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SUBSIDIARY BODY ON SCIENTIFIC,
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Sixteenth meeting
Montreal, 30 April-5 May 2012
Item 6.1 of the provisional agenda*

REPORT OF JOINT OSPAR/NEAFC/CBD SCIENTIFIC WORKSHOP ON EBSAs

Information note by the Executive Secretary

1. In paragraph 36 of its decision X/29, the Conference of the Parties requested the Executive Secretary to work with Parties and other Governments as well as competent organizations and regional initiatives, such as the Food and Agriculture Organization of the United Nations (FAO), regional seas conventions and action plans, and, where appropriate, regional fisheries management organizations (RFMOs), with regards to fisheries management, to organize a series of regional workshops, including the setting of terms of references, before a future meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) prior to the eleventh meeting of the Conference of the Parties to the Convention, with a primary objective to facilitate the description of ecologically or biologically significant marine areas (EBSAs) through application of scientific criteria in annex I of decision IX/20 as well as other relevant compatible and complementary nationally and intergovernmentally agreed scientific criteria, as well as the scientific guidance on the identification of marine areas beyond national jurisdiction, which meet the scientific criteria in annex I to decision IX/20.

2. Pursuant to this request, a Joint Scientific Workshop was convened by the OSPAR Commission and the North-East Atlantic Fisheries Commission (NEAFC) in collaboration with the Secretariat of the Convention on Biological Diversity to describe areas meeting scientific criteria for EBSAs and other relevant criteria, in Hyères, France, from 8 to 9 September 2011.

3. The workshop report is circulated, together with the cover letter signed by the executive secretaries of OSPAR Commission and NEAFC, in the form and language in which it was received by the Secretariat of the Convention on Biological Diversity.

** Reposted to include the following footnote: "The designations employed and the presentation of material in this note do not imply the expression of any opinion whatsoever on the part of the Secretariat concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries."

* UNEP/CBD/SBSTTA/16/1.

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CANADA

15 February 2012

Dear Dr Dias

North-East Atlantic Regional EBSA Workshop outcomes

On behalf of the Regional Seas Convention (OSPAR) and Regional Fisheries Management Organisation (NEAFC) for the North-East Atlantic we would like to congratulate you on your appointment as Executive Secretary for the Convention on Biological Diversity.

Further to our letter dated 14 December 2011, we have the honour to provide a description of candidate EBSAs in the North-East Atlantic region, representing a summary of the results of the North-East Atlantic Regional EBSA Workshop held in Hyeres, France, in September 2011 (the full report of which has already been forwarded to CBD Secretariat). We understand from colleagues at the CBD Secretariat that the full Workshop report will be presented as an Information Document to SBSTTA 16, and that this summary document should serve to provide information in a more manageable format.

Regarding our submissions we would like to emphasise that:

a. The North-East Atlantic Workshop report, together with this summary, are the products of a purely scientific and technical exercise. Both OSPAR and NEAFC have made arrangements for further scrutiny and political evaluation of the Workshop outcomes. OSPAR and NEAFC have not finalised their work regarding the candidate EBSAs or made decisions on them. For this reason the results are set out as <u>candidate</u> EBSAs;[1]

b. Further scrutiny will include advice from the International Council for the Explorations of the Sea (ICES), the details of which will also be communicated to the CBD Secretariat;

c. Although consideration was also given to dependency, representativeness, biogeographical importance, structural complexity, natural beauty and geological history, the North-East Atlantic Regional Workshop did not consider the criteria of 'naturalness' but subsequent evaluation will do so; and

d. The OSPAR Commission, at its meeting of Contracting Parties in June 2011, agreed that the six High Seas Marine Protected Areas, designated by Ministers in 2010 and representing the world's first network of MPAs in Area Beyond National Jurisdiction, should automatically qualify as EBSAs and

[1] The terminology adopted for the workshop was to bring forward proposals for consideration and, once agreed, to establish <u>candidate</u> EBSAs.

instructed the OSPAR Secretariat to submit these areas to the CBD EBSA Repository as an independent exercise.

We consider this Workshop to have been an excellent example of the cooperation between our two Regional Conventions, and we very much appreciated the support and input of the CBD Secretariat to facilitate this event. We look forward to a continuing fruitful cooperation.

Yours sincerely

David Johnson
Executive Secretary
OSPAR Commission

Stefan Asmundsson
Executive Secretary
NEAFC

Enc

Joint OSPAR/NEAFC/CBD Scientific Workshop on the identification of Ecologically or Biologically Significant Marine Areas (EBSAs) in the North-East Atlantic

Background and aims of the workshop

1. The 10th Conference of the Parties to the Convention on Biological Diversity (CBD COP 10; Nagoya, Japan, 18-29 October 2010) in its Decision on Marine and Coastal Biological Diversity (CBD Decision X/29, http://www.cbd.int/decision/cop/?id=12295) **Annex 1** sets out the process on the identification of Ecologically or Biologically Significant Marine Areas (EBSAs) based upon the scientific criteria as previously adopted by CBD COP 9 (http://www.cbd.int/doc/decisions/cop-09/cop-09-dec-20-en.doc).

2. In particular, § 36 of CBD Decision X/29:

> "*Requests the [CBD] Executive Secretary to work with Parties and other Governments as well as competent organizations and regional initiatives, such as the Food and Agriculture Organization of the United Nations (FAO), regional seas conventions and action plans, and, where appropriate, regional fisheries management organizations (RFMOs), with regards to fisheries management, to organize, including the setting of terms of references, subject to the availability of financial resources, a series of regional workshops, before a future meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) prior to the eleventh meeting of the Conference of the Parties to the Convention, with a primary objective to facilitate the description of ecologically or biologically significant marine areas through application of scientific criteria in annex I of decision IX/20 as well as other relevant compatible and complementary nationally and intergovernmentally agreed scientific criteria, as well as the scientific guidance on the identification of marine areas beyond national jurisdiction, which meet the scientific criteria in annex I to decision IX/20*;".

3. With a view to respond to the request set out in § 36 of CBD Decision X/29 and in light of the complementary competencies assigned to the OSPAR Commission and the North-East Atlantic Fisheries Commission (NEAFC), and as recognised in the Memorandum of Understanding between OSPAR and NEAFC, the two organisations together with the CBD Secretariat undertook to facilitate the identification and description of EBSAs in the North-East Atlantic through a joint scientific workshop prior to the eleventh meeting of the Conference of the Parties to the CBD.

4. The objective of this scientific workshop was to identify and describe marine areas in the high seas areas in the North-East Atlantic not included in the OSPAR Network of MPAs or the NEAFC Closed Areas but which fulfilled the scientific criteria set out by the CBD (Annex I of CBD Decision IX/20) for Ecologically or Biologically Significant Marine Areas (EBSAs) - with a view to respond to the request by CBD COP 10 (CBD Decision X/29, § 36). Agreed terms of reference are at **Annex 2**.

5. The geographic area of focus for the workshop was confined to the OSPAR Maritime Area and the Regulatory Area of NEAFC in areas beyond the EEZ of Contracting Parties (i.e. beyond 200 nautical miles).

6. At its 2011 Commission meeting, OSPAR agreed to report to the CBD Secretariat the six existing OSPAR Marine Protected Areas in areas beyond national jurisdiction that fulfil CBD EBSA criteria for inclusion in the CBD EBSA repository. These were therefore, not a primary consideration at the workshop. NEAFC is in the process of giving further consideration as to whether their closures can be considered similarly.

Approach and organisation of the workshop

7. The workshop was hosted by France in Hyères, France, 8-9 September 2011 and organised by a steering committee, comprising a representative of both the Secretariats and Contracting Parties of OSPAR, NEAFC and the CBD, as well as France as the workshop host. As this workshop was a joint organisation among OSPAR, NEAFC, and the CBD, the chairing arrangements reflected this collaboration, with chairing duties shared between OSPAR and NEAFC and CBD providing advice and guidance on the aims, interpretations, and process throughout the workshop.

8. Workshop participants were invited on the basis of their scientific expertise in marine biodiversity (benthic/pelagic species, habitats and ecological processes) and biogeography of the North-East Atlantic from OSPAR/NEAFC Contracting Parties, observer organisations and other relevant international organisations and initiatives (including ICES, Census of Marine Life, Ocean Biogeographic Information System/OBIS, Global Ocean Biodiversity Initiative/GOBI, HERMIONE). Representatives from NAFO, the Barcelona Convention (RAC-SPA), Abidjan Convention and Helsinki Convention were invited as observers to the workshop and organisations or individuals that put forward proposals in advance were also invited (University of York, WWF and BirdLife). A full list of workshop participants, including apologies, together with working group participation is provided as **Annex 3**.

9. The two-day workshop programme (**Annex 4**) comprised a mix of context setting, highlighting the context and goals of the CBD COP IX and X decisions with regard to the identification and description of EBSAs and drawing on the expertise of scientists with experience of the North-East Atlantic region. It was emphasized throughout the context setting and the meeting that the identification of any area at the meeting was to be based on scientific rationale rather than any jurisdictional considerations, and that the latter would be applied at a stage after this workshop. It was also noted that the terms of reference for the workshop excluded potential EBSAs within areas of national jurisdiction. For this reason, any EBSAs proposed within national jurisdiction were subject to workshop discussion but results withheld as this was considered a matter to be taken up by the jurisdiction wherein the EBSA was situated. Sessions were highly interactive, including the plenary presentations and large and smaller working groups. The workshop benefited from the support of facilitation staff and an innovative visualization tool prepared by GRID-Arendal with the input of the participants before and during the workshop.

10 Background documentation was made available to participants in advance of the workshop through an online file-sharing system utilizing the commercial application named “Basecamp” and hosted on the OSPAR website. The materials uploaded to this site are listed at **Annex 5** and an introduction to the visualization tool at **Annex 6**.

11 A key decision was to focus the workshop on area-specific rather than criteria-specific proposals. The CBD proforma was modified and EBSA proposals were invited prior to the workshop. On this basis pre-workshop participation included scientists individually and in groups working to prepare and put forward candidate EBSA proforma. A total of 18 proformas, summarized in **Table 1** below, were submitted in advance of the workshop.

Table 1: EBSA Proformas Submitted in Advance of the Workshop and their Disposition

Title	**Presented by**	**Disposition**
Reykjanes Ridge	Rachel Brown	Revised to include extent of features
Mid-Atlantic Ridge north of Charlie-Gibbs Fracture Zone	Rachel Brown	Revised to include extent of features
Area between Cherkis, Crumb and Lukin-Lebedev Seamounts – IBA MA 02	Ben Lascelles	Data used to amend areas and complement important EBSA criteria features EBSAs as appropriate
Around the Altair Seamount – IBA MA 01	Ben Lascelles	Data used to amend areas and complement important EBSA criteria features EBSAs as appropriate
Around Pedro Nunes and Hugo De Lacerda Seamount – IBA MA 04	Ben Lascelles	Data used to amend areas and complement important EBSA criteria features EBSAs as appropriate
Charlie-Gibbs Fracture Zone to the Greenland EEZ	Ben Lascelles	Data used to amend areas and complement important EBSA criteria features EBSAs as appropriate
North East Azores-Biscay Rise – IBA MA 03	Ben Lascelles	Data used to amend areas and complement important EBSA criteria features EBSAs as appropriate
North of the Azores	Ben Lascelles	Data used to amend areas and complement important EBSA criteria features EBSAs as appropriate
Pico Fracture Zone North to Charlie-Gibbs Fracture Zone	Ben Lascelles	Data used to amend areas and complement important EBSA criteria features EBSAs as appropriate
South West Reykjanes Ridge	Ben Lascelles	Data used to amend areas and complement important EBSA criteria features EBSAs as appropriate

West Iberian Abyssal Plain	Ben Lascelles	Data used to amend areas and complement important EBSA criteria features EBSAs as appropriate
Arctic Domain with Arctic and Polar Front – Greenland Norwegian Seas	Sabine Christiansen	Revised to consider
The Arctic high seas – pack ice, seasonal ice and marginal ice zone	Sabine Christiansen	Revised to consider
Seabed communities of the Hatton and Rockall Banks and the Hatton-Rockall Basin	Dave Billet (on behalf of a consortium of UK Scientists)	Revised to consider
Complex Pockmark G11 at Nyegga (Norway)	Jan Helge Fossaa	Presented and suspended for further action by Norway
Håkon Mosby Mud Volcano (Norway)	Jan Helge Fossaa	Presented and suspended for further action by Norway
Jan Mayen Hot Vent Field (including Soria Moria and the Troll Wall) (Norway)	Jan Helge Fossaa	Presented and suspended for further action by Norway
Vesteris Seamont (Norway)	Jan Helge Fossaa	Presented and suspended for further action by Norway

12. The workshop itself was organised around the following main topics:

(1) presentations on behalf of CBD of background information on the CBD process and the policy and process to identify EBSAs (CBD Decision X/29), including interpretation of the criteria as adopted in Annex I of CBD Decision IX/20;

(2) presentation by experts in the North-East Atlantic of relevant scientific information and data supporting the identification of marine areas in the North-East Atlantic that are not included in the OSPAR Network of MPAs or NEAFC closed areas but meet the criteria for CBD EBSAs; and

(3) consolidation of scientific information to achieve identification and description of marine areas in the North-East Atlantic as candidate CBD EBSAs.

13. Representatives of both OSPAR and NEAFC advised the workshop how the role and remit of both Commissions includes obligations to take account of wider biodiversity and the functional elements of marine ecosystems. In recent years, NEAFC success stems from an acceptance that unregulated fisheries are unacceptable and this has resulted in a suite of legally binding regulatory measures including effort limitations, with fishery bottom fishing ban, gear restrictions, and a bottom fishery regulation for areas outside MPAs that intend to facilitate sustainable fisheries and protection of vulnerable ecosystems. During the same period OSPAR has created a network of marine protected areas, agreed a List of Threatened and/or Declining Species and Habitats, and developed a code of conduct for deep sea science.

14. To inform the workshop, Prof Ricardo Santos (Portugal) presented an EBSA proforma for the Josephine Seamount: one of the six High Seas MPAs agreed by OSPAR for submission to the CBD EBSA repository. This is the first seamount discovered as a direct result of a scientific cruise. Ranking of EBSA reference criteria illustrated that whilst not all criteria were ranked as ‘high’: vulnerability, biological productivity and representativeness were considered as particularly important. More information was needed

to make judgement with confidence against some EBSA criteria. In a similar way, Mr Odd Aksel Bergstad (Norway) (on behalf of Jan Helge Fossaa) tabled a selection of sites within the Norwegian EEZ which may or may not satisfy the EBSA criteria.

15. An intervention by Mr Jake Rice (Canada) compared and contrasted CBD criteria (COP IX/20) with FAO VME criteria reinforcing the case that there are no inherent incompatibilities between various sets of criteria (see **Annex 7**). This was formalised by CBD in 2009 at the Expert Workshop on Scientific and Technical Guidance on the use of Biogeographic Classification Systems and Identification of Marine Areas beyond national jurisdiction in need of protection (Ottawa, Canada, 29 September - 2 October, 2009) who stated that:

> *"There are no inherent incompatibilities between the various sets of criteria that have been applied nationally by various IGOs (FAO, International Maritime Organisation, International Seabed Authority) and NGOs (e.g. BirdLife International and Conservation International). Consequently, most of the scientific and technical lessons learned about application of the various sets of criteria can be generalised. Moreover, some of the sets of criteria can act in complementary ways, because unlike the CBD EBSA criteria (annex 1 to decision IX/20), some of the criteria applied by other United Nations agencies include consideration of vulnerability to specific activities".*

16. The co-chairs emphasised that the workshop aimed to achieve the following outcome: Identification and agreement regarding the scientific rationale for areas in the North-East Atlantic considered to meet the criteria for EBSAs, including a description of the areas according to the CBD criteria. It was explained that following this scientific process, the Contracting Parties to OSPAR and NEAFC will consider the outcome of the workshop and the most appropriate way forward. Possible action may include reporting any candidate EBSAs identified to the CBD. In some cases it may be appropriate that any follow-up action, including possible reporting of candidate EBSAs to CBD, is taken individually by the relevant Contracting Parties, for example where candidate EBSAs are in areas subject to submissions to the CLCS. Where candidate EBSAs are clearly in areas beyond national jurisdiction it may be appropriate for follow-up action, including possible reporting of candidate EBSAs to CBD, to be taken by OSPAR or NEAFC Secretariats.

17. Tasks for the workshop participants

- *a.* *Task 1 – Evaluation of proposals*: The participants evaluated proposals that were submitted in advance of the workshop, with the aim of identifying and gaining consensus on the most appropriate candidate EBSAs. Relevant background information was provided via the basecamp online tool and the online data visualisation tool.
- *b.* *Task 2 – Initial gap analysis:* An initial gap analysis was attempted, but could only consider the sufficiency of OSPAR and NEAFC MPAs, and did not include the EBSA proposals put forward to this workshop. The gap analysis was therefore considered premature, and would be a useful exercise to undertake given the outcomes of this workshop before any additional exercise to identify EBSAs in the North-East Atlantic. .

18. The workshop considered all the proposed EBSAs in plenary to identify those which should be further refined. Once these were identified, the workshop established working groups (see **Annex 3**). Each working group reviewed feedback from the plenary before refining their proposal(s) and presenting revised proforma back to plenary. In this manner, the participants were able to check their work amongst those present and also to identify gaps in information presented.

Results of the workshop

Candidate EBSAs

19. A list of the proposals that the workshop developed is presented below in **Table 2** and in **Figure 1**. The justification arguments noted are illustrative. The full proforma for the candidate EBSAs are presented at **Annexes 8-17**.

Table 2: EBSA proposals to be put forward as a result of the workshop.

<table>
<tr><th>Title</th><th>Selected justification arguments for each of the EBSA proposals</th></tr>
<tr><td>Reykjanes Ridge south of Iceland EEZ</td><td rowspan="3">• Data comes from MAR-ECO cruises, ICES, earlier fisheries surveys
• CGFZ sub-polar front is a barrier for biology resulting in vulnerability, productivity and biogeographic importance
• The area incorporates IBAs</td></tr>
<tr><td>Charlie-Gibbs Fracture Zone and Sub-Polar Frontal Zone of the Mid-Atlantic Ridge</td></tr>
<tr><td>Mid-Atlantic Ridge north of the Azores</td></tr>
<tr><td>The Hatton and Rockall Banks and Hatton-Rockall Basin</td><td>• A unique bank area with non-active tectonics, varied depths, polyfonal faults. Some steep topography but also many gentle slopes
• Connections to areas within national jurisdiction
• Includes VMEs (as defined by structure – hard corals, soft corals, sponges)
• CoML data / quantification using sledge data
• Food poor environment – long generation times (e.g. Orange Roughy), sequential change is special, specialised distributions</td></tr>
<tr><td>Around Pedro Nunes and Hugo de Lacerda Seamounts – IBA MA04</td><td rowspan="2">• Threatened species, life history stages
• List of 24 seabirds (OSPAR Listed, IUCN Red List, Birds Directive) – 12 significant
• Compilation of tracking data, data groups, population analyses, key areas for each population, thresholds for migratory routes
• Sites not always important year-round (e.g. several species breed in the South Atlantic). Temporal factor 2-6 months</td></tr>
<tr><td>North east Azores-Biscay Rise – IBA MA03</td></tr>
<tr><td>Evlanov Seamount region</td><td rowspan="2">• EU Life project data, links to reference materials
• Regularity of seabird use, breeding areas
• High data confidence
• Links to upwelling over seamounts</td></tr>
<tr><td>North-west of Azores EEZ</td></tr>
<tr><td>The Arctic Front – Greenland/Norwegian Seas</td><td>• Focus on water column processes in upper ocean;
• Different hydrographic domains (warm Atlantic, cold polar and mixed Arctic) east-west on same latitude, limited by frontal systems. Very high biological production of domain – specific communities (Atlantic, ice-related, mixed);
• Critical feeding area of pelagic fish, whales, seals, seabirds;</td></tr>
</table>

	• Pelagic trophic interaction predominates, but links to adjacent Mohn's Ridge, Greenland slope and shelf.
The Arctic Ice habitat – multiyear ice, seasonal ice and marginal ice zone	• 5000m depth, covers 2 deep sea basins • Focus on permanently ice covered high seas section of OSPAR/NEAFC – but part of broader area in national waters • Observed and projected future changes in ice-cover (loss of multiyear ice) and related major ecosystem adaptations • Loss of unique ice-related ecosystem components • Endemic ice-dependant species such as several whale species, seals, polar bears, fish, seabirds

Discussion of an initial gap analysis

20. Consideration was given to an initial gap analysis of EBSAs in the North-East Atlantic in terms of biogeographic coverage, depth distribution, features (as a proxy for habitat), biological assemblages and connectivity. More specifically, in the context of the set of candidate EBSAs identified, the following gaps were noted:

a. specific geographic areas have not been proposed (e.g. Barents Sea).;

b. mobile taxa including migratory species other than birds (e.g. cetaceans);

c. cold water seeps (e.g. Bay of Biscay);

d. aggregations of important benthic communities that are only just becoming known to science, and for which standardised terminologies have not yet been developed.

21 Following this initial gap analysis, and talking into account the candidate areas identified as a result of this workshop, a more detailed systematic gap analysis would be required.

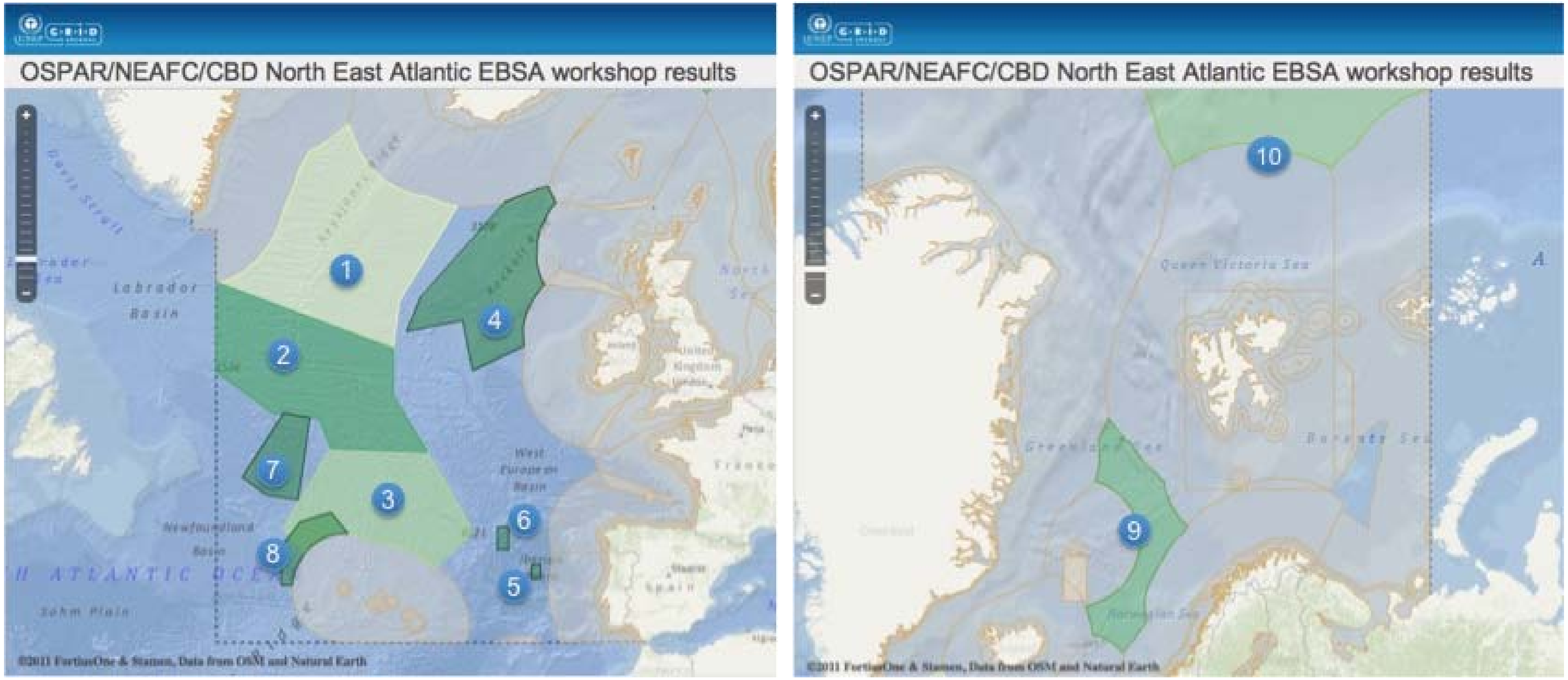

Figure 1: Map showing the location of the workshop EBSA proposals in the North-East Atlantic

Legend

1. Reykjanes Ridge south of Iceland EEZ
2. Charlie-Gibbs Fracture Zone and Sub-Polar Frontal Zone of the Mid-Atlantic Ridge
3. Mid-Atlantic Ridge north of the Azores
4. The Hatton and Rockall Banks and the Hatton-Rockall Basin
5. Around Pedro Nunes and Hugo de Lacerda Seamounts – IBA MA04
6. North east Azores-Biscay Rise – IBA MA03
7. Evlanov Seamount region
8. North-west of Azores EEZ
9. The Arctic Front – Greenland/Norwegian Seas
10. The Arctic Ice habitat – multiyear ice, seasonal ice and marginal ice zone

Workshop conclusions

22. The Workshop concluded that:

a. the North-East Atlantic Regional Workshop achieved an important first step towards identifying EBSAs in areas beyond 200nm and a breakthrough in terms of recognizing the value of marine biodiversity;

b. 10 candidate EBSAs have been agreed by the Workshop, to be taken forward for peer review and to be the subject of independent political scrutiny by both OSPAR and NEAFC (presented in **Table 2** and **Annexes 8-17**);

c. the candidate EBSAs have been depicted as polygons with straight line boundaries. It was considered that depth contours give a false sense of precision;

d. a rigorous follow-up gap analysis is needed. Some initial thought has been given to this but questions remain. Importantly the decision to restrict the workshop to areas beyond 200nm is a political compromise that fails to take full account of the ecological linkages between ABNJ and the EEZ;

e. the process has generated lessons learned that may be of interest to other workshops and future processes (see §§23a – h); and

f. the Workshop stands as an example of cooperation between a Regional Seas Convention (OSPAR) and a Regional Fisheries Management Organisation (NEAFC), on this occasion delivering a coordinated regional contribution to a global CBD commitment. This has been made possible as a result of the revised RFMO mandate, the political will generated within OSPAR towards biodiversity and ecosystems targets and the inclusion of experts nominated by both Contracting Parties and Observer Non-Governmental Organisations.

Lessons learned / open discussion points

23. Lessons learned as a result of the workshop and the preparatory process can be summarised as follows:

Technical aspects

a. determination of large areas for candidate EBSAs favouring biogeographic assessments and bringing together different scientific values provides a logical broader ‘envelope’ within which in future nested measures might be considered to protect smaller structures and/or determine representative areas;

b. there is still discussion to be had as to the most appropriate way to delineate the EBSA proposals: the use of straight lines vs bathymetric contours, or on the basis of natural features vs polygons to be identified/monitored;

c. plenary and group discussions during the workshop identified a number of outstanding issues and questions that need further consideration:

i. little is known about the connectivity of populations, what suffices as a reproducing population, the details of some life history characteristics and the relationship between natural change in communities as against changes resulting from human impacts;

ii linking EBSAs within and outside EEZs – the benefit of identifying separate benthic and pelagic EBSAs, interconnections between High Seas and surrounding shelf ecology;

iii. views on refinement of rationale as opposed to the application of a broad scope of EBSA criteria when science is working and sampling (taking observations) at a smaller scale than policy applications;

iv. there are different approaches to geographically defining EBSAs, and whether or not the boundaries of EBSAs should be fixed, or if this needs to be reviewed to create mobile boundaries, or boundary zone to account for resilience;

d. the workshop has implications for the direction of future deep sea research (research funding and evidence gathering priorities). The workshop was informed about plans for the Census of Marine Life beyond 2010 and the development of a new international scientific research programme "Life in a changing ocean" the prospectus and additional information can be downloaded at http://lifeinachangingocean.org/.

Process aspects

e. divorcing science from political considerations at the outset enabled the Workshop to make progress;

f. the prototype data visualization tool developed by GRID-Arendal for the workshop was an asset; data layers provided for the tool were instrumental in being able to visualize proposals whilst they were being discussed, and looking at them in the context of ecological data, juridical boundaries and other EBSA proposals. It enabled the sharing of information and map creation, allowing the workshop participants to upload and combine datasets and reassuring participants that access to large datasets can be achieved and managed. The tool requires that there is additional access to arc view for maximum benefit, and the developers identified further refinements to improve its use by future workshops;

g. seed funding contributed to the workshop success, with one-off donations from two Contracting Parties facilitating participation of some scientists. Furthermore the size of the workshop was purposefully constrained to no more than 40 participants;

h. for practical reasons this was also a time and resource constrained exercise, some key invitees were not able to participate and hence the need to review, refine and add to the results. In other words, this should not be a 'one-off' activity but will need further iterations of expert consultation to address the gaps identified.

Reporting, tasks and roadmap

24. The report of the meeting was prepared by written procedure according to the following schedule:

a. a draft report of the meeting was prepared by the Steering Committee and circulated to workshop participants by 30 September 2011;

b. each of the expert working groups prepared a short summary of their work and revised proforma to be annexed to the workshop report by the 16 September 2011 if possible, with updates being provided up to end of October; and

c. the compiled report and annexes were circulated to all workshop participants for comment and finalization on the 1st October 2011. Comments should be returned to secretariat@ospar.org by 17:00 Friday 21 October 2011. The OSPAR Secretariat will incorporate comments and revisions and the finalized report will be made available by Tuesday 25 October 2011.

25. A timeline for the onward transmission of the report through the relevant decision making processes of NEAFC and OSPAR respectively is presented in **Table 3**.

Table 3: Time table for taking the workshop report through NEAFC and OSPAR and eventual reporting, as appropriate, to the CBD EBSA Repository.

Date	Responsibility	Action
11 July 2011	OSPAR on behalf of the Steering Committee (SC)	Official announcement of the workshop/Invitation of participants to the workshop
22-26 August 2011	SC	Preview submitted proposals of candidate EBSAs to be presented at the workshop Uploading of WS materials for information and preparation of workshop participants
8-9 September 2011		Joint OSPAR/NEAFC/CBD Scientific Workshop
1 October 2011	SC/ Facilitators	Draft report and list of possible candidate EBSAs prepared and circulated to workshop participants for review
4-5 October 2011	NEAFC	Consideration of possible list of candidate EBSAs reviewed by the Permanent Committee on Management and Science (PECMAS)*
25 October 2011	SC	Workshop report final draft and made available for consultation through NEAFC and OSPAR processes
26-27 October 2011	OSPAR	Outcome of the workshop presented to the OSPAR Coordination Group
October 2011	NEAFC	ICES peer review of the possible list of candidate EBSAs (Date to be confirmed following consultation with ICES)
Early November 2011	SC	Review / preparation of a summary of advice/comments for NEAFC/OSPAR processes
7-11 November	NEAFC	Outcomes of the EBSAs workshop reviewed by NEAFC Annual Meeting*
December 2011	To be confirmed	Start of data entry into the CBD repository for NE Atlantic candidate EBSAs. (N.B. at this stage, data will be entered but not reported, and hence is a non-public place holder, which does not indicate any decision)
20 January 2012	OSPAR	Document deadline for Biodiversity Committee; consideration of the proposals resulting from the EBSA workshop by BDC
22 January 2012	SC	Finalised report to be put to the CBD Secretariat
13-17 February 2012	OSPAR	Consideration of the outcome of the workshop by the OSPAR Biodiversity Committee 2012*; proposal on EBSAs to be reported to the CBD Secretariat/CBD Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA).
February/March 2012	OSPAR	Consideration of/Agreement by the OSPAR Commission (through written procedure) on reporting of EBSAs in the North-East Atlantic to the CBD
March/April 2012	OSPAR, NEAFC and Contracting Parties	If endorsed by the Competent Authority, reporting, as appropriate, of EBSAs in the North-East Atlantic to the CBD Secretariat/CBD SBSTTA prior to CBD COP 11;
30 March – 4 April 2012		CBD SBSTTA 16
8-19 October 2012		CBD COP 11

*Progress through the NEAFC and OSPAR Commission procedures can be followed through meeting documentation available at www.neafc.org and www.ospar.org

Workshop close

26. The workshop closed at 17:00 on the 09 September 2011. The co-chairs extended their thanks to the hospitality of the Government of France, to the Steering Committee, facilitators, and to the participating scientific experts for their commitment to the work at this first regional exercise to feed into the CBD process to identify and describe ecologically and biologically significant marine areas.

List of Annexes

ANNEX 1	CBD COP 10 Decision X/29. Marine and coastal biodiversity. §§21 – 51: Identification of ecologically or biologically significant areas (EBSAs) and scientific and technical aspects relevant to environmental impact assessment in marine areas
ANNEX 2	Agreed terms of reference
ANNEX 3	A full list of workshop participants, including apologies, together with working group participation
ANNEX 4	Workshop Programme
ANNEX 5	List of materials made available to workshop participants
ANNEX 6	Data visualisation tool and data layers
ANNEX 7	Presentation by Jake Rice on the CBD EBSA Criteria and FAO VME Criteria
ANNEX 8	Proforma of proposed EBSAs Reykjanes Ridge south of Iceland EEZ
ANNEX 9	Proforma of proposed EBSAs Charlie-Gibbs Fracture Zone and Sub-Polar Frontal Zone of the Mid-Atlantic Ridge
ANNEX 10	Proforma of proposed EBSAs Mid-Atlantic Ridge North of the Azores
ANNEX 11	Proforma of proposed EBSAs The Hatton and Rockall Banks and the Hatton-Rockall Basin
ANNEX 12	Proforma of proposed EBSAs Around Pedro Nunes and Hugo de Lacerda Seamounts - IBA MA04
ANNEX 13	Proforma of proposed EBSAs North east Azores-Biscay Rise - IBA MA03
ANNEX 14	Proforma of proposed EBSAs Evlanov Seamount region
ANNEX 15	Proforma of proposed EBSAs North-west of Azores EEZ
ANNEX 16	Proforma of proposed EBSAs The Arctic Front - Greenland/Norwegian Seas
ANNEX 17	Proforma of proposed EBSAs The Arctic Ice habitat - multiyear ice, seasonal ice and marginal ice zone

Joint OSPAR/NEAFC/CBD Scientific Workshop on the Identification of Ecologically or Biologically Significant Marine Areas (EBSAs) in the North-East Atlantic

Hyères (Port Cros), France: 8 – 9 September 2011

CBD COP 10 Decision X/29 Marine and coastal biodiversity

§§21 – 51: Identification of ecologically or biologically significant areas (EBSAs) and scientific and technical aspects relevant to environmental impact assessment in marine areas

21. *Reiterating* the United Nations General Assembly's central role in addressing issues relating to the conservation and sustainable use of biodiversity in marine areas beyond national jurisdiction;

22. *Recalling* that General Assembly resolution 64/71 emphasized the universal and unified character of the United Nations Convention on the Law of the Sea and reaffirmed that the United Nations Convention on the Law of the Sea sets out the legal framework within which all activities in the oceans and seas must be carried out, and that its integrity needs to be maintained, as recognized also by the United Nations Conference on Environment and Development in chapter 17 of Agenda 21;

23. *Recalling* the General Assembly resolution 64/71 on oceans and the law of the sea;

24. *Recognizes* that the Convention on Biological Diversity has a key role in supporting the work of the General Assembly with regard to marine protected areas beyond national jurisdiction, by focusing on provision of scientific and, as appropriate, technical information and advice relating to marine biological diversity, the application of the ecosystem approach and the precautionary approach;

25. *Notes* that the application of the scientific criteria in annex I of decision IX/20 for the identification of ecologically and biologically significant areas presents a tool which Parties and competent intergovernmental organizations may choose to use to progress towards the implementation of ecosystem approaches in relation to areas both within and beyond national jurisdiction, through the identification of areas and features of the marine environment that are important for conservation and sustainable use of marine and coastal biodiversity;

26. *Notes* that the application of the ecologically or biologically significant areas (EBSAs) criteria is a scientific and technical exercise, that areas found to meet the criteria may require enhanced conservation and management measures, and that this can be achieved through a variety of means, including marine protected areas and impact assessments, and *emphasizes* that the identification of ecologically or biologically significant areas and the selection of conservation and management measures is a matter for States and competent intergovernmental organizations, in accordance with international law, including the United Nations Convention on the Law of the Sea;

27. *Acknowledges* the report on Global Open Oceans and Deep Seabed (GOODs) Biogeographic Classification published by the United Nations Educational, Cultural and Scientific Organization (UNESCO)-Intergovernmental Oceanographic Commission (IOC) and the International Union for Conservation of Nature (IUCN), which was submitted pursuant to paragraph 6 of decision IX/20, as a source of scientific and

technical information that may assist States and competent intergovernmental organizations with the identification of representative networks of marine protected areas (MPAs);

28. *Expresses its gratitude* to the Governments of Canada and Germany for co-funding, and Canada for hosting, the Expert Workshop on Scientific and Technical Guidance on the Use of Biogeographic Classification Systems and Identification of Marine Areas Beyond National Jurisdiction in Need of Protection, held in Ottawa, from 29 September to 2 October 2009, to other Governments and organizations for sponsoring the participation of their representatives, and to the Global Ocean Biodiversity Initiative (GOBI) for its technical assistance and support; and *takes note* of the report of this Expert Workshop (UNEP/CBD/SBSTTA/14/INF/4);

29. *Invites* Parties, other Governments and relevant organizations to use the scientific guidance on the use and further development of biogeographic classification systems, contained in annex V to the report of the Ottawa Expert Workshop (UNEP/CBD/SBSTTA/14/INF/4), in their efforts to conserve and sustainably use marine and coastal biodiversity, and to enhance ocean management at a large ecosystem scale, in particular to achieve the 2012 target of the World Summit on Sustainable Development to establish marine protected areas, in accordance with international law and based on best scientific information available, including representative networks;

30. *Recalling* decision IX/20 and the outcome from the Ottawa Workshop, invites the Ad Hoc Open-ended Informal Working Group of the United Nations General Assembly, Parties, other Governments, and competent intergovernmental organizations to consider the use of, as appropriate, the scientific guidance on the identification of marine areas beyond national jurisdiction, which meet the scientific criteria in annex I to decision IX/20, as contained in annex 6 to the report of this Expert Workshop (UNEP/CBD/SBSTTA/14/INF/4) ;

31. *Notes* that the Ottawa workshop (UNEP/CBD/SBSTTA/14/INF/4) identified a number of opportunities for collaboration between the Convention on Biological Diversity, in its work on ecologically or biologically significant marine areas (EBSAs) (decision IX/20, annex I), and the Food and Agriculture Organization of the United Nations (FAO), in its work on vulnerable marine ecosystems (VMEs);

32.*Encourages* Parties, other Governments and competent intergovernmental organizations to cooperate, as appropriate, collectively or on a regional or subregional basis, to identify and adopt, according to their competence, appropriate measures for conservation and sustainable use in relation to ecologically or biologically significant areas, and in accordance with international law, including the United Nations Convention on the Law of the Sea, including by establishing representative networks of marine protected areas in accordance with international law, including the United Nations Convention on the Law of the Sea, and based on best scientific information available, and to inform the relevant processes within the United Nations General Assembly;

33. *Noting* the slow progress in establishing marine protected areas (MPAs) in areas beyond national jurisdiction, and the absence of a global process for designation of such areas, *emphasizes* the need to enhance efforts towards achieving the 2012 target of establishment of representative network of MPAs, in accordance with international law, including the United Nations Convention on the Law of the Sea, and, *recalling* the role of United Nations General Assembly in this respect, *invites* the United Nations General Assembly to request the Secretary-General to convene during 2011 a meeting of the Ad Hoc Open-ended Informal Working Group to expedite its work on approaches to promote international cooperation and coordination for the conservation and sustainable use of marine biological diversity beyond areas of national jurisdiction, and consideration of issues of marine protected areas (MPAs), and *urges* Parties to take action as necessary to advance the work in that group;

34. *Recalling* decision IX/20, identification of ecologically or biologically significant areas (EBSAs) should use the best available scientific and technical information and, as appropriate, integrate the traditional

scientific, technical, and technological knowledge of indigenous and local communities, consistent with Article 8(j) of the Convention;

35. *Requests* the Executive Secretary to work with Parties, other Governments, the Food and Agriculture Organization (FAO) of the United Nations, the United Nations Educational, Scientific and Cultural Organization (UNESCO) -Intergovernmental Oceanographic Commission (IOC), in particular the Ocean Biogeographic Information System (OBIS), the Central Data Repository run by International Seabed Authority (ISA), and other relevant international scientific partnerships producing credible, quality-controlled scientific information, such as the World Conservation Monitoring Centre of the United Nations Environment Programme (UNEP-WCMC), and the Global Ocean Biodiversity Initiative (GOBI), to facilitate availability and inter-operability of the best available marine and coastal biodiversity data sets and information across global, regional and national scales;

36. *Requests* the Executive Secretary to work with Parties and other Governments as well as competent organizations and regional initiatives, such as the Food and Agriculture Organization of the United Nations (FAO), regional seas conventions and action plans, and, where appropriate, regional fisheries management organizations (RFMOs), with regards to fisheries management, to organize, including the setting of terms of references, subject to the availability of financial resources, a series of regional workshops, before a future meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) prior to the eleventh meeting of the Conference of the Parties to the Convention, with a primary objective to facilitate the description of ecologically or biologically significant marine areas through application of scientific criteria in annex I of decision IX/20 as well as other relevant compatible and complementary nationally and intergovernmentally agreed scientific criteria, as well as the scientific guidance on the identification of marine areas beyond national jurisdiction, which meet the scientific criteria in annex I to decision IX/20;

37. *Emphasizes* that additional workshops are likely to be necessary for training and capacity-building of developing country Parties, in particular the least developed countries and small island developing States, as well as countries with economies in transition, as well as through relevant regional initiatives, and that these workshops should contribute to sharing experiences related to integrated management of marine resources and the implementation of marine and coastal spatial planning instruments, facilitate the conservation and sustainable use of marine and coastal biodiversity, and may address other regional priorities that are brought forward as these workshops are planned;

38. *Invites* the Global Environment Facility and other donors and funding agencies, as appropriate, to extend support for capacity-building to developing countries, in particular the least developed countries and small island developing States, as well as countries with economies in transition, in order to identify ecologically or biologically significant and/or vulnerable marine areas in need of protection, as called for in paragraph 18 of decision IX/20 and develop appropriate protection measures in these areas, within the context of paragraphs 36 and 37;

39.*Requests* the Executive Secretary, in collaboration with Parties and other Governments, the Food and Agriculture Organization of the United Nations (FAO), United Nations Division for Ocean Affairs and the Law of the Sea, the United Nations Educational, Scientific and Cultural Organization (UNESCO) - Intergovernmental Oceanographic Commission (IOC), in particular the Ocean Biogeographic Information System, and other competent organizations, the World Conservation Monitoring Centre of the United Nations Environment Programme (UNEP-WCMC) and the Global Ocean Biodiversity Initiative (GOBI), to establish a repository for scientific and technical information and experience related to the application of the scientific criteria on the identification of EBSAs in annex I of decision IX/20, as well as other relevant compatible and complementary nationally and intergovernmentally agreed scientific criteria that shares information and harmonizes with similar initiatives, and to develop an information-sharing mechanism with similar initiatives, such as FAO’s work on vulnerable marine ecosystems (VMEs);

40. *Requests* the Executive Secretary to prepare, in collaboration with the relevant international organizations, a training manual and modules in the working languages of the United Nations, subject to the availability of financial resources, which can be used to meet the capacity-building needs for identifying ecologically or biologically significant marine areas using the scientific criteria in annex I to decision IX/20 having regard to other relevant compatible and complementary intergovernmentally agreed scientific criteria as well as the scientific guidance on the identification of marine areas beyond national jurisdiction, which meet the scientific criteria in annex I to decision IX/20, taking into account the results of the Ottawa workshop;

41. *Requests* that the Executive Secretary make available the scientific and technical data and information and results collated through the workshops referred to in paragraph 36 to participating Parties, other Governments, intergovernmental agencies and the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) for their use according to their competencies;

42. *Requests* the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) to prepare reports based on scientific and technical evaluation of information from the workshops, setting out details of areas that meet the criteria in annex I to decision IX/20 for consideration and endorsement in a transparent manner by the Conference of the Parties to the Convention, with a view to including the endorsed reports in the repository referred to in paragraph 39 and to submit them to the United Nations General Assembly and particularly its Ad Hoc Open-ended Informal Working Group, as well as relevant international organizations, Parties and other Governments;

43. *Recalling* paragraph 18 of decision IX/20, invites Parties and other Governments to provide for inclusion in the repository, scientific and technical information and experience relating to the application of the criteria in annex I to decision IX/20 or other relevant compatible and complementary nationally and intergovernmentally agreed scientific criteria to areas within national jurisdiction before the eleventh meeting of the Conference of the Parties;

44. *Further requests* the Executive Secretary to report on the status of this collaboration, as referred to in paragraph 39, to a future meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) for consideration by the eleventh meeting of the Conference of the Parties, and to inform the United Nations General Assembly as well as competent international organizations, such as International Seabed Authority (ISA) and the International Maritime Organization (IMO), of progress in this regard;

45. *Decides* to review the status and outcomes of application of the scientific criteria for ecologically or biologically significant marine areas as part of its consideration of the work contributing to the implementation of the 2012 target related to marine protected areas;

46. *Requests* the Executive Secretary to explore, together with secretariats of regional initiatives, regional seas organizations and agreements mandated to promote conservation and sustainable use of biodiversity in enclosed or semi-enclosed seas, the possibility for cooperation, including the identification, development and implementation of targeted joint activities to support biodiversity conservation and sustainable use in those regions;[63]

47. *Recalling* decision IX/20, paragraph 27, *requests* the Executive Secretary to undertake, subject to availability of financial resources, a study, within a context of Article 8(j) and related provisions, to identify specific elements for integrating the traditional, scientific, technical and technological knowledge of indigenous and local communities, consistent with Article 8(j) of the Convention, and social and cultural criteria and other aspects for the application of scientific criteria in annex I to decision IX/20 for the identification of ecologically or biologically significant areas as well as the establishment and management of marine protected areas, and make the report available at the eleventh meeting of the Conference of the Parties to the Convention and transmit the findings to the relevant United Nations General Assembly processes, including the Ad Hoc Open-ended Informal Working Group;

48. *Invites* Parties and other Governments to foster research and monitoring activities, in accordance with international law, including the United Nations Convention on the Law of the Sea, to improve information on key processes and influences on the marine and coastal ecosystems which are critical for structure, function and productivity of biological diversity in areas where knowledge is scarce and to facilitate the systematic collection of relevant information in order to continue proper monitoring of these areas;

49. *Expresses* its gratitude to the Government of the Philippines and the GEF/UNDP/UNOPS Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) for co-hosting, and the European Commission for providing financial support for, the Expert Workshop on Scientific and Technical Aspects relevant to Environmental Impact Assessment in Marine Areas Beyond National Jurisdiction, held in Manila from 18 to 20 November 2009, and to other Governments and organizations for sponsoring the participation of their representatives, and *welcomes* the report of this Expert Workshop (UNEP/CBD/SBSTTA/14/INF/5);

50. *Requests* the Executive Secretary to facilitate the development of voluntary guidelines for the consideration of biodiversity in environmental impact assessments (EIAs) and strategic environmental assessments (SEAs) in marine and coastal areas using the guidance in annexes II, III and IV to the Manila workshop report (UNEP/CBD/SBSTTA/14/INF/5), provide for technical peer review of those guidelines, and submit them for consideration to a future meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) prior to the eleventh meeting of the Conference of the Parties, *recognizing* that these guidelines would be most useful for activities that are currently unregulated with no process of assessing impacts;

51. *Takes note*, with appreciation, of the adoption by the Council of the International Seabed Authority of the Regulations on prospecting and exploration for polymetallic sulphides in the Area,[64] which requires the mandatory submission of an impact assessment of the potential effects on the marine environment, and *urges* Parties and *invites* other Governments and intergovernmental organizations to implement these Regulations;

Terms of Reference for a Joint OSPAR/NEAFC/CBD Scientific Workshop on the identification of Ecologically or Biologically Significant Marine Areas (EBSAs) in the North-East Atlantic

(Source: BDC 2011 Summary Record Annex 15)

Background

1. The 10th Conference of the Parties to the Convention on Biological Diversity (CBD COP 10; Nagoya, Japan, 18-29 October 2010) in its Decision on Marine and Coastal Biological Diversity (CBD Decision X/29) sets out the process on the identification of Ecologically or Biologically Significant Marine Areas (EBSAs) based upon the scientific criteria as previously adopted by CBD COP 9.

2. In particular, § 36 of CBD Decision X/29:

   "*Requests the [CBD] Executive Secretary to work with Parties and other Governments as well as competent organizations and regional initiatives, such as the Food and Agriculture Organization of the United Nations (FAO), regional seas conventions and action plans, and, where appropriate, regional fisheries management organizations (RFMOs), with regards to fisheries management, to organize, including the setting of terms of references, subject to the availability of financial resources, a series of regional workshops, before a future meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) prior to the eleventh meeting of the Conference of the Parties to the Convention, with a primary objective to facilitate the description of ecologically or biologically significant marine areas through application of scientific criteria in annex I of decision IX/20 as well as other relevant compatible and complementary nationally and intergovernmentally agreed scientific criteria, as well as the scientific guidance on the identification of marine areas beyond national jurisdiction, which meet the scientific criteria in annex I to decision IX/20*;".

3. With a view to respond to the request set out in § 36 of CBD Decision X/29 and in light of the complementary competencies assigned to the OSPAR Commission and the North-East Atlantic Fisheries Commission (NEAFC), and as recognised in the Memorandum of Understanding between OSPAR and NEAFC, the two organisations together with the CBD Secretariat propose to facilitate the identification and description of EBSAs in the North-East Atlantic through a joint scientific workshop prior to the eleventh meeting of the Conference of the Parties to the CBD.

Objective

4. The objective of this scientific workshop is to identify and describe marine areas in the high seas areas in the North-East Atlantic that are not yet included in the OSPAR Network of MPAs but fulfil the scientific criteria set out by the CBD (Annex I of CBD Decision IX/20) for Ecologically or Biologically Significant Marine Areas (EBSAs) - with a view to respond to the request by CBD COP 10 (CBD Decision X/29, § 36);

Outcome

5. The foreseen outcome of this scientific workshop is a list of areas considered to meet the criteria for EBSAs, including a description of the areas according to the CBD criteria, in the North-East Atlantic.

6. The outcome is to be used, as appropriate, by Contracting Parties, the OSPAR Commission or NEAFC to report to the CBD on EBSAs in the North-East Atlantic prior to CBD COP 11.

Topics of the Workshop

7. The workshop will be organised around the following main topics:

   (1) Presentation of background information on the CBD process regarding the identification and description of EBSAs (CBD Decision X/29), including the criteria as adopted in Annex I of CBD Decision IX/20;

   (2) Presentation of relevant scientific information and data supporting the identification of marine areas in the North-East Atlantic that are not yet included in the OSPAR Network of MPAs but meet the criteria for CBD EBSAs; and

   (3) Identification and description of marine areas in the North-East Atlantic that are not yet included in the OSPAR Network of MPAs but meet the criteria for CBD EBSAs.

Organisation

8. The workshop is scheduled to take place 9-11 September 2011 in France. The specific venue is yet to be determined.

9. The workshop will be organized by a steering committee consisting of the Chair/Secretariat of the OSPAR Intersessional Correspondence Group on Marine Protected Areas (ICG-MPA), the OSPAR Secretariat, the NEAFC Secretariat, the CBD Secretariat and France as the host of the workshop.

10. Participants: the workshop will be open to scientific experts on marine biodiversity (species, habitats and ecological processes) and biogeography of the North-East Atlantic from OSPAR/NEAFC Contracting Parties and observer organisations and other relevant international organisations and initiatives (including e.g. ICES, Census of Marine Life, Ocean Biogeographic Information System/OBIS, Global Ocean Biodiversity Initiative/GOBI, HERMIONE).

Preparation of the Workshop & Processing of Workshop Outcome

11-15 April 2011	BDC 2011	Agreement on DRAFT Terms of Reference for the workshop, including participants to the workshop taking into account the workshop objectives
April 2011	France in consultation with WS Steering Committee	Agreement on final schedule and venue for the workshop
April/May 2011	WS Steering Committee	Selection of key presentations/speakers on relevant scientific information and data
May 2011	WS Steering Committee	Preparation of detailed agenda and time-table for the workshop
June 2011	OSPAR Commission	Endorsement of the workshop
June 2011	OSPAR	Official announcement of the workshop/Invitation of participants

	Secretariat	to the workshop
September 2011	Scientific Workshop on the identification of Ecologically or Biologically Significant Marine Areas (EBSAs) in the North-East Atlantic	
By end of December 2011	To be confirmed	Provisional entry of data in the CBD repository subject to OSPAR endorsement
4th quarter 2011	WS Steering Committee	Compilation of workshop report
February 2012	BDC 2012	Consideration of the outcome of the workshop; proposal on EBSAs to be reported to the CBD Secretariat/CBD SBSTTA
February/March 2012	OSPAR Commission [through written procedure]	Consideration of/Agreement on reporting of EBSAs in the North-East Atlantic to the CBD
March/April 2012	OSPAR Secretariat	If endorsed by the OSPAR Commission, reporting of EBSAs in the North-East Atlantic to the CBD Secretariat/CBD SBSTTA prior to CBD COP 11

Joint OSPAR/NEAFC/CBD Scientific Workshop on the Identification of Ecologically or Biologically Significant Marine Areas (EBSAs) in the North-East Atlantic

Hyères (Port Cros), France: 8-9 September 2011

A - List of Participants

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C - Working group participation

Group	**Group members**
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Mid Atlantic Complex	Tim Packeiser Ricardo Santos Pat Halpin Henning von Nordheim Jeff Ardron Kerry Howell Rachel Brown Thorstein Sigurdsson Stephan Lutter Benjamin Ponge
Bird Areas	Ben Lascelles David Johnson Jiyhun Lee Christian Neumann
Arctic pelagic and high arctic	Sabine Christiansen Ingo Schewe Kjartan Hoydal Stefán Ragnarsson Vladimir Vinnichenko Henn Ojaveer

Joint OSPAR/NEAFC/CBD Scientific Workshop on the Identification of Ecologically or Biologically Significant Marine Areas (EBSAs) in the North-East Atlantic

Hyères (Port Cros), France: 8 – 9 September 2011

Workshop Programme

Wednesday 7th

From 15:00	Opportunity for informal discussion between scientists/ possible upload of data into a visualisation system
	Steering Committee meeting (final preparations)

Day 1

08.00 – 09.00	Arrival and registration of participants
09:00 – 09:30	Opening (Statements from OSPAR – David Johnson, NEAFC Kjartan Hoydal, CBD Jihyun Lee)
	Workshop aims and objectives (Co-Chairs)
	Introduction to the background/ context of the workshop
	Roles of Facilitators and Participants
09:30 – 10:30	*Overview visualisation*
	Guidance on identifying data and capacity gaps and research needs
	Discussion
10:30 – 11:00	*Coffee break*
11:00 – 12:30	Introduction to the existing candidate EBSA example
	Introduction to the new proposals for candidate EBSAs
12:30 – 14:00	*Lunch break*
14:00 – 15:30	Introduction to afternoon session which will be in breakout groups
	Group 1 – evaluate proposals that have been submitted (aim to be able to identify which are strongest candidates and which could be, with potentially more work on day 2) and relevant supporting information including ICES advice
	Group 2 – consider potential EBSA coverage for the North-East Atlantic as it currently stands, possible gaps and how these may be filled. Consider CBD IX/20 Annex 2 and OSPAR Background documents on ecological coherence as gudiance
15:30 – 16:00	*Coffee break*
16:00 – 18:00	Report back on progress by break out groups to plenary
	Review areas of commonality (i.e. do proposals being considered address gaps identified) and further consider how remaining gaps might be considered
	Summary of initial findings
Evening	*Dinner*

Day 2

09:00 – 10:30	Plenary – based on the outcomes of the Day 1 break out sessions develop a first draft list of candidate EBSAs
10:30 – 11:00	*Coffee break*
11:00 – 12:30	Working session to review templates of the proposed candidate EBSAs listed
12:30 – 14:00	*Working Lunch*
14:00 – 15:00	Working session continued
15:00 – 17:00	Final review of candidate EBSAs
	Technical Cooperation and Assistance – further outreach in the region
	Conclusions and way forward
Close	

Joint OSPAR/NEAFC/CBD Scientific Workshop on the Identification of Ecologically or Biologically Significant Marine Areas (EBSAs) in the North-East Atlantic

Hyères (Port Cros), France: 8 – 9 September 2011

List of materials made available to workshop participants

The following materials were made available to participants using an online, secure access document management system “Basecamp”.

Logistical information

Draft Programme for the Joint OSPAR/NEAFC/CBD Scientific Workshop on the identification of EBSAs in the North East Atlantic

EBSA ID Proforma developed by the Joint Workshop Steering Committee, based on the CBD Repository information requirements

Logistic information on the venue and accommodation

Participant briefing document

Workshop invitation letter

Background materials

CAFF. 2011. Arctic Marine Biodiversity Monitoring Plan. Marine Expert Monitoring Group. Circumpolar Biodiversity Monitoring Programme. CAFF Monitoring Series Report nr.3. April 2011.

CBD. 2008. Decision adopted by the Conference of Parties to the Convention on Biological Diversity at its 9th Meeting. IX/20 Marine and coastal biodiversity. UNEP/CBD/COP/DEC/IX/20

CBD. 2010. Decision adopted by the Conference of Parties to the Convention on Biological Diversity at its 10th Meeting. X/29 Marine and coastal biodiversity. UNEP/CBD/COP/DEC/X/29

Druel, Elisabeth. 2011. Particularly Sensitive Sea Areas (PSSAs), IDDRI, August 2011

Gibson, C., Valenti, S.V., Fordham, S.V. and Fowler, S.L. 2008. The Conservation of Northeast Atlantic Chondrichthyans: Report of the IUCN Shark Specialist Group Northeast Atlantic Red List Workshop. IUCN Species Survival Commission Shark Specialist Group. Newbury, UK. viii + 76pp.

ICES. 2008. 1.5.5.18 Answer to request from OSPAR for a scientific peer review of proposals for areas to be considered as marine protected areas in the Northeast Atlantic beyond national jurisdiction. ICES Advice 2008, Book 1.

ICES. 2011. 1.5.1.3/1.5.4.1 Update of cold-water coral and sponge maps an the information underpinning such maps on Vulnerable Marine Habitats (including Hatton and Rockall Banks). ICES Advice May 2011, Book 1

ICES. 2011. Report of the ICES/NAFO Joint Working Group on Deep-water Ecology (WGDEC), 28 February–4 March, Copenhagen, Denmark. ICES CM 2011/ACOM:27. 105 pp.

ICES. 2011. Report of the Working Group on the Biology and Assessment of Deep-sea Fisheries Resources (WGDEEP), 2–8 March 2011, Copenhagen, Denmark. ICES CM 2011/ACOM:17. 889 pp.

IFREMER (working document) Localisation of relevant sampling during IFREMER Deep Sea cruises

IUCN/NRDC. 2010. Workshop Report: Workshop to Identify Areas of Ecological and Biological Significance or Vulnerability in the Arctic Marine Environment. November 2-4, 2010, La Jolla, California, USA.

NEAFC Press Release (April 2009) NEAFC closes large areas to bottom fisheries on the Mid-Atlantic Ridge to protect Vulnerable Marine Ecosystems in the High Seas of the North East Atlantic

NEAFC, 2008, Proposal for revision of areas closed to bottom fisheries in the NEAFC Regulatory Region(PECM 2008/01/11 Rev 1)

NEAFC. 2008. NEAFC Fisheries Status Report 1998-2007. Ed. Kjartan Hoydal. www.neafc.org

OSPAR Commission. 2010. Background Document on Milne Seamount. Biodiversity Series

OSPAR Commission. 2010. Background Document on the Chalie-Gibbs Fracutre Zone. Biodiversity Series

OSPAR Commission. 2011. Background Document on the Altair Seamount Marine Protected Area. Biodiversity Series

OSPAR Commission. 2011. Background Document on the Antialtair Seamount Marine Protected Area. Biodiversity Series

OSPAR Commission. 2011. Background Document on the Josephine Seamount Marine Protected Area. Biodiversity Series

OSPAR Commission. 2011. Background Document on the Mid-Atlantic Ridge North of the Azores Marine Protected Area. Biodiversity Series

OSPAR, 2010. Quality Status Report 2010. OSPAR Commission. London. 176 pp

Penny, A., S. Parker, J. Brown, M. Cryer, M. Clark and B. Sims. 2009. New Zealand Implementation of the SPRFMO Interim Measures for High Seas Bottom Trawl Fisheries in the SPRFMO Area. SPRFMO-V-SWG-09.

EBSA proposal proforma submitted in advance of the meeting

Ben Lascelles, Phil Taylor, Mark Miller et al. (working document) Charlie Gibbs Fracture Zone to the Greenland EEZ. Birdlife International

Ben Lascelles, Phil Taylor, Mark Miller et al. (working document) North of the Azores. Birdlife International

Ben Lascelles, Phil Taylor, Mark Miller et al. (working document) Pico Fracture Zone north to Charlie Gibbs Fracture Zone. Birdlife International

Ben Lascelles, Phil Taylor, Mark Miller et al. (working document) South west Reykjanes Ridge. Birdlife International

Ben Lascelles, Phil Taylor, Mark Miller et al. (working document) Western Iberian Abyssal Plain. Birdlife International

Ben Lascelles, Phil Taylor, Mark Miller, Ramírez I., P. Geraldes, A. Meirinho, P. Amorim & V. Paiva (working document) Area between Cherkis, Crumb and Lukin-Lebedev seamounts - IBA MA02, SPEA and Birdlife International

Ben Lascelles, Phil Taylor, Mark Miller, Ramírez I., P. Geraldes, A. Meirinho, P. Amorim & V. Paiva (working document) Area Around the Altair Seamount - IBA MA01. SPEA and Birdlife International

Ben Lascelles, Phil Taylor, Mark Miller, Ramírez I., P. Geraldes, A. Meirinho, P. Amorim & V. Paiva (working document) Area Around Pedro Nunes and Hugo de Lacerda Seamounts - IBA MA04. SPEA and Birdlife International

Ben Lascelles, Phil Taylor, Mark Miller, Ramírez I., P. Geraldes, A. Meirinho, P. Amorim & V. Paiva (working document) North east Azores-Biscay Rise - IBA MA03. SPEA and Birdlife International

Billett, David, Brian Bett, Philip Weaver, Callum Roberts, Rachel Brown, Murray Roberts, Lea-Anne Henry, Kerry Howell Jason Hall-Spencer, Andrew Davies, Bhavani Narayanaswamy, Monty Priede, David Bailey and Alex Rogers (working document) Seabed communities of the Hatton and Rockall Banks and the Hatton-Rockall Basin.

Jan Helge Fosså (working document) *Vesteris Seamount. IMR, Norway*

Jan Helge Fosså, Rolf-Birger Pedersen (working document) *Jan Mayen Hot Vent Field (including Soria Moria and the Troll Wall). IMR, Norway and Centre for Geobiology, University of Bergen, Norway*

Jan Helge Fosså, Rolf-Birger Pedersen (working document) Loki's Castle Hot Vent Field*. IMR, Norway and Centre for Geobiology, University of Bergen, Norway*

Martin Hovland and Jan Helge Fosså (working document) Complex Pockmark G11 at Nyegga. *Centre for Geobiology, University of Bergen, Norway and IMR, Norway*

Martin Hovland and Jan Helge Fosså (working document) Håkon Mosby Mud Volcano. *Centre for Geobiology, University of Bergen, Norway and IMR, Norway*

Roberts, Callum, Rachel Brown, Bethan O’Leary (working document) Mid-Atlantic Ridge north of CGFZ. University of York

Roberts, Callum, Rachel Brown, Bethan O’Leary (working document) Reykjanes Ridge. University of York

WWF (Working document) Arctic Domain with Polar and Arctic Front - Greenland/Norwegian Seas. WWF

WWF (Working Document) The Arctic high seas - packice, seasonal ice and marginal ice zone. WWF

Presentations made during the meeting

Initial gap analysis for potential EBSAs in the North East Atlantic, Jeff Ardron

Life in a changing ocean, beyond the Census of Marine Life, Hann Ojaveer,

NEAFC MPAs and EBSAs, Odd Aksel Bergstad, IMR Norway

Presenting the CBD Context, Jihyun Lee, CBD Secretariat

The OSPAR MPA Network, 2011, Tim Packeiser, ICG-MPA/ BfN Germnay.

VME's and EBSA's, Jake Rice, DFO, Canada

Access to and guide to the Data visualisation tool

GRID-Arendal (working document) Mock-up data visualisation tool for OSPAR/NEAFC/CBD EBSA Workshop, August 2011.

See also Annex 6.

Joint OSPAR/NEAFC/CBD Scientific Workshop on the Identification of Ecologically or Biologically Significant Marine Areas (EBSAs) in the North-East Atlantic

Hyères (Port Cros), France: 8 – 9 September 2011

An introduction to the data visualisation tool

GeoIQ – an online tool for the visualisation and sharing of data and maps

GRID-Arendal[1], a UNEP-collaborating centre in Arendal, Norway, has used GeoIQ to support the workshop by pulling together and visualising data and information relevant for the identification of EBSAs.

GeoIQ is an online platform designed for public use, with the non-GIS-expert end-user in mind. Users can upload geo-referenced data and combine them with existing data sets on the platform. GeoIQ provides a range of possibilities to create maps and share them publicly. Thereby, data and maps can be accessed remotely and independent of a GIS-application on a computer. The display of map layers is interactive and can be changed by the user.

GeoIQ allows for upload of data in various formats including comma-separated files, ESRI- shapefiles and Google Earth / kml-files. Users can download files in the database in any of those formats and so can use GeoIQ to convert. Further, the platform supports traditional relational databases such as Orcale, PostgreSQL & PostGIS and MySQL as well as NoSQL object stores HBase, Hadoop and MongoDB. Support for Riak, Cassandra and Microsoft SQLServer are in development. It can also load GeoRSS feeds, Web Map Services (WMS), and Map Tile URLs.

GRID-Arendal used the GeoIQ platform to provide workshop participants with three kinds of information ahead of the meeting (see below for the list of data layers);

- jurisdictional boundaries and existing or proposed spatial management measures,
- candidate EBSA submitted to the workshop (see figure 1), and
- ecological and geographic data (see figure 2).

During the workshop, the platform was used to serve as reference for participants to see overlaps of submitted candidate EBSAs with each other and with existing MPAs designated by OSPAR and deep-water fishing closures agreed by NEAFC. It also provided background ecological information to put candidate EBSAs into context. After the meeting, a final map displaying all agreed EBSA will be available online to support the dissemination of workshop results.

Summary of data layers

Jurisdictional boundaries

a. EEZs,

b. territorial waters,

c. extended continental shelf subject to submissions to the Commission of the Limits of the Continental Shelf under UNCLOS Article 76)

d. Existing spatial management measures (OSPAR, NEAFC)

[1] www.grida.no

e. Proposed spatial management measures (Submitted to this workshop)

Ecological and geographic data provided

a. Seamount base areas, Yesson et al 2011[2]

b. Aquamaps[3] predictive species range maps for

- all available species (>11‘500);
- IUCN endangered + vulnerable;
- OSPAR List of Threatened and Declining Species

c. The Joint Nature Conservation Committee’s data on OSPAR Threatened and Declining Habitats

- Seamounts, Hydrothermal Vents, Carbonate Mounds, *Lophelia pertusa*, Sponges

d. Coral habitat suitability maps

- *Lophelia pertusa*[4] and Antipatharia (black corals)[5]

e. Octocorallia diversity maps[6]

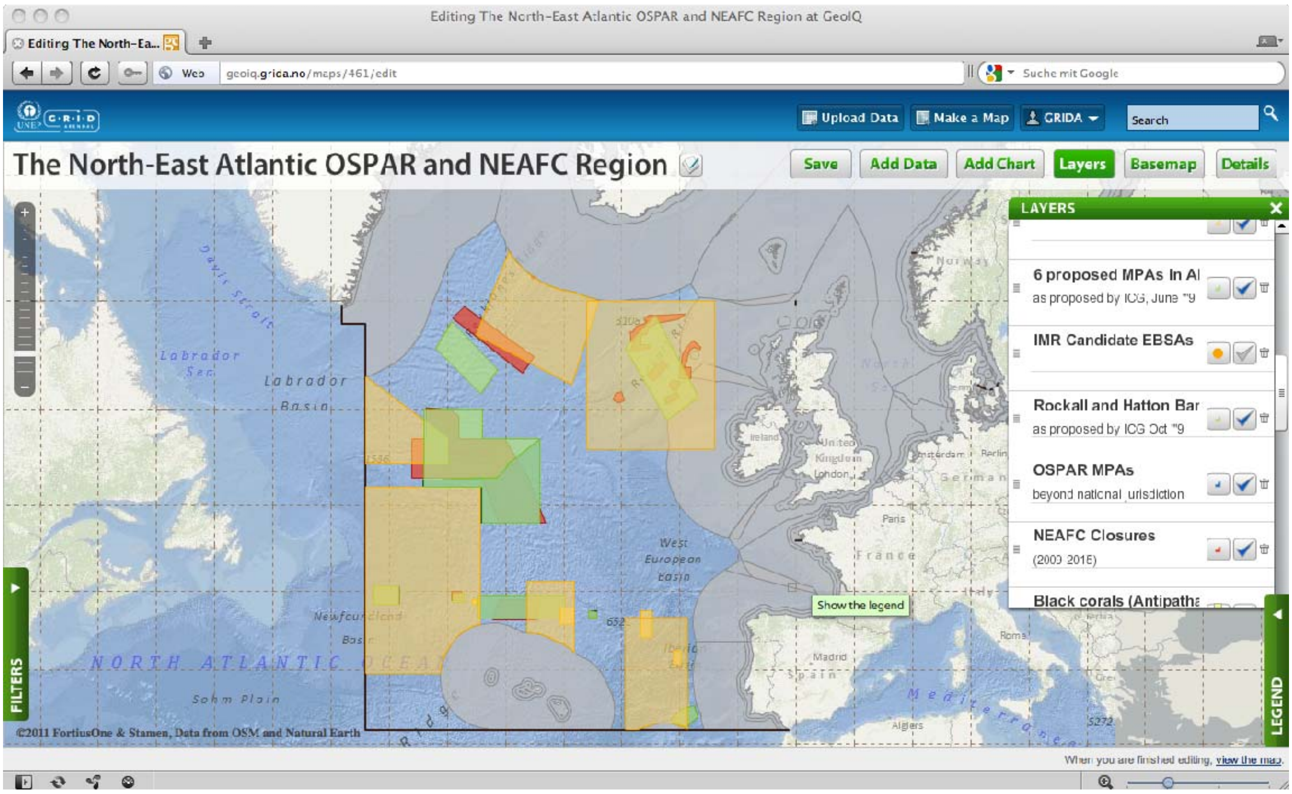

Figure 1: Exclusive Economic Zones, NEAFC closures (red), OSAPR MPAs in ABNJ (blue, covered), MPAs in ABNJ discussed by OSPAR earlier (green) and submitted candidate EBSAs (yellow)

[2] Yesson C, Clark MR, Taylor ML & Rogers AD (2011) The global distribution of seamounts based on 30-second bathymetry data. Deep Sea Research Part I: Oceanographic Research Papers. 58(4): 442-453.

[3] www.aquamaps.org

[4] Davies, A. J. & Guinotte, J. M. (2011) Global Habitat Suitability for Framework-Forming Cold-Water Corals. PLoS ONE. Public Library of Science 6: e18483

[5] F. A. H. Hendry (MSc thesis Aug 2011) Global Distribution Estimates for Black Corals (Antipatharia) (supervised by C. Yesson)

[6] Yesson C, Taylor, ML, Tittensor, DP, Davies AJ, Guinotte J, Baco-Taylor, A, Black, J, Hall-Spencer, J & Rogers, AD (In revision) Global habitat suitability of cold water octocorals

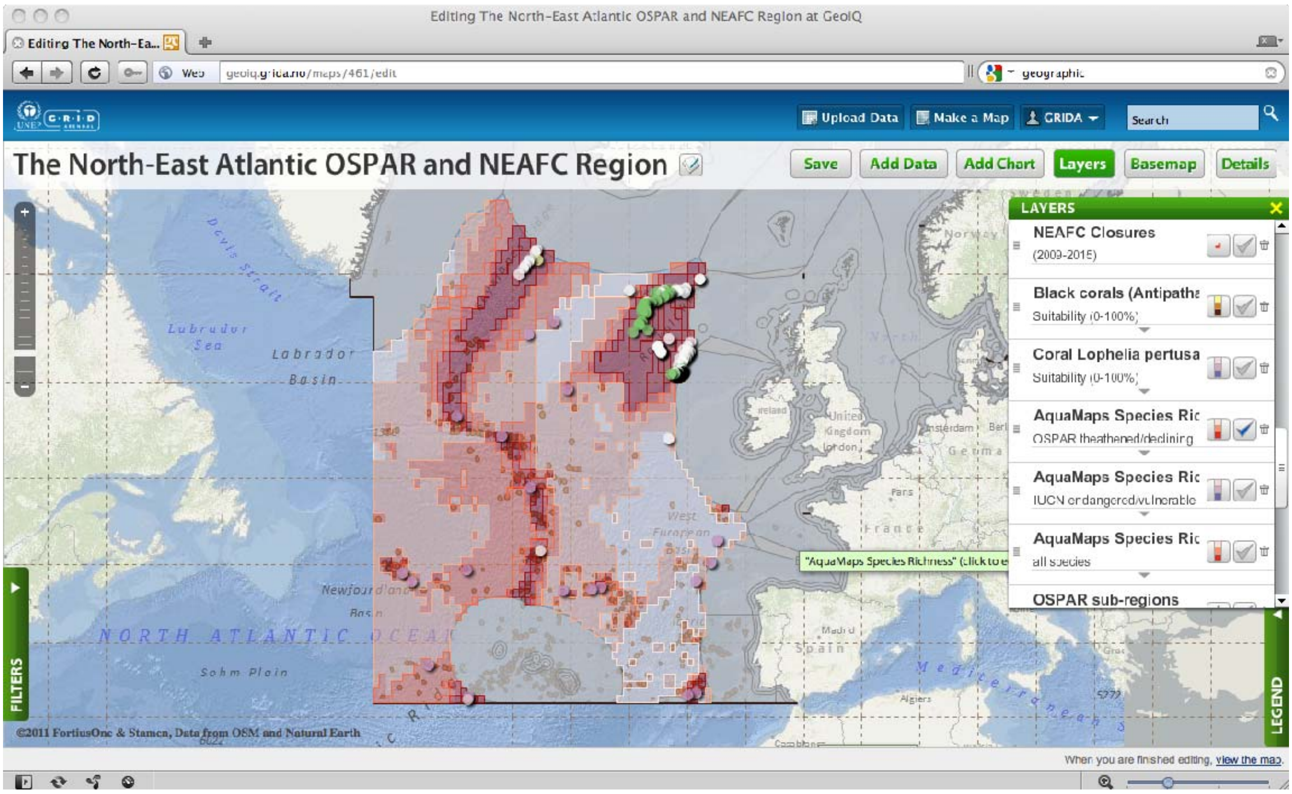

Figure 2: Exclusive Economic Zone, Seamounts (brown), JNCC habitat data (green, white, purple) and predicted species richness for OSPAR Threatened and Declining Species

Joint OSPAR/NEAFC/CBD Scientific Workshop on the Identification of Ecologically or Biologically Significant Marine Areas (EBSAs) in the North-East Atlantic

Hyères (Port Cros), France: 8 – 9 September 2011

VMEs and EBSAs – Protection and use of special marine places

Presentation by Jake Rice, DFO, Canada

A copy of the presentation given to the workshop by Jake is embedded here:

VME's and EBSA's_corr.ppt

Joint OSPAR/NEAFC/CBD Scientific Workshop on the Identification of Ecologically or Biologically Significant Marine Areas (EBSAs) in the North-East Atlantic

Hyères (Port Cros), France: 8 – 9 September 2011

EBSA identification proforma for the North-East Atlantic - 1

Title/Name of the area – Reykjanes Ridge south of Iceland EEZ

Presented by

Participants at the Joint OSPAR/NEAFC/CBD Scientific Workshop on the Identification of Ecologically or Biologically Significant Marine Areas in the North-East Atlantic

Abstract

Reykjanes Ridge is part of the major topographic feature in the Atlantic Ocean, the Mid-Atlantic Ridge. It is an important feature in the hydrography and circulation of the area and also provides a hard-bottom substrate for the colonization of benthic communities. There is evidence from recent surveys of several vulnerable species and groups of animals, including *Lophelia pertusa*, deep-sea sponge communities, deep sea fish communities and several shark and ray species. There are also surveys showing whales and birds in the area. There has been fishing in the area over the years, but it remains largely unquantified. This site meets several of the criteria for an EBSA and although there are extended continental shelf claims in the area it warrants designation.

Introduction

The Reykjanes Ridge forms the northernmost part of the Mid-Atlantic Ridge, a sub-marine mountain system which stretches from Iceland to the South Atlantic (Fock and John 2006). The Mid-Atlantic Ridge is the major topographic feature running the entire length of the Atlantic Ocean, dividing the ocean floor 'symmetrically' with an average summit/crest depth of approximately 2,500m (Dinter, 2001; Heger *et al*, 2008; Hosia *et al*, 2008). Within the OSPAR area the Mid-Atlantic Ridge separates the Newfoundland and Labrador basins from the West-European basin and the Irminger from the Iceland basins (Dinter, 2001). It has a profound role in the circulation of the water masses in the North Atlantic (Rossby, 1999; Bower et al, 2002; Heger et al, 2008; Søiland et al, 2008). The complex hydrographic setting and the presence of the Ridge leads to enhanced vertical mixing and turbulence resulting in areas of increased productivity over the Ridge (Falkowski et al, 1998; Heger et al, 2008).

Reykjanes Ridge is tectonically active, with a relatively low spreading rate of a few centimetres a year (Mironov & Gebruk, 2006). Volcanic activity is thought to be high, shown by the growth of lava domes, the development of extended volcanic chains and regular infilling of cracks with basaltic material (Sbortshikov & Rudenko, 1990; Mironov & Gebruk, 2006). There is one site north of the proposed area that has been shown to have hydrothermal activity, Steinaholl vent field at $63^{o}06'$N (Olaffson et al, 1991; German et al, 1994; Mironov & Gebruk, 2006). No other hydrothermal activity has been detected along the Reykjanes Ridge, despite intensive sampling (German et al, 1994; German & Parsons, 1998). The crests of the Mid-Atlantic Ridge consist mostly of hard volcanic rock whereas the flanks are covered with expanding thicknesses of soft sediments with increasing distance from the crests (Dinter, 2001). The Reykjanes Ridge is characterised by high sedimentation rates, which are related to the high biological productivity in the mixing zone of different water masses (Mironov & Gebruk, 2006).

Over the Mid-Atlantic Ridge within the OSPAR area there are three main water masses in the upper ocean, the one found within the proposed area is often termed Modified North Atlantic Water (Søiland et al, 2008). The surface current system of the North Atlantic is dominated by the warm North Atlantic Drift, which is a continuation of the Gulf Stream (Mironov & Gebruk, 2006). The northern boundary of this forms the characteristic Sub-Polar Front, which acts to separate the warm and cold water masses and is usually found between 52 – 53^{o}N (Mironov & Gerbuk, 2006; Søiland et al, 2008). After the North Atlantic Drift crosses the Mid-Atlantic Ridge at approximately 50 – 52^{o}N it flows north (Mironov & Gebruk, 2006). Some of this current enters the Norwegian Sea east of Iceland and some turns and flows westward (called the Irminger Current) over the Reykjanes Ridge at between 53^{o}N and 60^{o}N, into the Irminger Basin (Mironov & Gebruk, 2006). This is the major current within the proposed area. The proposed area lies Reykjanes Ridge south of Iceland EEZ and to the area where the polar front is expected to have it's northern boarder.

Reykjanes Ridge is characterised by sharp gradients in environmental conditions, which has allowed the area to be colonized by benthic fauna from very remote regions (Mironov & Gebruk, 2006). For example, species have been found whose distributions extend to the Antarctic, North Pacific and the Indo-West Pacific (Mironov & Gebruk, 2006). Within the area of the Icelandic Shelf and the Reykjanes Ridge the Arctic fauna is replaced by a boreal one, the European fauna by American and the autochthonous deep-sea fauna is replaced by an allochthonous one (Mironov & Gebruk, 2006). The composition of deep-sea benthic fauna on the Reykjanes Ridge south of Iceland EEZ is not very well known in comparison to adjacent areas (Mironov & Gebruk, 2006). As Mironov & Gebruk (2006) state, this is well illustrated by the fact that the 4th cruise of the "Akademik Mstislav Keldysh" (1982) sampled many species which were recorded on the Ridge for the first time. This cruise yielded an extensive collection of deep-sea fauna and since then other research cruises have focused on the Reykjanes Ridge (Mironov & Gebruk, 2006).

The northern part of the Mid-Atlantic Ridge has been subject to recent scientific investigations as part of the Census of Marine Life (MAR-ECO project) (Bergstad et al, 2008). Many scientific papers have been published in the years since the project's inception that span ecological zones and taxonomical ranges, several report findings from the Reykjanes Ridge (Bergstad et al, 2008). Numerous new species have also been discovered, data has been derived that has allowed taxonomic revisions and species that were not known to exist in this region have been uncovered (Gebruk et al, 2008). The published findings of the MAR-ECO project represent most of the modern information and data about the Reykjanes Ridge in this proposal. Information has also been gathered from historical fishing accounts found in ICES reports and older published scientific research.

Location

The northern and western boundary of the area is Iceland and Greenland EEZ's, respectively. The southern boundary is proposed to be well north the Sub-Polar Front, which acts to separate the warm and cold water masses and is usually found between 52 – 53^{o}N (Mironov & Gerbuk, 2006; Søiland et al, 2008). The eastern boundary extends to the abyssal plains. The proposed coordinates are as follows (Figure attached as separate file):

Nr	Longitude	Latitude
1	26°60,00W-	53°25,19N
2	41°46,34W-	56°35,54N
3	41°29,87W-	56°38,56N
4	40°59,87W-	56°45,04N
5	40°29,87W-	56°53,01N
6	39°59,87W-	57°02,01N
7	39°51,85W-	57°04,76N
8	39°53,93W-	57°05,39N
9	39°39,75W-	57°09,30N
10	39°32,76W-	57°11,76N
11	39°00,57W-	57°24,59N
12	38°40,56W-	57°34,14N
13	38°12,74W-	57°51,90N
14	37°58,85W-	58°00,61N
15	37°12,82W-	58°35,15N
16	36°59,90W-	58°47,72N
17	36°54,21W-	58°54,59N
18	36°50,46W-	58°59,48N
19	36°47,27W-	59°03,95N
20	36°42,15W-	59°11,32N
21	36°40,72W-	59°13,41N
22	36°14,31W-	59°51,82N
23	36°11,81W-	59°54,93N
24	35°48,31W-	60°24,04N
25	35°40,79W-	60°32,50N
26	35°35,29W-	60°38,68N
27	35°29,12W-	60°45,97N
28	35°23,97W-	60°52,69N
29	35°16,10W-	61°03,44N
30	35°15,01W-	61°04,94N
31	34°58,97W-	61°26,98N
32	34°55,00W-	61°33,96N
33	34°09,00W-	62°11,96N
34	32°30,00W-	62°39,96N
35	30°51,80W-	63°18,76N
36	30°40,03W-	63°06,46N
37	30°37,93W-	63°03,21N
38	30°36,82W-	63°01,87N

39	30°32,79W-	62°58,14N	52	27°29,26W-	60°59,14N	65	23°12,56W-	60°12,74N
40	30°15,78W-	62°37,92N	53	26°27,22W-	60°41,93N	66	23°08,70W-	60°12,06N
41	30°14,52W-	62°40,54N	54	26°23,37W-	60°41,06N	67	22°56,66W-	60°09,89N
42	30°10,64W-	62°36,75N	55	25°21,20W-	60°29,76N	68	22°49,31W-	60°09,17N
43	30°06,42W-	62°34,03N	56	25°17,15W-	60°29,19N	69	21°53,32W-	60°02,07N
44	29°54,02W-	62°15,73N	57	24°25,66W-	60°25,23N	70	21°49,40W-	60°02,07N
45	29°51,90W-	62°13,90N	58	24°18,83W-	60°24,67N	71	21°46,02W-	60°01,93N
46	29°14,00W-	61°46,55N	59	24°11,62W-	60°23,50N	72	21°33,08W-	60°01,35N
47	29°11,31W-	61°44,90N	60	24°07,21W-	60°24,01N	73	26°29,08W-	55°45,89N
48	28°21,02W-	61°18,95N	61	23°58,11W-	60°21,29N	74	26°60,00W-	53°25,19N
49	28°15,87W-	61°16,72N	62	23°51,61W-	60°20,04N			
50	27°47,49W-	61°06,47N	63	23°23,90W-	60°14,63N			
51	27°32,73W-	61°00,30N	64	23°20,04W-	60°13,99N			

Part of this proposed area falls within Iceland's Extended Continental Shelf claim. The eastern portion of this original proposed area still falls within an Area Beyond National Jursidiction (ABNJ).

The size of the proposed area is 595467 km^2.

Feature description

a) Physical Description

The proposed EBSA on the Reykjanes Ridge south of Iceland is a part of the Mid-Atlantic Ridge that runs the length of the Atlantic and within the OSPAR area runs from Iceland to the Azores. The entire Reykjanes Ridge forms a hard-bottomed substrate, rising up from the abyssal plain, which acts to provide a wide range of benthic habitats and is colonised by a variety of erect megafauna (e.g. gorgonians, sponges and cold-water corals) (Copley et al. 1996). In addition to this Reykjanes Ridge acts to separate the warmer waters of the Iceland Basin from the cooler waters of the Irminger Basin forming a hydrographic boundary in the mesopelagic realm (Fock and John 2006; Gislason et al. 2007). There is a strong relationship between larval fish communities and hydrography and topography, which is largely determined by the Reykjanes Ridge (Fock and John 2006). Larvae are retained above the Ridge by a branching current from the North Atlantic Current due to the Coriolis effect (Fock and John 2006). Therefore this area should be considered important for both its benthic and surrounding water column features.

b) Biological Communities

The proposed area includes deep-sea sponge aggregations, seamount habitats and potentially *Lophelia pertusa* reefs, which are listed as priority threatened or declining habitats by OSPAR (OSPAR Commission 2003). It includes cold water coral and sponge reefs and seamount habitats that qualify as Vulnerable Marine Ecosystems in relation to high seas fisheries according to criteria developed by FAO (FAO 2007, Rogers et al, 2008). It also contains seamount communities and coral and sponge aggregations, habitats listed as examples of ecologically or biological significant marine areas according to criteria developed by the CBD for identifying candidate sites for protection on the high seas (UNEP 2007).

Evidence of Cold-water Corals

Cold-water corals within the proposed area have not been studied in great detail. However, two studies, indicate that cold water corals are very likely to be present within the proposed area. Mortensen et al (2008) used video surveys to study an area of the Mid-Atlantic Ridge between 42^o and 53^o N (south of the proposed area). They found cold-water corals at every sample station (Mortensen et al, 2008). Corals were observed at depths between 800 and 2400m, however were commonly found shallower than 1400m (Mortensen et al, 2008). Many coral taxa were observed during these research dives, with species richness being very high (approximately 40 different species) (Mortensen et al, 2008). Living *L. pertusa* was repeatedly observed on the seamounts sampled, however no major reef structures were recorded, with the maximum colony size approximately 0.5m in diameter (Mortensen et al, 2008). The number of coral taxa was strongly correlated with the percentage cover of hard bottom substrate (Mortensen et al, 2008), indicating the importance of the

Mid-Atlantic Ridge as a whole for cold-water corals. The diversity of megafauna was higher in areas with coral than those without. It is unknown whether this was directly in relation to coral being present or simply the presence of hard bottom substrate suitable for colonisation (Mortensen et al, 2008). Either way though, the Reykjanes Ridge also provides hard bottomed substrate suitable for colonization within the area proposed and is likely to have higher megafaunal diversity than the surrounding abyssal plain region.

Hareide & Garnes (2001) conducted experimental long-line surveys between 60^o and 61^{o}N on the Reykjanes Ridge. At depths of approximately 1600m the largest catches were made on and in the vicinity of corals, with coral-free areas having extremely small catches by comparison (Hareide & Garnes, 2001). These two studies both indicate that cold-water corals should be present within the proposed area and that they may be *L. pertusa* reefs or other cold-water coral species, which are similarly vulnerable. They also both clearly demonstrate that there is an increase in megafaunal and fish species in the vicinity of these cold-water corals, as has been found in many other studies in other areas of the North-East Atlantic (Jensen & Frederiksen, 1992; Mortensen et al, 1995; Rogers, 1999; Freiwald, 2002; Hall-Spencer et al, 2002; Husebø et al, 2002; Costello et al, 2005; Henry & Roberts, 2007).

Evidence for Deep-Sea Sponge Aggregations

A relatively old study by Magnússon & Magnússon (1995) reported that the Reykjanes Ridge was very difficult for bottom trawling mainly due its irregular bottom topography with numerous peaks and rifts. On both sides of the Ridge huge quantities of sponges were found in some places, whilst in others the area was dominated by loose mud (Magnússon & Magnússon, 1995). The 4th cruise of “Akademik Mstislav Keldysh” (1982), in the area between 58^{o}03’N and 58^{o}52’N, and between 24^{o}09’W and 31^{o}52’W, yielded an extensive collection of benthic fauna (Mironov & Gebruk, 2006). The mud recovered during sampling was full of sponge spicules (Kuznetsov & Detinova, 2001; Mironov & Gebruk 2006), which along with the sponges themselves have been shown to be related to increases in the abundance and richness of macro and megafauna in other parts of the deep North East Atlantic (Rice et al, 1990; Bett & Rice, 1992). Sponges were also observed from a submersible in high densities, particularly *Geodia* species, reaching 20 – 30 specimens per m^2, with an estimated biomass of 1.0 and 1.5 kg/m^2 (Kuznetsov & Detinova, 2001).

In other areas of the Mid-Atlantic ridge rich hexactinellid sponge communities or ‘gardens’ have been observed around the Charlie Gibbs Fracture Zone and the associated seamounts (Felley et al, 2008; ICES, 2007a; Tabachnick & Collins, 2008). Sampling was concentrated around this area, so it is not known whether similar areas exist on Reykjanes Ridge (Tabachnick & Collins, 2008). The findings of Tabachnick & Collins (2008) suggested a relatively rich hexactinellid fauna, with several novel findings, for this part of the Mid-Atlantic Ridge and indicate that this fauna has been poorly investigated in the past. The presence of rich sponge fauna south of the area proposed here combined with the reports of large quantities of sponge within the proposed area suggest that there may be similarities in terms of species richness of deep-sea sponges. Clearly there is a paucity of information. However, given what is known about the rest of the proposed area’s ecosystem, application of the precautionary principle in this instance may be warranted.

Planktonic Communities

The Reykjanes Ridge acts to retain two populations of the planktonic copepod Calanus finmarchicus which is thought to form the basis of many food webs within the North-East Atlantic (Gislason et al, 2007; Gislason et al, 2008). C. finmarchicus is considered to be one of the most important components of the zooplankton in the waters around Iceland, where it is usually by far the most abundant in terms of biomass (Speirs et al, 2005; Gislason et al, 2007). It has a widespread distribution over the North Atlantic and its highest population densities occur in the Norwegian Sea gyre and the Labrador/Irminger Sea gyre (Speirs et al, 2005). As such in these areas this copepod forms a critical part of the diet of the larval stages of many important commercial fish stocks (Speirs et al, 2005).

Fish Species

Much of the information about fish species on the Reykjanes Ridge comes from literature that focuses on their exploitation, the history of which is given in a little more detail in the next section. Within the proposed area there have been fisheries for several different deep water species. These include:

- **Oceanic Redfish** (*Sebastes mentella*), a commercially important species, inhabit the entire oceanic area of the Irminger Sea (Magnússon and Magnússon 1995) and has been targeted since early 1980's (Sigurdsson et al. 2006). The oceanographic conditions brought about by the Reykjanes Ridge acts as the boundary for the distribution of *S. mentella* to the east (Magnússon and Magnússon 1995). The production of larvae by *S. mentella* however takes place in the eastern part of the Irminger Sea extending southwards from 65°N and eastwards from 32°W along the Reykjanes Ridge (Magnússon and Magnússon 1995), and part of this area is included within the proposed boundaries. Spawning occurs between April and May (Magnússon and Magnússon 1995). The Reykjanes Ridge is therefore vital in maintaining conditions suitable for the survival of larval fish and maintenance of adult fish abundances (Fock and John 2006) and important copepod populations (Gislason et al. 2007) as well as acting as a spawning site for the commercially important redfish, *S. mentella* (Magnússon and Magnússon 1995).

- **Roundnose grenadier** (*Coryphaenoides rupestris*), was fished for on seamounts of the northern Mid-Atlantic Ridge between 46 and 62^{o}N in 1973 by USSR trawlers and subsequently there has been a sporadic fishery by Russia, Latvia, Poland and Lithuania (ICES, 2007b; ICES, 2011). Recent Russian trawl acoustic surveys have indicated that this species' distribution over the northern Mid-Atlantic Ridge has changed considerably since the 1970s and 1980s, and the biomass of the pelagic component is much smaller than previously found (ICES, 2007b).
- **Blue ling** (*Molva dypterygia*) was found on a seamount of the Reykjanes Ridge by French trawlers in 1993 (ICES, 2007b). Catches declined sharply after fishing began in 1993 and nothing further was reported by French vessels (ICES, 2007b). A fishery was resumed on the seamount in the 2000s, with the biggest reported catch of blue ling being 1000t (ICES, 2007b). More recent data about this species has not been found. Areas where spawning aggregations of blue ling have been found are currently closed by NEAFC during spawning season (NEAFC;Recommendation X:2010).
- **Orange roughy** (*Hoplostethus atlanticus*) is known to occur in restricted areas of the Reykjanes Ridge, where it can be abundant on the tops and the slopes of underwater peaks (ICES, 2007b; ICES, 2011). The most recent ICES advice is for no directed fisheries for this species and measures to minimize bycatch should be taken (ICES, 2011). However, it is known that a Faroese trawl fishery for this species is taking place in the Mid-Atlantic Ridge area (ICES, 2011). Exactly where this fishery is occurring it is not known(ICES, 2011)., but it is within the proposed area
- **Tusk** (*Brosme brosme*) was first exploited in 1996 by a small fleet of Norwegian longliners also targets redfish (ICES, 2007b). The fishery occurred mainly on the summits of seamounts along the Reykjanes Ridge (ICES, 2007b).
- **Mesopelagic fishes.** Surveys have shown that an extensive deep-scattering layer (DSL) exists in the area that extends beyond the western and eastern boundary of the proposed EBSA (Sigurdsson et al. 2002, Sutton and Sigurdsson 2008). The DSL is occurring mainly at depths between 300-800 m (Sigurdsson et al 2002). Sigurdsson et al (2002) reported 100 fish species in the area with Myctiphids are the most common group of organisms that are caught in a large pelagic trawl with 40 mm codend. The most common fish species (excluding the oceanic redfish) are *Lampanyctus macdonaldi, Notoscopelus kroeyeri, Lampadena speculigera*, *Benthosema glaciale* and *Myctophum punctatum*. Other common families of fish (most common species in parenthesis) are Bathylagidae (*Bathylagus euryops*), Stomiidae (*Chauliodus sloani*, *Stomias boa ferox, Borostomias antarcticus*), Serrivomeridae (*Serrivomer beani*), Melamphaeidae (*Scopelogadus beanii, Poromitra crassiceps*), Platytroctidae (*Normichthys operosus*, *Holtbyrnia macrops*, *Holtbyrnia anomala*, *Searsia koefoedi*).
-
- **Whale Species** North Atlantic Sightings Surveys (NASS) is a series of large scale international cetacean line transect surveys, conducted in 1987, 1989, 1995 and 2001, that covered a large

part of the central and eastern North Atlantic. The results of these surveys show that within the proposed there are area number of whales being observed with the fin whale/ *Balaenoptera physalus)* as the most abundant species but blue whales (*Balaenoptera musculus*) and minkey whale have also been reported. (Pike et al, 2009a, Pike et al 2009b, Vikingsson et al 2009)

In their most recent report about deep-sea fisheries ICES state that no data are currently available to assess the effects of localized depletions of seamount species on the Mid-Atlantic Ridge (ICES, 2011). ICES also state that little is known about the fish stocks that live on the Mid-Atlantic Ridge, but that given its relative isolation to other continental shelf areas fish stocks are probably isolated from others in the North Atlantic, making them vulnerable to overexploitation (ICES, 2011).

In general, deep-water fish species are known to be highly vulnerable to human disturbances as a result of their life history characteristics, i.e. long-lived, slow growing and low fecundity (e.g. Hall-Spencer et al, 2002; Devine et al, 2006; Fossen et al, 2008). As inshore fish stocks are depleted and technological advances are made with fishing gear, fisheries will begin to explore new grounds, even those that have previously been considered unfishable. Importantly, scientific investigation lags behind the collapse of deep-sea fisheries and few deep-sea fish species have even been evaluated by the World Conservation Union (IUCN) (Devine et al, 2006).

Shark & Ray Species

The seamounts of the northern Mid-Atlantic Ridge were surveyed between 43^o and 57^{o}N by Kukuev (2004), which is just outside the proposed boundaries. The species that were sampled by Kukuev (2004) consisted of approximately 20 elasmobranch species including **Frilled shark** (*Chlamydoselachus anguineus),* **Greenland shark** (*Somniosus microcephalus*), **Leafscale gulper shark** (*Centrophorus squamosus*), **Great lanternshark** (*Etmopterus princeps*) and the **Portuguese dogfish** (*Centroscymnus coelolepis*). Kukuev (2004) also reports two species, which are potential endemics to the northern Mid-Atlantic Ridge, the **White ray** (*Raja kukujevi*) and the **Azores dogfish** (*Scymnodalatias garricki*). In addition to this Hareide & Garnes (2001) reported catching the **Pale ray** (*Bathyraja pallida*) and **Richardson's Ray** (*Bathyraja richardsoni)*, for both of which few records exist.

Chondrichthyan fishes, including deep-water sharks and rays, in general have life history characteristics that include slow-growth, late maturity and a low reproductive output (Kyne & Simpfendorfer, 2007). In recognition of their sensitivity to human impact *C. squamosus, C. coelolepis* and *Centrophorus granulosus* (Gulper shark, not recorded in the proposed area) have all been accepted by OSPAR for inclusion on the OSPAR list of Threatened and/or Declining Species and Habitats by BDC/MASH 2007. Trade and landings data for deep-water sharks in general, is lacking and many deepwater species are taken as bycatch, often discarded or landed under generic species codes such as 'shark' or 'other', making investigations about the status of stocks difficult at best (Kyne & Simpfendorfer, 2007).

C. anguineus, *S. microcephalus* and *C. coelolepis* are listed as near threatened on the IUCN Red List (Paul & Fowler, 2003; Kyne et al, 2006; Stevens & Correla, 2003). *S. microcephalus* is an extremely long-lived and slow-growing deep water species of shark that was historically targeted for its liver oil by Norway, Iceland and Greenland (Kyne et al, 2006). In the 1910s catches for this species reached 32,000 sharks per year by Greenland alone and these fisheries are thought to have had a significant impact on this species (Kyne et al, 2006). *C. anguineus* and *C. coelolepis* are both mainly caught as bycatch by trawl, longline and gillnet fisheries and there is concern that the expansion of deepwater fisheries (both geographically and in depth range) will increase the rate of bycatch (Paul & Fowler, 2003; Stevens & Correla, 2003). Concern is especially high for *C. anguineus* as this species is generally one of the more uncommon deepwater shark species, which is only found in a few localities (Paul & Fowler, 2003). There are insufficient data to categorise *E. princeps* on the Red List, however it is known to be a small deepwater lantern shark found in North and Eastern Central Atlantic whose biology is essentially unknown (Herndon & Burgess, 2006). This species is caught as bycatch by deepwater trawlers over much of its range and may be under considerable fishing pressure. However, specific information is unavailable (Herndon & Burgess, 2006).

The three rare ray species that have been reported for the northern Mid-Atlantic Ridge (Hareide & Garnes, 2001; Kukuev, 2004) come from two families. *B. richardsoni* and *B. pallida* belong to the Family Arhynchobatidae (Softnose Skates) and *R. kukujevi* and belongs to the Family Rajidae (Hardnose Skates) (Kyne & Simpfendorfer, 2007). There is a high species diversity within the Arhynchobatidae Family. However, relatively little is known about their biology mainly due to their scattered distributions, deep occurrences (this family includes some of the deepest occurring chondrichthyans), taxonomic uncertainty and limited material, meaning some species, such as those found in and near to the proposed area, are virtually unknown (Kyne & Simpfendorfer, 2007). Estimates from the limited information about Softnose skates suggests they can live up to 29 years and reach maturity at about 10 years (Kyne & Simpfendorfer, 2007), making them highly vulnerable to any human induced exploitation. There is considerably more information available about the Rajidae family than the Arhynchobatidae family, which is the most speciose of chondrichthyans, and contains the deepest occurring chondrichthyan species. However, the overall knowledge about this family is poor (Kyne & Simpfendorfer, 2007). The family on the whole conforms to the general life history traits of chondrichthyan species and therefore will also be highly vulnerable to exploitation. Both *B. pallida* and *B. richardsoni* are listed on the IUCN Red List of Threatened Species as being of least concern, due to their very deep depth ranges, which remain out of the range of most deep-water fishing activity (Kulka et al, 2007; Orlov, 2007). However, both were caught during experimental fishing along the Mid-Atlantic Ridge and therefore they can be considered vulnerable to deep-water fishing in the area. Indeed the whole of their depth range is now reachable with longline gear. *R. kukujevi* is not listed on the IUCN Red List

c) Role in the Ecosystem

Reykjanes Ridge plays an important role within the open ocean ecosystem. The lack of terrigenous nutrient input to the open ocean means that productivity is generally low and the deep-sea fauna found there are reliant on the limited local surface water primary production (Fossen et al, 2008). The complex hydrographic setting and the presence of Reykjanes Ridge itself leads to enhanced vertical mixing and turbulence, resulting in areas of increased productivity over the Ridge (Falkowski et al, 1998; Fossen et al, 2008; Heger et al, 2008). This increased biological productivity means that Reykjanes Ridge is likely to have a greater abundance and diversity of fauna than the surrounding open ocean and abyssal plains (Sutton et al, 2008).

In addition to increased biological productivity Reykjanes Ridge acts to separate the warmer waters of the Iceland Basin from the cooler waters of the Irminger Basin forming a hydrographic boundary in the mesopelagic realm (Fock and John 2006; Gislason et al. 2007). There is a strong relationship between larval fish communities and hydrography and topography, which is largely determined by Reykjanes Ridge (Fock and John 2006). Larvae are retained above the Ridge by a branching arm from the North Atlantic Current due to the Coriolis effect (Fock and John 2006). Reykjanes Ridge also acts to separate and retain two populations of the planktonic copepod *Calanus finmarchicus*, which is one of the most important components of the zooplankton in the NE Atlantic (Heath et al, 2000; Gislason et al, 2007). *C. finmarchicus* is a major prey item of the larval stages of many commercially important demersal (e.g. haddock) and pelagic (e.g. redfish) fish species and baleen whales (Speirs et al 2005; Gislason et al 2007). Amongst the highest *C. finmarchicus* population densities in the north east Atlantic occur in the Irminger Sea as a result of the hydrographic conditions created by the presence of the Reykjanes Ridge (Speirs et al. 2005). The influence that the Reykjanes Ridge has in retaining the two populations of *C. finmarchicus* in suitable conditions is therefore of direct importance to the food webs of this area.

Not only is Reykjanes Ridge important for the hydrography and the pelagic ecosystem of the surrounding area, but it is also an important hard-bottomed substrate. This Ridge rises up from the abyssal plain and provides a wide range of benthic habitats and is colonised by a variety of erect megafauna (e.g. gorgonians, sponges and cold-water corals) (Copley et al. 1996). The recent MAR-ECO project cruise completed video surveys along the Mid-Atlantic Ridge from approximately 42^{o}N to 53^{o}N and found cold-water corals at all sites (Mortensen et al. 2008). It can therefore be inferred that cold-water corals occur along the Reykjanes Ridge providing further support to past studies (e.g. Copley et al. 1996). There is also evidence from experimental trawling of the Reykjanes Ridge that sponge communities inhabit the flanks and summits of the Ridge (Magnússon & Magnússon, 1995).

The fauna found on the continental shelves off southern Iceland and the Azores occupy different biogeographical subdivisions (Mironov & Gebruk, 2006). The Mid-Atlantic Ridge between these two shelf regions is considered to have different biogeographic regions, the northern, the southern and the transition zone around the Charlie-Gibbs Fracture Zone (O.A. Bergstad, pers. comm.). Although there are gaps in the knowledge regarding exactly what fauna is present on Reykjanes Ridge, it is thought that this area will contain representative fauna for the area north of the Charlie Gibbs Fracture Zone.

d) Data & Model Availability

Mid-ocean ridges are vast features of all oceans (Heger et al, 2008; Hosia et al, 2008). Despite their importance, their fauna and ecological significance remain poorly understood, mainly because ridge studies in the past have concentrated on chemosynthetic ecosystems (Bergstad et al, 2008). The majority of information and data used in this proposal came from the results of the MAR-ECO project mentioned above. Many papers have been published, some early on in the project (Fock et al, 2004; Holland et al, 2005; Sanamyan & Sanamyan, 2005; Vinogradov, 2005; King et al, 2006; Fock & John, 2006; Fossen & Bergstad, 2006; Priede et al, 2006; Vecchione & Young, 2006; Young et al, 2006a, b), others, after substantial field research, were published in the journal Deep-Sea Research II (see reference list) and others have been published in Marine Biology Research (Bergstad & Gebruk, 2008; Brandt & Andres, 2008; Dilman, 2008; Gebruk, 2008; Gebruk et al, 2008; Martynov & Litvinova, 2008; Mironov, 2008; Molodtsova et al, 2008; Murina, 2008; Tabachnick & Collins, 2008; Zezina, 2008). In that one issue of Marine Biology Research 15 new species and a new genus were described, which represented about 10% of the total number of benthic species sampled during the expedition (Gebruk et al, 2008). Some specimens were recorded in the North Atlantic for the first time (Dilman, 2008; Zezina, 2008), others added information to records of species only recorded a few times before (Molodtsova et al, 2008).

Other data particularly that for commercial fish species has come from working papers produced by relevant ICES working groups. In the most recent report by the ICES Working Group on the Biology and Assessment of Deep-sea Fisheries Resources (WGDEEP) it was again stated that little is known and understood about fish stock structure along the entire length of the Mid-Atlantic Ridge (ICES, 2011). ICES (2011) do however, recognize that the Mid-Atlantic Ridge supports benthic habitats that are highly susceptible to damage by mobile bottom fishing gear and that fish stocks associated with such areas can be rapidly depleted.

Our knowledge of mid-ocean ridges is sparse at best, even with the MAR-ECO project ongoing many questions remain unanswered or partially answered (Bergstad et al, 2008). Ongoing monitoring and research is required, but as with any research it is very expensive (Hall-Spencer et al, 2002). The vulnerability of the deep-sea to human impacts may mean that much of the diversity that is as yet unknown could be lost before we can catalogue it, let alone protect it (Roberts, 2002).

Feature condition, and future outlook

It is unknown to what degree anthropogenic activities have impacted this part of Reykjanes Ridge. Past fisheries may have altered trophic levels and species dominances within the ecosystem. Indeed recent acoustic trawl surveys of a previously targeted species *C. rupestris* indicate that this species now aggregates much deeper than was found in the 1970s and 1980s (ICES, 2007b). However, the potential overall causes and effects of this are unknown. While some evidence of fishing impacts has been found in sections of the Mid-Atlantic Ridge south of the proposed area, this comprised lost long-lines rather than trawl marks on the seabed, which have been seen for areas of the European continental margin (Hall-Spencer et al, 2002; Mortensen et al, 2008).

The actual extent and severity of the impact that fishing and other human activities have had on Mid-Atlantic Ridge ecosystems is largely unquantified. Although Magnússon & Magnússon (1995a) reported that the Reykjanes Ridge is in general a very difficult area for bottom trawling because of its extremely irregular bottom topography, if the depletion of inshore stocks continues and fishing technology advances, deep-water habitats, such as the Reykjanes Ridge will become more threatened (Turner et al, 2001; Roberts, 2002). However the North East Atlantic Fisheries Commission (NEAFC), the RFMO for this area, has closed several large areas on the Mid-Atlantic Ridge to protect Vulnerable Marine Ecosystems (VME) on the High Seas of the North East Atlantic. The closures came into effect in April 2009 and will remain in effect until 2015, with a possibility of extension. One of these closures is on the northern Mid-Atlantic Ridge, or Reykjanes Ridge, with the co-ordinates:

Latitude	Longitude
59.75 °N	33.50 °W
57.50 °N	27.50 °W
56.75 °N	28.50 °W
59.25 °N	34.50 °W

There is no information regarding bioprospecting and the mining of minerals in the proposed area or for the Reykjanes Ridge as a whole. There are several un-named seamounts within the proposed area and seamounts may in the future be targeted by mining operations for their cobalt crusts (Probert, 1999). There is no information about the presence of such valuable minerals in the proposed protected area. The removal of habitat and release of sediment by mining can be expected to heavily impact the benthic fauna and their predators (Rogers, 2004). Currently bioprospecting of deep-ocean habitats is likely to focus on hydrothermal vent areas rather than seamounts (Glowka, 2003; Synnes, 2007) and cannot be categorised as a threat to the proposed areas at this time.

Scientific research will continue along the Mid-Atlantic Ridge. Plans for further field stages of the MAR-ECO program are to be focused south of the proposed area around the Sub-Polar Front (Bergstad et al, 2008). Protection of the area and the requirement for permits before research can be conducted may allow co-ordination of effort thereby conserving economic resources and vulnerable habitats that may be impacted by experimental trawling.

The effects of global scale processes such as climate change and ocean acidification are unknown, although it is likely that they will have an impact.

Assessment against CBD EBSA Criteria

Table 1. relation of each of the CBD criteria to the proposed area relating to the best available science. Note that a candidate EBSA may qualify on the basis of one or more of the criteria, the boundaries of the EBSA need not be defined with exact precision.

CBD EBSA Criterion	**Description**	**Ranking of criterion relevance** (please mark one column with an X)			
		Don't Know	**Low**	**Some**	**High**
Uniqueness or rarity	The 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**	

<table>
<tr><td colspan="6">Explanation for ranking
There is some evidence (explained above) to suggest the presence of several unique and rare species, although detailed investigations have only been conducted relatively recently, so it is possible that many other rare species exist in this area.</td></tr>
<tr><td>Special importance for life-history stages of species</td><td>Areas that are required for a population to survive and thrive</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking
There is evidence (explained above) that the Reykjanes Ridge is important in the life history of the calanoid copepod Calanus finmarchicus.</td></tr>
<tr><td>Importance for threatened, endangered or declining species and/or habitats</td><td>Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking
Several endangered and threatened shark and ray species have been found in the proposed area (details above). Also there is evidence for deep water coral and sponge communities, both of which have been described as threatened.</td></tr>
<tr><td>Vulnerability, fragility, sensitivity, or slow recovery</td><td>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</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking
Much more detail is given in the text above. Many of the fauna present in this area are deep sea fauna that have life history characteristics that make them particularly vulnerable to the effects of fishing. Seamount fish species have been shown in the past to be slow to recover from the impacts of fishing, as have other deep sea species. Commercial fishing on Reykjanes Ridge is thought to be of a low level at the moment, but ICES reports data gaps and there is always the possibility of fisheries developing as inshore stocks become depleted.</td></tr>
<tr><td>Biological productivity</td><td>Area containing species, populations or communities with comparatively higher natural biological productivity</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking
As compared to the surrounding open ocean, Reykjanes Ridge is an area of relatively high biological productivity, which in turn has lead to relatively high biological diversity in both the pelagic and benthic communities.</td></tr>
<tr><td>Biological diversity</td><td>Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking
There is evidence that the biogenic structures present on Reykjanes Ridge and the high biological productivity has caused relatively high levels of biological diversity (details given above).</td></tr>
</table>

Sharing experiences and information applying other international criteria (Optional)

CBD EBSA Criterion	Description	**Ranking of criterion relevance** (please mark one column with an X)			
		Don't Know	**Low**	**Some**	**High**
Dependency:	An area where ecological processes are highly dependent on biotically structured systems (e.g., coral reefs, kelp forests, mangrove forests, seagrass beds). Such ecosystems often have high diversity, which is dependent on the structuring organisms. Dependency also embraces the migratory routes of fish, reptiles, birds, mammals, and invertebrates.	**X**			
Explanation for ranking Paucity of data, it is possible that *Lophelia pertusa* reefs exist in the area, but given what is known it is unlikely that they will large biogenic structures.					
Representativeness:	An area that is an outstanding and illustrative example of specific biodiversity, ecosystems, ecological or physiographic processes				**X**
Explanation for ranking The Mid-Atlantic Ridge is represents communities that exist between the continental shelf of Iceland and the Charlie-Gibbs Fracture Zone but the level of detailed research on different communities within the area is lacking.					
Biogeographic importance:	An area that either contains rare biogeographic qualities or is representative of a biogeographic "type" or types, or contains unique or unusual biological, chemical, physical, or geological features				**X**
Explanation for ranking Reykjanes Ridge and it's biological communities are biogeographical distinct from other parts of the Mid-Atlantic Ridge.					
Structural complexity:	An area that is characterized by complex physical structures created by significant concentrations of biotic and abiotic features.				**X**
Explanation for ranking The Ridge provides structural benthic habitat in the middle of the Atlantic, other than seamounts the surrounding benthos is primarily abyssal plain.					
Natural Beauty:	An area that contains superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance.	**X**			
Explanation for ranking The area is below sea-level and very few people will be able to experience it's own unique beauty.					
Earth's geological history:	An area with outstanding examples representing major stages of Earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features.			**X**	
Explanation for ranking The Mid-Atlantic Ridge is a divergent tectonic plate boundary running the entire length of the Atlantic. In the OSPAR region it separates the Eurasion from the North American tectonic plate.					
[Other relevant criterion]					
Explanation for ranking					
[Other relevant criterion]					
Explanation for ranking					

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Maps and Figures

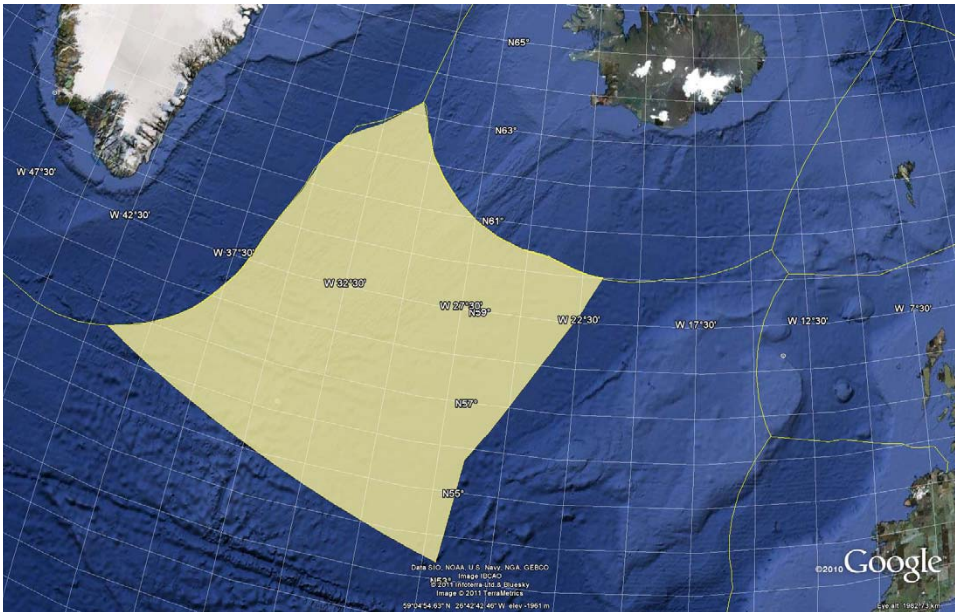

Figure 1. *Boundaries of the area proposed as an EBSA on the Reykjanes Ridge south of Iceland.*

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Joint OSPAR/NEAFC/CBD Scientific Workshop on the Identification of Ecologically or Biologically Significant Marine Areas (EBSAs) in the North-East Atlantic

Hyères (Port Cros), France: 8 – 9 September 2011

EBSA identification proforma for the North-East Atlantic - 2

Title/Name of the area – Charlie-Gibbs Fracture Zone and Sub-Polar Frontal Zone of the Mid-Atlantic Ridge

Presented by Callum Roberts*, Rachel Brown, Bethan O'Leary (University of York, U.K.) and reviewed by participants of the Joint OSPAR/NEAFC/CBD Scientific Workshop on the Identification of Ecologically or Biologically Significant Marine Areas in the North-East Atlantic

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Abstract

The Mid-Atlantic Ridge is not only the major topographic feature of the Atlantic Ocean within the OSPAR maritime area, but it is also an important benthic habitat and is integral to the circulation of the Atlantic Ocean. Several areas along the Mid-Atlantic Ridge have been protected with either bottom fishing closures (as Vulnerable Marine Ecosystems) and/or have been designated as OSPAR High Seas Marine Protected Areas in the last few years. Much of the data that has informed these decisions came from the MAR-ECO research project. This information is used again within this proposal to show that the productive frontal region around the Charlie-Gibbs Fracture Zone warrants recognition as an EBSA.

Introduction

The Mid-Atlantic Ridge (MAR) is the major topographic feature of the Atlantic Ocean extending within the OSPAR maritime area, from the Lomonossov Ridge in the Arctic Ocean to its southern boundary. The MAR is a slow-spreading ridge where new oceanic floor is formed, and western and eastern parts of the North Atlantic basin spread at a speed of 2-6cm/year. (Dinter, 2001;Heger *et al.,* 2008; Hosia *et al.,* 2008). Its shallower part is found south of Iceland and towards the Azores, both groups of islands being the top of ridge-associated seamounts.

Rising from bathyal and abyssal depths, the Mid Atlantic Ridge dominates the seafloor topography in the High Seas of the OSPAR region. The topography is highly differentiated with depths ranging from 4500 m in the deepest channel to only 700-800m on top of adjacent seamounts (Dinter, 2001). The relief of the axial part of the MAR is presented by systems of separated volcanic rocky mountains. More than 170 seamounts with summit depths less than 1500 metres were found in the northern part of the MAR between 43° and 60°N during Russian explorations in 1972-1984 (Shibanov *et al.* 2002). The majority of seamounts are concentrated in the central (rift) zone of the ridge and in the zone of the transversal (transformed) cracks. Intermountain slashes and smooth slopes are covered with irregular granular sand aleurite, silt, coral, shelly and benthos detritus (Shibanov *et al.* 2002 and literature therein). With its deep, sometimes abyssal valleys and intermittent shallow hills and islands, the ridge can be compared to a mountain chain on land. Apart from the rocky and mountainous areas, there are extensive areas of soft sediment (Feller *et al.* 2008) in particular at greater depth.

Ecologically, ridges are fundamentally different from both isolated seamounts surrounded by deep ocean and from continental slopes where effects of coastal processes are pronounced. They affect not only the availability of suitable habitats for benthic or benthopelagic species, but the topography also strongly shapes the habitat characteristics in the water column through modification of currents and production patterns (see *e.g.* Opdal *et al.*2008). The Mid-Atlantic Ridge has a profound role in the circulation of the water masses in the North Atlantic (Rossby, 1999; Bower *et al.*, 2002; Heger *et al.*, 2008; Søiland *et al.*, 2008). The complex hydrographic setting around the Mid-Atlantic Ridge in general and the presence of the ridge itself leads to enhanced vertical mixing and turbulence that results in areas of increased productivity over the MAR (Falkowski *et al.,* 1998; Heger *et al.,* 2008).

Despite generally limited surface production, there is evidence of enhanced near ridge demersal fish biomass above the Mid-Atlantic Ridge (Fock *et al.*, 2002; Bergstad *et al.*, 2008). There is also evidence that the mid-ocean ridges are ecologically important for higher trophic levels relative to the surrounding abyssal plains and the open ocean (*e.g.*, blue ling and roundnose grenadier spawning aggregations on the northern MAR (Magnusson & Magnusson 1995, Vinnichenko & Khlivnoy 2004).

This proposal concentrates on an area that is an especially complex section of the Mid-Atlantic Ridge (Søiland *et al.,* 2008) and as such is expected to be home to diverse and interesting deep-sea fauna (Tabachnick & Collins, 2008). From the north, the Reykjanes Ridge stretches southwestwards from Iceland to approximately 52^{o}N, where a major fracture zone known as the Charlie-Gibbs Fracture Zone (Felley *et al.,* 2008; Heger *et al.,* 2008) offsets the ridge by 5^{o} to the east and opens the deepest (maximum depth 4500m) connection between the northwest and northeast Atlantic (Felley *et al.,* 2008; Heger *et al.,* 2008; Mortensen *et al.,* 2008; Søiland *et al.,* 2008). South of the Charlie-Gibbs Fracture zone, two pronounced deep rift valleys at 32.25^{o}W and 31.75^{o}W (Opdal *et al.,* 2008) and two further fracture zones (Faraday and Maxwell Fracture Zones, at 50^{o}N and 48^{o}N respectively) create an enormous topographic –and fairly unknown – ecological complexity.

The general circulation in the epipelagic zone (0-200m) is well understood as the warm North Atlantic current flowing north-eastwards from the subtropical gyre in the southwest Atlantic towards the European shelf with two to four branches crossing the MAR between 45° and 52° N, approximately coinciding with the three fracture zones (Sy *et al.* 1992, Søiland *et al.*2008). The sub-polar front is created where the warm, saline North Atlantic water meets the cold, less saline water of the sub-polar gyre from the Labrador and Irminger Seas and is a permanent feature. The meandering of the sub-polar front between 48-53°N coincides with temporal variation in the character and spatial distribution of the water masses and frontal features (Søiland *et al.* 2008). This front is one of the major oceanic features in the OSPAR region, being an area of elevated abundance and diversity of many taxa, including a elevated standing stock of phytoplankton (Clark *et al.,* 2001; Gallienne *et al.,* 2001; Gaard *et al.,* 2008; Opdal *et al.,* 2008; Sutton *et al.,* 2008).

In the last few years, substantial new discoveries and new knowledge on the ecosystems of the northern part of Mid-Atlantic Ridge within the OSPAR maritime area have increased our understanding of this remote area. This is due to a cooperative, multinational, large scale investigation programme focussing on 'Patterns and Processes of the Ecosystem of the Northern mid-Atlantic', acronymed MAR-ECO, as part of the global

Census of Marine Life Initiative (Bergstad *et al.,* 2008a). Many scientific papers have been published in the years since the project's inception that span the ecological zones and taxonomic ranges of the MAR (Bergstad *et al.,* 2008a). Numerous new species have been discovered, information has been derived that has allowed taxonomic revisions, and species that were not known to exist in this region have been uncovered (Gebruk *et al.,* 2008). Despite the numerous publications the information remains preliminary and represents a first look at the Mid-Atlantic Ridge. Further field campaigns, such as the UK research programme EcoMar (http://www.oceanlab.abdn.ac.uk/**ecomar**) are ongoing, and more publications will follow (Bergstad *et al.,* 2008a). Much of the information used in this proposal is from recently published papers by scientists involved in the MAR-ECO project.

The Mid-Atlantic Ridge within the OSPAR maritime area is considered to have three different biogeographic regions. The MAR-ECO project studied these areas in their fieldwork, by targeting three clear areas in the northern, southern and Charlie-Gibbs Fracture Areas regions. Within the area proposed as the "Charlie-Gibbs Fracture Zone and Sub-Polar Frontal Zone of the Mid-Atlantic Ridge a large section of the Mid-Atlantic Ridge was established as an OSPAR marine protected area on 24 September 2010 by the OSPAR Ministerial Meeting in Bergen, Norway, i.e. the "Charlie-Gibbs South MPA".

Charlie-Gibbs South MPA as established by the OSPAR Ministerial Meeting in October 2010 with the following co-ordinates:

Latitude N	Longitude W
49,00 º	32,00 º
51,00 º	32,00 º
51,00 º	37,00 º
51,40 º	37,00 º
51,40 º	35,34 º
51,50 º	30,70 º
51,64 º	30,44 º
51,91 º	30,02 º
52,20 º	29,77 º
53,50 º	27,00 º
49,00 º	27,00 º
49,00 º	32,00 º

Furthermore NEAFC has designated in this area a closed area as a Vulnerable Marine Ecosystem, which will remain closed until 2015 (see Figure 1 for a map of the various designations).

Location

The area in question is defined by the following coordinates (see Figure 2 below). The area will encompass the Charlie-Gibbs Fracture Zone, the meandering Sub-polar Frontal Zone and the benthic communities of the Mid-Atlantic Ridge in this area.

The northern area of the proposed EBSA is subject to the submission of Iceland for an Extended Continental Shelf (see Figure 3).

Feature description

The Mid-Atlantic Ridge is a benthic feature and has important benthic habitats associated with it. However, as mentioned in the introductory section the MAR plays a fundamental role in circulation patterns of the area and so can also be considered a water column feature.

Benthic system

Ridges like the Mid-Atlantic Ridge provide a large variety of benthic habitats. The hard bottom areas are often colonised by erect megafauna such as gorgonians, sponges, hydroids, and black corals (Grigg, 1997). Mortensen *et al.* (2008) presume that to a large degree, the topography of the seabed controls the distribution of habitats along the Mid-Atlantic Ridge by providing different settings for sedimentation and retention of particulate matter. They found this illustrated by the accumulation of coral rubble near the bases of volcanic ledges, and deposits of pteropod shells on level sandy bottom some tens of metres away from rocky obstructions where currents will not sweep the light shells away. The topography also controls the current patterns and velocity (Genin *et al.*, 1986), and hence the transport rate and concentration of food particle for suspension feeders. For the benthic fauna, the Mid-Atlantic Ridge is a major barrier for east-west dispersal (see *e.g.* Mironov & Gebruk 2002, 2006). Gebruk *et al.* (2006) noted that in particular in the area south of the Charlie-Gibbs Fracture Zone 48% of the 150 identified species occurred only to the west of the ridge, whereas 19 % of the species were restricted to the eastern Atlantic. Likewise, the Charlie-Gibbs Fracture Zone acts as a barrier in north-south direction: The areas south and north of the Charlie-Gibbs Fracture Zone share only 27 % of the species (of the groups used as indicators). Due to the transition of water masses at 800-1000m depth there is also a vertical zonation of the bathyal fauna. Comprehensive sponge grounds are known to occur off south Iceland, especially on the Reykjanes Ridge (Klitgaard & Tendal 2004). *In situ* observations revealed that clumped patterns of distribution were the rule for soft-bottomed features in sediment-filled areas and for sessile organisms in rocky areas (Felley *et al.* 2008).

Cold water corals

The Reykjanes Ridge south of Iceland is an area where cold-water corals *(L. pertusa, M.oculata, S. ariabilis)* are frequently dredged (Copley *et al.* 1996). In Icelandic waters, most of the existing coral areas are found on the shelf slope and on the Reykjanes Ridge. In some of the shelf areas off south Iceland remains of trawl nets and trawl marks were observed, providing evidence of the effects of trawling activities (ICES ACE 2005). Until the MAR-ECO project cruise (2004), the coral records mainly came from the upper ridge at depths of less than 1000 m (ICES ACE 2005). Video inspections in the areas south and north of the Charlie-Gibbs Fracture Zone found cold water corals at all sites, at depths of 772-2355m, most commonly between 800 and 1400 m. 27 of the 40 coral taxa were octocorals among which the gorgonacea were the most diverse (Mortensen *et al.,* 2008). Molodtsova *et al.*(2008) found very little overlap in species composition of the coral fauna in the sampling areas north, near and south of the CGFZ. Mortensen *et al.* (2008) observed four of the coral taxa only in the Charlie-Gibbs Fracture Zone area. Otter trawls sampling at 826-3510 m depth came up with a bycatch of 10 coral taxa, and also the longlining experiments (433- 4200 m depth) brought up 11 coral taxa. *Lophelia pertusa* and *Solenosmilia variabilis* were found to act as the main structure corals, *Solenosmilia* was most common in the deeper parts of the study areas. All *Lophelia/Solenosmilia* colonies were relatively small with a maximum diameter of less than 0.5m. L*ophelia/Solenosmilia* were most common on the video of the north and central sample sites, but rare on video of the southern site. The video-observations indicated that the diversity of corals is higher in the southern than the middle and northern study areas. Bycatch of corals was recorded in bottom trawl and on longline from all areas, but most species were caught in the southern area. (Mortensen *et al.* 2008). The number of megafaunal species was higher in areas where corals dominated compared to areas without coral. Typical taxa that co-occurred with Lophelia were crinoids, certain sponges, the bivalve *Acesta excavata*, and squat lobster (Mortensen *et al.* 2008).

Demersal (benthopelagic) fish fauna

The actual number of demersal fish species depends on the fishing gear used and the definition of demersal" employed. In a review, Bergstad *et al.* (2008) estimate some 80 demersal fish species to occur on the northern MAR between Iceland and the Azores. The biogeography of the seamount-related fish fauna of the North Atlantic, caught mainly as bycatch in roundnose grenadier (*Coryphaenoides rupestres*) and alfonsino (*Beryx splendens*) trawls down to 1500 m depth in over 20 years of commercial exploitation by Russian fisheries, is described by Kukuev (2004). He accounts for 68 species of mainly mesobenthopelagic bathyal fishes associated to the seamounts of the northern MAR (45-55°N, *i.e.* within the proposed area), including 44 species of deepwater sharks such as Chlamydoselachidae, Pseudotriakidae, Scyliorinidae and Squalidae, including Leafscale gulper shark (*Centrophorus squamosus*), Gulper shark (*C. granulosus*) and Portuguese dogfish (*Centroscymnus coelepis*).

The biogeographic boundary of the Charlie-Gibbs Fracture Zone is also evident in the distribution of commercially relevant deep water fish (Hareide & Garnes 2001, Shibanov *et al.* 2002): North of 52 °N2, sub-Arctic species such as giant redfish (*Sebastes marinus)*, tusk (*Brosme brosme*) and Greenland halibut (*Reinhardtius hippoglossoides*) are dominant in longline catches. The largest catches of Greenland halibut were made at approximately 1600 m depth on and in the vicinity of coral reefs, catches were extremely small in coral-free areas. In the southern part (south of 48° N), subtropical species such as golden eye perch (*Beryx splendens*) and cardinal fish (*Epigonus telescopus*) are the dominant species. The area between 48 and 52 ° N is a region of faunal change with species mixtures according to the species-specific distribution limits. It was observed that all along the investigation area (43 – 61 °N) there was always one dominant species forming dense schools close to the top of seamounts: In the north, this is redfish (*Sebastes marinus*), between 53 and 46 °N this niche is taken by roundnose grenadier (*Coryphaenoides rupestris*) and south of 46 °N by goldeneye perch (*Beryx splendens*). The authors report about the quick exhaustion of redfish and alfonsino when commercially fished in the early 1990s and speculate about a changing balance between the species of the fish community. King *et al.* (2006) confirm the biogeographic zones, however emphasize the importance of the Charlie-Gibbs Fracture Zone and the sub-polar Front for the location of the split between northern and transitional communities.

Pelagic system

The pelagic productivity of the northern part of the Mid-Atlantic Ridge (Reykjanes Ridge) and nearby areas (Irminger Sea and Iceland Basin), which form a part of the offshore North Atlantic Ocean, is considered to be very high (Gjøsæter & Kawaguchi, 1980; Magnusson,1996), in particular when compared to the region north of the Azores (*i.e.* Longhurst 1998). More or less continuous deep-scattering layers exist in the area (mostly at 300–800 m depth) consisting of a great variety of organisms, including a large stock size of the commercially important pelagic redfish, *Sebastes mentella* (Travin, 1951; Magnusson, 1996; Anonymous, 1999; Sigurdsson *et al.*, 2002; Anderson *et al.*, 2005; Gislason *et al.*, 2007). Abundant taxa in these layers are, for example, fishes belonging to the family of Myctophidae and various species of shrimps, euphausiids, cephalopods and medusae (Magnusson, 1996). Zooplankton (mainly copepods) is a very important part of the diet of small mesopelagic oceanic fish (Mauchline & Gordon, 1983; Roe & Badcock, 1984; Sameoto, 1988). The *Sebastes mentella* stock also mainly feeds on zooplankton, of which euphausiids, chaetognaths, amphipods and gastropods are most important. Myctophids also form a part of their diet, although in much smaller quantities than the zooplankton (Magnusson & Magnusson, 1995; Petursdottir *et al.* 2008). Petursdottir *et al.* (2008) found this pattern confirmed in their 2003/4 investigations. Further up the food web, the abundance and biomass of deep demersal fishes showed a mid water maximum near the summit of the ridge (Bergstad *et al.* 2008), coinciding with the maximal deep-pelagic fish biomass, their prey, as reported by Sutton *et al.* (2008).

The dominant zooplanktonic organisms occurring throughout the water column were crustaceans, ctenophores, siphonophores, appendicularians, medusae and chaetognaths (Vinogradov 2005, Gaard *et al.* 2008, Stemman *et al.*2008, Youngbluth *et al.* 2008). The boreal copepod species *Calanus finmarchicus* is one of the most important components of the zooplankton in the North Atlantic as it is at the basis of one major food pathway in the pelagic ecosystem through to small mesopelagic fish and shrimp (Petursdottir *et al.* 2008) and baleen whales (Skov *et al.* 2008). The copepod directly transfers the energy taken up by feeding into egg production which is therefore used as an indicator of pelagic productivity. Nowhere along the Mid-Atlantic Ridge were the egg production rates higher than in the Charlie-Gibbs Fracture Zone and Subpolar front (Gislason *et al.* 2008). The Subpolar front acts as a biogeographic boundary for several species, reflecting vertically and horizontally the different water masses and this is also clearly reflected in the zooplankton community structure north and south of Charlie-Gibbs Fracture Zone (Hosia *et al.* 2008, Gaard *et al.* 2008, Stemmann *et al.* 2008). Topographically-induced aggregation mechanisms may play a crucial role in creating a suitable habitat for plankton feeders (Skov *et al.* 2008).

Fock & John (2006) indicate a strong relationship between the larval fish community and hydrography and topography, species richness being highest on the Mid-Atlantic Ridge proper and lowest in the adjacent Irminger Sea. Contrary to the adjacent basins, the distribution of fish larvae was shallower over the Mid-Atlantic Ridge, indicating that the Ridge does exert a measurable effect even on pelagic fauna.

Altogether 13 species of cetaceans, with 1,433 individuals were observed along the entire section of the Mid-Atlantic Ridge studied during the Mar-Eco cruise (Skov *et al.* 2008). About half of the individuals (727) belonged to 7 species of dolphins (Doksaeter *et al.* 2008): Two of the four most frequently observed species (pilot whale *Globicephala melas*, whitesided dolphin *Lagenorhynchus acutus*), occurred only north of the Charlie-Gibbs Fracture Zone, the other two species (common dophin *Delphinus delphis*), and striped dolphins *Stenella coeruleoalba*) were found in the warmer, more saline water south of the Charlie-Gibbs Fracture Zone. Dolphins tended to aggregate over the slope of the ridge, independent of water depth, following the distribution of their most important prey, various species of mesopelagic fishes and squid.

The ecosystem associated with the Mid-Atlantic Ridge seems to be of particular importance to sei (*Balaenoptera boralis*) and sperm whales (*Physeter macrocephalus*). The highest aggregations of baleen whales and especially sei whales (*B. boralis*) were observed north of and in relation to the CGFZ, which overlaps with earlier observations of Sigurjónsson *et al.*(1991) (in Skov *et al.* 2008). *B. boralis* in particular were most abundant over the slopes of steep seamounts and rises in water depths between 1500 and 3000 m, whereas *P.macrocephalus* were most common in waters shallower than 2000 m and often seen above high rising seamounts where they presumably found the best feeding conditions, *i.e.* the highest squid density (Nøttestad *et al.* 2005).

The MAR-ECO cruise provided a snapshot of seabird distribution along the Mid-Atlantic Ridge in summer 2004: 22 species of seabirds were identified, however only the northern fulmar (*Fulmarus glacialis*), great shearwater (*Puffinus gravis*) and Cory´s shearwater (*Calonectris diomedea*) were observed by the hundreds. The distribution of these species reflects the broad characters of water masses in the area (from Mar-Eco cruise report Nøttestad *et al.*2004) and in particular the boundary effect of the frontal zone and the limited nesting sites available only on the Azores and Iceland (Skov *et al.* 1994). *F. glacialis* were distributed along most of the study transect north of 47° N, and they were by far the most common species of seabird along the central and northern parts of the Mid-Atlantic Ridge. Densities were generally below 1 bird per km^2, and no large-scale concentrations were noted. However, discrete elevations in densities were recorded both in the Reykjanes and the Charlie-Gibbs Fracture Zone regions. *P. gravis* were observed only in the vicinity of the Subpolar front just north of the Charlie-Gibbs Fracture Zone. Most of the birds recorded were found in the area of the Subpolar front, where concentrations of both sitting and flying birds were observed. The largest flock seen was of 160 birds, but flock sizes were generally between 3 and 10 birds. Outside the frontal area *P. gravis* were mainly seen in singles. *C. diomedea* on the other hand is found only south of the *P. gravis* distribution area – usually not in flocks except for an area where warm Gulf Stream water surfaced. *C. diomedea* were commonly observed with cetaceans, most notably dolphins, but also with other species, *e.g.* sperm whales.

There is only anecdotal evidence on the observation of sea turtles over the Mid-Atlantic Ridge, in particular enhanced abundances over the Charlie-Gibbs Fracture Zone and Sub-polar front regions. The Leatherback turtle (*Dermochelys coriacea*) can be found foraging at oceanic fronts during their long trans-Atlantic migrations (Eckert, 2006). It occurs within the proposed region and feeds primarily on gelatinous zooplankton (Hays *et al.,* 2006; Doyle, 2007, Doyle et al, 2008), high concentrations of which have been recorded several times around the Charlie-Gibbs Fracture Zone and Sub-Polar front (Fock *et al.,* 2004; Youngbluth *et al.,* 2008). One study has tracked individuals to the Sub-Polar front area of the North East Atlantic, presumably to feed in this plankton rich environment (Ferraroli *et al.,* 2004; Hays *et al.,* 2004). It is probable therefore, that this species of turtle visits the proposed area to feed. *Caretta caretta* (Loggerhead turtle) is the most common sea turtle in the North-East Atlantic (Revelles *et al.,* 2007). No direct observations of this species have been made near the Charlie-Gibbs Fracture Zone. However, it is known to make trans-Atlantic migrations between nesting and foraging sites (Encalada *et al.,* 1998). It is possible that animals may stop to feed in the Charlie-Gibbs Fracture Zone during these migrations as noted for individual *D. Coriacea.*

Feature condition, and future outlook

Despite the remoteness of the Mid Atlantic Ridge, the area is not pristine. Starting in the early 1970s with Soviet/Russian trawlers the roundnose grenadier (*Coryphaenoides rupestris*), orange roughy (*Hoplostethus atlanticus*) and alfonsino (*Beryx splendens*) stocks of the Mid Atlantic Ridge were exploited (Shibanov *et al.* 2002, Clark *et al.* 2007, ICES 2007). It can be assumed that most hills along the ridge were at least explored (usually by midwater trawl close to the seafloor), and at least 30 seamounts were exploited for *C. rupestris*. After 1982, the targeted fishery for redfish developed, dwarfing the catches of roundnose grenadier. After the transition from Soviet to Russian fisheries, the Russian fishing effort and absolute catch on the MAR was significantly reduced, however catch per fishing day settled at relatively low levels end of the 1990s and the fishery was conducted only periodically (ICES 2007). The fishery on *C. rupestris* takes deepwater redfish (*Sebastes spp*), orange roughy (*H. atlanticus*), blackscabbard fish (*Aphanopus carbo*) and deepwater sharks as bycatch (Shibonov *et al.* 2002, Clark *et al.* 2007). In the 1980s, a significant longline fishery for tusk developed on the seamounts between 51 and 57° N.

In 1992, the Faroe Islands began a series of exploratory cruises for orange roughy (*H. atlanticus*), exploitable concentrations being found in late 1994 (annual catch 260 t) and early 1995 (1040 t), mostly on the Mid Atlantic Ridge. The (trawl) fishery took place on five features on the Mid Atlantic Ridge, incl. Faraday Seamount, and Hatton Bank. Catches peaked in 1996 at 1320 t, and since then have generally been less than 500 t (ICES, 2006, and Clark *et al.* 2007 and literature therein). The Faroese fishery was the only one of the many experimental fisheries in the 1080s and 90s from many countries which lasted more than a few years (Bergstad, pers. com.). Also the exploratory longline and trawl surveys on the MAR conducted by Norway between 1993 and 1997 (Hareide & Garnes 2001) were not further developed as the fishery did not seem economically viable: Already after one year of fishery for "giant" redfish, (*Sebastes marinus)* and two year of fishery for alfonsino (Beryx spp.), catch rates dropped drastically, indicating the limitations of the resource (ICES 1998 quoted in Hareide & Garnes 2001).

The actual scale of the impact that fishing and other human activities have had on the Mid-Atlantic Ridge is largely unquantified. Magnússon & Magnússon (1995a) reported that the Reykjanes Ridge section of the Mid-Atlantic Ridge is in general a very difficult area for bottom trawling mainly because of its extremely irregular bottom topography. They reported that on both sides of the ridge huge quantities of sponges can be encountered in some places and loose mud in others (Magnússon & Magnússon, 1995a). In 2004 fishing effort was recorded to a small extent over the Reykjanes Ridge and over Faraday seamount and more frequently above Hecate seamount (ICES, 2007a). In 2005, when the NEAFC fisheries closures in this area came into force, no bottom fishing was observed over the Reykjanes Ridge and Hecate seamount during the entire year, however fishing effort increased over Faraday seamount (ICES, 2007a).

Threats from future fishing activity to this area are high. As inshore stocks are depleted and fishing technology advances deep-water fish stocks in general are being increasingly exploited (Turner *et al.,* 1999; Roberts, 2002). Deep-sea fish species such as *H. atlanticus* and *C. rupestris* are long-lived and highly vulnerable to fishing. While catches early on in such fisheries can be highly rewarding and encourage increased effort, fishing soon leads to stock collapses such as those that have happened in the fisheries for *H. atlanticus* in New Zealand (Roberts, 2002).

There is no information available regarding prospecting for minerals from the seabed or bioprospecting in the Charlie-Gibbs Fracture Zone area. It is likely that both of these activities are more of a threat to areas of hydrothermal activity (Glowka, 2003; Synnes, 2007) on the Mid-Atlantic Ridge. Likewise tourism is a highly unlikely threat in this remote part of the Atlantic Ocean. Scientific investigations in the area will continue, and recognition of this area as an EBSA is likely to enable co-ordinated effort that can be sustainably conducted.

Assessment against CBD EBSA Criteria

Table 1. relation of each of the CBD criteria to the proposed area relating to the best available science. Note that a candidate EBSA may qualify on the basis of one or more of the criteria, the boundaries of the EBSA need not be defined with exact precision.

CBD EBSA Criterion	**Description**	**Ranking of criterion relevance** (please mark one column with an X)			
		Don't Know	**Low**	**Some**	**High**
Uniqueness or rarity	The 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 The MAR-ECO scientific investigations can be considered as a snapshot into this complex ecosystem. It is not known whether the proposed area contains unique/rare/endemic species. However, in terms of within the OSPAR area the proposed area is unique in the sense that it is part of the only mid-ocean ridge and has a distinct biogeography from the other parts present. However, the Charlie-Gibbs Fracture Zone is a unique feature in the North East Atlantic.					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive	**X**			
Explanation for ranking Not enough information is known about this area to rank this criterion. Although the northern MAR is considered to be a major reproduction area of roundnose grenadier (*Coryphaenoides rupestris*, see e.g.Vinnichenco & Khlivnoy 2004), and may be crucial for the reproduction of bathypelagic fish (Sutton *et al.* 2008).					
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 There is evidence for the presence of several species/habitats that are considered to 'Threatened and/or declining' by OSPAR. These include: Orange roughy (*H. atlanticus*) Deep sea sponge aggregations *Lophelia pertusa* reefs Seamount communities					
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 The proposed MPA on the Mid Atlantic Ridge through its associated substrate, current and feeding conditions, provides a habitat to a number of particularly sensitive/vulnerable species and communities both					

<table>
<tr><td colspan="6">on soft and hard substrate and in the water column. In particular deep water species such as orange roughy (H. atlanticus), and biogenic habitats such as formed by cold water corals and sponges are considered vulnerable, as often fragile, and slow (if at all) to recover due to slow growth, retarded maturity, irregular reproduction and high generation length, as well as community characteristics of high diversity at low biomass. This is an adaptation to stable, low food environments. Propagation and dispersal of larvae is largely unknown and therefore little can be said about a possible recovery of neither invertebrates nor fishes.</td></tr>
<tr><td>Biological productivity</td><td>Area containing species, populations or communities with comparatively higher natural biological productivity</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking
The pelagic productivity of the northern part of the Mid-Atlantic Ridge (Reykjanes Ridge) and nearby areas (Irminger Sea and Iceland Basin), which form a part of the offshore North Atlantic Ocean, is considered to be very high (Gjøsæter & Kawaguchi, 1980; Magnusson, 1996), in particular when compared to the region north of the Azores (i.e. Longhurst 1998). More or less continuous deep-scattering layers exist in the area (mostly at 300–800 m depth) consisting of a great variety of organisms, including a large stock size of the commercially important pelagic redfish, Sebastes mentella (Travin, 1951; Magnusson, 1996; Anonymous, 1999; Sigurdsson et al., 2002; Anderson et al., 2005; Gislason et al., 2007). Abundant taxa in these layers are, for example, fishes belonging to the family of Myctophidae and various species of shrimps, euphausiids, cephalopods and medusae (Magnusson, 1996).

The Sub-polar front is also an area of increased productivity within the north-east Atlantic.

The deep-pelagic ecosystem over the MAR is different from ‘typical’ open ocean regimes, at least in respect to fishes, in that there is a dramatic increase in fish biomass in the benthic boundary layer (0 to 200 metres above the seafloor) not seen in other areas (Sutton et al., 2008). The reason for this difference is thought to be the enlarged bathypelagic food sources that are available in the shallower depths of the Ridge as compared to the abyssal plains (Sutton et al., 2008).</td></tr>
<tr><td>Biological diversity</td><td>Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking
The recent MAR-ECO expeditions have reported a diverse and extensive range of taxonomic information regarding the benthos of the Mid-Atlantic Ridge in general (Bergstad & Gebruk, 2008). In this one expedition taxa have been found that are new to science, new to the geographic region and others that have contributed to taxonomic re-descriptions and revisions of known species (Gebruk et al., 2008). For example, the Hexactinellid fauna of the northern Mid-Atlantic Ridge has been poorly investigated in the past. Recent work has shown that it is relatively rich, with fourteen new species described in one report and similarities being found between the fauna in the Charlie-Gibbs Fracture Zone and the fauna of the Indian Ocean and Indo-Pacific (Tabachnick & Collins, 2008).

Increased diversity was also seen in the gelatinous zooplankton of the Mid-Atlantic Ridge. Visual observations of what appeared to be undescribed species were made in submersible dives along the entire length of the Mid-Atlantic Ridge (Youngbluth et al., 2008).

In comparison to adjacent abyssal plains and other studies from the North Atlantic, Sutton et al.(2008) found that the deep-pelagic fish assemblage along the entire Mid-Atlantic Ridge is taxonomically diverse, with 205 species from 52 families. Between 70 and 80 deep-water benthopelagic fish species were caught by Bergstad et al.(2008) during experimental trawls over the Mid-Atlantic Ridge. This sample was described by the authors as being a substantial subset of the demersal fish species listed by both Haedrich & Merrett (1988) and Kukuev (2004) for the North Atlantic deep sea. Bergstad et al.(2008) were unable to statistically compare the sites along the Mid-Atlantic Ridge that they sampled due to a lack of replication.

The diversity is extensive within the proposed MPA, but a full account is not yet available. Whether the proposed area has particularly high diversity is unclear.. The diversity of the Mid-Atlantic Ridge in general has been understudied, both in terms of the pelagic ecosystem (Youngbluth et al., 2008) and the benthos (Tabachnick & Collins, 2008). The findings of the MAR-ECO expedition have allowed glimpses into the structure and patterns of fauna there (Mortensen et al., 2008; Opdal et al., 2008) and have furthered our understanding of this important region (Gebruk et al., 2008).</td></tr>
</table>

Sharing experiences and information applying other international criteria (Optional)

CBD EBSA Criterion	Description	Ranking of criterion relevance (please mark one column with an X)			
		Don't Know	**Low**	**Some**	**High**
Dependency:	An area where ecological processes are highly dependent on biotically structured systems (e.g., coral reefs, kelp forests, mangrove forests, seagrass beds). Such ecosystems often have high diversity, which is dependent on the structuring organisms. Dependency also embraces the migratory routes of fish, reptiles, birds, mammals, and invertebrates.	**X**			
Explanation for ranking Not enough information is known.					
Representativeness:	An area that is an outstanding and illustrative example of specific biodiversity, ecosystems, ecological or physiographic processes				**X**
Explanation for ranking The Mid-Atlantic Ridge is the only mid-ocean ridge in the OSPAR maritime region and is representative of this type of geological feature (Dinter, 2001). The Charlie-Gibbs Fracture Zone is the only such feature in this area of the north-east Atlantic and as such could be described as representative of this type of feature in this region. The sub-polar front is also representative of a pelagic frontal system. The area is nominated for its importance as a section of the northern Mid Atlantic Ridge.					
Biogeographic importance:	An area that either contains rare biogeographic qualities or is representative of a biogeographic "type" or types, or contains unique or unusual biological, chemical, physical, or geological features				**X**
Explanation for ranking This area is being proposed as a biogeographically representative section of the northern MAR. Currently there are OSPAR High Seas MPAs covering the other biogeographic areas of the MAR. NEAFC has also created a closed area in this section of the MAR in recognition of the Vulnerable Marine Ecosystems in this area.					
Structural complexity:	An area that is characterized by complex physical structures created by significant concentrations of biotic and abiotic features.			**X**	
Explanation for ranking There is evidence for both deep sea sponge aggregations and cold-water corals within the proposed area. In addition to this the MAR represents the only extensive hard substrate available for propagation of benthic suspension feeders off the continental shelves and isolated seamounts.					
Natural Beauty:	An area that contains superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance.	**X**			
Explanation for ranking					
Earth's geological history:	An area with outstanding examples representing major stages of Earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features.	**X**			
Explanation for ranking					

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Maps and Figures

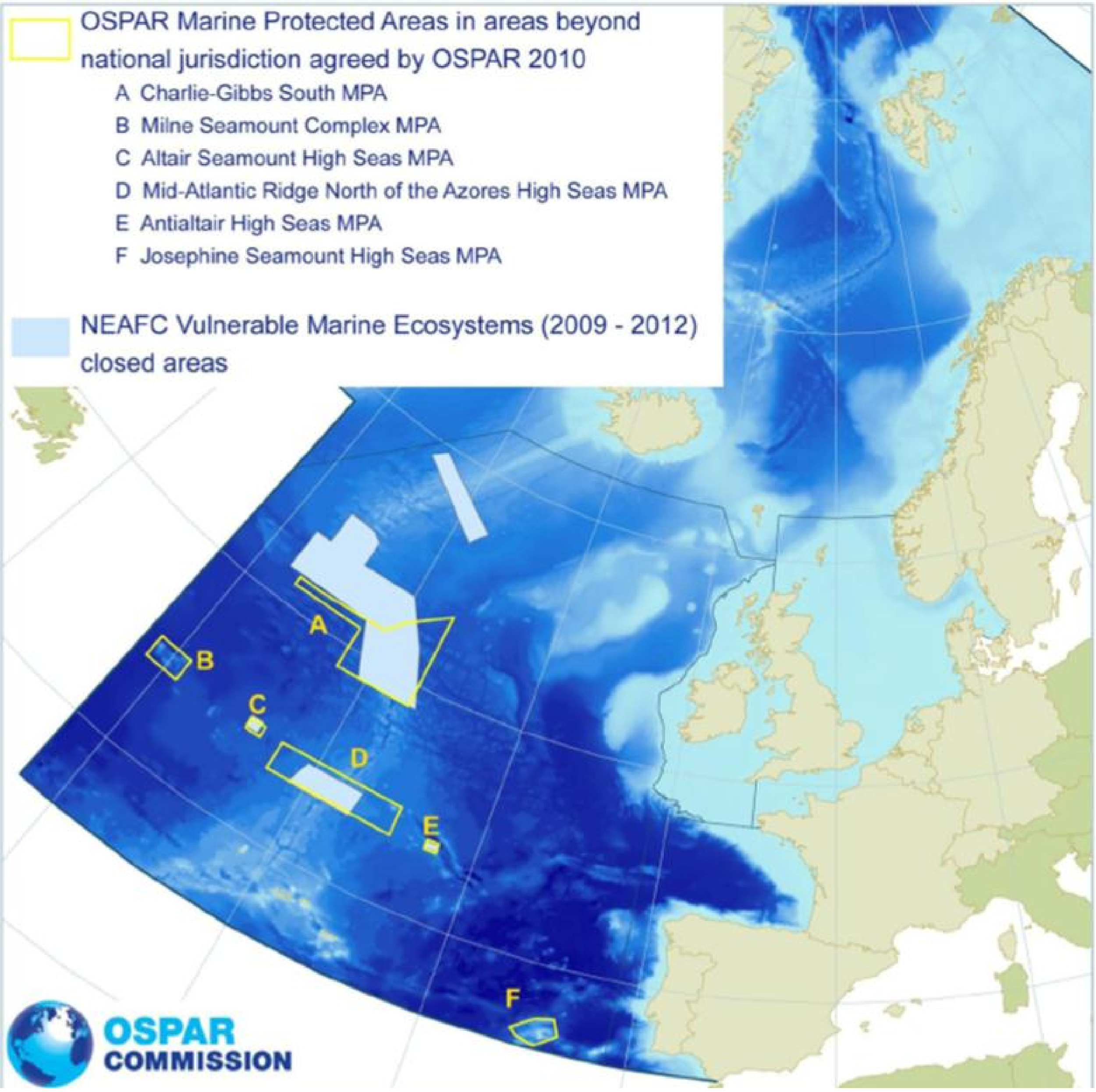

Figure 1. Designations within the OSPAR area for protection of deep-sea ecosystems.

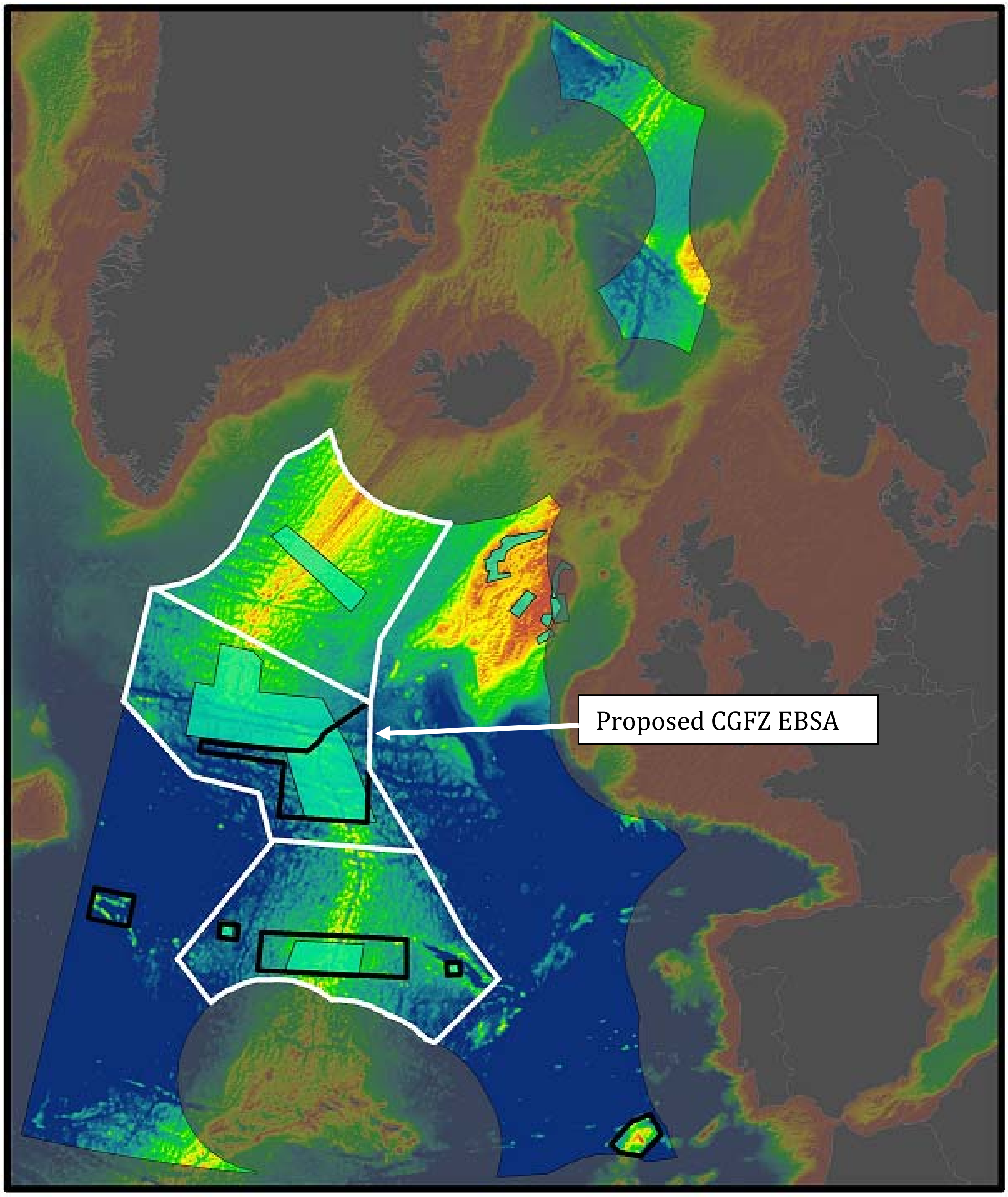

Figure 2. Mid-Atlantic Ridge EBSA boundaries (in white) discussed and decided upon by the working group. The middle area covers the features within this proposal. Bold black boundaries delineate current OSPAR MPA areas and light black boundaries with green infilling delineate NEAFC VME closures.

Joint OSPAR/NEAFC/CBD Scientific Workshop on the Identification of Ecologically or Biologically Significant Marine Areas (EBSAs) in the North-East Atlantic
Hyères (Port Cros), France: 8 – 9 September 2011

EBSA identification proforma for the North-East Atlantic - 3

Title/Name of the area – Mid-Atlantic Ridge North of the Azores

Presented by Ricardo Serrão Santos(University of the Azores) with contributions by Andrew Wheeler (University College Cork), Bramley J Murton (National Oceanography Centre, UK).

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Abstract

The Mid-Atlantic Ridge is not only the major topographic feature of the Atlantic Ocean within the OSPAR Maritime Area, but it is also an important benthic habitat and is central to the circulation of the Atlantic Ocean, influencing the pelagic environment and its biology. Several areas along the Mid-Atlantic Ridge have been protected with either bottom fishing closures (as Vulnerable Marine Ecosystems [VME]) and/or have been designated as OSPAR High Seas Marine Protected Areas in the last few years. Much of the data that has informed these decisions came from the MAR-ECO research project. This information is used again within this proposal to show that the Mid-Atlantic Ridge North of the Azores warrants recognition as an EBSA. In general terms the box selected is distinct in terms of biodiversity and, thus, biography from two other northern EBSA proposed for the MAR at northern latitudes. It comprises three OSPAR Marine Protected Areas, partly coincident with NEAFC VME, and the recently discovered deep-sea hydrothermal vent Moytirra.

Introduction

The Mid-Atlantic Ridge (MAR) is the major topographic feature of the Atlantic Ocean extending within the OSPAR Maritime Area, from the Lomonossov Ridge in the Arctic Ocean to its southern boundary, at the Azores Triple Junction. The MAR is a slow-spreading ridge where new oceanic floor is formed, and western and eastern parts of the North Atlantic basin spread at a speed of 28-33mm/year (Dinter, 2001; Heger et al., 2008; Hosia et al., 2008). Its shallower part is found south of Iceland and towards the Azores, both groups of islands being the top of ridge-associated seamounts.

Rising from bathyal and abyssal depths, the Mid Atlantic Ridge dominates the seafloor topography in the High Seas of the OSPAR region. The topography is highly differentiated with depths ranging from 4500 m in the deepest channel to only 700-800m on top of adjacent seamounts (Dinter, 2001). The relief of the axial part of the MAR is presented by systems of separated volcanic rocky mountains. More than 170 seamounts with summit depths less than 1500 metres were found in the northern part of the MAR between 43° and 60°N during Russian explorations in 1972-1984 (Shibanov et al. 2002). The majority of seamounts are concentrated in the central (rift) zone of the ridge and in the zone of the transversal faults (fracture zones).

Intermountain troughs and smooth slopes are covered with irregular granular calcareous sand, silt, coral, shelly and benthos detritus (Shibanov et al. 2002). With its deep, sometimes abyssal valleys and intermittent shallow hills and islands, the ridge can be compared to a mountain chain on land. Apart from the rocky and mountainous areas, there are extensive areas of soft sediment in particular at greater depth.

Ecologically, ridges are fundamentally different from both isolated seamounts surrounded by deep ocean and from continental slopes where effects of coastal processes are pronounced. They affect not only the availability of suitable habitats for benthic or benthopelagic species, but the topography also strongly shapes the habitat characteristics in the water column through modification of currents and production patterns (see e.g. Opdal et al. 2008). The Mid-Atlantic Ridge has a profound role in the circulation of the water masses in the North Atlantic (Rossby, 1999; Bower et al., 2002; Heger et al., 2008; Søiland et al., 2008). The complex hydrographic setting around the Mid-Atlantic Ridge in general and the presence of the ridge itself leads to enhanced vertical mixing and turbulence that results in areas of increased productivity over the MAR (Falkowski et al., 1998; Heger et al., 2008).

Despite generally limited surface production, there is evidence of enhanced near ridge demersal fish biomass above the Mid-Atlantic Ridge (Fock et al., 2002; Bergstad et al., 2008). There is also evidence that the mid-ocean ridges are ecologically important for higher trophic levels relative to the surrounding abyssal plains and the open ocean (e.g., blue ling and roundnose grenadier spawning aggregations on the northern MAR (Magnusson & Magnusson 1995, Vinnichenko & Khlivnoy 2004).

In the last few years, substantial new discoveries and new knowledge on the ecosystems of the Mid-Atlantic Ridge within the OSPAR Maritime area have increased our understanding of this feature. This is due to a cooperative, multinational, large-scale investigation programme focussing on 'Patterns and Processes of the Ecosystem of the Northern mid-Atlantic' (MAR-ECO), as part of the global Census of Marine Life Initiative (Bergstad et al., 2008a). Many scientific papers have been published in the years since the project's inception that span the ecological zones and taxonomic ranges of the MAR (Bergstad et al., 2008a). Numerous new species have been discovered, information has been derived that has allowed taxonomic revisions, and species that were not known to exist in this region have been uncovered (Gebruk, 2008). Much of the information used in this proposal is from recently published papers by scientists involved in the MAR-ECO project (Boyle 2009).

The Mid-Atlantic Ridge within the OSPAR maritime area is considered to have three different biogeographic regions. The MAR-ECO project studied these areas in their fieldwork, by targeting three clear areas: one in the north, one in the middle (the Charlie-Gibbs Fracture) and the other in the southern, the MAR north of the Azores (Fig. 1).

This proposal is focusing on this last portion of the MAR and the pelagic waters above it (Fig 2).

Location

The area in question is located north of the Azores, it encompasses not only the MAR section but also two neighbouring seamounts: the Altair and the Antialtair.

Longitude	Latitude
-32.3105	48.1130
-24.1341	47.9112
-20.2176	43.1380
-23.4588	40.9074
-34.3991	41.9217
-36.3737	43.3207

Figure 2 (See Appendix) shows this original boundary.

This area of the Mid-Atlantic Ridge north of the Azores is almost all constituted by the Azores component of the Portuguese Continental Shelf (see Figure 2), is under national jurisdiction of this country (ISA 2010). The pelagic waters are High Seas, and thus are under international jurisdiction.

Feature description

The Mid-Atlantic Ridge is a range of underwater mountains and valleys that separates the Eurasian from the American plate as an active seafloor-spreading centre (Dinter 2001; Heger et al 2008). The southern section of the Mid-Atlantic Ridge within the OSPAR area has no connection to a major landmass, but the Azores plateau, at the Azores Triple Junction, constitutes a significantly more shallow area (Bergstad et al 2008b).

The dominant water masses over the Mid-Atlantic Ridge between Iceland and the Azores show three different hydrographic regimes (Pierrot-Bults, 2008; Søiland et al 2008). These regimes basically divide the pelagic environment into cold, sub-polar conditions north of the Sub-Polar Front; warm, sub-tropical conditions south of the Sub-Polar Front; and the frontal region itself which blends the characteristics of both areas (Søiland et al 2008). The faunal assemblages along the Mid-Atlantic Ridge from Iceland to the Azores appear to be determined by these major water masses.

The Mid-Atlantic Ridge North of the Azores archipelago has the highest concentration of seamount features on the Mid-Atlantic Ridge (Epp & Smoot, 1989), with the exception of the Azores (Morato et al. 2008a).

Seamounts are recognised in many different fora as being vulnerable to the effects of fishing pressure (e.g. UN, OSPAR, FAO, NEAFC, NAFO, UNEP). The area here is proposed as an EBSA not solely on the basis of the presence of seamounts, but as a representative section of the Mid-Atlantic Ridge habitat between the Azores and the Charlie-Gibbs Fracture Zone. However, the presence of seamounts within the area was also considered significant to justify protection for a particularly vulnerable ecosystem, considered as priority habitat under the OSPAR convention (OSPAR 2010a).

The recent discovery of a new hydrothermal vent field at 3000 metres depth on this region of the MAR (http://www.ryaninstitute.ie/hydrothermal-vent-ecosystem-discovered-at-mid-atlantic-ridge/) [Fig. 2 and 3] adds particular significance in terms of conservation. Mid-Ocean Ridges with hydrothermal vents are considered priority habitats under the OSPAR convention (OSPAR 2001b).

A significant amount of new information has been gathered about the Mid-Atlantic Ridge through the CoML MAR-ECO project (Boyle 2009). It emerged that the biogeography of the Mid North-Eastern Atlantic Ridge between Iceland and the Azores are defined in three distinct zones. It was also uncovered that the Sub-Polar Front acts as a barrier to many taxa at several trophic levels and habitats (Doksæter et al 2008).

Doksæter et al (2008) found that white-sided dolphins and to a certain degree pilot whales inhabited areas dominated by cold, sub-arctic water, whereas common and striped dolphins were found in the warmer, sub-tropical waters. Not only does species composition of dolphins change between these two water masses, but abrupt changes are also seen in fish (Hareide & Garnes, 2001, Bergstad et al 2008b, Fossen et al 2008, Sutton et al 2008), cephalopods (Gaard et al 2008) and zooplankton (Stemmann et al. 2008, Youngbluth et al. 2008) or at the meso- and bathypelagic scattering layers (Opdal et al. 2008).

The taxonomic structure of the bathyal benthic fauna is also different between the MAR North of the Azores and the neighbouring Charles Gibbs Fracture Zone area, particularly in what concerns echinoderms, sponges and anthozoa. Gebruk et al. (2010) mentions a turnover in the benthic bathyal fauna between the Charlie-Gibbs Fracture Zone and the Azores.

In terms of fishes, when the area between the Charlie-Gibbs Fracture Zone and the Azores, i.e. the wider MAR North of the Azores, was sampled, Rajella pallida (pale ray) was caught, providing the first record of this species for this area (Orlov et al 2006). Two newly born individuals of Rajella bigelowi (Bigelow’s ray) were also captured, indicating that the central Atlantic is part of their spawning ground (Orlov et al 2006). Fourteen specimens of Amblyraja jensei (Jensen’s skate) were recovered, which until this study were not known in the open waters of the Atlantic, and with other new data has suggested a continuous distribution for this species across the Atlantic (Orlov et al 2006).

In terms of migrating mesopelagic assemblages, the MAR North of the Azores (i.e. the Southern MAR-ECO box) is represented by high diversity (e.g. 29 lanterfish species) (Sutton et al. 2008), when compared with the northern box.

In terms of the benthic community, the Mid-Atlantic Ridge provides a significant amount of hard substrate in the open ocean of the OSPAR area (Dinter, 2001). In addition the hydrographic conditions over the Mid-Atlantic Ridge are thought to be favourable for sessile suspension feeders such as cold-water corals (Mortensen et al 2008). During ROV dives on the MAR-ECO box North of the Azores, Mortensen et al (2008) observed 28 different coral taxa (including Lophelia pertusa). Of those, seven were unique to the area (Madrepora oculata, Solenosmilia variabilis, Stephanocyathus moseleyanus, Scleroptilum grandiflorum, and three Radicipes species), as compared to sample sites around and north of the Charlie-Gibbs Fracture Zone (Mortensen et al 2008). The number of megafaunal taxa was higher in areas with coral than those without, a finding common to other regions (Mortensen et al 2008).

Hareide & Garnes (2001) studied the summit living species of seamounts along the Mid-Atlantic Ridge, they found that the dominant deep water fish species change with latitude. Sub-tropical species such as Golden-eye perch (Beryx splendens) and Cardinal fish (Epigonus telescopus) dominated the seamount summits in the MAR North of the Azores, and sub-polar species dominate those north of the Charlie-Gibbs Fracture Zone (Hareide & Garnes, 2001).

Fossen et al (2008) sampled the Mid-Atlantic Ridge between Iceland and the Azores in 2004 as part of the MAR-ECO expedition. In total 59 long-lines were set across the ridge axis at depths ranging from 400 to 4300 metres (Fossen et al 2008). Chondrichthyans (sharks, rays and chimaeras) dominated the catches overall, which was expected given the gear used (Fossen et al 2008). The southern sample station (in the area of this proposed EBSA) produced fish that were significantly larger than those of the other sample stations (Fossen et al 2008). The catches from here were mainly dominated by large chondrichthyans and at deeper stations, the large cusk eel (Spectrunculus spp.) (Fossen et al 2008). This pattern may indicate a more fundamental difference in production and biomass compared to other parts of the Mid-Atlantic Ridge, however the data available was not enough for a more detailed study (Fossen et al 2008).

Of the large shark species along the Mid-Atlantic Ridge Centrophorus squamosus and Centroscymnus coelolepis were both caught only in the area just north of the Azores (Fossen et al 2008). These two species are included on the OSPAR list of Threatened and/or Declining Species and Habitats by BDC/MASH 2007. The fact that this area was the only part of the Mid-Atlantic Ridge in which these species were caught during recent investigations, indicates that probably it is an important representative habitat in the OSPAR area. It is also likely that other deep-water shark species will be included on the OSPAR List of Threatened and/or Declining Species and Habitats in the near future given their life-history characteristics and their vulnerability to fishing impacts. The International Union for the Conservation of Nature (IUCN) Shark Specialist Group has assessed the threatened status of deepwater sharks globally. It concluded that all deepwater chondrichthyan species have limited productivity and therefore should be considered as having limited ability to sustain high levels of fishing pressure and will be slow to recover from overfishing (Kyne & Simpfendorfer, 2007).

Among birds, Cory's shearwater (Calonectris diomedea borealis) breeding in the Azores has been shown to forage over this region of the Mid-Atlantic Ridge (Magalhães et al, 2008). This species performs a dual-foraging strategy that combines short and long foraging trips. The majority of short trips were confined to the Mid-Atlantic Ridge just north of the Azores (within about 300km) (Magalhães et al, 2008). The core foraging areas for long-trips were areas of the Mid-Atlantic Ridge further north, including the designated area (Magalhães et al, 2008) [Fig. 4]. It appears that no birds make long foraging trips south of the Azores, which Magalhães et al (2008) suggest indicates that the Mid-Atlantic Ridge south of the Azores is less productive than that to the north. This section of the Mid-Atlantic Ridge, north of the Azores, is thought to have enhanced productivity in comparison to other open ocean areas, resulting from nutrient rich upwelling's and eddies, particularly in the vicinity of seamounts. Seamounts as described above are found in high concentrations on the Mid-Atlantic Ridge between the Azores and Charlie-Gibbs Fracture Zone (Epp & Smoot, 1989; Gubbay, 2003; Magalhães et al 2008). The breeding colony of Cory's shearwater found on the Azores represents more than 70% of the global breeding population of the Atlantic subspecies C. diomedea borealis (188,000 breeding pairs, Tucker & Heath, 1994).

The wider north-east Atlantic at Azores region was where Archie Carr found the lost year size class of the loggerhead turtle (Caretta caretta), breeding in Florida beaches. Loggerheads spend approximately 7-12 years around the MAR region having the Azores as a core area during their oceanic stage.

Sea turtles are known to use seamounts as a traveling points and feeding areas (Santos et at. 2007). Most of the by catch observations of sea turtles are around steep slopes of the seamounts and islands. Based on Santos et al. 2007 analysis, the slope of the area had the strongest influence on loggerhead CPUE.

Main threats to loggerheads are long line fisheries. These fisheries are targeting swordfish and blue shark, but they have relevant by catch of loggerheads.

Satellite tagged loggerhead turtles have shown to visit seamounts both north and south of the Azores. Some of the individuals that moved north have shown association with Altair seamount (Fig. 5), which is a component of this proposed EBSA.

Decadal observation data of tuna fisheries have shown that several species of epipelagic vertebrates are consistent visitors of seamount features of the Azores ZEE (Morato et al. 2008b). Unfortunately the same kind of information is not available for the high seas north of the Azores, but it may be expected that the seamounts there was exert the same type of attraction. The MAR North of the Azores was found to be highly rich in common dolphins (Doksæter et al. 2008), a species with strong affinity to seamounts and other ridge features in the Azores EEZ (Morato et al. 2008b).

Feature condition, and future outlook

Despite the remoteness of the Mid Atlantic Ridge, the area is not pristine. Starting in the early 1970s with Soviet/Russian trawlers the roundnose grenadier (Coryphaenoides rupestris), orange roughy (Hoplostethus atlanticus) and alfonsino (Beryx splendens) stocks of the Mid Atlantic Ridge were exploited (Shibanov et al. 2002, Clark et al. 2007, ICES 2007). It can be assumed that most hills along the ridge were at least explored (usually by midwater trawl close to the seafloor), and at least 30 seamounts were also exploited for C. rupestris. After 1982, the targeted fishery for redfish developed, dwarfing the catches of roundnose grenadier. After the transition from Soviet to Russian fisheries, the Russian fishing effort and absolute catch on the MAR was significantly reduced, although catch per fishing day settled at relatively low levels by the end of 1990s and the fishery was still conducted periodically (ICES 2007). The fishery on C. rupestris takes deepwater redfish (Sebastes spp), orange roughy (H. atlanticus), blackscabbard fish (Aphanopus carbo) and deepwater sharks as bycatch (Shibonov et al. 2002, Clark et al. 2007).

The scale of the impact that fishing and other human activities have had on the Mid-Atlantic Ridge is at present largely unquantified. A recent paper made is available information for the North East Atlantic but the scope was concentrated on the European margin (Benn et al, 2010).

In 2005, when the North-East Atlantic Fisheries Commission decided to close large areas to bottom fisheries in order to protect vulnerable ecosystems this included the Altair, the Antialtair and a larger area at the ridge North of the Azores (Fig. 1). Although slightly modified, all of them are now MPA under the OSPAR convention.

There is no information available regarding prospecting for minerals from the seabed or bio prospecting in MAR north of the Azores. However given the recent discovery of high temperature hydrothermal vent fields at 45ºN it is likely that the interest will increase as it is the case for the vents in the Azores EEZ and the mid-Atlantic Ridge south of the Azores. However, any planned operation, bio-prospection or exploration will be under the national law of Portugal.

Scientific investigations in the area will continue, and recognition of this area as an EBSA is likely to enable co-ordinated effort that can be sustainably conducted.

More then 90% of the seafloor is under the national decree law of the Azores Marine Park, recently approved at the Azores parliament. This Marine Park as integrated several OSPAR MPA, three of them, the Altair, the Antialtair and the MAR North of the Azores, beyond the Azores EEZ.

Assessment against CBD EBSA Criteria

Table 1. relation of each of the CBD criteria to the proposed area relating to the best available science. Note that a candidate EBSA may qualify on the basis of one or more of the criteria, the boundaries of the EBSA need not be defined with exact precision.

CBD EBSA Criterion	**Description**	**Ranking of criterion relevance** (please mark one column with an X)			
		Don't Know	**Low**	**Some**	**High**
Uniqueness or rarity	The 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

The Mid-Atlantic Ridge North of the Azores archipelago has the highest concentration of seamount features on the Mid-Atlantic Ridge (Epp & Smoot, 1989), if we exclude the Azores plateau.

During ROV dives under the MAR-ECO project, Mortensen et al (2008) observed 28 different coral taxa (including Lophelia pertusa). Of those, seven were unique to the area (Madrepora oculata, Solenosmilia variabilis, Stephanocyathus moseleyanus, Scleroptilum grandiflorum, and three Radicipes species). The number of mega faunal taxa was higher in areas with coral than those without, a finding common to other regions (Mortensen et al 2008).

In terms of migrating mesopelagic assemblages, the MAR North of the Azores is represented by high diversity of species.

Clark & Tittensor (2010), which created an index to assess the risk to stony corals by fisheries, considered the Azores and the MAR north of the Azores has one of the most relevant areas of the all oceans in terms of stony corals (Fig. 6)

A high-temperature hydrothermal vent field and associated seafloor massive sulphide deposit was recently discovered in the area (the Moytirra Vent Field: Wheeler, Murton et al., 2011: http://noc.ac.uk/news/scientists-explore-uncharted-deep-sea-vent-field) at 45° 23.406'N and 27° 54.898'W at a depth of 2995m field, during the VENTuRE Cruise on the Irish research ship R/V Celtic Explorer in 2011 (see Fig. 3).

Overall, the faunal assemblage at the Moytirra vent field shows some high-level taxonomic similarities to assemblages at other known Mid-Atlantic Ridge vent fields, but also some differences in assemblage structure. ROV dives at the Moytirra vent (Wheeler, Murton et al., 2011) identified three distinct morphotypes of alvinocaridid shrimp, which were observed on vent chimneys and on the valley wall above the vent edifices. Other crustacean identified included haustorid amphipods, and brachyuran crabs that are present on vent chimneys, the adjacent rift valley wall, and sulphide rubble at the base of vent edifices. Chordates observed at the vent field include zoarcid, macrourid, and ophidiid fish. Specimens of scale worms, terebellomorph, and spionid polychaetes, and peltospirid limpets, skeneid, and turrid gastropods were also collected. Microbial mats of at least two colours are widespread on the sulfides chimneys and on the

<table>
<tr><td colspan="6">exposed basalts of the rift valley wall above the vents.</td></tr>
<tr><td>Special importance for life-history stages of species</td><td>Areas that are required for a population to survive and thrive</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking

This area of the MAR was the only part where Centrophorus squamosus and Centroscymnus coelolepis were caught during the MAR-ECO cruise, indicates that probably it is an important representative habitat in the OSPAR area. It is also likely that other deep-water shark species will be included on the OSPAR List of Threatened and/or Declining Species and Habitats in the near future given their life-history characteristics and their vulnerability to fishing impacts.

Also during ROV dives on the MAR-ECO box North of the Azores, 28 different coral taxa (including Lophelia pertusa), where observed. Of those, seven were unique to the area (Madrepora oculata, Solenosmilia variabilis, Stephanocyathus moseleyanus, Scleroptilum grandiflorum, and three Radicipes species. The number of megafaunal taxa was higher in areas with coral than those without, a finding common to other regions (Mortensen et al 2008).

Among birds, Cory’s shearwater (Calonectris diomedea borealis) breeding in the Azores has been shown to forage over this region of the Mid-Atlantic Ridge (Magalhães et al, 2008). This species performs a dual-foraging strategy that combines short and long foraging trips. The majority of short trips were confined to the Mid-Atlantic Ridge just north of the Azores (within about 300km) (Magalhães et al, 2008). This section of the Mid-Atlantic Ridge, north of the Azores, is thought to have enhanced productivity in comparison to other open ocean areas, resulting from nutrient rich upwelling’s and eddies, particularly in the vicinity of seamounts. The breeding colony of Cory’s shearwater found on the Azores represents more than 70% of the global breeding population of the Atlantic subspecies C. diomedea borealis (188,000 breeding pairs, Tucker & Heath, 1994).

The wider north-east Atlantic at Azores region was where Archie Carr found the lost year size class of the loggerhead turtle (Caretta caretta), breeding in Florida beaches. Loggerheads spend approximately 7-12 years around the MAR region having the Azores as a core area during their oceanic stage. Sea turtles are known to use seamounts as a traveling points and feeding areas (Santos et at. 2007). Most of the by catch observations of sea turtles are around steep slopes of the seamounts and islands. Satellite tagged loggerhead turtles have shown to visit seamounts both north and south of the Azores. Some of the individuals that moved north have shown association with Altair seamount (Fig. 5), which is a component of this proposed EBSA.</td></tr>
<tr><td>Importance for threatened, endangered or declining species and/or habitats</td><td>Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species</td><td></td><td></td><td></td><td>X</td></tr>
</table>

<table>
<tr><td colspan="6">Explanation for ranking

Two newly born individuals of Rajella bigelowi (Bigelow’s ray) were also captured, indicating that the central Atlantic is part of their spawning ground (Orlov et al 2006)

The proposed area incorporates foraging areas by breeding Cory’s shearwater (C. diomedea) from the Azores (Fig. 4). The breeding pairs found on the Azores make up >70% of the total breeding population of the Atlantic subspecies C. diomedea borealis (Magalhães et al 2008).

In addition to the above there are records of Centrophorus squamosus and Centroscymnus coelolepis. (Fossen et al. 2008). Both of these shark species are included in the OSPAR list of Threatened and/or Declining Species and Habitats (BDC/MASH 2007).

Loggerhead turtles visit the seamounts north of the Azores.</td></tr>
<tr><td>Vulnerability, fragility, sensitivity, or slow recovery</td><td>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</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking

The area shows high abundance of seamounts, stony corals and coral gardens (Morato et al 2008, Clark & Tittensor 2010, OSPAR 2010a). Recently a new hydrothermal vent was discovered on the ridge at 45ºN. Seamounts (OSPAR 2010a), ocean ridges with hydrothermal vents (OSPAR 2010b), coral reefs and coral gardens (OSPAR 2010c) are all considered priority habitats in need of protection by the OSPAR convention for the protection and conservation of the North-East Atlantic.

Clark & Tittensor (2010), which created an index to assess the risk to stony corals by fisheries, considered the Azores and the MAR north of the Azores as one of the most relevant areas of the all oceans in terms of stony corals (Fig. 6) .

Anthipataria, to which belongs the Leiopathes spp. deep-sea corals which may live up to 4000 years old, and reef building corals like Lophelia, are both highly vulnerable to fisheries and other potential anthropogenic activities, like mining, occur in the region (Mortensen et al. 2008)</td></tr>
<tr><td>Biological productivity</td><td>Area containing species, populations or communities with comparatively higher natural biological productivity</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking

Despite generally limited surface production, there is evidence of enhanced near ridge demersal fish biomass above the Mid-Atlantic Ridge (Fock et al., 2002; Bergstad et al., 2008). There is also evidence that the mid-ocean ridges are ecologically important for higher trophic levels relative to the surrounding abyssal plains and the open ocean (e.g., blue ling and roundnose grenadier spawning aggregations on the northern MAR (Magnusson & Magnusson 1995, Vinnichenko & Khlivnoy 2004).</td></tr>
<tr><td>Biological diversity</td><td>Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity</td><td></td><td></td><td>X</td><td></td></tr>
</table>

Explanation for ranking
In general terms the box selected is distinct in terms of biodiversity and, thus, biography from two other northern EBSA proposed for the MAR at northern latitudes. In terms of migrating mesopelagic assemblages, the MAR North of the Azores is represented by high diversity of species. Clark & Tittensor (2010), which created an index to assess the risk to stony corals by fisheries, considered the Azores and the MAR north of the Azores has one of the most relevant areas of the all oceans in terms of stony corals (Fig. 6) A high-temperature hydrothermal vent field and associated seafloor massive sulphide deposit was recently discovered in the area (see Fig. 2 and 3). The faunal assemblage at the Moytirra vent field shows some high-level taxonomic similarities to assemblages at other known Mid-Atlantic Ridge vent fields, but also some differences in assemblage structure.

Sharing experiences and information applying other international criteria (Optional)

CBD EBSA Criterion	**Description**	**Ranking of criterion relevance** (please mark one column with an X)			
		Don't Know	**Low**	**Some**	**High**
Dependency:	An area where ecological processes are highly dependent on biotically structured systems (e.g., coral reefs, kelp forests, mangrove forests, seagrass beds). Such ecosystems often have high diversity, which is dependent on the structuring organisms. Dependency also embraces the migratory routes of fish, reptiles, birds, mammals, and invertebrates.				

Explanation for ranking
The Mid-Atlantic Ridge plays a pivotal role in circulation of water masses within the OSPAR Maritime Area and the whole North Atlantic (Rossby, 1999; Bower et al 2002; Heger et al 2008; Søiland et al 2008). The complex hydrographic setting around the Mid-Atlantic Ridge in general and the presence of the ridge itself leads to enhances vertical mixing and turbulence that results in areas of increased productivity over the Ridge (Falkowski et al 1998; Heger et al 2008; see also Ecological Significance (B3) criterion below). The Sub-Polar Front (usually found around the Charlie-Gibbs Fracture just south of 52oN) acts to separate the turbulent, nutrient-rich, cool waters to the north and the stratified-nutrient-poor warm waters in the southern part of the North Atlantic (Richardson & Schoeman, 2004; Opdal et al 2008). Fish biomass on the section of the Ridge between the Azores and the Charlie-Gibbs Fracture Zone is thought to be sustained by zooplankton advection over the Ridge, rather than local nutrient enrichment and/or phytoplankton production (Rogers, 1994; Opdal et al 2008). Ecologically the Mid-Atlantic Ridge (like all mid-ocean ridges) is fundamentally different from both isolated

<table>
<tr><td colspan="6">seamounts surrounded by deep-ocean and continental slopes where effects of coastal processes are pronounced (Opdal et al 2008). The Ridge provides the only extensive hard substrate habitat available for benthic suspension feeders off the continental shelves and the isolated seamounts provide suitable habitats for benthic or benthopelagic species. In addition the topography of the Ridge strongly shapes the habitat characteristics in the water column, through its effects on currents (see e.g. Opdal et al 2008).

The proposed EBAS is in sub-tropical waters and the species present reflect this. The proper management of the proposed EBSA would offer protection to representatives of this distinctive group of species.</td></tr>
<tr><td>Representativeness:</td><td>An area that is an outstanding and illustrative example of specific biodiversity, ecosystems, ecological or physiographic processes</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking

The proposed EBSA is considered to be representative of the area of the Mid-Atlantic Ridge south of the Sub-Polar Front. This area is described as being the warm sub-tropical section of the Mid-Atlantic Ridge within the OSPAR area (Bergstad et al 2008b, Søiland et al 2008).

Other proposal has focused on the Charlie-Gibbs Fracture Zone area, including the Sub-Polar Front as an area of high productivity. Alongside this an area of the Reykjanes Ridge (i.e. the northern cold section of the Mid-Atlantic Ridge) is proposed also proposed. Combined these three proposals are thought to protect representative sections of all of the biological communities and oceanographic processes found on the Mid-Atlantic Ridge in the OSPAR area.</td></tr>
<tr><td>Biogeographic importance:</td><td>An area that either contains rare biogeographic qualities or is representative of a biogeographic “type” or types, or contains unique or unusual biological, chemical, physical, or geological features</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking

The Mid-Atlantic Ridge within the OSPAR maritime area is considered to have three different biogeographic regions: one in the north, one in the middle (the Charlie-Gibbs Fracture) and the other in the southern, the MAR north of the Azores (Fig. 1, Boyle 2009).

The present EBAS proposal is focusing on this southern OSPAR portion of the MAR and the pelagic waters above it (Fig 2).

This area (together with the Azores EZZ) possesses one of the higher concentrations of seamounts of the North-East Atlantic.

It contains unusual chemosynthetic hydrothermal vents only recently discovered.</td></tr>
<tr><td>Structural complexity:</td><td>An area that is characterized by complex physical structures created by significant concentrations of biotic and abiotic features.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking

It contains highly structurally complex and active geological features like ridges, seamounts, deep-sea valleys (abyssal plain) and high temperature active hydrothermal vents.</td></tr>
</table>

Natural Beauty:	An area that contains superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance.	**X**			
Explanation for ranking Not relevant					
Earth's geological history:	An area with outstanding examples representing major stages of Earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features.			**X**	
Explanation for ranking The Mid-Atlantic Ridge (MAR) is the major topographic feature of the Atlantic Ocean extending within the OSPAR Maritime Area, from the Lomonossov Ridge in the Arctic Ocean to its southern boundary, at the Azores Triple Junction. The MAR is a slow-spreading ridge where new oceanic floor is formed, and western and eastern parts of the North Atlantic basin spread at a speed of 28-33mm/year. Its shallower part is found south of Iceland and towards the Azores, both groups of islands being the top of ridge-associated seamounts. The North Atlantic					

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Maps and Figures: c.f. Separate Annex

EBSA identification proforma for the North-East Mid-Atlantic Ridge North of the Azores

(ANNEX – FIGURES)

Figure 1 - The OSPAR region. Along the Mid-Atlantic Ridge are represented three of the proposed EBSA.

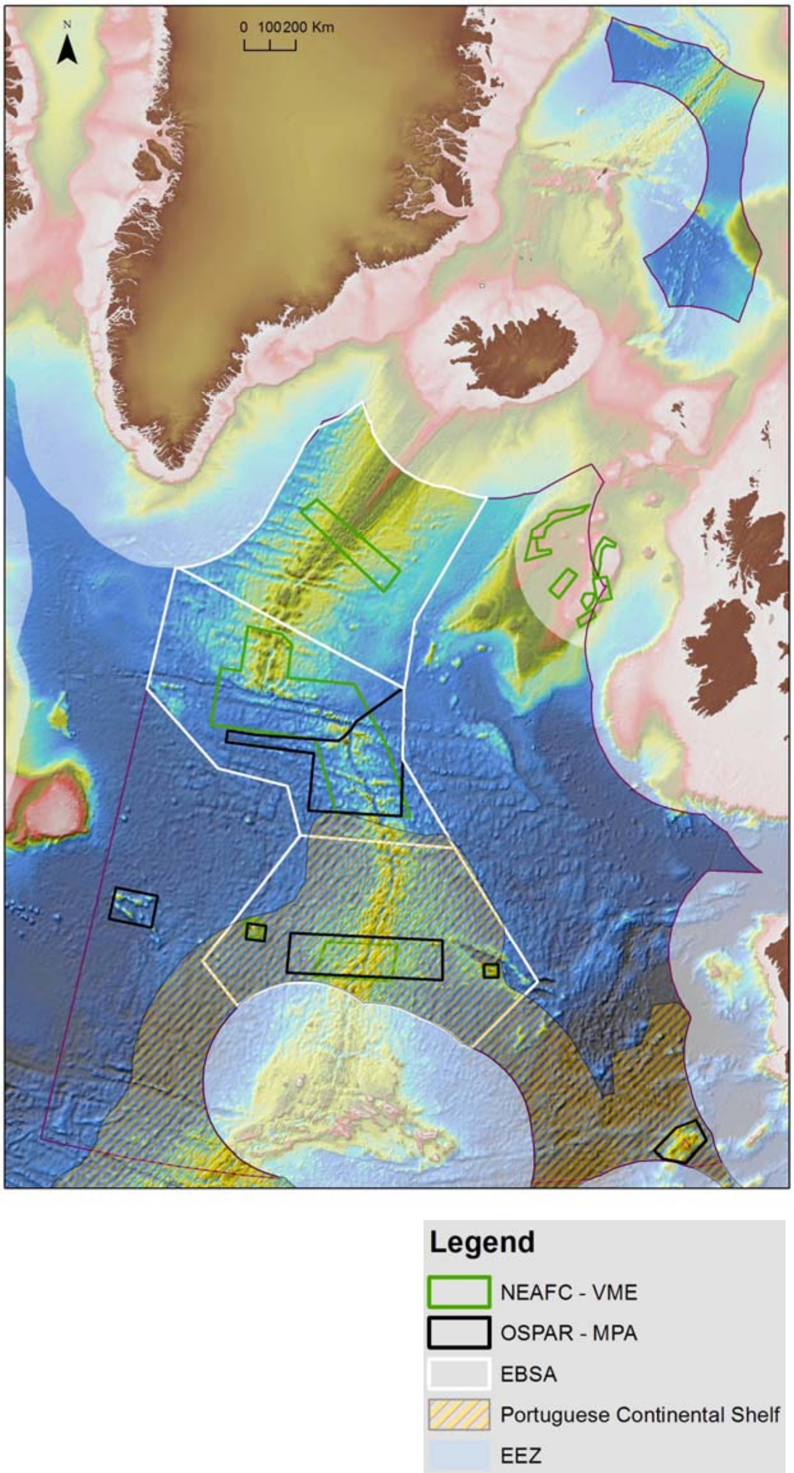


Figure 2. Delimitation of the proposed EBSA MAR North of the Azores. The EBSA covers an area of 647.559 Km^2. 595.942 Km^2 (92%) of the seafloor is Portuguese Continental Shelf. The water column is High-seas. In red the hydrothermal vent Moytirra**.**

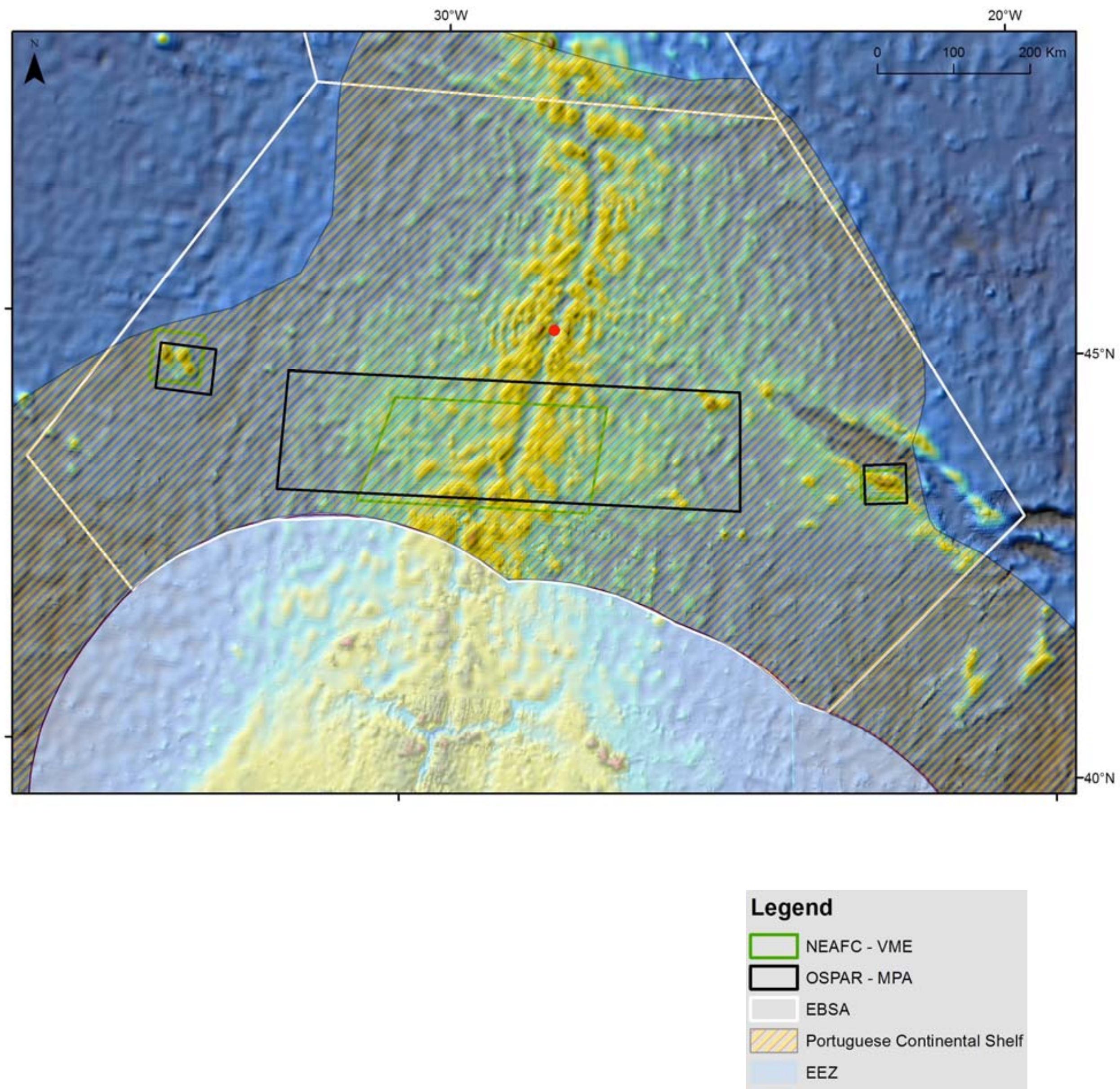


Figure 3. Photo mosaics from the Moytirra vent field showing a) 'Balor' and b) a 'Fomorian' chimney. [Scale bar = 1m] [Andrew Wheeler and Bramley J Murton]

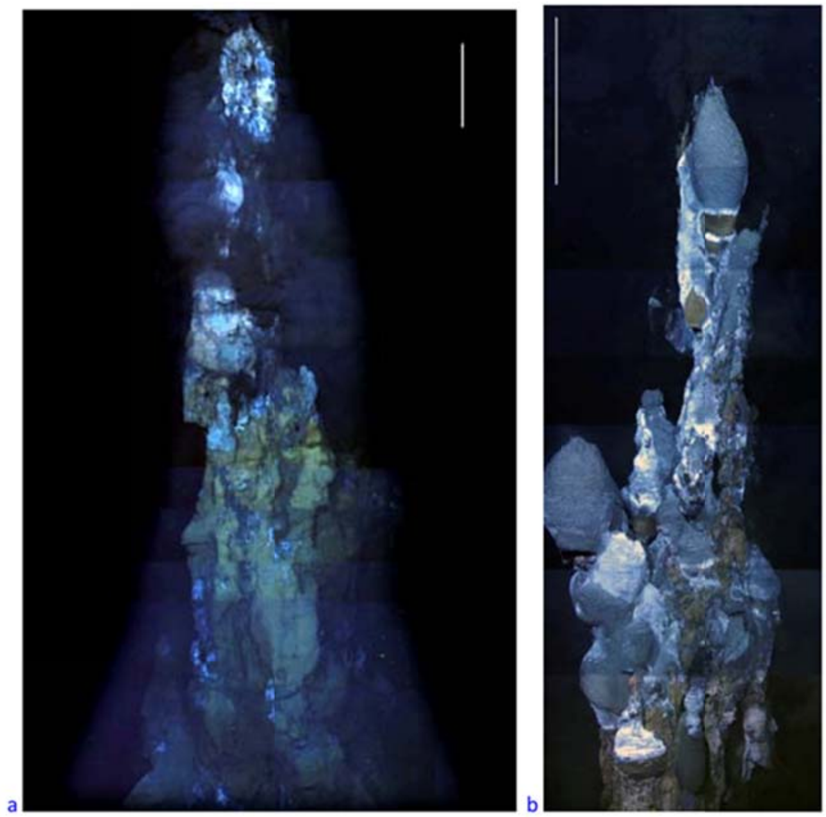


Figure 4 . *Calonectris diomedea borealis* foraging ranges and destinations of long trips (5 to 18 d) from 3 islands in the western (yellow), central (orange) and eastern (red) Azores. Circles mark maximum ranges for individual foraging trips. Oceanographic features: 1 = Flemish Cap; 2 = Milne seamounts; 3 = Charlie Gibbs Fracture Zone; 4 = Charcot seamounts. Palest blue indicates depths below 1000 m and darkest blue depths above 3000 m. [Figure and legend taken from Magalhães et al. 2008]

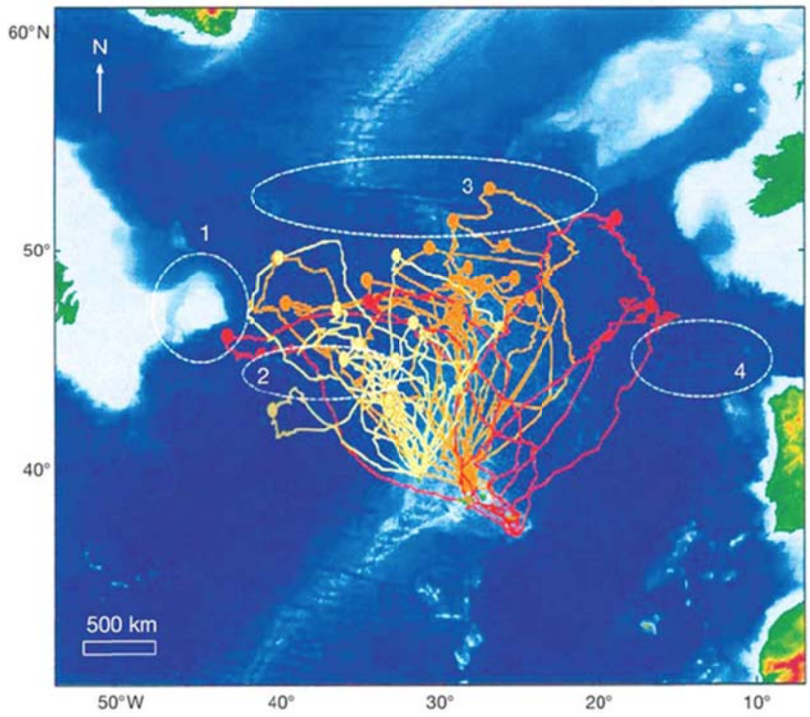
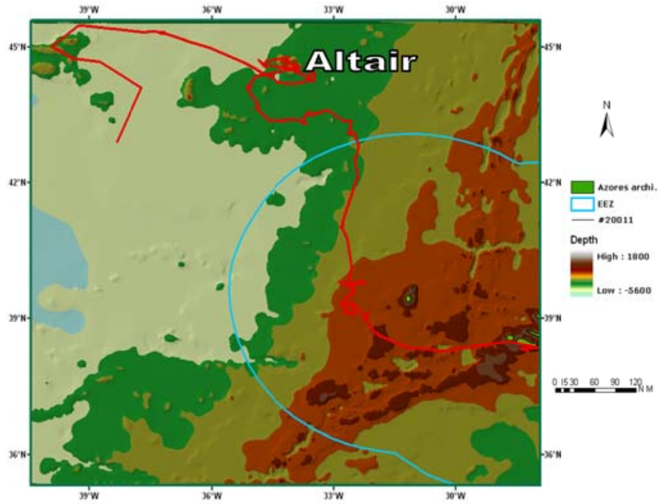
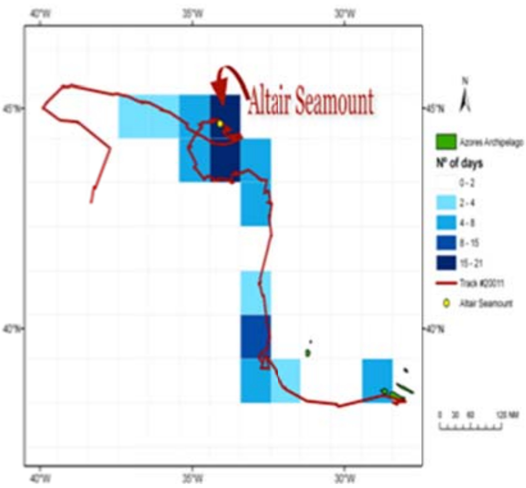


Figure 5 . a) Satellite tracking of a loggerhead (*Caretta caretta*) SCL- 42cm, released at: 08-Jun-2000, last signal: 08-Jul-2001. b) Analyses of number of days show higher values of residence time in the vicinity of the Altair seamount [© Marco Aurélio Santos DOP/Univ Azores & Alan Bolten CB/Univ Florida personal communications].

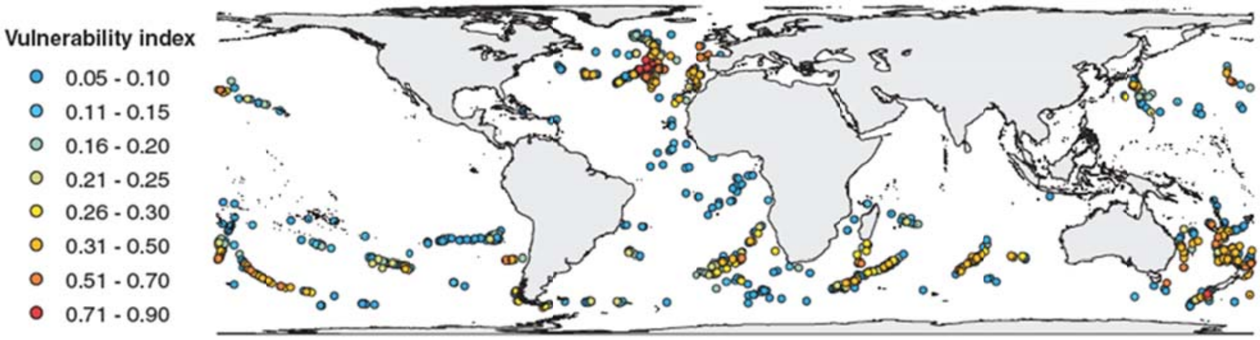


a)



b)

Figure 7. Vulnerability index for seamount summits between 10 and 2500 m (top panel), and only for seamount summits with index value >0.05 (bottom panel). See Methods for a description of how the index is derived. [Figure and legend from Clark & Tittensor 2010]



Joint OSPAR/NEAFC/CBD Scientific Workshop on the Identification of Ecologically or Biologically Significant Marine Areas (EBSAs) in the North-East Atlantic

Hyères (Port Cros), France: 8 – 9 September 2011

EBSA identification proforma for the North-East Atlantic - 4

Title/Name of the area - The Hatton and Rockall Banks and the Hatton-Rockall Basin

Presented by the participants of the Joint OSPAR/NEAFC/CBD Scientific Workshop on the identification of Ecologically or Biologically Significant Marine Areas (EBSAs) in the North-East Atlantic. Drafting team: Dave Billett, Phil Weaver, Od Aksel Bergstad, Kerry Howell, Andrew Kenney, Anthony Grehan, Chris Yesson

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Abstract

The Hatton and Rockall Banks, and associated slopes, represent unique offshore bathyal habitats (200 to 3000 m) and constitute a most prominent feature of the NE Atlantic continental margin south of the Greenland to Scotland ridges. The banks and slopes have a high habitat heterogeneity and support a wide range of benthic and pelagic faunas. They are also subject to significant fishing impact, including bottom trawling, longlining, and midwater fisheries.

Introduction

The Hatton and Rockall Banks are large isolated geomorphological features in the NE Atlantic. Together they encompass depths from c. 200 to 3,000m and are one of the few regions of the NE Atlantic ABNJ with (for the most part) gently sloping bathyal bathymetry. The banks are linked by the Rockall-Hatton Basin with its own particular features. The banks and the basin provide a contrasting environment to the Mid-Atlantic Ridge. Moreover, most of the NE Atlantic continental margin is characterised by steep bathyal slopes making the Rockall and Hatton Banks important in terms of their geomorphology and the species that occur there. The banks encompass a large depth range, which has a significant effect on seabed communities as a result of strong environmental gradients (e.g. temperature, pressure, and food availability). These factors cause large-scale changes in species composition with depth (Billett, 1991; Bett, 2001; Howell et al., 2002) and give rise to a high diversity of species and habitats (Davies et al. 2006; Roberts et al. 2008; Howell et al., 2009; Howell et al. 2010). The area is influenced by a number of different water masses and there is considerable interaction between the topography and physical oceanographic processes, in some areas focusing internal wave and tidal energy (Ellett et al. 1986) which results in strong currents and greater mixing and resuspension. This may give rise to highly localized / specialised biological communities. All of these factors lead to considerable environmental heterogeneity, which is generally characteristic of bathyal waters

(200 to 3000m) in all regions of the world (Menot et al., 2010). Environmental heterogeneity is correlated positively with biological diversity at a variety of scales (Menot et al. 2010) as indicated by significantly enhanced species turnover in the megafauna in areas such as Hatton Bank (Howell et al., 2007; Roberts et al. 2008).

In addition to relatively shallow demersal fisheries targeting haddock, gurnard and monkfish, the Hatton and Rockall Banks are target areas of deep-water bottom fisheries for Ling (*Molva molva*), Blue Ling (*Molva dypterygia*), Tusk (*Brosme brosme*), Orange Roughy (*Hoplostethus atlanticus*), Roundnose Grenadier (*Coryphaenoides rupestris*), Black Scabbardfish (*Aphanopus carbo*) and deep-water sharks. A wide variety of other species are also taken as by-catch (Gordon et al., 2003; Large et al., 2003; ICES 2010). The deep-water target species have characteristics of low production and extended generation times. These characteristics are generally shared with all deep-water fauna, including the invertebrate communities on which the fish depend. Deep-water fisheries have significant effects not only on target species, which are known to be highly susceptible to over-fishing and cannot sustain a fishing intensity typical of shelf seas, but also on all fauna that occur in areas impacted by bottom trawling (Le Guilloux et al., 2009; Clark et al. 2010).

Major wide-ranging Northeast Atlantic epipelagic fish stocks, i.e. mackerel and blue whiting, utilise the Hatton-Rockall area for parts of their life cycle and are also targeted by international fisheries there. The slopes of the banks and channels between the banks have a diverse bentho- and mesopelagic fish community sustained by the zooplankton production in the epipelagic zone. The pelagic communities are probably similar to, and extensions of, those in adjacent oceanic waters and along slopes to the south along the European continent.

In addition, some invertebrate species, such as cold-water corals and sponges, provide important benthic habitat heterogeneity. These habitats are highly susceptible to physical damage and will take hundreds, if not thousands, of years to reform (Hall-Spencer et al. 2002; Roberts et al. 2009; Söffker et al., 2011).

Current fisheries control measures on Hatton and Rockall Banks, although a significant step towards whole ecosystem management, have focused mainly on the protection of corals (Hall-Spencer et al., 2009). In the NE Atlantic ABNJ intensive bottom trawling also occurs on sedimented slopes. These areas have vulnerable species different to those found in association with corals, but of equal importance in terms of ecosystem function (e.g. Henry & Roberts, 2007; Le Guilloux et al., 2010; Vanreusel et al. 2010).

Location

Areas shallower than 3000m and the pelagic zones above the Rockall and Hatton Banks together with the Rockall-Hatton Basin between. The geomorphological feature (and potentially the EBSA) extends into adjacent EEZs, but the current proposal refers to the ABNJ subarea only. The area beyond national jurisdiction lies wholly within regions under consideration by the Commission on the Limits of the Continental Shelf.

Feature description

Benthic and pelagic communities occupying all depths in and around the Hatton and Rockall Banks and Basin. Seabed communities including cold-water coral formations, rocky reefs, carbonate mounds, polygonal fault systems, sponge aggregations, steep and gentle sedimented slopes. Pelagic communities comprise those inhabiting bathy-, meso- and epi-pelagic zones, including zooplankton, fish, cetaceans, turtles and seabirds.

1. Benthic and benthopelagic communities

Cold-water coral

Observations in the early 1970s found cold-water coral communities on the Rockall Bank down to a depth of 1,000 m (Wilson, 1979a). Thickets of *Lophelia pertusa* and *Madrepora oculata occurred* principally at depths between 150-400m[1]. Wilson (1979b) also found large reef structures below 500 m on the eastern flank of the bank. "Wilson-rings", large coral growth features, have recently (June 2011) been re-discovered on the northern Rockall Bank (Huvenne et al., 2011). Any one of these extraordinary features could be completely destroyed by just a few minutes of deep-water trawling by a single vessel.

Frederiksen *et al*. (1992) reported a high diversity of corals on the northern Hatton Bank, including *Paragorgia*, *Paramuricea*, Isididae and Antipatharia as well as the scleractinians *L. pertus*a and *M. oculata*. Since these early observations further records of coral frameworks have been noted throughout the Rockall, Hatton and George Bligh Banks, including the Logachev Mounds and the Western Rockall Bank Mounds (Kenyon *et al.*, 2003; Roberts *et al.*, 2003; Narayanaswamy et al., 2006; Howell et al., 2007; Durán Muñoz et al. 2009).

Surveys during the UK Department of Trade and Industry SEA7 project and the Spanish ECOVUL/ARPA project identified many areas that contained the cold-water coral *L. pertusa* throughout the Rockall and Hatton Banks (Narayanaswamy *et al.*, 2006; Howell *et al.*, 2007; Roberts et al. 2008; Durán Muñoz et al. 2009). Several areas on the Hatton Bank contained pinnacles and mounds with extensive biogenic structures including areas of coral rubble around the flanks of the coral mounds. Coral frameworks are known directly on the Hatton Bank (Durán Muñoz et al. 2009), and are predicted to occur over focused regions of both Hatton and George Bligh Banks (Howell et al., 2011) with several areas supporting frameworks of *L. pertusa*. Geophysical evidence suggests that these have formed by successive coral growth and sedimentation episodes, as in other regions (Roberts *et al.*, 2006), forming coral carbonate mounds (Roberts et al. 2008). Single and clustered coral carbonate mounds have also been discovered on the Southeast of Rockall Bank. These structures are comprised mostly of *L. pertusa* and can reach heights of 380 m in water depths of between 600-1000 m (Kenyon *et al.*, 2003; Mienis *et al.*, 2006; Mienis *et al.*, 2007).

Cold-water coral frameworks have been reported to support over 1,300 species in the Northeast Atlantic, many of which have yet to be described (Roberts *et al.*, 2006). Some new species and associations have been reported recently (e.g. Myers & Hall-Spencer 2007; Le Guilloux et al., 2010; Söffker et al. 2011). The corals provide an important habitat for fish (Fosså et al., 2002; Söffker et al. 2011), including commercial species *Sebastes* sp., *Molva molva*, *Brosme brosme*, *Anarhichas lupus* and *Pollachius virens* (Mortensen et al., 1995; Freiwald, 2002; Hall-Spencer et al., 2002). The coral frameworks provide valuable feeding, refuge, breeding and/or nursery areas for various fish (Husebø et al., 2002; Costello et al., 2005; Söffker et al. 2011). Pregnant *Sebastes viviparus* may use the reef as a refuge or as a nursery ground (Fosså et al., 2002) as recently observed in Wilson-rings on the northern Rockall Bank (Huvenne et al., 2011).

As well as living reefs, dead coral framework and coral rubble provide a significant habitat. Jensen and Frederiksen (1992) collected 25 blocks of *Lophelia* and found 4,626 individuals belonging to 256 species; a further 42 species were identified amongst coral rubble. Jensen and Frederiksen (1992) found only 1366 individuals in 12 kg of live coral compared with 3260 individuals in 6.5 kg of dead coral framework.

There has been only limited research into linkages between coral and other deep-water ecosystems. Compared to the southeastern US and Gulf of Mexico, molecular research has shown that northeastern Atlantic populations of *L. pertusa* are moderately differentiated (Morrison et al. 2011) and form distinct subpopulations, but also that Rockall Bank corals show some genetic similarity to those occurring on the New England Seamounts (Morrison et al. 2011). Larvae may pass between populations, but gene flow is sporadic. *Lophelia pertusa* exhibits high levels of inbreeding through asexual reproduction at several sites in the NE Atlantic, suggesting a high incidence of self-recruitment in local populations (Le Goff-Vitry and Rogers, 2005). Further molecular studies are required in local areas to gauge the importance of the Rockall and Hatton Banks in the life history of regional coral populations.

In summary the cold-water corals fit the following EBSA criteria:

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[1] http://www.lophelia.org/lophelia/case_4.htm

Uniqueness or rarity

- Large areas of cold-water corals and sponges have been reported in the area. Some of these have been destroyed by demersal trawling, but some areas of large coral frameworks still exist.

Special importance for life-history stages

- Cold-water corals and areas of natural coral rubble provide highly diverse habitats

Importance for threatened, endangered or declining species/habitats

- The cold-water corals and natural rubble contain very large numbers of invertebrate species including giant protozoans (xenophyophores), vase shaped white sponges, actiniarians, antipatharian corals, hydroids, bryozoans, asteroids, ophiuroids, echinoids, holothurians and crustaceans.

- The distribution of cold-water coral has been severely reduced in the area over the last 30 years

Vulnerability, fragility, sensitivity, or slow recovery

- There is a high diversity of corals, including bamboo coral (Isididae), black coral (Antipatharia) as well as the reef forming stony corals (Scleractinia), though some of these may now be reduced in distribution occurring in patches.

- Cold-water coral habitats are easily impacted and recover very slowly, if at all.

Biological diversity

- Cold-water corals provide diverse habitats for other invertebrates and fish.

Sediment communities

The Hatton and Rockall Banks support many different habitats each with their own species assemblages (Narayanaswamy et al., 2006; Howell et al., 2007; Roberts et al. 2008; Howell et al., 2009). Local seabed morphology in this region is ultimately controlled by hydrography and oceanography (Due et al. 2006; Sayago-Gil et al. 2010), which creates heterogeneity in sediment types including mud, exposed bedrock, fine sediments, living coral framework and coral debris that – this habitat heterogeneity has a major influence on species diversity and turnover (Roberts et al. 2008). A great variety of large invertebrate fauna (megafauna) occur in this region including giant protozoans (xenophyophores), vase shaped white sponges, actiniarians, antipatharian corals, hydroids, bryozoans, asteroids, ophiuroids, echinoids, holothurians and crustaceans (Narayanaswamy et al., 2006; Howell et al., 2007; Roberts et al. 2008). Large mega-infauna such as echiuran worms are evident from observations of their feeding traces (lebenspurren). Little is known, however, of the smaller fauna living within the sediment. The Hatton-Rockall Basin is known to host an unique polygonal fault system. An early UK Department of Trade and Industry survey (Jacobs et al. pers. comm.) provided an indication that the faults in the Hatton-Rockall Basin had surface expression, i.e. a network of interlinked channels across the level seafloor. These fault structures were seen in August 2006 and were confirmed again in May 2011 on a NOC Southampton cruise (Huvenne et al., 2011). The flanks of the gullies appear to support extensive, dense aggregations of mixed species sponge communities. A key interest / conservation concern in such a geological setting would be the occurrence of cold-seep communities. The NOC expedition did not find any immediate evidence of extant cold-seep fueled biological communities. However, large carbonate blocks were encountered that were likely formed as a result of seafloor fluid escape. Given the relatively small area of seafloor examined by remotely operated vehicle during the NOC expedition, the occurrence of extant cold-seep communities should not be ruled out. It is evident that there is a lot still to learn of the seafloor and ecology of the Hatton and Rockall Banks indicating the importance of a Precautionary Approach to environmental management.

The megafauna on the Hatton and Rockall Banks are largely species known from the wider NE Atlantic continental margin (for bibliographic reviews Gage et al. 1983; Gage et al., 1985; Mauchline et al., 1986; Harvey et al., 1988; Rice et al., 1991). These studies focused on sedimented areas within the EEZs of the UK and Ireland and provide a lot of information on the life history characteristics of the species including information on growth and reproduction. Apart from some species that produce small eggs (indicative of planktotrophic development) in a seasonal cycle, most species conform to the life history characteristics typical of the deep sea of larger egg size, lower fecundity and greater generation times (Gage and Tyler, 1991). This is an adaptation to the low food input to the deep sea, which leads to the rapid decrease in biomass with increasing depth (Lampitt et al., 1986; Wei et al., 2010). Fauna adapt to lower food availability in the deep sea by a number of trade-offs, one of which is a reduction in reproductive effort and longer generation times. The vast majority of species, therefore, are highly susceptible to repeated physical disturbance. This susceptibility is not limited to the charismatic fauna (e.g. corals and sponges), but is pervasive in all deep-sea ecosystems.

Changes in pressure and temperature have significant effects on the biochemistry of species, influencing cell membrane structure and enzyme characteristics (Gage and Tyler, 1991). In general, each species is adapted to a particular range of environmental conditions. Each may occur over a depth range of about 500m, but the depths where any species is abundant, and therefore able to form actively reproducing populations, is generally limited to a much more restricted depth range of 100 to 200m (Billett, 1991; Howell et al., 2002). There is evidence that such depth-related effects promote speciation (Howell et al., 2004). In addition, the progressive decrease in organic matter availability with increasing depth (with some patchiness depending on geomorphology) leads to a reduction of carnivores and an increase in detritus feeders (Billett, 1991). Taken together such environmental changes lead to a continuous sequential change in species composition with depth, and biological community characteristics that are radically different to those known in shelf seas; the rules of life change in the deep sea.

In summary the sediment communities fit the following EBSA criteria:

Uniqueness or rarity

- The area has considerable environmental heterogeneity, and therefore biological diversity, as a result of its large depth range and strong environmental gradients. Habitat-forming sessile benthic communities, such as those of giant protozoans and sponges, are common.
- An area of polygonal faults may be a unique seabed feature – currently poorly investigated but may host important biological communities (e.g. cold-seeps).

Importance for threatened, endangered or declining species/habitats

- The area comprises a patchwork of habitats with species changing consistently with both habitat type and increasing depth. Some habitats are threatened by direct impacts (e.g. trawling), others may suffer indirectly e.g. through the creation of sediment plumes by impacts of fishing gear in sensitive areas.

Vulnerability, fragility, sensitivity, or slow recovery

- Many of the species have reproductive cycles with long generation times leading to very slow and episodic recoveries following human impact. Most deep-sea species are particularly susceptible to degradation and depletion by human activity and natural events.

Biological productivity

- There are localised areas of greater production depending on geomorphology, food input and hydrography.

Biological diversity

- Benthic and pelagic communities occupy all depths in and around the Hatton and Rockall Banks and Basin. Seabed communities include cold-water corals, rocky reefs, carbonate mounds, polygonal fault systems, sponge aggregations, steep and gentle sedimented slopes.
- The Hatton and Rockall Banks and the Hatton-Rockall Basin have a high habitat heterogeneity that supports diverse seabed communities.

Dependency:

- The wide range of seabed types - cold-water corals, rocky reefs, carbonate mounds, polygonal fault systems, sponge aggregations, steep and gentle sedimented slopes - leads to high diversity of habitats.

Structural complexity:

- The area is structurally complex with cold-water coral, rocky reefs, carbonate mounds, polygonal fault systems, sponge aggregations, steep and gentle sedimented slopes.

Demersal fish

The deep-water fish of the NE Atlantic continental margin are generally well-known following comprehensive and extensive surveys of the region by the Scottish Association for Marine Science (e.g. Gordon & Duncan, 1985) and the Institute of Oceanographic Sciences (e.g. Merrett et al., 1991) and their co-workers (see bibliographies by Mauchline et al. 1986 and Rice et al. 1991). Species of commercial importance are reviewed by Gordon et al. (2003) and Large et al. (2003) and for fish associated with cold-water corals by Söffker et al. (2011).

The detailed sampling in the Porcupine Seabight in the 1970s and 1980s took place before the start of deep-water commercial fishing. More recent sampling of the same area in the 1990s and 2000s can be used to compare fish communities before and after bottom trawling (Bailey et al. 2009). These data show that over 70 fish species have been heavily impacted by the fishing activity, of which only 4-5 are target commercial species. The area impacted is up to 2.5 times larger than the area fished because the home range of many the fish extends into considerably deeper waters.

In summary the demersal fish fit the following EBSA criteria:

Vulnerability, fragility, sensitivity, or slow recovery

- Many of the demersal fish have very slow recovery times as a result of their slow reproductive rate compared to pelagic fish. Stocks have already been diminished in some areas.

2. Pelagic communities (plankton, nekton, birds)

<u>Fish:</u> Mackerel, blue whiting and other wide-ranging pelagic fish such as epipelagic sharks and tuna-like species use the area during parts of their life-cycle, for feeding or as migration corridors. To blue whiting the slope area is to some extent used as spawning area. Mackerel eggs and larvae from spawning areas further south drift through the area.

<u>Turtles:</u> Investigations of suitable foraging habitats for leatherback turtles in the NE Atlantic identified Rockall Bank as a potentially important area for this species (Witt et al., 2007)

<u>Cetaceans:</u> The harbour porpoise (*Phocoena phocoena*) is quite common and widely distributed on the continental shelf of the UK. There have been limited observations of this species around the shallower waters of Rockall Bank and their full distribution throughout the Rockall Plateau is poorly understood at present (Hammond et al., 2006). Limited numbers of the endangered Blue whale (*Balaenoptera musculus*) and the critically endangered northern right whale (*Eubalaena glacialis*) have also been observed in this area (Cronin and Mackey, 2002; Hammond et al., 2006).

<u>Seabirds:</u> Analyses of satellite tracking data hosted at <u>www.seabirdtracking.org</u> (Table 1) found the area to be used by multiple species over a significant period of the year (Fig. 2). The site is heavily used by Manx Shearwaters (*Puffinus puffinus*) during the breeding season (Apr-Sept) from Iceland and UK colonies. From September until November tracked individuals of Cory's Shearwater (*Calonectris diomedea*) from 3 colonies, Sooty Shearwater (*Puffinus griseus*), Fea's Petrel (*Pterodroma* feae) and Zino's Petrel (*Pterodroma madeira*) have also been found to utilize the area. Studies of tracked Atlantic Puffin (*Fratercula arctica*) from Skomer and Isle of May colonies found the site to be important during the overwintering phase (Aug-Apr) (Harris et

al. 2010, Guilford et al. 2011). In addition to tracking data, at-sea survey data confirms 22 species within the area (Table 2).

In summary the pelagic communities fit the following EBSA criteria:

Special importance for life-history stages

- Parts of the Hatton-Rockall area are important as spawning areas for blue whiting, and the area is used as a corridor for a range of migrating species including turtles
- The area is important for a wide range (at least 22 species) of seabirds for a significant period of the year

Importance for threatened, endangered or declining species/habitats

- Both Zino's Petrel (Endangered) and Fea's Petrel (Near threatened) are listed on the IUCN Red List. In addition 5 species of seabird that are listed on Annex I of the European Union Bird's Directive are found within the area.
- Knowledge of cetaceans in the area is poor but the critically endangered northern right whale (*Eubalaena glacialis*) has been observed in this area

Feature condition, and future outlook

Demersal fish have been targets of extensive fisheries for decades, expanding primarily in the latter half of the 1980s. Although satisfactory stock assessments were seldom achieved, the probable decline in abundance and vulnerability of many of the target species have been reflected in advice from ICES for many years (ICES 1996 onwards, Large et al., 2003). A range of management actions by NEAFC and relevant coastal states have been implemented to reduce fishing effort and facilitate recovery of target species and some associated by-catch species. A similar range of measures applies to species inhabiting the shallowest areas, e.g. haddock.

Epipelagic species such as mackerel and blue whiting, and large pelagic sharks and tuna-like species occurring in the area straddle between ABNJ and several EEZs and the fisheries are managed by relevant coastal states, NEAFC and ICCAT. Cetaceans are managed by the IWC. The management is based on recurrent stock assessments by ICES and other advisory bodies.

Records of the physical impact of deep-water trawling west of Scotland extend back to the late 1980s (Roberts et al., 2000; Gage et al., 2005) and studies using VMS data show that fishing activity potentially affects much of the Hatton-Rockall area (Hall-Spencer et al. 2009; Benn et al. 2010). Damage may occur to structural species such as corals and sponges, which may take hundreds to thousands of years to recover (Hall-Spencer et al., 2002; Davies et al. 2007; Roberts et al., 2009; Hogg et al. 2010).

A recent NOC expedition (May-June 2011) has documented extensive destruction of coral frame-work habitats in the Darwin Mounds area (northern Rockall Trough) and on the northern Rockall Bank (Huvenne et al. 2011). This expedition also encountered evidence of trawling impact on the megafauna of open sedimented areas, with photographic surveys in the area of the 'Haddock Box' (eastern Rockall Bank) showing frequent occurrence of physically damaged holothurians - thought to be net escapees or discarded by-catch. If cold seep communities do exist in the Hatton-Rockall Basin these would be extremely vulnerable to trawling impacts; they are typically highly localised and are of a relatively small scale such that they could be eliminated by a single trawl. Cold seeps are OSPAR priority habitats for which there are considerable concerns regarding the effects of bottom trawling (van Dover et al. 2011a, b).

The benthic communities of the Hatton and Rockall Banks are already significantly affected by deep-water fishing effects (ICES WGDEC, 2007). The effects on deep-water fish may extend to waters deeper than those utilised by trawl fisheries (Bailey et al., 2009). Broad-scale multibeam surveys undertaken by the Spanish Institute Oceanography, British Geological Survey and NOC have revealed a diverse range of geomophological features and sediment types on Hatton Bank (Jacobs and Howell, 2007; Stewart and

Davies, 2007; MacLachlan et al., 2008; Sayago-Gil et al., 2010). These physical environment maps, coupled with targeted biological surveys have resulted in the production of biological habitat maps for the region (Howell et al., 2011) which highlight the range and diversity of non-coral seabed features present in the area and provide evidence for a more comprehensive management plan for the region than has been achieved to date.

Assessment against CBD EBSA Criteria

Table 1. relation of each of the CBD criteria to the proposed area relating to the best available science. Note that a candidate EBSA may qualify on the basis of one or more of the criteria, the boundaries of the EBSA need not be defined with exact precision.

<table>
<tr><th rowspan="2">CBD EBSA Criterion</th><th rowspan="2">Description</th><th colspan="4">Ranking of criterion relevance
(please mark one column with an X)</th></tr>
<tr><th>Don’t Know</th><th>Low</th><th>Some</th><th>High</th></tr>
<tr><td>Uniqueness or rarity</td><td>The 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</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking
The area has considerable environmental heterogeneity, and therefore biological diversity, as a result of its large depth range and strong environmental gradients. Habitat-forming sessile benthic communities, such as those of giant protozoans and sponges, are common.
Large areas of cold-water corals and sponges have been reported in the area. Some of these have been destroyed by demersal trawling, but some areas of large coral frameworks still exist.
An area of polygonal faults may be a unique seabed feature – currently poorly investigated but may host important biological communities (e.g. cold-seeps).</td></tr>
<tr><td>Special importance for life-history stages of species</td><td>Areas that are required for a population to survive and thrive</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking
Cold-water corals and areas of natural coral rubble provide highly diverse habitats
Parts of the Hatton-Rockall area are important as spawning areas for blue whiting, and the area is used as a corridor for a range of migrating species including turtles.
The area is important for a wide range (at least 22 species) of seabirds for a significant period of the year</td></tr>
<tr><td>Importance for threatened, endangered or declining species and/or habitats</td><td>Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking
The cold-water corals and natural rubble contain very large numbers of invertebrate species including giant protozoans (xenophyophores), vase shaped white sponges, actiniarians, antipatharian corals, hydroids, bryozoans, asteroids, ophiuroids, echinoids, holothurians and crustaceans.</td></tr>
</table>

- The distribution of cold-water coral has been severely reduced in the area over the last 30 years
- The area comprises a patchwork of habitats with species changing consistently with both habitat type and increasing depth. Some habitats are threatened by direct impacts (e.g. trawling), others may suffer indirectly e.g. through the creation of sediment plumes by impacts of fishing gear in sensitive areas.
- Both Zino's Petrel (Endangered) and Fea's Petrel (Near threatened) are listed on the IUCN Red List. In addition 5 species of seabird that are listed on Annex I of the European Union Bird's Directive are found within the area.
- Knowledge of cetaceans in the area is poor but the critically endangered northern right whale (*Eubalaena glacialis*) has been observed in this area

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

- There is a high diversity of corals, including bamboo coral (Isididae), black coral (Antipatharia) as well as the reef forming stony corals (Scleractinia), though some of these may now be reduced in distribution occurring in patches.
- Cold-water coral habitats are easily impacted and recover very slowly, if at all
- Many of the species have reproductive cycles with long generation times leading to very slow and episodic recoveries following human impact. Most deep-sea species are particularly susceptible to degradation and depletion by human activity and natural events.
- Many of the demersal fish have very slow recovery times as a result of their slow reproductive rate compared to pelagic fish. Stocks have already been diminished in some areas.

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

Explanation for ranking

- There are localised areas of greater production depending on geomorphology, food input and hydrography.

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

Explanation for ranking

- Benthic and pelagic communities occupy all depths in and around the Hatton and Rockall Banks and Basin. Seabed communities include cold-water corals, rocky reefs, carbonate mounds, polygonal fault systems, sponge aggregations, steep and gentle sedimented slopes.
- The Hatton and Rockall Banks and the Hatton-Rockall Basin have a high habitat heterogeneity that supports diverse seabed communities.
- Cold-water corals provide diverse habitats for other invertebrates and fish.

Sharing experiences and information applying other international criteria (Optional)

CBD EBSA Criterion	**Description**	**Ranking of criterion relevance** (please mark one column with an X)			
		Don't Know	**Low**	**Some**	**High**
Dependency:	An area where ecological processes are highly dependent on biotically structured systems (e.g., coral reefs, kelp forests, mangrove forests, seagrass beds). Such ecosystems often have high diversity, which is dependent on the structuring organisms. Dependency				**X**

	also embraces the migratory routes of fish, reptiles, birds, mammals, and invertebrates.				
Explanation for ranking • The wide range of seabed types - cold-water corals, rocky reefs, carbonate mounds, polygonal fault systems, sponge aggregations, steep and gentle sedimented slopes - leads to high diversity of habitats.					
Representativeness:	An area that is an outstanding and illustrative example of specific biodiversity, ecosystems, ecological or physiographic processes				
Explanation for ranking					
Biogeographic importance:	An area that either contains rare biogeographic qualities or is representative of a biogeographic "type" or types, or contains unique or unusual biological, chemical, physical, or geological features				
Explanation for ranking					
Structural complexity:	An area that is characterized by complex physical structures created by significant concentrations of biotic and abiotic features.				**X**
Explanation for ranking • The area is structurally complex with cold-water coral reefs, reef rubble, rocky reefs, carbonate mounds, polygonal fault systems, sponge aggregations, steep and gentle sedimented slopes.					
Natural Beauty:	An area that contains superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance.				
Explanation for ranking					
Earth's geological history:	An area with outstanding examples representing major stages of Earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features.				
Explanation for ranking					
[Other relevant criterion]					
Explanation for ranking					

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Maps and Figures

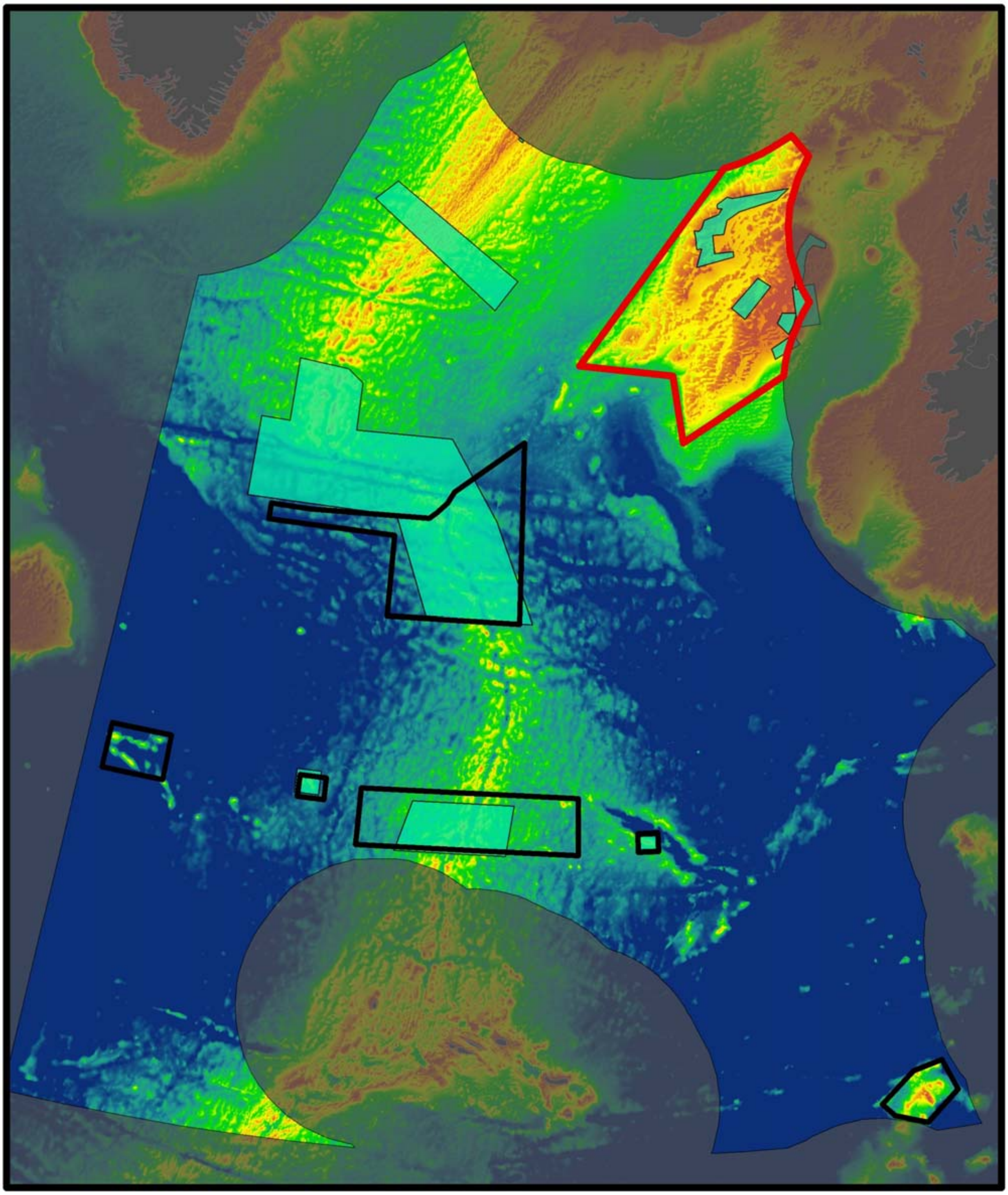
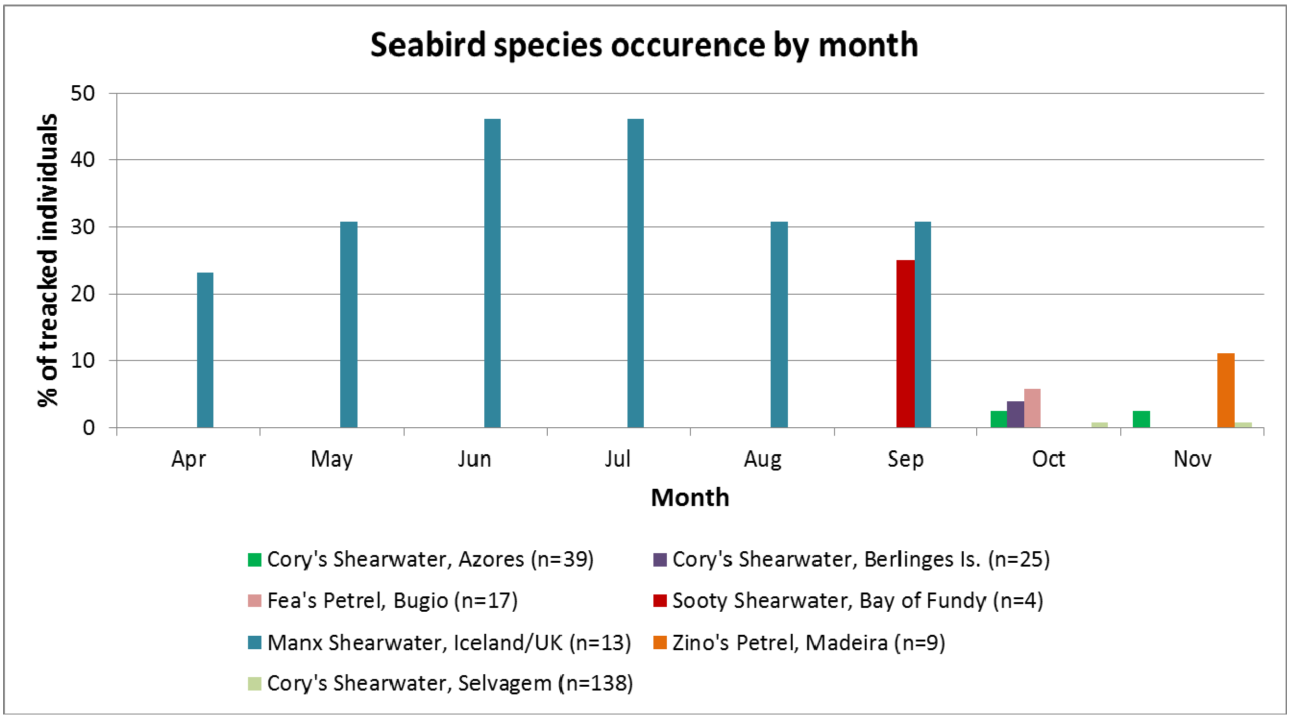


Figure 1. Map of the ABNJ area in the NE Atlantic with boundary of the Hatton-Rockall EBSA outlined in red. This boundary approximates the 3000 m contour.

Table 1. Contributors of data for the analysis of seabird satellite tracking are as follows; full details about each dataset are available via *www.seabirdtracking.org*

Species	Site	Owner
Corys Shearwater	Azores	J. González-Solís
Corys Shearwater	Balearics	J. González-Solís
Corys Shearwater	Canaries	J. González-Solís
Corys Shearwater	Chafarinas	J. González-Solís
Corys Shearwater	Berlengas	P. Catry, J.P. Granadeiro
Corys Shearwater	Selvagens	M.A. Dias, P. Catry
Corys Shearwater	Selvagens	M.A. Dias, J.P. Granadeiro
Corys Shearwater	Veneguera	J. González-Solís
Sooty Shearwater	Bay Fundy	R. Ronconi
Sooty Shearwater	Falkland Islands (Malvinas)*	A. Hedd
Sooty Shearwater	Gough	A. Hedd
Great Shearwater	Bay Fundy	R. Ronconi
Great Shearwater	Inaccessible Island	R. Ronconi, P. Ryan, M. Caroline Martin
Manx Shearwater	Iceland	I.A. Sigurðsson, Y. Kolbeinsson, J. González-Solís
Manx Shearwater	UK	A. Ramsay, J. González-Solís
Fea's Petrel	Bugio	I. Ramirez, V. Paiva
Black-legged Kittiwake	Norway	T. Boulinier, D. Gremillet, J. González-Solís
Little Shearwater	Azores	V. Neves, J. González-Solís
Zino's Petrel	Madeira	F. Zino, R.A. Phillips, M. Biscoito



*A dispute exists between the Governments of Argentina and the United Kingdom of Great Britain and Northern Island concerning sovereignty over the Falkland Islands (Malvinas).

Figure 2. Species occurrence by month within the Hatton-Rockall area, showing percentage of tracked population for each species (and where relevant subpopulation) found within the area each month.

Table. 2 At-sea survey data from Cronin and Mackey (2002) of observations of seabirds in Hatton-Rockall area during a 5 week survey in May 2002.

Species Name	**Common Name**	**EU Bird's directive status**
Alca torda	Razorbill	Migratory
Alle alle	Little Auk	Migratory
Calonectris diomedea	Cory's Shearwater	Annex 1
Fratercula arctica	Atlantic Puffin	Migratory
Fulmarus glacialis	Northern Fulmar	Migratory
Hydrobates pelagicus	European Storm-petrel	Annex 1
Larus argentatus	Herring Gull	Migratory
Larus argentatus cachinnans	Yellow-legged Gull	Migratory
Larus fuscus	Lesser Black-backed Gull	Migratory
Larus glaucoides	Iceland Gull	Migratory
Larus ridibundus	Black-headed Gull	Migratory
Larus sabini	Sabine's Gull	Migratory
Morus bassanus	Northern Gannet	Migratory
Oceanodroma leucorhoa	Leach's Storm-petrel	Annex 1
Puffinus puffinus	Manx Shearwater	Migratory
Rissa tridactyla	Black-legged Kittiwake	Migratory
Stercorarius longicaudus	Long-tailed Skua	Migratory
Stercorarius parasiticus	Arctic Skua	Migratory
Stercorarius pomarinus	Pomarine Skua	Migratory
Stercorarius skua	Great Skua	Migratory
Sterna hirundo	Common Tern	Annex 1
Sterna paradisaea	Arctic Tern	Annex 1
Uria aalge	Common Guillemot	Migratory

Rights and permissions – Any requests to use the seabird tracking data shown for this site in any publication need to be agreed with the data owners. An initial request should be sent to BirdLife International to coordinate this process. See http://www.seabirdtracking.org/terms.php for full terms of reference

Joint OSPAR/NEAFC/CBD Scientific Workshop on the Identification of Ecologically or Biologically Significant Marine Areas (EBSAs) in the North-East Atlantic

Hyères (Port Cros), France: 8 – 9 September 2011

EBSA identification proforma for the North-East Atlantic - 5

Title/Name of the area - Around Pedro Nunes and Hugo de Lacerda Seamounts - IBA MA04

Presented by: Ramírez I., P. Geraldes, A. Meirinho, P. Amorim & V. Paiva, Ben Lascelles, Phil Taylor, Mark Miller (BirdLife International), reviewed by Participants at the Joint OSPAR/NEAFC/CBD Scientific Workshop on the Identification of Ecologically or Biologically Significant Marine Areas in the North-East Atlantic

Contact: ben.lascelles@birdlife.org

Abstract

This site is around 485 km away from Berlengas and 890 km from Desertas. It has been identified as a pelagic feeding and resting area for Cory's Shearwater. Its presence may be explained by the presence of seamounts.

Introduction

This area includes two seamounts - Pedro Nunes and Hugo de Lacerda - which act as natural boosters of the likely increased richness of this site. Besides, there are four other significant seamounts in the surrounding area.

Location

This area currently lies outside of national jurisdiction, see fig 1, coordinates are as follows:

A - 41°16'N, 15°31'W B - 41°16'N, 14°54'W
C - 40°24'N, 15°31'W D - 40°24'N, 14°54'W

Feature description

Please see Ramirez et al 2008 for methods involved in identifying this site.

The site covers an area of 5,002 km^2, with depths ranging from 5448m to 2510m and averaging at 4947m. Chlorophyll a concentration ranges from 0.21 mg m^{-3} to 0.32 mg m^{-3}, averaging at 0.25 mg m^{-3}, while Sea surface temperature ranges from 16.61°C to 17.67°C, averaging at 17.1°C (IOC et al., 2003, Feldman and McClain, 2011).

Developing habitat suitability models for this area would further help to determine the key variables that explain the seabird species distribution and abundance.

Feature condition, and future outlook

This site is currently thought to be static, as it is located around several seamount, and Cory's shearwater was shown to be using the area in several years that tracking data was available. It is possible the site may move as a result of climate change and shifts in ocean currents, though this would need to be further explored via habitat modeling techniques.

Cory's Shearwater is vulnerable to incidental bycatch in fisheries, particularly long-line. All seabird species a vulnerable to surface pollution events, particularly oil spills.

Assessment against CBD EBSA Criteria

Table 1. relation of each of the CBD criteria to the proposed area relating to the best available science. Note that a candidate EBSA may qualify on the basis of one or more of the criteria, the boundaries of the EBSA need not be defined with exact precision.

CBD EBSA Criterion	**Description**	**Ranking of criterion relevance** (please mark one column with an X)			
		Don't Know	**Low**	**Some**	**High**
Uniqueness or rarity	The 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 This site is used by Zino's Petrel during the breeding season, when it is an endemic breeder to Madeira (Zino et al 2011). The site is also used by Fea's Petrel which currently breeds at several localities in Macaronesia, though genetic studies suggest up to three species may be involved.					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive				**X**
Explanation for ranking Primary qualifying information: Cory's Shearwater is the most relevant species at this site. Both the Desertas and the Berlengas populations used the area for resting and feeding during their incubation period. Data for this area shows that birds from the Desertas islands used the area regularly in July 2006 and individuals from the Berlengas islands used it in June 2007.					
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 EU Bird's Directive Annex I species: Cory's Shearwater,					
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 shearwater are highly susceptible to incidental bycatch in fisheries, particularly long-line					
Biological productivity	Area containing species, populations or communities with comparatively higher natural	**X**			

	biological productivity				
Explanation for ranking Not assessed					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity	**X**			
Explanation for ranking Not assessed					

Sharing experiences and information applying other international criteria (Optional)

CBD EBSA Criterion	Description	Ranking of criterion relevance (please mark one column with an X)			
		Don't Know	**Low**	**Some**	**High**
Dependency:	An area where ecological processes are highly dependent on biotically structured systems (e.g., coral reefs, kelp forests, mangrove forests, seagrass beds). Such ecosystems often have high diversity, which is dependent on the structuring organisms. Dependency also embraces the migratory routes of fish, reptiles, birds, mammals, and invertebrates.	**X**			
Explanation for ranking Not assessed					
Representativeness:	An area that is an outstanding and illustrative example of specific biodiversity, ecosystems, ecological or physiographic processes	**X**			
Explanation for ranking Not assessed					
Biogeographic importance:	An area that either contains rare biogeographic qualities or is representative of a biogeographic "type" or types, or contains unique or unusual biological, chemical, physical, or geological features	**X**			
Explanation for ranking Not assessed					
Structural complexity:	An area that is characterized by complex physical structures created by significant concentrations of biotic and abiotic features.	**X**			
Explanation for ranking Not assessed					
Natural Beauty:	An area that contains superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance.	**X**			
Explanation for ranking Not assessed					
Earth's geological history:	An area with outstanding examples representing major stages of Earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features.	**X**			
Explanation for ranking Not assessed					
[Other relevant criterion] Important Bird Area (IBA)	Areas used by more than threshold numbers of threatened species (criteria A1), greater than 1% of the world population of a given species (criteria A4i and A4ii), or used by congregations (criteria A4iii)				**X**
Explanation for ranking This site was identified as a high seas IBA during the SPEA EU LIFE project (Ramirez et al (2008) and was shown to contain >1% of the world population of Cory's Shearwater, thus triggering IBA criteria A4ii. See BirdLife International (2009) for a comparison between IBA and EBSA criteria.					

References

BirdLife International (2009) Designing networks of marine protected areas: exploring the linkages between Important Bird Areas and ecologically or biologically significant marine areas. Cambridge, UK: BirdLife International.

Feldman, GC., CR McClain (2011) Ocean Color Web, MODIS L3 Annual Mean 2008, *NASA Goddard Space Flight Center. Eds. N Kuing, SW Bailey.* http://oceancolor.gsf.nasa.gov/

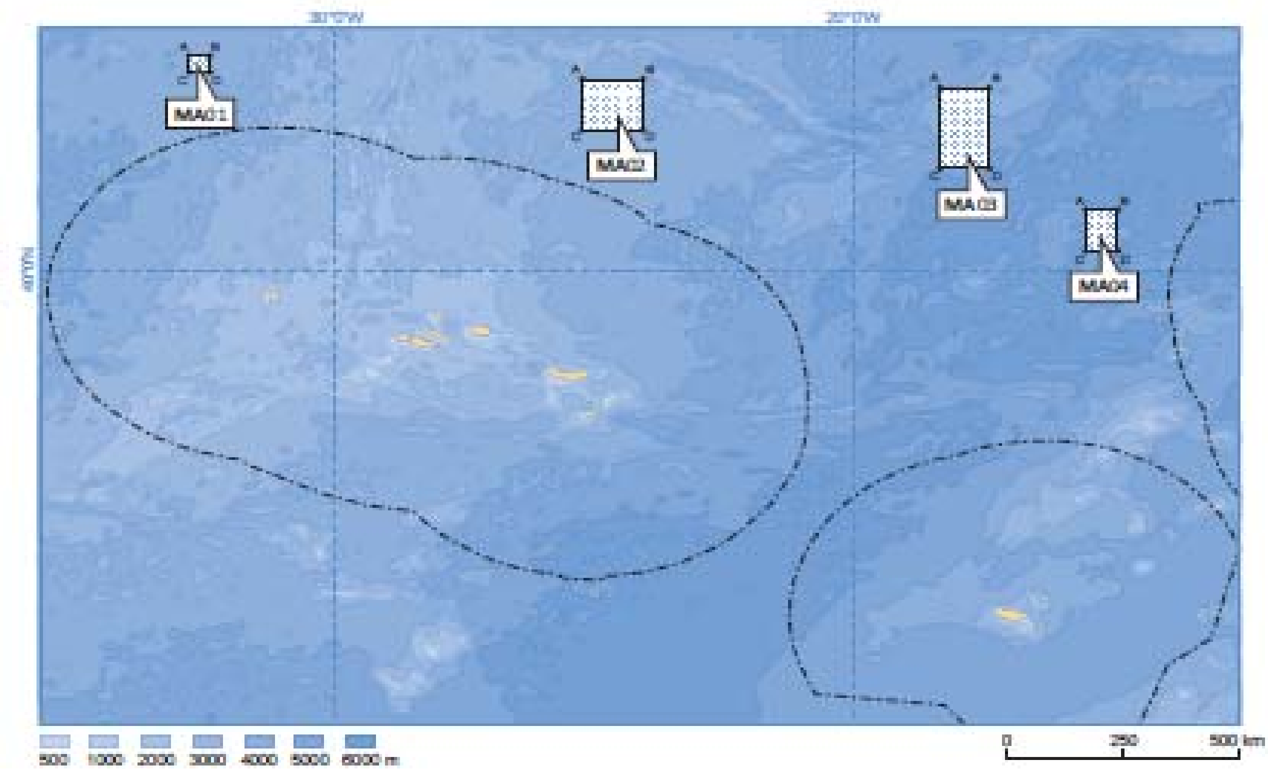
IOC, IHO, BODC, (2003) Centenary Edition of the GEBCO Digital Atlas, published on CD-ROM on behalf of the Intergovernmental Oceanographic Commission and the International Hydrographic Organization as part of the General Bathymetric Chart of the Oceans; British Oceanographic Data Centre, Liverpool

Ramírez I., P. Geraldes, A. Meirinho, P. Amorim & V. Paiva (2008). *Áreas Marinhas Importantes para as Aves em Portugal.* Projecto LIFE04NAT/PT/000213 - Sociedade Portuguesa Para o Estudo das Aves. Lisboa**.** http://lifeibasmarinhas.spea.pt/en/y-book/marineibas/

Zino,F., RA Phillips, M Biscoito (2011). Zino's petrel movement at sea – a preliminary analysis of datalogger results. Birding World 24 (5): 216-219

Maps and Figures

Fig 1: Approximate representation of the four Important Bird Areas (MA01 - MA04) identified in international waters.



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Joint OSPAR/NEAFC/CBD Scientific Workshop on the Identification of Ecologically or Biologically Significant Marine Areas (EBSAs) in the North-East Atlantic

Hyères (Port Cros), France: 8 – 9 September 2011

EBSA identification proforma for the North-East Atlantic - 6

Title/Name of the area - North east Azores-Biscay Rise - IBA MA03

Presented by : Ramírez I., P. Geraldes, A. Meirinho, P. Amorim & V. Paiva, Ben Lascelles, Phil Taylor, Mark Miller (BirdLife International) and reviewed by Participants at the Joint OSPAR/NEAFC/CBD Scientific Workshop on the Identification of Ecologically or Biologically Significant Marine Areas in the North-East Atlantic

Contact– ben.lascelles@birdlife.org

Abstract

This site is around 740 km away from the Berlengas islands and 1,080 km from Deserta Grande. It has been identified as a pelagic feeding and resting area for Cory's Shearwater. Its presence may be explained upwellings that are thought to occur in the area.

Introduction

This large area is located at an elevation of the seabed (Azores - Biscaia) which may be the cause for an upwelling phenomenon in this area, increasing its productivity. This effect appears to be confirmed through the satellite pictures obtained for this location and period, both SST and CHL.

Location

This area currently lies outside of national jurisdiction, see fig 1, coordinates are as follows:

A - 43°50'N, 18°20'W B - 43°50'N, 17°23'W
C - 42°08'N, 18°20'W D - 42°08'N, 17°23'W

Feature description

Please see Ramirez et al 2008 for methods involved in identifying this site.

The site covers an area of 14,640 km^2, with depths ranging from 5534m to 2988m and averaging at 3789m. Chlorophyll a concentration ranges from 0.22 mg m^{-3} to 0.30 mg m^{-3}, averaging at 0.27 mg m^{-3}, while Sea surface temperature ranges from 14.98°C to 17.13°C, averaging at 16.3°C (IOC et al., 2003, Feldman and McClain, 2011).

Developing habitat suitability models for this area would further help to determine the key variables that explain the seabird species distribution and abundance.

Feature condition, and future outlook

This site is currently thought to be static, as it is located around a seamount, and Cory's shearwater was shown to be using the area in several years that tracking data was available. It is possible the site may move as a result of climate change and shifts in ocean currents, though this would need to be further explored via habitat modeling techniques.

Cory's Shearwater is vulnerable to incidental bycatch in fisheries, particularly long-line. All seabird species a vulnerable to surface pollution events, particularly oil spills.

Assessment against CBD EBSA Criteria

Table 1. relation of each of the CBD criteria to the proposed area relating to the best available science. Note that a candidate EBSA may qualify on the basis of one or more of the criteria, the boundaries of the EBSA need not be defined with exact precision.

CBD EBSA Criterion	Description	Ranking of criterion relevance (please mark one column with an X)			
		Don't Know	Low	Some	High
Uniqueness or rarity	The 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 This site is used by Zino's Petrel during the breeding season, when it is an endemic breeder to Madeira (Zino et al 2011). The site is also used by Fea's Petrel which currently breeds at several localities in Macaronesia, though genetic studies suggest up to three species may be involved.					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive				**X**
Explanation for ranking Primary qualifying information: Cory's Shearwater populations from both Desertas and Berlengas used the area for resting and feeding during their incubation period in June 2006 and July 2007, respectively. The use of this purely pelagic area by two populations from different colonies adds greater relevance to it in terms of conservation.					
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 EU Bird's Directive Annex I species: Cory's Shearwater,					
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 shearwater are highly susceptible to incidental bycatch in fisheries, particularly long-line					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity	**X**			
Explanation for ranking Not assessed					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity	**X**			
Explanation for ranking Not assessed					

Sharing experiences and information applying other international criteria (Optional)

CBD EBSA Criterion	Description	Ranking of criterion relevance (please mark one column with an X)			
		Don't Know	**Low**	**Some**	**High**
Dependency:	An area where ecological processes are highly dependent on biotically structured systems (e.g., coral reefs, kelp forests, mangrove forests, seagrass beds). Such ecosystems often have high diversity, which is dependent on the structuring organisms. Dependency also embraces the migratory routes of fish, reptiles, birds, mammals, and invertebrates.	**X**			
Explanation for ranking Not assessed					
Representativeness:	An area that is an outstanding and illustrative example of specific biodiversity, ecosystems, ecological or physiographic processes	**X**			
Explanation for ranking Not assessed					
Biogeographic importance:	An area that either contains rare biogeographic qualities or is representative of a biogeographic "type" or types, or contains unique or unusual biological, chemical, physical, or geological features	**X**			
Explanation for ranking Not assessed					
Structural complexity:	An area that is characterized by complex physical structures created by significant concentrations of biotic and abiotic features.	**X**			
Explanation for ranking Not assessed					
Natural Beauty:	An area that contains superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance.	**X**			
Explanation for ranking Not assessed					
Earth's geological history:	An area with outstanding examples representing major stages of Earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features.	**X**			
Explanation for ranking Not assessed					
[Other relevant criterion] Important Bird Area (IBA)	Areas used by more than threshold numbers of threatened species (criteria A1), greater than 1% of the world population of a given species (criteria A4i and A4ii), or used by congregations (criteria A4iii)				**X**
Explanation for ranking This site was identified as a high seas IBA during the SPEA EU LIFE project (Ramirez et al (2008) and was shown to contain >1% of the world population of Cory's Shearwater, thus triggering IBA criteria A4ii. See BirdLife International (2009) for a comparison between IBA and EBSA criteria.					

References

BirdLife International (2009) Designing networks of marine protected areas: exploring the linkages between Important Bird Areas and ecologically or biologically significant marine areas. Cambridge, UK: BirdLife International.

Feldman, GC, CR McClain (2011) Ocean Color Web, MODIS L3 Annual Mean 2008, *NASA Goddard Space Flight Center. Eds. N Kuing, SW Bailey.* http://oceancolor.gsf.nasa.gov/

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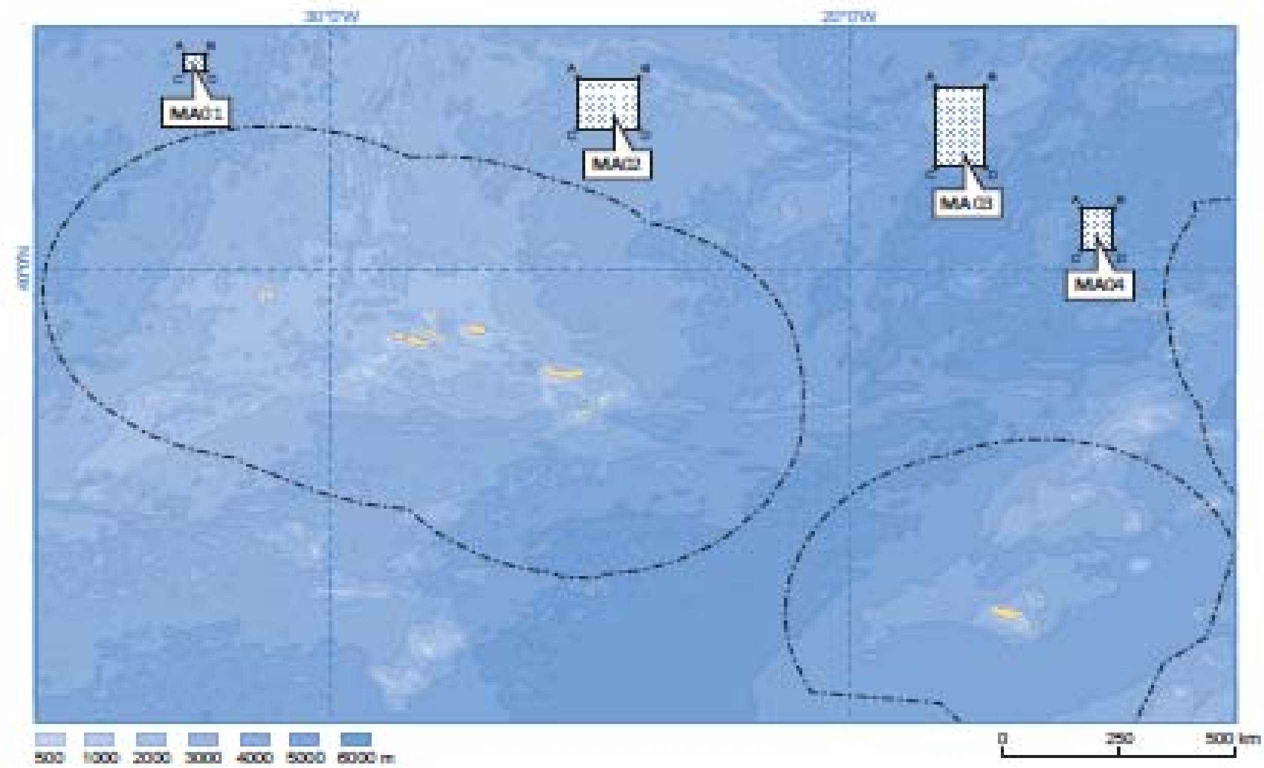
Ramírez I., P. Geraldes, A. Meirinho, P. Amorim & V. Paiva (2008). *Áreas Marinhas Importantes para as Aves em Portugal.* Projecto LIFE04NAT/PT/000213 - Sociedade Portuguesa Para o Estudo das Aves. Lisboa http://lifeibasmarinhas.spea.pt/en/y-book/marineibas/

Zino, F., RA Phillips, M Biscoito (2011). Zino's petrel movement at sea – a preliminary analysis of datalogger results. Birding World 24 (5): 216-219

Maps and Figures

Fig 1: Approximate representation of the four Important Bird Areas (MA01 - MA04) identified in international waters.



Joint OSPAR/NEAFC/CBD Scientific Workshop on the Identification of Ecologically or Biologically Significant Marine Areas (EBSAs) in the North-East Atlantic

Hyères (Port Cros), France: 8 – 9 September 2011

EBSA identification proforma for the North-East Atlantic - 7

Title/Name of the area - Evlanov Seamount region

Presented by Ben Lascelles, Phil Taylor, Mark Miller (BirdLife International), T. Boulinier, M. Caroline Martin, P. Catry, M.A. Dias, J. González-Solís, J.P. Granadeiro, D. Gremillet, A. Hedd, Y. Kolbeinsson, V. Paiva, I. Ramirez, A. Ramsay, R. Ronconi, P. Ryan, I.A. Sigurðsson, and V. Neves all contributed tracking data for this analysis via www.seabirdtracking.org

Additional information and data processing was provided by A. Hedd, L.A. McFarlane and E. Wakefield.

The proposal has been reviewed by Participants at the Joint OSPAR/NEAFC/CBD Scientific Workshop on the Identification of Ecologically or Biologically Significant Marine Areas in the North-East Atlantic

Contact: ben.lascelles@birdlife.org

Abstract

This site to the North West of the Azores EEZ and west of the mid-Atlantic ridge has been identified for a number of seabird species which satellite tracking data shows use the area. Different species use the site at different times of year, for the primary species considered here the period of importance runs from April to November (see fig 1). 7 out of the 8 species considered have been found here. A wide range of supporting information is available for this site from published sources.

Introduction

The site covers an area of 146,635 km^2, with depths ranging from 4686 m to 3110 m and averaging at 4326 m. Chlorophyll a concentration ranges from 0.22 mg m^{-3} to 0.79 mg m^{-3}, averaging at 0.37 mg m^{-3}, while Sea surface temperature ranges from 12.22°C to 18.41°C, averaging at 15.44°C (IOC et al., 2003, Feldman and McClain, 2011).

Location

See fig 2 for the geographic location of the feature. This area currently lies outside of national jurisdiction, areas within the EEZ were not considered within this analysis, but it is likely that the site would straddle both upon further investigation.

Feature description

Satellite tracking data for a range of seabird species have been used to identify and define the boundaries to this site. Additional tracking data and published papers on further seabird species have been used as supporting information.

For each species data was divided into data groups which reflect different life history stages from different breeding sites (i.e. data collected during the non-breeding season from one site, was treated separately to the same life history stage from another site).

Each data group was then analysed to identify the 50% Utilisation Distribution for each individual track, this highlights the areas that each bird was targeting and can be regarded as the core distribution of that bird.

These findings were summed to identify areas used as core by multiple individuals. Areas where >35% of all tracked individuals used as their core distribution were then isolated and used to identify candidate EBSAs.

Migration corridors or bottlenecks were identified by buffering around each track (150km based on standard error of GLS devices) to determine areas of overlap, these findings were summed to identify migratory areas used by multiple individuals. Areas where >87.5% of tracked birds occur in a migration corridor were isolated to identify candidate EBSAs.

In addition sites targeted by birds from multiple colonies of the same species were also identified. For species where this data was available, the core areas targeted by each data group were identified by summing individual 50% Utilisation Distributions (as above). Areas where >50% of data group cores overlapped were then isolated and used to identify candidate EBSAs.

While seabirds occur at the waters surface and in the upper water column, their distribution can be explained by a range of oceanographic processes such as SST, wind speed and direction, as well as ocean currents. It was not possible to conduct habitat modeling approaches for this submission, though these could be developed in future and may help identify the underlining factors explaining seabird distribution and abundance within this site.

Feature condition, and future outlook

This site is currently thought to be static, as 6 out of 8 species considered were found to be using the area in every year that tracking data was available. It is possible the site may move as a result of climate change and shifts in ocean currents, though this would need to be further explored via habitat modeling techniques.

Several of the seabird species found here are vulnerable to incidental bycatch in fisheries, particularly long-line. All seabird species are vulnerable to surface pollution events, particularly oil spills.

Assessment against CBD EBSA Criteria

Table 1. relation of each of the CBD criteria to the proposed area relating to the best available science. Note that a candidate EBSA may qualify on the basis of one or more of the criteria, the boundaries of the EBSA need not be defined with exact precision.

CBD EBSA Criterion	**Description**	**Ranking of criterion relevance** (please mark one column with an X)			
		Don't Know	**Low**	**Some**	**High**
Uniqueness or rarity	The 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 The site is used by Fea's Petrel which currently breeds at several localities in Macaronesia, though genetic studies suggest up to three species may be involved.					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive				**X**
Explanation for ranking Primary qualifying information: • Above threshold counts for core distributions of Sooty Shearwater (2 colonies)					

<table>
<tr><td colspan="6">

Above threshold counts for migratory pathways of Sooty Shearwater (2 colonies),
Area used regularly by multiple (≥3) colonies of Cory’s Shearwater
Area used regularly by multiple (≥2) colonies of Sooty Shearwater

Supporting information:

Area used in multiple (≥4) years by Cory’s Shearwater
Arctic Tern migration point used on average during 24 days during autumn, and to a lesser extent in spring (Egevang et al 2009)
Long-tailed skua migration point with 75% of tracked birds (n=4) spending 8-20 days here in July and August (Sittler et al 2011)
Northern Gannet migration point in Feb/Mar and Oct (Fifield et al submitted)
Northern Fulmar wintering area for 20% of tracked birds (n=5) Dec-Mar (Mallory et al 2008)
Included in area important for 18 species of seabird as well as for other higher predators, including bill fish and bluefin tuna, turtles, sharks and cetaceans (Wakefield et al in lit)
Preliminary data from tracking of Atlantic puffins from Vestmannaeyjar in south Ice-land (A. Petersen, unpublished), Northern fulmars breeding in Orkney, north Scotland (P.M. Thompson, unpublished) and Little auks from a colony in north-east Greenland all suggested to be using this area extensively (A. Mosbech et al., unpublished) (ICES 2010)

</td></tr>
<tr><td>Importance for threatened, endangered or declining species and/or habitats</td><td>Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">
Explanation for ranking
Primary qualifying information:

IUCN Red Listed species: Sooty Shearwater (Near Threatened)
EU Bird’s Directive Annex I species: Cory’s Shearwater
EU Bird’s Directive migratory species: Sooty Shearwater

Supporting information:

IUCN Red Listed species: Fea’s Petrel (Near Threatened)
OSPAR listed species: Black-legged Kittiwake, Little Shearwater
EU Bird’s Directive Annex I species: Arctic Tern
EU Bird’s Directive migratory species: Great Shearwater, Manx Shearwater, Black-legged Kittiwake, Northern Gannet, Northern Fulmar, Long-tailed Skua.

</td></tr>
<tr><td>Vulnerability, fragility, sensitivity, or slow recovery</td><td>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</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking
Four species of shearwater are highly susceptible to incidental bycatch in fisheries, particularly long-line</td></tr>
<tr><td>Biological productivity</td><td>Area containing species, populations or communities with comparatively higher natural biological productivity</td><td>X</td><td></td><td></td><td></td></tr>
<tr><td colspan="6">Explanation for ranking
Not assessed</td></tr>
<tr><td>Biological diversity</td><td>Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking
Important for 18 species of seabird as well as for other higher predators, including bill fish and bluefin tuna, turtles, sharks and cetaceans (Wakefield et al in lit)</td></tr>
</table>

Sharing experiences and information applying other international criteria (Optional)

CBD EBSA Criterion	**Description**	**Ranking of criterion relevance** (please mark one column with an X)			
		Don't Know	**Low**	**Some**	**High**
Dependency:	An area where ecological processes are highly dependent on biotically structured systems (e.g., coral reefs, kelp forests, mangrove forests, seagrass beds). Such ecosystems often have high diversity, which is dependent on the structuring organisms. Dependency also embraces the migratory routes of fish, reptiles, birds, mammals, and invertebrates.	**X**			
Explanation for ranking Not assessed					
Representativeness:	An area that is an outstanding and illustrative example of specific biodiversity, ecosystems, ecological or physiographic processes	**X**			
Explanation for ranking Not assessed					
Biogeographic importance:	An area that either contains rare biogeographic qualities or is representative of a biogeographic "type" or types, or contains unique or unusual biological, chemical, physical, or geological features	**X**			
Explanation for ranking Not assessed					
Structural complexity:	An area that is characterized by complex physical structures created by significant concentrations of biotic and abiotic features.	**X**			
Explanation for ranking Not assessed					
Natural Beauty:	An area that contains superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance.	**X**			
Explanation for ranking Not assessed					
Earth's geological history:	An area with outstanding examples representing major stages of Earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features.	**X**			
Explanation for ranking Not assessed					
[Other relevant criterion] Important Bird Area (IBA)	Areas used by more than threshold numbers of threatened species (criteria A1), greater than 1% of the world population of a given species (criteria A4i and A4ii), or used by congregations (criteria A4iii)				**X**
Explanation for ranking Areas within this site are likely to qualify as Important Bird Areas under BirdLife International criteria. See BirdLife International (2009) for a comparison between IBA and EBSA criteria.					

References

Contributors of data for this analysis are as follows; full details about each dataset are available via *www.seabirdtracking.org*

Species	Site	Owner
Corys Shearwater	Azores	J. González-Solís
Corys Shearwater	Balearics	J. González-Solís
Corys Shearwater	Canaries	J. González-Solís
Corys Shearwater	Chafarinas	J. González-Solís
Corys Shearwater	Berlengas	P. Catry, J.P. Granadeiro
Corys Shearwater	Selvagens	M.A. Dias, P. Catry
Corys Shearwater	Selvagens	M.A. Dias, J.P. Granadeiro
Corys Shearwater	Veneguera	J. González-Solís
Sooty Shearwater	Bay Fundy	R. Ronconi
Sooty Shearwater	Falkland Islands (Malvinas)*	A. Hedd
Sooty Shearwater	Gough	A. Hedd
Great Shearwater	Bay Fundy	R. Ronconi
Great Shearwater	Inaccessible Island	R. Ronconi, P. Ryan, M. Caroline Martin
Manx Shearwater	Iceland	I.A. Sigurðsson, Y. Kolbeinsson, J. González-Solís
Manx Shearwater	UK	A. Ramsay, J. González-Solís
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Black-legged Kittiwake	Norway	T. Boulinier, D. Gremillet, J. González-Solís
Little Shearwater	Azores	V. Neves, J. González-Solís

Additional Supporting References

BirdLife International (2009) Designing networks of marine protected areas: exploring the linkages between Important Bird Areas and ecologically or biologically significant marine areas. Cambridge, UK: BirdLife International.

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ICES. 2010. Report of the Working Group on Seabird Ecology (WGSE), 15–19 March 2010, ICES Headquarters, Copenhagen, Denmark. ICES CM 2010/SSGEF:10. 77 pp.

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Mallory ML, JA Akearok, DB Edwards, K O'Donovan, CD Gilbert (2008). Autumn migration and wintering of northern fulmars (*Fulmarus glacialis*) from the Canadian high Arctic. Polar Biol (2008) 31:745–750

*A dispute exists between the Governments of Argentina and the United Kingdom of Great Britain and Northern Island concerning sovereignty over the Falkland Islands (Malvinas).

Sittler, B., A Aebischer, O Gilg (2011). Post-breeding migration of four Long-tailed Skuas (Stercorarius longicaudus) from North and East Greenland to West Africa. Journal of ornithology 152, 2 (2011) 375-381

Wakefield, E. D., L. A. McFarlane Tranquilla, R. A. Phillips, A. Aebischer, M. I. Bogdanova, T. Boulinier, J. Bried, P. Catry, R. J. Cuthbert, F. Daunt, M. P. Dias, C. Egevang, R. Freeman, R. W. Furness, A. J. Gaston, P. Geraldes, O. Gilg, J. González-Solís, J. P. Granadeiro, D. Gremillet, T. Guilford, S. Hahn, A. Hedd, Y. Kolbeinsson, M. Kopp, M. C. Magalhães, E. Magnusdottir, T. Militão, B. Moe, W. A. Montevecchi, V. Neves, V. H. Paiva, H. U. Peter, A. E. Petersen, L. R. Quinn, I. Ramirez, R. Ramos, A. Ramsay, P. G. Ryan, R. S. Serrão Santos, I. A. Sigurðsson, B. Sittler, I. J. Stenhouse, P. M. Thompson, M. J. Witt, K. C. Hamer (in prep). A newly described seabird diversity hotspot in the deep Northwest Atlantic identified using individual movement data.

Maps and Figures

Fig 1: Species occurrence by month within the site, showing percentage of tracked population for each species (and where relevant subpopulation) found within the area each month. Solid colours represent occurrence of species that were primary feature for the site, while hashed colours represent occurrence of species used as supporting information.

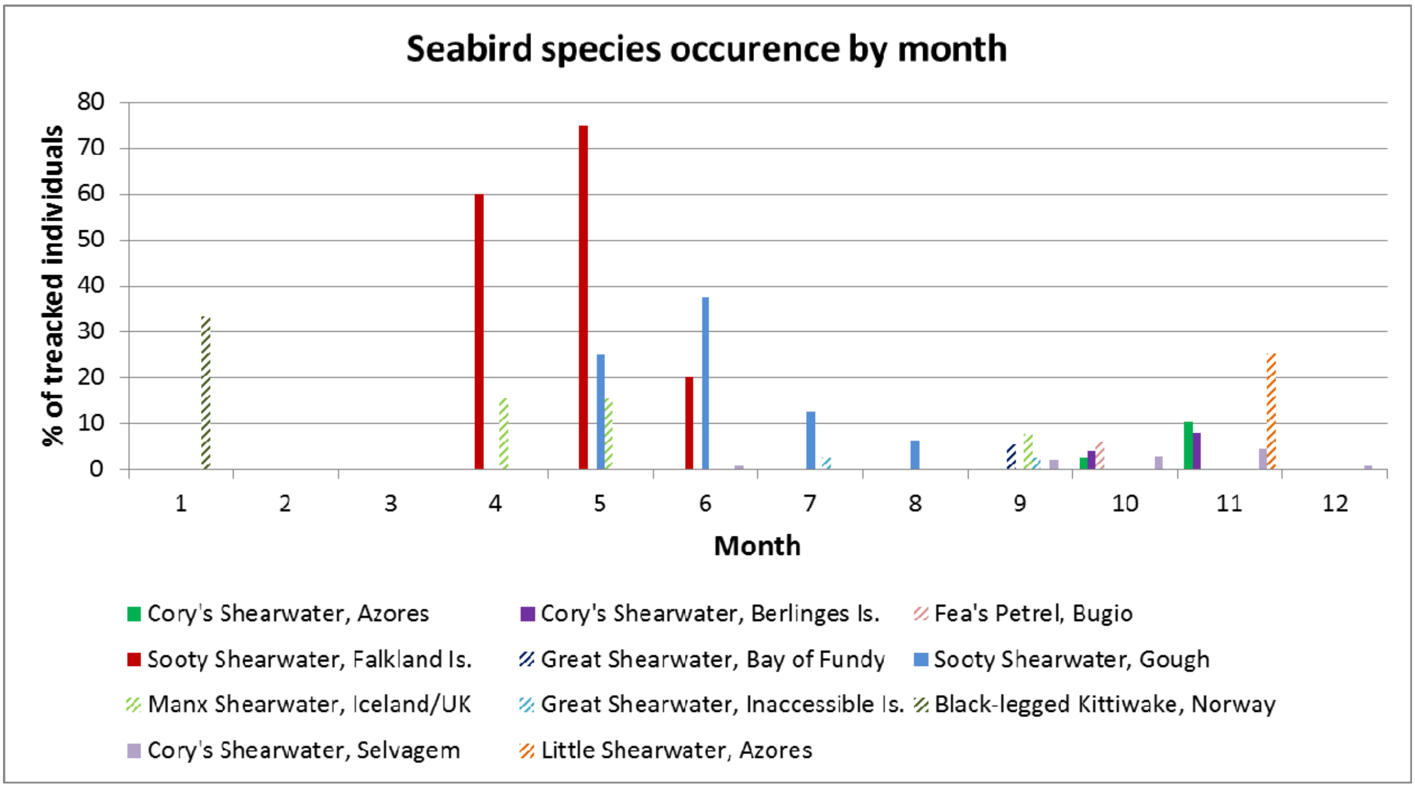
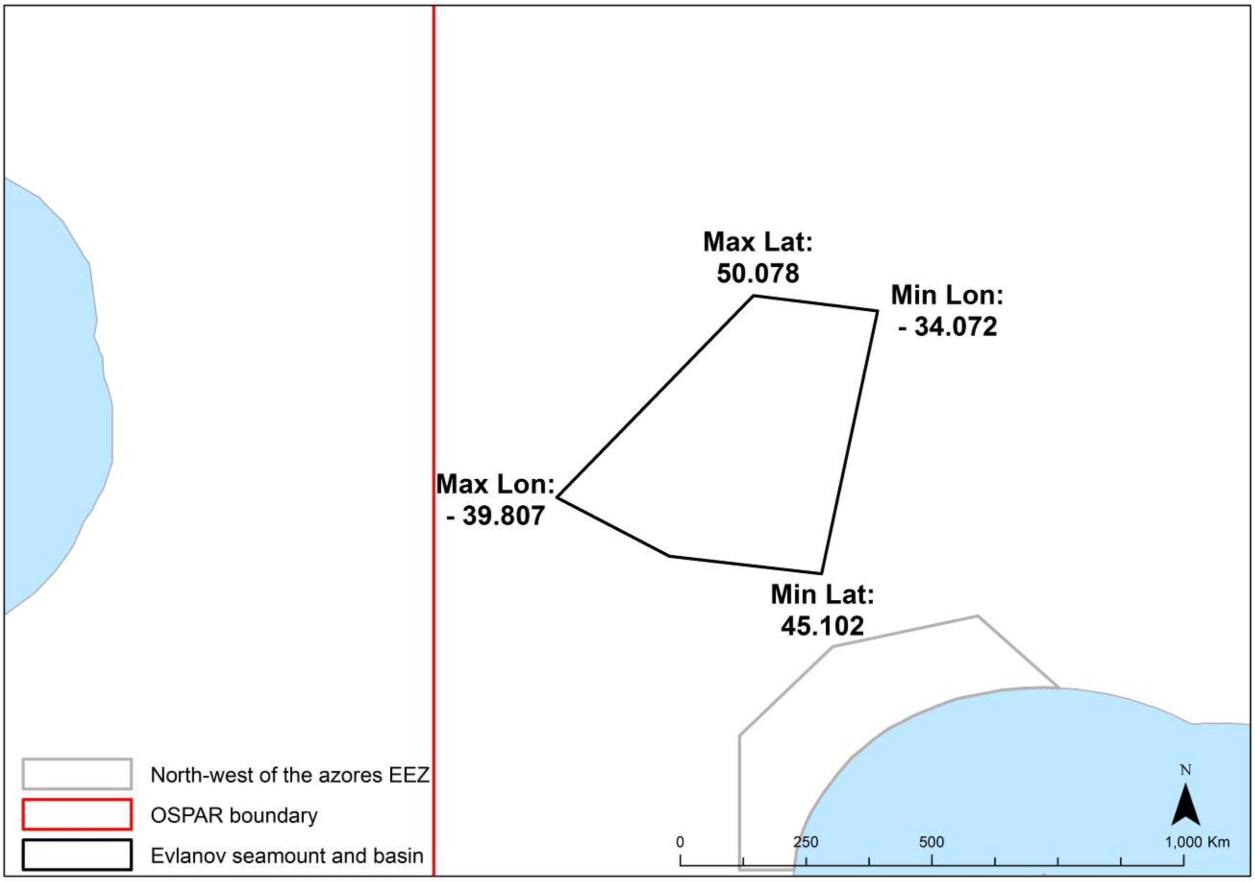


Fig 2: Showing location and extent of this EBSA



Rights and permissions – Any requests to use the tracking data shown for this site in any publication need to be agreed with the data owners. An initial request should be sent to BirdLife International to coordinate this process. See http://www.seabirdtracking.org/terms.php for full terms of reference

Joint OSPAR/NEAFC/CBD Scientific Workshop on the Identification of Ecologically or Biologically Significant Marine Areas (EBSAs) in the North-East Atlantic

Hyères (Port Cros), France: 8 – 9 September 2011

EBSA identification proforma for the North-East Atlantic - 8

Title/Name of the area - North-west of Azores EEZ

Presented by Ben Lascelles, Phil Taylor, Mark Miller (BirdLife International); T. Boulinier, M. Caroline Martin, P. Catry, M.A. Dias, J. González-Solís, J.P. Granadeiro, D. Gremillet, A. Hedd, Y. Kolbeinsson, V. Paiva, I. Ramirez, A. Ramsay, R. Ronconi, P. Ryan, I.A. Sigurðsson, and V. Neves all contributed tracking data for this analysis via www.seabirdtracking.org

Additional information and data processing was provided by A. Hedd, L.A. McFarlane and E. Wakefield.
The proposal has been reviewed by Participants at the Joint OSPAR/NEAFC/CBD Scientific Workshop on the Identification of Ecologically or Biologically Significant Marine Areas in the North-East Atlantic

Contact: ben.lascelles@birdlife.org

Abstract

This site borders the Azores EEZ on the North-western corner, it has been identified for a number of seabird species which satellite tracking data shows use the area. Different species use the site at different times of year, for the primary species considered here the period of importance runs from April to November (see fig 1). 7 out of the 8 species considered have been found here. A wide range of supporting information is available for this site from published sources.

Introduction

This site includes part of the MAR North of the Azores High seas MPA. In addition it includes the Important Bird Area MA01 (Ramirez et al 2008).

The site covers an area of 91,243km^2, with depths ranging from 4569 m to 2692 m and averaging at 4326 m. Chlorophyll a concentration ranges from 0.15 mg m^{-3} to 0.35 mg m^{-3}, averaging at 0.21 mg m^{-3}, while Sea surface temperature ranges from 17.08°C to 21.51°C, averaging at 19.37°C (IOC et al., 2003, Feldman and McClain, 2011).

Location

See fig 2 for the geographic location of the feature. This area currently lies outside of national jurisdiction, areas within the EEZ were not considered within this analysis, but it is likely that the site would straddle both upon further investigation.

Feature description

Satellite tracking data for a range of seabird species have been used to identify and define the boundaries to this site. Additional tracking data and published papers on further seabird species have been used as supporting information.

For each species data was divided into data groups which reflect different life history stages from different breeding sites (i.e. data collected during the non-breeding season from one site, was treated separately to the same life history stage from another site).

Each data group was then analysed to identify the 50% Utilisation Distribution for each individual track, this highlights the areas that each bird was targeting and can be regarded as the core distribution of that bird. These findings were summed to identify areas used as core by multiple individuals. Areas where >35% of all tracked individuals used as their core distribution were then isolated and used to identify candidate EBSAs.

Migration corridors or bottlenecks were identified by buffering around each track (150km based on standard error of GLS devices) to determine areas of overlap, these findings were summed to identify migratory areas used by multiple individuals. Areas where >87.5% of tracked birds occur in a migration corridor were isolated to identify candidate EBSAs.

In addition sites targeted by birds from multiple colonies of the same species were also identified. For species where this data was available, the core areas targeted by each data group were identified by summing individual 50% Utilisation Distributions (as above). Areas where >50% of data group cores overlapped were then isolated and used to identify candidate EBSAs.

While seabirds occur at the waters surface and in the upper water column, their distribution can be explained by a range of oceanographic processes such as SST, wind speed and direction, as well as ocean currents. It was not possible to conduct habitat modeling approaches for this submission, though these could be developed in future and may help identify the underlining factors explaining seabird distribution and abundance within this site.

Feature condition, and future outlook

This site is currently thought to be static, as 6 out of 8 species considered were found to be using the area in every year that tracking data was available. It is possible the site may move as a result of climate change and shifts in ocean currents, though this would need to be further explored via habitat modeling techniques.

Several of the seabird species found here are vulnerable to incidental bycatch in fisheries, particularly long-line. All seabird species are vulnerable to surface pollution events, particularly oil spills.

Assessment against CBD EBSA Criteria

Table 1. relation of each of the CBD criteria to the proposed area relating to the best available science. Note that a candidate EBSA may qualify on the basis of one or more of the criteria, the boundaries of the EBSA need not be defined with exact precision.

<table>
<tr><th rowspan="2">CBD EBSA Criterion</th><th rowspan="2">Description</th><th colspan="4">Ranking of criterion relevance
(please mark one column with an X)</th></tr>
<tr><th>Don’t Know</th><th>Low</th><th>Some</th><th>High</th></tr>
<tr><td>Uniqueness or rarity</td><td>The 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</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking
This site is used by Zino’s Petrel during the breeding season, when it is an endemic breeder to Madeira (Zino et al 2011). The site is also used by Fea’s Petrel which currently breeds at several localities in Macaronesia, though genetic studies suggest up to three species may be involved.</td></tr>
<tr><td>Special importance for life-history stages of species</td><td>Areas that are required for a population to survive and thrive</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking
Primary qualifying information:</td></tr>
</table>

<table>
<tr><td colspan="6">

Above threshold counts for core distributions of Fea’s Petrel
Above threshold counts for migratory pathways of Fea’s Petrel
Area used regularly by multiple (≥3) colonies of Cory’s Shearwater

Supporting information:
Area used in multiple (≥4) years by Cory’s Shearwater
Arctic Tern migration point used on average during 24 days during autumn, and to a lesser extent in spring (Egevang et al 2009)
Long-tailed skua migration point with 25% of tracked birds (n=4) spending 8-20 days here in July and August (Sittler et al 2011)
Northern Gannet migration point in Feb/Mar and Oct (Fifield et al submitted)
Zino’s Petrel core distribution during breeding Apr-late Sept (Zino et al 2011)
Partial overlap with area important for 18 species of seabird as well as for other higher predators, including bill fish and bluefin tuna, turtles, sharks and cetaceans (Wakefield et al in lit)
Preliminary data from tracking of Atlantic puffins from Vestmannaeyjar in south Ice-land (A. Petersen, unpublished), Northern fulmars breeding in Orkney, north Scotland (P.M. Thompson, unpublished) and Little auks from a colony in north-east Greenland all suggested to be using part of this area extensively (A. Mosbech et al., unpublished) (ICES 2010)

</td></tr>
<tr><td>Importance for threatened, endangered or declining species and/or habitats</td><td>Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking
Primary qualifying information:

IUCN Red Listed species: Fea’s Petrel (Near Threatened),
EU Bird’s Directive Annex I species: Cory’s Shearwater, Fea’s Petrel

Supporting information:

IUCN Red Listed species: Zino’s Petrel (Endangered)
OSPAR listed species: Little Shearwater
EU Bird’s Directive Annex I species: Arctic Tern
EU Bird’s Directive migratory species: Great Shearwater, Manx Shearwater, Sooty Shearwater, Northern Gannet, Long-tailed Skua.

</td></tr>
<tr><td>Vulnerability, fragility, sensitivity, or slow recovery</td><td>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</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking
Four species of shearwater are highly susceptible to incidental bycatch in fisheries, particularly long-line</td></tr>
<tr><td>Biological productivity</td><td>Area containing species, populations or communities with comparatively higher natural biological productivity</td><td>X</td><td></td><td></td><td></td></tr>
<tr><td colspan="6">Explanation for ranking
Not assessed</td></tr>
<tr><td>Biological diversity</td><td>Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking
Important for 18 species of seabird as well as for other higher predators, including bill fish and bluefin tuna, turtles, sharks and cetaceans (Wakefield et al in lit)</td></tr>
</table>

Sharing experiences and information applying other international criteria (Optional)

CBD EBSA Criterion	Description	Ranking of criterion relevance (please mark one column with an X)			
		Don't Know	**Low**	**Some**	**High**
Dependency:	An area where ecological processes are highly dependent on biotically structured systems (e.g., coral reefs, kelp forests, mangrove forests, seagrass beds). Such ecosystems often have high diversity, which is dependent on the structuring organisms. Dependency also embraces the migratory routes of fish, reptiles, birds, mammals, and invertebrates.	**X**			
Explanation for ranking Not assessed					
Representativeness:	An area that is an outstanding and illustrative example of specific biodiversity, ecosystems, ecological or physiographic processes	**X**			
Explanation for ranking Not assessed					
Biogeographic importance:	An area that either contains rare biogeographic qualities or is representative of a biogeographic "type" or types, or contains unique or unusual biological, chemical, physical, or geological features	**X**			
Explanation for ranking Not assessed					
Structural complexity:	An area that is characterized by complex physical structures created by significant concentrations of biotic and abiotic features.	**X**			
Explanation for ranking Not assessed					
Natural Beauty:	An area that contains superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance.	**X**			
Explanation for ranking Not assessed					
Earth's geological history:	An area with outstanding examples representing major stages of Earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features.	**X**			
Explanation for ranking Not assessed					
[Other relevant criterion] Important Bird Area (IBA)	Areas used by more than threshold numbers of threatened species (criteria A1), greater than 1% of the world population of a given species (criteria A4i and A4ii), or used by congregations (criteria A4iii)				**X**
Explanation for ranking Areas within this site are likely to qualify as Important Bird Areas under BirdLife International criteria. See BirdLife International (2009) for a comparison between IBA and EBSA criteria.					

References

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Corys Shearwater	Chafarinas	J. González-Solís
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Corys Shearwater	Selvagens	M.A. Dias, P. Catry
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Ramírez I., P. Geraldes, A. Meirinho, P. Amorim & V. Paiva (2008). *Áreas Marinhas Importantes para as Aves em Portugal.* Projecto LIFE04NAT/PT/000213 - Sociedade Portuguesa Para o Estudo das Aves. Lisboa

Sittler, B., A Aebischer, O Gilg (2011). Post-breeding migration of four Long-tailed Skuas (Stercorarius longicaudus) from North and East Greenland to West Africa. Journal of ornithology 152, 2 (2011) 375-381

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Zino, F., RA Phillips, M Biscoito (2011). Zino's petrel movement at sea – a preliminary analysis of datalogger results. Birding World 24 (5): 216-219

Maps and Figures

Fig 1: Species occurrence by month within the site, showing percentage of tracked population for each species (and where relevant subpopulation) found within the area each month. Solid colours represent occurrence of species that were primary feature for the site, while hashed colours represent occurrence of species used as supporting information.

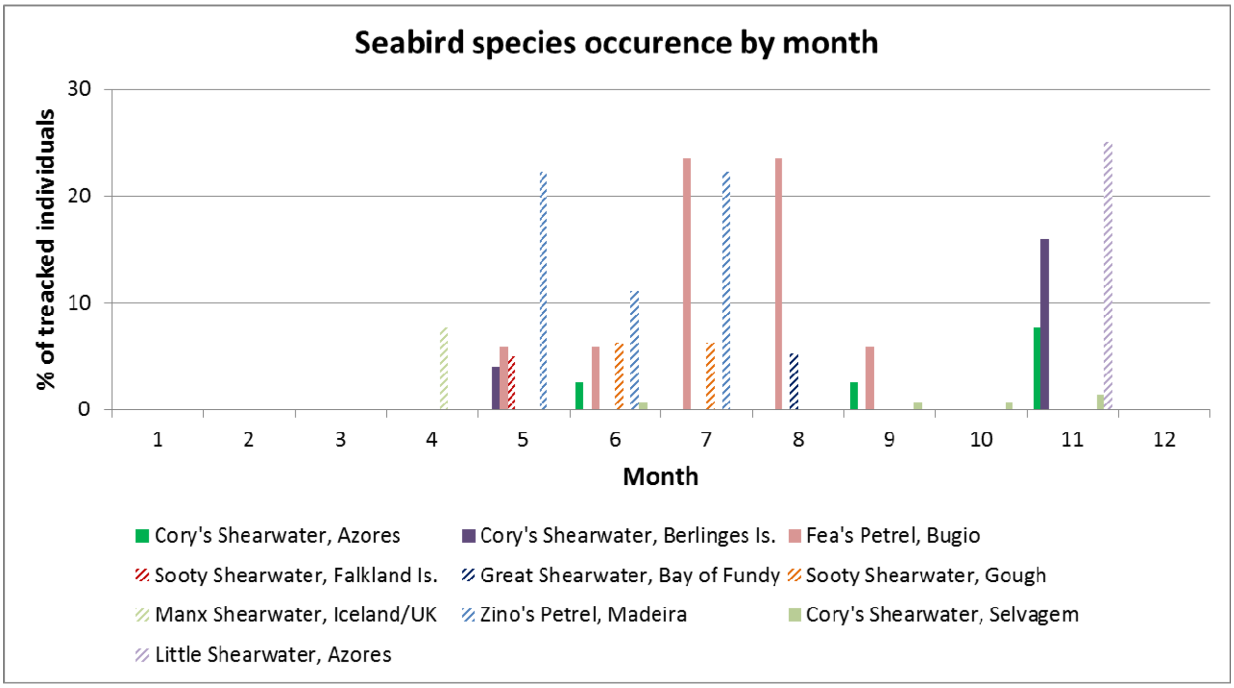
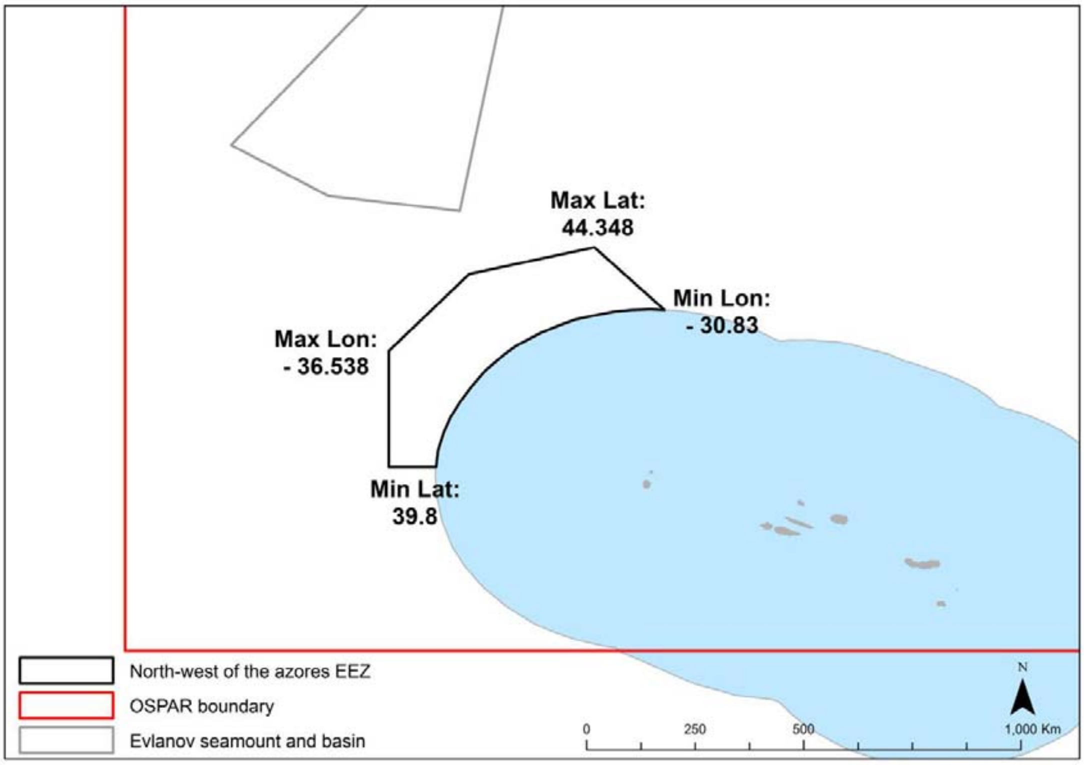


Fig 2: Showing location and extent of this EBSA



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EBSA identification proforma for the North-East Atlantic - 9

Title/Name of the area - The Arctic Front - Greenland/Norwegian Seas

Presented by WWF and reviewed by Participants at the Joint OSPAR/NEAFC/CBD Scientific Workshop on the Identification of Ecologically or Biologically Significant Marine Areas in the North-East Atlantic

Contact: Sabine Christiansen sabine.christiansen@janthina.de

Abstract

The area proposed as EBSA reflects the meridional, interannual and seasonal variability of the **Arctic front** with adjacent Atlantic waters to the east (warm side) and Arctic waters up to the marginal ice zone to the west. The frontal processes are the power machine for the ecosystem, generating seasonally a huge biomass production on all trophic levels, but best visualized by the large schools of feeding pelagic fish.

Introduction

The ecology of the northern North Atlantic depends on the complex interplay with the water masses of Arctic and Atlantic origin, the degree of ice cover as well as the light regime. All these factors vary to a large extent on a seasonal and longer term scale as an expression of, among others, the North Atlantic Oscillation and the overall warming trend (Blindheim, 2004; Skjoldal and Sætre, 2004). Boreal ecosystems meet polar ecosystems here, and in particular frontal areas and marginal ice zones provide for production hotspots in pelagic waters (Joiris, 2011; Nøttestad *et al.*, 2007; Smith Jr *et al.*, 1987)

Hydrographically, three principal domains can be distinguished in the surface waters of the Greenland and Norwegian Seas (Swift and Aargaard, 1981): The polar domain in the ice-covered outflow of the Arctic Ocean on the East Greenland shelf, the Atlantic domain in the warm Atlantic waters in the Norwegian Sea, and the Arctic domain in the Greenland Sea in-between, bounded by the polar front to the west and the Arctic front to the east. Both the Arctic and polar fronts, smaller scale eddies and the physical phenomena in the marginal ice zone enhance locally the biomass production allover the respective food webs.

The seasonal latitudinal progression of increasing and diminishing light levels, respectively, is the determining factor for the timing of phytoplankton production. Therefore, the phytoplankton spring bloom and ice break up progress from south to north in spring, reaching the Arctic area by about June/July. Due to the different directions of the currents east (north bound) and west (south bound) of the Arctic front in relation to the latitudinal change in solar power there is a delay of about a month in the onset of the hydrological spring and summer between the cold Arctic and the warm Atlantic side of the Arctic front above Mohn´s Ridge (Kostianoy *et al.*, 2004), reflected in the biological patterns of distribution and seasonal development (Hirche *et al.*, 1991).

Polar and Atlantic waters both have their characteristic pelagic faunas, which are mixing to a variable degree in the surface water body of the Arctic domain (Gradinger and Baumann, 1991; Hirche *et al.*, 1991; Melle *et al.*, 2005). The Arctic front fish community of the Atlantic (warm) side is characterized by a large biomass of several medium-sized, highly migratory pelagic species, in particular blue whiting *Micromesistius poutassou*, NE Atlantic mackerel *Scomber scombrus* and Norwegian spring spawning herring *Clupea harengus,* which have their summer feeding area in the pelagic zone over large bottom depths. The Norwegian spring-spawning herring stock is considered to be the largest herring stock in the world, and it is the most important fish stock in the Norwegian Sea in both ecological and commercial terms (Norway Ministry of Environment, 2008-2009). The herring not only fuel the food web in the open sea but also transfer large quantities of energy to coastal waters during their seasonal migrations. These large stocks must be regarded key species in the ecosystem (ICES, 2008b). On the cold side of the front in the Arctic domain, the fish fauna counts fewer species and is characterized by cold water ones such as capelin *Mallotus villosus* (ICES, 2008a).

Feeding aggregations of top predators such as seabirds, seals or, for example, humpback whales can be used as indicators for such productivity hotspots (Joiris, 2011; Joiris and Falck, 2011).

Location

The Ecologically or Biologically Significant Marine Area (EBSA) focusses primarily on the Arctic front and its adjacent waters, including the broad range of the meridional, interannual and seasonal variability of its position (Blindheim, 2004). A central part of the proposed EBSA is in high seas waters, outside the 200 nm zones of Norway, Jan Mayen, Greenland and Svalbard (the „Banana Hole"). (see Fig. 1 attached). Figure 1 distinguishes between the high seas beyond national jurisdiction for which the „Joint OSPAR/NEAFC/CBD Scientific Workshop on the Identification of Ecologically or Biologically Significant Marine Areas (EBSAs) in the North-East Atlantic" has a mandate[1], and national/nationally administered waters within the 200 nm zone, within which the OSPAR Contracting Parties have committed to report candidate EBSAs to the Convention on Biodiversity EBSA repository (Convention on Biological Diversity, 2010). The coordinates of the overall area, as well as the high seas section are provided in Annex 1 (in decimals, shape files provided).

Around Jan Mayen and Spitsbergen/Svalbard, Norway has implemented 200 nm Fisheries Protection Zones. However, the Norwegian sovereignty over the 200 nm zone of Svalbard (outside territorial waters) is disputed (Molenaar and Oude Elferink, 2011), based on different interpretations of the Spitsbergen Treaty, which ensures non-discriminatory access to the resources for all currently 40 signatories of the Treaty (1920).

The delimitations of the extended continental shelves of Norway, Iceland and Denmark/The Faroes in the southern "Banana Hole" have not yet been finally agreed (Norway Ministry of Environment, 2008-2009).

All waters outside the Greenland Exclusive Economic Zone are included in the Norwegian Sea management plan of the Norwegian government (Norway Ministry of Environment, 2008-2009).

Feature description

1 Participant Briefing for a Joint OSPAR/NEAFC/CBD Scientific Workshop on the Identification of Ecologically or Biologically Significant Marine Areas (EBSAs) in the North-East Atlantic. Invitation Annex 2, 2011

The area proposed as EBSA reflects the meridional, interannual and seasonal variability of the **Arctic front** with adjacent Atlantic waters to the east (warm side) and Arctic waters up to the marginal ice zone to the west (cold side) (Blindheim, 2004). The Arctic front and the Jan Mayen front to the north and south of Jan Mayen, respectively, are the dominating hydrographic structures in the Atlantic north of Iceland. The frontal processes are the power machine for the ecosystem, generating seasonally a huge biomass production on all trophic levels, but best visualized by the large feeding schools of pelagic fish (e.g. Holst *et al.*, 2004; Melle *et al.*, 2005; Nøttestad *et al.*, 2007). The western part of the area is ice covered during winter, though decreasing in recent years, with the respective production-enhancing processes in the marginal ice zone taking place in spring (Johannessen *et al.*, 1987a; Smith Jr *et al.*, 1987).

Fronts are sharp horizontal gradients in water density, either due to differences in temperature, salinity or both, between adjacent water masses. The Arctic front separates Arctic surface water (temperature 0-3° C, salinity 34.4-34.9) from Atlantic waters (warmer than 3° C, salinity >34.4 , (Swift and Aargaard, 1981) (compare hydrographic cross section in Fig. 3, (Spall, 2010). On the western margin of the Greenland Sea, the Arctic basin outflow of polar water (temperatures less than 0° C, salinity <34.4) and ice moves southwards on the East Greenland Shelf to Danmark Strait and beyond. This surface current is bound to the east by the polar front. Arctic water is generated by a mixing of polar and Atlantic water, as well as freshening by ice melt, and it extends from the seasonally shifting marginal ice zone east of the polar front on the Greenland shelf to the Arctic front overlaying the Mohn´s and Knipovich Ridge in the Greenland Sea and Framstrait.

The western boundary of the proposed EBSA is therefore the summer marginal ice zone to the east of the polar front. The summer ice cover of the East Greenland Current usually coincides with the location of the polar front, however may be shifted east or west with strong westerly or easterly winds and varies with the weather/climate forcing (see e.g. Blindheim, 2004; Joiris and Falck, 2011). Cold core eddies are a common mesoscale feature along the marginal ice zone (Johannessen *et al.*, 1987b) which locally enhance the pelagic production available to top predators such as seabirds (Joiris and Falck, 2011). This could be also observed around Jan Mayen (Kostianoy *et al.*, 2004), explaining the huge productivity of its waters.

North of Jan Mayen, the location of the Arctic front and other characteristics of the regional hydrography (Spall, 2010) are to some extent determined by the subjacent section of the Mid Atlantic Ridge, the Mohn´s Ridge, at approximately 73.5° N, 8° E (Blindheim and Østerhus, 2005). Recirculating cold Arctic water is found in the Greenland Sea to the north and west of Mohn´s Ridge, the warm, northwards circulating Atlantic water remains to the south and east of the ridge in the Norwegian Sea. Therefore, the ridge corresponds to the location of the boundary between the Arctic and Atlantic biomes as defined by Longhurst (1998), reflected in the biogeographic boundary between cool Arctic and cool temperate waters in the deep benthal (down to 1000 m) set by Dinter (2001). South of Jan Mayen, on the other hand, no such topographic boundary exists, and variations in the volume of Arctic waters may result in relatively large shifts in the location of the Arctic front. Generally, strong westerly winds (as indicated by a high NAO index) will result in Arctic waters to occupy a larger portion of the western Norwegian Sea (Blindheim, 2004).

c.f. **Fig. 2**: Hydrographic cross-section of the Norwegian Sea in summer, between the Norwegian coast at about 65° N, across Mohn´s Ridge, and the East Greenland shelf at approx. 78° N (modified after Spall (2010) who used measurements of Oliver and Heywood (2003)).

The Arctic front is one of the **productivity hotspots** in the Norwegian Sea. The density gradients caused by the different temperatures and salinities of the water masses on both sides of the front, likely result in areas of sufficiently low mixing depth and consequently enhance a phytoplankton bloom earlier in the season than in open water. Following the seasonal latitudinal progression of the sunlight, the phytoplankton bloom proceeds from south to north, initiating the pelagic production of secondary producers (grazers) such as zooplankton (e.g. the copepod *Calanus finmarchicus*, the amphipod *Themisto abyssorum*, the euphausid *Thyssanoessa inermis* on the warm Atlantic side, *Calanus hyperboreus* on the cold Arctic side, the amphipod *Themisto libellula*, krill *Thysanoessa longicaudata;* (Melle *et al.*, 2005)). The physical forcing from the different directions of the currents may supply nutrients to the upper layers and therefore prolong the growth season. In addition, cold core eddies detach from the front and maintain for some time an enhanced food web (Rey, 2004).

Zooplankton production aggregates to highest biomass in the vicinity of the front (Nøttestad *et al.*, 2007), attracting planktivores such as herring *(Clupea harengus)*, blue whiting (*Micromesistius poutassou)*, mackerel (*Scomber scombrus)* and redfish (*Sebastes mentella)* on the warm eastern side of the front, capelin (*Mallotus villosus)* on the cold western side of the front, and blue *Balaenoptera musculus)*, fin and minke whales in ice-free waters (Holst *et al.*, 2004; Nøttestad and Olsen, 2004). Fin whales (*Balaenoptera physalus)*, and killer whales (*Orcinus orca)* follow the herring schools during their seasonal feeding migration (Nøttestad *et al.*, 2002), whereas sperm whales (*Physeter macrocephalus)* and Northern bottlenose whales (*Hyperodon ampullatus)* exploit the riches of the deep waters such as the large stock of the cephalopod *Gonatus fabricii* up to the edge of the pack ice (Holst *et al.*, 2004; Nøttestad and Olsen, 2004).

The warm side of the Arctic front is a well-known feeding area of Norwegian Spring-spawning **herring** during its seasonal migration (Nøttestad *et al.*, 2007). After spawning, the herring schools move northwards parallel to the front. The western boundary of the herring schools coincides with a zooplankton biomass maximum at the Arctic front in surface waters, but the herring also appear to consume larger zooplankton in the cold subjacent water masses at more than 300 m depth (Nøttestad *et al.*, 2007), such as hibernating *Calanus hyperboreus* (Hirche *et al.*, 2006). The area of the proposed Arctic front EBSA covers the full extent of the seasonal herring feeding migration starting in the south in May/June, and arriving at the northern part of the Arctic front in July/August (Skjoldal *et al.*, 2004), when the larger herring also start feeding on the large, lipid-rich copepod *Calanus hyperboreus* in Arctic surface water (Holst *et al.*, 2004). In recent years, the seasonal feeding migration of herring has been observed to expand in northerly direction, due to, among other factors, the recent warm period (high NAOI) (Holst *et al.*, 2004). If the warming continues or even amplifies, the northerly section of the Arctic front is likely to gain importance for the herring stock and other plankton feeders.

Apart from Norwegian Spring-spawning herring, NE Atlantic **mackerel** (*Scomber scombrus)* and **lumpsucker** (*Cyclopterus lumpus)* also belong to the epipelagic fish community (from the surface down to about 150-200 m, Bjelland and Holst, 2004) and have their summer feeding areas associated with the warm side of the Arctic front (Iversen, 2004; Monstad, 2004). Mackerel is a surface feeder which may benefit from occasional stronger inflows of Atlantic water into the Norwegian Sea for moving its northern distribution limit further to the north (Monstad, 2004).

The **mesopelagic** community (200 - 1000 m) in the vicinity of the Arctic front is dominated by large stocks of blue whiting (*Micromesistius poutassou)* and, among others, pearlsides (*Maurolicus muelleri)* and lanternfishes (*Benthosema glaciale)* (Bjelland and Holst, 2004). Pelagic redfish (*Sebastes mentella),* classified as vulnerable (Norway Ministry of Environment, 2008-2009), undertake feeding migrations from the continental shelf into the Norwegian Sea and form (exploitable) aggregations in the zone of the Arctic front at 150-450 m depth in the summer-autumn season (Vinnichenko, 2007).

The gonatid **squid** *Gonatus fabricii* occurs over large areas of the Norwegian Sea but with highest biomass along the Arctic front in summer (interpretation of Fig. 14.3 in Bjørke and Gjøsæter, 2004). It is estimated to produce annually some 20 million tons of biomass in the Norwegian Sea (Bjørke and Gjøsæter, 2004). These squids are another important link between the secondary producers (mesozooplankton like *Calanus finmarchicus* and *C. hyperboreus*, amphipods and krill) and large predators such as northern bottlenose whales, pilot whales, sperm whales, but also several seal species, seabirds, and predatory fish, including Greenland sharks (Bjørke and Gjøsæter, 2004).

On the **cold side of the Arctic front**, the mesozooplankton community includes several species adapted to the colder waters over the deep sea such as the large, lipid-rich copepod *Calanus hyperboreus* and the amphipod *Themisto libellula* (e.g. Melle *et al.*, 2005). These are the prey of capelin (*Mallotus villosus),* which has its main feeding area of adults in the oceanic waters from about 68 to 72°N, between the Jan Mayen Ridge and the East Greenland continental shelf, i.e. between the Polar and Arctic fronts (ICES, 2008; Vilhjálmsson, 2002). Capelin spawn in shallow coastal waters south and west of Iceland and at the heads of numerous fjords on the eastern coast of Greenland.

Jan Mayen lies within or at least very close to the Arctic front (Kostianoy *et al.*, 2004) and therefore provides superior feeding conditions for seabirds breeding on the island, exploiting the enhanced frontal productivity. Some 300000 pairs of northern fulmars *Fulmarus glacialis)*, little auks *Alle alle*, Brünnich's guillemots *Uria lomvia* and kittewakes *Rissa tridactyla* breed here in several colonies (Norway Ministry of Environment, 2008-2009).

Additional information: **Mohn´s Ridge** (lying beneath and determining the location of the Arctic Front)

The Mohn´s Ridge is one of three distinct parts of the Mid Atlantic Ridge north of Iceland and south of the Arctic Basin. It extends from the Jan Mayen Fracture Zone at 71° N to approximately 73°30´N, 8° E, from were the ridge turns north and continues as the Knipovic Ridge (Blindheim, 2004). Blindheim and Østerhus (2005) describe the Mohn Ridge as having depths between 1000 and 2000 m on either side of a rift valley, with a rather complex topography characterized by many isolated elevations. Some banks rise to approximately 600 m below sea level (Myrseth, Boyd, B. Schultz Banks, see map of Eggvin (1963).

A number of seamounts (elevations higher than 1000 m above surrounding) have been identified along the ridge (see Fig. 3). Little is known about the fauna of these seamounts or the level of fishing activity, but ICES (Report WGDEEP, 2011) recalls that such habitats are known to be generally areas with often higher levels of productivity and associated dense aggregations of fish.

Recently, hydrothermal vent fields and sulfide deposits have been discovered all along the ridge . (see e.g. Pedersen *et al.*, 2010).

c.f. Figure 3: Ocean ridges in the Norwegian Sea with elevations of more than 1000 m above the surrounding (seamounts) indicated by red dots (Norway Ministry of Environment, 2008-2009).

Little is known about the benthos at Mohn´s Ridge (see e.g. Bluhm *et al.*, 2011) , but 7 photographic transects between 900 and 3000 m indicate patchy, but relatively species- and biomass-rich megabenthos communities (Santos, 2010). The author identified 66 disparate taxa and three distinct hard substrate communities, represented by the basket star *Gorgonocephalus* spp., Crinoidean species and Anthozoan species, respectively. Hexacorallia were the most common group, observed during all dives but one, with the anemone *Hormathia digitata* being the most abundant species and occurring in dense colonies on exposed rock surfaces, followed by Porifera (18 species), Tunicata (3 species), and Crinoidea. One cartilaginous fish species (*Amblyraja hyperborea*) and six bony fish species were identified (*Lycodes* sp., *Gaidropsarus argentatus, Macrourus berglax*, *Reinhardtius hippoglossoides, Rhodichthys regina*, *Paraliparis* sp.).

Additional information on the fauna of Mohn´s Ridge was provided by Schander *et al*. (2010), who investigated the fauna of the Jan Mayen hydrothermal vent fields (see also EBSA proposal by J. H. Fosså). With a few exceptions of specialized vent taxa, the fauna observed at the vent fields was considered to be representative for the non-vent conditions at Mohn´ s Ridge at 71° N latitude and related to the regional faunal pool at similar depths. On vertical surfaces away from the vents dense aggregations of the motile crinoid *Hormathia* sp. and several anthozoans were found. Among the sponge fauna, calcareous sponges represented 8 out of 14 taxa and are likely to be considered pioneer fauna. No larger erect or massive demosponges or hexactinellids were observed, but dense aggregations of the echinoderms *Heliometra glacialis* and *Gorgonocephalus eucnemis* were seen.

Feature condition, and future outlook

The actual locations and hydrographic regimes of the Arctic and polar fronts, and consequently the biological regime in the Arctic domain in-between are highly dependent on large scale atmospheric pressure oscillations and long-term climate trends. The large-scale atmospheric pressure fields in the North Atlantic are closely linked to the general oceanic circulation patterns, and their variation is reflected in changing patterns of zooplankton biomass production (Skjoldal and Sætre, 2004). During periods of a high NAO index (NAOI) the zooplankton biomass, in particular that of *Calanus finmarchicus,* is high, during periods of a low NAOI the biomass is low (Skjoldal and Sætre, 2004). The transition from one to the other NAO state is suspected to trigger particularly successful recruitment for the most important pelagic fishes: herring respond positively to the switch from low to high NAOI, blue whiting to a switch from high to low NAOI (Skjoldal and Sætre, 2004).

Recent studies reveal that sea surface warming in the Northeast Atlantic is accompanied by significant latitudinal shifts in the size distribution of phytoplankton (Richardson and Shoeman, 2004), and in the species distribution of zooplankton (Beaugrand *et al.*, 2002) and fish (Brander *et al.*, 2003). In addition, due to different control mechanisms (light, temperature, food) for the various ecosystem components, a variable trophic match (or mismatch) may contribute to these distribution shifts, in the end affecting also the commercially important species, primarily fish, and dependent predators such as marine mammals and sea birds (Edwards and Richardson, 2004).

Assessment against CBD EBSA Criteria

Table 1. relation of each of the CBD criteria to the proposed area relating to the best available science. Note that a candidate EBSA may qualify on the basis of one or more of the criteria, the boundaries of the EBSA need not be defined with exact precision.

CBD EBSA Criterion	**Description**	**Ranking of criterion relevance (please mark one column with an X)**			
		Don't Know	**Low**	**Some**	**High**
Uniqueness or rarity	**The 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**				
Explanation for ranking					
Special importance for life-history stages of species	**Areas that are required for a population to survive and thrive**				**x**

<table>
<tr><td colspan="6">Explanation for ranking

Feeding on the plankton, cephalopod and mesopelagic fish production along the Arctic front is essential for, among others, the Norwegian spring-spawning herring and blue whiting populations, for several baleen and toothed whale species, including blue whales, fin whales, northern bottlenose whales, pilot whales, sperm whales, but also several seal species and predatory fish, including Greenland sharks. The productivity of the Arctic front is essential for the millions of breeding seabirds on the cliffs of Jan Mayen, for feeding their young, and during their pelagic life outside the breeding season.</td></tr>
<tr><td>Importance for threatened, endangered or declining species and/or habitats</td><td>Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species</td><td></td><td></td><td></td><td>x</td></tr>
<tr><td colspan="6">Explanation for ranking

Several of the top predator species listed above are considered vulnerable on the IUCN Redlist (2011): Blue, fin and sperm whale, hooded seal.</td></tr>
<tr><td>Vulnerability, fragility, sensitivity, or slow recovery</td><td>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</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="6">Explanation for ranking

Sensitivity to large scale climate oscillations (NAO) and trends

Norway Ministry of Environment (Norway Ministry of Environment, 2008-2009) characterise the Arctic front as a particularly valuable and vulnerable area in the Norwegian Sea because „High biological production makes this an important feeding area for several whale species, including blue whale, fin whale, minke whale and northern bottlenose whale. Further north, the marginal ice zone stretching further northwards to the Fram Strait north-west of Svalbard is also important for the same species, and also for species that are more permanently associated with ice-covered waters, such as the bowhead whale.

Seabirds and marine mammals are vulnerable to oil spills and substances that are liable to bioaccumulate. Different species may vary in their vulnerability at different times of year (see further details on seabird vulnerability in section 3.2).“

It is highly likely that the megabenthos communities of Mohn´s Ridge, lying beneath the Arctic front, as described by Santos (Santos, 2010) and partially by Schander et al. (2010), are as vulnerable to physical impact as similar communities in other regions. However, there does not seem to be any bottom fishery in the area at present (Norway Ministry of Environment, 2008-2009). The North East Atlantic Fishery Council considers the area to be a new fishing area to bottom fishing (NEAFC AM2008/53 rev1), any developing fishery being subject to an Exploratory Bottom Fisheries Protocol (NEAFC, 2010). Other activities in relation to the seabed are not known.</td></tr>
<tr><td>Biological productivity</td><td>Area containing species, populations or communities with comparatively higher natural biological productivity</td><td></td><td></td><td></td><td>x</td></tr>
</table>

Explanation for ranking Frontal areas are generally characterised by high productivity and relatively low diversity. The Arctic Front is the production machine of the northern North Atlantic. One expression of this pelagic productivity is the huge biomass of among others the herring, blue whiting and since recently in the south also the mackerel stocks which exploit the plankton and mesopelagic fish production during their seasonal feeding migration along the Arctic front.					
Biological diversity	**Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity**				**x**
Explanation for ranking The area proposed comprises three ecologically relevant types of production systems in the water column, the cold Arctic domain to the west of the front, the frontal zone itself and the warm Atlantic water east of the frontal zone. Each system is characterized by typical pelagic communities. In addition, the winter ice cover, and therefore ice-related biota enrich the species pool. The frontal system and its associated plankton production is extensively used for feeding by highly migratory species such as baleen whales and schooling pelagic fish.					

Sharing experiences and information applying other international criteria (Optional)

CBD EBSA Criterion	Description	Ranking of criterion relevance (please mark one column with an X)			
		Don't Know	**Low**	**Some**	**High**
Dependency:	**An area where ecological processes are highly dependent on biotically structured systems (e.g., coral reefs, kelp forests, mangrove forests, seagrass beds). Such ecosystems often have high diversity, which is dependent on the structuring organisms. Dependency also embraces the migratory routes of fish, reptiles, birds, mammals, and invertebrates.**		**x**		
Explanation for ranking Frontal areas are physically, not biologically structured.					
Representativeness:	**An area that is an outstanding and illustrative example of specific biodiversity, ecosystems, ecological or physiographic processes**				**?**

Explanation for ranking The proposed boundaries enclose all the Arctic front with respect to its meridional, seasonal and interannual variablility. As such, the area is an outstanding example of specific frontal processes in a subpolar region with strongly varying environmental drivers.					
Biogeographic importance:	**An area that either contains rare biogeographic qualities or is representative of a biogeographic “type” or types, or contains unique or unusual biological, chemical, physical, or geological features**				**?**
Explanation for ranking The proposed area covers a unique set of physical and biological properties and marks the separation and interaction of two distinct biogeographic regions					
Structural complexity:	**An area that is characterized by complex physical structures created by significant concentrations of biotic and abiotic features.**				**x**
Explanation for ranking Frontal zones separate distinct water masses and create complex physical structures (density, either due to temperature and/or salinity differences) in the water column. This structure enhances productivity (but likely, this was not meant by this point)					
Natural Beauty:	**An area that contains superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance.**		**x**		
Explanation for ranking					
Earth’s geological history:	**An area with outstanding examples representing major stages of Earth’s history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features.**		**x**		
Explanation for ranking					

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Maps and Figures

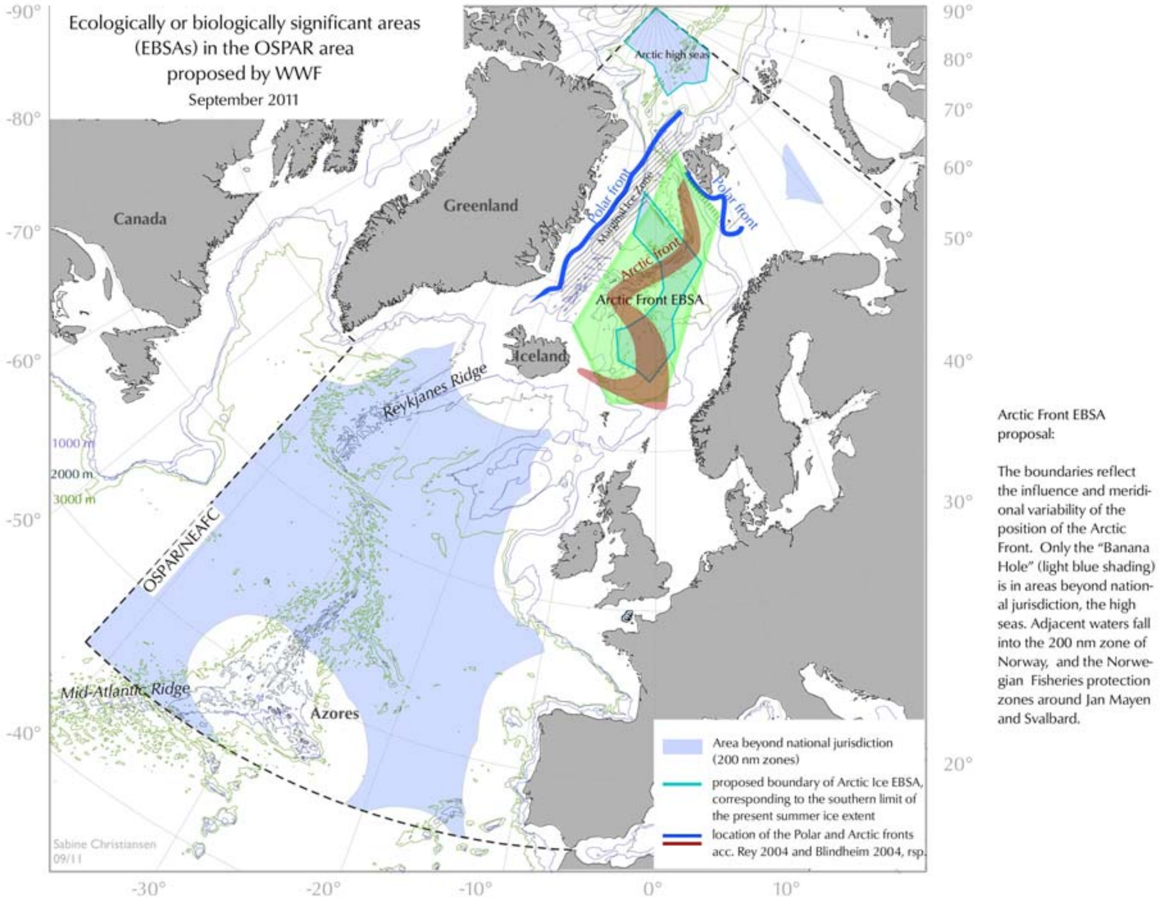


Figure 1: Location of the Ecologically or biologically significant areas (EBSA) proposed by WWF in September 2011. The position of the Arctic and polar fronts was redrawn after (Rey, 2004, Fig. 5.7).

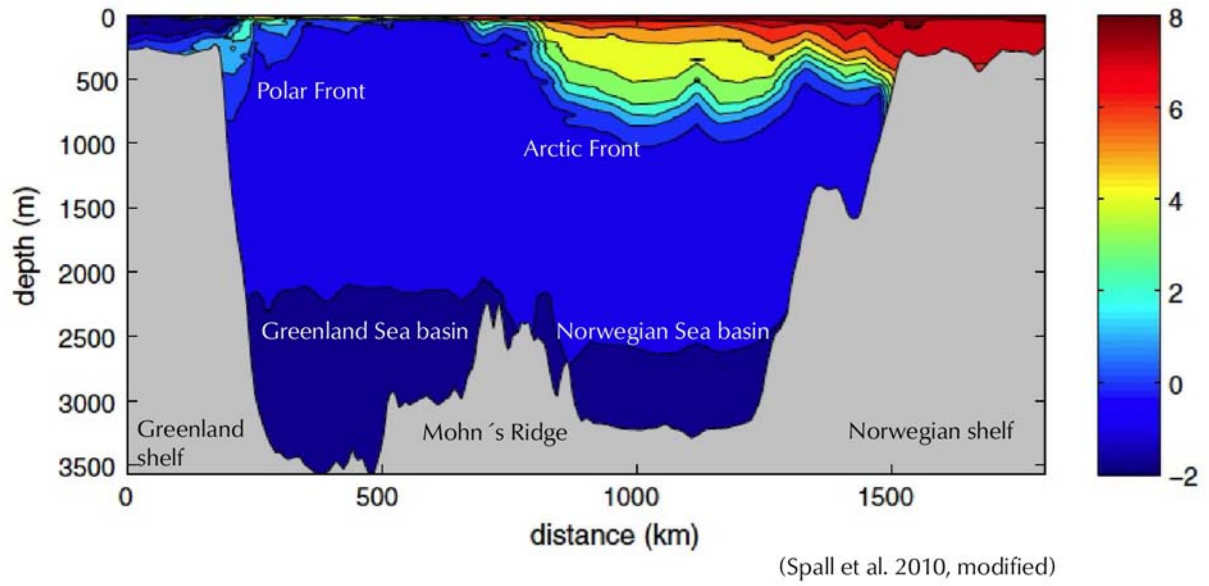
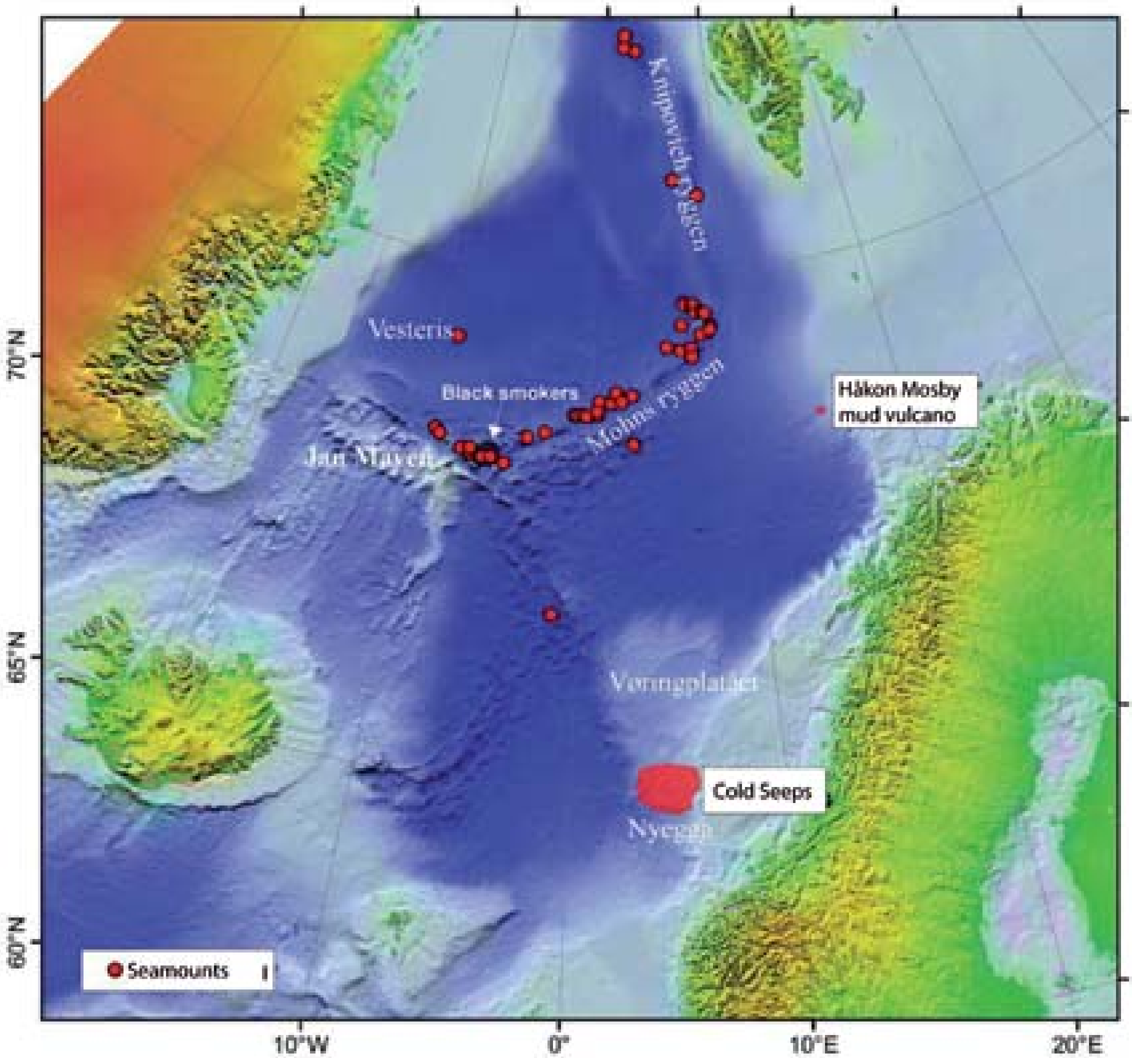


Fig. 2: Hydrographic cross-section of the Norwegian Sea in summer, between the Norwegian coast at about 65° N, across Mohn´s Ridge, and the East Greenland shelf at approx. 78° N (modified after (Spall, 2010) who used measurements of (Oliver and Heywood, 2003).



Ocean ridges in the Norwegian Sea (higher than 1000 m). The mud vulcano "Håkon Mosby" and a gas flow area on Nyegga are also marked.

Figure 3: Ocean ridges in the Norwegian Sea with elevations of more than 1000 m above the surrounding (seamounts) indicated by red dots (Norway Ministry of Environment, 2008-2009).

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Joint OSPAR/NEAFC/CBD Scientific Workshop on the Identification of Ecologically or Biologically Significant Marine Areas (EBSAs) in the North-East Atlantic

Hyères (Port Cros), France: 8 – 9 September 2011

EBSA identification proforma for the North-East Atlantic - 10

Title/Name of the area - The Arctic Ice habitat - multiyear ice, seasonal ice and marginal ice zone

Presented by WWF and reviewed by Participants at the Joint OSPAR/NEAFC/CBD Scientific Workshop on the Identification of Ecologically or Biologically Significant Marine Areas in the North-East Atlantic

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Abstract

The permanently ice covered waters of the high Arctic provide a range of globally unique habitats associated with the variety of ice conditions. Multi-year sea ice only exists in the Arctic and although the projections of changing ice conditions due to climate change project a considerable loss of sea ice, in particular multiyear ice, the Eurasian Central Arctic high seas are likely to at least keep the ice longer than many other regions in the Arctic basin. Ice is a crucial habitat and source of particular foodweb dynamics, the loss of which will affect also a number of mammalian and avian predatory species. The particularly pronounced physical changes of Arctic ice conditions as already observed and expected for the coming decades, will require careful ecological monitoring and eventually measures to maintain or restore the resilience of the Arctic populations to quickly changing environmental conditions.

Introduction

Up until today most of the Eurasian part of the Arctic Basin, and in particular the high seas area in the Arctic Ocean (the waters beyond the 200 nm zones of coastal states, i.e. Norway, Russia, USA, Canada and Greenland/Denmark) is permanently ice covered. However, in recent years, much of the original multiyear pack ice has been replaced by seasonal (1 year) ice which made it possible for research and other vessels to reach the pole. In addition, the former fast pack-ice is now increasingly broken up by leads. This structural change in the Arctic ice quality will result in a substantial increase in light penetrating the thin ice and water column, in conjunction with the overall warming of surface waters and increased temperature and salinity stratification due to the melting of ice.

In the near future, up to the end of the century, the permanent ice cover is expected to disappear completely in some models (Anisimov et al., 2007). This will result in significant changes in the structure and dynamics of the high Arctic ecosystems (CAFF, 2010; Gradinger, 1995; Piepenburg, 2005; Renaud et al., 2008; Wassmann, 2008, 2011) which should be closely monitored (Bluhm et al., 2011) as already envisaged by the Arctic Council (Gill et al., 2011; Mauritzen et al., 2011).

Therefore, the area proposed here as EBSA is of particular scientific interest and may in the longterm, become relevant for the commercial exploitation of resources.

Location

The Ecologically or Biologically Significant Marine Area (EBSA) proposed focusses on the presently permanently ice-covered waters in the OSPAR/NEAFC maritime areas, including the high seas section in the

Central Arctic Basin north of the 200 nm zones of coastal states (see Fig. 1 attached). Therefore, the boundaries proposed extend from the North Pole (northernmost point of OSPAR/NEAFC maritime areas) to the southern limit of the summer sea ice extent and marginal ice zone, including on the shelf of East Greenland.

The proposal currently only relates to features of the water column. Two legal states have to be distinguished: the Central Arctic high seas waters north of the 200 nm zones of adjacent coastal states, generally north of 84° N, and the waters within the Exclusive Economic Zones of Greenland, Russia and the fisheries protection zone of Norway around Svalbard. Figure 1 distinguishes between the high seas beyond national jurisdiction for which the „Joint OSPAR/NEAFC/CBD Scientific Workshop on the Identification of Ecologically or Biologically Significant Marine Areas (EBSAs) in the North-East Atlantic“ has a mandate1, and national/nationally administered waters within the 200 nm zone, within which the OSPAR Contracting Parties have the responsiblity to report candidate EBSAs to the Convention on Biodiversity EBSA repository (OSPAR Commission, 2011).

The seafloor of the respective region will likely fall on the extended continental shelves of several coastal states. It belongs to the „Arctic Basin“ region of (Gill et al., 2011).

The coordinates of the overall area, as well as the high seas section are provided in Annex 1 (in decimals, shape files provided):

c.f. **Figure 1**: Location of the Arctic Ice „Ecologically or Biologically Significant Area“ (EBSA) proposed by WWF in September 2011. The position of the Arctic and polar fronts was redrawn after (Rey, 2004, Fig. 5.7).

Feature description

The Ecologically or Biologically Significant Marine Area (EBSA) proposed focusses on the presently permanently ice-covered waters in the OSPAR/NEAFC maritime areas, including the high seas section in the Central Arctic Basin north of the 200 nm zones of coastal states, and the marginal ice zone (where the ice breaks up, also called seasonal ice zone) along its southern margins (see Fig. 1 attached). Due to the inflow of Atlantic water along the shelf of Svalbard, and the concurrent outflow of polar water and ice on the Greenland side of Fram Strait, the southern limit of the summer sea ice extent is much further south in the western compared to the eastern Framstrait, and in former times extended all along the Greenland coast.

The high seas section of the OSPAR maritime area in the Central Arctic ocean is generally north of 84° N and is until today fully ice-covered also in summer, although the quantity of multiyear ice has already substantially decreased and the 1-year ice leaves increasingly large leads and open water spaces. The ice overlays a very deep water body of up to 5000 m depth far away from the surrounding continental shelves and slopes of Greenland and the Svalbard archipelago. The Nansen-Gakkel Ridge, a prolongation of the Mid Atlantic Ridge north of the Fram Strait is structuring the deep Arctic basin in this section, separating the Central Nansen Basin to the south from the Amundsen Basin to the north. Abundant hydrothermal vent sites have been discovered on this ridge at about 85° 38 N (Edmonds et al., 2003).

North of Spitsbergen, the Atlantic water of the West Spitsbergen Current enters the Arctic basin as a surface current. At around 83° N, a deep-reaching frontal zone separates the incoming Atlantic and shelf waters from those of the Central Nansen Basin (Anderson et al., 1989), as reflected in ice properties, nutrient concentrations, zooplankton communities, and benthic assemblages (Hirche and Mumm, 1992, and literature quoted). This water subsequently submerges under the less dense (less salinity, lower temperature) polar water and circulates, in opposite direction to the surface waters and ice, counterclockwise along the continental rises until turning south along the Lomonossov Ridge and through Fram Strait as East Greenland Current south to Danmark Strait (Aagaard, 1989; Aagaard et al., 1985). Connecting the more fertile shelves with the deep central basin, these modified Atlantic waters supply the waters north of the Nansen-Gakkel Ridge, in the Amundsen basin, with advected organic material and nutrients which

[1] Participant Briefing for a Joint OSPAR/NEAFC/CBD Scientific Workshop on the Identification of Ecologically or Biologically Significant Marine Areas (EBSAs) in the North-East Atlantic. Invitation Annex 2, 2011

supplement the autochtonous production (Mumm et al., 1998). Due to the import of organic biomass from the Greenland Sea and the Arctic continental shelves, part of which may not be kept in the food web due to the polar conditions, the Arctic Ocean may also represent an enormous carbon sink (Hirche and Mumm, 1992).

In the Fram Strait, the region between Svalbard to the east and Greenland to the west, the East Greenland Current is the main outflow of polar water and ice from the Arctic Basin (Maykut, 1985) (Aagaard and Coachman, 1968). The polar front (0° C isotherm and 34.5 isohaline at 50 m depth) extends approximately along the continental shelf of Greenland, separating the polar surface water from the Arctic (Intermediate) water and the marginal ice zone to the east (e.g. Aagaard and Coachman, 1968; Paquette et al., 1985). The ice cover is densest in polar water, its extent to the east depends on the wind conditions (compare also Angelen et al., 2011; Wadhams, 1981).

The seasonal latitudinal progression of increasing and diminishing light levels, respectively, is the determining factor for the timing of the phytoplankton-related pelagic production. Therefore, the springbloom and ice break up progress from south to north in spring, reaching the Arctic area by about June/July. Because the currents in Fram Strait move in opposite direction, the polar East Greenland Current to the south, and the Atlantic West Spitsbergen Current to the north, there is a delay of about a month between biological spring and summer between the polar and the Atlantic side (Hirche et al., 1991). Therefore sea ice and the effect of melting ice are important determinants of the ecosystem processes all along the East Greenland polar front from the Greenland Sea through Fram Strait to the Arctic Basin (Legendre et al., 1992; Wassmann, 2011).

Ice situation

The Arctic Ocean develops towards a one-year instead of a multi-year sea-ice system with consequences for the entire ecosystem, including ecosystem shifts, biodiversity loss, for water mass modifications and for its role in the global overturning circulation. At its maximum, sea-ice covers 4.47 million km² in the Arctic Basin (Gill et al., 2011): According to data from ice satellite observations in 1973-76 (NASA, 1987, in (Gill et al., 2011)), permanent ice occupied 70-80% of the Arctic Basin area, and the interannual variability of this area did not exceed 2%. Seasonal ice occupied 6-17% (before the melting period of the mid-1970s). Only in the first decade of the 21st century, the permanent-ice area decreased to 6% in February 2008, concurrent with a rapid increase in seasonal- ice. Whereas multiyear ice used to cover 50-60% of the Arctic, it covered less than 30% in 2008, after a minimum of 10% in 2007. The average age of the remaining multiyear ice is also decreasing from over 20 % being at least six years in the mid- to late 1980s, to just 6% of ice six years old or older in 2008.

c.f**. Figure 2:** Modelled ice age distribution in 1985-2000 (left) compared to February 2008 (right) (CAFF, 2010).

This trend is likely to amplify in the coming years, as the net ocean-atmosphere heat output due to the current anomalously low sea ice coverage has approximately trippled compared to previous years, suggesting that the present sea ice losses have already initiated a positive feedback loop with increasing surface air temperatures in the Arctic (Kurtz et al., 2011).

About 10% of the sea ice in the Arctic basin is exported each year through Fram Strait into the Greenland Sea (Maykut, 1985) which is therefore major sink for Arctic sea ice (Kwok, 2009). From 2001 to 2005, the summer ice cover was so low on the East Greenland shelf, that it was more of a marginal ice zone (Smith Jr and Barber, 2007), however the subsequent record lows in overall Arctic ice cover brought about an increase in ice cover off Greenland, which minimised the extent of the North East Water Polynia on the East Greenland shelf2, a previously seasonally ice-free stretch of water (Wadhams, 1981).

Ice related biota

[2] http://www.issibern.ch/teams/Polynya/

Allover the Arctic, an inventory of ice-associated biota presently counts over 1000 protists, and more than 50 metazoan species (Bluhm et al., 2011). The regionally very variable ice fauna (depends i.e. on ice age, thickness, origin) consists of sympagic biota living within the caverns and brine channels of the ice, and associated pelagic fauna. The most abundant and diverse sympagic groups of the ice mesofauna in the Arctic seas are amphipods and copepods. Polar cod (Boreogadus saida) and partly Arctic cod (Arctogadus glacialis) are dependent on the sympagic macro- and mesofauna for food, themselves being important food sources for Arctic seals (such as ringed seal Phoca hispida) and birds, for example black guillemots Cephus grylle (Bradstreet and Cross, 1982; Gradinger and Bluhm, 2004 and literature reviewed; Horner et al., 1992; Süfke et al., 1998).

The higher the light level in the ice, the higher is the biomass of benthic algae as well as meiofauna and microorganisms within the ice (Gradinger et al., 1991). Decreasing snow cover induces a feedback loop with enhanced algal biomass increasing the heat absorption of the ice which leads to changes in the ice structure, and ultimately the release of algae from the bottom layer (Apollonio, 1961 in Gradinger et al., 1991). Because of the distance to land and shelves, and the thickness and internal structure of the multiyear pack ice over deeper water, this type of ice has a fauna of its own (Carey, 1985; Gradinger et al., 1991). Arctic multiyear ice floes can have very high algal biomasses in the brine channels and in the bottom centimeters which serves as food for a variety of proto- and metazoans, usually smaller than 1 mm, over deep water (Gradinger et al., 1999). In the central Arctic, ice algal productivity can contribute up to 50 % of the total primary productivity, with lower contributions in the sea ice covered margins (Bluhm et al., 2011).

In the boundary layer between ice floes and the water column, another specific community exists which forms the link between the ice based primary production and the pelagic fauna (Gradinger, 1995): large visible bands of diatoms hang down from the ice, exploited by amphipods such as Gammarus wilkitzki, and occacionally by water column copepods such as Calanus glacialis, which are important prey of for example polar cod Boreogadus saida. The caverns, wedges and irregularities of the ice provide important shelter from predators for larger ice associated species and provide an essential habitat for these species (Gradinger and Bluhm, 2004).

During melt, the entire sympagic ice biota are released into the water column where they may initiate the spring algal plankton bloom (Smith and Sakshaug, 1990) or they may sink to the sea floor and serve as an episodic and first food pulse for benthic organisms before pelagic production begins (Arndt and Pavlova, 2005). In particular the shallow shelves and the shelf slope benthos has been shown to profit of this biomass input, reflected in very rich benthic communities (Klitgaard and Tendal, 2004; Piepenburg, 2005).

The role of the polar front and marginal ice zone for the production system

Primary production in the Arctic Ocean is primarily determined by light availability, which is a function of ice thickness, ice cover, snow cover, light attenuation), the abundance of both ice algae and phytoplankton, nutrient availability and surface water stratification. Generally, the spring bloom occurs later further north and in regions with a thick ice and snow cover. The current production period in the Arctic Ocean may extend to 120 days per year, with a total annual primary production in the central Arctic Ocean of probably up to 10 g C m-2 (Wheeler et al., 1996).

Ice algae start primary production already at relatively low light levels when melting reduces the thickness of the ice and snow cover. Only after the ice breaks up, when melting releases the ice biota into the water column and meltwater leads to surface stratification, a major phytoplankton bloom of a few weeks develops, fuelling the higher trophic foodweb of the Arctic (Gradinger et al., 1999, and literature quoted).

The marginal ice zones, i.e. where the ice gets broken up in warmer Atlantic or Arctic water, therefore play an important role in the overall production patterns of the Arctic Ocean. Due to the strong water column stratification and increased light levels involved with the melting of the ice, the location and recession of the ice edge in spring and summer determines the timing and magnitude of the spring phytoplankton bloom, which is generally earlier than in the open water (Gradinger and Baumann, 1991; Smith Jr et al., 1987). Wind- or eddy-induced upwelling in the marginal ice zone, as well as biological regeneration processes replenish the surface nutrient pool and therefore prolong the algal growth period (Gradinger and Baumann, 1991; Smith, 1987). The hydrographic variability explains the patchy patterns of primary and secondary production observed, as well as consequently the patchy occurrence of predators.

The polar front separates to some degree the pelagic faunas of the polar and Arctic waters in the Greenland Sea and Fram Strait, each characterised by a few dominant copepod species with different life history strategies (Hirche et al., 1991; see also review in Melle et al., 2005): In polar waters, Calanus glacialis uses under ice plankton production and lipid reserves for initiating its spring reproduction phase, however depending on the phytoplankton bloom for raising its offspring (e.g. Leu et al., 2011). Somewhat later, on the warm side of the polar front in Arctic water, the Atlantic species Calanus finmarchicus uses the ice edge-related phytoplankton bloom for secondary production. Calanus hyperboreus, the third and largest of the charismatic copepod species has its core area of distribution in the Arctic waters of the Greenland Sea (Hirche, 1997; Hirche et al., 2006).

Zooplankton of the Arctic Basin

Overall zooplankton biomass decreases towards the central Arctic basin, reaching a minimum in the most northerly waters, i.e. the region with permanent ice cover (Mumm et al., 1998). However, investigations in recent years demonstrated increased biomasses compared to studies several decades earlier - possibly a consequence of the decrease in ice thickness and cover which only enabled the investigations to take place from ship board.

There is a south-north decrease in zooplankton biomass, with a sharp decline north of 83°N (Hirche and Mumm, 1992), coinciding with differences in the species composition of the biomass-forming zooplankton species. Whereas the southern Nansen basin plankton is dominated by the Atlantic species Calanus finmarchicus, entering the Arctic Basin with the West Spitsbergen Current, the northernmost branch of the North Atlantic current, the Arctic and polar species Calanus hyperboreus and C. glacialis dominate the biomass in the high-Arctic Amundsen and Makarov Basins (Auel and Hagen, 2002; Mumm et al., 1998). The zooplankton species communities generally can be differentiated according to their occurrence in Polar Surface Water (0-50 m, temperature below –1.7°C, salinity less than 33.0), Atlantic Layer (200–900 m; temperature 0.5–1.5°C); salinity 34.5–34.8) and Arctic Deep Water (deeper than 1000 m, temperature -0,5--1° C, salinity > 34.9) (Auel and Hagen, 2002; Grainger, 1989; Kosobokova, 1982). The polar surface community in the upper 50 m of the water column consists of original polar species as well as species emerging from deeper Atlantic waters, alltogether leading to a high abundance and biomass peak in summer. Diversity and biomass are minimal in the impoverished Arctic basin deepwater community (Kosobokova 1982). Apart from a limited exchange with the Atlantic Ocean via the Fram Strait, the central Arctic deep-sea basins are isolated from the rest of the world ocean deepsea fauna. Therefore, the bathypelagic fauna consists of a few endemic Arctic species and some species of Atlantic origin. Due to the separation of the Eurasian and Canadian Basins by the Lomonosov Ridge, significant differences in hydrographic parameters (Anderson et al. 1994) and in the zooplankton composition occur between both basins (Auel and Hagen, 2002).

Fish

Polar cod, Boreogadus saida, is a keystone species in the ice-related foodwebs of the Arctic. Due to schooling behavior and high energy content polar cod efficiently transfer the energy from lower to higher trophic levels, such as seabirds, seals and some whales (Crawford and Jorgenson, 1993).

Seabirds

Ice cover is a physical feature of major importance to marine birds in high latitude oceans, providing access to resources, refuge from aquatic predators (Hunt, 1990). As seabirds are dependant on leads between ice floes or otherwise open water to access food, they search for the most productive waters in polynias (places within the ice which are permanently ice free) and marginal ice zones (Hunt, 1990). Here they forage both on the pelagic and sympagic ice-related fauna, especially the early stages of polar cod and the copepods

Calanus hyperboreus and C. glacialis. Likely, they benefit of the structural complexity and good visibility of their prey near the ice (Hunt, 1990).

In the Greenland Sea and Fram Strait, major breeding colonies exist on Svalbard, Greenland and on Jan Mayen, all of these within reach of the seasonally moving marginal ice zone or a polynia (North East Water Polynia on the East Greenland shelf). Breeding seabirds like Little auks (Alle alle), from colonies in the northern Svalbard archipelago feed their offspring with prey caught in the vicinity of the nests, however intermittently travel at least 100 km to the marginal ice zone at 80° N to replenish their body reserves (Jakubas et al., Online 03 June 2011). Therefore, the distance of the marginal ice zone to the colony site is a critical factor determining the breeding success (e.g. Joiris and Falck, 2011). Opportunistically, the birds also use other zooplankton aggregations such as a in a cold core eddy in the Greenland Sea, closer to the nesting site (Joiris and Falck, 2011).

A synopsis of seabird data for the period 1974–1993 (Joiris, 2000) showed that the little auk is one of the most abundant species, together with the fulmar Fulmarus glacialis, kittiwake Rissa tridactyla and Brünnich's guillemot Uria lomvia in the European Arctic seas (mainly the Norwegian and Greenland Seas). In the Greenland Sea and the Fram Strait, little auks represented the main species in polar waters, at the ice edge and in closed pack ice, reaching more than 50% of all bird species (Joiris and Falck, 2011). In spring and autumn, millions of seabirds pass through the area when migrating between their breeding sites on Svalbard or the Russian Arctic and their wintering areas in Canada (Gill et al., 2011).

There are several seabird species in the European Arctic which are only met in ice-covered areas, for example the Ivory gull Pagophila eburnea and the Thick-billed guillemot Uria lomvia (see e.g. CAFF, 2010): Both species spend the entire year in the Arctic, and breed in close vicinity to sea ice although Thick-billed guillemots were observed to fly up to 100 km from their colonies over open water to forage at the ice edge (Bradstreet 1979). The relatively rare Ivory gulls are closely associated with pack-ice, favouring areas with 70 – 90% ice cover near the ice edge, where they feed on small fish, including juvenile Arctic cod, squid, invertebrates, macro-zooplankton, carrion, offal and animal faeces (e.g. OSPAR Commission, 2009b). Ivory gulls have a low reproductive rate and breeding only takes place if there is sufficient food, which makes the population highly vulnerable to the effects of climate warming (e.g. OSPAR Commission, 2009b). Thick-billed guillemots are relatively long lived and slow to reproduce and has a low resistance to threats including oil pollution, by-catch in and competition with commercial fisheries operations, population declines due to hunting – particularly in Greenland (OSPAR Commission, 2009c).

Ivory gull and Thick-billed guillemots are both listed by OSPAR as being under threat and/or decline, (OSPAR Commission, 2008) and in 2011 recommendations for conservation action were agreed (OSPAR Commission, 2011) which will be implemented in conjunction with the circumpolar conservation actions of CAFF (CAFF, 1996; Gilchrist et al., 2008).

Marine mammals

Several marine mammal species permanently associate with sea ice in the European Arctic. These include polar bear, walrus, and several seal species: bearded, Erignathus barbatus; ringed, Pusa hispida; hooded, Cystophora cristata; and harp seal Pagophilus groenlandicus. Three whale species also occupy Arctic waters year- round – narwhal, Monodon monoceros; beluga whale, Delphinapterus leucas; and bowhead whale, Balaena mysticetus.

Polar bears Ursus maritimus are highly specialized for and dependent on the sea ice habitat and are therefore particularly vulnerable to changes in sea ice extent, duration and thickness. They have a circumpolar distribution limited by the southern extent of sea ice. Three subpopulations of polar bears occur in the European high Arctic: the East Greenland, Barents Sea and Arctic Basin sub-populations, all with an unknown population status (CAFF, 2010). Following the young-of-the-year ringed seal distribution, polar bears are most common close to land and over the shelves, however some also occur in the permanent multi-year pack ice of the central Arctic basin (Durner et al., 2009). Due to low reproductive rates and long lifetime, it is expected that the polar bears will not be able to adapt to the current fast warming of the Arctic and become extirpated from most of their range within the next 100 years (Schliebe et al., 2008).

Walrusses, Odobenus rosmarus, inhabit the Arctic ice year-round. They are conservative benthic feeders, diving to 80-100 m depth for scaping off the rich mollusc fauna of the continental shelves, and need ice floes as resting and nursing platform close to their foraging grounds. Walrusses have been subject to severe hunting pressure from the end of the 18th century to the mid 20th century, and are still hunted today in Greenland (NAMMCO). By 1934, the estimated 70000-80000 individuals of the Atlantic population were reduced to 1200-1300, with none left on Svalbard (Weslawski et al., 2000). Todays relatively small sub-populations on the East Greenland and Svalbard-Franz Josef Land coasts have recently shown a slightly increasing trend, in the latter case reflecting the full protection of the species since the 1950´s (CAFF, 2010; NAMMCO). Apart from their sensitivity to direct human disturbance and pollution, it is expected that walrusses will suffer from the changing ice conditions (location, thickness for being used as haul-out site) as well as changes in ice-related productivity.

The Atlantic subspecies of the **bearded seal**, Erignathus barbatus occurs south of 85° N from the central Canadian Arctic east to the central Eurasian Arctic, but no population estimates exist (Kovacs, 2008b). Because of their primarily benthic feeding habits they live in ice covered waters overlying the continental shelf. They are typically found in regions of broken free-floating pack ice; in these areas bearded seals prefer to use small and medium sized floes, where they haul out no more than a body length from water and they use leads within shore-fast ice only if suitable pack ice is not available (Kovacs, 2008b, and literature quoted).

The **Arctic ringed seal** Pusa (Phoca) hispida hispida has a very large population size and broad distribution, however, there are concerns that future changes of Arctic sea ice will have a negative impact on the population, some of which have already been documented in some parts of the subspecies range (Kovacs et al., 2008). As the other seals, the ringed seal uses sea ice exclusively as their breeding, moulting and resting (haulout) habitat, and feed on small schooling fish and invertebrates. In a co-evolution with one of their main predators, the polar bear, they developed the ability to create and maintain breathing holes in relatively thick ice, which makes them well adapted to living in fully ice covered waters allover the year.

The West Ice (or Is Odden) to the west of Jan Mayen, at approx. 72-73° N, in early spring a stretch of more of less fast drift ice, is of crucial importance as a whelping and moulting area for harp seals and hooded seals (summarised e.g. by ICES, 2008). Discovered in the early 18th century, up to 350000 seals (1920s) were killed per year, decimating the populations from an estimated one million individuals in the 1950s (Ronald et al., 1982) to today´s 70000 and 243000 of hooded and harp seals, respectively (Kovacs, 2008a, c).

Hooded seal, Cystophora cristata, is a pack ice species, which is dependent on ice as a substrate for pupping, moulting, and resting and as such is vulnerable to reduction in extent or timing of pack ice formation and retreat, as well as ice edge related changes in productivity (Kovacs, 2008a, and literature quoted). Hooded Seals feed on a wide variety of fish and invertebrates, including species that occur throughout the water column. After breeding an moulting on the West Ice they follow the retreating pack ice to the north, but also spend significant periods of time pelagically, without hauling out (Folkow and Blix 1999) in (Kovacs, 2008a). The northeast Atlantic breeding stock has declined by 85-90 % over the last 40-60 years. The cause of the decline is unknown, but very recent data suggests that it is on-going (30% within 8 years), despite the protective measures that have been taken in the last few years. The species is therefore considered to be vulnerable (Kovacs, 2008a).

Harp seals Pagophilus (Phoca) groenlandicus are the most numerous seal species in the Arctic seas. Their reproduction takes place in huge colonies, for example on the pack ice of the ‘‘West Ice’’ north of Jan Mayen, and after the breeding season they follow the retreating pack ice edge northwards up to 85° N, feeding mainly on polar cod under the ice (Kovacs, 2008c) .

Narwhals Monodon monoceros primarily inhabit the ice-covered waters of the European Arctic, including the ice sheet off East Greenland (Jefferson et al., 2008b). For two months in summer, they visit the shallow fjords of East Greenland, spending all the rest of the year offshore, in deep ice-covered waters along the continental slope in the Greenland Sea and Arctic Basin (Heide-Jørgensen and Dietz, 1995). Narwhals are deep diving benthic feeders and forage on fish, squid, and shrimp, especially Arctic fish species, such as Greenland halibut, Arctic cod, and polar cod at up to 1500 m depth and mostly in winter. A recent assessment of the sensitivity of all Arctic marine mammals to climate change ranked the narwhal as one of the three most sensitive species, primarily due to its narrow geographic distribution, specialized feeding and habitat choice, and high site fidelity (Laidre et al. 2008 in (Jefferson et al., 2008b)).

Bowhead whales Balaena mysticetus are found only in Arctic and subarctic regions and a Svalbard-Barents population occurs from the coast of Greenland across the Greenland Sea to the Russian Arctic. They spend all of their lives in and near openings in the pack ice feeding on small to medium-sized zooplankton. They migrate to the high Arctic in summer, and retreat southward in winter with the advancing ice edge (Moore and Reeves 1993 in (Reilly et al., 2008)). Whaling has decimated the original bowhead whale populations to be rare nowadays, listed by OSPAR as being under threat and/or decline (OSPAR Commission, 2008). The species is considered to be very sensitive to changes in the ice-related ecosystem as well as sound disturbance, possible consequences of a progressive reduction of ice cover (OSPAR Commission, 2009a).

Belugas Delphinapterus leucas prefer coastal and continental shelf waters with a broken-up ice cover. They have never been surveyed around Svalbard. Pods numbering into the thousands are sighted irregularly around the archipelago, and pods ranging from a few to a few hundred individuals are seen regularly (Gjertz and Wiig 1994; Kovacs and Lydersen 2006 in (Jefferson et al., 2008a)).

Little is known about the populations of the larger fauna in the Central Arctic Basin over the deepsea basins and ridges. But it is not likely that it is currently an area of great abundance - too far from the coastal nesting sites of marine birds, and over too deep water to allow feeding on benthos, as most of the larger mammals would need, and currently of too low plankton production to feed the large whales. All of these groups have their distribution center along the continental shelves presently - however, following the receeding ice edge out to the central Arctic basin may be one of the options for the future.

Feature condition, and future outlook

This high Arctic region is particularly vulnerable to the the loss of ice cover and other effects of the anticipated global warming, including elevated UV radiation levels (Agustí, 2008). (Wassmann et al., 2010) summarise what changes may be expected within the subarctic/Arctic region:

northward displacement (range shifts) of subarctic and temperate species, and cross-Arctic transport of organisms;

increased abundance and reproductive output of subarctic species, decline and reduced reproductive success of some Arctic species associated with the ice and species now preyed upon by predators whose preferred prey have declined;

increased growth of some subarctic species and primary producers, and reduced growth and condition of animals that are bound to, associated with, or born on the ice;

anomalous behaviour of ice-bound, ice-associated, or ice-born animals with earlier spring events and delayed fall events;

changes in community structure due to range shifts of predators resulting in changes in the predator–prey linkages in the trophic network.

(Wassmann, 2008) expects radical changes in the productivity, functional relationships and biodiversity of the Arctic Ocean. He suggests that a warmer climate with less ice cover will result in greater primary production, a reduction of the stratified water masses to the south, changes in the relationship between biological processes in the water column and the sedimentss, a reduction in niches for higher trophic levels and a displacement of Arctic by boreal species. On the shelves, increased sediment discharges are expected to lower the primary production due to higher turbidity, and enhance the organic input to the deep ocean. A more extensive review of expected or suspected consequences of climate change for the marine system of the Arctic is given in (Loeng et al., 2005).

Figure 3, extracted from (Gill et al., 2011), presents the conceptual ideas about possible Arctic ecosystem changes mediated by human impact:

The normal situation shown in the upper left panel consists of ice-dependent species and species that tolerate a broader range of temperatures and are found in waters with little or no sea ice. Primary production occurs in phytoplankton (small dots in the figure) in ice-free waters and in ice-attached algae and phytoplankton in ice-covered waters. Phytoplankton (small t-shaped symbols in the figure) and ice algae are the main food sources for zooplankton and benthic animals. The fish community consists of both pelagic and demersal species. Several mammals are ice-associated, including polar bears and several species of seals. A number of sea bird species are also primarily associated with ice-covered waters.

At moderate temperature increases (upper right) populations of ice-dependent species are expected to decline as sea ice declines, and sub-Arctic species are expected to move northwards. Arctic benthic species are expected to decline, especially if their distributions are pushed close to or beyond the continental slope.

The expected effects from fisheries relate to the continental shelves. Two major effects are reductions in populations of benthic organisms due to disturbance from bottom trawling and removal of large individuals in targeted fish stocks. In addition, the size of targeted stocks, both demersal and pelagic, may be reduced.

In addition, the effects of ocean acidification are considered (lower right). Ocean acidification will result in depletion of carbonate phases such as aragonite and calcite. This will alter the structure and function of calcareous organisms, particularly at lower trophic levels. Changes in pH can also alter metabolic processes in a range of organisms. It is not known how these changes will propagate to higher trophic levels, but the effects could be substantial.

c.f. Figure 3: Conceptual models showing potential impacts on Arctic marine ecosystems under different scenarios (Gill et al., 2011).

(Gill et al., 2011) conclude that the central part of the Arctic Basin is not a region for fisheries or oil and gas exploration. However, this region has played and will continue to play a very important role in the redistribution of pollutants, due to ice drift and/or currents between coastal and shelf areas and the Arctic Basin peripheries, far from sources of pollution.

Assessment against CBD EBSA Criteria

Table 1. relation of each of the CBD criteria to the proposed area relating to the best available science. Note that a candidate EBSA may qualify on the basis of one or more of the criteria, the boundaries of the EBSA need not be defined with exact precision.

CBD EBSA Criterion	**Description**	**Ranking of criterion relevance (please mark one column with an X)**			
		Don't Know	**Low**	**Some**	**High**
Uniqueness or rarity	The 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 Arctic sea ice, in particular the multiyear ice of the Central Arctic is globally unique and hosts endemic species such as the Gammarid amphipod Gammarus wilkitzki an sea ice meiofauna which will disappear with the melting of the ice. Polar bears, walrusses,bowhead whales, narwhales, belugas, several seal species and many bird species are endemic to the high Arctic ice.					

Special importance for life-history stages of species	Areas that are required for a population to survive and thrive				x
Explanation for ranking Sea ice is essential for its sympagic fauna, and to some extent also for the pelagic associated fauna which also depends on the right timing of biomass production (match/mismatch with bloom periods. The marginal ice zone and other openings in the ice are essential feeding grounds for a large number of ice-associated species which exploit the seasonallly high production there.					
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 high arctic ice hosts endemic species such as the Gammarid amphipod Gammarus wilkitzki an sea ice meiofauna which will disappear with the melting of the ice. Many of the obligatory ice-related species are listed as vulnerable by IUCN, and/or listed as under threat and/or decline by OSPAR - examples Ivory gull, thick-billed guillemot, bowhead whale, hooded seal, polar bear.					
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 The ice-related foodweb and ecosystem is highly sensitive to the ecological consequences of a warming climate. Many of the seabird and mammal populations are particularly sensitive to changes due to their already low population numbers, and low fertility. If the retreat of the ice to the north will lead to increased shipping and oil and gas exploitation in Arctic waters, the increased risk of spills would also pose a potential hazard for example for guillemots, which are extremely susceptible to mortality from oil pollution (CAFF, 2010). In addition, some species like Ivory gull are sensitive to an increased heavy metal load in their prey.					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity				
Explanation for ranking					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity				

Sharing experiences and information applying other international criteria (Optional)

CBD EBSA Criterion	**Description**	**Ranking of criterion relevance (please mark one column with an X)**			
		Don't Know	**Low**	**Some**	**High**

Dependency:	An area where ecological processes are highly dependent on biotically structured systems (e.g., coral reefs, kelp forests, mangrove forests, seagrass beds). Such ecosystems often have high diversity, which is dependent on the structuring organisms. Dependency also embraces the migratory routes of fish, reptiles, birds, mammals, and invertebrates.				x
Explanation for ranking High dependency of ecosystem on ice quantity and quality in conjunction with seasonal light availability and nutrient pool					
Representativeness:	An area that is an outstanding and illustrative example of specific biodiversity, ecosystems, ecological or physiographic processes				
Explanation for ranking Section proposed may be representative for high Arctic ecosystem, currently permantly ice covered					
Biogeographic importance:	An area that either contains rare biogeographic qualities or is representative of a biogeographic "type" or types, or contains unique or unusual biological, chemical, physical, or geological features				
Explanation for ranking					
Structural complexity:	An area that is characterized by complex physical structures created by significant concentrations of biotic and abiotic features.				
Explanation for ranking					
Natural Beauty:	An area that contains superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance.				
Explanation for ranking					
Earth's geological history:	An area with outstanding examples representing major stages of Earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features.				
Explanation for ranking					

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Maps and Figures

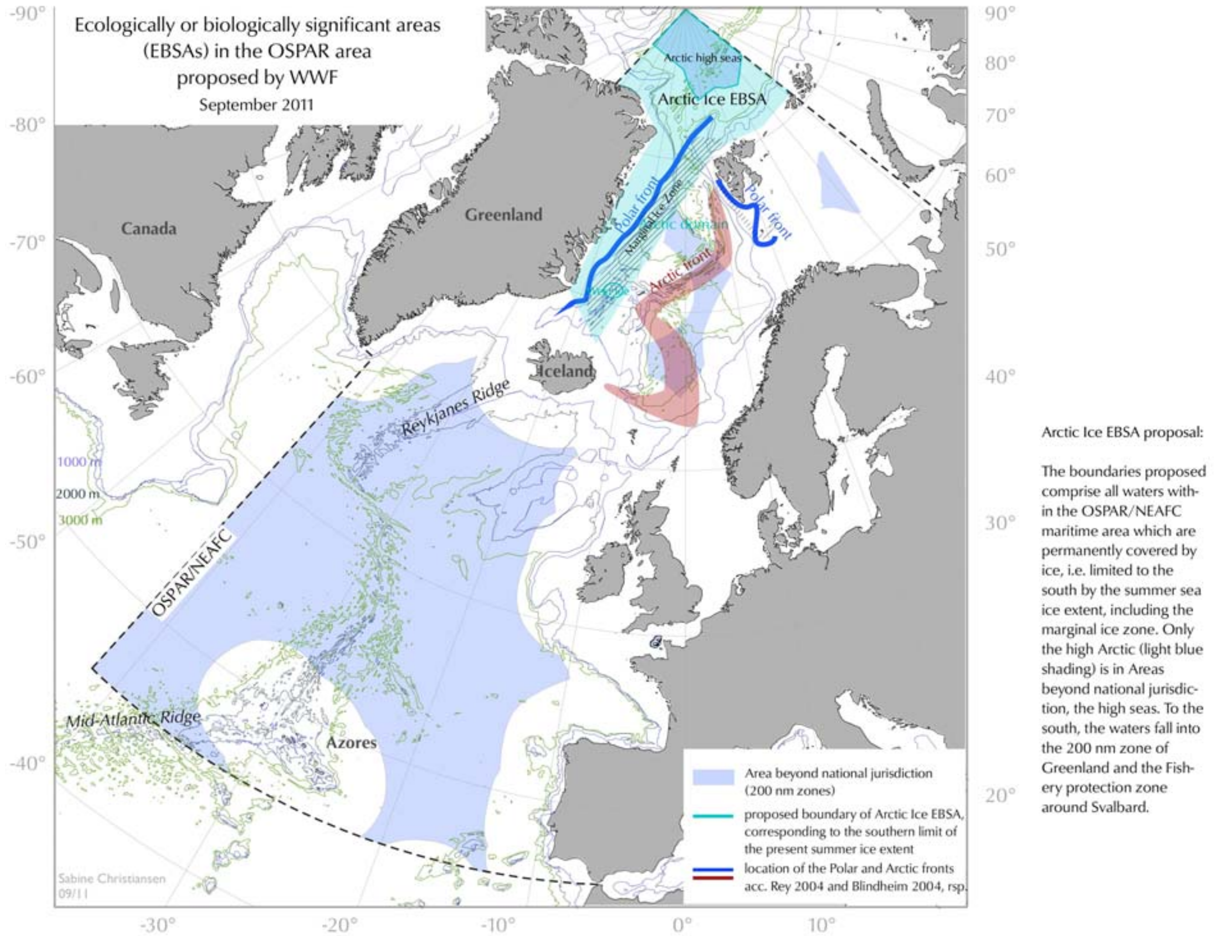

Figure 1: Location of the Ecologically or biologically significant areas (EBSA) proposed by WWF in September 2011. The position of the Arctic and polar fronts was redrawn after (Rey, 2004, Fig. 5.7).

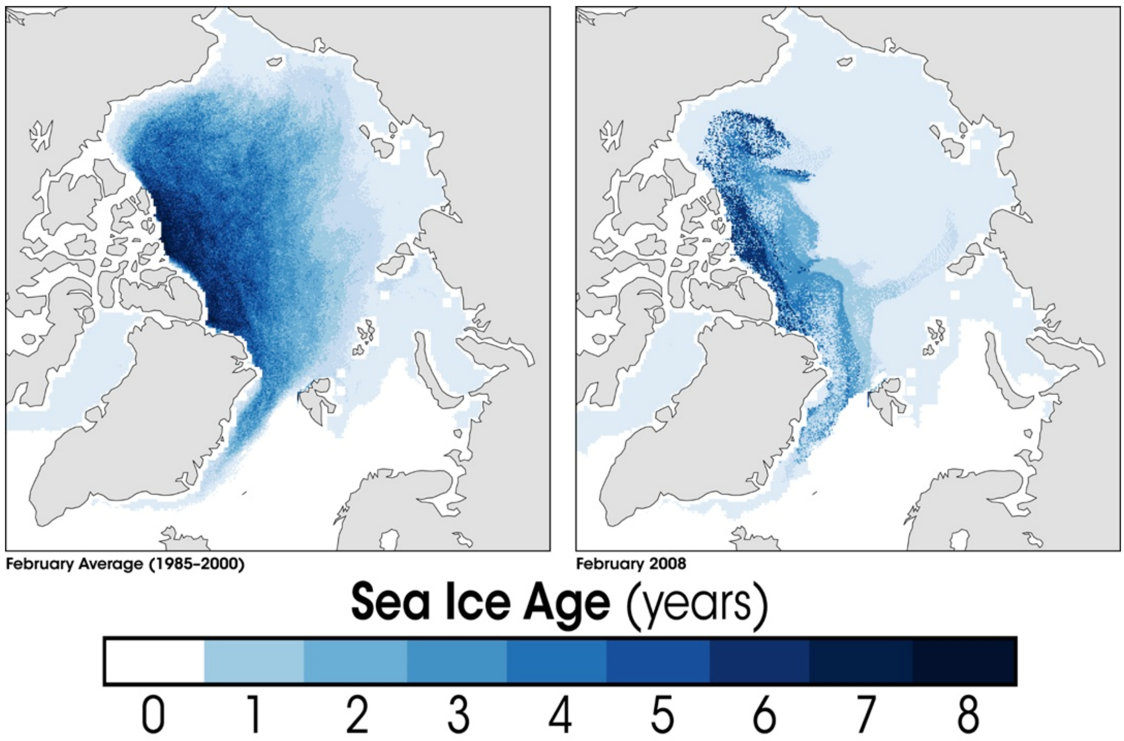

Figure 2: Modelled ice age distribution in 1985-2000 (left) compared to February 2008 (right) (CAFF, 2010).

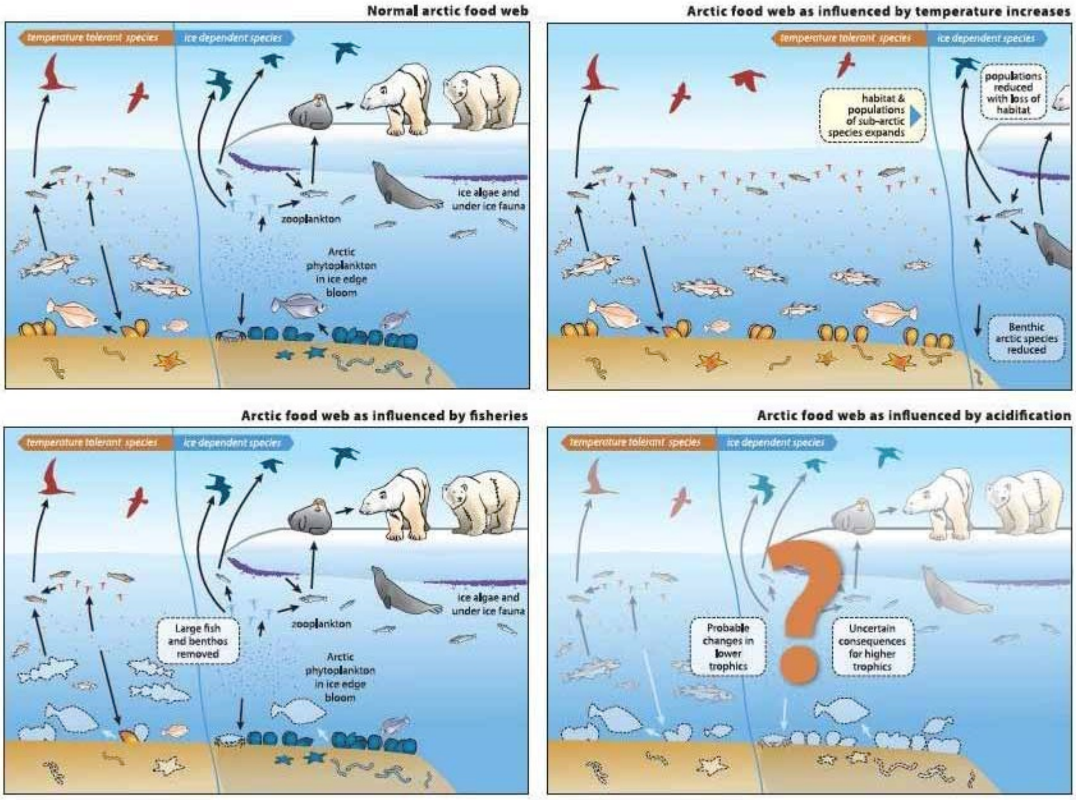

Figure 3: Conceptual models showing potential impacts on Arctic marine ecosystems under different scenarios (Gill et al., 2011).

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