

## Stakeholder consultation on the draft regional environmental management plan for the Area of the northern Mid-Atlantic Ridge with a focus on polymetallic sulphide deposits

### TEMPLATE FOR COMMENTS

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<b>General Comments</b>	
<ol style="list-style-type: none"> <li>1) The structure and layout of the draft REMP.</li> <li>2) The level of detail of the draft REMP, while avoiding being too prescriptive.</li> <li>3) The goals and objectives in the draft REMP in providing for long-term, effective protection of the marine environment in the Area of the northern Mid-Atlantic Ridge.</li> <li>4) The management measures and their ability to achieve the goals and objectives in the draft REMP.</li> </ol>	
<p><b>Preface:</b></p> <p>The <b>Deep-Ocean Stewardship Initiative (“DOSI”)</b> is a global network of experts which seeks to integrate science, technology, policy, law and economics to advise on ecosystem-based management of resource use in the deep ocean and strategies to maintain the integrity of deep-ocean ecosystems within and beyond national jurisdiction. As a distributed network, DOSI has over 2500 members from 104 countries. The Minerals Working Group includes over 230 members.</p> <ul style="list-style-type: none"> <li>• DOSI was granted Observer Status at the 22<sup>nd</sup> Session of the ISA in Jamaica in 2016.</li> <li>• DOSI gives Express Consent to the ISA to make this submission publicly available.</li> </ul> <p>As Group Leads, we submit on behalf of the <b>Deep-Sea Minerals Working Group of DOSI, the Deep-Ocean Stewardship Initiative</b>. The list of contributors is presented at the beginning of the document. Express Consent for sharing is granted.</p> <p>The document is also shared at <a href="https://www.dosi-project.org/topics/minerals-deep-sea-mining/">https://www.dosi-project.org/topics/minerals-deep-sea-mining/</a></p> <p><b>Contributors (in alphabetical order), affiliation. Expertise.</b></p> <p>Dr. Peter J. Auster, Mystic Aquarium &amp; University of Connecticut, Groton, Connecticut, USA. Marine ecology.</p> <p>Dr. Narissa Bax, South Atlantic Environmental Research Institute (SAERI), Falkland Islands. Deep-sea ecology.</p> <p>Dr. Catherine Blanchard, Royal Netherlands Institute for Sea Research (NIOZ) and Utrecht University, The Netherlands. Law of the Sea.</p> <p>Dr. Ana Colaço, Institute of Marine Sciences - Okeanos, University of the Azores, Horta, Portugal. Deep-sea ecology.</p> <p>Dr. Megan Cook, megan-cook.com. Deep-sea biology and management planning.</p> <p>Dr. Elva Escobar, Universidad Nacional Autónoma de México, Mexico. Deep-sea ecology and conservation.</p> <p>Dr. Patricia Esquete, Universidade de Aveiro, Portugal. Deep-sea ecology.</p> <p>Dr. Sabine Gollner, Royal Netherlands Institute for Sea Research (NIOZ), The Netherlands. Deep-sea ecology.</p> <p>Dr. Jesse van der Grient, South Atlantic Environmental Research Institute (SAERI), Falkland Islands. Deep-sea ecology.</p> <p>Dr. Lisa A. Levin, Scripps Institution of Oceanography, University of California San Diego, USA. Deep-sea ecology and climate change science.</p> <p>Dr. Beth N. Orcutt, Bigelow Laboratory for Ocean Sciences, USA. Deep-sea microbiology and biogeochemistry.</p> <p>Dr. Anne Helene Solberg Tandberg, University Museum of Bergen, Norway. Deep-sea ecology.</p> <p>Dr. Verena Tunnicliffe, University of Victoria, Canada. Deep-sea ecology.</p>	

**General comment:**

This draft REMP has been developed through a series of ISA-sponsored stakeholder workshops, and much of the discussed science is reflected in this REMP. We acknowledge for example, that SINPs, AINPs, and S/A Precaution have been included as suggested. At the same time, this draft REMP needs improvement in order to be effective for its purpose. Further collaboration with stakeholders will be necessary to fill the current gaps.

**1)The structure and layout of the draft REMP**

The overall structure is clear and follows in several aspects ISBA/26/C/7 (*Proposal for a template with minimum requirements for regional environmental management plans: a proposal for a standardized approach*). However, improvement on structure and layout is especially needed on the identification of responsibilities and where and what data have to be provided for the REMP. For example, ISBA/26/C/7 suggests the use of a template and square brackets [...] that identify which information has to be provided.

The draft nMAR REMP is not a stand-alone document, but is and shall be tightly linked to other ISA documents. Cross-linking to other relevant ISA documents (e.g. to Draft Standard and Guidelines on establishment of Baseline Environmental data) is essential that the structure is understood.

The structure and layout overall can be followed but could be improved as follows:

The headers could be numbered. For example:

I.Introduction

II.Guiding principles

III.Overarching goals

...

VII.Region-specific goals and objectives

....

X.Review of the progress in the implementation of REMP

The sub-headings could then be numbered accordingly, so there is no confusion where these subheadings belong to. For example:

VII.Region-specific goals and objectives

VII.1.Region-specific goals

VII.2.Operational objectives

VII.2.a.Operational objectives for the area covered under this REMP

VII.2.b.Operational objectives for contract areas

**2)The level of detail of the draft REMP, while avoiding being too prescriptive.**

The level of detail/principal length for the sections in this REMP is good, but we identified that the draft nMAR REMP misses several sections that are crucial for an effective REMP.

Important aspects that are currently poorly developed include for example the identification of unknowns (e.g. knowledge gaps in baseline data) and how this relates to the precautionary principle/approach.

We suggest reviewing the structure and level of detail of the nMAR draft REMP in the light of ISBA/26/C/7 to discuss what additional aspects could be useful for the development of the nMAR REMP.

ISBA/26/C/7 is mentioned in paragraph 7 of the nMAR REMP. The LTC, following the request of the council (ISBA/26/C/10), could explain which parts were (not) taken up. This could speed up the process of developing a robust nMAR REMP and would provide more transparency.

**3)The goals and objectives in the draft REMP in providing for long-term, effective protection of the marine environment in the Area of the northern Mid-Atlantic Ridge.**

Many of the current goals and objectives in the draft nMAR REMP could serve as bases for long-term, effective protection of the marine environment. However, more clarity is needed on their definition and especially on how it can be controlled and measured that objectives are achieved. It would need measurable objectives and targets.

We identified the following gaps.

- Climate change is poorly considered. Whilst it is excellent that climate change is considered in the evaluation of the ABMTs (27j), the effects of warming, acidification and oxygen depletion would need to be considered throughout the REMP.

- Other uses are not identified, which can cause conflict. We suggest adding (from ISBA/26/C7):

“Identifying and mitigating conflicts in different uses by avoiding overlap between contract areas, reserved

areas, areas of particular environmental interest, marine protected areas and areas designated for other legitimate uses (such as fisheries, submarine cables)”

Likewise, traditional knowledge, cultural heritage, spiritual and indigenous values are not included

· Measurable targets are not included, but should be added as otherwise the goals and objectives can't be met.

#### **4)The management measures and their ability to achieve the goals and objectives in the draft REMP.**

The suggested management measures could serve to achieve the goals and objectives, once the following tasks are accomplished:

- Definition of Buffer zones at SINPs, and criteria to be used to define buffer zones around SINPs
- Definition of network criteria. A network of representative habitats for each natural management unit is needed. These shall consider biogeographic regions, including the benthic and pelagic realms.
- Definition of thresholds
- Consideration of cumulative impacts and scenario forecasting
- Definition of indicator species (benthic and pelagic)
- Definition of terms such as “key”, “important”, “representative”, “sufficient information”

#### **5)Additional comment: Implementation and Responsibilities of contractors, LTC, council, secretariat, science, stakeholders**

It is currently not sufficiently clear how the REMP can be implemented.

In the draft nMAR REMP the responsibilities are often not clear. Examples: Who has to provide which data? Who is reviewing and synthesizing data? Who is developing thresholds? Who reviews and approves new AINPs/SINPs? What is the role of science and stakeholders in any review process? Who will monitor non-contractor areas?

We refer here to document ISBA/26/C/6 (Procedure for the development, approval, and review of regional environmental management plans).

ISBA/26/C/6 is mentioned in paragraph 7 of the nMAR REMP. The LTC, following the request of the council (ISBA/26/C/10), could explain which parts were (not) taken up. This could speed up the process of developing a robust nMAR REMP and would provide more transparency.

One of the points addressed in ISBA/26/C/6 is the establishment of an expert committee, which the council, acting on the recommendation of the LTC, establishes. The expert committee would reduce the workload of the LTC and develop and review one regional environmental management plan for a specific region (p5/8).

#### **6)Additional comment: Review**

The review section in the draft nMAR is poorly developed.

We refer here to document ISBA/26/C/6 (Procedure for the development, approval, and review of regional environmental management plans), and would appreciate a response of the LTC (ISBA/26/C/10) on how ISBA/26/C/6 was considered for the draft nMAR REMP.

*See here below the suggested procedure in ISBA/26/C/6:*

*Review of the regional environmental management plan:*

##### *Annual reporting*

*Every year, the expert committee, with administrative support from the secretariat, shall provide to the Council a report that summarizes new environmental data from all contractors, as well as new scientific literature data that are relevant to the regional environmental management plan and monitoring data and information. Furthermore, the committee shall provide recommendations as to the implications (if any) of new knowledge and findings for the plan.]*

*The annual report should be made publicly accessible by the secretariat of the Authority.*

*If a State member of the Authority or an observer wishes to discuss the outcomes contained in an annual report, they may include the topic in the agenda of the Council at its subsequent session.*

##### *Timing*

*Each regional environmental management plan should undergo a review, at the latest five years after its adoption by Council, or earlier if requested by the Council.*

*Events that may lead the Council to request an earlier review may include:*

- (a) Issue of an Authority emergency order that relates to a site within the region;*
- (b) Request by another organ of the Authority;*
- (c) Submission of substantial new environmental knowledge or data for the region;*
- (d) A major environmental change in or affecting the region (e.g., a natural or anthropogenic disaster);*
- (e) Relinquishment of areas previously under contract within the region;*

(f) *Submission of a new application for a plan of work for exploitation in the region, when the exploitation would be for a new resource category in the relevant area.*

*Responsibility*

*The expert committee leads the review process (taking into account any specific instructions from the Council) and reports on the outcome to the Legal and Technical Commission.*

*The Legal and Technical Commission considers the review report of the expert committee to satisfy itself that the proper procedure has been followed in the review of the regional environmental management plan, in accordance with any relevant guidelines. The Commission recommends to the Council any proposed amendments regarding the plan and its contents, objectives and measures. In submitting such recommendations to the Council, the Commission should include a rationale for its recommendations and a description of the process followed in conducting the review of the plan.*

*The Council reviews the amendments recommended by the Legal and Technical Commission and either adopts the revised plan or reverts the recommendations to the Commission for further work.*

*The Secretariat provides administrative support throughout the regional environmental management plan review process.*

**7)Additional comment: Contractor’s security of tenure over contract areas (para 29, para 40).**

We would like to seek clarification on what “the contractor’s security of tenure over contract areas” means in practice. Our question relates specifically to the ISA’s obligation of the protection of the marine environment. A REMP should enable the ISA to take decisions on contract locations and areas/sites in need of protection. An exploration contract does not necessarily have to be converted into an exploitation contract.

**8)Additional comment: REMP under exploration and exploitation**

We would like to seek clarification if the nMAR REMP is developed for exploration and exploitation.

**9)Additional comment: Taking into account the best available science**

This draft REMP needs improvement in order to be effective for its purpose. Further collaboration with stakeholders, including scientists, will be necessary to fill the current gaps. Here below we show some examples on how science could help and guide to further improve the nMAR REMP.

Examples of peer-reviewed scientific manuscripts addressing biogeography, connectivity, network-criteria, spatial management:

Dunn, D. C., Van Dover, C. L., Etter, R. J., Smith, C. R., Levin, L. A., Morato, T., ... & SEMPIA Workshop Participants. (2018). A strategy for the conservation of biodiversity on mid-ocean ridges from deep-sea mining. *Science advances*, 4(7), eaar4313.

Sutton, T. T., Clark, M. R., Dunn, D. C., Halpin, P. N., Rogers, A. D., Guinotte, J., ... & Heino, M. (2017). A global biogeographic classification of the mesopelagic zone. *Deep Sea Research Part I: Oceanographic Research Papers*, 126, 85-102.

Van Dover et al. 2011 “Environmental management of deep-sea chemosynthetic ecosystems: Justification of and considerations for a spatially based approach” International Seabed Authority, Kingston, Jamaica Tech Study 9

Van Dover, C. L., Smith, C. R., Ardron, J., Dunn, D., Gjerde, K., Levin, L., ... & Contributors, T. D. W. (2012). Designating networks of chemosynthetic ecosystem reserves in the deep sea. *Marine Policy*, 36(2), 378-381.

Watling, L., Guinotte, J., Clark, M. R., & Smith, C. R. (2013). A proposed biogeography of the deep ocean floor. *Progress in Oceanography*, 111, 91-112.]

Examples of needed research to be able to manage inactive and extinct PMS deposits:

Van Dover, C. L., Colaço, A., Collins, P. C., Croot, P., Metaxas, A., Murton, B. J., et al.. (2020). Research is needed to inform environmental management of hydrothermally inactive and extinct polymetallic sulfide (PMS) deposits. *Marine Policy*, 121, 104183.

Work on “Quantitative modeling for addressing cumulative impact assessment” that started during the ISA-organized Evora workshop in 2019 and was continued by online expert working groups afterwards could be used to further advance how cumulative-impacts could be addressed in the nMAR REMP.

<https://isa.org.jm/files/files/documents/Draft-report-cumulative-impacts.pdf>

Please see below our Specific Comments in track-changes, with new text suggestions underlined. Comments given in square brackets [ ]		
Specific Comments		
Page	Line	Comment
4	11-14	<p>1. Article 145 of the Convention requires ISA to adopt appropriate rules, regulations and procedures for, <i>inter alia</i>, the prevention, reduction and control of pollution and other hazards to the marine environment, the protection and conservation of the natural resources of the Area, and the prevention of damage to <u>biota</u> <del>the flora and fauna</del> of the marine environment <u>and preservation of ecosystem function and services.</u></p> <p>[We acknowledge that flora and fauna relates to Art 145, but suggest changing to <u>biota</u>, reflecting the unique diversity and ecosystem services which are provided by microbial communities at active and inactive hydrothermal vents. We suggest adding <u>preservation of ecosystem function and services.</u> This takes into account the services the ocean provides, such as for example nutrient cycling or carbon storage.]</p>
5	70	<p>REMPs also have the potential to contribute to the achievement of Sustainable Development Goal 14 (Life below water) <u>with synergies to other SDGs</u> of the 2030 Agenda for Sustainable Development, namely to “<i>conserve and sustainably use the oceans, seas and marine resources for sustainable development</i>” and xxx.</p> <p>[We suggest adding: <u>with synergies to other SDGs.</u>]</p>
5	79	<p><b>Common heritage of humankind.</b> The Area and its resources <u>and its cultural artifacts</u> are the common heritage of humankind. All rights to the resources of the Area are vested in humankind as a whole on whose behalf the Authority shall act, <u>in line with articles 136 and 140 of the Convention;</u></p> <p>[We suggest rephrasing “mankind” to “humankind”, to be consistent within the document (acknowledging that the original language is “mankind”). We suggest adding art 136 and 140 as reference.</p> <p>We suggest adding “<u>and its cultural artifacts</u>”. As noted by Turner et al. (2020), ISA draft exploitation regulations include provisions for preserving human remains, objects and sites of an archaeological or historic nature. As per Article 149 of UNCLOS, cultural artifacts found in the Area are to be “preserved or disposed of for the benefit of mankind as a whole, particular regard being paid to the preferential rights of the State or country of origin, or the State of cultural origin, or the State of historical and archaeological origin”. With this, cultural artifacts are also part of the Common Heritage of Mankind.</p> <p>Turner, P. J., Cannon, S., DeLand, S., Delgado, J. P., Eltis, D., Halpin, P. N., Kanu, M. I., Sussman, C. S., Varmer, O. &amp; Van Dover, C. L. (2020). Memorializing the Middle Passage on the Atlantic seabed in Areas Beyond National Jurisdiction. <i>Marine Policy</i>, 122, 104254.]</p>
5	85	<p>lack of full scientific certainty shall not be used as a reason for postponing <del>cost</del>-effective measures to prevent environmental degradation;</p> <p>[We suggest deleting the term “cost” from these principles.]</p>

5	89	<p>The application of an <b>ecosystem approach</b></p> <p>[We suggest including a definition of “ecosystem approach”]</p>
5	90	<p><u>f) Incorporate traditional knowledge of indigenous peoples and local communities</u>  <u>g) Incorporate cultural heritage, spiritual and indigenous values</u></p> <p>[We suggest adding f) and g) to the guiding principles.]</p>
6	95	<p>Ensure the protection and preservation of the marine environment, <u>and preservation of ecosystem function and services.</u></p> <p>[We suggest adding <u>preservation of ecosystem function and services.</u> This takes into account the services the ocean provides, such as for example nutrient cycling or carbon storage.]</p>
6	98	<p>Enable the conservation of <del>representative</del> habitats and vulnerable marine ecosystems.</p> <p>[We suggest providing further clarification of what constitutes a “representative” habitat in the context of the nMAR. ]</p>
6	105	<p>Facilitate cooperative research to better understand the marine environment <u>and the impacts of climate change</u> to inform the implementation of this plan,</p> <p>[We suggest adding <u>and the impacts of climate change,</u> here and/or in other places within the REMP (see further comments below). It is important that climate change is incorporated throughout this and other ISA documents, because it is causing cumulative impacts on top of any mining (or other) impact]</p>
6	109	<p><u>j) Identifying and mitigating conflicts in different uses by avoiding overlap between contract areas, reserved areas, areas of particular environmental interest, marine protected areas and areas designated for other legitimate uses (such as fisheries, submarine cables)</u></p> <p>[We suggest adding j) to take into account other uses and avoid conflicts (reference: ISBA/26/C7, Annex)]</p>
6	111	<p>13. The purpose of this REMP is to set in place conservation and management measures and tools across the region in the Area of the northern MAR to ensure the effective protection of the marine environment from harmful effects that may arise from activities in the Area, in accordance with Article 145 of the Convention and the strategic plan of the Authority <u>and to preserve and protect underwater cultural heritage in the Area, in accordance with Article 149 and 303 of the Convention, and the international standards as reflected in the Annex Rules of UNESCO’s 2001 Convention.</u></p> <p>[We suggest adding the underlined text as this would be consistent with Article 149 and 303 of UNCLOS, and draft ISA exploitation regulations that include provisions for preserving and protecting human remains, objects and sites of an archaeological or historic nature (Draft Regulation 35)].</p>

7	125	<p>Figure 1. Geographic scope of the REMP for the Area of the northern MAR.</p> <p>[We suggest adding close-up figures of contractor areas (including foreseen relinquished areas), and any reserved areas.</p> <p>We suggest adding a 3-d map showing the biogeographic region.]</p>
7	126	<p><b>Environmental and geological and cultural setting</b></p> <p>[We suggest adding biogeographic regions to the concept of the REMP. Several peer-reviewed scientific studies have addressed this:</p> <p>Dunn, D. C., Van Dover, C. L., Etter, R. J., Smith, C. R., Levin, L. A., Morato, T., ... &amp; SEMPIA Workshop Participants. (2018). A strategy for the conservation of biodiversity on mid-ocean ridges from deep-sea mining. <i>Science advances</i>, 4(7), eaar4313.</p> <p>Sutton, T. T., Clark, M. R., Dunn, D. C., Halpin, P. N., Rogers, A. D., Guinotte, J., ... &amp; Heino, M. (2017). A global biogeographic classification of the mesopelagic zone. <i>Deep Sea Research Part I: Oceanographic Research Papers</i>, 126, 85-102.</p> <p>Van Dover et al. 2011 “Environmental management of deep-sea chemosynthetic ecosystems: Justification of and considerations for a spatially based approach” International Seabed Authority, Kingston, Jamaica Tech Study 9</p> <p>Van Dover, C. L., Smith, C. R., Ardron, J., Dunn, D., Gjerde, K., Levin, L., ... &amp; Contributors, T. D. W. (2012). Designating networks of chemosynthetic ecosystem reserves in the deep sea. <i>Marine Policy</i>, 36(2), 378-381.</p> <p>Watling, L., Guinotte, J., Clark, M. R., &amp; Smith, C. R. (2013). A proposed biogeography of the deep ocean floor. <i>Progress in Oceanography</i>, 111, 91-112.]</p> <p>[we further suggest to add here the cultural setting, to have a specific place where such information is added, reflecting the additions we propose on page 5, line 90]</p>
7	127	<p><del>Comprehensive</del> Existing sets of scientific data and information on the geology, oceanography and biological communities of the MAR have been compiled and synthesized in the Data Report and Regional Environmental Assessment</p> <p>[We suggest replacing “comprehensive” with “existing”. Whilst we acknowledge the effort of data collection and assessment, it is important to recognise and specify that many data gaps remain.]</p>
7	133	<p>The MAR covers <del>not only</del> <i>inter alia</i> the rocky ridge, <del>but also</del> rift valleys, fracture zones, seamounts, submarine volcanoes, hydrothermal vents, sediment slopes, sediment plains, <del>pelagic oceanic complexes</del> <u>oceanic core complexes</u>, and pelagic provinces</p>

		<p>[We suggest replacing “not only...but also” with <u>inter alia</u>, in order to take into account any new features that may be discussed in the future.</p> <p>We also suggest replacing “pelagic oceanic complexes” with <u>oceanic core complexes</u>, which is the correct term for the geological feature]</p>
7	140-146	<p>The MAR is a slow spreading ridge system. The ridge axis is broken into numerous segments by fracture zones which can offset the ridge by hundreds of metres to hundreds of kilometres. The active volcanism associated with spreading centres along the MAR has created a series of hydrothermal vent sites; <u>hydrothermal vent sites are also sourced from fluid-rock reactions that generate heat in mantle-type rock of oceanic core complexes</u>. The hydrothermal activity at these sites and resulting precipitation of sulphide minerals has formed hard substrate sulphide habitat, and in some places, metal-rich sediments. <u>Typically, several active vent sites are located within an active vent field. Within an active vent field, in some locations, sulphide habitat remains hydrothermally active (active vent site), whilst in other locations, hydrothermal activity has ceased rendering the vents hydrothermally inactive (inactive vent site). Active and inactive vent sites share the same subsurface structure and heat budget of the active vent field, and inactive vent sites can be reactivated. In contrast, extinct vent fields can’t be reactivated (Jamieson &amp; Gartman 2020). These vent field dynamics result in a diverse mosaic of habitat elements and landscape processes that are connected to each other.</u></p> <p>[We suggest adding an explanation of active/inactive/extinct vent sites and vent fields, as this is crucial for management purposes. Reference: Jamieson, J. W., &amp; Gartman, A. (2020). Defining active, inactive, and extinct seafloor massive sulfide deposits. <i>Marine Policy</i>, 117, 103926.].</p>
8	160-165	<p>The benthic environment (rows 166-176) is described for its different habitats. This, too, should happen for the midwater. The midwater environment hosts many different species communities, some which are characterised as mesopelagic or bathypelagic. Further, the diurnal vertical migration that vertically connects epipelagic and food webs at deeper depths is important to acknowledge as (i) diurnal vertical migrators support fisheries, (ii) diurnal vertical migrators play an active role in carbon transport to the deep ocean, and (iii) diurnal vertical migration may be affected by deep-sea mining plumes. There are also resident midwater animals that do not vertically migrate, which highlights that these different components of the midwater can be potentially affected by deep-sea mining in different ways.</p>
8	170	<p>(ii) <u>exposed non-sulphide hard substrate (such as basalt and hydrothermally active and inactive carbonate chimneys and serpentinite)</u>;</p> <p>[We suggest adding <u>and hydrothermally active and inactive carbonate chimneys and serpentinite</u> to cover oceanic core complex environments like those that host Lost City vents].</p>
8	172	<p>Distinguishing between hydrothermally active, <del>and inactive</del>, and <u>extinct sulphide habitat (active and inactive vent sites; active and extinct vent fields)</u> can be challenging, but is essential, because active and inactive habitats support very different biological communities, with potentially different resilience and recovery potential. <u>Juvenile and adult invertebrates reside in the benthic environment, but for most benthic species, a portion of</u></p>



		<p><u>their life history is spent as larvae in the water column. Deep-sea benthic habitats are dynamically connected by the larval phases over a range of spatial scales through dispersal processes and interactions with the pelagic ecosystem.</u></p> <p>[We suggest adding the underlined sentences to clarify vent fluid dynamics and to address larval phases of most faunae.]</p>
8	177	<p>In the northern MAR, distribution of the <u>currently</u> known twenty two sites of PMS occurrences <del>deposits</del></p> <p>[We suggest adding <u>currently</u> to appreciate that more occurrences are likely found in the (near) future. We suggest replacing “deposits” with “occurrences”; Occurrences is a geological term, whilst deposits typically refers to a discrete commercial value]</p>
8	181	<p><u>The overall area occupied by known PMS occurrences is a very small (&lt;1%) fraction of the proposed area of the REMP.</u></p> <p>[We suggest adding the sentence above]</p>
8	184	<p>“make it challenging to identify a representative network of sites or areas that can capture the full range of biodiversity and environmental gradients across the region”</p> <p>[We note that Dunn et al. 2018 proposed a model for design of representative networks. We further note that it is essential to address connectivity, metapopulations and metacommunities.</p> <p>Dunn et al. 2018 "A strategy for the conservation of biodiversity on mid-ocean ridges from deep-sea mining." <i>Science advances</i> 4.7: eaar4313.</p> <p>Mullineaux, L. S., Metaxas, A., Beaulieu, S. E., Bright, M., Gollner, S., Grupe, B. M., et al. (2018). Exploring the ecology of deep-sea hydrothermal vents in a metacommunity framework. <i>Frontiers in Marine Science</i>, 5, 49.</p> <p>Vrijenhoek, R. C. (2010). Genetic diversity and connectivity of deep-sea hydrothermal vent metapopulations. <i>Molecular ecology</i>, 19(20), 4391-4411.</p> <p>We support the text proposal of Cindy van Dover:</p> <p>“§23. The environmental setting of the MAR influences the development of this REMP in a number of ways. <u>The Mid-Atlantic Ridge has complex cross-axis and along-axis geomorphologies and a high heterogeneity of habitats. This suggests that a network of cross-axis areas distributed latitudinally could capture most of the biodiversity and environmental gradients within each natural management unit (Dunn et al. 2018).</u> Distinct habitats and communities such as active hydrothermal vent systems also occur at a much finer spatial scale compared to the axial valley and bathyal slopes of this mid-ocean ridge and several active vent systems are present within existing contract areas for exploration. <u>In the case of hydrothermally active vent ecosystems, however, each species population and community at a site is one part of a metapopulation (spatially separated populations; Vrijenhoek 2010) or metacommunity (spatially separated communities; Mullineaux et al. 2018).</u> Because of this “meta” condition, the spatial scale of the metapopulations and metacommunities is much greater than the</p>

		<u>spatial scale of an individual sulfide occurrence.</u> As such, the goals, objectives, and management measures developed under this REMP were developed to reflect <u>these regional and specific</u> characteristics.]
9	199	<p>The surface area of known PMS deposits is measured at a scale of a few hundreds of meters. <u>The PMS deposit is a mound and can reach tens to hundreds meters deep.</u> In comparison, the surface area is dozens of times larger for CMC deposits, and hundreds and thousands of times larger for PMN deposits, <u>but at CMC and PMN deposits are restricted to the top meter.</u> <del>The large difference in the surface extent of different mineral deposits likely result in different scales of the potential environmental impacts from exploitation activities in different mineral provinces, and should be taken into consideration in regional environmental planning and management</del></p> <p>[We suggest deleting the last sentence because it is not clear what is meant by scales. Whilst the area impacted may be larger for PMN, the sediment overburden that may be (re)moved at PMS may include very high volumes. We therefore also suggest adding the 3-D map or model of mineral occurrences.]</p>
9	204	<p>We support the additional text proposal of Cindy van Dover: <u>“In addition, species that colonize hydrothermally active sulfide ecosystems comprise metapopulations and metacommunities. Because hydrothermally active sulfide systems are transient features, local populations/communities have finite lifespans, but the metapopulation (metacommunity) is stable because one population/community may provide colonists to another one. This highlights the importance of source-sink dynamics for the persistence of benthic populations/communities at hydrothermal vents. It also underscores the much greater geographical extent of indirect impacts of exploiting mineral deposits hosting hydrothermally active ecosystems.”</u></p>
9	204	<p><u>26. The mineral resources of this REMP include...</u>(please insert an overview of the mineral grade, volume etc., )</p> <p>[We suggest adding information on the mineral resource, as this information is relevant for the environment, including its biota.]</p>
9	204	<p><u>27. (or as 22 bis). Biological characterizations of hydrothermally inactive sulfide occurrences and metal-rich sediments in the region are very limited. It is not known to what extent these hard and soft substrata might support vent endemic taxa.</u></p> <p>[We suggest adding information on these knowledge gaps. Please also see our additions on operational objectives. Reference: Van Dover, C. L., Colaço, A., Collins, P. C., Croot, P., Metaxas, A., Murton, B. J., et al. (2020). Research is needed to inform environmental management of hydrothermally inactive and extinct polymetallic sulfide (PMS) deposits. <i>Marine Policy</i>, 121, 104183.]</p>
9	205	<p>This REMP <u>follows the overarching goals</u> and has to <del>aims to</del> achieve the following environmental goals at the regional scale for the northern MAR.</p> <p>[We suggest the textual change above, in order to add a connection to the overarching goals of any REMP and to use tighter language.]</p>

9	207	<p><u>26. x) Prevent adverse impacts to underwater cultural heritage, ensuring that cultural artifacts discovered on the seabed are protected and preserved, and that the cultural heritage of the deep Atlantic is recognized.</u></p> <p>- [We suggest adding the underlined section above, taking into account cultural heritage]</p>
9	209	<p>Prevent habitat loss <u>and degradation</u> to maintain ecosystem viability</p> <p>[We suggest adding <u>and degradation</u>, taking into account the pelagic realm.]</p>
9	211	<p>Maintain representativity of habitats <del>at the regional scale</del> <u>within the natural management unit, taking into account biogeography, metapopulations and metacommunities. Protect [TBD] percent of the representative habitat within each natural management unit.</u></p> <p>[We suggest taking into account natural management units, because otherwise representativity can't be achieved.]</p>
9	212	<p>Maintain migratory corridors <u>and connectivity highways</u>;</p> <p>[We suggest taking into account any potential connectivity highways that maintain dispersal and connectivity of benthic species' larvae. Typically, dispersal of vent biota and its larvae is along the ridges.]</p>
9	216-246	<p>Operational objectives</p> <p>[it is unclear who will carry out the operational objectives. The LTC, an expert body (selected by whom and how), the contractor? Please clarify. ]</p>
9	217	<p>[We suggest adding specific operational objectives to address cultural heritage.]</p>
9	220	<p>Describe the marine environment (as described in the Standard and Guidelines for baseline data), <u>gather data from global and regional databases and scientific literature</u>, and determine the types and distribution of habitats (including through modeling) to assess representativity at the regional scale.</p> <p>[We suggest providing here a link to the ISA document on Standard and Guidelines for baseline data. This includes data from geophysical, chemical and biological features collected by the contractors and open source data.]</p>
9	222	<p>Determine patterns of connectivity between populations of species important for maintaining ecosystem function and processes, <u>and map connectivity highways</u></p> <p>[We suggest adding a map that shows the main connectivity highways of benthic species, similar to what is proposed under f (p.10, line230).]</p>
9	224	<p><del>Identify and designate, where appropriate, Areas and Sites in Need of Protection and establish processes and methods for the identification and designation of such sites;</del></p>

		<p><u>Establish and implement a process and the needed methods for the identification and designation of AINPs, SINPs. Identify and designate AINPs and SINPs.</u></p> <p>[We suggest rewording as above to follow the logical order.]</p>
9	226	<p>Monitor and assess impacts from activities in the Area <u>and promote development of new monitoring technologies</u></p>
10	227	<p>“develop scientific methodologies for understanding and assessing cumulative environmental impacts”</p> <p>[At the Evora REMP meeting and in subsequent zoom meetings (throughout the summer of 2020), hosted by the ISA, a modeling team and scientific experts worked intensively on “Quantitative modeling for addressing cumulative impact assessment”. We suggest incorporating the findings in the nMAR REMP]</p>
10	229	<p><u>These processes have to be transparent. Scientific findings shall undergo scientific peer-review and published open-access.</u></p> <p>[We suggest adding the two sentences above to address transparency of the scientific methodologies.]</p>
10	237	<p>We support the additional text proposal of Cindy van Dover</p> <p>“§.27.i. Assess ABMT network design options against region-specific goals, including, but not limited to, protection of representative areas, including those that are potentially less impacted by climate change. See Dunn et al. (op. cit.)”</p>
10	246	<p>[We suggest adding the following objectives (as given in ISBA/26/C7):</p> <p><i>m) Identification of natural stressors in the region, including climate change</i></p> <p><i>n) Description of uncertainties</i></p> <p><i>o) Information on human activities and limitations in the region, including Activities in the Area [ of seabed mineral activities, including exploration and exploitation contracts, applications for contracts received, other spatial information from contracted areas, such as preservation reference zones and impact reference zones in the region, Activities in areas beyond the limits of national jurisdiction and in adjacent waters under national jurisdiction [ identified descriptions, designations, management systems or standards by other international organizations or agreements (e.g., Convention on Biological Diversity, Food and Agriculture Organization of the United Nations, regional fisheries management organizations, International Maritime Organization,, International Finance Corporation, regional seas conventions, marine, biological diversity of areas beyond national jurisdiction, ecologically or biologically significant marine areas, traditional marine management areas and measures) relevant to the region], Freedom of the high seas activities [ other legitimate marine uses in the region (e.g., shipping, fishing, laying of submarine cables, marine scientific research projects)], Dumpsites [Identification of underwater munition, weapons, radioactive substances, or other spoil, if applicable], Cultural heritage and interests [any cultural heritage and interests in the region (e.g., sunken ships, fossils, human remains, routes and marine features used by indigenous peoples and local communities for traditional instrument-free navigation)]</i></p>

<p>10</p>	<p>240</p>	<p>“Establish a process for periodically updating environmental baseline data for the region;”</p> <p>[Additional information on who establishes this process, as well as information on the mechanisms to update and review the environmental baseline data for the region should be provided in this REMP.</p> <p>See for example ISBA/26/C/6 on the suggested procedure Review of the regional environmental management plan:</p> <p><i>Annual reporting</i></p> <p><i>Every year, the expert committee, with administrative support from the secretariat, shall provide to the Council a report that summarizes new environmental data from all contractors, as well as new scientific literature data that are relevant to the regional environmental management plan and monitoring data and information. Furthermore, the committee shall provide recommendations as to the implications (if any) of new knowledge and findings for the plan.]</i></p> <p><i>The annual report should be made publicly accessible by the secretariat of the Authority.</i></p> <p><i>If a State member of the Authority or an observer wishes to discuss the outcomes contained in an annual report, they may include the topic in the agenda of the Council at its subsequent session.</i></p> <p><i>Timing</i></p> <p><i>Each regional environmental management plan should undergo a review, at the latest five years after its adoption by Council, or earlier if requested by the Council.</i></p> <p><i>Events that may lead the Council to request an earlier review may include:</i></p> <p><i>(a) Issue of an Authority emergency order that relates to a site within the region;</i></p> <p><i>(b) Request by another organ of the Authority;</i></p> <p><i>(c) Submission of substantial new environmental knowledge or data for the region;</i></p> <p><i>(d) A major environmental change in or affecting the region (e.g., a natural or anthropogenic disaster);</i></p> <p><i>(e) Relinquishment of areas previously under contract within the region;</i></p> <p><i>(f) Submission of a new application for a plan of work for exploitation in the region, when the exploitation would be for a new resource category in the relevant area.</i></p>
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		<p><i>Responsibility</i></p> <p><i>The expert committee leads the review process (taking into account any specific instructions from the Council) and reports on the outcome to the Legal and Technical Commission.</i></p> <p><i>The Legal and Technical Commission considers the review report of the expert committee to satisfy itself that the proper procedure has been followed in the review of the regional environmental management plan, in accordance with any relevant guidelines. The Commission recommends to the Council any proposed amendments regarding the plan and its contents, objectives and measures. In submitting such recommendations to the Council, the Commission should include a rationale for its recommendations and a description of the process followed in conducting the review of the plan.</i></p> <p><i>The Council reviews the amendments recommended by the Legal and Technical Commission and either adopts the revised plan or reverts the recommendations to the Commission for further work.</i></p> <p><i>The Secretariat provides administrative support throughout the regional environmental management plan review process.</i></p>
10	248	[We suggest adding a paragraph to take into account cultural heritage]
10	251	<p>Avoid harmful environmental <u>direct or indirect</u> impacts on any active vent site <u>including its sphere of influence with significant megafauna communities, including loss of vent communities in areas around a potential mine site.</u></p> <p>[We suggest including here all active vent sites, as all active vents classify as SINPs (see p.32).</p> <p>The sphere of vent influence relates to buffer zones (surroundings) around active vent sites and vent fields. These will need to be defined. Please see our comments above.]</p>
10	253	<p>Ensure that sustainability is not compromised due to harmful environmental impacts on vulnerable/sensitive habitats and communities, including <u>inter alia</u> coral gardens and sponge aggregations in the contract area and surrounding areas;</p> <p>[We suggest adding <u>inter alia</u> to not restrict it to coral gardens and sponges aggregations.]</p>
10	256	<p><u>Avoid or minimize</u> harmful environmental impacts on important <u>benthic and pelagic</u> species for the maintenance of ecosystem functioning and integrity.</p> <p>[We suggest adding the term <u>avoid</u>. The term “important species” needs to be defined. We also suggest to include this for both benthic and pelagic species.]</p>

10	258	<p><u>Avoid or minimize</u> Manage harmful environmental impacts to ecologically important sediment, <u>hard substrate, and pelagic</u> systems.</p> <p>[We suggest replacing “managing” with “avoid or minimize”, harmful impacts shall be avoided or minimized. In addition to sediment systems, impacts on hard substrate and pelagic systems shall be avoided/minimized.]</p>
10	258	<p>e) <u>Provide a forecast of the possible effects of various mining scenarios (extent, duration, frequency of exploitation), taking into account cumulative impacts and climate change, potential stress from outside the region, using modeling that follows the best available scientific techniques and comparisons against the baseline).</u></p> <p>[We suggest adding e) above and providing links to relevant ISA documents (e.g. Standard and Guidelines to EIA, EIS)]</p>
10	260	<p>Management measures</p> <p>[In our expert opinion, there should be clauses noting that thresholds for harm need to be described before the REMP will be in place ]</p>
10	261	<p>This REMP recognizes that contractors have security of tenure over contract areas, and any management measures prescribed in the context of this plan will need to take this into account.</p> <p>[It is unclear to what extent the contractors have security of tenure over contract areas. This should be clarified.]</p>
11	270	<p>We support the additional text proposal of Cindy van Dover.</p> <p>Contractors are encouraged to conduct environmental surveys outside their contract areas, in cooperation with the scientific community and in particular <del>these scientists</del> from developing countries. <u>If a mine site is near the boundary of a contract area (within some initially prescribed threshold distance), then it is imperative that all AINPs and SINPs in the adjacency (to some initially prescribed threshold distance) should be mapped.</u></p> <p>[It is unclear how this “encouragement” shall work in practice. This should be clarified before the REMP is operational].</p>
11	272	<p>“This REMP does not include Areas Based Management Tools (ABMTs) identified through the application of network criteria such as representativity and connectivity, based on a regional analysis. It is noted that additional expert discussion led by the LTC will be needed in the future on the application of the network criteria. <u>These must be in place before mining may commence</u>”</p> <p>[We suggest adding the text above. Network criteria need to be developed to make this REMP effective. Before these are in place, a REMP shall not be accepted]</p>
11	276	<p>“It is noted that thresholds are needed for describing the occurrence of vulnerable ecosystem features in the application of the criteria for ABMTs, and for evaluating and controlling the impacts of mining activities. <u>These must be in place before mining may commence</u>”</p>

		[We suggest adding the text above. Thresholds need to be developed to make this REMP effective. Before these are in place, a REMP shall not be accepted.]
11	279	<p>“These thresholds may need to be adaptive <u>starting from the precautionary principle</u>, and likely change as new data and information are collected on the impacts of mining activities....”</p> <p>[We appreciate that currently thresholds are not yet defined, derived or established for deep-sea communities, and therefore an adaptive approach is necessary. However, it is unclear what this means in this context, and especially what the starting point would be. We therefore added the suggested text.]</p>
11	281-282	It would be helpful to clarify what the frequency of the periodic updates of the appropriate parameters and thresholds would be. This could be annually. The text would then read as follows: “Periodic <u>annual</u> updates on appropriate parameters and thresholds will be also needed.”
11	292	<p><u>Based on the outcomes of the workshop (report number and link)</u>, this REMP identifies three AINPs (Kane Fracture Zone, Vema Fracture Zone, and Romanche Fracture Zone System), as listed in Annex 1. <u>More AINPs may be added in a future REMP.</u></p> <p>[We suggest adding the underlined text, to address any future AINPs.]</p>
11	294	<p>In these <del>three</del> AINPs, the following management measures will be applied:</p> <p>[We suggest deleting the term “three” as management measures shall be applied to all AINPs.]</p>
11	303	<p>ISA secretariat should <u>ensure</u>, promote and facilitate collaborative monitoring</p> <p>[We suggest adding the term “ensure”]</p>
12	315	<p><u>More SINPs may be added in a future REMP.</u></p> <p>[We suggest adding the underlined text, to address any future SINPs.]</p>
12	316	<p>The management of SINPs should aim to maintain ecosystem <u>integrity functions, i.e. ecosystem function and species interactions</u>, and associated features from the direct and indirect impacts of exploitation of mineral resources.</p> <p>[We suggest adding the underlined text.]</p>
12	320	<p>Fully respecting the rights and obligations of contractors in the existing contracts for exploration, the following management measures will be applied for the <del>11</del> SINPs.</p> <p>[We suggest deleting the term “11”, as management measures shall be applied to all SINPs including those added in the future.</p> <p>We would like to seek clarification on a definition of “rights and obligations of contractors”, and why this is included for SINPs and not for AINPs.]</p>
12	333	“Contractors may prepare a clear description, through detailed mapping (including physical and biological features), of the different zones (core and buffer) in terms of their areal extent, based on the



		<p>generic guidance developed by the LTC on the zoning scheme, including identification of a set of different zones and the corresponding set of allowed and/or prohibited activities.”</p> <p>[Developing a zoning scheme is a complex task that requires highly specific expertise. We welcome a transparent process on how such zones shall be developed in the future, taking into account best available scientific knowledge.</p> <p>Before zoning schemes for buffers are in place, a REMP shall not be accepted. ]</p>
12	340	Contractors <u>shall</u> report the discovery of new vulnerable or sensitive ecosystems.
12	343	<p>In addition to contractors’ exploration activities, new vulnerable or sensitive ecosystems can also be discovered by scientific communities, which <del>can</del> <u>shall</u> be communicated to the ISA secretariat for review by the LTC;</p> <p>[We suggest adding the term shall, as to date the large majority of SINPs have been discovered by scientists.</p> <p>Although there is currently no legal power to impose obligations on the scientific community, it would be in everybody's interest that whatever discovery is made is communicated to the ISA, who shall take the necessary actions to protect them.]</p>
12	355	<p>The predictions could be based on various methods, including <u>but not limited to</u> the detection of natural hydrothermal plumes (e.g., inferred hydrothermal vents) or habitat modelling (e.g., cold-water, <u>stylasterid, scleractinian and</u> octocorals).</p> <p>[We suggest adding the underlined text.]</p>
13	363	<p><u>More S/A Precaution may be added in a future REMP.</u></p> <p>[We suggest adding the underlined text, taking into account any future S/A Precaution.]</p>
13	368	<p>“In the case of inferred active vents, contractors are encouraged to apply increased survey efforts to validate the existence of active vents.”</p> <p>[Encouraged is a very weak language, as all vents classify as SINPs.</p> <p>We support the additional text proposal of Cindy van Dover.</p> <p><u>§45. A comprehensive/systematic hydrothermal plume survey over an exploitation contract area is required to ensure that ALL active hydrothermal vents (within a certain threshold of detection and threshold distance from a proposed mine site) are located relative to commercial deposits to be extracted. Other types of SINPs and AINPs need to be located relative to commercial deposits as well. Habitat suitability models may provide preliminary indications of where to focus surveys, but locations of all SINPs and AINPs must be validated through visual surveys. Encounters and quantitative measurements</u></p>

		<p><u>(e.g. abundance, diversity, biomass) of indicator species need to be reported.</u></p> <p>References:</p> <p>German, C. R., Baumberger, T., Lilley, M. D., Lupton, J. E., Noble, A. E., Saito, M., ... &amp; Blackman, D. K. (2022). Hydrothermal Exploration of the southern Chile Rise: Sediment-hosted venting at the Chile Triple Junction. <i>Geochemistry, Geophysics, Geosystems</i>, e2021GC010317.</p> <p>Baker, E. T., Resing, J. A., Haymon, R. M., Tunnicliffe, V., Lavelle, J. W., Martinez, F., ... &amp; Nakamura, K. (2016). How many vent fields? New estimates of vent field populations on ocean ridges from precise mapping of hydrothermal discharge locations. <i>Earth and Planetary Science Letters</i>, 449, 186-196.]</p>
13	374	<p>“Contractors planning to undertake exploitation activities in the S/A Precaution should apply a precautionary approach until their status are assessed <u>through validation by surveys.</u>”</p> <p>[We suggest adding the underlined text to clarify what this would entail in practice. ]</p>
13	376	<p>[We suggest inclusion of other management measures as suggested in ISBA/26/C7:</p> <ul style="list-style-type: none"> <li>• <i>Seasonal or temporal restrictions [any seasonal or temporal restrictions that should be applied to seabed mineral activities (e.g., to take into account breeding seasons, migration of cetaceans and other marine species, including culturally significant migratory species).]</i>,</li> <li>• <i>Restrictions of impacts on specific biota [any measures designed to prevent or minimize impacts on specific biota (including, for example, habitats, areas of scientific value and/or interest, areas of cultural, social importance).]</i>,</li> <li>• <i>Measures to deal with potential conflicts with other legitimate uses [The purpose of this section is to address measures to avoid potential conflicts with other legitimate uses, in accordance with article 147 of the Convention and draft regulation 31.]</i></li> </ul>
13	380	<p>“The following non-spatial management measures will be applied at the regional scale (see Figure 1 for the geographical scope of this REMP)”:</p> <p>[We recommend clarifying who will be responsible of those management measures (i. e., the contractors, the ISA, or both). For example, the mitigation measures under para a) could be done by contractors, while the threshold discussed under para c) should be done by the ISA.]</p>
13	385	<p>Monitoring for potential cumulative impacts in the Area to prevent serious harm</p> <p>[We recommend providing detailed guidance to monitoring. Gradient approaches away from point impacts will be critical at site level but cumulative impacts will need a coherent framework within the larger area to assess effects.</p>

		Links to relevant documents (e.g. Draft Guidelines for the Preparation of Environmental Management and Monitoring Plans) shall be provided.]
13	385	<u>b. bis. Monitoring for potential transboundary impacts to prevent serious harm in areas under the jurisdiction of coastal State</u>  [We suggest adding the underlined text to be in line with DR4.]
13	386	“Develop multiple thresholds, which can enable timely detection of where impacts are approaching serious harm. Determining the thresholds for what would be considered “serious harm” can draw on existing frameworks and strategies and benefit from engaging with appropriate experts. The following thresholds together with their indicators and methodology for measuring these thresholds will be developed.”  [We would like to seek clarification on any mechanism to develop the thresholds, and who is responsible to develop those. Also, we want to stress once more that these thresholds must be in place before any mining can commence.  Please provide information on the existing frameworks and strategies referred here.]
13	397	“acceptable deviation from baseline information”  [The meaning of “acceptable deviation from baseline information” should be clarified and defined in detail]
13	400	We support the additional text proposal of Cindy van Dover.  Proposed new section:  <u>§xx.) Active vents and other SINPs, AINPs must be fully mapped within some reasonable distance of the mine site, of PRZs, and, where necessary, outside the exploitation contract area (within a threshold distance from a proposed mine site).</u>
13	400	We support the additional text proposal of Cindy van Dover.  Proposed new section:  <u>§xx.) As part of their environmental baseline requirements, contractors must characterize the biota of hydrothermally inactive sulfide occurrences or metal-rich sediments that are target for exploitation, including characterizing any endemic taxa and identifying representative inactive sulfide occurrences and metal-rich sediments that will be protected from mining impacts.</u>
14	402	On active <u>all</u> active vent sites <del>with significant megafauna communities</del> <u>including the sphere of influence</u> , contractors should ensure active mining plume management as well as monitoring of hydrothermal flows to avoid interruption or disruption to hydrothermal flows upon which vent communities rely;

		[We suggest deleting “significant megafauna communities”. Please see our comments earlier in this document.]
14	405	On vulnerable habitats including coral gardens, sponge aggregations, contractors will monitor any of such habitats likely to be impacted by their activities, including the habitats that lie in the vicinity outside their contract areas;  [The list of vulnerable habitats should be more complete and specific. We suggest that VME habitats from RFMO’s should be applied here]
14	408	On key vulnerable/sensitive species, contractors will monitor <del>significant</del> communities of fauna within contract areas and in surrounding areas likely to be impacted by mining activities.  [We suggest either deleting the term “significant” or adding a definition of “significant communities”.  Further, we note that “significant communities” not only include fauna, but (especially at vents) also microbial communities.]
14	410	[Please add a definition of “key” systems/communities]
14	415	to control exploitation activity to remain within impact thresholds, contractors <del>should</del> <u>must</u> apply the established thresholds <del>and where relevant identify relevant thresholds, e.g. for impact of particulates in plumes</del>  [We suggest replacing “should” with must. The contractor shall not develop and identify thresholds, this shall be the responsibility of the LTC, or any expert body, consulting with scientists]
14	432	Control light on the seabed and from vessels that can attract birds <u>and fishes</u> and disrupt their behavior;  [We suggest rephrasing to include impact of light on species in the water]
14	431	<u>avoid frequencies used by larvae of benthic species as settlement cues</u> ;  [We suggest adding the underlined text, taking into account settlement cues of benthic species].
14	439	“Monitor direct and indirect impacts of mining, <del>including and avoid</del> impacts on subsurface hydrological flow changes, impacts of overburden removal and on key habitats outside contract areas, and potential long-term impacts on biological communities, in order to minimize such impacts;”  [Based on our current scientific understanding and results of the cumulative impact workshop organized by the ISA, any subsurface hydrological flow changes would cause significant harm to active vents (SINPs) and thus has to be avoided.  Monitoring of fluid changes does not avoid impact, as the impact can’t be made unchanged. Please rephrase ]
15	449-524	50.

		<p>[The section lists priorities to collect data and conduct research, and in that sense contributes to implementing (at least partially) some of the region-specific goals and, to some extent, the operational objectives. However, the implementation strategy does not explain how the management measures are to be implemented.</p> <p>We recommend that para 50 is retitled (for example: “Priorities for future monitoring and research”)]</p>
15	492	<p>Habitat mapping and modeling: Habitats will first need to be comprehensively defined and mapped within the region to establish environmental baselines and assess habitat quality, quantity and regional distribution. Habitat models may be developed for the identification of representative habitats. <u>Such models require linkages to water column processes and among habitats.</u></p> <p>[We suggest adding the underlined text to take connectivity of benthic-pelagic systems into account.]</p>
15	498	<p>...and geophysical characteristic of vents fields <u>and other vulnerable habitata</u>, which are necessary for understanding the footprint around which to design buffer zones.</p> <p>[We suggest adding the underlined text]</p>
15	500	<p>Better knowledge of <u>SINPs</u>, AINPs and S/A-Precaution:</p> <p>[We suggest adding SINPs, as these are otherwise not covered.]</p>
15	525	<p>[We suggest to add the following paragraph:</p> <p><u>50 bis. If deemed necessary by scientific evidence, the above-noted list of priorities can be amended to allow for the inclusion of other priorities without having to wait for the official 5-year review discussed under para 57 below. ]</u></p>
15	525	<p>51. In implementing the above-noted priorities, dedicated expert workshops will be organized/facilitated by the ISA secretariat</p> <p>[More detail is needed on the organization of the workshops: we suggest indicating at least the timescales and agents involved ]</p>
15	531	<p>52. DeepData</p> <p>[Not all relevant data for assessment will be within Deep Data. There should be acknowledgement of other regionally relevant data bases (e.g. EMODNet) relevant GOOS data bases (e.g. Argo, Go SHIP, OceanSITES), regional observatories, as well as OBIS. Engagement with science programs (e.g. iAtlantic, AtlantOS) should also be considered.</p> <p>Please see ISBA/26/C/7 on 4.2. Environmental baseline information ]</p>
17	544-554	<p>53. collaboration</p> <p>[We suggest clarifying how this can be achieved/implemented]</p>

17	546	<p>“...with relevant international and regional organizations, contractors, scientific institutions, <del>and</del> the industries, <u>and indigenous communities and others that have cultural/spiritual connection to the environment</u>”</p> <p>[We suggest adding stakeholder groups such as indigenous communities and others that have cultural/spiritual connection to the environment.]</p>
17	567-576	<p><b>Review of the progress in the implementation of the REMP</b></p> <p>[In our expert opinion, the review section is poorly developed. We suggest considering ISBA/26/C/6 section 4.]</p>
32	619-621	<p>[We recommend specifying that if one of the criteria is met, then a site or area is identified as SINP or AINP]</p>
32	620	<p>[Reference to the report of the Evora Workshop (2019) is made for the criteria adopted for SINPs and AINPs from the criteria developed by other component international organizations. In the workshop report, it is mentioned that the list of scientific references in the appendix was prepared without intending to be exhaustive or complete in terms of editorial requirements in view of limited time available during the workshop and post-workshop editorial process. An updated version with all references can be found in:</p> <p>Gollner, S., Colaço, A., Gebruk, A., Halpin, P.N., Higgs, N., Menini, E., Mestre, N.C., Qian, P.Y., Sarrazin, J., Szafranski, K., Van Dover, C.L., 2021. Application of scientific criteria for identifying hydrothermal ecosystems in need of protection. <i>Marine Policy</i> 132, 104641.</p> <p>This additional reference may be included.]</p>