Red List of the Bulgarian algae. I. Macroalgae

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Received: December 19, 2007 ▷ Accepted: April 25, 2008

Abstract. The Red List presented in this paper is focused on the threatened Bulgarian macroalgae and is based on critical reading of the references and on the evaluation of the most recent data on their distribution according to authors’ findings and observations. The list contains 83 species, one subspecies, one variety and three forms from five classes of four divisions distributed in six IUCN categories, and is organized in the following way: category of threat, the main taxonomic group and relevant taxon with the exact formula of threat, its synonyms, distribution in Bulgaria and in the Black Sea, additional notes and references.

Key words: algae, Black Sea, Bulgaria, Red List, threatened species

Introduction

Red Lists are among the worldwide recognized tools for showing the risk of extinction and designating the threatened status of various organisms. They play a valuable role in the nature conservation activities. Therefore it is not surprising that in addition to the general IUCN Red List, regional Red Lists have become quite common in almost all European countries. Originally, the European Red Lists did not concern the algae. However, with the efforts of many phycologists, ever more species, varieties and forms of these organisms became enlisted in these important zoological tools (e.g. Krause 1984; Gutowski & Mollenhauer 1996; Knappe & al. 1996; Lange-Bertalot & Steindorf 1996; Mollenhauer & Christensen 1996; Kusel-Fetzmann 1999; Lenzenweger 1999; Blaženič & al. 2006; Siemińska 2006). The latest edition of the IUCN Red List of Threatened Species (2004) includes 75 algae from the classes Florideophyceae, Chlorophyceae, Ulvophyceae, and Phaeophyceae.

The Red List proposed below is the first list published for Bulgaria. However, we should underline that formerly there were attempts to lay a stress on the most endangered species, while in the comprehensive reviews or single publications some threatened algae were enlisted with proposals for protection (Vodenicharov & al. 1993; Draganov & Stoyneva 1994; Dimitrova-Konaklieva 2000; Temniskova & al. 2005). Most recently, six macrophytes have been included in the new Bulgarian Red Data Book (Stoyneva & Temniskova in prepar.; Temniskova & Stoyneva in prepar.; Temniskova & al. in prepar.). The list presented in this paper is focused on macroalgae and is based on critical reading of the references and on evaluation of the most recent data on their distribution according to the authors’ findings and observations.

The Red List provided below is organized in the following way: category of threat, main taxonomic group and relevant taxon with the exact formula (except for the cases of Regionally Extinct and Data Deficient taxa) and its synonyms (Syn.) used in the sources for Bulgarian localities. The synonyms are followed by
the distribution of species (variety or form) in Bulgaria and along the Bulgarian Black Sea coastal line (Bu), which is cited exactly and without changes according to the original sources. For seaweeds, the distribution in other Black Sea aquatories (BS) is added, following Dimitrova-Konaklieva (2000). Text on the species distribution in the Black Sea (BS) is added also in cases when the species is known only from the Bulgarian aquatory. The distribution along the Bulgarian Black Sea coastal line follows the regions and subregions proposed by Dimitrova-Konaklieva (2000): Kaliakra, Varna, Bourgas and Sozopol regions, where the latest is subdivided into the Sozopol-Tsarevo and Ahtopol subregions. For seaweeds, the most recent website of the Black Sea Red Data Book (2007) was checked, despite of the fact that it does not contain exact information on the Bulgarian aquatory and literature. When necessary, additional notes (Note) are added about the threatened taxon, which reflect mainly some uncertainties in its identification and localities, wrongly written names, or contradictions in literature. References on each taxon are provided at the end of description, abbreviated as Refer. They include all sources, where the taxon has been mentioned, even in cases of re-citation or of taxonomic discussion. Therefore, references for some species could be quite recent but this does not necessarily mean that there is a new finding or confirmation of a locality. For some of the taxa in the old sources, there are quite strange descriptions of the locality or of the habitat, presumably due to typographical errors. However, following the line of correctness, we cite these notes completely but in cases of obvious contradictions indicate the possibility of printing mistakes. When the locality is identified according to the Inventory of Bulgarian Wetlands (Michev & Stoyneva 2007b), its inventory identification number (IBWXXXX) is provided in brackets in order to facilitate the work of future researchers. Information on the recent status of identified localities and habitats is given in superscript, with capital letters, according to the same Inventory (Michev & Stoyneva 2007b): the sites which have been transformed are indicated by (T), the sites known to be destroyed nowadays are indicated by (D), the remnants of former large water bodies are indicated by (R) and the sites of uncertain status are indicated by (U). The algal and authors’ names have been checked according to the Algae Database (2007) and the abbreviations of the authors’ names follow John (2002) and Brumitt & Powell (1992).

In general, the authors have tried to abide by the world-wide accepted IUCN criteria for designation of the threatened status. The provided categories and formulas follow the IUCN Red List of Categories and Criteria (2001) and Guidelines for Application of IUCN Red List Criteria at Regional Levels (2003). An exception makes the category Least Concern (LC) to which no taxa have fitted. According to the IUCN recommendations (2001), we avoided the general categories Extinct (E) and Extinct in the Wild (EW), and indicated the category Regional Extinct (RE) for species, which have not been confirmed for the country’s territory during the last five decades. The category Data Deficient (DD) has been applied to species for which there have been no confirmations during the last 30 years, but the authors believe that their finding in the country is still possible. The same category was applied to some species which cannot be distinguished in the field from their commonly appearing relatives and our expert evaluation is that data on them from personal communications or some internal reports are not reliable (e.g. of the genus Polysiphonia Grev.). Following Watanabe (2005), we find this category very important because in spite of not being exactly a category of threat, it shows the necessity to pay more attention to those taxa for which we are anxious on the basis of our expert knowledge. The categories Vulnerable (VU) and Near Threatened (NT) were designated to some species which have been found in one or two localities only, but according to our knowledge about their ecology, their broader distribution in the country is assumed. In these cases, the exact category was given in an arbitrary way based on our expert evaluation of the peculiarities of the species (ecology and life history) and knowledge about the state of its habitats and localities. The subjective character of the assessments of algae in relation to IUCN criteria when compared with vertebrates, flowering plants, beetles, butterflies, etc. was underlined recently by Watanabe (2005). But mention deserves the fact that the same author wrote: “Even if this is a subjective process, it must be made for each algal species and population based on present knowledge” (Watanabe 2005: 421).

It should be also underlined that in some special cases of algae and peculiar conditions of some of the localities we had to make arbitrary decisions for the categories Critically Endangered (CR) and Endangered (EN), despite the fact that for some taxa there were more localities enlisted than the number set by IUCN
criteria for the relevant category. Here we should mention that for some species only the region of distribution is known from the earlier literature but the exact number of localities was never reported and, therefore, comparisons with the modern status are practically impossible. Some of the localities were described briefly, without exact coordinates and their recent checking is quite problematic. At the same time, the region where the species should be situated according to the sources, had been strongly disturbed and changed in the last decades (e.g. the tributaries and rivers Vucha, Trigradska, Muglenska, Chepelarska, and Arda in the Rhodopi Mts, the upstream stretches of many rivers in the Balkan Range, such as Cherni Osum, Beli Osum, Vit, etc. – Temnikova & al. 2005; Kirijakov & in prep.). Besides the registered habitat destruction, the authors also had to take into account both land restitution in some localities (which is a potential threat to the habitats) and direct changes of some localities already noted in the literature on Bulgarian algae (e.g. Vodenicharov & al. 1993; Temnikova & al. 2005). The latter concerns in particular the wetlands and the habitats of the thermal springs and their effluents (e.g. Petkoff 1929b; Stoyneva 2003; Stoyneva & Gärtner 2004; Temnikova & al. 2005; Michev & Stoyneva 2005, 2007a; Stoyneva & Michev 2007). In many cases, the sensitivity of the species has been also taken into account. The extinction of most species, or threats to them are mainly due to direct destruction of the pristine habitats, or their strong disturbance and changes (mainly of water quality, depth and area), as well as to direct collection by tourists in cases of the most beautiful and attractive species.

After taking all these considerations into account, the Red List of Threatened Bulgarian Macroalgae contains 83 species, one subspecies, one variety, and three forms from four divisions, distributed into six IUCN categories (Table 1).

### Table 1. Distribution of the threatened Bulgarian macroalgae into taxonomic divisions and IUCN categories*.

<table>
<thead>
<tr>
<th>IUCN</th>
<th>Rhodophyta</th>
<th>Ochrophyta</th>
<th>Chlorophyta</th>
<th>Streptophyta</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>RE</td>
<td>5 sp.</td>
<td>2 sp.</td>
<td>–</td>
<td>4 sp.</td>
<td>11 sp.</td>
</tr>
<tr>
<td>CR</td>
<td>7 sp.</td>
<td>5 sp.</td>
<td>2 sp.</td>
<td>3 sp.</td>
<td>17 sp.</td>
</tr>
<tr>
<td>EN</td>
<td>8 sp., 1 f.</td>
<td>3 sp.</td>
<td>1 sp.</td>
<td>–</td>
<td>12 sp., 1 f.</td>
</tr>
<tr>
<td>VU</td>
<td>10 sp.</td>
<td>6 sp.</td>
<td>3 sp., 1 subs.</td>
<td>3 sp., 1 f.</td>
<td>22 sp., 1 subs., 1 f.</td>
</tr>
<tr>
<td>NT</td>
<td>6 sp.</td>
<td>1 sp.</td>
<td>1 sp.</td>
<td>1 sp.</td>
<td>9 sp.</td>
</tr>
<tr>
<td>DD</td>
<td>3 sp.</td>
<td>1 sp.</td>
<td>1 sp.</td>
<td>7 sp., 1 var., 1 f.</td>
<td>12 sp., 1 var., 1 f.</td>
</tr>
<tr>
<td>Total</td>
<td>39 sp., 1 f.</td>
<td>18 sp.</td>
<td>8 sp., 1 subs.</td>
<td>18 sp., 1 var., 2 f.</td>
<td>83 sp., 1 subs., 1 var., 3 f.</td>
</tr>
</tbody>
</table>

*Abbreviations of the categories are standard and in conformity with the text above.

### Red List

**I. Regionally extinct species (RE)**

**I.1. Division Rhodophyta (Class Florideophyceae)**

*Cyrtoclonium purpureum* (Huds.) Batters

**Bu:** Varna region of the Black Sea.

**BS:** Russia.

**Note:** Published as *C. purpurascens* (Huds.) Kütz.

**Refer:** Petkoff 1943; Dimitrova-Konaklieva 2000.

*Furcellaria lumbricalis* (Huds.) J.V. Lamour.

**Syn.** *F. fastigiata* (Huds.) J.V. Lamour.

**Bu:** Varna region of the Black Sea.

**BS:** only in Bulgaria.

**Note:** Published as *Fastigiaria furceolata* (L.) Stockh.

**Refer:** Petkoff 1932, 1943; Dimitrova-Konaklieva 2000.

*Helminthora divaricata* (C. Agardh) J. Agardh

**Bu:** Varna region of the Black Sea.

**BS:** Russia.

**Note:** Marked with a question mark (‘?’) by Petkoff (1932) and indicated for only one locality – in the vicinity of the St Konstantin Resort (U).

**Refer:** Petkoff 1932; Kalugina-Gutnik 1975; Dimitrova-Konaklieva 2000.

*Laurencia lacustris* Skolka

**Bu:** Shabla lake (IBW0247).

**Refer:** Vodenicharov 1964; Vodeničarov & al. 1991.

*Lemanea ciliata* (Sirodot) De Toni

**Bu:** In running waters in the Dyovlen peat bogs (Devinski Torfishta U – IBW8231) in the Rhodopi Mts.

**Note:** The species was published by Vodeničarov & al.
(1991) only from this location in Bulgaria, based on the herbarium specimen collected by D. Jordanov in 1930 and determined by him as *L. fluviatilis* (L.) C. Agardh *f. longa*.


**I.2. Division Ochrophyta (Class Phaeophyceae)**

*Nereia filiformis* (J. Agardh) Zanardini

**Bu:** Varna region of the Black Sea.

**BS:** Russia and Turkey.


*Punctaria plantaginea* (Roth) Grev.

**Bu:** Bourgas region of the Black Sea.

**BS:** Russia.


**I.3. Division Streptophyta (Class Charophyceae)**

*Chara aculeolata* Kütz.

Syn. *C. intermedia f. bulgarica* Vilh.

**Bu:** In the vicinity of Vratsa town, Western Balkan Range.

Refer.: Vilhelm 1908; Temniskova & al. 2005; Blaženčić & Temniskova (unpubl.).

*Nitella capillaris* (Krocker) J. Groves & Bull.-Webst.

**Bu:** In clear slow waters in peat areas; particularly common at new excavations, Mt Lyulin; meadows in the vicinity of Dragalevtsi village at the foothills of Mt Vitosa; in the floods near Kazichene village^R^ (IBW0783), Sofia region.

Note: Published as *N. capitata* (Krocker) J. Groves & Bull.-Webst. Indicated as *Tolypella hispanica* Nordst. in Petkoff (1922) but subsequently corrected by him and referred to “*N. capitata* (Nees ab. Es.) Agardh.”


*Nitella mucronata* (A. Braun) Miq.

**Bu:** In the swamps near Dragoman, at the foothills of Mt Chepun (IBW0012) and near Dragichevo in Mt Lyulin (IBW0019).


*Nitella opaca* (C. Agardh ex Bruzelius) C. Agardh

**Bu:** In peat pools and in the Kazichene peat bog^R^ (IBW0735), in the swamp near Slivnitsa^D^ (IBW0015) in Sofia region. According to Vodenicharov & al. (1971), it is distributed predominantly in larger water bodies, as well as in standing and running waters.

Refer.: Petkoff 1934; Wodenitscharow 1963; Vodenicharov & al. 1971; Blaženčić & al. 2006.

**II. Critically endangered species (CR)**

**II.1. Division Rhodophyta (Class Florideophyceae)**

*Coccotylus truncatus* (Pall.) M.J. Wynne & J.W. Heine

Syn. *Phyllophora truncata* (Pall.) Zinova

[CR B2ab(i,ii,iii); C1]

**Bu:** Varna region of the Black Sea.

**BS:** Russia and Romania.


*Gymnogongrus griffithsiae* (W.B. Turner) Mart.

[CR B2ab(i,ii,iii); C1]

**Bu:** Ahtopol subregion of the Sozopol region of the Black Sea.

**BS:** Turkey.


*Haliphtilon virgatum* (Zanardini) Garbary & H.W. Johans.

Syn. *Corallina granifera* J. Ellis & Sol.

[CR B2ab(i,ii,iii); C1]

**Bu:** Ahtopol subregion of the Sozopol region of the Black Sea.

**BS:** Russia and Turkey.


*Nemalion helminthoides* (Velley) Batters

Syn. *N. lubricum* Duby

[CR B1ab(i,ii,iii); C1]

**Bu:** Sozopol-Tsarevo and Ahtopol subregions of the Sozopol region of the Black Sea.

**BS:** Russia and Turkey.

Refer.: Petkoff 1905, 1929a; Kalugina-Gutnik 1975; Zinova & Dimitrova-Konaklieva 1976; Dimitrova-Konaklieva 2000; Temniskova & Stoynova (in prepar.).

*Polysiphonia subulata* (Ducluz.) P. Crouan & H. Crouan

Syn. *P. subulata* (Ducluz.) J. Agardh

[CR B2ab(i,ii,iii); C1]
**Bu:** Ahtopol subregion of the Sozopol region of the Black Sea.
**BS:** Russia and Turkey.

**Polysiphonia tripinnata** J. Agardh
[CR B2ab(i,ii,iii); C1]
**Bu:** Ahtopol subregion of the Sozopol region of the Black Sea.
**BS:** only in Bulgaria.

**Thorea hispida** (Thore) Desv.
**Syn.** *T. ramosissima* Bory
[CR B1ab(i,ii,iii); C1]
**Bu:** Below the thermal springs of Malo Belovo in the Rhodopes (IBW0825); river Veleka near Brodilovo village in Mt Strandzha; Nevestino village in Gotse Delchev region in the valley of river Strouma.
**Note:** According to Petkoff (1904), the first finding in Malo Belovo region belongs to Prof. S. Georgieff (unpubl.). The peculiar forms of this species noted by Prof. A. Vulkanov and discussed by Petkoff (1942) from the thermal springs in the region of Gotse Delchev are not included here, owing to the need of more detailed taxonomic studies on this material.
**Refer.:** Petkoff 1904, 1908/1909, 1929a, b, 1942, 1950; Vodeničarov & al. 1991; Vodenicharov & al. 1993; Draganov & Stoyneva 1994; Temniskova & al. 2005; Temniskova & Kirjakov 2006; Kirjakov & Temniskova (in press); Stoyneva & al. (in prepar.).

**II.2. Division Ochrophyta (Class Phaeophyceae)**

**Asperococcus ensiformis** (Chiaje) M.J. Wynne
**Syn.** *A. compressus* A.W. Griffiths ex Hook.
[CR B2ab(i,ii,iii); C1]
**Bu:** Ahtopol subregion of the Sozopol region of the Black Sea.
**BS:** only in Bulgaria.

**Dictyota fasciola** (Roth) J.V. Lamour.
**Syn.** *Dilophus fasciola* (Roth) J. Agardh; *D. repens* (J. Agardh) J. Agardh; *D. simplex* Kütz.
[CR B2ab(i,ii,iii); C1]
**Bu:** Varna and Sozopol regions of the Black Sea with both Sozopol-Tsarevo and Ahtopol subregions of the Sozopol region.
**BS:** Russia, Romania and Turkey.
**Note:** Published as *D. repens* J. Agardh. Petkoff (1905) gave among the other synonyms *Dilophus repens*, which currently is regarded as a synonym of *Dictyota fasciola* var. *repens* (J. Agardh) Ardiss.

**Dictyota spiralis** Mont.
**Syn.** *Dilophus spiralis* (Mont.) Hamel, *D. ligulatus* (Kütz.) Feldmann
[CR B2ab(i,ii,iii); C1]
**Bu:** Ahtopol subregion of the Sozopol region of the Black Sea.
**BS:** Russia.
**Note:** Published as *D. ligulata* (Kütz.) Feldmann.

**Padina pavonica** (L.) Thivy
**Syn.** *P. pavonia* J.V. Lamour.
[CR B2ab(i,ii,iii); C1]
**Bu:** Limited to a few sites of the Sozopol-Tsarevo subregion of the Sozopol region of the Black Sea.
**BS:** Russia, Romania and Turkey.
**Note:** Published as *P. pavonica* (L.) J.V. Lamour. and as *P. pavonia* (L.) Gaillon.
**Refer.:** Petkoff 1943; Dimitrova 1969; Kalugina-Gutnik 1975; Draganov & Stoyneva 1994; Vodenicharov & al. 1993; Dimitrova-Konaklieva 2000; Stoyneva & Temniskova (in prepar.).

**II.3. Division Chlorophyta (Class Ulvophyceae)**

**Bryopsis adriatica** (J. Agardh) Frauenf.
**Syn.** *B. adriatica* (J. Agardh) Menegh.
[CR B2ab(i,ii,iii); C2a(ii)]
**Bu:** Ahtopol subregion of the Sozopol region of the Black Sea.
**BS:** Russia.
**Note:** Published as *S. attenuata* (C. Agardh) Grev.

**Striaria attenuata** (Grev.) Grev.
[CR B2ab(i,ii,iii); C2a(ii)]
**Bu:** Ahtopol subregion of the Sozopol region of the Black Sea.
**BS:** Russia.
**Note:** Published as *S. attenuata* (C. Agardh) Grev.

**II.3. Division Chlorophyta (Class Ulvophyceae)**

**Bryopsis adriatica** (J. Agardh) Frauenf. **Syn.** *B. adriatica* (J. Agardh) Menegh.
[CR B2ab(i,ii,iii); C1]
**Bu:** Sozopol-Tsarevo subregion of the Sozopol region of the Black Sea.
**Bryopsis duplex** De Not.

_Syn. B. balbisiana_ J.V. Lamour.

[CR B2ab(i,ii,iii); C1]

**Bu:** Sozopol-Tsarevo subregion of the Sozopol region of the Black Sea.

**BS:** Russia.


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**II.4. Division Streptophyta (Class Charophyceae)**

**Chara canescens** Desv. & Loisel.


[CR B2ab(i,ii,iii); D]

**Bu:** In Dyavolsko Blato locality<sup>R</sup> (IBW0178), below the former Kyupriya village (recently Primorsko town), in stagnant and deep clear waters of the swamps, in the calcareous-mergel area between Balchik and Tatar-Suyuchouk<sup>E</sup> (IBW0214), and in the morasses formed by a streamlet with slow waters near the haline swamps of Anhialo<sup>U</sup> (IBW4800). According to Vodenicharov & al. (1971), in the haline waters along the Bulgarian Black Sea coast and near Gara Levski (?– IBW0150).

**Refer.:** Petkoff 1913, 1914, 1919, 1934; Wodenitscharow 1963; Vodenicharov & al. 1971; Temniskova & al. 2005; Blaženčić & al. 2006; Blaženčić & Temniskova (unpubl.).

**Chara kokeilii** A. Braun

_Syn._ *C. globularis* Thuill. _var._ *kokeilii* (A. Braun) R.D. Wood

[CR B2ab(i,ii,iii); C1]

**Bu:** In stagnant waters in Primorsko region along the Black Sea coast.

**Refer.:** Wodenitscharow 1963; Vodenicharov & al. 1971; Temniskova & al. 2005; Blaženčić & al. 2006; Blaženčić & Temniskova (unpubl.).

**Tolypella intricata** (Trentep. ex Roth) Leonh.

[CR B2ab(i,ii,iii); C1]

**Bu:** In the region of Beglika in the Western Rhodopi Mts.

**Note:** Published as _T. intricata_ (Trentep.) v. Leonh. _ad._ _f._ _n._ _microcephala_ Mig.

**Refer.:** Petkoff 1913, 1914; Wodenitscharow 1963; Vodenicharov & al. 1971; Temniskova & al. 2005; Blaženčić & al. 2006; Temniskova & Kirjakov 2006; Blaženčić & Temniskova (unpubl.); Temniskova & Stoyneva (in press).

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**III. ENDANGERED SPECIES (EN)**

**III.1. Division Rhodophyta (Class Florideophyceae)**

**Batrachospermum anatinum** Sirodot

_Syn._ *B. ectocarpum* Sirodot

[EN B1ab(i,ii,iii); C1]

**Bu:** In the springs of river Mladezhka, Mt Strandzha.


**Batrachospermum anatinum** _f._ *confusum* (Bory) S. Stewart & Vis

_Syn._ *B. boryanum var. distensum* (Kylin) Israelson; *B. crouanianum* Sirodot

[EN B1ab(i,ii,iii); C1]

**Bu:** In river Mladezhka and its springs in Mt Strandzha, in a fountain trough near Bansko in the Pirin Mts.


**Batrachospermum boryanum** Sirodot

[EN B1ab(i,ii,iii); C1]

**Bu:** The the springs of rivers Mladezhka and Veleka in Mt Strandzha.

**Refer.:** Vodenicharov & al. 1986; Vodeničarov & al. 1991; Kirjakov & Temniskova (in prepar.).

**Batrachospermum turfosum** Bory

_Syn._ *B. vagum* (Roth) C. Agardh

[EN B1ab(i,ii,iii); C2a(i)]

**Bu:** In Shabla lake (IBW0212) and in river Aydere, in the vicinity of Malko Turnovo, Mt Strandzha.

**Note:** Indicated by Petkoff (1943) for Shabla lake as _B. vagum_ Roth _f._ _densa_. close to _B. densum_ Sirodot.

Shabla lake was reported as a locality for _B. vagum_ by Vodeničarov & al. (1991).


**Ceramium circinatum** (Kütz.) J. Agardh

_Syn._ *C. areschougii* Kylin

[EN B2ab(i,ii,iii); C1]

**Bu:** Ahtopol subregion of the Sozopol region of the Black Sea.

**BS:** Russia, Romania and Turkey.

**Ceramium virgatum** Roth

Syn. *C. pedicellatum* (Duby) J. Agardh

[EN B2ab(i,ii,iii); D]

**Bu:** Ahtopol subregion of the Sozopol region of the Black Sea.

**BS:** Russia and Romania.


**III.3. Division Chlorophyta (Class Ulvophyceae)**

**Bryopsis hypnoidex** J.V. Lamour.

[EN B2ab(i,ii,iii,iv); C2a(ii)]

**Bu:** Along the entire Bulgarian Black Sea coast.

**BS:** Russia, Romania and Turkey.


**IV. Vulnerable species (VU)**

**IV.1. Division Rhodophyta**

**IV.1.1. Class Bangiophyceae**

**Porphyra leucosticta** Thur.

[EN B2ab(i,ii,iii,iv); C1]

**Bu:** Ahtopol subregion of the Sozopol region of the Black Sea.

**BS:** Russia and Romania.


**IV.1.2. Class Florideophyceae**

**Apoglossum ruscifolium** (W.B. Turner) J. Agardh


[EN B2ab(i,ii,iii,iv); C1]

**Bu:** Varna, Bourgas and Sozopol regions of the Black Sea, the latter with both Sozopol-Tsarevo and Ahtopol subregions.

**BS:** Russia and Turkey.

**Note:** Published as *Delesseria rustifolia* C. Agardh.


**Ceramium arborescens** J. Agardh

[EN B2ab(i,ii,iii,iv); D1]

**Bu:** Ahtopol subregion of the Sozopol region of the Black Sea.

**BS:** Russia and Romania.

Corallina elongata J. Ellis & Sol.
Syn. C. mediterranea Aresch.
[VU B2ab(i,ii,iii); D1]
Bu: Varna and Sozopol regions of the Black Sea, the latter with both Sozopol-Tsarevo and Ahtopol subregions.
BS: Russia, Romania and Turkey.

Corallina officinalis L.
[VU B2ab(i,ii,iii); C1]
Bu: Kaliakra and Varna regions of the Black Sea, and Sozopol-Tsarevo subregion of Sozopol region too.
BS: Russia, Romania and Turkey.

Eupogodon spinellus (C. Agardh) Kütz.
Syn. Dasyopsis spinella (C. Agardh) Zanardini
[VU B2ab(i,ii,iii); C2a(ii)]
BS: Russia.

Gracilaria gracilis (Stackh.) M. Steentoft, L.M. Irvine & W.F. Farnham
Syn. G. verrucosa (Huds.) Papenf.
[VU B2ab(i,ii,iii); C2a(ii)]
Bu: Kaliakra, Varna and Bourgas regions of the Black Sea.
BS: Russia and Turkey.

Lemanea mamillosa Kütz.
[VU B1ab(i,ii,iii); C2a(i)]
Bu: In river Kutelska (a tributary to Malka Arda) in the Kazanite locality, near Slaveyno village, Smolyan region (Rhodopi Mts); at the entrance to the Vladaya catchment at the eastern foothills of Selimitsa on Mt Vitosha U (IBW5621).
Note: Published as L. mamillosa (Sirodot) De Toni. According to Vodeničarov & al. (1991), indicated as L. fluviatilis by Petkoff (1922).

Paralemanea annulata (Kütz.) Vis & Sheath
Syn. Lemanea annulata Kütz.
[VU B1ab(i,ii,iii); C2a(ii)]
Bu: In the rivers Veleka (in the Kovach locality), Sredetska and its tributary (between the villages Draka and Vulchanovo), and Muti Vir (near the bridge to Muhovo village in Sofia region).

Paralemanea catenata (Kütz.) Vis & Sheath
Syn. Lemanea nodosa Kütz.
[VU B1ab(i,ii,iii); D1]
Bu: In river Osenovska above the village Gradevo in Simitli region; in river Temrushka above Hrabrino village in the Plovdiv region and in the leftside tributary of river Asenitsa near Kosovo village in the Smolyan region in the Rhodopi Mts.

IV.2. Division Ochrophyta (Class Phaeophyceae)

Cladostephus spongiosus (Huds.) C. Agardh
Syn. C. verticullatus (Lightf.) Lyngb.
[VU B2ab(i,ii,iii); C2a(ii)]
Bu: Along the entire Bulgarian Black Sea coast.
BS: Russia, Turkey and Romania.
Note: Published as C. verticullatus (Lightf.) Agardh and C. myriophyllum Agardh.

Ectocarpus fasciculatus Harv.
[VU B2ab(i,ii,iii); C1]
BS: Russia.

Petalonia zosterifolia (Reinke) Kuntze
[VU B2ab(i,ii,iii); D1]
Bu: Kaliakra and Varna regions of the Black Sea and in Ahtopol subregion of the Sozopol region.
BS: Romania.

Punctaria tenuissima (C. Agardh) Grev.
Syn. D. tenuissium (C. Agardh) Kütz.
[VU B2ab(i,ii,iii); C1]
Bu: Varna region and Ahtopol subregion of the Sozopol region of the Black Sea.

BS: Russia and Romania.

**Note:** Published as *Diplostromium tenuissimum* Kütz.


*Scytosiphon lomentaria* (Lyngb.) Link


[VU B2ab(i,ii,iii); D1]

Bu: Distributed in Kaliakra, Varna, Bourgas and Sozopol regions of the Black Sea; the latter with both Sozopol-Tsarevo and Ahtopol subregions.

BS: Russia and Romania.

**Note:** Published as *S. lomentarius* (Lyngb.) Link. and as *S. lomentarius* (Lyngb.) J. Agardh.


*Stilophora tenella* (Esper) P.C. Silva

Syn. *S. rhizodes* (C. Agardh) J. Agardh.

[VU B2ab(i,ii,iii); C2a(i)]


BS: Russia and Romania.

**Note:** Published as *S. lomentarius* (Lyngb.) Link. and as *S. lomentarius* (Lyngb.) J. Agardh.


**IV.3. Division Chlorophyta (Class Ulvophyceae)**

*Bryopsis plumosa* (Huds.) C. Agardh

Syn. *B. plumosa* var. *genuina* Hauck

[VU B2ab(i,ii,iii); C1]

Bu: Varna, Bourgas and Sozopol regions of the Black Sea, the latter with both Sozopol-Tsarevo and Ahtopol subregions.

BS: Russia and Romania.


*Ulva clathrata* (Roth) C. Agardh


[VU B2ab(i,ii,iii); D1]


BS: Russia and Romania.


*Ulva flexuosa* Wulfen

Syn. *Enteromorpha flexuosa* (Wulfen) J. Agardh

[VU B2ab(i,ii,iii); C1]

Bu: Varna region and Ahtopol subregion of the Sozopol region of the Black Sea; Saltworks of Pomorie town.

BS: Russia and Romania.

**Note:** According to Dimitrova-Konaklieva (2000), *E. flexuosa* has *E. plumosa* as a synonym, while in the AlgaeBase *E. flexuosa* is a synonym of *Ulva flexuosa* and *E. plumosa* is a synonym of *Ulva flexuosa* subsp. *paradoxa*.


*Ulva flexuosa* subsp. *paradoxa* (C. Agardh) Kraft


[VU B2ab(i,ii,iii); C1]

Bu: Varna region and Ahtopol subregion of the Sozopol region of the Black Sea.

BS: Russia and Romania.

**Refer.:** Petkoff 1943; Jordanov & Dimitrova 1958/1959; Zinova & Dimitrova-Konaklieva 1974; Stoyneva (unpubl.).

*Ulva flexuosa* subsp. *paradoxa* (C. Agardh) Kraft


[VU B2ab(i,ii,iii); C1]

Bu: Varna region and Ahtopol subregion of the Sozopol region of the Black Sea.

BS: Russia and Romania.

**Refer.:** Petkoff 1943; Jordanov & Dimitrova 1958/1959; Zinova & Dimitrova-Konaklieva 1974; Stoyneva (unpubl.).

*Chara contraria* A. Braun ex Kütz.

[VU B1ab(i,ii,iii); C1]

Bu: Ovcharovo reservoir, Shoumen region; nearby Kurdzhali reservoir.


*Chara contraria* A. Braun f. *capillacea* Mig.

[VU B1ab(i,ii,iii); D1]
Bu: Ovcharovo reservoir, Shoumen region.
Refer.: Temniskova & al. 2005; Blaženčić & Temniskova (unpubl.).

Chara virgata Kütz.
Syn. C. delicatula C. Agardh
[VU B1ab(i,ii,iii); C2a(i)]
Bu: In a swamp in the Yuzhen Park of Sofia; in river Yantra, above Debelets village in Turnovo region.
Refer.: Temniskova 2005; Blaženčić & Temniskova (unpubl.).

Chara virgata Kütz.
Syn. C. delicatula C. Agardh
[VU B1ab(i,ii,iii); C2a(i)]
Bu: In a swamp in the Yuzhen Park of Sofia; in river Yantra, above Debelets village in Turnovo region.
Refer.: Temniskova 2005; Blaženčić & Temniskova (unpubl.).

Nitellopsis obtusa (Desv.) J. Groves
[VU B1ab(i,ii,iii); D1]
Bu: In swamps along the Danube, fresh or oligohaline standing waters; regions of Radomir, Svishtov and Sliven.

V. Near threatened species (NT)

V.1. Division Rhodophyta (Class Florideophyceae)

Chondria capillaris (Huds.) M.J. Wynne
Syn. C. tenuissima C. Agardh, Alsidium tenuissimum (Gooden. & Woodw.) Kütz.
Bu: Kaliakra, Varna and Sozopol regions of the Black Sea, the latter with both Sozopol-Tsarevo and Ahtopol subregions.
BS: Russia, Romania and Turkey.
Note: Published as: Chondria tenuissima (Gooden. & Woodw.) ??? Agardh; Alsidium tenuissimum Kütz. Reported by Jordanov & Dimitrova (1958/1959) as collected only from the wave-swept material on the coast in Balchik and collected earlier in Sozopol, near Galata in Varna Bay and near cape Kaliakra.

Dasya baillouiana (S.G. Gmel.) Mont.
Syn. D. elegans (G. Martens) C. Agardh, D. pedicellata (C. Agardh) C. Agardh, D. kützingiana Biasol.
Bu: Varna, Bourgas and Sozopol regions of the Black Sea, the latter with both Sozopol-Tsarevo and Ahtopol subregions.
BS: Russia, Romania and Turkey.

Osmundea pinnatifida (Huds.) Stackh.
Syn. Laurencia pinnatifida (Huds.) J.V. Lamour.
Bu: In the Rhodopi Mts – in the thermal springs and their effluents in the vicinity of the Belovo town (IBW0825) and in river Tsruncha; in the outlet of the Zhitolyub karst spring near Lakatnik village and in river Leva, in the vicinities of Zgorigrad in the Balkan Range, in the river Vedena near Zheleznitsa village and in the rivers Dragalev ska and Iskur in Mt Vitosha.

Paralemanea catenata (Kütz.) Vis & Sheath
Syn. Lemanea catenata Kütz.
Bu: In the vicinity of Slaveyno village in the Smolyan region, in the tributaries of the rivers Malka Arda and Kutelska in Padalski Dol; in a leftside tributary of river Topolnitsa, between the Koprivshtitsa town and its railway station in Mt Sredna Gora.

Paralemanea torulosa (Roth) Sheath & Sherwood
Syn. Lemanea torulosa (Roth) C. Agardh
[NT B2b(i,ii,iii,iv); D1]
Bu: In river Trigradska, below the Trigrad village; in several localities in the vicinity of Slaveyno village, Smolyan region in the Rhodopi Mts – Padalski Dol, between the peaks Stoudenets and Cherni Vruh, in the Murdzhova Kyupriya locality and in the river below the Belev Dol locality; in a leftside tributary of river Topolnitsa, between Koprivshtitsa town and its railway station in Mt Sredna Gora.
V.2. Division Ochrophyta (Class Phaeophyceae)

Heribaudiella fluviatilis (Aresch.) Sved.
Bu: In the outlet of the Zhitolyub karst spring, near Lakatnik village in the Balkan Range, in river Vede na near Zheleznitsa village and in the rivers Dragalevska and Iskur in Mt Vitosha.
Refer.: Stoyneva & al. 2003.

V.3. Division Chlorophyta (Class Chlorophyceae)

Cladophora coelothrix Kütz.
Syn. C. repens (J. Agardh) Harv.
[NT B2b(i,ii,iii,iv); D1]
Bu: Kaliakra and Bourgas regions of the Black Sea; Ahtopol subregion of the Sozopol region of the Black Sea and in lake Shabla (IBW0219).
BS: Russia and Turkey.
Note: Published as C. repens Harv.

V.4. Division Streptophyta (Class Charophyceae)

Nitella gracilis (J.E. Smith) C. Agardh
Bu: In the swamp behind SlivnitsaD (IBW0015) and Kazichensko peat bogR (IBW0735) in Sofia region, in the floods of river Yantra nearby Draganovo village, in the region of Gorna Oryahovitsa.

VI. Data Deficient species (DD)

VI.1. Division Rhodophyta (Class Florideophyceae)

Brongniartella byssoides (Gooden. & Woodw.) F. Schmitz
Syn. Polysiphonia byssoides (Gooden. & Woodw.) Grev.
Bu: Varna region of the Black Sea.
BS: only in Bulgaria
Note: Petkoff (1943) indicated some similarities of the specimens with P. asperula Kütz. Therefore this finding needs verification.

Chondria dasypylla (Woodw.) C. Agardh
BS: Russia and Romania.


Polyisiphonia brodiaei (Dillwyn) Spreng.
BS: Russia.
Note: Published as P. brodiaei (Dillwyn) Grev. and as P. brodiaei Grev. Marked with a question mark (?) by Petkoff (1932).
Refer.: Petkoff 1932; Dimitrova-Konaklieva 2000.

VI.2. Division Ochrophyta (Class Phaeophyceae)
Punctaria plantaginea (Roth) Grev.
BS: Russia.
Note: Published as P. asperula Kütz. Therefore this finding needs verification.

VI.3. Division Chlorophyta (Class Chlorophyceae)

Chaetomorpha herbipolensis Lagerh.
Bu: In the Opitsvet thermal springsT (IBW9020), in the springs of DevnyaT (IBW0725), in Sevlievo region and near Levski railway station.

VI.4. Division Streptophyta (Class Charophyceae)

Chara aspera Willd.
Bu: In the haline pools near the Bourgas-Pomorie road and between lake Atanasovo and the Black Sea, Bourgas region.
Note: Published as C. aspera (Dethard.) Willd. ad f. marina Mig. and as C. aspera Dethard. ex Willd.
Refer.: Petkoff 1913; Wodenitscharow 1963; Vodenicharov & al. 1971; Blaženčić & al. 2006.

Chara globularis f. connivens (Salzm. ex A. Braun) R.D. Wood
Syn. C. connivens Salzm. ex A. Braun, C. connivens var. pygmaea f. rabichii Petkoff
Bu: In the former swampy lake RabishaT (IBW0252 – Petkoff 1934). According to Vodenicharov & al. (1971), the species is ‘common in brackish waters along the Black Sea coast and occasional in fresh waters’.
Refer.: Petkoff 1934; Vodenicharov & al. 1971; Blaženčić & al. 2006; Blazencic и Temniskova (unpubl.)

Chara hispida L.
Syn. C. hispida f. typica Mig.; C. hispida var. hispida R.D. Wood
Bu: In deep freshwater swamps in the Balchik region (?-IBW0214).


Chara hispida var. major (Hartm.) R. D. Wood
Bu: Predominantly in standing, slightly haline waters, Vratsa region.

Note: Published as C. hispida var. major (Vaill. ex Hy) R.D. Wood.


Chara tomentosa L.
Bu: Predominantly in large water bodies with stagnant fresh water but also in brackish waters; in Sadovo, in the Plovdiv region, and Abramova Kuriya locality in the Sliven region.

Refer.: Vilhelm 1908; Wodenitscharow 1963; Vodenicharov & al. 1971; Blaženčić & al. 2006.

Lamprothamnus papulosus (Wallr.) Bég. & Formigg.
Bu: In stagnant waters along the Black Sea coast in the vicinity of Bourgas (according to Petkoff 1934) – without indication of halinity; in stagnant fresh waters in the Bourgas region (according to Vodenicharov & al. 1971).

Note: Published as L. papulosum (Wallr.) J. Groves, Lamprothamnion alopecuroides (Del.) A. Braun and as Lamprothamnion papulosum (Wallr.) J. Groves. Petkoff (1943) reported that the material was collected in the summer of 1910 by his student V. Petkoff and contained only two partially destroyed specimens.

Refer.: Petkoff 1934; Wodenitscharov 1963; Vodenicharov & al. 1971; Temniskova & al. 2005; Blaženčić & al. 2006; Blaženčić & Temniskova (unpubl.).

Nitella flexilis (L.) C. Agardh
Bu: Predominantly in shallow, slow and standing waters, Mt Lyulin and in the vicinity of Bourgas.

Note: Published as N. flexilis (L.) C. Agardh ad. var. subcapitata A. Braun.


Nitella tenuissima (Desv.) Kütz.
Bu: Swamp Novogradsko BlatoR (IBW0212) in Svishtov region.

Refer.: Petkoff 1934; Wodenitscharov 1963; Vodenicharov & al. 1971; Blaženčić & al. 2006.

Spirogyra rhodopea Petkoff
Bu: In a spring with slow waters and its effluents above Yugovo villageU (IBW5567) in the Rhodopes.


References


