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Research Article

Current State Overview of the Vama Veche - 2 Mai Marine Reserve, Black Sea, Romania

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Abstract. The Vama Veche - 2 Mai marine area is an almost unique combination at the Romanian coast, covering a wide variety of elementary habitats, the area being considered a true mosaic. The extremely rich benthic and pelagic life, expressed by the high biodiversity in the area, is a real milestone for the Romanian coast, being at the same time shelter and breeding area for many nektonic marine organisms. The National Institute for Marine Research and Development "Grigore Antipa" Constanta was custodian of the reserve in the period 2004 - 2009, during which an intense research activity was developed in the area, evidenced by the numerous scientific papers published, as well as the Management Plan and Regulation of the Reserve, completed and submitted for approval to the Ministry of Environment. Since December 2011, the Institute has again taken into custody the Vama Veche Reserve, for a period of five years. The paper herein is a brief scan of the current state of the protected area, based mainly on the research conducted there by the Institute, within many projects focusing on the quality of the Romanian marine environment.

Key Words: Vama Veche - 2 Mai Marine Reserve, biodiversity, marine habitats.

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Introduction

Romanian shore of the Black Sea abounds in natural resources (Doroftei *et al* 2011ab), some of them playing a role in subsistence fishing (Roşca & Mânzu 2011). Besides the natural riches of economic importance, the Black Sea hosts values that cannot be estimated economically and cannot be bought (Niţă *et al* 2011). Expansion of Natura 2000 network was auspicious for Romanian flora and fauna (Gagyi-Palffy 2007; Badea 2008). Governed by European legislation, the network brought with it many protected areas in a very short time period (Covaciu-Marcov *et al* 2008, 2009; Krecsak & Zamfirescu 2008; Sas 2010; Moga *et al* 2010; Cupşa *et al* 2010).

The aim and protected area category of the Vama Veche - 2 Mai Marine Reserve corresponds to Annex 1 of GEO 57/2007 on the regime of natural protected areas, natural habitats, wild flora and fauna conservation. According to it, the Vama Veche - 2 Mai Marine Reserve falls under the category "natural reserve" (corresponding to IUCN category IV - Protected area managed mainly for cWrodonservation through management intervention - Habitat/Species Management Area), aiming at protecting and preserving marine habitats and marine natural species significant from the flora and fauna point of view (NIMRD 2007). In addition, the protection and preservation of the marine landscape shall be achieved. According to Decision 2009/92/EC and Order of the Sustainable Development Minister no. 1964 of December 13, 2007, on setting up the natural protected area regime of Community importance sites, as integral part of the Natura 2000 European ecological network, the reserve was put under special preservation regime as part of the Natura 2000 European ecological network (Natura 2000 code - ROSCI0269). The Vama Veche - 2 Mai marine area is an almost unique combination at the Romanian coast, covering a wide variety of elementary habitats, the area being considered a true mosaic. The extremely rich benthic and pelagic life, expressed by the high biodiversity in the area, is a real milestone for the Romanian coast, being at the same time shelter and breeding area for many marine organisms (Zaharia *et al* 2007b).

The area is important from the fauna and flora point of view, as well as for its biodiversity (Abaza 2010). Given its location (the southern limit is the Bulgarian border), as well as the interest of scientists in the neighboring country, there is the opportunity for a cross-border expansion.

Material and Methods

The National Institute for Marine Research and Development "Grigore Antipa" Constanta was custodian of this reserve between 2004-2009, during which an intense research activity was developed in the area, evidenced by the numerous scientific papers published. The paper herein is substantiated on consulting and compiling the results of this research activities, available to the public, for better documentation, both printed and online. The data is comprised in the Annual Report on the Current State of the Marine Environment (2006-2011), which is available online on the website www rmri.ro, as well as in several scientific

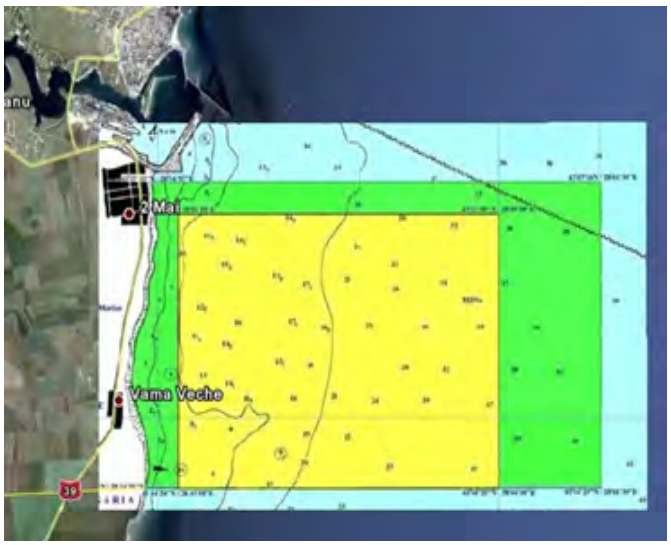

Figure 1. Location of the Vama Veche - 2 Mai Marine Reserve (green - buffer zone; yellow - strictly protected zone).

papers published in the journal "Cercetări Marine (Recherches Marines)" and in other journals, in Romania and abroad.

Results and Discussion

Our brief overview of the state of the Vama Veche - 2 Mai Marine Reserve deals with a few general character aspects (location, physical and geographical frame, geology of the area), but it is mainly focused on detailing the European interest marine habitat inventory and identified species inventory in the area. The biodiversity is structured on ecological groups, not systematic ones (phytoplankton, zooplankton, phytobenthos, zoobenthos, ichthyofauna, mammals).

Location of the Reserve

The Vama Veche - 2 Mai Littoral Marine Aquatory Reserve is located in the southern part of the Romanian coastline, belonging, from the administrative point of view, to the Limanu Municipality, Constanta County (NIMRD 2007).

The access in the reserve is made from shore, through 2 Mai and Vama Veche villages. The access in the departure area is made from the Mangalia - Bulgarian border national road.

Photo 1. *Zostera noltii* in ROSCI0269 Vama Veche - 2 Mai (photographer D. Micu).

Description of the Physical-Geographical Frame

As location, the reserve is comprised in the southern sector of the Romanian coastline (Figure 1), which is abrasive and formed of Sarmatian sandstone and limestone seafronts, covered by a thick layer of loess deposits. The Sarmatian limestone continues down to the sea, forming a real submerged board.

As concerning strictly the declared area of the reserve, it corresponds to those segments of the seafloor ranging between the upper level, permanently or only exceptionally flooded by sea water, down to the approx. 40 m depth.

Geology and Geomorphology

In the Vama Veche - 2 Mai Marine Reserve, the sediments are dominated by biogenic coarse and pebbly sands. Fine quartz sand becomes dominant as water depth increases. The rocky seafloor in the protected area generally comprises Sarmatian limestone shelves or rocks of the same origin. They form a continuous board from the shoreline down to 12-18 m depths; certain profiles have the aspect of enclaves surrounded by sandy areas.

Habitat Types

(According to the classification made by Donita *et al* 2005ab, Micu *et al* 2007 and EUR 27 – Manual of European Union Habitats, 2007).

1. 1110-1 *Zostera* meadows on clean or slightly muddy fine sands: *Zostera noltii* forms mono-specific submerged meadows, in sheltered bays 4 meters deep (Photo 1), where sedimentary stability leads to a slight muddying of the sand;

2. 1110-4: Well sorted sands: Immediately following shallow fine sands, this habitat type stretches from a 3-4 m water depth to the eastern limit of the site;

3. 1110-5: Wave-lashed coarse sands and fine gravels: This habitat type is encountered in small bays in the site and does not exceed a few tens of centimeters in depth.

4. 1110-6: Infralittoral cobbles: The habitats consists of round and flattened rock (cobbles) submerged beaches, usually white limestone, modeled by the waves. The lower limit corresponds

Photo 2. Midlittoral detritus accumulation in 2 Mai (photographer T. Zaharia).

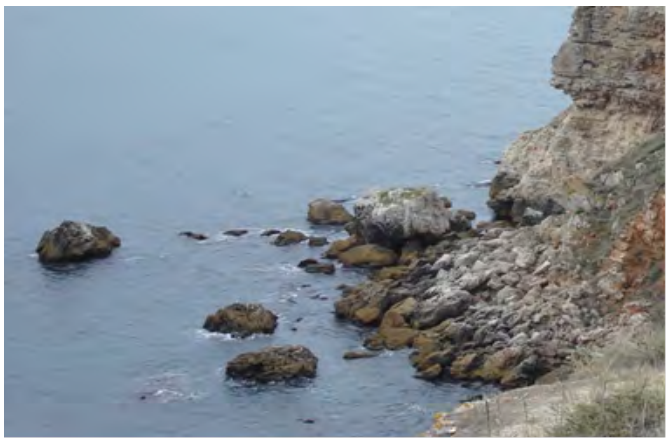

Photo 3. Boulders and blocks (photographer V. Niţă).

Photo 4. Lower midlittoral rock (photographer V. Niţă).

Photo 5. *Cystoseira barbata* in ROSCI0269 Vama Veche - 2 Mai (photographer D. Micu).

to the area where wave force becomes insufficient to roll the cobbles;

5. 1110-9: Sandy muds and muddy sands bioturbated by *Upogebia*: They form a continuous belt along the Romanian coast, at 10-30 m depths, on muddy sands.

6. 1140-1: Supralittoral sands with or without fast-drying drift lines: This habitat type occupies the beach part that is covered by water only during storms. The deposits are made of the materials brought by the sea - of vegetal origin (tree trunks, wood pieces, algae, leaves), of animal origin (underwater animal corpses, drowned terrestrial animals) and of anthropogenic origin (solid wastes), as well as the dense foam of marine plankton.

7. 1140-2: Supralittoral slow-drying drift lines: The habitat occupies the portion of the boulder shoreline or cobble beaches that is covered by waves only during storms. They accumulate in the space between them the debris described above, but also humidity, so that the debris hardly dries.

8. 1140-3: Midlittoral sands: This habitat type occupies the sand stretch on the shore, on which the waves break. Depending on the sea choppines, the portion may be wider or narrower. The sand is compact, coarse and mixed with shell debris and gravel.

9. 1140-4: Midlittoral detritus on shingle and boulders: This type of habitat occupies the midlittoral portion of the shores and is formed of boulders, cobbles or gravel, continuing the supralittoral slow-drying detritus drift lines (Photo 2).

10. 1170-2: *Mytilus galloprovincialis* biogenic reefs: These habitats are made of mussel banks the shells of which have accumulated in time, forming a rough support higher than the surrounding sediments (mud, sand, gravel or mixture), on which living mussel colonies fix themselves.

11. 1170-4: Boulders and blocks: Large sized rock and boulder piles appear on the midlittoral of rocky shores, at the base of rocky cliffs (Photo 3). These blocks can be rolled or eroded by the water charged with sand during storms, which is why algal populations are ephemeral. The structural complexity and the obscurity attract an extraordinarily diverse fauna for such shallow waters. This habitat is actually a mosaic of microhabitats, representing midlittoral enclaves of species that normally belong to deeper areas.

12. 1170-5: Supralittoral rock: The upper-littoral rock is situated above the sea level and becomes wet to due wave foam or during storms. The vertical expansion depends on hydrodynamism, solar exposure and gradient. This type of habitat is populated by the *Verrucaria* lichen, isopod crustaceans and the *Pachygrapsus marmoratus* crab.

13. 1170-6: Upper midlittoral rock: The upper midlittoral rock is located in the superior part of the wave breaking area and is

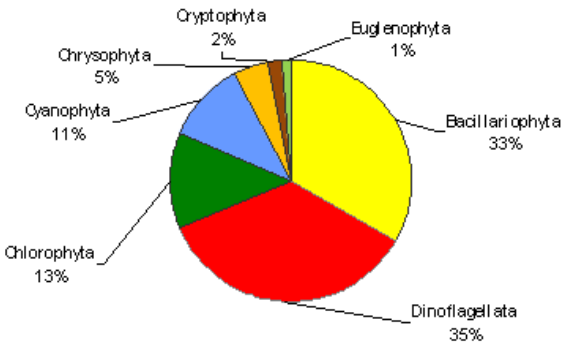

Figure 2. Taxonomy group distribution of phytoplankton in the Vama Veche - 2 Mai Marine Reserve waters.

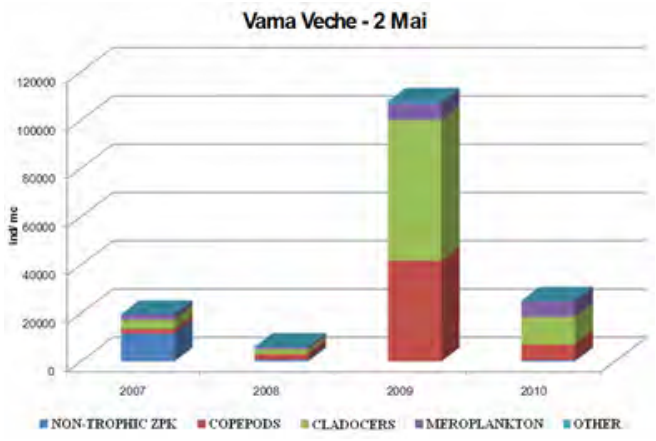

Figure 3. The quantitative structure of zooplankton in the Vama Veche - 2 Mai Marine Reserve between 2007-2010.

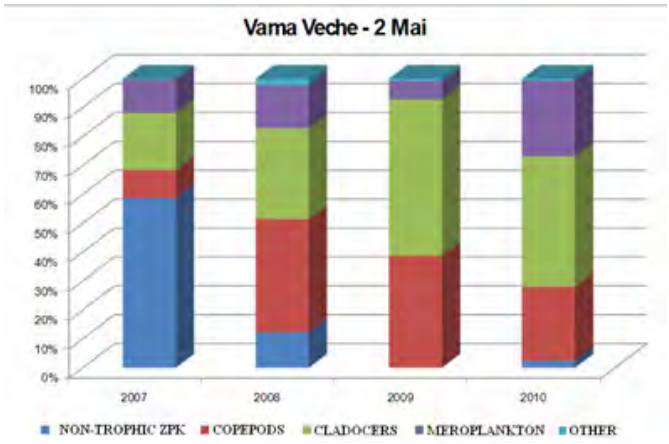

Figure 4. The qualitative structure of zooplankton in the Vama Veche - 2 Mai Marine Reserve between 2007-2010.

Figure 5. Trap net set up at the Romanian coastline.

not permanently covered by water, being nevertheless wet intermittently by high waves.

14. 1170-7: Lower midlittoral rock: The lower midlittoral rock is located in the lower part of the wave breaking area and it is covered by water most of the time (Photo 4). High and constant humidity and strong light are the dominant factors of this habitat. Articulated *Corallina officinalis* and ephemeral macrophyte *Ulva* sp., *Cladophora* sp. and *Ceramium sp*. algae occur. The fauna is characterized by *Balanus improvisus*, *Mytilaster lineatus* and *Mytilus galloprovincialis*, bryozoa, amphipod and isopod crustaceans, the *Pachygrapsus marmoratus* and *Eriphia verrucosa* crabs.

15. 1170-8: Infralittoral rock with photophilic algae: The infralittoral rock with photophilic algae is situated immediately under the lower midlittoral level, where water immersions are only accidental, and stretches down to the inferior limit of the spreading of the photophilic and marine phanerogam algae. This lower limit is conditioned by the penetration of light and is thus variable, according to the topography and water clarity. Generally, on the Romanian littoral, this limit is around 10 meters deep, but in the areas with high turbidity it can be less than 1 meter. The rocky substrate between these two boundaries is covered with rich and varied populations of photophilic algae. It includes various facets (including the ones containing the *Cystoseira barbata* and *Corallina officinalis* perennial macrophyte algae) and a great algal and fauna diversity (Photo 5).

16. 1170-9: Infralittoral rock with *Mytilus galloprovincialis*: The infralittoral rock with *Mytilus galloprovincialis* stretches down to maximum 28 meters deep, at the lower limit of the rocky platforms. In the photophilic algae area, it overlaps the previous habitat, but continues deeper, overcoming its limits. The fauna is extremely diverse, including numerous sponge, hydrozoas, polichaet, mollusk, crustacean and fish species, characteristic only for this type of habitat, some of them being rare or protected.

17. 1170-10: Infralittoral hard clay banks with Pholadidae: This type of habitat comprises red hard clay banks, shaped as plateaus or wavy, that can be partially covered by the surrounding sediments. The galleries dug by *Pholas dactylus* provide this habitat a high tridimensional complexity and allow the fixation of a special fauna association.

Biodiversity

Phytoplankton

The qualitative structure of phytoplankton was characterized in the past years by the occurrence of 102 species, belonging to the seven algae taxonomy groups (Bacillariophyta, Dinoflagellata, Chlorophyta, Cyanophyta, Chrysophyta, Euglenophyta and Cryptophyta). The dominance of dinoflagellates stands out (35%), followed by diatomes (33%), chlorophytes (13%) and

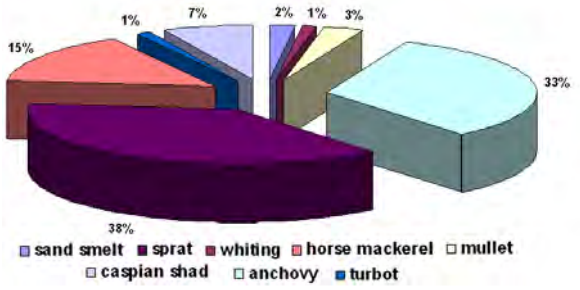

Figure 6. Percentage distribution of fish species caught in the Vama Veche - 2 Mai area (June 2011).

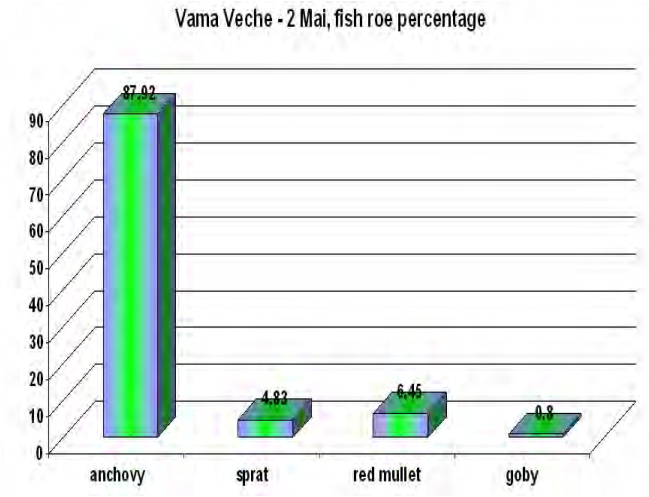

Figure 7. Numerical distribution of roe in the Vama Veche - 2 Mai site.

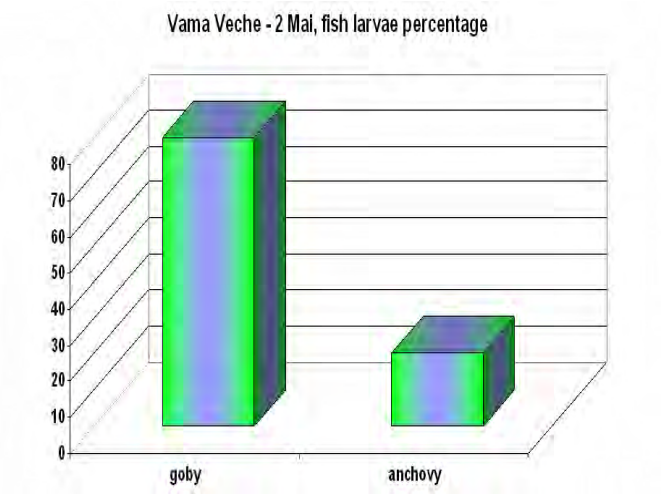

Figure 8. Numerical distribution of larvae in the Vama Veche - 2 Mai site.

cyanobacteria (11% of the total number of identified phytoplankton species) (Figure 2). The most poorly represented taxonomy groups in the area are Chrysophyta (5%), Cryptophyta (2%) and Euglenophyta (1%) (NIMRD 1990 – 2010, 2010).

Zooplankton

The highest species abundance is encountered in the Vame Veche - 2 Mai area. 27 taxa belonging to 14 taxonomy groups were identified here. The qualitative structure of zooplankton in the ROSCI-0269 site has varied widely during the past years (6,104 - 107,753 ind/m3). The peak value was recored by the cladoceran group (58,307 ind/m3 in 2009).

The qualitative structure also ranged within very broad limits, from the prevalence of the non-trophic zooplankton in 2007 to the prevalence of the trophic zooplankton in 2008-2010. However, within the trophic zooplankton, cladocerans remained the dominant group during the study period, regardless of the fact that copepods are represented by a high number of taxa (NIMRD 1990 – 2010, 2010) (Figures 3 and 4).

Phytobenthos

Both in Vame Veche and in 2 Mai, the phytobenthic vegetation frame is dominated by the *Cladophora* genus from the quantitative point of view: 102.5 g/m2 in 2 Mai/1 m, 200 g/m2 in 2 Mai/3 m, 315 g/m2 in Vama Veche/1 m.

Regardless of the fact that, in 2009, the dominant species in the Vama Veche - 2 Mai area was *Ulva rigida*, in 2011 it was identified only as small sized thalli fixed on mussels in Vama Veche. *Ceramium sp*ecimens were reported in both stations.

The complete list of macrophyte algae identified over time in the analyzed area (NIMRD 1990 – 2010, 2010; Niţă & Ursache 2010; Zaharia *et al* 2007a, 2008) is compiled in Supplemental Table 1.

Zoobenthos

The analysis of samples collected over time has indicated the presence, on the 8 m depth contour, of a community dominated by *Mytilus galloprovincialis* bivalves (mean density - 496 ind/m2, mean biomass - 3,005 g/m2) and *Mytilaster lineatus* (mean density - 8,184 ind/m2, mean biomass - 1,803 g/m2), allong with the cirriped *Balanus improvisus* (5,656 ind/m2 and 52 g/m2, respectively). The complete list of species identified over time in the analyzed area (NIMRD 1990 – 2010, 2010; Niţă, 2010; Zaharia *et al* 2007a, 2008, 2010) is compiled in Supplemental Table 2.

Fish fauna

The fishery activities at the Romanian Black Sea coastline are carried out starting from the shallow area, approximately 2 m deep for beach seines and gray mullet gill nets, to areas located at great distances offshore, at depths ranging between 10-70 m (for fishing gear such as gill nets for shad, turbot, dogfish and gobies and mid water trawl).

Stationary fishing at the Romanian coastline, for small sized species (sprat, achovy, horse mackerel etc.), is practiced with marine trap nets, the gear being set up in the area between Vama Veche and 2 Mai, at depths between 5-12 m (Figure 5).

As a result of analyzing the reports elaborated by the National Agency for Fisheries and Aquaculture on the fish amounts and species caught in 2011 in the Vama Veche - 2 Mai area, it was found that the dominant species was sprat (Figure 6).

Ichtyoplankton

The qualitative and quantitative distribution of the ichtyoplankton was determined by analyzing several samples collected in May 2011 using a Bongo net. As in previous years, the anchovy is still the dominant species in the ichtyoplankton, represented both by roe and larvae (NIMRD 1990 – 2010, 2010).

In the samples collected from ROSCI0269 Vama Veche - 2 Mai, anchovy (*Engraulis encrasicolus*) roe and Gobiide larvae are prevalent (Figures 7 and 8).

From the structural point of view, the analyzed material can be framed, according to systematics, within the following families: Engraulidae, Clupeidae, Mullidae, Gadidae and Gobiidae. The

taxonomic distribution is numerically dominated by mid water fish in relation to benthic fish species.

For species in which roe is laid in rates and roe ageing is also made in rates, the total duration of the breeding period is much longer, consequently the survival rate is higher.Gobiidae larvae hatch from benthic roe and have their mouth open. Hatch laying is made in a single rate for some typifiers (*Mesogobius batrachocephalus*) and in several rates for others (*Neogobius melanostomus*) (NIMRD 1990 – 2010, 2010).

In order to rehabilitate the Black Sea ecosystem, the fishery management policies must be improved and fishing effort must be sized in relation to stock status. When elaborating a fishery management system, the following components must be had in view: regular and regionally coordinated stock assessment; providing the conditions of selective-non-destructive fisheries; national licenses for all fishing vessels in the Black Sea; regional licensing system and quota system.

Mammals

Concerning marine mammals, the occurrence of the three Black Sea dolphin species was reported: *Delphinus delphis* and *Tursiops truncatus* (Delphinidae Family) and *Phocoena phocoena* (Phocoenidae Family). The last two species are listed in Annex II of the Habitats Directive.

Every year, dolphin accidental catches are reported at the Romanian Black Sea coast and, consequently, fatalities caused by them occur (strandings), mostly among the small sized species *Phocoena phocoena*, who proved to be the most vulnerable to gill net fishing. This vulnerability is caused by the small size of the body, in relation to mesh size/thread hank and lower reaction force compared to larger species, when clenching and entangling in the mesh networks of this type of fishing gear.

Conclusions

The great array of species and habitats, as well as the still low anthropogenic impact in the area bestow on the Vama Veche - 2 Mai Marine Reserve a priceless value for the preservation of biodiversity and the natural assets of the Black Sea. By taking over the custody, the National Institute for Marine Research and Development "Grigore Antipa" Constanta aims at enhancing this highly important natural heritage by species and habitat conservation and protection measures, as well as by harmonizing the traditional activities carried out here with the protected area status.

A crucial aspect shall be the popularization of the importance of the natural protected area and public education and awareness, starting from children in the neighboring villages (through the "Junior Ranger" Club) and continuing with tourists, local and central authorities/decision makers.

The management of the reserve shall be made in a differentiated manner, in accordance with the features of the existing habitats and species. Aside from scientific activities, a series of organized tourism and education activities shall be allowed, as well as sustainable capitalization activities of traditional natural resources. The management aims at preserving the harmonious interactions between man and nature, by protecting marine habitat and landscape diversity, promoting the conservation of traditional uses of the surrounding marine waters, encouraging and consolidating the activities, practices and culture of the local population. In addition, the public shall have the possibility of leisure and tourism, while scientific and traditional activities shall also be included.

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Supplemental Information

Supplemental Table 1. Macrophyte algae species identified in the Vama Veche - 2 Mai area (species names are given according to www.marinespecies.org).

CHLOROPHYTA
Bryopsis plumosa (Hudson) C.Agardh, 1823
Chaetomorpha aerea (Dillwyn) Kützing, 1849
Cladophora dalmatica Kützing, 1843
Cladophora laetevirens (Dillwyn) Kützing, 1843
Cladophora sericea (Hudson) Kützing, 1843
Cladophora vagabunda (Linnaeus) Hoek, 1963
Rhizoclonium tortuosum (Dillwyn) Kützing, 1845
Ulva compressa Linnaeus, 1753
Ulva intestinalis Linnaeus, 1753
Ulva linza Linnaeus, 1753
Ulva prolifera O.F.Müller, 1778
Ulva rigida C.Agardh, 1823
Urospora penicilliformis (Roth) J.E.Areschoug, 1866
PHAEOPHYTA
Cladostephus spongiosus f. verticillatus (Lightfoot), 1972
Cystoseira barbata (Stackhouse) C.Agardh, 1820
Ectocarpus siliculosus (Dillwyn) Lyngbye, 1819
Punctaria latifolia Greville, 1830
Punctaria tenuissima (C.Agardh) Greville, 1830
Scytosiphon lomentaria (Lyngbye) Link, 1833
Sphacelaria cirrosa (Roth) C.Agardh, 1824
RHODOPHYTA
Acrochaetium parvulum (Kylin) Hoyt, 1920
Antithamnion cruciatum (C.Agardh) Nägeli, 1847
Bangia fuscopurpurea (Dillwyn) Lyngbye, 1819
Callithamnion corymbosum (Smith) Lyngbye, 1819
Callithamnion granulatum (Ducluzeau) C.Agardh, 1828
Ceramium arborescens J.Agardh, 1894
Ceramium ciliatum (J.Ellis) Ducluzeau, 1806
Ceramium diaphanum var. elegans (Roth) Roth, 1806
Ceramium secundatum Lyngbye, 1819
Ceramium virgatum Roth, 1797
Corallina officinalis Linnaeus, 1758
Dasya baillouviana (S.G.Gmelin) Montagne, 1841
Gelidium spinosum (S.G.Gmelin) P.C.Silva, 1996
Gelidium latifolium (S.G.Gmelin) P.C.Silva, 1996
Hydrolithon farinosum (J.V.Lamouroux), 1993
Laurencia coronopus J.Agardh
Laurencia obtusa (Hudson) J.V.Lamouroux, 1813
Lithophyllum cystoseirae (Hauck) Heydrich, 1897
Lithophyllum pustulatum (J.V.Lamouroux) Foslie, 1904
Lomentaria clavellosa (Turner) Gaillon, 1828
Lophosiphonia obscura (C.Agardh) Falkenberg, 1897
Nemalion helminthoides (Velley) Batters, 1902
Osmundea pinnatifida (Hudson) Stackhouse, 1809
Phymatolithon lenormandii W.H.Adey, 1966
Polysiphonia brodiaei (Dillwyn) Sprengel, 1827
Polysiphonia denudata (Dillwyn) Greville ex Harvey, 1833
Polysiphonia elongata (Hudson) Harvey
Polysiphonia sanguinea (C.Agardh) Zanardini, 1840
Polysiphonia subulifera (C.Agardh) Harvey, 1834
Porphyra leucosticta Thuret, 1863
MAGNOLIOPHYTA
Zostera noltii Hornemann, 1832

Supplemental Table 2. Zoobenthos species identified in the Vama Veche - 2 Mai area (species names are given according to www.marinespecies.org, Appeltans *et al* 2012).

SPONGES
Dysidea fragilis (Montagu, 1818)
Halichondria (Halichondria) panicea (Pallas, 1766)
Myxilla (Myxilla) swartschewskii Burton, 1930
Pione vastifica (Hancock, 1849)
Sycon ciliatum (Fabricius, 1780)
ANTHOZOA
Actinia equina (Linnaeus, 1758)
Actinothoe clavata (Ilmoni, 1830)
Diadumene lineata (Verrill, 1869)
Pachycerianthus solitarius (Rapp, 1829)
NEMERTINES
Cyanophthalma obscura (Schultze, 1851)
Leucocephalonemertes aurantiaca (Grube, 1855)
Micrura fasciolata Ehrenberg, 1828
Pontolineus arenarius Müller & Scripcariu, 1964
Tetrastemma bacescui Müller, 1962
Tetrastemma melanocephalum (Johnston, 1837)
TURBELLARIA
Leptoplana tremellaris (Müller, 1773)
Stylochus tauricus Jakubova, 1909
POLYCHAETA
Alitta succinea (Leuckart, 1847)
Arenicola marina (Linnaeus, 1758)
Capitella capitata (Fabricius, 1780)
Capitomastus minima (Langerhans, 1881)
Fabricia stellaris (Müller, 1774)
Salvatoria clavata (Claparède, 1863)
Harmothoe imbricata (Linnaeus, 1767)
Harmothoe impar (Johnston, 1839)
Hediste diversicolor (O.F. Müller, 1776)
Hesionides arenaria Friedrich, 1937
Janua (Dexiospira) pagenstecheri (Quatrefages, 1865)
Lagis koreni Malmgren, 1866
Leiochone leiopygos (Grube, 1860)

Supplemental Table 2. Continued.

Namanereis littoralis (Grube, 1871)
Nephthys hombergii Savigny in Lamarck, 1818
Nereis zonata Malmgren, 1867
Nereiphylla rubiginosa (Saint-Joseph, 1888)
Perinereis cultrifera (Grube, 1840)
Platynereis dumerilii (Audouin & Milne Edwards, 1834)
Polydora cornuta Bosc, 1802
Pygospio elegans Claparède, 1863
Scolelepis (Scolelepis) squamata (O.F. Muller, 1806)
Sphaerosyllis bulbosa Southern, 1914
Spio decoratus Bobretzky, 1870
Spirobranchus triqueter (Linnaeus, 1758)
Syllis gracilis Grube, 1840
Terebellides stroemii Sars, 1835
POLYPLACOPHORA
Lepidochitona caprearum (Scacchi, 1836)
Lepidochitona cinerea (Linnaeus, 1767)
GASTROPODA
Bittium reticulatum (da Costa, 1778)
Calyptraea chinensis (Linnaeus, 1758)
Cerithiopsis minima (Brusina, 1865)
Chrysallida fenestrata (Jeffreys, 1848)
Chrysallida indistincta (Montagu, 1808)
Chrysallida interstincta (Adams J., 1797)
Corambe obscura (A. E. Verrill, 1870)
Cyclope neritea (Linnaeus, 1758)
Cylichnina robagliana (Fischer P. in de Folin, 1869)
Cylichnina umbilicata (Montagu, 1803)
Cylichnina variabilis (Milaschievici)
Cythara costata (Pennat)
Ebala pointeli (de Folin, 1868)
Ecrobia ventrosa (Montagu, 1803)
Epitonium clathrus (Linnaeus, 1758)
Mangelia pontica Milaschewitsch, 1908
Marshallora adversa (Montagu, 1803)
Nassarius nitidus (Jeffreys, 1867)
Odostomia acuta Jeffreys, 1848
Odostomia scalaris MacGillivray, 1843
Pusillina lineolata (Michaud, 1832)
Rapana venosa (Valenciennes, 1846)
Retusa truncatula (Bruguière, 1792)
Rissoa membranacea (J. Adams, 1800)
Rissoa splendida Eichwald, 1830
Tricolia pullus (Linnaeus, 1758)
Trophonopsis breviata (Jeffreys, 1882)

Supplemental Table 2. Continued.

LAMELLIBRANCHIA
Abra alba (W. Wood, 1802)
Abra segmentum (Récluz, 1843)
Acanthocardia paucicostata (G.B. Sowerby II, 1834)
Anadara inaequivalvis (Bruguière, 1789)
Cerastoderma glaucum (Bruguière, 1789)
Chamelea gallina (Linnaeus, 1758)
Gastrana fragilis (Linnaeus, 1758)
Lentidium mediterraneum (O. G. Costa, 1829)
Modiolula phaseolina (Philippi, 1844)
Mya arenaria Linnaeus, 1758
Mytilaster lineatus (Gmelin, 1791)
Mytilus galloprovincialis Lamarck, 1819
Papillicardium papillosum (Poli, 1791)
Parvicardium exiguum (Gmelin, 1791)
Pholas dactylus Linnaeus, 1758
Pitar rudis (Poli, 1795)
Spisula subtruncata (da Costa, 1778)
Tellina tenuis da Costa, 1778
Teredo navalis Linnaeus, 1758
Venerupis aurea (Gmelin, 1791)
HARPACTICOIDA
Alteutha typica Czerniavski, 1868
Amphiascopsis cinctus (Claus, 1866)
Cletodes perplexus (Scott T., 1899)
Cletodes longicaudata Brady & Robertson D., 1875
Dactylopusia tisboides (Claus, 1863)
Ectinosoma melaniceps Boeck, 1865
Ectinosoma normani Scott T. & A., 1894
Harpacticus littoralis Sars G.O., 1911
Laophonte elongata elongata Boeck, 1873
Mesochra armoricana Monard, 1935
Mesochra pontica Marcus, 1965
Nitocra lacustris Schmankevitsch
Paradactylopodia brevicornis (Claus, 1866)
Parastenhelia spinosa spinosa (Fischer, 1860)
Tisbe dilatata Klie, 1949
Tisbe furcata (Baird, 1837)
CIRRIPEDA
Balanus improvisus Darwin, 1854
AMPHIPODA
Ampelisca diadema (Costa, 1853)
Corophium volutator (Pallas, 1766)
Crassicorophium bonellii (Milne Edwards, 1830)
Crassicorophium crassicorne (Bruzelius, 1859)
Dexamine spinosa (Montagu, 1813)

Supplemental Table 2. Continued.

Ericthonius punctatus (Bate, 1857)
Hyale pontica Rathke, 1847
Medicorophium runcicorne (Della Valle, 1893)
Melita palmata (Montagu, 1804)
Phtisica marina Slabber, 1769
Stenothoe monoculoides (Montagu, 1815)
CUMACEA
Cumella (Cumella) limicola Sars, 1879
Iphinoe elisae Băcescu, 1950
Iphinoe maeotica Sowinskyi, 1893
MYSIDAE
Siriella jaltensis Czerniavsky, 1868
Hemimysis serrata Bacescu, 1938
ISOPODA
Eurydice dollfusi Monod, 1930
Idotea balthica (Pallas, 1772)
Naesa bidentata (Adams)
Sphaeroma pulchellum (Colosi)
Sphaeroma serratum (Fabricius, 1787)
DECAPODA
Athanas nitescens (Leach, 1814)
Brachynotus sexdentatus (Risso, 1827)
Clibanarius erythropus (Latreille, 1818)
Crangon crangon (Linnaeus, 1758)
Diogenes pugilator (Roux, 1829)
Eriphia verrucosa (Forskål, 1775)
Liocarcinus navigator (Herbst, 1794)
Liocarcinus vernalis (Risso, 1816)
Palaemon adspersus Rathke, 1837
Palaemon elegans Rathke, 1837
Pilumnus hirtellus (Linnaeus, 1761)
Pisidia longicornis (Linnaeus, 1767)
Rhithropanopeus harrisii (Gould, 1841)
Upogebia pusilla (Petagna, 1792)
Xantho poressa (Olivi, 1792)
Pachygrapsus marmoratus (Fabricius, 1787)
BRYOZOA
Conopeum seurati (Canu, 1928)
Cryptosula pallasiana (Moll, 1803)
Electra pilosa (Linnaeus, 1767)
TUNICATA
Ascidiella aspersa (Müller, 1776)
Botryllus schlosseri (Pallas, 1766)
Ciona intestinalis (Linnaeus, 1767)
Molgula manhattensis (De Kay, 1843)

Supplemental Table 3. Fish species identified in the Vama Veche - 2 Mai area. (species names are given according to www.marinespecies.org, Appeltans *et al* 2012)

CHONDRYCHTHYES
Squaliformes Order
Squalidae Family
Squalus acanthias Linnaeus, 1758
Rajidae Family
Raja clavata Linnaeus, 1758
Dasyatis pastinaca Linnaeus, 1758
OSTEICHTHYES
Acipenseriformes Order
Acipenseridae Family
Acipenser gueldenstaedtii Brandt & Ratzeburg, 1833
Acipenser stellatus Pallas, 1771
Huso huso Linnaeus, 1758
Clupeiformes Order
Clupeidae Family
Sprattus sprattus Linnaeus, 1758
Clupeonella cultriventris Nordmann, 1840
Alosa tanaica (Grimm, 1901)
Alosa immaculata Bennett, 1835
Engraulidae Family
Engraulis encrasicolus Linnaeus, 1758
Beloniformes Order
Belonidae Family
Belone belone (Linnaeus, 1761)
Gadiformes Order
Gadiidae Family
Gaidropsarus mediterraneus Linnaeus, 1758
Merlangius merlangus (Linnaeus, 1758)
Syngnathiformes Order
Syngnathidae Family
Syngnathus schmidti Popov, 1928
Syngnathus tenuirostris Rathke, 1837
Syngnathus typhle Linnaeus, 1758
Syngnathus variegatus Pallas, 1811
Nerophis ophidion Linnaeus, 1758
Hippocampus ramulosus Leach, 1814
Mugiliformes Order
Mugilidae Family
Liza aurata (Risso, 1810)
Liza saliens (Risso, 1810)
Liza ramada (Risso, 1827)
Atherinidae Family
Atherina (Atherina) hepsetus Linnaeus, 1758
Perciformes Order
Sciaenidae Family

Supplemental Table 3. Continued.

Sciaena umbra Linnaeus, 1758
Mullidae Family
Mullus barbatus ponticus Essipov, 1927
Mullus surmuletus Linnaeus, 1758
Pomatidae Family
Pomatomus saltatrix, Linnaeus, 1766
Carangidae Family
Trachurus mediterraneus (Steindachner, 1868)
Labridae Family
Symphodus cinereus staitii Nordmann, 1848
Symphodus (Crenilabrus) ocellatus Forsskal, 1775
Symphodus (Crenilabrus) roissali Risso, 1810
Symphodus (Symphodus) rostratus Bloch, 1797
Trachinidae Family
Trachinus draco Linnaeus, 1758
Uranoscopidae Family
Uranoscopus scaber Linnaeus, 1758
Blenniidae Family
Blennius sphynx Valencienns, 1837
Parablennius sanguinolentus Pallas, 1811
Parablennius tentacularis Brunnich, 1768
Ammodytidae Family
Gymnammodites cicerellus Rafinesque, 1810
Callionymidae Family
Callionymus lyra Linnaeus, 1758
Callionymus pusillus Delarochee, 1809
Scombridae Family
Scomber scombrus, Linnaeus, 1758
Sarda sarda Bloch, 1793
Gobiidae Family
Gobius niger Linnaeus, 1758
Mesogobius batrachocephalus Pallas, 1811
Neogobius cephalarges Pallas, 1811
Neogobius melanostomus Pallas, 1811
Neogobius platyrostris Pallas, 1811
Pomatoschistus marmoratus (Risso, 1810)
Pomatoschistus minutus (Pallas, 1770)
Proterorhinus marmoratus Pallas, 1811
Aphia minuta Risso, 1810
Scorpaenidae Family
Scorpaena porcus Linnaeus, 1758
Triglidae Family
Trigla lucerna Linnaeus, 1758
Pleuronectiformes Order
Bothidae Family
Psetta maeotica Pallas, 1811

Supplemental Table 3. Continued.

Pleuronectidae Family
Platichthys flesus (Linnaeus, 1758)
Soleidae Family
Pegusa lascaris (Risso, 1810)