which raises the overall number of world unique species to 8 and the endemism rate to 38%.

Lake Ohrid's salmonid fish demonstrate high genetic diversity. The lake has been identified as the probable epicentre for brown trout (*Salmo trutta*) diversity (Duguid, R.A., 2002).

[✓ ] **Criterion 8 : Fish spawning grounds, etc.**

*To justify this Criterion, please give information in the box below. Completion of details on relevant fish species in the section Criteria & justification> Animal species (3.3) is optional.*

Justification *(This field is limited to 3000 characters)*

Lake Ohrid contains the only spawning grounds for its 8 endemic fish taxa: *Salmo ohridanus* Steindachner 1892, *Salmo aphelios*, Kottelat,1997, *Salmo balcanicus* Karaman, 1928, *Salmo letnica* Karaman, 1924, *Salmo lumi* Poljakov, Filip & Basho 1958, *Barbatula sturanyi* (Steindachner, 1892), *Rutilus ohridanus* and *Gobio ohridanus*, Karaman, 1924. Studenchishte Marsh is also a spawning area (Society of Wetland Scientists, 2018).

Spawning sites for Lake Ohrid's endemic salmonids vary by species, but are generally located in rocky, sandy or gravel-based habitats in the littoral and sublittoral zones (Spirkovski, 2004), with the exception of *Salmo lumi*, which prefers sheltered tributaries (Crivelli, 2006), and *Salmo*

*ohridana*, which will also spawn in Lake Ohrid's shell zone. High-water quality is an important precondition for spawning success. The endemic cyprinid fish *Gobio ohridanus* prefers fine sand between reed belts and the shore (Talevska and Talevski, 2015).

Almost all of the littoral zone holds importance to spawning fish.

[✓ ] **Criterion 9: >1% non-avian animal population**

*To justify this Criterion, please give details on relevant non-avian species and their population size in the section Criteria & justification> Animal species (3.3)*

Optional text box to provide further information *(This field is limited to 3000 characters)*

Lake Ohrid and its springs support the entire populations of over 182 endemic freshwater animal species (Albrecht and Wilke, 2008) across all stages of their lifecycles.

## 3.2 Plant species whose presence relates to the international importance of the site

| Scientific name* | Common name | Criterion 2 | Criterion 3 | Criterion 4 | IUCN Red List[2] | CITES Appendix I | Other status | Justification |
|---|---|---|---|---|---|---|---|---|
| *Carex elata* | Tufted sedge | | | ✓ | | | | Close to extinction in the Republic of North Macedonia, *Carex elata* is a protected species at national level, whose importance is heightened by its context in the relict plant community *Caricetum elatae* (Spirovska et al, 2012), present in Macedonia only at Studenchishte Marsh. The population still holds genetic potential for preservation of the species (Ministry of Environment and Physical Planning, 2014). |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Chara kokeilli* | | ✓ | | | | | CR (Balkans) | Assessed as CR on a global scale by *Red Data List of Charophytes in the Balkans* (2006). |
| *Chara ohridana* | | ✓ | ✓ | | | | CR (Balkans) | *Chara ohridana* is known only for Lake Ohrid and a couple |

[2] | LC | NT | VU | EN | CR | EW | EX

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | of other locations such as Lake Dojran and Lake Skadar. It is thus a Balkan endemic with limited & fragmented range. Assessed CR (global) *by Red Data List of Charophytes in the Balkans* (2006). |
| *Chara tomentosa* | | ✓ | | | | | VU (Balkans) | Assessed as VU by *Red Data List of Charophytes in the Balkans* (2006). |
| *Nitellopsis obtuse* | | ✓ | | | | | VU (Balkans) | Assessed as VU by *Red Data List of Charophytes in the Balkans* (2006). |
| *Nymphaea alba* | European White Water Lily | ✓ | | | LC | | | Present at Studenchishte Marsh and identified |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | as a strongly threatened species in the Republic of North Macedonia, according to the National Strategy for Biological Diversity (2018-2023). Protected species at national level. |
| *Nuphar lutea* | | ✓ | | | LC | | | Identified as a strongly threatened species in the Republic of North Macedonia, according to the |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | National Strategy for Biological Diversity (2018-2023) |
| *Nymphoides peltata* | | ✓ | | | | | | Identified as a seriously threatened species in the Republic of North Macedonia, according to the National Strategy for Biological Diversity (2018-2023) |

*Optio nal text box to provide further information on plant species of international importance:*

*(This field is limited to 3000 characters)*

Although some of the plant species listed in the table above are widespread on a global and/or European level, they are rare within the Republic of North Macedonia due to post-glacial climate change and the widespread loss of wetland habitat over the past century, or have heightened importance due to

the unusual associations they form. This is particularly true for the species listed at Studenchishte Marsh, whose presence may provide a blueprint for wetland rehabilitation at other locations in the country (Apostolova et al, 2016).

Acording scientific evaluation of conservation status of selected plant species for future National Red List of RSM, four plant species are evaluated from Ohrud and Struga localitiees, near Lake Ohid (Matevski, V, and all., 2019).

- *Angelica palustris* (CR), near sprint Sv. Naum, Lake Ohrid;  -; - *Trapa natans* (EN), *Salvinia Natans* (VU)

## 3.3 Animal species whose presence relates to the international importance of the site

| Phylum | Scientific name* | Common name | Species qualifies under criterion | | | | Species contributes under criterion | | | | Pop. Size[3] | Period of pop. Est.[3] | % occurrence[3] | IUCN Red List[4] | CITES Appendix I | CMS Appendix I | Other Status | Justification |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2 | 4 | 6 | 9 | 3 | 5 | 7 | 8 | | | | | | | | |
| Annelida/ Clitellata | *Criodrilus ochridensis* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Annelida/ Clitellata | *Dina eturrshem* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Annelida/ Clitellata | *Dina krilata* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Annelida/ Clitellata | *Dina kuzmani* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Annelida/ Clitellata | *Dina lepinja* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of Macedonia) | Lake Ohrid endemic |

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| Annelida/ Clitellata | *Dina lyhnida* | | | ✓ | | ✓ | ✓ | | | | | 100 | | | | | Lake Ohrid endemic |
| Annelida/ Clitellata | *Dina ohridana* | | | ✓ | | ✓ | ✓ | | | | | 100 | | | | | Lake Ohrid endemic |

[3] Percentage of the total biogeographic population at the site. These fields are only compulsory to justify criteria 6 & 9

[4] | LC | NT | VU | EN | CR | EW | EX

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| Annelida/ Clitellata | *Dina profunda* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Annelida/ Clitellata | *Dina svilesta* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Annelida/ Clitellata | *Eiseniella ochridana ochridana* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Annelida/ Clitellata | *Eiseniella ochridana profunda* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Annelida/ Clitellata | *Glossiphonia complanata maculosa* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Annelida/ Clitellata | *Glossiphonia pulchella* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |

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| Annelida/ Clitellata | *Haplotaxis gordioides dubius* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Annelida/ Clitellata | *Lamprodrilus pygmaeus intermedia* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Annelida/ Clitellata | *Lamprodrilus pygmaeus ochridanus* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Annelida/ Clitellata | *Peloscolex* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species | Lake Ohrid |

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| | *cernosvitovi* | | | | | | | | | | | | | | | (Republic of North Macedonia) | endemic |
| Annelida/ Clitellata | *Peloscolex stankovici litoralis* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Annelida/ Clitellata | *Peloscolex stankovici stankovici* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Annelida/ Clitellata | *Peloscolex stankovici sublitoralis* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Annelida/ Clitellata | *Peloscolex tenuis* | | | | | ✓ | ✓ | | | | | | | | | | Protected species (Republic of North | Endemic to Lakes Ohrid and Prespa |

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| | | | | | | | | | | | | | | | | | Macedonia) | |
| Annelida/ Clitellata | *Piscicola (Cystobranchus) pavlovskii* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Annelida/ Clitellata | *Potamothrix isochaetus* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Annelida/ Clitellata | *Potamothrix ochridanus* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Annelida/ Clitellata | *Psammoryctes ochridanus* | | | | | ✓ | ✓ | | | | | | | | | | Protected species | Endemic to Lakes Ohrid and |

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| | *ochridanus* | | | | | | | | | | | | | | | (Republic of North Macedonia) | Prespa |
| Annelida/ Clitellata | *Psammoryctes ochridanus variabilis* | | | | | | ✓ | | | | | | | | | Protected species (Republic of North Macedonia) | Endemic to Lakes Ohrid and Prespa |
| Annelida/ Clitellata | *Rhynchelmis komareki breviristra* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Annelida/ Clitellata | *Stylodrilus leucocephalus* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Arthropoda/ Arachnida | *Copidognathus tectiporus profundus* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Lake Ohrid endemic |

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| Arthropoda/ Branchiopoda | *Alona smirnovi* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | VU | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Arthropoda/ Copepoda | *Cyclops ochridanus* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Arthropoda/ Copepoda | *Diacyclops ichnusoides* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Arthropoda/ Copepoda | *Ochridacyclop* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species | Lake Ohrid |

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| | *s arndti* | | | | | | | | | | | | | | | (Republic of North Macedonia) | endemic |
| Arthropoda/ Copepoda | *Bryocamptus mirus* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Arthropoda/ Insecta | *Lycaena dispar* | Large Copper | ✓ | | | | | | | | | | | NT | | | Strictly protected species (Republic of North Macedonia) VU Red List of Butterflies for the Republic of North Macedonia | Species recorded at Studenchishte Marsh. VU at national level. |
| Arthropoda/ Insecta | *Maculinea arion* | Large Blue | ✓ | | | | | | | | | | | NT | | | Strictly protected | Species recorded at Studenchishte |

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| | | | | | | | | | | | | | | | | species (Republic of North Macedonia); EN European Red List of Butterflies | Marsh. EN at European level |
| Arthropoda/ Malacostraca | *Astacus astacus balcanicus* | Noble Crayfish | ✓ | | | | | | | | | | VU | | | Protected species (Republic of North Macedonia) | |
| Chordata/ Actinopterygii | *Alburnoides ohridanus* | | ✓ | | | | ✓ | | ✓ | ✓ | | | 100 | VU | | | Protected species (Republic of North Macedonia | *Alburnoides ohridanus* is a protected species endemic of Drim Basen |

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| Chordata/ Actinopterygii | *Alburnus scoranza* | | | ✓ | | | ✓ | | ✓ | | | | | LC | | | | Endemic to the Drim basin lakes of Ohrid and Skadar, this species would likely trigger criterion 8 too, but population data is lacking. |
| Chordata/ Actinopterygii | *Anguilla Anguilla* | | ✓ | | | | | | | | | | | CR | | | Strictly protected species (Republic of North Macedonia); Appendix II; CMS Appendix II | Lake Ohrid populations are currently artificially restocked due to dam interruptions on the River Drim. |

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| Chordata/ Actinopterygii | *Barbatula sturanyi* | | | ✓ | | | ✓ | | ✓ | ✓ | | | 100 | LC | | | | Endemic to Lake Ohrid (Talevski et al, 2009). |
| Chordata/ Actinopterygii | *Barbus rebeli* | Western Balkan Barbel | | | | | ✓ | | | | | | | LC | | | Protected species (Republic of North Macedonia) | The Western Balkan Barbel is found only in a handful of West Balkan rivers, including the Drim Basin. |
| Chordata/ Actinopterygii | *Cobitis ohridana* | | | | | | ✓ | | | | | | | LC | | | | Representative species of the Southeast Adriatic Drainages |

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| | | | | | | | | | | | | | | | | | biogeographic region. |
| Chordata/ Actinopterygii | *Cyprinis carpio* | Common carp | ✓ | | | | | | | | | | VU | | | | |
| Chordata/ Actinopterygii | *Gobio ohridanus* | | ✓ | ✓ | | | ✓ | | ✓ | ✓ | | | 100 | VU | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Chordata/ Actinopterygii | *Pachychilon pictum* | | | | | | ✓ | | | | | | | LC | | | | The native range of *Pachychilon pictum* is restricted to the Western Balkans |
| Chordata/ Actinopterygii | *Pelasgus minutus* | | | | | | ✓ | | | | | | | DD | | | Strictly protected species (Republic of North Macedoni | Representative species of the Southeast Adriatic Drainages biogeographic |

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| | | | | | | | | | | | | | | | | a) | region |
| Chordata/ Actinopterygii | *Rutilus ohridanus* | | | ✓ | | | ✓ | | ✓ | ✓ | | | | LC | | | Protected species (Republic of North Macedonia) | Endemic to Lake Ohrid (Milosevic et al, 2011) |
| Chordata/ Actinopterygii | *Salmo aphelios* | | | ✓ | | | ✓ | | ✓ | ✓ | | | 100 | DD | | | Strictly protected species (Republic of North Macedonia) | Lake Ohrid endemic |

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| Chordata/ Actinopterygii | *Salmo balcanicus* | | | ✓ | | | ✓ | | ✓ | ✓ | | | 100 | DD | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Chordata/ Actinopterygii | *Salmo letnica* | | | ✓ | | | ✓ | | ✓ | ✓ | | | 100 | DD | | | | Lake Ohrid endemic |
| Chordata/ Actinopterygii | *Salmo lumi* | | | ✓ | | | ✓ | | ✓ | ✓ | | | 100 | DD | | | | Lake Ohrid endemic |
| Chordata/ Actinopterygii | *Salmo ohridanus* | | ✓ | ✓ | | | ✓ | | ✓ | ✓ | | | 100 | VU | | | Strictly protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Chordata/ Actinopterygii | *Scardinius knezevici* | Skadar Rudd | | | | | ✓ | | | | | | | LC | | | Protected species (Republic of North | Representative species of the Southeast Adriatic |

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| | | | | | | | | | | | | | | | | | Macedonia) | Drainages, present only at Lakes Ohrid/ Skadar worldwide. Rare at Lake Ohrid (Freyhoff, 2013) |
| Phylum | Scientific | Common name | | Species qualifies undue criterion | | | | Species contributes under | | | Pop. Size3 | Period of pop 3 esttimation | % Occurrence E3 | IUCN red list 4 | CITES appendix I | CMS Appendix I | Other Status | Justification |
| | | | 2 | 4 | 6 | 9 | 3 | 5 | 7 | 8 | | | | | | | | |
| Chordata/Amphibia | *Salamandra salamandra* | Fire salamander | | ✓ | | | ✓ | | | | | | | LC | | | On the National Red List of Amphibians this species is recognized as LC; | *Justification for criteria 3 and 4: Studencisko marsh is recognized as a amphibian HOT-SPOT that provides shelter for all amphibian species refered in this list that enriches Ohrid Lake amphibian diversity. The last is justified due to the fact that the total number of present amphibian species on National level is 14 which means that 9 species in this region are 64.2% of all species of this class.*<br><br>*Justification for criteria 4: The parts of the shore line with reeds and Studencisko Marsh are vital for the amphibian life* |

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| | | | | | | | | | | | | | | | | | | *cycle due toa the fact that this part of the lake is playing a role of reproductive center for amphibian class.* |
| Chordata/Amphibia | *Lissotriton vulgaris* | Smooth newt | | ✓ | | | ✓ | | | | | | | | LC | | | On the National Red List of Amphibians this species is recognized as VU | *Justufication for criteria 3 and 4: Studencisko marsh is recognized as a amphibian HOT-SPOT that provides shelter for all amphibian species refered in this list that enriches Ohrid Lake amphibian diversity. The last is justified due to the fact that the total number of present amphibian species on National level is 14 which means that 9 species in this region are 64.2% of all species of this class.*<br><br>*Justufication for criteria 4: The parts of the shore line with reeds and Studencisko Marsh are vital for the amphibian life cycle due toa the fact that this part of the lake is playing a role of reproductive center for amphibian class.* |
| Chordata/Amphibia | *Triturus macedonicus* | Macedonian newt | | ✓ | | | ✓ | | | | | | | | / | | | On the National Red List of Amphibians this species is recognized as VU;<br><br>Accoriding the National | *Justufication for criteria 3 and 4: Studencisko marsh is recognized as a amphibian HOT-SPOT that provides shelter for all amphibian species refered in this list that enriches Ohrid Lake amphibian* |

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| | | | | | | | | | | | | | | | | | List of Strictly Protected and Protected Wild Species this pecies is PROTECTED.<br><br>On EU Habitat directive this species is listed in Annex IV | *diversity. The last is justified due to the fact that the total number of present amphibian species on National level is 14 which means that 9 species in this region are 64.2% of all species of this class.*<br><br>*Justufication for criteria 4: The parts of the shore line with reeds and Studencisko Marsh are vital for the amphibian life cycle due toa the fact that this part of the lake is playing a role of reproductive center for amphibian class.* |
| Chordata/Amphibia | *Bombina variegata* | Fire belly toad | | ✓ | | | ✓ | | | | | | | LC | | | On the National Red List of Amphibians this species is recognized as LC;<br><br>Accoriding the National List of Strictly Protected and Protected Wild Species this pecies is PROTECTED.<br><br>On EU Habitat directive this species is listed in Annex II and IV | *Justufication for criteria 3 and 4: Studencisko marsh is recognized as a amphibian HOT-SPOT that provides shelter for all amphibian species refered in this list that enriches Ohrid Lake amphibian diversity. The last is justified due to the fact that the total number of present amphibian species on National level is 14 which means that 9 species in this region are 64.2% of all species of this class.*<br><br>*Justufication for criteria 4: The parts of the shore line with reeds and Studencisko Marsh are vital for the amphibian life cycle due toa the* |

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| | | | | | | | | | | | | | | | | | | *fact that this part of the lake is playing a role of reproductive center for amphibian class.* |
| Chordata/Amphibia | *Rana graeca* | Stream frog | | ✓ | | | ✓ | | | | | | | LC | | | On the National Red List of Amphibians this species is recognized as NT;<br><br>Accoriding the National List of Strictly Protected and Protected Wild Species this pecies is PROTECTED.<br><br>On EU Habitat directive this species is listed in Annex IV | *Justufication for criteria 3 and 4: Studencisko marsh is recognized as a amphibian HOT-SPOT that provides shelter for all amphibian species refered in this list that enriches Ohrid Lake amphibian diversity. The last is justified due to the fact that the total number of present amphibian species on National level is 14 which means that 9 species in this region are 64.2% of all species of this class.*<br><br>*Justufication for criteria 4: The parts of the shore line with reeds and Studencisko Marsh are vital for the amphibian life cycle due toa the fact that this part of the lake is playing a role of reproductive center for amphibian class.* |
| Chordata/Amphibia | *Pelophylax ridibundus* | Marsh frog | | ✓ | | | ✓ | | | | | | | LC | | | On the National Red List of Amphibians this species is recognized as LC;<br><br>On EU Habitat directive this species is listed in Annex V | *Justufication for criteria 3 and 4: Studencisko marsh is recognized as a amphibian HOT-SPOT that provides shelter for all amphibian species refered in this list that enriches Ohrid Lake amphibian diversity. The last* |

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| | | | | | | | | | | | | | | | | | | *is justified due to the fact that the total number of present amphibian species on National level is 14 which means that 9 species in this region are 64.2% of all species of this class.*<br><br>*Justufication for criteria 4: The parts of the shore line with reeds and Studencisko Marsh are vital for the amphibian life cycle due toa the fact that this part of the lake is playing a role of reproductive center for amphibian class.* |
| Chordata/Amphibia | *Bufo bufo* | Common toad | | ✓ | | | ✓ | | | | | | | LC | | | On the National Red List of Amphibians this species is recognized as LC | *Justufication for criteria 3 and 4: Studencisko marsh is recognized as a amphibian HOT-SPOT that provides shelter for all amphibian species refered in this list that enriches Ohrid Lake amphibian diversity. The last is justified due to the fact that the total number of present amphibian species on National level is 14 which means that 9 species in this region are 64.2% of all species of this class.*<br><br>*Justufication for criteria 4: The parts of the shore line with reeds and Studencisko Marsh are vital for the amphibian life cycle due toa the fact that this part* |

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| | | | | | | | | | | | | | | | | | | *of the lake is playing a role of reproductive center for amphibian class.* |
| Chordata/Amphibia | *Bufotes viridis* | Green toad | | ✓ | | | ✓ | | | | | | | LC | | | On the National Red List of Amphibians this species is recognized as LC;<br><br>Accoriding the National List of Strictly Protected and Protected Wild Species this pecies is PROTECTED.<br><br>On EU Habitat directive this species is listed in Annex IV | *Justufication for criteria 3 and 4: Studencisko marsh is recognized as a amphibian HOT-SPOT that provides shelter for all amphibian species refered in this list that enriches Ohrid Lake amphibian diversity. The last is justified due to the fact that the total number of present amphibian species on National level is 14 which means that 9 species in this region are 64.2% of all species of this class.*<br><br>*Justufication for criteria 4: The parts of the shore line with reeds and Studencisko Marsh are vital for the amphibian life cycle due toa the fact that this part of the lake is playing a role of reproductive center for amphibian class.* |
| Chordata/Amphibia | *Hyla arborea* | European tree frog | | ✓ | | | ✓ | | | | | | | LC | | | On the National Red List of Amphibians this species is recognized as NT;<br><br>Accoriding the National List of Strictly Protected and Protected | *Justufication for criteria 3 and 4: Studencisko marsh is recognized as a amphibian HOT-SPOT that provides shelter for all amphibian species refered in this list that enriches Ohrid Lake amphibian diversity. The last is justified due to* |

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| | | | | | | | | | | | | | | | | | Wild Species this pecies is PROTECTED.<br><br>On EU Habitat directive this species is listed in Annex IV | *the fact that the total number of present amphibian species on National level is 14 which means that 9 species in this region are 64.2% of all species of this class.*<br><br>*Justufication for criteria 4: The parts of the shore line with reeds and Studencisko Marsh are vital for the amphibian life cycle due toa the fact that this part of the lake is playing a role of reproductive center for amphibian class.* |
| Chordata/Reptilia | *Testudo hermanni* | Herman's tortoise | | | | | ✓ | | | | | | | NT | | | On the National Red List of Reptiles this species is recognized as VU;<br><br>On EU Habitat directive this species is listed in Annex II and IV | *Justufication for criteria 3: As a result of National Red List Assesments of amphibians and reptiles, Ohrid Lake Region is recognized with high diversity species richenss regarding the reptile class.* |
| Chordata/Reptilia | *Emys orbicularis* | Pond turtle | | | | | ✓ | | | | | | | NT | | | On the National Red List of Reptiles this species is recognized as VU;<br><br>On EU Habitat directive this species is listed in Annex II and IV | *Justufication for criteria 3: As a result of National Red List Assesments of amphibians and reptiles, Ohrid Lake Region is recognized with high diversity species richenss regarding the reptile class.* |
| Chordata/Reptilia | *Lacerta* | Balkan green lizard | | | | | ✓ | | | | | | | LC | | | On the National Red List of | *Justufication for criteria 3: As a result of National* |

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| | *trilineata* | | | | | | | | | | | | | | | | Reptiles this species is recognized as LC;<br><br>On EU Habitat directive this species is listed in Annex IV | *Red List Assesments of amphibians and reptiles, Ohrid Lake Region is recognized with high diversity species richenss regarding the reptile class.* |
| Chordata/Reptilia | *Lacerta viridis* | Green lizard | | | | | ✓ | | | | | | | LC | | | On the National Red List of Reptiles this species is recognized as LC;<br><br>On EU Habitat directive this species is listed in Annex IV | *Justufication for criteria 3: As a result of National Red List Assesments of amphibians and reptiles, Ohrid Lake Region is recognized with high diversity species richenss regarding the reptile class.* |
| Chordata/Reptilia | *Podarcis erhardii* | Balkan wall lizard | | | | | ✓ | | | | | | | LC | | | On the National Red List of Reptiles this species is recognized as LC;<br><br>On EU Habitat directive this species is listed in Annex IV | *Justufication for criteria 3: As a result of National Red List Assesments of amphibians and reptiles, Ohrid Lake Region is recognized with high diversity species richenss regarding the reptile class.* |
| Chordata/Reptilia | *Podarcis muralis* | Wall lizard | | | | | ✓ | | | | | | | LC | | | On the National Red List of Reptiles this species is recognized as LC;<br><br>On EU Habitat directive this species is listed in Annex IV | *Justufication for criteria 3: As a result of National Red List Assesments of amphibians and reptiles, Ohrid Lake Region is recognized with high diversity species richenss regarding the reptile class.* |

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| Chordata/Reptilia | *Anguis fragilis* | Slow worm | | | | | ✓ | | | | | | | | LC | | | On the National Red List of Reptiles this species is recognized as LC; | *Justufication for criteria 3: As a result of National Red List Assesments of amphibians and reptiles, Ohrid Lake Region is recognized with high diversity species richenss regarding the reptile class.* |
| Chordata/Reptilia | *Coronella austriaca* | Smooth snake | | | | | ✓ | | | | | | | | LC | | | On the National Red List of Reptiles this species is recognized as LC;<br><br>On EU Habitat directive this species is listed in Annex IV | *Justufication for criteria 3: As a result of National Red List Assesments of amphibians and reptiles, Ohrid Lake Region is recognized with high diversity species richenss regarding the reptile class.* |
| Chordata/Reptilia | *Elaphe quatuorlineata* | Four lined rat snake | | | | | ✓ | | | | | | | | NT | | | On the National Red List of Reptiles this species is recognized as NT;<br><br>On EU Habitat directive this species is listed in Annex II and IV | *Justufication for criteria 3: As a result of National Red List Assesments of amphibians and reptiles, Ohrid Lake Region is recognized with high diversity species richenss regarding the reptile class.* |
| Chordata/Reptilia | *Zamenis longissimus* | Aesculapian snake | | | | | ✓ | | | | | | | | LC | | | On the National Red List of Reptiles this species is recognized as LC;<br><br>On EU Habitat directive this species is listed in Annex IV | *Justufication for criteria 3: As a result of National Red List Assesments of amphibians and reptiles, Ohrid Lake Region is recognized with high diversity species richenss regarding the reptile class.* |

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| Chordata/Reptilia | *Natrix natrix* | Grass snake | | | | | ✓ | | | | | | | LC | | | On the National Red List of Reptiles this species is recognized as LC; | *Justufication for criteria 3: As a result of National Red List Assesments of amphibians and reptiles, Ohrid Lake Region is recognized with high diversity species richenss regarding the reptile class.* |
| Chordata/Reptilia | *Natrix tessellata* | Dice snake | | | | | ✓ | | | | | | | LC | | | On the National Red List of Reptiles this species is recognized as NT;<br><br>On EU Habitat directive this species is listed in Annex IV | *Justufication for criteria 3: As a result of National Red List Assesments of amphibians and reptiles, Ohrid Lake Region is recognized with high diversity species richenss regarding the reptile class.* |
| Chordata/Reptilia | *Dolichophis caspius* | Caspian whip snake | | | | | ✓ | | | | | | | LC | | | On the National Red List of Reptiles this species is recognized as LC;<br><br>On EU Habitat directive this species is listed in Annex IV | *Justufication for criteria 3: As a result of National Red List Assesments of amphibians and reptiles, Ohrid Lake Region is recognized with high diversity species richenss regarding the reptile class.* |
| Chordata/Reptilia | *Hierophis gemonensis* | Balkan whip snake | ✓ | | | | ✓ | | | | | | | LC | | | On the National Red List of Reptiles this species is recognized as EN; | *Justufication for criteria 2: This species distribution is rectricted to Prespa region, Ohrid Lake region and River Drim valley. Therefore throughout the National Red List assessment it is recognized as ENDANGERED.* |

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| Chordata/Reptilia | *Vipera ammodytes* | Nose horned viper | | | | | ✓ | | | | | | | LC | | | On the National Red List of Reptiles this species is recognized as LC;<br><br>On EU Habitat directive this species is listed in Annex IV | *Justufication for criteria 3: As a result of National Red List Assesments of amphibians and reptiles, Ohrid Lake Region is recognized with high diversity species richenss regarding the reptile class.* |
| Chordata/<br><br>Aves | *Alcedo atthis* | Common<br><br>kingfisher | ✓ | ✓ | | | | | | | | | | LC | | | VU<br><br>(Europe);<br><br>Bern<br><br>Convention<br><br>Appendix II;<br><br>EU Birds<br><br>Directive<br><br>Annex I. | *Alcedo atthis* is<br><br>vulnerable in<br><br>Europe,<br><br>according to<br><br>Birdlife<br><br>International<br><br>(2015).Passage/<br><br>Dispersion 25-<br><br>100 individuals |

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| | | | | | | | | | | | | | | | | | for Lakes Ohrid and Prespa combined. |
| Chordata/ Aves | *Anas crecca* | Eurasian Teal | | ✓ | | | | ✓ | | | | | | LC | | | Protected species (Republic of North Macedonia); Birds Directive Annex IIA IIB; Bern Convention Appendix III; CMS Appendix II | Wintering 2,500 individuals. Passage/Dispersion: 100-3000 (Lakes Ohrid and Prespa). |
| Chordata/ Aves | *Anas penelope* | Eurasian wigeon | | ✓ | | | | ✓ | | | | | | | | | Strictly protected species (Republic of North Macedonia) | Passage/ Dispersion 10-500 individuals for Lakes Ohrid & Prespa |

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| Chordata/ Aves | *Anas platyrhynchos* | Mallard | | ✓ | | | | ✓ | | | | | | LC | | | Protected species (Republic of North Macedonia). Birds Directive Annex IIA IIIB; Bern Convention Appendix III; CMS Appendix II | Passage/ Dispersion 500-1500 individuals for Lakes Ohrid & Prespa |
| Chordata/ Aves | *Anas querquedula* | Garganey | | ✓ | | | | | | | | | | LC | | | | Passage/ Dispersion 1000-2000 individuals for Lakes Ohrid & Prespa |

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| Chordata/ Aves | *Ardea alba* | Great Egret | | | | | | ✓ | | | | | | LC | | | Birds Directive, Annex I; Bern Convention Appendix II; Emerald Network Annex I; CMS Appendix II | |
| Chordata/ Aves | *Ardea cinerea* | Grey Heron | | | | | | ✓ | | | | | | LC | | | Bern Convention Appendix III; CMS Appendix II. | Passage/ Dispersion 50-200 individuals for Lakes Ohrid & Prespa. |
| Chordata/ Aves | *Aythya ferina* | Common Pochard | | | | | | ✓ | | | | | | VU | | | Protected species (Republic of North Macedonia); Birds | VU on both global and European level; Passage/ Dispersion 300-600 individuals |

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| Chordata/ Aves | *Aythya fuligula* | Tufted Duck | | ✓ | | | | ✓ | | | | | | LC | | | Protected species (Republic of North Macedonia); Birds Directive Annexes IIA, IIIB; Bern Convention Appendix III; CMS Appendix II | Passage/ Dispersion 1000-2000 individuals for Lakes Ohrid & Prespa |

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| Chordata/ Aves | *Aythya nyroca* | Ferruginous Duck | | ✓ | | | | | | | | | NT | | ✓ | Protected species (Republic of North Macedonia) | Passage/ Dispersion Common for Lakes Ohrid & Prespa |
| Chordata/ Aves | *Bucephala clangula* | Common Goldeneye | | ✓ | | | | ✓ | | | | | LC | | | Birds Directive Annex IIB; Bern Convention Appendix III; CMS Appendix II | Passage/ Dispersion 1-300 individuals for Lakes Ohrid & Prespa |
| Chordata/ Aves | *Cinclus cinclus* | White-throated Diver | | | | | | ✓ | | | | | LC | | | Bern Convention Appendix II | Passage/ Dispersion 15-30 individuals for Lakes Ohrid and Prespa combined. |
| Chordata/ | *Circus* | | | | | | | ✓ | | | | | LC | | | Strictly | Passage/ |

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| Aves | *cyaneus* | | | | | | | | | | | | | | | | protected species (Republic of North Macedonia) . Birds Directive, Annex I; Bern Convention Appendix III; Emerald Network Annex I; CMS Appendix II | Dispersion: Few individuals |
| Chordata/ Aves | *Cygnus olor* | Mute Swan | | ✓ | | | | ✓ | | | | | | LC | | | Strictly protected species (Republic of North Macedonia) | Passage/ Dispersion few individuals recorded for |

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| | | | | | | | | | | | | | | | | . Birds Directive Annex IIB; Bern Convention Appendix III; CMS Appendix II | Lake Ohrid. |
| Chordata/ Aves | *Fulica atra* | Common coot | | ✓ | | | | ✓ | | | | | | LC | | | Protected species (Republic of North Macedonia) ; Birds Directive, Annex III; Bern Convention Appendix III; CMS Appendix II; NT for Europe (Birdlife | Large Lake Ohrid population (7,458-19,005 from 2010-2016) uses site for moulting & wintering. |

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| | | | | | | | | | | | | | | | | | Europe, 2015); | |
| Chordata/ Aves | *Gallinula chloropus* | Common moorhen | | | | | | ✓ | | | | | | LC | | | Strictly protected species (Republic of North Macedonia); Birds Directive, Annex I; Bern Convention Appendix II; CMS Appendix II | Passage/ Dispersion 100-500 individuals for Lakes Ohrid and Prespa combined. |
| Chordata/ Aves | *Gavia arctica* | Arctic Loon | | ✓ | | | | ✓ | | | | | | LC | | | Birds Directive Annex I; Bern Convention | Passage/ Dispersion 0-5 individuals Lakes Ohrid and |

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| | | | | | | | | | | | | | | | | Appendix II; Emerald Network Annex I; CMS Appendix II | Prespa combined. |
| Chordata/ Aves | *Gavia stellate* | | | | | | | ✓ | | | | | | LC | | | Birds Directive Annex I; Bern Convention Appendix II; Emerald Network Annex I; CMS Appendix II | |
| Chordata/ Aves | *Ixobrychus minutus* | Little Bittern | | ✓ | | | | | | | | | | LC | | | Strictly protected species (Republic of North Macedonia); CMS | Passage/ Dispersion scarce to numerous at Lake Ohrid. Nesting at Studenchishte |

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| | | | | | | | | | | | | | | | | | Appendix II. | Marsh |
| Chordata/ Aves | *Larus michahellis* | Yellow-legged Gull | | | | | | ✓ | | | | | | LC | | | Bern Convention Appendix II; | |
| Chordata/ Aves | *Larus ridibundus* | Black-headed Gull | | | | | | ✓ | | | | | | LC | | | Strictly protected species (Republic of North Macedonia). Birds Directive Annex IIB; Bern Convention Appendix | Passage/ Dispersion 1000-3000 individuals recorded for Lakes Ohrid & Prespa. |

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| Chordata/ Aves | *Marmaronetta angustirostris* | Marbled Teal | ✓ | | | | | | | | | | | VU | | | III; CMS Appendix I; CR at EU27 level. | Probable records require verification at Lake Ohrid (Vasic, 2010). |
| Chordata/ Aves | *Mareca strepera* | Gadwall | | ✓ | | | | ✓ | | | | | | LC | | | Strictly protected species (Republic of North Macedonia) . Birds Directive Annex IIA; Bern Convention Appendix III; CMS Appendix II | Passage/ Dispersion 25-100 individuals recorded for Lakes Ohrid & Prespa. |
| Chordata/ | *Melanitta fusca* | Velvet | ✓ | | | | | ✓ | | | | | | VU | | | Birds | Recorded for |

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| Aves | | Scoter | | | | | | | Directive Annex IIB; Bern Convention Appendix III; CMS Appendix II | Studenchishte Marsh |
| Chordata/ Aves | *Mergus merganser* | Goosander | ✓ | ✓ | ✓ | | 0-114 AVG: 45 (45% of biogeographic region) | LC | Birds Directive IIB; Bern Convention Appendix III; CMS Appendix II | Lake Ohrid's *Mergus Merganser* are part of a small, isolated Balkan population centred in the Ohrid-Prespa region. Lake Ohrid is an increasingly important wintering & |

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| | | | | | | | | | | | | | | | | | | moulting site for them. With International Waterbird Census counts up to 114 individuals from 2010-2016, Lake Ohrid passes the 1% criterion for the Balkans (bre) biogeographic area of 1 individual (Wetlands International, 2019) in all years but 1. The average Lake Ohrid population of 45 is 45% of the Balkan biogeographic population. |

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| Chordata/ Aves | *Mergus serrator* | Red-breasted Merganser | | | | | | ✓ | | | | | | LC | | | Birds Directive IIA; Bern Convention Appendix III; CMS Appendix II | |
| Chordata/ Aves | *Microcarbo pygmaeus* | Pygmy Cormorant | | ✓ | ✓ | | | ✓ | | | | 291 & 4551<br><br>AVG: 972<br>(1.03% of Mediterranean and Black Sea biogeographic region) | | LC | | | Strictly protected species (Republic of North Macedonia). Birds Directive, Annex I; Bern Convention | Lake Ohrid contains an average 1.03% of the *Microcarbo pygmaeus* population for the Mediterranean and Black Sea biogeographic region with |

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| | | | | | | | | | | | | | | | | Appendix II; Emerald Network Annex I; CMS Appendix II | between 291 & 4551 individuals (International Waterbird Census, 2010-2016). It therefore surpasses the 1% threshold of 940 (Wetlands International, 2018). Uses site for moulting. |
| Chordata/ Aves | *Netta rufina* | Red-crested pochard | | ✓ | ✓ | | | ✓ | | | 143 – 4004 AVG 1090 (3.3% of the Mediterranean and Black Sea | 2010 – 2016 | | LC | | | Strictly protected species (Republic of North Macedonia). Birds Directive | Surpassed the 1% threshold for the Black Sea and East Mediterranean region of 330 individuals |

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| | | | | | | | | | | | biogeographic region) | | | | | | IIB; Bern Convention Appendix III; | (Wetlands International, 2018) in 6 out of 7 years from 2010 to 2016. Contains an average 3.3% of the biogeographic population according to International Waterbird Census (Macedonian Ecological Society, 2010-2019). Passage/ Dispersion 10-100 individuals Lakes Ohrid & |

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| | | | | | | | | | | | | | | | | | Prespa combined. |
| Chordata/ Aves | *Numenius arquata* | Eurasian Curlew | ✓ | | | | | | | | | | | NT | | | VU at European level | Records in wider area, expected at lake shore (Vasic, 2010) |
| Chordata/ Aves | *Phalacrocorax carbo* | Great Cormorant | | | | | | ✓ | | | | | | LC | | | Bern Convention Appendix III | Passage/ Dispersion 1000-4000 individuals Lakes Ohrid & Prespa combined |
| Chordata/ Aves | *Podiceps cristatus* | Great-crested Grebe | | ✓ | | | | ✓ | | | | | | LC | | | Strictly protected species (Republic of North Macedonia). Bern Convention Appendix III | Passage/ Dispersion 500-1200 individuals Lakes Ohrid & Prespa combined. |

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| Chordata/ Aves | *Podiceps nigricollis* | Black-necked Grebe | | ✓ | | | | ✓ | | | | | | LC | | | Bern Convention Appendices II, III | Passage/ Dispersion 1000-2000 individuals Lakes Ohrid & Prespa combined |
| Chordata/ Aves | *Rallus aquaticus* | Western Water Rail | | | | | | ✓ | | | | | | LC | | | Strictly protected species (Republic of North Macedonia). Birds Directive Annex IIB; Bern Convention Appendix III | |

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| Chordata/ Aves | *Riparia riparia* | Collared sand marten | | ✓ | | | | | | | | | | | | | Passage/ Dispersion: thousands daily at Lakes Ohrid & Prespa combined |
| Chordata/ Aves | *Rissa tridactyla* | Black-legged Kittiwake | ✓ | | | | | | | | | | VU | | | EN at EU27 level | Occasional accidental vagrant (Vasic, 2010). |
| Chordata/ Aves | *Spatula clypeata* | Northern Shoveler | | ✓ | | | | ✓ | | | | | LC | | | Birds Directive Annex IIA, IIIB; Bern Convention Appendix III; CMS Appendix II | Passage/ Dispersion: 10-100 individuals at Lakes Ohrid & Prespa combined |
| Chordata/ Aves | *Tachybaptus ruficollis* | Little Grebe | | ✓ | | | | ✓ | | | | | LC | | | Strictly protected species (Republic of North | Passage/ Dispersion: 500-1000 individuals at Lakes Ohrid |

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| | | | | | | | | | | | | | | | | | Macedonia). Bern Convention Appendix II | and Prespa combined. |
| Chordata/ Aves | *Tadorna tadorna* | Common Shellduck | | ✓ | | | | | | | | | | LC | | | | Passage/ Dispersion: 25-100 individuals, Lakes Ohrid and Prespa combined. |
| Chordata/ Aves | *Vanellus vanellus* | Northern Lapwing | ✓ | | | | | | | | | | | NT | | | VU (Europe); Strictly protected species (Republic of North Macedonia) | Assessed as vulnerable on European Red List. Recorded at Studenchishte Marsh (Spirovska |

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| | | | | | | | | | | | | | | | | ; Birds Directive IIB; Bern Convention Appendix III. CMS Appendix II | et al, 2012). |
| Chordata/ Mammalia | *Lutra lutra*<br><br>*Vulpes vulpes, Mustela putorius, Martes foina* | Eurasian Otter | ✓ | | | | | | | | | | NT | ✓ | | | Strictly protected species<br><br>(Republic of North Macedonia). Population in decline due to loss of wetland habitats. Present at Studenchishte Marsh |
| Arthropoda/ Ostracoda | *Candona alta* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North | Lake Ohrid endemic |

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| Arthropoda/ Ostracoda | *Candona dedelica* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Arthropoda/ Ostracoda | *Candona depressa* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Arthropoda/ Ostracoda | *Candona expansa* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic | Lake Ohrid endemic |

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| Arthropoda/ Ostracoda | *Candona Formosa* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Arthropoda/ Ostracoda | *Candona goricensis* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Arthropoda/ Ostracoda | *Candona hadzistei* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |

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| Arthropoda/ Ostracoda | *Candona hartmanni* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Arthropoda/ Ostracoda | *Candona holmesi* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Arthropoda/ Ostracoda | *Candona jordae* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic | Lake Ohrid endemic |

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| Arthropoda/ Ostracoda | *Candona litoralis* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Arthropoda/ Ostracoda | *Candona lychnitis* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Arthropoda/ Ostracoda | *Candona macedonica* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Arthropoda/ Ostracoda | *Candona margaritana* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North | Lake Ohrid endemic |

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| Arthropoda/ Ostracoda | *Candona marginata* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Arthropoda/ Ostracoda | *Candona marginatoides* | | | | | | ✓ | | | | | | | | | | Protected species (Republic of North Macedonia) | Endemic to Lakes Ohrid and Prespa |

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| Arthropoda/ Ostracoda | *Candona media* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Arthropoda/ Ostracoda | *Candona ohrida* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Arthropoda/ Ostracoda | *Candona ovalis* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Arthropoda/ Ostracoda | *Candona trapeziformis* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Arthropoda/ Ostracoda | *Candona triangulate* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedoni | Lake Ohrid endemic |

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| Arthropoda/ Ostracoda | *Candona vidua* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Arthropoda/ Ostracoda | *Cypria oblique* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |

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| Arthropoda/ Ostracoda | *Eucandona krstici* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Arthropoda/ Ostracoda | *Leptocythere prespensis* | | | | | | ✓ | | | | | | | | | | Protected species (Republic of North Macedonia) | Endemic to Lakes Ohrid & Prespa |
| Arthropoda/ Ostracoda | *Leptocythere proboscidea* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Arthropoda/ Ostracoda | *Paralimnocythere alata* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North | Lake Ohrid endemic |

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| Arthropoda/ Ostracoda | *Paralimnocythere georgevitschi* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Arthropoda/ Ostracoda | *Paralimnocythere karamani* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |

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| Arthropoda/ Ostracoda | *Paralimnocythere ochridense* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Arthropoda/ Ostracoda | *Paralimnocythere slavei* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Arthropoda/ Ostracoda | *Paralimnocythere umbonata* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Arthropoda/ Ostracoda | *Pseudocandona slavei* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Arthropoda/ | *Asellus* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid |

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| Malacostraca | *arnautovici arnautovici* | | | | | | | | | | | | | | | | | endemic |
| Arthropoda/ Malacostraca | *Asellus arnautovici elongates* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Arthropoda/ Malacostraca | *Asellus gjorgjevici gjorgevici* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Arthropoda/ Malacostraca | *Asellus gjorgjevici litoralis* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Arthropoda/ Malacostraca | *Asellus remyi* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid |

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| | *acutangulus* | | | | | | | | | | | | | | | | endemic |
| Arthropoda/ Malacostraca | *Asellus remyi nudus* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Arthropoda/ Malacostraca | *Asellus remyi remyi* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Arthropoda/ Malacostraca | *Gammarus ochridensis abyssalis* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Arthropoda/ Malacostraca | *Gammarus ochridensis ochridensis* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Arthropoda/ Malacostraca | *Niphragus ohridanus ohridanus* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic | Lake Ohrid endemic |

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| Arthropoda/ Malacostraca | *Niphragus sanctinaumi* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Arthropoda/ Malacostraca | *Synurella longidactylus* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Bivalvia | *Pisidium edlaueri* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | EN | | | Protected species (Republic | Lake Ohrid endemic |

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| Mollusca/ Bivalvia | *Pisidium subtruncatum recalvum* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Bivalvia | *Sphaerium parenzani* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Acroloxus improvisus* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | VU | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Acroloxus macedonicus* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | CR | | | Protected species (Republic of North | Lake Ohrid endemic |

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| Mollusca/ Gastropoda | *Ancylus lapidicus* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | EN | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Ancylus scalariformis* | | | ✓ | | | | | | | | | 100 | VU | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |

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| Mollusca/ Gastropoda | *Ancylus tapirulus* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | EN | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Chilopyrgula sturanyi* | | | ✓ | | ✓ | ✓ | | | | | | 100 | NT | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Dolapia ornata* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Ginaia munda munda* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North | Lake Ohrid endemic |

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| Mollusca/ Gastropoda | Ginaia munda sublitoralis | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Gocea ohridana* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | CR | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |

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| Mollusca/ Gastropoda | *Gyraulus crenophilus* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | EN | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Gyraulus fontinalis* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | EN | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Gyraulus lychnidicus* | | | ✓ | | ✓ | ✓ | | | | | | 100 | NT | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Gyraulus paradoxus* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North | Lake Ohrid endemic |

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| Mollusca/ Gastropoda | *Gyraulus trapezoids* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | EN | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Lyhnidia gjorgjevici* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | EN | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |

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| Mollusca/ Gastropoda | *Lyhnidia hadzii* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | CR | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Lyhnidia karamani* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | CR | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Lyhnidia stankovici* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | CR | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Lyhnidia sublitoralis* | | | ✓ | | ✓ | ✓ | | | | | | 100 | DD | | | Protected species (Republic of North | Lake Ohrid endemic |

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| Mollusca/ Gastropoda | *Lymnaea relicta* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Macedopyrgula pavlovici* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | VU | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |

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| Mollusca/ Gastropoda | *Macedopyrgula wagneri* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | VU | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Micropyrgula stankovici* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | VU | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Neofossarulus stankovici* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | VU | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Ochridopyrgula macedonica charensis* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North | Lake Ohrid endemic |

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| Mollusca/ Gastropoda | *Ochridopyrgula macedonica macedonica* | | | ✓ | | ✓ | ✓ | | | | | | 100 | NT | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Ohridohauffenia depressa* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | EN | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |

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| Mollusca/ Gastropoda | *Ohridohauffenia minuta* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | CR | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Ohridohauffenia rotunda* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | EN | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Ohridohauffenia sanctinaumi* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | EN | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Ohridohauffenia sublitoralis* | | | ✓ | | ✓ | ✓ | | | | | | 100 | DD | | | Protected species (Republic of North | Lake Ohrid endemic |

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| Mollusca/ Gastropoda | *Ohridohauffenia sanctinaumi* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | EN | | | Protected species (Republic of North Macedonia) | Endemic to 3 Lake Ohrid springs |
| Mollusca/ Gastropoda | *Ohridohoratia carinata* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | EN | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |

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| Mollusca/ Gastropoda | *Ohridohoratia polinskii* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | VU | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Ohridohoratia pygmaea* | | | ✓ | | ✓ | ✓ | | | | | | 100 | NT | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Ohridohoratia sturanyi* | | | ✓ | | ✓ | ✓ | | | | | | 100 | NT | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Ohrigocea karevi* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | EN | | | Protected species (Republic of North | Lake Ohrid endemic |

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| Mollusca/ Gastropoda | *Ohrigocea miladinovorum* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | EN | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Ohrigocea samuili* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | EN | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |

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| Mollusca/ Gastropoda | *Ohrigocea stankovici* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | EN | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Planorbis macedonicus* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | EN | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Pseudohoratia brusinae* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | VU | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Pseudohoratia lacustris* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | VU | | | Protected species (Republic of North | Lake Ohrid endemic |

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| Mollusca/ Gastropoda | *Pseudohoratia ochridana* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | VU | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Pyrgohydrobia grochmalickii* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | VU | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |

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| Mollusca/ Gastropoda | *Pyrgohydrobia sanctinaumi* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | VU | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Stankovicia baicaliiformis* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | CR | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Strugia ohridana* | | ✓ | | | | ✓ | | | | | | | VU | | | Protected species (Republic of North Macedonia) | Restricted to subterranean spring systems in Southeast Adriatic Drainages biogeographic region |
| Mollusca/ Gastropoda | *Trachyochridia filocincta* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | CR | | | Protected species | Lake Ohrid endemic |

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| | | | | | | | | | | | | | | | | | (Republic of North Macedonia) | |
| Mollusca/ Gastropoda | *Valvata stenoterma* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Valvata hirsutecostata* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | VU | | | Protected species (Republic of North Macedoni | Lake Ohrid endemic |

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| Mollusca/ Gastropoda | *Valvata rhabdota* | | | ✓ | | ✓ | ✓ | | | | | | 100 | NT | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Valvata relicta* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | VU | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Xestopyrgula dybowskii* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | VU | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Mollusca/ Gastropoda | *Zaumia kusceri* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | CR | | | Protected species | Lake Ohrid endemic |

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| Mollusca/ Gastropoda | *Zaumia sanctizaumi* | | ✓ | ✓ | | ✓ | ✓ | | | | | | 100 | CR | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Nematoda/ Chromadorea | *Neochromadora trilineata* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Nematoda/ Chromadorea | *Punctodora* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |

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| | *ochridensis* | | | | | | | | | | | | | | | | | |
| Nematoda/ Chromadorea | *Theristus subsetosus* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Platyhelminthes/ Rhabditophora | *Castrada ochridense* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Platyhelminthes/ Rhabditophora | *Castradella unidentata* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Platyhelminthes/ Rhabditophora | *Dalyellia minima* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Platyhelminthes/ Rhabditophora | *Dendrocoelum adenodactylosum* | | | | | | ✓ | | | | | | | | | | | Endemic species found only in Lakes Ohrid & Prespa |
| Platyhelminthes/ | *Dendrocoelum albidum* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |

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| Rhabditophora | | | | | | | | | | | | | | | | | |
| Platyhelminthes/ Rhabditophora | *Dendrocoelum cruciferum* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Platyhelminthes/ Rhabditophora | *Dendrocoelum decoratum* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Platyhelminthes/ Rhabditophora | *Dendrocoelum dorsivittatum* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Platyhelminthes/ Rhabditophora | *Dendrocoelum komareki* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |

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| Platyhelminthes/ Rhabditophora | *Dendrocoelum lacustre* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Platyhelminthes/ Rhabditophora | *Dendrocoelum lychnidicum* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Platyhelminthes/ Rhabditophora | *Dendrocoelum maculatum* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Platyhelminthes/ Rhabditophora | *Dendrocoelum magnum* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Platyhelminthes/ Rhabditophora | *Dendrocoelum minimum* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Platyhelminthes/ Rhabditophor | *Dendrocoelum ochridense* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |

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| Platyhelminthes/ Rhabditophora | *Dendrocoelum porfirevi* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Platyhelminthes/ Rhabditophora | *Dendrocoelum sanctinaumi* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Platyhelminthes/ Rhabditophora | *Dendrocoelum sapkarevi* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Platyhelminthes/ Rhabditophora | *Dendrocoelum sinisai* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |

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| Platyhelminthes/ Rhabditophora | *Dendrocoelum tockoi* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Platyhelminthes/ Rhabditophora | *Dendrocoelum translucidum* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Platyhelminthes/ Rhabditophora | *Jovanella balcanica* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Platyhelminthes/ Rhabditophora | *Macrostomum leptos* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Platyhelminthes/ Rhabditophora | *Mesovortex stankovici* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Platyhelminthes/ Rhabditophor | *Opistomum macedonicum* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |

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| Platyhelminthes/ Rhabditophora | *Phagocata maculate* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Platyhelminthes/ Rhabditophora | *Phagocata ochridana* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Platyhelminthes/ Rhabditophora | *Phagocata stankovici* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Platyhelminthes/ Rhabditophora | *Phagocata undulate* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |

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| Platyhelminthes/ Rhabditophora | *Proamphibolella simplex* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Platyhelminthes/ Rhabditophora | *Proamphibolella st.naumi* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Platyhelminthes/ Rhabditophora | *Promacrostomum paradoxum* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | | Lake Ohrid endemic |
| Porifera/ Demospongiae | *Ochridospongia interlithonis* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Porifera/ Demospongiae | *Ochridospongia interlithonis* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedoni | Lake Ohrid endemic |

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| | | | | | | | | | | | | | | | | | a) | |
| Porifera/ Demospongiae | *Ochridospongia rotunda* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |
| Porifera/ Demospongiae | *Ochridospongilla stankovici* | | | ✓ | | ✓ | ✓ | | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Porifera/ Demospongiae | *Spongilla stankovici* | | | ✓ | | ✓ | ✓ | | | | | 100 | | | | Protected species (Republic of North Macedonia) | Lake Ohrid endemic |

*Optional text box to provide further information on animal species of international importance:*

*(This field is limited to 3000 characters)*

Bird data is often given for both Lakes Ohrid and Prespa combined. Hence, it is presented this way in the species table.

## 3.4 Ecological communities whose presence relates to the international importance of the site

| Name of ecological community | Community qualifies under Criterion 2? | Description | Justification |
|---|---|---|---|
| *Caricetum Elatae* | [✓ ] | | Once a widespread association in the valleys of Macedonia, *Caricetum elatae* became restricted to the Ohrid region in the post-glacial era due to the relatively more humid climate and wetter conditions there. It is therefore an important and rare relict community. Once inhabiting wetlands at Struga and Studenchishte Marsh, the latter is now the only remaining location in Macedonia due to habitat loss. Studenchishte Marsh offers an important source of *Carex elata* for potential wetland rehabilitation in other locations. |
| *Charophyte-gastropod communities* | ✓ | | Charophyte meadows display rich diversity and host a high density of gastropods, whose explosive endemism is characteristic of |

| | | | |
|---|---|---|---|
| | | | Lake Ohrid as a Wetland of International Importance. The meadows are also thought to promote speciation processes by acting as a natural barrier (Albrecht and Wilke, 2008). |
| *Cyperetum longi* | | | Rare in the Republic of North Macedonia. Present at Studenchishte Marsh. |
| *Oenantheto-Roripetum Lohm* | | | Rare in the Republic of North Macedonia. Present at Studenchishte Marsh. |
| *Scirpeto-Phragmitetum* | | | Although relatively more common in the Republic of North Macedonia than other wetland plant associations, large areas have nonetheless been drained over the past |

| | | | |
|---|---|---|---|
| | | | century. Present at Studenchishte Marsh. |
| *Sparganio-Glycerietum fluitantis* | | | Although relatively more common in the Republic of North Macedonia than other wetland plant associations, large areas have nonetheless been drained over the past century. Present at Studenchishte Marsh. |
| *Trifolietum nigrescentis-subterranei* | | | This association builds lowland meadows in Macedonia. These habitats are under strong pressure due to abandonment (they are not mowed anymore) and conversion (into different land use types). |

Optional text box to provide further information *(This field is limited to 3000 characters)*

Myriophylletum-Nypharetum community (W. Koch 1926).

This community completely cover the surface, with large production, and with a thick layer of water meal. Characteristic species are Myriophyllum verticillatum, Nympaea alba and Nuphar luteum.

Potameto-Najadetum community (H-ci et Micevski, 1960).

This community grows in the shallower zones of the Ohrid shore, in place with calm, warm water.

The depth of the water in the places where this community can be found is 20-60 cm. The surface of places is also covered with a thick layer of water mil.

Hydrocharideto-Nymhoidetum commmunity.

This community is located in marshy areas , near lake, with shallow (40-60 cm), and warm water. In the summer period the water level decreases and the soil becomes exposed. Characteristic plants are Hidrocharis morsus ranae and Utricularia neglecta.

# What is the Site like?

## 4.1 Ecological character

*Please summarize the ecological components, processes and services which are critical to determining the ecological character of the site. Please also summarize any natural variability in the ecological character of the site, and any known past or current change*

*(This field is limited to 4000 characters)*

Lake Ohrid is an oligotrophic freshwater with a continuous existence of approximately 1,300,000 to 1,900,000 years (Wagner, 2017). A combination of comparative isolation; stable conditions; and habitat assortment across vertical and horizontal axes has led to the development of unique ecosystems containing over 1,200 species, including at least 200 endemics, many of which have evolved in-lake (Albrecht and Wilke, 2008). These 1,200 species have adapted to Lake Ohrid's clear, low-nutrient, high-oxygen aquatic environment. Some can only survive in waters of this kind.

Such conditions are maintained by karst underground channels that provide 50% of the lake's inflow while partially removing phosphorous en-route; the buffering function of Studenchishte Marsh, a shoreline wetland with additional nutrient-filtering capacity; and macrophyte meadows, all three of which both directly constitute habitat for various, specific species and indirectly facilitate habitat at other lacustrine locations by limiting eutrophication processes and providing the high-quality water-conditions required by taxa that are key to ecosystem functioning such as salmonid fish, the in-lake apex predators.

The karst underground channels supply water both from Lake Prespa and atmospheric precipitation to surface and sub-lacustrine springs. Due to chemical processes that occur along the way and the array of karst pathways, the water that arrives at the springs is nutrient-limited; differs from that of the lake proper; and varies chemically from source to source, producing a subtle diversity of aquatic habitats (Matzinger et al, 2006; Matter et al, 2010; Jordanoska et al, 2010). As a result, invertebrate fauna diverges both from one spring complex to another and with the lake proper. Each contains endemic taxa.

Moving to the main water body, Lake Ohrid's transparency penetrates endemic phytoplankton species to greater depths where more nutrients are available. The phytoplankton in turn furnish zooplankton communities and the fish that predate upon them. High rates of dissolved oxygen open habitats for benthic fauna up to 150m from the lake surface (Matzinger et al, 2006a). The result is endemicity at every trophic layer.

After the profundal zone, the sublittoral and littoral are subdivided into belts known as the sand/silt (35-50m depth), shell (20-35m), *Chara* (3-20m) and rock/sand (0-3m), varied habitats that support different species compositions. Species distribution (and evolution) is further influenced by heterogeneous sedimentation patterns and horizontal differences in hydrology, ecology and geology, all of which define the ecological arena through niche habitats.

The Chara Belt refers to the several *Chara* species growing in an almost continuous line around the lake, some of which are Balkan endemics. Aside from providing habitat, these may drive speciation processes by acting as barriers between invertebrate populations (Albrecht & Wilke, 2008). Macrophyte flora is also represented by Potamogeton, Phragmites and Cladophora belts, which provision food, shelter and spawning locations for 8 of 12 cyprinid fish taxa, including 2 endemics (Talevska and Talevski, 205). This is in contrast to the rocky and sandy locations where salmonid fish spawn.

In transition between aquatic and terrestrial habitats, Studenchishte Marsh is one of Lake Ohrid's most important ecotones. Containing alkaline marshes and fens, Studenchishte has been in constant

communication with the lake proper for many thousands of years. Although water channels have been interrupted in recent times, connection still occurs by underground water passages. The final remains of onetime extensive shoreline wetlands, Studenchishte has a

historical function as a nesting, spawning and wintering ground for birds and fish. Diminished by land-use changes and habitat degradation, it is yet home to relict plants, nationally rare insects, endemic invertebrates, and protected herpetofauna (Spirovska et al, 2012; Apostolova et al, 2016).

The past century has seen large anthropogenic impact at Lake Ohrid: loss of coastal wetlands, overfishing, evident eutrophication et cetera (Kostoski et al, 2010).

## 4.2 What wetland type(s) are in the site?

*Please list all wetland types which occur on the site, and for each of them: - rank the four most abundant types by area from 1 (greatest extent) to 4 (least extent) in the third column, - if the information exists, provide the area (in ha) in the fourth column - if this wetland type is used for justifying the application of Criterion 1, indicate if it is representative, rare or unique in the last column - you can give the local name of the wetland type if different from the Ramsar classification system in the second column*

Marine or coastal wetlands

| **Wetland types (code and name)**[5] | **Local name** | **Ranking of extent (1: greatest - 4: least)** | **Area (ha) of wetland type** | **Justification of Criterion 1**[6] |
|---|---|---|---|---|

Inland wetlands

| **Wetland types (code and name)**[7] | **Local name** | **Ranking of extent (1: greatest - 4: least)** | **Area (ha) of wetland type** | **Justification of Criterion 1**[6] |
|---|---|---|---|---|
| 0 – Permanent freshwater lake | Lake Ohrid | 1 | **24.732** | Unique |
| U – Permanent non-forested peatlands | Studenchishte Marsh | 2 | **65,3** | Rare |
| Y – Permanent Freshwater Springs | Sveti Naum Springs | 2 | **2,5** | Unique |
| Y – Permanent Freshwater Springs | Bijanini Springs | 3 | / | Unique |
| Zk(b) | Subterranean Karst Channels | 2 | / | Unique |

Human-made wetlands

| Wetland types (code and name)[8] | Local name | Ranking of extent (1: greatest - 4: | Area (ha) of wetland type | Justification of Criterion 1[6] |
|---|---|---|---|---|

[5] A: Permanent shallow marine waters | B: Marine subtidal aquatic beds (Underwater vegetation) | C: Coral reefs | D: Rocky marine shores | E: Sand, shingle or pebble shores | G: Intertidal mud, sand or salt flats | Ga: Bivalve (shell-fish) reefs | H: Intertidal marshes | I: Intertidal forested wetlands | J: Coastal brackish / saline lagoons | F: Estuarine waters | Zk(a): Karst and other subterranean hydrological systems | K: Coastal freshwater lagoons

[6] | Representative | Rare | Unique

[7] M: Permanent rivers/ streams/ creeks | L: Permanent inland deltas | Y: Permanent Freshwater springs; oases | N: Seasonal/ intermittent/ irregular rivers/ streams/ creeks | O: Permanent freshwater lakes | Tp: Permanent freshwater marshes/ pools | P: Seasonal/ intermittent freshwater lakes | Ts: Seasonal/ intermittent freshwater marshes/ pools on inorganic soils | Tp: Permanent freshwater marshes/ pools | W: Shrub-dominated wetlands | Xf: Freshwater, tree-dominated wetlands | Ts: Seasonal/ intermittent freshwater marshes/ pools on inorganic soils | U: Permanent Non-forested peatlands | Xp: Permanent Forested peatlands | Va: Montane wetlands | Vt: Tundra wetlands | Q: Permanent saline/ brackish/ alkaline lakes | R: Seasonal/ intermittent saline/ brackish/ alkaline lakes and flats | Sp: Permanent saline/ brackish/ alkaline marshes/ pools | Ss: Seasonal/ intermittent saline/ brackish/ alkaline marshes/ pools | Zg: Geothermal wetlands | Zk(b): Karst and other subterranean hydrological systems

[8] 1: Aquaculture ponds | 2: Ponds | 3: Irrigated land | 4: Seasonally flooded agricultural land | 5: Salt exploitation sites | 6: Water storage areas/Reservoirs | 7: Excavations | 8: Wastewater treatment areas | 9: Canals and drainage channels or ditches | Zk(c): Man-made subterranean hydrological systems

**least)**

*What non-wetland habitats are within the site?*

Other non-wetland habitat

| Other non-wetland habitats within the site | Area (ha) if known |
|---|---|

Habitat connectivity (ECD)

## 4.3 Biological components

### 4.3.1 Plant species

Other noteworthy plant species

| Scientific name | Common name (optional) | Position in range / endemism / other (optional) |
|---|---|---|
| *Ceratophyllum submersum* | Soft Hornwort | Rare species in the Republic of North Macedonia. Present at Studenchishte Marsh. |
| *Cyperus longus* | Sweet Cyperus | Rare species in the Republic of North Macedonia. Present at Studenchishte Marsh. |
| *Chara imperfecta* | | Close to extinction in the Balkans. Recorded only in Macedonia, according to *Red Data List of Charophytes in the Balkans* (2006). |

Invasive alien plant species

| Scientific name | Common name | Impacts[9] |
|---|---|---|
| *Elodea Canadensis* | *Canadian pondweed* | Potentially |

Optional text box to provide further information *(This field is limited to 2500 characters)*

Lake Ohrid is considered a hotspot of Charophyte diversity.

### 4.3.2 Animal species

Other noteworthy animal species

| Phylum | Scientific name | Common name | Pop. size (optional) | Period of pop. est. (optional) | % occurrence (optional) | Position in range /endemism/other (optional) |
|---|---|---|---|---|---|---|
| Arthropoda/ Insecta | *Agonum lugens* | | | | | Species only recorded at Studenchishte Marsh for Republic of North Macedonia. |
| Arthropoda/ Insecta | *Agonum piceum* | | | | | Species only recorded at Studenchishte Marsh for Republic of North Macedonia. |
| Arthropoda/ | *Amara* | | | | | Species only recorded at |

[9] No impacts | Potentially | Actually (minor impacts) | Actually (major impacts)

| | | | | | | |
|---|---|---|---|---|---|---|
| Insecta | *convexiuscula* | | | | | Studenchishte Marsh for Republic of North Macedonia. |
| Arthropoda/ Insecta | *Stenolophus skrimshiranus* | | | | | Species only recorded at Studenchishte Marsh for Republic of North Macedonia. |
| Arthropoda/ Insecta | *Brachinus elegans* | | | | | Species only recorded at Studenchishte Marsh for Republic of North Macedonia. |
| Arthropoda/ Insecta | *Stenolophus proximus* | | | | | Species only recorded at Studenchishte Marsh for Republic of North Macedonia. |
| Arthropoda/ Insecta | *Pterostichus elongates* | | | | | Species only recorded at Studenchishte Marsh for Republic of North Macedonia. |
| Arthropoda/ Insecta | *Oodes helopioides* | | | | | Species only recorded at Studenchishte Marsh for Republic of North Macedonia. |
| Arthropoda/ Insecta | *Oodes gracilis* | | | | | Species only recorded at Studenchishte Marsh for Republic of North Macedonia. |
| Chordata/ Amphibia | *Bombina variegata* | Yellow-bellied Toad | | | | Protected species (Republic of North Macedonia). |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | Present in Studenchishte Marsh. |
| Chordata/ Amphibia | *Hyla arborea* | European Tree Frog | | | | Protected species (Republic of North Macedonia). Present in Studenchishte Marsh. |
| Chordata/ Amphibia | *Rana dalmatina* | Agile Frog | | | | Protected species (Republic of North Macedonia). Present in Studenchishte Marsh. |
| Chordata/ Amphibia | *Triturus (carniflex) macedonicus* | Macedonian Crested Newt | | | | Protected species (Republic of North Macedonia). Population in decline due to loss of wetland habitats. Present at Studenchishte Marsh. |
| Chordata/Aves | *Acrocephalus palustris* | Marsh Warbler | | | | Passage/Dispersion common for Lakes Ohrid and Prespa. |

| | | | | | | |
|---|---|---|---|---|---|---|
| Chordata/ Aves | *Anas acuta* | Northern Pintail | | | | Protected species (Republic of North Macedonia). Recorded for Studenchishte Marsh. |
| Chordata/ Aves | *Ardea purpurea* | Purple Heron | | | | Strictly protected species (Republic of North Macedonia). CMS Appendix II. Recorded for Studenchishte Marsh. |
| Chordata/ Aves | *Ardeola ralloides* | Squacco Heron | | | | Strictly protected species (Republic of North Macedonia). Recorded for Studenchishte Marsh. |
| Chordata/ Aves | *Botaurus stellaris* | Eurasian Bittern | | | | Strictly protected species (Republic of North Macedonia). CMS Appendix II. Recorded for Studenchishte Marsh. Migratory/dispersion recorded for Lake Ohrid. |
| Chordata/Aves | *Calidris minuta* | Little Stint | | | | Passage/ Dispersion 0-100. |
| Chordata/Aves | *Cettia cetti* | Cetti's Warbler | | | | Passage/ Dispersion: Common for Lakes Ohrid and Prespa. |

| | | | | | | |
|---|---|---|---|---|---|---|
| Chordata/ Aves | *Charadrius dubius* | Little Ringed Plover | | | | Passage/ Dispersion 10-100 individuals. |
| Chordata/ Aves | *Ciconia ciconia* | White Stork | | | | Strictly protected species (Republic of North Macedonia). CMS Appendix II. Recorded for Studenchishte Marsh. |
| Chordata/ Aves | *Circus aeruginosus* | Western Marsh Harrier | | | | Strictly protected species (Republic of North Macedonia). Recorded for Studenchishte Marsh. |
| Chordata/ Aves | *Egretta garzetta* | Little Egret | | | | Strictly protected species (Republic of North Macedonia). Recorded for Studenchishte Marsh. |
| Chordata/ Aves | *Hydrocoloeus minutus* | Little Gull | | | | Accidental passage/ dispersion 0-30 individuals. |
| Chordata/ Aves | *Motacilla alba* | White Wagtail | | | | Passage/ Dispersion common for Lakes Ohrid & Prespa. |

| | | | | | | |
|---|---|---|---|---|---|---|
| Chordata/ Aves | *Motacilla cinerea* | Grey Wagtail | | | | Passage/ Dispersion common for Lakes Ohrid & Prespa. |
| Chordata/ Aves | *Motacilla flava* | Western Yellow Wagtail | | | | Passage/ Dispersion common for Lakes Ohrid & Prespa. |
| Chordata/ Aves | *Nycticorax nycticorax* | Black-crowned Night Heron | | | | Strictly protected species (Republic of North Macedonia). Recorded for Studenchishte Marsh. |
| Chordata/ Aves | *Panurus biarmicus* | Bearded Parrotbill | | | | Passage/dispersion: Common |
| Chordata/ Aves | *Plegadis falcinellus* | Glossy Ibis | | | | Strictly protected species (Republic of North Macedonia). CMS Appendix II. Recorded for Studenchishte Marsh. |
| Chordata/ Aves | *Podiceps grisegena* | Red-necked Grebe | | | | CMS Appendix II; Accidental passage/ dispersion recorded. |
| Chordata/ Aves | *Remiz pendulinus* | Eurasian Penduline Tit | | | | Passage/dispersion: Common |
| Chordata/ Reptilia | *Emys orbicularis* | European Pond Turtle | | | | Protected species (Republic of North Macedonia). Population in decline due to loss of wetland habitats. Present at Studenchishte Marsh. |

| | | | | | | |
|---|---|---|---|---|---|---|
| Chordata/ Reptilia | *Natrix tessellata* | Tessellated Water Snake | | | | Protected species (Republic of North Macedonia). Population in decline due to loss of wetland habitats. Present at Studenchishte Marsh. |

### Invasive alien animal species

| Phylum | Scientific name | Common name | Impacts[9] |
|---|---|---|---|
| Arthropoda/ Branchiopoda | *Diaphanosoma brachiurum* | | |
| Arthropoda/ Branchiopoda | *Leptodora kindtii* | | |
| Arthropoda/ Malacostraca | *Orchestia cavimana* | | |
| Chordata/ Actinopterygii | *Alosa fallax* | Twaite Shad | Low |
| Chordata/ Actinopterygii | *Carassius gibelio* | Prussian Carp | Low |

| | | | |
|---|---|---|---|
| Chordata/ Actinopterygii | *Gambusia holbrooki* | Eastern Mosquitofish | Low |
| Chordata/ Actinopterygii | *Lepomis gibbosus* | Pumpkinseed | Low |
| Chordata/ Actinopterygii | *Oncorhynchus mykiss* | Rainbow Trout | Low |
| Chordata/ Actinopterygii | *Pseudorasbora parva* | Topmouth Gudgeon | Low |
| Chordata/ Actinopterygii | *Rhodeus amarus* | | Low |
| Mollusca/ Gastropoda | *Physa acuta* | | |
| Mollusca/ Gastropoda | *Ferrissia fragilis* | Fragile ancylid | |

Optional text box to provide further information *(This field is limited to 2500 characters)*

## 4.4 Physical components

### 4.4.1 Climate

*Please indicate the prevailing climate type(s) by selecting below the climatic region(s) and subregion(s), using the Köppen-Gieger Climate Classification System.*

| Climatic region[10] | Subregion[11] |
|---|---|
| C | Sa |

*If changing climatic conditions are affecting the site, please indicate the nature of these changes:*

*(This field is limited to 1000 characters)*

Ecological changes such as in the zooplankton community (including recent invasions by *Diaphanosoma brachiurum* and *Leptodora kintii*) may be linked to warming lake waters (Kostoski et al, 2010). Eutrophication has been predicted to accelerate with climate change (Matzinger et al, 2007) and decreased vertical mixing/complete deep convections in the recent past is also possibly climate-related.

### 4.4.2 Geomorphic setting

a) Minimum elevation above sea level (in metres) *(The online RIS only accepts numeric values)*

693m

a) Maximum elevation above sea level (in metres) *(The online RIS only accepts numeric values)*

696m

*b) Position in landscape/river basin:*

[ ] Entire river basin

[✓ ] Upper part of river basin

[ ] Middle part of river basin

[ ] Lower part of river basin

[ ] More than one river basin

[ ] Not in river basin

[ ] Coastal

Please name the river basin or basins. If the site lies in a sub-basin, please also name the larger river basin. For a coastal/marine site, please name the sea or ocean. *(This field is limited to 1000 characters)*

Drim Basin

### 4.4.3 Soil

[ ] Mineral

[✓] Organic

[ ] No available information

Are soil types subject to change as a result of changing hydrological conditions (e.g., increased salinity or acidification)?

---

[10] A. Tropical humid climate | B. Dry climate | C. Moist Mid-Latitude climate with mild winters | D. Moist Mid-Latitude climate with cold winters | E. Polar climate with extremely cold winters and summers | H. Highland

[11] Af: Tropical wet (No dry season) | Am: Tropical monsoonal (Short dry season; heavy monsoonal rains in other months) | Aw: Tropical savanna (Winter dry season) | BWh: Subtropical desert (Low-latitude desert) | BSh: Subtropical steppe (Low-latitude dry) | BWk: Mid-latitude desert (Mid-latitude desert) | BSk: Mid-latitude steppe (Mid-latitude dry) | Csa: Mediterranean (Mild with dry, hot summer) | Csb: Mediterranean (Mild with dry, warm summer) | Cfa: Humid subtropical (Mild with no dry season, hot summer) | Cwa: Humid subtropical (Mild with dry winter, hot summer) | Cfb: Marine west coast (Mild with no dry season, warm summer) | Cfc: Marine west coast (Mild with no dry season, cool summer) | Dfa: Humid continental (Humid with severe winter, no dry season, hot summer) | Dfb: Humid continental (Humid with severe winter, no dry season, warm summer) | Dwa: Humid continental (Humid with severe, dry winter, hot summer) | Dwb: Humid continental (Humid with severe, dry winter, warm summer) | Dfc: Subarctic (Severe winter, no dry season, cool summer) | Dfd: Subarctic (Severe, very cold winter, no dry season, cool summer) | Dwc: Subarctic (Severe, dry winter, cool summer) | Dwd: Subarctic (Severe, very cold and dry winter, cool summer) | ET: Tundra (Polar tundra, no true summer) | EF: Ice Cap (Perennial ice) | H: Highland (-)

[ ] Yes / [x] No

Please provide further information on the soil (optional) *(This field is limited to 1000 characters)*

### 4.4.4 Water regime

Water permanence

| Presence?[12] |
|---|
| Permanent |

Source of water that maintains character of the site

| Presence?[13] | Predominant water source |
|---|---|
| Water inputs from groundwater | [✓] |

| | |
|---|---|
| Water inputs from surface water | |
| Water inputs from rainfall | |

Water destination

| Presence?[14] |
|---|
| To downstream catchment |

Stability of water regime

| Presence?[15] |
|---|
| Stable (Lake Ohrid); Fluctuating (Studenchishte Marsh) |

Please add any comments on the water regime and its determinants (if relevant). Use this box to explain sites with complex hydrology: *(This field is limited to 2000 characters)*

With a comparatively small catchment of 2,600 $km^2$, Lake Ohrid receives approximately 54% of its water from subterranean karst channels, 23% from direct precipitation, and the remaining 23% from overland inflows (Albrecht & Wilke, 2008), including most majorly the River Sateska, which was artificially diverted into the lake in 1961/62, River Koselska, River Cerava, River Pogradec, and River Verdova. Several other smaller streams cease to flow in dry conditions.

The aforementioned karst channels run through Mount Galichica on the lake's eastern shore and emerge as surface (51% by water volume) and sublacustrine springs (49%). They are predominantly fed by waters from Lake Prespa on the other side of the mountain, although a significant contribution originates from precipitation that has been absorbed into the highly porous mountain as well (Albrecht and Wilke, 2008).

A single outflow, the River Black Drim, accounts for 60% of Lake Ohrid's exiting water (Matzinger et al, 2006a). The remaining 40% is lost to evaporation. Due to artificial regulation for hydroelectric dams, the Lake Ohrid water level is (generally) held between 693.10m and 693.75m. This is legally mandated although fluctuations beyond these parameters have been known to occur.

Studenchishte Marsh's groundwaters flow northeast to southwest and derive from precipitation that has been filtered through Mount Galichica. An important source of both its water and that of the lake proper is Biljanini Springs. During high-water extremes, Lake Ohrid and Studenchishte Marsh fully merge. To date, the movement of groundwater between Studenchishte and Lake Ohrid has not been sufficiently researched (Spirovska et al, 2012).

Connectivity of surface waters and of groundwater (ECD)

Stratification and mixing regime (ECD)

At depths above 150m, Lake Ohrid's water is layered by temperature from March to November. Below 150m, it is stratified by salinity. Complete mixing takes place roughly once per decade during exceptionally cold winters. The water residence time is 70 years (Albrecht and Wilke, 2008).

---

[12] Usually permanent water present | Usually seasonal, ephemeral or intermittent water present | Unknown

[13] Water inputs from rainfall | Water inputs from surface water | Water inputs from groundwater | Marine water | Unknown

[14] Feeds groundwater | To downstream catchment | Marine | Unknown

[15] Water levels largely stable | Water levels fluctuating (including tidal) | Unknown

### 4.4.5 Sediment regime

[✓] Significant erosion of sediments occurs on the site

[✓] Significant accretion or deposition of sediments occurs on the site

[✓] Significant transportation of sediments occurs on or through the site
[ ] Sediment regime is highly variable, either seasonally or inter-annually
[ ] Sediment regime unknown

Please provide further information on sediment (optional): *(This field is limited to 1000 characters)*

Sediment accretion is the basis for some of the most important ecosystem services of Lake Ohrid: biodiversity and paleoenvironmental archives. Diverse habitats created by the non-uniform distribution/structure of sediments are thought to contribute to speciation processes.

Surface sedimentation displays significant heterogeneity due to the varied geological catchment, anthropogenic land use and anticlockwise water currents. Coarser grain sizes are proximate to river outlets, while finer sand and clay materials become more prevalent at greater depths. Wind-driven surface currents are the main transport mechanism, while tectonically induced turbidity currents account for irregular movements of larger material to deeper zones (Vogel, 2010).

Increased sediment loads from human influences such as redirection of the River Sateska, deforestation, and intensive agriculture are causing sediment homogenization and elevated nutrient inputs with associated changes to species compositions.

Water turbidity and colour (ECD)

Light - reaching wetland (ECD)

Water temperature (ECD)

### 4.4.6 Water pH

[ ] Acid (pH<5.5)

[ ] Circumneutral (pH: 5.5-7.4 )

[✓ ] Alkaline (pH>7.4)

[ ] Unknown

Please provide further information on pH (optional): *(This field is limited to 1000 characters)*

### 4.4.7 Water salinity

[✓] Fresh (<0.5 g/l)

[ ] Mixohaline (brackish)/Mixosaline (0.5-30 g/l)

[ ] Euhaline/Eusaline (30-40 g/l)

[ ] Hyperhaline/Hypersaline (>40 g/l)

[ ] Unknown

Please provide further information on salinity (optional): *(This field is limited to 1000 characters)*

Dissolved gases in water (ECD)

### 4.4.8 Dissolved or suspended nutrients in water

[ ] Eutrophic

[ ] Mesotrophic

[✓ ] Oligotrophic

[ ] Dystrophic

[ ] Unknown

Please provide further information on dissolved or suspended nutrients (optional): *(This field is limited to 1000 characters)*

Although Lake Ohrid remains oligotrophic, anthropogenic eutrophication is evident, particularly in the littoral zone.

Dissolved organic carbon (ECD)

Redox potential of water and sediments (ECD)

Water conductivity (ECD)

### 4.4.9 Features of the surrounding area which may affect the Site

Please describe whether, and if so how, the landscape and ecological characteristics in the area surrounding the Ramsar Site differ from the site itself:

[ ] i) broadly similar / [x] ii) significantly different

*If the surrounding area differs from the Ramsar Site, please indicate how: (Please tick all categories that apply)*

[✓] Surrounding area has greater urbanisation or development
[ ] Surrounding area has higher human population density [✓]
Surrounding area has more intensive agricultural use

[ ] Surrounding area has significantly different land cover or habitat types

Please describe other ways in which the surrounding area is different: *(This field is limited to 2000 characters)*

It is not a lake.

## 4.5 Ecosystem services

### 4.5.1 Ecosystem services/benefits

*Please select below all relevant ecosystem services/benefits currently provided by the site and indicate their relative importance in the right-hand column.*

Provisioning Services

| **Ecosystem service**[16] | **Examples**[17] | **Importance/Extent/Significance**[18] |
|---|---|---|
| Fresh water | Drinking water for humans | High |
| Fresh water | Water for irrigated agriculture | Medium |
| Fresh water | Water for energy production | Medium |
| Food for humans | Fish | Medium |
| Wetland non-food product | Other | Low |

Regulating Services

| **Ecosystem service**[19] | **Examples**[20] | **Importance/Extent/Significance**[18] |
|---|---|---|
| Pollution control and detoxification | Soil, sediment and nutrient retention | High |
| Maintenance of hydrological regimes | Groundwater recharge and discharge | High |

| | | |
|---|---|---|
| Climate regulation | Local climate regulation/buffering of change | High |
| Climate regulation | Regulation of greenhouse gases, temperature and precipitation other | Low |

[16] Food for humans | Fresh water | Wetland non-food products | Biochemical products | Genetic materials

[17] Sustenance for humans (e.g., fish, molluscs, grains) | Drinking water for humans and/or livestock | Water for irrigated agriculture | Water for industry | Water for energy production (hydro-electricity) | Timber | Fuel wood/fibre | Peat | Livestock fodder | Reeds and fibre | Other | Extraction of material from biota | Medicinal products | Genes for tolerance to certain conditions (e.g., salinity) | Genes for resistance to plant pathogens | Ornamental species (live and dead)

[18] not relevant for site | Low | Medium | High

[19] Maintenance of hydrological regimes | Erosion protection | Pollution control and detoxification | Climate regulation | Biological control of pests and disease | Hazard reduction

[20] Groundwater recharge and discharge | Storage and delivery of water as part of water supply systems for agriculture and industry | Soil, sediment and nutrient retention | Water purification/waste treatment or dilution | Local climate regulation/buffering of change | Regulation of greenhouse gases, temperature, precipitation and other climactic processes | Support of predators of agricultural pests (e.g., birds feeding on locusts) | Flood control, flood storage | Coastal shoreline and river bank stabilization and storm protection

| | | |
|---|---|---|
| | climatic processes | |
| Maintenance of hydrological regimes | Flood control, flood storage | Low |

Cultural Services

| **Ecosystem service**[21] | **Examples**[22] | **Importance/Extent/Significance**[18] |
|---|---|---|
| Recreation and tourism | Picnics, outings, touring | High |
| Recreation and tourism | Water sports and activities | High |
| Scientific and educational | Cultural heritage (historical and archaeological) | High |
| Scientific and educational | Educational activities and opportunities | High |
| Scientific and educational | Important knowledge systems, importance for research | High |
| Scientific and educational | Long-term monitoring site | High |
| Scientific and | Major scientific | High |

| | | |
|---|---|---|
| educational | study site | |
| Scientific and educational | Type location for a taxon | High |
| Spiritual and inspirational | Aesthetic and sense of place values | High |
| Spiritual and inspirational | Inspiration | High |
| Spiritual and inspirational | Spiritual and religious values | High |

[21] Recreation and tourism | Spiritual and inspirational | Scientific and educational

[22] Recreational hunting and fishing | Water sports and activities | Picnics, outings, touring | Nature observation and nature-based tourism | Inspiration | Cultural heritage (historical and archaeological) | Contemporary cultural significance, including for arts and creative inspiration, and including existence values | Spiritual and religious values | Aesthetic and sense of place values | Educational activities and opportunities | Important knowledge systems, importance for research (scientific reference area or site) | Long-term monitoring site | Major scientific study site | Type location for a taxon

| | | |
|---|---|---|
| Spiritual and inspirational | Contemporary cultural significance, including for arts and creative inspiration, and including existence values | High |
| Recreation and tourism | Recreational hunting and fishing | Medium |
| Recreation and tourism | Nature observation and nature-based tourism | Low |

### Supporting Services

| **Ecosystem service**[23] | **Examples**[24] | **Importance/Extent/Significance**[18] |
|---|---|---|
| Biodiversity | Supports a variety of all life forms including plants, animals and microorganisms, the genes they contain, and the ecosystems of which they form a part | High |

| | | |
|---|---|---|
| Nutrient cycling | Storage, recycling, processing and acquisition of nutrients | High |
| Soil formation | Carbon sequestration | Low |

Other ecosystem service(s) not included above: *(This field is limited to 2000 characters)*

Studenchishte Marsh's groundwaters flow northeast to southwest and derive from precipitation that has been filtered through Mount Galichica. An important source of both its water and that of the lake proper is Biljanini Springs. During high-water extremes, Lake Ohrid and Studenchishte Marsh fully merge. To date, the movement of groundwater between Studenchishte and Lake Ohrid has not been sufficiently researched.

Sublittoral and littoral are subdivided into belts known as the sand/silt with varied habitats have support existing of different habitats tipes and species diversity. Distribution of species is further influenced by heterogeneous sedimentation patterns and horizontal differences in hydrology, ecology and geology, all of which define the ecological arena through niche habitats.

Lake Ohrid and Studenchishte Marsh are key components of the World Natural and Cultural Heritage of the Ohrid Region, globally recognized for their Outstanding Universal Value to humankind and one of only 38 sites to receive UNESCO status for both natural and cultural importance.

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[23] Biodiversity | Soil formation | Nutrient cycling | Pollination

[24] Supports a variety of all life forms including plants, animals and microorganizms, the genes they contain, and the ecosystems of which they form a part | Sediment retention | Accumulation of organic matter | Storage, recycling, processing and acquisition of nutrients | Carbon storage/sequestration | Support for pollinators

Present-day biodiversity, particularly invertebrate species which can be fossilized in statistically significant numbers, facilitates paleoecological, paleoenvironmental and paleoclimatic reconstructions over hundreds of thousands of years (Lorenschat et al, 2013; Wagner et al, 2017).

Continuous human settlements over eight millennia combined with archaeological and sediment core analyses permit investigations of human history across several distinct societal, cultural and religious frameworks including neolithic communities, and ancient Greek, ancient Roman, Byzantine, and Ottoman empires. Lake Ohrid and Studenchishte Marsh therefore offer a relatively unique opportunity to study the interplay between humans and wetlands in pluralized contexts. Current research based on underwater archaeology and paleoecological techniques is focused on the development of European agriculture and its adjustment to climate change over thousands of years (Universitat Bern, 2018).

Ohrid pearls, derived from the scales of the plasica fish (*Alburnus scoranza*), are crafted according to a specific and secretive local technique. The resulting jewellery is represented in the collections of European royal families.

Evidence of the spiritual connection between humans and wetlands abounds in the Ohrid region too: Archaeological remains of the Studenchishte Basilica, located immediately above Studenchishte Marsh, are an example of early Christian sacral architecture dating back to the fifth or sixth century. The basilica was erected at the site of an earlier, pre-Christian religious site undoubtedly linked to the worship of water.

The springs of Sveti Naum are associated with the Monastery of Sveti Naum, which is a site of enormous significance to Slavic and Orthodox Christian culture as the former residence of Saint Naum, a religious figure renowned for his learning, whose legacy extends to the development of Slavic literacy. Numerous other sites of religious significance surround the Lake Ohrid Ramsar Site, most notably the Church of Sveti Jovan Kaneo, Sveta Sofija Cathedral and the Monastery of Saint Zaum.

Lake Ohrid is a major location for the annual Vodici ritual. Celebrated in January, Vodici sees hundreds of worshippers dive into the lake waters to retrieve a cross.

*Please make a rough estimate of the approximate number of people who directly benefit from the ecological services provided by this site (estimate at least in orders of magnitude: 10s, 100s, 1000s, 10 000s etc.):*

Within the site:

Outside the site:

500,000 residents and visitors yearly, although this does not include the downstream beneficiaries of fresh water and hydroelectric energy.

Have studies or assessments been made of the economic valuation of ecosystem services provided by this Ramsar Site?

[ ] Yes / [x] No / [] Unknown

Where economic studies or assessments of economic valuation have been undertaken at the site, it would be helpful to provide information on where the results of such studies may be located (e.g. website links, citation of published literature): *(This field is limited to 2500 characters)*

### 4.5.2 Social and cultural values

*Is the site considered internationally important 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 so, please describe this importance under one or more of the four following*

*categories. You should not list here any values derived from non-sustainable exploitation or which result in detrimental ecological changes.*

[ ] i) the site provides 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

Description if applicable *(This field is limited to 2500 characters)*

[ ] ii) the site has exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland

Description if applicable *(This field is limited to 2500 characters)*

[ ] iii) the ecological character of the wetland depends on its interaction with local communities or indigenous peoples

Description if applicable *(This field is limited to 2500 characters)*

[ ] iv) 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

Description if applicable *(This field is limited to 2500 characters)*

## 4.6 Ecological processes

*This section is not intended for completion as part of a standard RIS, but is included for completeness as part of the agreed format of a 'full' Ecological Character Description (ECD) outlined by Resolution X.15*

Primary production (ECD)

Studenchishte Marsh's groundwaters flow northeast to southwest and derive from precipitation that has been filtered through Mount Galichica. An important source of both its water and that of the lake proper is Biljanini Springs. During high-water extremes, Lake Ohrid and Studenchishte Marsh fully merge. To date, the movement of groundwater between Studenchishte and Lake Ohrid has not been sufficiently researched.

Sublittoral and littoral are subdivided into belts known as the sand/silt with varied habitats have support existing of different habitats tipes and species diversity. Distribution of species is further influenced by heterogeneous sedimentation patterns and horizontal differences in hydrology, ecology and geology, all of which define the ecological arena through niche habitats.

Nutrient cycling (ECD)

Carbon cycling (ECD)

Animal reproductive productivity (ECD)

Vegetational productivity, pollination, regeneration processes, succession, role of fire, etc. (ECD)

Notable species interactions, including grazing, predation, competition, diseases and pathogens (ECD)

Notable aspects concerning animal and plant dispersal (ECD)

Notable aspects concerning migration (ECD)

Pressures and trends concerning any of the above, and/or concerning ecosystem integrity (ECD)

Lake Ohrid and Studenchishte Marsh are key components of the World Natural and Cultural Heritage of the Ohrid Region, globally recognized for their Outstanding Universal Value to humankind and one of only 38 sites to receive UNESCO status for both natural and cultural importance.

# How is the Site managed?

## 5.1 Land tenure and responsibilities (Managers)

### 5.1.1 Land tenure/ownership

*Please specify if this category applies to the Ramsar Site, to the surrounding area or to both, by ticking the relevant option(s).*

Public ownership

| Category[25] | Within the Ramsar Site | In the surrounding area |
|---|---|---|
| Local authority | [✓] | [✓] |

Private ownership

| Category[26] | Within the Ramsar Site | In the surrounding area |
|---|---|---|
| Commercial company | [✓] | [✓] |
| Other types of private/individual owner | [✓] | [✓] |
| Religious body | [✓] | [ ] |

Other

| Category[27] | Within the Ramsar Site | In the surrounding area |
|---|---|---|
| | [ ] | [ ] |

Provide further information on the land tenure / ownership regime (optional): *(This field is limited to 1000 characters)*

### 5.1.2 Management authority

Please list the local office / offices of any agency or organization responsible for managing the site: *(This field is limited to 1000 characters)*

Municipality of Ohrid,

Str. Dimitar Vlahov 57,

6000 Ohrid,

Municipality of Struga

Majka Teresa Square 6.6

Struga

Municipality of Debarca

Belchishta, Debarca, 6344

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[25] Public land (unspecified) | National/Federal government | Provincial/region/state government | Local authority, municipality, (sub)district, etc. | Other public ownership

[26] Cooperative/collective (e.g., farmers cooperative) | Commercial (company) | Foundation/non-governmental organization/trust | Religious body/organization | Other types of private/individual owner(s)

[27] Unspecified mixed ownership | No information available | Commoners/customary rights

Provide the name and title of the person or people with responsibility for the wetland:

Mayor of Municipality of Ohrid, Struga and Debarca

Postal address: *(This field is limited to 1000 characters)*

**Municipality of Ohrid,**
Str. Dimitar Vlahov 57,
6000 Ohrid,

**Municipality of Struga**
Majka Teresa Square 6.6
Struga

**Municipality of Debarca**
Belchishta, Debarca, 6344

E-mail address: *(The online RIS only accepts valid e-mail addresses, e.g. example@mail.com )*

Municipality of Ohrid,
gradonacalnik@ohrid.gov.mk
Municipality of Struga
n.nexhipi@struga.gov.mk
Municipality of Debarca
contact@debrca.gov.mk

## 5.2 Ecological character threats and responses (Management)

### 5.2.1 Factors (actual or likely) adversely affecting the Site's ecological character

*Please specify if this category applies to the Ramsar Site, to the surrounding area or to both, by ticking the relevant option(s).*

Human settlements (non agricultural)

| Factors adversely affecting site[28] | Actual threat[29] | Potential threat[29] | Within the site | In the surrounding area |
|---|---|---|---|---|
| Housing and urban areas | High | High | ✓ | ✓ |
| Commercial and industrial areas | Low | High | ✓ | ✓ |
| Tourism and recreation | High | High | ✓ | ✓ |
| Unspecified development | Low | High | ✓ | ✓ |

Water regulation

| Factors adversely affecting site[30] | Actual threat[29] | Potential threat[29] | Within the site | In the surrounding area |
|---|---|---|---|---|
| Drainage | Low | High | ✓ | ✓ |
| Water abstraction | Low | High | | ✓ |
| Water releases | Low | High | | ✓ |

Agriculture and aquaculture

| Factors adversely | Actual threat[29] | Potential threat[29] | Within the site | In the |
|---|---|---|---|---|

| affecting site[31] | | | | surrounding area |
|---|---|---|---|---|
| Marine and freshwater aquaculture | Medium impact | High | ✓ | |
| Livestock farming and ranching | Medium impact | Medium | | ✓ |
| Annual and perennial non-timber crops | Medium impact | High | ✓ | ✓ |
| Wood and pulp | Low | Medium | | ✓ |

[28] Housing and urban areas | Commercial and industrial areas | Tourism and recreation areas | Unspecified development

[29] Low impact | Medium impact | High impact | unknown impact |

[30] Drainage | Water abstraction | Dredging | Salinisation | Water releases | Canalisation and river regulation

[31] Annual and perennial non-timber crops | Wood and pulp plantations | Livestock farming and ranching | Marine and freshwater aquaculture | Non specified

| | | | | |
|---|---|---|---|---|
| plantations | | | | |

### Energy production and mining

| Factors adversely affecting site[32] | Actual threat[29] | Potential threat[29] | Within the site | In the surrounding area |
|---|---|---|---|---|
| Renewable energy | High | High | | ✓ |
| Mining and quarrying | High | High | | ✓ |

### Transportation and service corridors

| Factors adversely affecting site[33] | Actual threat[29] | Potential threat[29] | Within the site | In the surrounding area |
|---|---|---|---|---|
| Roads and railroads | Medium | High | | ✓ |
| Shipping lanes | Low | Medium | ✓ | |
| Aircraft flight paths | Unspecified | Unspecified | | ✓ |

### Biological resource use

| Factors adversely affecting site[34] | Actual threat[29] | Potential threat[29] | Within the site | In the surrounding area |
|---|---|---|---|---|
| Logging and wood harvesting | Low | Medium | | ✓ |
| Fishing and harvesting aquatic resources | High | High | ✓ | |

Human intrusions and disturbance

| Factors adversely affecting site[35] | Actual threat[29] | Potential threat[29] | Within the site | In the surrounding area |
|---|---|---|---|---|
| Recreational and tourism activities | High | High | ✓ | ✓ |
| (Para)military activities | Low | Low | ✓ | ✓ |

[32] Oil and gas drilling | Mining and quarrying | Renewable energy | Unspecified

[33] Roads and railroads | Utility and service lines (e.g., pipelines) | Shipping lanes | Aircraft flight paths | Unspecified

[34] Hunting and collecting terrestrial animals | Gathering terrestrial plants | Logging and wood harvesting | Fishing and harvesting aquatic resources | Unspecified

[35] Recreational and tourism activities | (Para)military activities | Unspecified/others

### Natural system modifications

| Factors adversely affecting site[36] | Actual threat[29] | Potential threat[29] | Within the site | In the surrounding area |
|---|---|---|---|---|
| Fire and fire suppression | Low | Medium | | ✓ |
| Dams and water management use | Medium | High | | ✓ |

### Invasive and other problematic species and genes

| Factors adversely affecting site[37] | Actual threat[29] | Potential threat[29] | Within the site | In the surrounding area |
|---|---|---|---|---|
| Invasive non-native/alien species | Unspecified | High | ✓ | ✓ |
| Introduced genetic material | Medium | Unspecified | ✓ | |

### Pollution

| Factors adversely affecting site[38] | Actual threat[29] | Potential threat[29] | Within the site | In the surrounding area |
|---|---|---|---|---|
| Domestic and urban wastewater | High | High | ✓ | ✓ |
| Industrial and military effluents | High | High | ✓ | ✓ |
| Agricultural and forestry effluents | Medium | Medium | ✓ | ✓ |

| | | | | |
|---|---|---|---|---|
| Garbage and solid waste | High | High | ✓ | ✓ |
| Air-borne pollutants | Low | Low | | ✓ |

Geological events

| **Factors adversely affecting site**[39] | **Actual threat**[29] | **Potential threat**[29] | **Within the site** | **In the surrounding area** |
|---|---|---|---|---|
| Earthquakes | Low | Low | ✓ | ✓ |

[36] Fire and fire suppression | Dams and water management/use | Vegetation clearance/ land conversion | Unspecified/others

[37] Invasive non-native/ alien species | Problematic native species | Introduced genetic material | Unspecified

[38] Household sewage, urban waste water | Industrial and military effluents | Agricultural and forestry effluents | Garbage and solid waste | Air-borne pollutants | Excess heat, sound, light | Unspecified

[39] Volcanoes | Earthquakes/tsunamis | Avalanches/landslides | Unspecified

Climate change and severe weather

| Factors adversely affecting site[40] | Actual threat[29] | Potential threat[29] | Within the site | In the surrounding area |
|---|---|---|---|---|
| Habitat shifting and altering | High | High | ✓ | ✓ |
| Droughts | High | High | ✓ | ✓ |
| Temperature extremes | Medium | High | ✓ | |
| Storms and flooding | Low | Medium | ✓ | ✓ |

Please describe any other threats (optional): *(This field is limited to 3000 characters)*

The construction of landfills in the watershed is of concern due to the countrywide experience with their substandard quality by European Union standards. Illegal dumps are a related issue.

Legal provisions for wetland conservation are insufficient. Legislation aimed at nature protection is often in conflict with or subordinate to other laws. Even when a robust legal framework is theoretically in place, implementation is inconsistent in part because enforcement responsibilities are poorly defined/understood. Economic, infrastructure and tourism development strategies/policies are weakly aligned with wetland protection aims.

The research potential of Lake Ohrid's ecosystems is high. However, there is no functional system to ensure sustainable use of resources, leaving a high risk of over-exploitation from discoveries.

Strategic Environmental Assessments are under-researched and routinely contain important omissions, particularly of complete plans and full cumulative impacts. The mitigation hierarchy is not meaningfully applied.

### 5.2.2 Legal conservation status

*Please list any other relevant conservation status, at global, regional or national level and specify the boundary relationships with the Ramsar Site:*

Global legal designations

| Designation | Name of area | Online information url | Overlap with |
|---|---|---|---|

| type[41] | | | Ramsar Site[42] |
|---|---|---|---|
| World Heritage Site | Natural and Cultural Heritage Ohrid Region | https://whc.unesco.org/en/list/99 | Partly |
| UNESCO Biosphere Reserve | Ohrid-Prespa Transboundary Biosphere Reserve | http://www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/biosphere-reserves/europe- | Partly |

[40] Habitat shifting and alteration | Droughts | Temperature extremes | Storms and flooding | Unspecified

[41] World Heritage site | UNESCO Biosphere Reserve | Other global designation

[42] whole | partly

| | | | |
|---|---|---|---|
| | | north-america/albaniathe-former-yugoslav-republic-of-macedonia/ohrid-prespa/ | |

Regional (international) legal designations

| Designation type[43] | Name of area | Online information url | Overlap with Ramsar Site[42] |
|---|---|---|---|
| Other International Designation | Lake Ohrid Emerald Site (Nominated, not adopted) | https://www.coe.int/en/web/bern-convention/emerald-network | Whole |
| Other International Designation | Mount Galichica Emerald Site (Nominated, not adopted) | https://www.coe.int/en/web/bern-convention/emerald-network | Partly |

National legal designations

| Designation type | Name of area | Online information url | Overlap with Ramsar Site[42] |
|---|---|---|---|
| National Park | National Park Galichica | http://www.galicica.org.mk/ | Partly |
| Monument of Nature | Monument of Nature “Ohrid Lake” | http://www.moepp.gov.mk/?page_id=4920&lang=en | Whole |

Non-statutory designations

| Designation | Name of area | Online information url | Overlap with |
|---|---|---|---|

| type[44] | | | Ramsar Site[42] |
|---|---|---|---|
| Important Bird Area | Lake Ohrid | http://datazone.birdlife.org/site/factsheet/lake-ohrid-iba-macedonia-the-former-yugoslav-republic-of | Partly |
| Important Plant Area | IPA Galichica | | Partly |
| Other Non-statutory Designation | Prime Butterfly Area Galichica | | Partly |
| Other Non-statutory Designation | Lake Ohrid Key Biodiversity Area | http://www.keybiodiversityareas.org/site/results | Partly |

[43] EU Natura 2000 | Other international designation

[44] Important Bird Area | Important Plant Area | Other non-statutory designation

### 5.2.3 IUCN protected areas categories (2008)

[ ] Ia Strict Nature Reserve

[ ] Ib Wilderness Area: protected area managed mainly for wilderness protection

[✓] II National Park: protected area managed mainly for ecosystem protection and recreation

[✓] III Natural Monument: protected area managed mainly for conservation of specific natural features

[ ] IV Habitat/Species Management Area: protected area managed mainly for conservation through management intervention

[ ] V Protected Landscape/Seascape: protected area managed mainly for landscape/seascape conservation and recreation

[ ] VI Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems

### 5.2.4 Key conservation measures

Legal protection

| Measures[45] | Status[46] |
|---|---|
| Legal protection | Partially Implemented |

Habitat

| Measures[47] | Status[46] |
|---|---|
| Catchment management initiatives/controls | Partially implemented |
| Improvement of water quality | Partially implemented |
| Land conversion controls | Partially implemented |

Species

| Measures[48] | Status[46] |
|---|---|
| Reintroductions | Implemented |

Human Activities

| Measures[49] | Status[46] |
|---|---|
| Management of water | Partially |

[45] Legal protection

[46] Proposed | Partially implemented | Implemented

[47] Catchment management initiatives/controls | Improvement of water quality | Habitat manipulation/enhancement | Hydrology management/restoration | Re-vegetation | Soil management | Land conversion controls | Faunal corridors/passage

[48] Threatened/rare species management programmes | Reintroductions | Control of invasive alien plants | Control of invasive alien animals

[49] Management of water abstraction/takes | Regulation/management of wastes | Livestock management/exclusion (excluding fisheries) | Fisheries management/regulation | Harvest controls/poaching enforcement | Regulation/management of recreational activities | Communication, education, and participation and awareness activities | Research

| | |
|---|---|
| abstraction/takes | implemented |
| Regulation/Management of wastes | Partially implemented |
| Fisheries management/regulation | Partially implemented |
| Harvest controls/poaching enforcement | Partially implemented |
| Research | Implemented |

Other: *(This field is limited to 3000 characters)*

### 5.2.5 Management planning

Is there a site-specific management plan for the site?

Yes[50]

Is the management plan/planning implemented?

[ ] Yes / [x] No

The management plan covers

All of the Ramsar Site[51]

Is the management plan currently subject to review and update?

[] Yes / [x] No

Has a management effectiveness assessment been undertaken for the site?

[ ] Yes / [x] No

Please give link to site-specific plan or other relevant management plan if this is available via the Internet or upload it in section 'Additional material': *(This field is limited to 500 characters)*

If the site is a formal transboundary site as indicated in section Data and location > Site location, are there shared management planning processes with another Contracting Party?

[ ] Yes / [x] No

Please indicate if a Ramsar centre, other educational or visitor facility, or an educational or visitor programme is associated with the site: *(This field is limited to 1000 characters)*

URL of site-related webpage (if relevant):

### 5.2.6 Planning for restoration

Is there a site-specific restoration plan?

[52] No; but restoration is needed

---

[50] No | Yes | In preparation

[51] All of Ramsar Site | Part of Ramsar Site

[52] Please select a value | No need identified | No; the site has already been restored | No; but restoration is needed | No; but a plan is being prepared | Yes; there is a plan

Has the plan been implemented?

[ ] Yes / [x] No

The restoration plan covers:

Is the plan currently being reviewed and updated?

[ ] Yes / [x] No

Where the restoration is being undertaken to mitigate or respond to a threat or threats identified in this RIS, please indicate it / them: *(This field is limited to 1000 characters)*

Further information *(This field is limited to 2500 characters)*

Studenchishte Marsh on the north east coast requires removal of solid waste, reestablishment of certain connections with the lake proper and rewetting of degraded areas in order both to revitalize its own biodiversity and secure the ecosystem services it provides to the wider lacustrine area.

Rogue dumpsites at other locations, particularly surrounding the city of Struga, also require solid waste removal.

The mouths of inflows, particularly the River Sateska, and their vicinities need measures to prevent eutrophication, pollution and stem anthropogenic sedimentation.

The littoral zone, especially near the mouths of inflows, and Studenchishte Canal have been assessed with poor ecological status, based on sampling of macroinvertebrate fauna (Trajanovski et al, 2019). Pressures and disturbances must be reduced to the entire littoral zone both to reverse this decline and secure breeding areas for native fish, especially salmonids.

The springs of Sveti Naum are at risk of degradation from land usurpation, which requires reversal to protect several endemic species.

Maintenance of the water transparency is necessary to conserve endemic phytoplankton and thereby the role they play in the Lake Ohrid food web.

Reed belt loss and deterioration must be addressed and reeds re-established in key areas to arrest declines in the populations of birds and fish and buffer against eutrophication.

To result in stable populations, restocking efforts for *Salmo letnica* and *Anguilla anguilla* require bolstering from other management actions such as reestablishment of habitat quality, connectivity and suitability, pollution controls, and sustainable harvesting.

### 5.2.7 Monitoring implemented or proposed

| **Monitoring**[53] | **Status**[54] |
|---|---|
| Water quality | Implemented |
| Birds | Implemented |

*Please indicate other monitoring activities:*

*(This field is limited to 3000 characters)*

---

[53] Water regime monitoring | Water quality | Soil quality | Plant community | Plant species | Animal community | Animal species (please specify) | Birds

[54] | Implemented | Proposed

Although various monitoring activities have been undertaken, most have either been discontinued or suffer from data gaps. Detailed fish inventories (which were mainly focused on species of commercial interest) have not been undertaken since the nineties, for example.

# Additional material

## 6.1 Additional reports and documents

### 6.1.1 Bibliographical references

*(This field is limited to 3000 characters)*


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2. Apostolova, N. et al (2016) Studenchishte Marsh as an Integral Part of Ancient Lake Ohrid: Current Status and Need for Protection. Wetland Science & Practice 33, 2.
3. Birdlife International (2015) European Red List of Birds. Luxembourg: Office for Official Publications of the European Community.
4. Blaženčić et al (2006) Red Data List of Charophytes in the Balkans. Biodiversity and Conservation 15, 11 pp 3445-3457.
5. Crivelli, A.J. 2006. Salmo lumi. The IUCN Red List of Threatened Species 2006
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### 6.1.2 Additional reports and documents

i. taxonomic lists of plant and animal species occurring in the site (see section 4.3)

**-UPLOAD via online form-**

ii. a detailed Ecological Character Description (ECD) (in a national format)

**-UPLOAD via online form-**

iii. a description of the site in a national or regional wetland inventory

**-UPLOAD via online form-**

iv. relevant Article 3.2 reports

**-UPLOAD via online form-**

v. site management plan

**-UPLOAD via online form-**

vi. other published literature

**-UPLOAD via online form-**

*Please note that any documents uploaded here will be made publicly available.*

### 6.1.3 Photograph(s) of the Site

Please provide at least one photograph of the site:

| File | Copyright holder | Date on which the picture was taken | Caption |
|---|---|---|---|

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### 6.1.4 Designation letter and related data

Designation letter*

**-UPLOAD via online form-**

Transboundary Designation letter

**-UPLOAD via online form-**

Date of Designation

Number of certificates wished *(The online RIS only accepts numeric values)*