Template for Submission of Scientific Information to Describe Areas Meeting Scientific Criteria for Ecologically or Biologically Significant Marine Areas

Title/Name of the area:
Zernov's Phyllophora Field or Big Phyllophora Field

Abstract

Zernov's Phyllophora Field (ZPF) located in the north-western part of the Black Sea at a depth from 25 to 50 meters. It is a unique natural phenomenon - seaweeds concentration with the dominant species presented red algae of Phyllophoraceae. ZPF is an important habitat for many species of invertebrates and fish. The main cluster of macrophytes is the paleobed of Dnieper River, and is located between the two branches of the Black Sea circular current. The dominant sediments are shell limestone, silted shell limestone, shelly silt. The state of the ZPF ecosystem is an indicator of the whole northwestern part of the Black Sea ecosystem state. An intensive commercial production of unattached form specie *Phyllophora crispa* took place here during more than fifty years. This area was declared in 2008 as a botanical reserve of state-wide importance; it was established to protect and restore a unique natural environment. "Zernov's Phyllophora field" is the biggest MPA in the Black Sea.

Introduction

This area includes the pelagic and benthic habitats. Maximum water depth within the ZPF reaches 54 m, water depth varies from 24 to 54 m (pic. 1). The main cluster of macrophytes is the paleobed of the Dnieper River where mussel attached and unattached forms of algae are growing (pic 2). There are 3 species of Phyllophoraceae within the ZPF: *Coccotylus truncates*, *Phyllophora crispa* and endemic *Phyllophora pseudoceranoides*. In addition brown *Sphacelorbus nanus* grows only in this area. Last two species listed in the Red Book of Ukraine. The stable circular current of the Black Sea north-western shelf contributed to the Phyllophora phytocenosis formation. In 1970th-80th the habitats of *Phyllophora crispa* and *Coccotylus truncates* dramatically decreased due to the anthropogenic impact such as eutrophication. *Phyllophora crispa* and *Coccotylus truncatus* are the dominant habitat-forming species and creating an ecological niche for more than 100 species of invertebrates and 40 species of fish at the same time. ZPF is the unusual association of organisms, unique combination of the surrounding physical and geographical conditions, a reliable indicator of the marine environment state for the whole north-western part of the Black sea.

Location

The area is located on a wide shelf of the north-western part of the Black Sea. It is covers an area of 4025 square kilometers in the Black Sea with the following coordinates:
45°18'25" N 30°42'26" E;
45°54'42" N 30°55'05" E;
46°01'53" N 31°10'40" E;
45°31'05" N 31°42'56" E;
45°17'41" N 31°23'20" E.

Feature description of the proposed area

Landscapes of the ZPF are located at the depth of 25 to 50 m. . The dominant deposits are shell limestone, silted shell limestone with carbonate content of about 70%, passing to the east in mid carbonate shelly silt. The silt deposits found in the paleodelte of the Dnieper River in the north of the district. Quartz sands are found at the high grounds of the bottom relief. ZPF has the following characteristics: average depth of 20-50 m, 17-18 ‰ salinity, temperature in summer is 25 ° C and 4 ° C in winter, the marine species of plankton are dominated, but freshwater and brackish are also presented. Most of the benthic biocenosis are Phyllophora and mussels, deep water is

Phaseolina biocenosis. According to the geochemical migration of elements the so-called aquatic landscapes of ZPF related to the area located in the central part of the shelf, it contains oxygen-clayey trans-accumulative landscapes on shell limestone (pelite content up to 20% and organic substances up to 1-1.5%). Bivalves *Mytilus galloprovincialis* and more deep *Modiolula phaseolina* are cenosis forming species that form not only biocenoses, and also relevant environmental belt areas, landscapes and geologic facies. Benthal of the cold intermediate layer (CIL) of the Black Sea (BS) is characterized not only by a specific set of shellfish, but also cold-loving representative of phytobenthos *Coccotylus truncatus* (boreal element of the Black Sea ecosystem). In the northern seas *Coccotylus truncatus* and *Phyllophora pseudoceranoides* are found at shallow depths (0.5-8 m), in the Black Sea are adapted to the greater depths (20-50 m), where their normal existence provided by the constant year-round temperature in the range of 6-10 ° C. Species complex typical for benthic of the CIL BS, in which the leading role belongs to the species with the boreal roots formed about 2,800 years ago. *Phyllophora crispa* is endemic to the Mediterranean basin

Feature condition and future outlook of the proposed area

The area is very sensitive to the changes in environmental conditions. So in 2012 the upper limit of *Modiolula phaseolina* registration took place on 42 m isobaths, clusters of the large sized clams groups is in the range of depths of 44-54m. This allowed to assume the changes in the location of the upper boundaries of *Modiolula phaseolina* biocenosis of north-western shelf of the Black Sea. It should be noted that the border of *Modiolula phaseolina* was limited to a depth from 50-60 m and up to 200m till the end of the 20th century. *Coccotylus truncatus* distribution in a shallow area of the ZPF in recent years is connected to the decrease in temperature of the bottom waters caused by the widespread decrease in water transparency in the 4-10 times, which in turn caused a rise in the lower boundary of the photosynthesis zone. In recent years there was an increase in the area of macrophytobenthos biodiversity mainly due to the filamentous form with high specific surface area of the thallus. This can be explained by the intake of nutrients with the river flow of the Dniester, Dnieper, and from the Karkinitsky Bay, as well as elution of nutrients from the bottom sediments.

Assessment of the area against CBD EBSA Criteria

CBD EBSA Criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				**X**
Explanation for ranking There are two endemic growing in the area: red algae *Phyllophora pseudoceranoides* and brown *Sphacelorbus nanus.* The accumulation of algae Coccotylus and Phyllophora is a unique habitat of the Black Sea north-western shelf.					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.				**X**
Explanation for ranking The area is required survive and thrive populations of Phyllophoraceae, Mytilidae and many species of macrophytes, invertebrates and fish.					
Importance for threatened, endangered	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.				**X**

or declining species and/or habitats					
Explanation for ranking Area containing habitat for the survival and recovery of endangered, threatened, declining species: *Sphacelorbus nanus* (Ochrophyta) (Vulnerable), *Ectocarpus siliculosus* (Ochrophyta) (Vulnerable), *Phyllophora pseudoceranoides* (Rhodophyta) (Critically Endangered). *Coccotylus truncatus* (Rhodophyta) (=*Phyllophora brodiaei*) («Vulnerable»), *Phyllophora pseudoceranoides* (Rhodophyta) (Critically Endangered), *Phyllophora crispa* (Rhodophyta) (*Phyllophora nervosa*) (Vulnerable), *Diogenes pugilator* (Decapoda) (Endangered) etc.					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.				**X**
Explanation for ranking *Coccotylus* and *Phyllophora* have minimum values of the specific surface area ratios S/Wp, $m^2 \cdot kg^{-1}$, and therefore the most vulnerable to eutrophication and are characterized by a slow recovery rate.					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.				**X**
Explanation for ranking In modern conditions apeared favorable conditions for the mass development of highly productive filamentous macrophytes **Ochrophyta**: *Sphacelaria saxatilis*, *Ectocarpus siliculosus*, *Feldmannia irregularis* and **Rhodophyta**: *Spermothamnion strictum*, *Callithamnion corymbosum*, *Antithamnion cruciatum*					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				**X**
Explanation for ranking According to the results of benthic surveys 2010, 2011 and 2013during the cruises 68, 70 and 72 of RV "Professor Vodyanitsky" in ZPF found more than 162 species of benthic macrofauna. As a result of expeditions in 2012, 2016 in the waters of ZPF found 30 species of macrophytes.					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.		**X**		
Explanation for ranking The level of human impact was very high to the end of the last century. During the 50 years bottom trawling of Phyllophora (Kitrana trawls) were conducted in the area for agar production.					

Sharing experiences and information applying other criteria (Optional)

Other Criteria	**Description**	**Ranking of criterion relevance** (please mark one column with an X)			
		Don't Know	**Low**	**Medium**	**High**
Add relevant criteria					
Explanation for ranking					

References

Black Sea Red Data Book [Text] / Ed. by H. J. Dumont. – New York: United Nations Office for Project Services (UNOPS), 1999. – 413 pp

Babanets A.A., Emelyanov V.A., Mitropolsky A.Yu., et al. Physical and chemical properties of benthic sediments of the Black Sea. Kiev: Naukova Dumka, 1981. – 204 p. [In Russian]

Berlinsky N.A., Denga Yu.M., Matveev A.V., Podust O.S., Popov Yu.I., Tretyak I.P. Influence of variation of conditions of marine environment on dynamics of Zernov's Phyllophora Field / Visnyk ONU. Ser. Geogr. and Geol. Sci. 2014. - 19, 2. - P. 40-57. [In Russian]

Bondarev I. P. Problems of instability of underwater seascape (on the example of the northern Black Sea) / Uchene Zapiski TNU. - Ser. Geogr. - 21, 2. - 2008. - P. 128-133 [In Russian]

Bondarev I. P. General features and stages of forming of the Black Sea ecosystem in the Late Pleistocene-Holocene / Geology and fossils of the World Ocean, 2012, 2. - P. 53-71 [In Russian]

Bondarev I. P. Biological basics of facial structuring of the Black Sea shelf / Geology and fossils of the World Ocean. - № 4. - 2014. - P. 72-90 [In Russian]

Zaitsev YuP. Ecological state of the Black Sea shelf zone along the coast of Ukraine (review). Hydrobiological Journal 1992;28(4): 3-18 [In Russian]

Report on Monitoring and Assessment: Ukraine, 2012 /. Reg. ID 0113U007210 – 2013. – 68 c.

Zernov S. A. Facies of Phyllophora [Algae-Rhodophyceae], a phyllophore filed in the north-western part of the Black Sea. A zoological cruise on a steam ship Fedya 11-14 April 1909 / Bull Zool Mus Acad Sci - St Petersburg. - Typogr Imp Acad Sci. - 1909. –14. – P. 181-191.

Kalugina-Gutnik AA. Phytobenthos of the Black Sea. Kiev: Naukova Dumka; 1975. 247 pp [in Russian].

Kalugina-Gutnik AA, Evstigneeva IK. Perennial dynamics of species composition and structure of seabed phytocenoses of Zernov's Phyllophora Field. Ecology of Seas 1993: 43:90-7 [In Russian].

Minicheva GG. Phytocenoses of Zernov's Phyllophora Field as indicators of the current ecological state for Northwest shelf of the Black Sea. In: Proceedings of international applied science conference on ecological problems of the Black sea; 2007. p. 229-233 [in Russian]

Minicheva GG., Kosenko MN, Shvets AV Phytobenthos of the Big and Small Phyllophora fields as a reflection of modern ecological state of the north-western Black Sea. Morskoy Ekologicheskiy Zhurnal, №4, T.VIII – 2009. – P. 24-40.

Zaitsev Yu, Alexandrov B, Minicheva G, editors. Northwest part of the Black Sea: biology and ecology. Kiev: Naukova Dumka; 2006. p. 701 [In Russian].

Sovga EE, Zhorov VA, Boguslavsky SG, Siden VP. Classification of sea area in the north-western Black Sea in mathematical modelling of shelf ecosystems // Ecological safety of shelf and coastal zones and complex use of shelf resources . – 2005. –. 12. – P. 421-428.

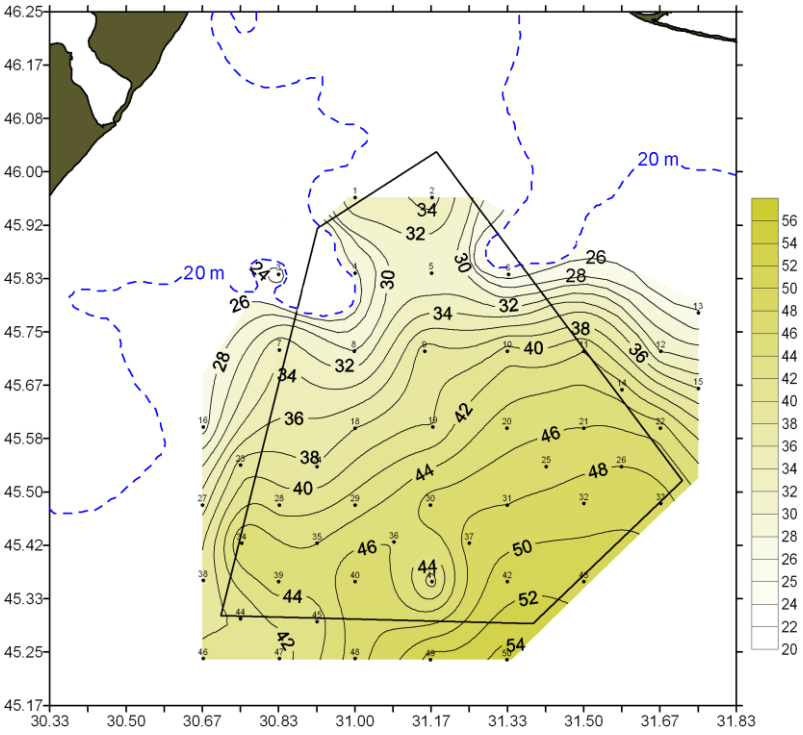
Tkachenko FP, Tretyak IP Macrophytobenthos of a botanical preserve of state-wide importance "Zernov's Phyllophora Field" (Ukraine) // Algologia. – 2015. –25, 3. – P. 238-246.

Yuschenko VA. Presidential order #1064/2008. On declaring an area of natural waters of the Black Sea a botanical preserve of state-wide importance "Zernov's Phyllophora Field"; 21 November 2008.

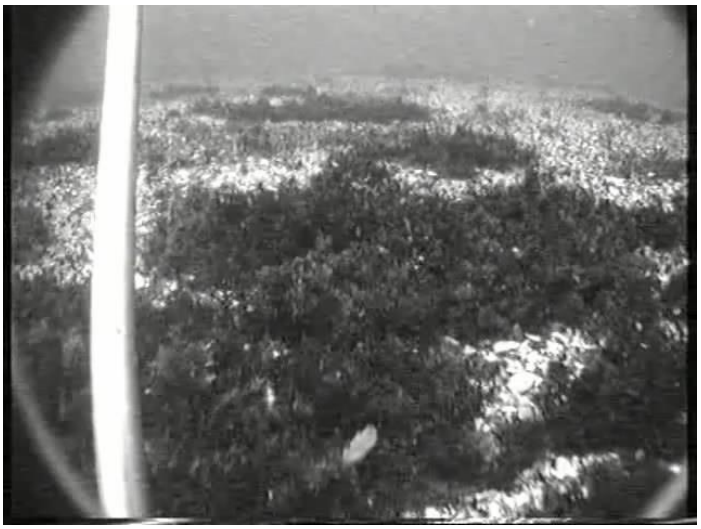
Khovansky AD, Chernousiv SYa. Geochemistry of landscapes of the north-western Black Sea // Geokhimia.– 1989.– 12.– P.1727-1735.

Red Data Book of Ukraine. Plants. – Kiev : Globalkonsalting. – 2009. – 900 p.

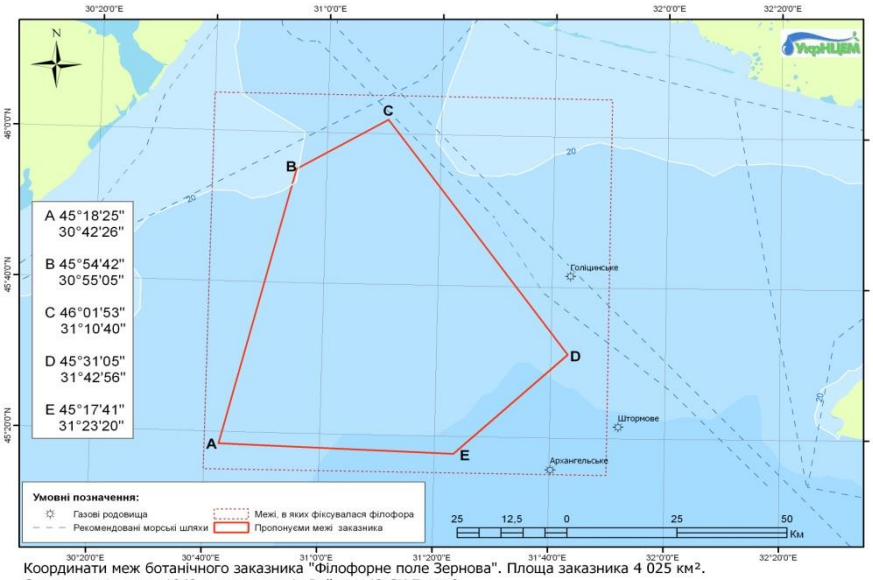
Maps and Figures



Pic. 1 - Bathymetric scheme of ZPF

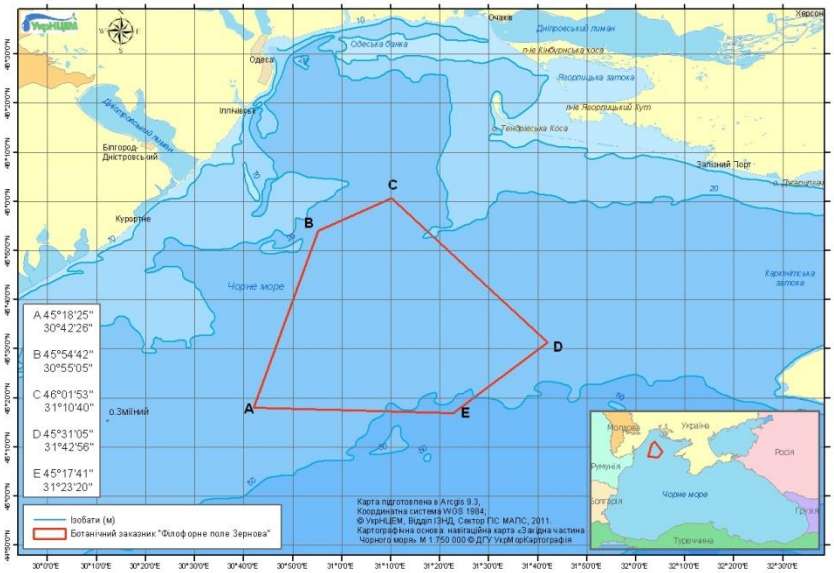


Pic. 2 - ZPF bottom



Координати меж ботанічного заказника "Філоформе поле Зернова". Площа заказника 4 025 км².
Система координат 1942 року, проекція Pulkovo-42 GK Zone 6.

Pic. 3 - "Zernov's Phyllophora Field" MPA boundaries
http://ims.sea.gov.ua:8081/MPA/



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