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

Title/Name of the area: Onega Bay and White Sea polynya (including Solovki Shallow)

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Abstract (*in less than 150 words)*
The Onega Bay and White Sea polynya EBSA data presented here are based on synthesizing , extending and updating the assessment done by the IUCN/NRDC and AMSA workshop reports (Speer and Laughlin, 2011; Skjoldal et al., 2012). This EBSA is characterizied by medium uniqueness, high level of importance for life history stages of key or iconic species, medium level of importance for endangered or threatened species, and high levels of biological productivity and diversity and high vulnerability.

Introduction
(To include: feature type(s) presented, geographic description, depth range, oceanography, general information data reported, availability of models)

The IUCN/NRDC Workshop to Identify Areas of Ecological and Biological Significance or Vulnerability in the Arctic Marine Environment (Speer and Laughlin, 2011) identified a super-EBSA named "White Sea/ Barents Sea Coast" as meeting nearly all CBD criteria. "This region is characterized by highly productive coastal waters influenced by a coastal branch of warm current originating from the North-Atlantic current. The area supports diverse and productive benthic communities including kelp, provides important nursery habitat for several species of pelagic fishes, and supports Atlantic salmon as well as seabird colonies with diverse species composition. The area is important for breeding Common eiders, and provides staging, molting and wintering grounds for three eider species including Steller's eider, which is considered globally vulnerable by IUCN. The White Sea/Barents Sea coast also supports local populations of White Sea beluga whales and provides pupping and molting areas for the entire East Ice harp seal population" (Speers and Laughlin, 2011). The report on identifying Arctic marine areas of heightened ecological significance (AMSA) also revealed the White Sea as an important area (Skjoldal et al., 2012). As the White Sea and the Barents Sea coast is a really big and complex area that includes parts which meet EBSA criteria in different ways we provide here a separate description and recent information for the included areas which correspond to "elementary" EBSA mapped and listed in Annexes 1 and 2 to the IUCN/NRDC Workshop report.

Location
(Indicate the geographic location of the area/feature. This should include a location map. It should state if the area is within or outside national jurisdiction, or straddling both.)
This area cover EBSA 15 and 16 illustrated in Annex 1.1 in Speers and Laughlin (2011) but is broader and include the entire Onega Bay of the White Sea. We conventionally define the northern boundary of this EBSA from approximately 6°5 11' N 34° 43' E to the northern coast of Zhizhgin Island, then along its northeastern point, and to Uht-Navolok Cape (65°09′10″N. 36°50′55″ E). This area is covered by the jurisdiction of Russian Federation (internal marine waters).

Feature description of the proposed area
(This should include information about the characteristics of the feature to be proposed, e.g. in terms of physical description (water column feature, benthic feature, or both), biological communities, role in ecosystem function, and then refer to the data/information that is available to support the proposal

and whether models are available in the absence of data. This needs to be supported where possible with maps, models, reference to analysis, or the level of research in the area)

Onega Bay is the largest bay in the White Sea, with an area of 12,800 km^2. The depth of the bay is generally <50 m, with the exception of northern parts, where depths can reach 87 m. The bottom relief is uneven, especially along the coastline. Particularly complex bathymetry is observed along the bay's western coast, where numerous islands are concentrated. A broad range of sediment types characterises Onega Bay, but coarse and hard sediments with a small percentage of silt are the dominant substrata (Berger and Naumov 2001). Onega Bay is connected to the central part of the sea by two relatively broad straits, to the east and to the west of Solovki Archipelago the Western and the Eastern Solovetsky Salma (Fig. 1). Deep waters of the Salmas enable large volumes of water to enter the bay, generating strong tidal currents exacerbated by the shallow depths in the Bay (Babkov 1998; Filatov et al. 2005). Tidal amplitude is increasing towards the inner part of the Onega Bay from 1.5 to 3.0 m. Within particular type sof the shores tidal flats may extend to about 5 km. The Bay is fed by several large rivers (Onega, Vyg, Kem') contributing to about 20% of its volume.
About 1900 islands are located in the Onega Bay which size range from small rocks (< 5 ha) to largest islands of Solovki Archipelago which have the area of about 30,000 ha. The complex coastline and a variety of islands create complexity of environmental conditions in the Bay.
In winter the Onega Bay is covered with seasonal sea ice but extensive and variable polynyas are formed near Solovki Archipelago and in the south-western part of the area. These polynyas are of critical importance for wintering sea birds and marine mammals (Krasnov et al., 2010; Krasnov et al., 2011)

Feature condition and future outlook of the proposed area
(Description of the current condition of the area – is this static, declining, improving, what are the particular vulnerabilities? Any planned research/programmes/investigations?)
The area appears to be relatively stable (see discussion in Solyanko et al., 2011) but the impact of changing sea ice regime and increasing pressure of tourism and recreation appear to impact biodiversity and ecological processes.

Assessment of the area against CBD EBSA Criteria
(Discuss the area in relation to each of the CBD criteria and relate the best available science. Note that a proposed area for EBSA description may qualify on the basis of one or more of the criteria, and that the polygons of the EBSA need not be defined with exact precision. And modeling may be used to estimate the presence of EBSA attributes. Please note where there are significant information gaps)

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 Although the area hauses no unique habitats nor endemic species, some rare and distinct habitats are present, namely semi-isolated inlets containing enclaves of the cold water biota of the Arcic origin (i.e. Dolgaya and Troitskaya inlets at Solovki Islands). The area also attracts major spawning and autumnal aggregations of the endemic White Sea subspecies of herring *Clupea pallasii marisalbi* (of recent North Pacific origin) (Ivanchenko and Lajus, 1991), houses an enclave population of the north Atlantic shrimp species *Crangon allmanni* (Spiridonov et al., 2008) and provides the principal wintering grounds for the endemic common eider population of the White Sea (Krasnov et al., 2010) . This is probably one of the few areas where boreal species having					

migrated from both North Atlantic and North Pacific in the near geological time (Holocene) live together. Therefore we qualify the uniqueness of the area as medium.

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 important for maintaining rich and long time persisting of benthic communities dominated by quahog (*Arctica islandica*), horse mussel (*Modiolus modiolus*) and scallop (*Chlamys islandica*) (Solyanko et al., 2011); it is an important spawning ground of the White Sea herring (*Clupea pallasii marisalbi*), navaga (*Eleginoides navaga*) and some other fishes (Ivanchenko and Lajus, 1991). In the past abundant stocks of Atlantic salmon were maintained in Onega, Vyg and smaller rivers of the Onega Bay; currently the stocks declined but nevertheless the area is critical for recovery of salmon populations in the White Sea (Studenov, 2011).
67% of about 1900 islands of the entire Onega Bay and 84% of the islands of Solovki archipelago are nesting areas of common eiders and provide breeding habitats for another 17 species of aquatic birds (Semashko et al., 2012). The polynyas developing in winter in the northern and the western parts of the Bay are important wintering grounds for common eider (most of the White Sea population) and several other seabirds species (Krasnov et al., 2010, 2011).The Onega Bay has a tremendous importance as a migration corridor and staging area of the Baltic – White Sea Flyway (Lehikoinen et al., 2006). In summer the Bay is a feeding area for the greatest fraction of ringed seal population, with the population densities above 10 specimen per 100 km^2 (Lukin et al., 2006).

Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.			X	

Explanation for ranking

The area has some importance for maintaining populations of endangered shore birds of prey, such as sea eagles White-tailed Eagle (*Haliaeetus albicilla*) and Osprey (*Pandion haliaetus*) as well at it serves as a wintering area for limited number of Steller eider (M. V. Gavrilo, pers. comm..). Recently with increasing the period of open water and slow formation of landfast ice wintering of White-tailed eagles have been observed (A.E. Volkov, National Park "Onezhskoe Pomorie", pers. Comm..).

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

Benthic communities dominated by long-living bivalves, i.e. quahog, horse mussel and scallop are stable in the current conditions but most probably slow recovering and susceptible to eutrophication and the impact of active fishing gears. The other potential threat to the entire ecosystem would be introduction of alien species, i.e. comb jellies, clams or crabs associated with decreasing sea ice cover; although this is not expected in the near future taking into account the current low intensity of shipping. Nesting grounds of aquatic birds on the islands are becoming more and more impacted by development of unregulated tourism (Semashko et al., 2012) and so do reproductive aggregations of beluga whales (Cherenkova, 2013). Wintering grounds of sea birds, in particular common eiders in the polynyas around Solovki Archipelago and in the western part of the Bay are extremely vulnerable to oil spills in sea ice conditions.

Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.				X

Explanation for ranking

There are not many data regarding primary productivity and phytoplankton biomass of the Onega Bay compared to other parts of the White Sea; the existing observations indicate a moderate to high 0.1 – 0.2 g C m-2 dai-1 and high but not the highest for the sea phytoplankton biomass (Rat'kova, Savinov, 2001; Makarevich and Krasnov, 2005; Ilyash et al., 2011). The data for particulate organic matter POM) indicate the concentration to be among

highest for the region (Kravchishina, 2009). There is a very high patchiness of phytoplankton distribution and, probably numerous spots of high production associated with oceanographical phenomena, i.e. tidal and river plume fronts. The Onega Bay houses the in the White Sea kelp area and the standing stock of kelp algae (*Sacharina sacharina* and *Laminaria digitata*) is by oeder of magnitude greater than in the Dvina Bay and about twice greater than in the Kandalaksha Bay of the White Sea (Shoshina, 2011).

Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				X

Explanation for ranking

The Onega Bay contains the greatest for the entire White Sea number of habitat types: extensive saltmarshes, wadden shores and beaches (Sergienko, 2011), habitats of typical abrasive-accumulative coast, rocky shores, fjord-like inlets with sills and inner deep depressions (Troitskaya and Dolgaya inlets at Solovki Islands). The species number of macrobenthic fauna is highest for the White Sea – 464 species (Spiridonov et al., 2012). The number of nesting aquatic birds (17) is comparable to the Kandalaksha Bay and is among the highest for the region (Semashko et al., 2012).

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 White Sea, and the Onega Bay in particular was used by traditional and artisan fisher and hunters for millennia, so that a characteristic maritime cultural landscape has been formed (Spiridonov et al., 2010) that is especially remarkable at Solovki Archipelago with its famous monastery - UNESCO Heritage site (Cherenkova, 20013).With regard to land based pollution and other kind of contamination the Onega Bay may be regarded as being exposed to lower anthropogenic impacts than many other Northeast Atlantic seas, as the industrial activity in the area has never been particularly high and has decreased recently (Terzhevik et al. 2005; Moiseenko, 2010). The area also experienced practically no impact of active fishing gears and showed relative stability of dominant species in benthic communities over decades (Solyanko et al., 2011The islands that are close to coastal towns have been strongly impacted as nesting areas of aquatic birds, other part is accessible for terrestrial predators, i.e. foxes, but about 19% are still good and protected natural habitas.). Currently the greatest actual threat is unregulated tourism (often associated with illegal hunting and the use of boats with powerful engines) (Semashko et al., 2012).

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

(e.g. relevant documents and publications, including URL where available; relevant data sets, including where these are located; information pertaining to relevant audio/visual material, video, models, etc.)

Babkov A.V. 1998. Hydrology of the White Sea. St. Petersburg , Belomorskaya biostantsiya. 94 p. (In Russian).

Berger V.Y., Naumov A.D. 2001. General features. In: Berger V., Dahle S. (eds) White Sea. Ecology and environment. Derzhavets, St.Petersburg Tromsø, pp. 9–22.

Cherenkova N.N. (ed). 2013. Ecological and economical justification of the landscape-marine natural reserve on Solovki Islands. Moscow, GEF/UNDP Project " Strengthening of marine and coastal protected areas of Russia" document, 149 p. (in Russian).

Filatov N.N., Pozdnyakov D.V., Ingebeikin Yu.I., Zdorovenov R.E., Melentyev V.V., Tolstikov A.V., Pettersson L.H. 2005. Oceanographical regime. In: Filatov N.N., Pozdnyakov D.V., Johannessen O.M. (eds) White Sea. Its marine environment and ecosystem dynamics influenced by global change. Chichester, Springer-Praxis, pp. 73–154.
Ivanchenko O.F., Lajus D.L. 1991. Herring. In: Oceanographic conditions and biological productivity of the White Sea. Annotated atlas. Murmansk, PINRO, pp. 116-123 (in Russian).
Krasnov Yu.V., Gavrilo M.V., Shavylin A.A., Vaschenko P.S. 2010. Sex and age structure of endemic common eider *Somateria mollissima* population. Doklady Russian Academy of Sciences, 435(4): 568–570 (in Russian).
Krasnov Yu.V., Gavrilo M.V., Spiridonov V.A. 2011. Sea ice biotopes of the southeastern Barents and the White Seas. In: V. Spiridonov, M. Gavrilo, N. Nikolaeva, E. Krasnova (eds) Atlas of the Marine and Coastal Biodiversity of the Russian Arctic. Moscow, WWF Russia Publication, pp. 32–33.
Lehikoinen A., Kondratyev A., Asanti T., Gustafsson L., Laminsalo O., Lapshin N., Pessa J., Rusanon P. 2006. Survey of Srctic bird migration and staging at the White Sea, in autumna of 1999 and 2004. Helsinki, The Finnish Environment Institute, 107 p.
Lukin L.R., Ognetov G.N., Boiko N.S. 2006. Ecology of ringed seal in the White Sea. Ekaterinburg, Institute of Plant and Animal Ecology of Ural Branch of Russian Academy of Sciences. 165 p. (in Russian).
Makarevich P.R., Krasnov J.V. 2005. Aquatic ecosystem profile. In: Filatov N.N., Pozdnyakov D.V., Johannessen O.M. (Eds), White Sea. Its Marine Environment and Ecosystem Dynamics Influenced by Global Change. Chichester, Springer-Praxis Publishing, pp. 155–177
Moiseenko T.I. 2010. Pollution of surface waters of the watershed and key antropogenic processes. In: A.P. Lisitsyn (ed.) The White Sea System. V. 1. Warershed Environment. Moscow, Nauchnyi Mir, p. 301–303 (in Russian).
Rat'kova T., Savinov V. 2001. Phytoplankton. In: Berger V., Dahle S. (eds) White Sea. Ecology and environment. St.Petersburg – Tromsø, Derzhavets, pp 23–28.
Sergienko L.A. 2011. Marsh biotopes and plant communities of the White, Barents and the Kara Seas. In: V. Spiridonov, M. Gavrilo, N. Nikolaeva, E. Krasnova (eds) Atlas of the Marine and Coastal Biodiversity of the Russian Arctic. Moscow, WWF Russia Publication, pp. 42–43.
Shoshina E.V. Macrophytes. In: Berger V.Ya. (ed.) Biological resources of the White Sea: exploration and exploitation. Explorations of the fauna of the sea, 69(77). St. Petersburg, Zoological Institute of Russian Academy of Sciences, pp. 132–148.
Studenov I.I. 2011. Semga (stlantic salmon). In: Stasenkov V.A. (Ed). Pomor fisheries. Arkhangel, SevPINRO, pp. 135–158 (in Russian).
Semashko V. Yu., Cherenkov A.E. Tertitski G.M. Current breeding population of sea birds on islands of the Onega Bay of the Whitea Sea and and its trend. In: Ecology of marine birds of the White Sea. Apatity, Kola Science Centre of Russian Academy of Sciences. Pp. 140–168 (in Russian).
Skjoldal H.R., Chrisnesen T., Ericksen E., Gavrilo M., Mercier F., Mosbech A., Thurston D., Andersen J., Falk K. 2012. Identifying Arctic Marine Areas of Heightened Ecological Significance. A follow-up project to Recommendation IIC of the Arctic Marine Shipping Assessment, 2009. Prepared for PAME by national experts with assistance from AMAP, CAFF, and SDWG. 181 p.
Solyanko K., Spiridonov V., Naumov A. 2011. Biomass, commonly occurring and dominating species of macrobenthos in Onega Bay (White Sea, Russia): data from three different decades. Marine Ecology, 32 (Suppl. 1): 36–48.
Speer L., Laughlin T. (eds) 2011. IUCN/NRDC Workshop to Identify Areas of Ecological and Biological Significance or Vulnerability in the Arctic Marine Environment, La Jolla, California. 02-04 November 2010. 37 p.

Spiridonov VA, Sokolov VI, Krönke I, Türkay M (2008) How is the fragmented distribution range of the reddish sand shrimp *Crangon allmanni* Kinahan formed? In: Presentations of the Scientific Conference dedicated to the 70 years anniversary of the White Sea Biological Station of the Moscow University. Moscow, Grif and Co , pp 121–123 (in Russian).
Spiridonov V.A., Bogoslovskaya L.S., Suprunenko Yu.S. 2010. Maritine and coastal cultural landscapes of the White Sa and Chukotka as components of natural-cultural heritage of Russia. In: Study and conservation of marine heritage of Russia. Presentations of the First Scientific-Applied Conference, St. Petersburg, 27-30 October 2010. Kaliningrad, Terra Baltica, pp. 442–453 (in Russian).
Spiridonov V.A., Mokievsly V.O., Solynako E.Yu. 2012. Chronicle of field work and some results of the hydrobiological and oceanological investigations on board R.V. "Professor Vladimir Kuznetsov" in July 2006. In: Mokievsky V.O., Spiridonov V.A. Tzetlin A.B. and Krasnova E.D. (eds) Integrated study of the bottom landscapes in the White Sea using remote methods (Proc. N.A. Pertsov White Sea Biological Station. V. 11), Moscow, KMK Sci Press, pp. 112–120 9in Russian).
Terzhevik A.Y., Litvinenko A.V., Druzhinin P.V., Filatov N.N. (2005) Economy of the White Sea watershed. In: Filatov N.N., Pozdnyakov D.V., Johannessen O.M. (Eds), White Sea. Its Marine Environment and Ecosystem Dynamics Influenced by Global Change. Chichester, Springer-Praxis Publishing, pp. 241–301.

Maps and Figures

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