



**CONVENTION ON
MIGRATORY
SPECIES**

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14th MEETING OF THE CONFERENCE OF THE PARTIES
Samarkand, Uzbekistan, 12 – 17 February 2024
Agenda Item 27.2.4

**LETTER FROM THE SECRETARY-GENERAL OF THE INTERNATIONAL SEABED
AUTHORITY**

Summary:

The attached letter was received from the International Seabed Authority on 2 February 2024, with a request to make it available to CMS Parties.

It pertains to UNEP/CMS/COP14/Doc.27.2.4/Rev.1 *Deep-Sea Mining*.



The Secretary-General

1 February 2024

Dear Ms. Fraenkel,

My attention has been drawn to a CMS document and draft decisions prepared by the Secretariat of the Convention on Migratory Species entitled “Deep-Sea Mining” (UNEP/CMS/COP14/DOC.27.2.4/Rev.1) [“CMS Document”]. I understand that this document is to be submitted for consideration to the 14th Meeting of the Conference of the Parties to be held in Samarkand from 12-17 February 2024.

As you will be aware, the regulation of mineral exploration and exploitation in areas beyond national jurisdiction is the remit of the International Seabed Authority (ISA) in accordance with the provisions of the 1982 United Nations Convention on the Law of the Sea and the 1994 Implementation Agreement relating to Part XI of the Convention. In marine areas under national jurisdiction, exploration and exploitation of the continental shelf is a sovereign right of the coastal State.

The CMS Document, which appears to be an initiative of the Secretariat and not a proposal submitted by any member State, purports to describe the potential negative impacts of deep-sea mining on migratory species and their habitats.

I was surprised to learn about this document and even more surprised that at no point was ISA consulted in its preparation, even though the work of the ISA has been referred to several times. More importantly, the document as presented is seriously flawed with significant mistakes revealing a lack of understanding of what deep sea mineral exploration and exploitation entails, or even the difference between exploration within national jurisdiction and exploration beyond national jurisdiction. It contains numerous factual (and legal) errors, misleading statements and erroneous assumptions and lacks substantial scientific foundation. For example, almost half of the references cited are to materials published by anti-deep-seabed mining campaign groups which can lack objective scientific reference, whilst a further four references are to a single (inaccurate) ‘issues brief’ prepared by IUCN which contains statements that conflict with UNCLOS and the 1994 Agreement.

While we wish ISA had been consulted earlier, we stand ready to help correct inaccuracies and share information. We would be pleased to provide you with accurate information about the work of the Authority and our exploration contractors and to refer you to credible, unbiased and independent scientific sources, as well as to inform you about the already extensive system of regulation and guidance on environmental impact assessment and mitigation.

Ms. Amy Fraenkel
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In light of CMS' upcoming meeting this February and wanting to ensure a detailed review of the CMS Document, I requested several internationally renowned and independent experts (with expertise in deep-sea environment and ecosystems, deep-sea sediment plume dynamics and behaviour, deep-sea environmental management and monitoring, environmental impact assessment, marine nature conservation, spatial planning, ecology and conservation and marine mammals) to peer review the CMS Document. The findings of this peer review are attached to this letter. Given the several issues and areas of concern raised by the reviewers, it would seem that the CMS Document cannot be considered a credible basis for decision-making.

As far as the draft resolution attached to your document is concerned, and noting again that this appears to be an initiative of the Secretariat, we are unclear as to the motivation for this proposal. As far as the draft resolution encourages parties to cooperate through the ISA and other relevant international organizations, I can assure you that such cooperation is already taking place at the level of the ISA with the active participation of all member States and many international organizations with relevant mandates. To that extent, operative paragraphs 1, 2, 4 and 5 of the resolution would appear to be redundant.

With respect to operative paragraphs 1 and 3 of the draft resolution, we find it difficult to understand the logic behind the proposition. Ensuring that a species achieves or maintains a favorable conservation status is not the responsibility of one industry or set of human activities alone.

Understanding the effects of deep-sea mining and the possible mitigation for those effects can only ever form only one aspect of achievement or maintenance of species wide Favourable Conservation Status (FCS). As such, our recommendation for operative paragraph 1 would be not to single out deep-sea mining here but include the effects of all ocean activities (with shipping and fisheries being the main ones) in relation to achieving or maintenance of FCS. Operative paragraph 3 appears to make a general proposition which goes far beyond the mandate of the Convention on Migratory Species and should have no place in a technical document. Similar comments would apply to preambular paragraphs 4 and 5, which we would suggest are deleted.

With respect to operative paragraph 2, we further note that the various actions called for in the paragraph are already required by the ISA's rules, regulations and procedures. Again, we fail to understand the motivation for the CMS Secretariat to urge parties to do what they are already required to do and are in fact doing under the regulatory system of the competent international body.

As far as the draft decisions are concerned, we suggest that, as a first step, if the Secretariat of the Convention of the Migratory Species is interested to consider the potential impacts of activities in the international seabed Area on migratory species, the status of knowledge on such impacts, and the status of relevant regulations and guidance on avoiding and mitigating any potential adverse impacts, the Secretariat might want to consult with the Secretariat of the Authority and other independent experts with appropriate expertise and objectivity. In this respect, the Secretariat of the Authority would be pleased to provide you with relevant information.



I further note that it has always been open to the CMS Secretariat, should it wish to do so, to participate as an observer in meetings of the ISA and to contribute to the development of relevant rules and guidance in relation to activities in the Area. Our records show that CMS representatives have yet to attend the meetings of the ISA. Please know we would value CMS' inputs.

I would kindly request that you make this letter and the findings in the attachment available to all the parties and non-parties of the Convention of the Migratory Species through the website where the document of the 14th Conference of the Parties are uploaded but also where needed, by circulating this letter and its attachment to them.

Yours sincerely,

A handwritten signature in black ink, appearing to read "Michael W. Lodge".

Michael W. Lodge

30 January 2024

RE: Review of the Convention on Migratory Species Deep-Sea Mining Document (UNEP/CMS/COP14/Doc.27.2.4/Rev.1, 14 August 2023)

Thank you for reaching out to us to review and provide our thoughts on the above-named document. Whilst the document discusses an important topic, namely the potential negative impacts of deep-sea mining on migratory species, it is equally important that the evidence presented for consideration is supported by best available scientific information. We provide a paragraph-by-paragraph review below, highlighting some of the concerns we have with the document.

Understanding effects on migratory species, whether cetaceans, turtles, or fish, will form an intrinsic part of any application to the ISA for exploration or exploitation consent through the requirement for environmental impact assessment. We note however that exploitation for deep-sea minerals could take many forms, and potentially occur in different environments. This appears not to have been considered to the needed degree in the CMS document. Risks that might exist for cobalt-rich ferromanganese crust mining may not exist for polymetallic nodule or polymetallic sulphide mining, and these differences must be considered in any decision made.

As such, we urge CSM to work together with the ISA through their already established scientific research programmes that aim to ensure that connectivity occurs among scientists and policy-makers on this issue.

Paragraph	Statement Made	Comments
1.	“Deep-sea mining (DSM) is the process of retrieving mineral deposits from the deep seabed – the ocean floor below 200 metres.”	While it is true that the ‘deep-sea’ is defined as any part of the ocean 200 m water depth and deeper, it should be noted that sites of commercial mineral interest (especially polymetallic nodules) occur much deeper than this. For example, polymetallic sulphide deposits are typically located in <u>1,000 to 4,000 m</u> water depth, cobalt-bearing ferromanganese crusts occur at <u><400 to >5,000 m</u> water depth and polymetallic nodules typically occur at <u>4000-6000 m</u> water depth. This is an important point to make as ultra-deep water sites expected to be mainly utilised by deep-sea mining are unlikely to overlap with the depth ranges of migratory species. As an example, for the Clarion-Clipperton Zone, where the majority of seabed mineral exploration is currently occurring, none of the marine mammals, fish, reptiles or birds on the CMS list can physiologically access the depths at which nodule collecting would occur. Overlap could occur only from the depth range to which any of these species inhabit, with the majority of the interaction at the surface or near-surface.
	“DSM is a comparatively new activity”	We note commercial DSM is not yet occurring.
	“Methods and technologies for DSM are evolving, but currently there are typically three main components in DSM: surface (where processing is done), midwater (where sub-surface material is pumped to the surface for processing and waste products returned), and seafloor (where extraction takes place).”	<p>The text here does not describe three main components of DSM, it rather lists three parts of the receiving environment and some (not entirely accurate) potential impacts. The three main components of DSM would be: i. some form of mineral collecting/mining device or devices on the seafloor, ii. some way to transport the minerals from the seafloor to a surface vessel and, iii. a surface vessel to dewater the minerals (if needed) and store the minerals until they are transferred for transshipment to shore.</p> <p>We note that neither processing nor refining will take place offshore/at the surface and so the assumption stated in paragraph 1 suggesting this is incorrect. The minerals will be transported to land for processing and refining. What <i>is</i> done offshore is a process called dewatering, which entails separating the seawater (that was brought up with the minerals) from the minerals. This seawater will need to be discharged offshore, and different entities have different solutions for where this return water would be discharged, including some that have proposed solutions that avoid midwater discharges altogether.</p>

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		<p>It should be noted that this ‘return water’ is likely to be comprised of unwanted seawater, some sediment fines and possibly some mineral fragments.</p> <p>If the document is going to go into this level of detail up front, should the three types of resources (and the depths they are found) also be touched upon?</p>
	<p>“potential impacts are poorly understood.”</p>	<p>This statement is overly simplified. Potential impacts are quite well elaborated now, at least in the Clarion Clipperton Zone, through two recent mining trials and the associated environmental monitoring that accompanied them (for example, please see this report of Professor Thomas Peacock from the Massachusetts Institute of Technology on Global Sea Mineral Resource’s Patania II trial).</p> <p>What is less well understood are the longer-term impacts on biota, geology, etc., but these are nevertheless being studied. For example, the EU project “MiningImpact” has the specific aim to examine and improve understanding of the potential impacts associated with deep-sea mining, including longer term impacts. To date, two phases of MiningImpact have been completed. A third phase is due to begin in 2024.</p> <p>In addition, the UK-funded SMARTEX project aims to provide the critical scientific understanding and evidence-base to reduce risks of deep-sea mining of polymetallic nodules in the Clarion Clipperton Zone.</p>
<p>2.</p>	<p>“There are difficulties in acquiring baseline data for DSM sites due to the complexity of the environment, the inherent characteristics of deep-sea habitats that make research challenging, and the lack of taxonomists to analyse the</p>	<p>These are issues shared by many – if not all – marine environments, not just the deep-sea. However, the point could be made that acquiring baseline data from the deep ocean is not easy, in part because of the costs/equipment involved to access, study, sample it, etc.</p>

Paragraph	Statement Made	Comments
	collected biological samples, evaluate loss of diversity, and describe, identify and record species occurrence.”	
3.	“While the potential negative effects vary across areas and species, there is consistent scarcity of available data for all areas proposed for mining.”	<p>As noted above, we don’t entirely agree with this statement. Some parts of the Clarion-Clipperton Zone, for example, have considerable quantities of data associated with them.</p> <p>Environmental data is becoming publicly available through DeepData, ISA’s database, and the scientific literature. Environmental data upon which any application for exploitation is based would also be publicly available.</p> <p>While baseline studies are very important, so too is understanding the activity that is being proposed, the likelihood of impact(s) arising from that activity, the potential mitigation strategies that will be deployed, and the residual impacts. All of these things need to be assessed during the environmental impact assessment (EIA) process that is required by the International Seabed Authority (ISA).</p> <p>The EIA process culminates in the production of an environmental impact statement (EIS), which is expected to become publicly available for a period of consultation after submission (ISBA/25/C/WP.1 Reg 11(2)).</p> <p>Thus, while not all data/knowledge is yet publicly available to make a decision about a DSM proposal, it should become publicly available through the EIS review process required by the ISA.</p>
	“It is clear, however, that DSM can have a negative impact on migratory species, including cetaceans, sharks and turtles, as well as their habitats and their prey.”	The basis for this statement is not clear. Evidence is needed before including a statement such as this.

Paragraph	Statement Made	Comments
4.	“DSM is predicted to increase due to the growing demand for minerals.”	Commercial DSM does not yet exist. A more appropriate/correct statement would be: “Demand for minerals has resulted in countries and companies searching for mineral supply solutions. Minerals found on the seabed beneath the deep ocean is one of the potential solutions (or sources) being considered.”
	“There are currently no recognized international best practice guidelines for DSM or for mitigating the environmental impacts resulting from DSM.”	While this is true (given the industry doesn’t yet exist), the evolution of standards, best practise guidelines and regulations is a remit of the International Seabed Authority. Exploitation regulations, standards and guidelines have been negotiated for ~10 years. In addition, there are a number of similar industries (or combination of similar industries) where international best practice guidelines do exist, and which can be drawn from.
5.	“In January 2022, ISA published its Draft standard and guidelines for the environmental impact assessment process.”	This is true. In addition, draft standards and/or guidelines for environmental impact statements and environmental management and monitoring plans were also issued for review.
	“However, it is not clear whether these provisions will adequately address potential impacts on marine migratory species.”	The ISA’s Draft guidelines for the establishment of baseline environmental data includes the use of at-sea tracking data from international initiatives to develop understanding of distribution, as well as recommendations for ongoing spatial and temporal recording of presence of species known to have migration routes through the area(s) under consideration for DSM.
	“CMS-listed marine species are highly migratory and therefore particularly susceptible to the adverse impacts of DSM.”	We do not entirely agree with this statement. What needs to be understood is whether there is any potential exposure of CMS-listed marine species to impacts from DSM at the surface and through the water column, the effects of that exposure (if any) to populations or species, and whether or not those effects are significant. As noted before, for the Clarion-Clipperton Zone, where the majority of exploration is currently occurring, none of the marine mammals, fish, reptiles or birds on the CMS list access the depths at which nodule collection would occur. Overlap would occur only from the depth range to which any of these species inhabit, with the majority of the interaction at the surface or near-surface. Furthermore, surface-based mitigation comprises a well-known set of techniques based

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		<p>on agreed attenuation models and threshold values for effects related to noise frequency and loudness.</p> <p>We also note that surface and near-surface effects to CMS species would affect all maritime industries that interact spatially or temporally with any distribution patterns. Decreasing surface effects to CMS species needs to involve a cumulative effort from all marine and maritime industries.</p>
6.	<p>“The network of ocean currents and the migratory patterns of animals connect all corners of the ocean. This connectivity is a key element contributing to ocean health and biodiversity.”</p>	<p>While we agree with the statement made, it is unclear why the authors would use a Fauna & Flora (a publicly anti-DSM NGO) reference for it. Is there a scientific reference that could be used instead?</p>
	<p>“The interconnectedness of the ocean means that impacts on marine life in one area, including from activities such as DSM, can impact other areas.”</p>	<p>While technically true, this should also state that the impacts/effects would likely occur at decreasing scales from the impact area. The same statement would be true for all industries occurring in marine conditions.</p>
7.	<p>“Destruction of benthos and benthic habitats through impacts such as physical destruction, injury or death of marine species in equipment, sediment smothering (i.e., most of the non-target material</p>	<p>The wording “marine species” does not seem reasonable (entire species would not be lost in equipment). We suggest that the word “species” should be replaced by “individuals”.</p> <p>Regarding “most of the non-target material collected during mining is dumped back into the water column” – this is not correct. Most of the non-target material (seafloor sediment) would re-settle and/or be released near the seafloor.</p> <p>Regarding “toxic effects from sedimentation”, it should be noted that there may not be toxic effects (i.e. from</p>

Paragraph	Statement Made	Comments
	collected during mining is dumped back into the water column), toxic effects from sedimentation, underwater noise, and light pollution (and how that might influence foraging and prey) are among the most likely impacts from DSM”	chemicals) and we recommend the words “if present” should be added after “sedimentation”.
	“There will be complete defaunation of the entire mining area”	Images taken after two recent mining trials show some fauna are still present after mining (e.g. see post-trial mining images from the November 2023 NORI webinar).
	“100 per cent mortality of any individuals that are vacuumed up as part of mining operations due to catastrophic damage from moving along several kilometres of pipe, the separation and dewatering processes, and the huge change in pressure from being drawn from the deep sea to the surface and back again”	While it is true that the small (mostly sessile) biota associated with the nodules would be taken up with the nodules, this seems like an unlikely outcome for migratory / most free-swimming species (e.g. the species listed on the CMS site).
	“In the water column, impacts could include displacement and/or mortality of species (e.g., fish).”	The use of the word “species” does not seem correct here and we suggest it is replaced by the word “individuals”. We are also not sure if “displacement of fish” is the right wording – something like “changes in movement patterns” might be more appropriate.

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	<p>“a reduction in foraging success for visual predators as a result of sediment plumes, the bioaccumulation in animals of seabed toxins released into the water column, potential physiological and/or reproductive impacts”</p>	<p>We note that these are listed as impacts, but they are actually effects. Not all of these are guaranteed effects of DSM – there are some assumptions made here that are not facts. Mitigation measures are an essential part of the EIA and consenting processes, and these should also be mentioned here.</p> <p>The words “if any,” should be inserted between “water column,” and “potential”. It is not a given that toxins that have a significant – or even measurable - effect would be released into the water column.</p>
8.	<p>“The current understanding of sediment plume behaviour is primarily limited to near-surface waters, with little information available on mixing behaviour in deeper waters.”</p>	<p>While any knowledge base can always be built upon, this statement, as worded, is not true.</p> <p>Several ISA contractors have installed long-term oceanographic moorings to understand full water column current dynamics, with a particular focus on deep water studies (given that is where the mining operations, should they occur, would take place). Several of these studies have been ongoing for several years (e.g. studies at the BGR, GSR, NORI, etc., ISA exploration contract areas).</p> <p>One of the specific aims of the environmental monitoring of two recent mining trials was to define sediment plume behaviour. Public presentations, peer-reviewed scientific publications and reports are available that cover this topic.</p> <p>There have actually been more studies of the benthic plumes than any potential midwater or surface plumes. Recent studies of benthic plumes have provided substantial insights to support understanding and modelling.</p>
	<p>“research suggests that plumes resulting from waste discharge near the surface, whether intentional or accidental, can be toxic to organisms</p>	<p>There is no reference given for the research mentioned here. No mining waste discharges are expected to occur near the surface. Again, mitigation measures could/should be mentioned.</p> <p>Toxicity studies are ongoing, and while “can” may be true, we note the words “may” or “may not” or “are unlikely to” could also be true.</p>

Paragraph	Statement Made	Comments
	inhabiting these waters.”	
	“Additionally, near-surface plumes may contribute to plankton blooms, leading to the bioaccumulation of harmful toxins in the marine food chain”	No reference is provided for this statement. As far as we are aware, there should be no near surface plumes associated with mining operations.
	“This could affect the movement and migration of species that rely on plankton and fish for sustenance, such as birds, sharks and cetaceans.”	At this stage, there is not enough evidence to suggest that this will be a (significant) issue, or that it is an issue that can’t be mitigated.
	“many marine animals, including whales, turtles and tuna, frequently dive to depths of 1,000 metres or more, which means that they could potentially be exposed to mining waste that is discharged at any point in the water column.”	<p>This statement does not reflect up-to-date understanding of a) proposed deep-sea mining operations, b) sediment plume behaviour.</p> <p>We note that term “mining waste” is used by the authors. The only envisaged mining-related discharges to the water column will be from the dewatering plant. The discharges will contain unwanted seawater and possibly some mineral fragments and sediment fines.</p> <p>For polymetallic nodule projects in the CCZ, it should be noted that the depth of discharge is expected to be much deeper than 1000 m. As far as we are aware, the shallowest depth currently being considered by an ISA contractor is 2000 m (TMC/AllSeas), with some companies aiming for just above the seafloor (GSR).</p> <p>Please also see other responses and references related sediment plumes, throughout this review.</p> <p>Aside: The reference used in the CMS document is from an anti-DSM NGO publication.</p>

Paragraph	Statement Made	Comments
9.	“The impact may not be direct, but the influence of DSM could potentially be felt throughout the entire food web.”	<p>Note: no reference has been provided for this statement.</p> <p>Research into food web impacts is incorporated into the “Draft guidelines for the establishment of baseline environmental data” (ISBA/27/C/11) and is being undertaken by ISA Contractors. It may be worth noting that, at this stage, it is equally true that the influence of DSM “may not be felt” throughout any entire food web.</p>
	“The discharge of wastewater laden with seafloor sediment from production support ships at the surface will exacerbate the situation.”	<p>No reference is provided for this statement.</p> <p>This impact is mentioned earlier in the document, resulting in a double counting of this impact.</p> <p>It is also likely that the wording “wastewater laden with seafloor sediment” is overstating what will happen in commercial operations.</p> <p>For economic as well as environmental reasons, Contractors will aim to leave as much sediment on the seafloor as possible – rather than transport it to the surface and have to deal with it there. Options for mitigation need to be considered.</p>
	“There are concerns among scientists that these particles could disperse over hundreds of kilometres, take an extended period (e.g. weeks to months) to resettle on the seafloor,”	<p>No reference is provided for this statement.</p> <p>It should be noted that a particle is not the same thing as a sediment plume. It is also important to consider whether or not an effect of particles is significant (and it seems extremely unlikely that a particle, or even some particles, could have any significant effect).</p> <p>Monitored field trials conducted in the Clarion Clipperton Zone in 2021 show the sediment plume from the collector stayed close to the seafloor, initially not rising more than ~ 2 m and that most sediment deposited locally. <i>Reference: Munoz-Royo et al., 2022</i></p> <p>Monitored field trials show the horizontal extent of the sediment plume is a few kilometers (with most re-</p>

Paragraph	Statement Made	Comments
		<p>deposition occurring within 2 km). <i>Reference:</i> MiningImpact2</p> <p>The "worst case" scenario of 20 mining operations operating simultaneously is expected to impact 0.3% of the water volume of the CCZ. <i>References:</i> Munoz-Royo et al., 2021; Ouillon et al., 2022.</p>
	<p>“Research shows that even small-scale disturbance events have long-lasting impacts on deep-sea ecosystems, which can take decades to recover, if they recover at all. It is therefore highly probable that commercial-scale mining activities will have a lasting impact on seafloor ecosystems.”</p>	<p>It is important to note that all mineral deposits, whether they are found on land or on the seafloor, form on geological time scales and the environmental effects of extracting them – such as habitat and biota removal – could be long-lasting. As with any mining project, the benefits of obtaining the minerals must outweigh the environmental cost.</p>
<p>10.</p>	<p>“Studies indicate that seafloor mining could cause significant ecological impacts in deep midwaters that stretch from 200 to 5,000 metres in depth.”</p>	<p>Note: there is no reference provided for this statement.</p> <p>An important consideration is that different mineral deposits occur at different depths – this 200 to 5000 m depth definition of “midwater” is not applicable to all resource types.</p> <p>With respect to polymetallic nodules in the CCZ:</p> <p>Monitored field trials conducted in the Clarion Clipperton Zone in 2021 show the sediment plume from the collector stayed close to the seafloor, initially not rising more than ~ 2 m and that most sediment deposited locally. <i>Reference:</i> Munoz-Royo et al., 2022</p> <p>Monitored field trials show the horizontal extent of the sediment plume is a few kilometers (with most re-deposition occurring within 2 km). <i>Reference:</i> MiningImpact2</p>

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		The "worst case" scenario of 20 mining operations operating simultaneously is expected to impact 0.3% of the water volume of the CCZ. <i>References: Munoz-Royo et al., 2021; Ouillon et al., 2022.</i>
	“These ecosystems, which make up over 90 per cent of the biosphere, are vital as they harbour fish biomass that is a hundred times larger than the world’s annual fish catch.”	While this statement might be true, it is misleading to imply that DSM will have significant impacts on all of it. For example, for the Clarion Clipperton Zone, we note that in the "worst case" scenario of 20 mining operations operating simultaneously is expected to impact 0.3% of the water volume of the CCZ. <i>References: Munoz-Royo et al., 2021; Ouillon et al., 2022.</i>
	“Additionally, deep midwater ecosystems link shallow and deep-sea ecosystems and are critical in facilitating carbon transport, nutrient regeneration and the production of harvestable fish stocks”	Note the reference provided is an opinion piece, not a peer-reviewed scientific article. There appears to be a scale issue. The oceans as a whole may do this, but it is important to consider the role the specific areas that may be impacted by DSM play, and if their role is significant.
11.	“Some marine migratory species are prone to accumulating certain human-generated pollutants.”	While this may be true, what is the link to DSM? It is unclear what human-generated pollutants that are prone to being accumulated are being considered. If these are not associated with DSM, is this statement fair to make here?
	“Therefore, seabed toxins released from DSM might accumulate in food webs and have a negative impact on marine mammals and other species.”	This is conjecture. We note toxicity studies (e.g. MiningImpact2) are ongoing which will help elucidate whether or not this is a real concern (at least for CCZ polymetallic nodules).
	“A worst-case scenario could include mortality	The worst-case scenario for migratory species will relate to noise scenarios leading to individual mortality through permanent auditory injury. Other noise impacts, such as

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	<p>and adverse impacts on health, potentially including reduced reproductive performance, all of which are very difficult to estimate and monitor and require baseline and long-term studies.”</p>	<p>temporary auditory injury, disturbance and masking scenarios are considered sub-lethal effects. Understanding how individual injury or disturbance could contribute to wider-scale effects through reduction or change in vital rates is the subject of scientific research.</p> <p>We agree that an environmental baseline for the presence, spatial and temporal distribution of migratory species is needed, and this will be expected by the ISA as part of any application’s Environmental Impact Statement (EIS) and Environmental Management and Monitoring Plan (EMMP). Detail for this is expected to be part of the draft baseline guidelines and the draft Environmental Impact Assessment (EIA) / EIS / EMMP standards and guidelines.</p>
	<p>“These compounds are likely to be a by-product of many mining programmes, as only the desired products are extracted from the mining materials and most (often more than 95 per cent) of the unwanted material is simply returned to the water column.</p>	<p>This statement represents a fundamental misunderstanding of how DSM will work.</p> <p>We note that neither processing nor refining will take place offshore/at the surface. The minerals will be transported to land for processing and refining.</p> <p>The only envisaged mining-related discharges to the water column will be from the dewatering plant (where the minerals are separated from seawater). The discharges will contain unwanted seawater and possibly some mineral fragments and sediment fines.</p>
12	<p>Mining at more than 1,000 metres requires operators to have large-scale pumps and processing units, which are likely to create a great deal of noise under water.</p>	<p>There is no reference for the 1000 m point.</p> <p>Studies involving TMC and GSR technical solutions for polymetallic nodules show that the main source of noise from DSM operations will be from surface vessels. Surface vessels will also be the main source of noise effect for migratory species. Risers will be an additional source of noise, both from any pumping system used and potentially from the noise of mineralised material ascending in the riser.</p> <p>Initial noise modelling suggests that the loudness and frequency of noise being emitted from the riser will not have a significant effect on marine mammals at distances</p>

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		<p>beyond 1km (based on a disturbance threshold of 160 dB re 1 μPa rms) beyond given current globally-accepted noise thresholds (Southall et al, 2019).</p> <p>The ISA has established expert working groups to develop [potentially normative] environmental thresholds, including noise. These have initiated their work and are expected to report back within 2024.</p>
	<p>Furthermore, the activities related to extraction (such as dredging, drilling and scraping), the positioning of mining tools using sonar, the use of pumps in the riser system, submersibles, remotely operated vehicles (ROVs) and autonomous underwater vehicles (AUVs) for propulsion can produce high levels of noise, posing potentially critical effects on migratory marine species and their prey</p>	<p>As with other marine industries, there may be auditory impact to individuals if they are extremely near a source of noise, and if that species is vulnerable to the frequency and the strength of noise being emitted.</p> <p>Again, as with other marine industries, standard mitigation for noise impact will be expected to be in place during all DSM operations, including specialised Marine Mammal Observers being on board as well as 24-hour use of Passive Acoustic Monitoring.</p> <p>There appears to be an error in the language around AUVs. We are unaware of any plan / ability to use AUVs for propulsion. As far as we are aware, the planned use of AUVs is surveying and monitoring.</p>
13.	<p>DSM has recently been highlighted as a major risk to cetaceans as the noise from mining operations (which are expected to continue around the clock) is likely to overlap with the acoustic frequencies that cetaceans use</p>	<p>Note: no reference was provided for this statement.</p> <p>While the issue has rightfully been raised as a concern, research is needed to determine if this will actually be an issue for DSM operations and if it is, the mitigation that can be put in place to reduce the risk to acceptable levels will need to be assessed.</p> <p>While most sounds have a point source, the level or intensity of that sound will attenuate at different distances and depths as the sound travels away from the source. To understand the distance over which this attenuation occurs, thresholds such as those produced by Southall et al (2019)</p>

Paragraph	Statement Made	Comments
		<p>and NMFS (2014), can be compared to results of site-specific sound modelling, which will utilise a variety of environmental parameters such as geographic location, the time of year that the source will be used, physical oceanography, water depth, and properties of the seafloor and sea surface. This comparison provides understanding of how close to a sound source a cetacean can be without potentially manifesting either TTS, PTS, behavioural changes or masking.</p> <p>For marine mammals, analysis of initial noise expectations provided by ISA Contractors suggests that, by far, the majority of potential interactions of cetacean individuals and sound related to potential DSM operations occurs on the ocean surface. Surface vessel sound is the major pressure pathway to be considered in Environmental Impact Assessment and subsequent monitoring requirements. If more than one surface vessel occurs within the limits of impact thresholds, these would also need to be considered cumulatively.</p> <p>The only pathway found in an initial study of vulnerability for either physiological impact or disturbance from potential DSM operations below the surface is that of noise interacting with the auditory range of <i>Z. cavirostris</i>. This species has been known to dive down at least once to 2,992 m (Schorr et al 2014).</p>
	<p>The CCZ has an average depth of 5,500 metres and covers an area of approximately 11,650,000 km². It provides habitat for a variety of cetacean species.</p>	<p>The area provided for the CCZ is not accurate. The ISA's Environmental Management Plan for the Clarion-Clipperton Zone states that it is 4,500,000 km².</p> <p>The CCZ is used by some species of cetaceans, likely mainly for migration.</p> <p>We recommend the words “potential migratory route and/or” be added before the word “habitat”.</p>
<p>14.</p>	<p>Mining operations are likely to introduce large amounts of light to an ecosystem that has evolved in its</p>	<p>This statement may not be true. Seafloor mining operations can use sonar and other means to “see” / navigate. If light is used, it would likely be associated with environmental monitoring practises (in order to allow visual observations and to take photos and videos).</p>

Paragraph	Statement Made	Comments
	absence.	
	<p>The potential effects of the introduction of artificial light into the marine environment will vary across species, but little is known about the actual direct impact on individual animals. Potential consequences include physiological effects such as changes in morphology or neurophysiology, damage to photoreceptors, and significant behavioural change. Additionally, there is a lack of information regarding the visual perception of deep-diving cetaceans and whether they may be impacted by light pollution directly or indirectly through effects on their prey at the surface or at depth</p>	<p>We believe this to all be supposition. Studies need to be done, and the ISA has included light as an important topic within the environmental threshold expert working groups it established in 2023.</p> <p>Light would generally be used at the seafloor, associated with the collector, ROVs and AUVs. As noted above, at least in the CCZ, there are few, if any, migratory species that would encounter that energy source.</p>
15.	<p>“outcomes identified above are likely and expected consequences of DSM operations”</p>	<p>We do not agree there are sufficient grounds to reach this conclusion. At very least, a risk assessment with appropriate experts involved should be conducted prior to making such a statement.</p>

Paragraph	Statement Made	Comments
		<p>Studies are still ongoing, although what we know so far indicates most noise associated with DSM will be associated with vessel operations at the surface, similar to the noise made by shipping and marine scientific research surveys. The issue can be managed through the use of marine mammal observers and mitigating actions taken if a marine mammal is seen.</p> <p>Please see other relevant points made in other sections of this review.</p>
	<p>However, the idea of ‘no net loss’ of biodiversity is viewed as an unattainable goal for DSM, given the delicate and distinct nature of deep-sea ecosystems, restricted technological capabilities to reduce damage, and the substantial dearth of information regarding the ecology and resilience of deep-sea species and habitats.</p>	<p>The reference provided for this statement is from an anti-DSM NGO publication.</p> <p>While this might be a challenging goal (globally and not just for DSM), meaningful discussions and research around this topic, with the relevant experts, needs to be undertaken prior to reaching rigid conclusions. These discussions need to not least define how net loss and net gain can be defined in terms of DSM at a site and regional level.</p> <p>At very least we recommend inserting the words “currently challenging /” before the word “unattainable”.</p>
	<p>It may be possible to develop a range of mitigation strategies to minimize impacts, but such mitigation will only ever be able to mitigate a small proportion of impacts – and to what degree is uncertain.</p>	<p>Meaningful discussions and research around this topic, with the relevant experts and the regulator / inspectorate, needs to be undertaken prior to reaching conclusions.</p> <p>The EIS will provide an understanding of what impacts are expected, which mitigation actions will be taken and what the residual impacts are expected to be. During the consenting process, the regulator will have to decide whether those mitigations are practical and possible and likely to deliver the expected results. Any unmitigated impacts will need to be considered in detail during the consenting process.</p>

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		<p>For nodule provinces, it is generally recognised that establishing a network of “no go zones” / set aside areas is the most appropriate way to ensure ecosystem health and function is maintained at a regional scale. In the Clarion Clipperton Zone, the ISA has established Areas of Particular Environmental Importance (APEIs), which together form a network of 1.9 million km² of protected areas. Contractors also need to create Preservation Reference Zones within their contract areas, and while their initial purpose is monitoring, it is generally agreed that these will become areas protected at least for the life of the exploitation contract.</p> <p>Embedded project mitigation, such as use of Marine Mammal Observers (MMOs) and acceptable methods for waste disposal will be regulated by the ISA and also by the International Maritime Organization (IMO).</p>
16.	What is clear is that impacts from DSM can be felt far from the seafloor mining site, including at both the surface and in the midwater zone.	We suggest the words “What is clear is that” is removed and that the word “can” be replaced with “may”.
	Given these wide-ranging impacts, such operations are much more likely to affect migratory marine species than previously thought.	How so? Where is the previous thought documented?
16. a)	The Sperm Whale (<i>Physeter macrocephalus</i>) and Cuvier’s Beaked Whale (<i>Ziphius cavirostris</i>) possess the ability to dive to extraordinary depths. Cuvier’s	With respect to polymetallic nodule mining in the CCZ: Understanding the likelihood of <i>Z. cavirostris</i> interacting with the seafloor of the CCZ (generally 4,000-5,500 m) would take further scientific study, and consideration of any suggested interaction will require appropriate application of the precautionary principle. For <i>Z. cavirostris</i> in particular, the balance between anatomical studies that suggest that cranial air spaces in Cuvier’s beaked whales could potentially withstand a dive to depths of 3,750-5,000 m (Cranford et al 2008); possible signs of

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	<p>Beaked Whale, for instance, has been recorded at 3,000 metres and can stay underwater for extended periods. It has developed anatomical adaptations that enable it to endure dives of up to 5,000 metres, indicating that it may be capable of accessing areas directly affected by DSM</p>	<p>beaked whale interaction with the seafloor (Marsh et al 2018); and species energetics, which suggest that diving to those depths exceed individuals' aerobic dive limits will need to be considered. Balance of evidence currently suggests that <i>Z. cavirostris</i>'s deepest dives are likely to have been pushing the very outer limit of each animal's physical capabilities, and that any interaction between <i>Z. cavirostris</i> and noise effects from seafloor collectors may be unlikely and must remain hypothetical.</p>
<p>16. b)</p>	<p>The Whale Shark (<i>Rhincodon typus</i>) is listed as 'endangered' on the IUCN Red List, and is also an important focus of ecotourism. Despite being a surface-dwelling species, mining waste discharge could harm their food sources and potentially affect their health and reproduction due to bioaccumulation of toxic metals. Because Whale Sharks have a long life-expectancy and remain in areas with abundant food, there is a risk of sub-lethal impacts from mining discharge.</p>	<p>While this is a reasonable concern to raise (and one we share), it should be mentioned that not all deep seabed mineral sites would interact with whale sharks.</p> <p>For example, it seems that the Pacific Ocean above the CCZ does not provide a suitable habitat and that most whale shark occurrences are in the Atlantic Ocean. Indeed, as far as we are aware, no whale sharks have been sighted above the CCZ. If there is no exposure, then there is no risk.</p>

Paragraph	Statement Made	Comments
16. c)	<p>Like Whale Sharks, Leatherback Turtles (<i>Dermochelys coriacea</i>) could be impacted by waste discharge in shallow waters, which result in nutrient enrichment and metal toxicity. This could, for example, lead to jellyfish blooms that may affect turtle migration behaviour by creating artificial food concentrations. Leatherback Turtles are also at risk of encountering plumes at depths greater than 1,000 metres and bioaccumulating metals released by seabed mining, potentially leading to bio-toxicity</p>	<p>What is the reference for shallow water waste discharge? As far as we know, no operation is planning on shallow water discharge and so the concerns raised here are not realistic.</p> <p>Having said this, this is why the Environmental Impact Assessment (EIA) process exists - to examine issues such as this further. Note that the International Seabed Authority requires an EIA and for an Environmental Impact Statement (EIS), Environmental Management and Monitoring Plan (EMMP) to be submitted as part of an application for exploitation (mining).</p> <p>From what is currently known, it is unlikely that that DSM would have a population scale impact or effect, but this will be assessed further during the EIA process.</p>
17.	<p>The available scientific evidence suggests that the impacts of DSM mining on migratory species and their prey could be extensive and long-lasting, and result in adverse environmental, ecological and</p>	<p>The two references cited are publications made by anti-DSM NGOs. The concerns raised may reflect societal concerns, but not “available scientific evidence”.</p>

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	physiological effects. DSM would impose cumulative pressures on species, habitats and ecosystems, including those in shallower waters	
18.	The 4 th Meeting of the Signatories to the CMS Memorandum of Understanding for the Conservation of Cetaceans and their Habitats in the Pacific Islands Region (PIC MOS4, August 2021) discussed DSM, and agreed that a set of standards for EIA would provide a useful baseline for countries.	<p>The ISA is establishing a set of regulations, standards, guidelines and guidance for EIA. i.e.,:</p> <p>The Mining Code: Standards and Guidelines - International Seabed Authority (isa.org.jm)</p> <ul style="list-style-type: none"> • Draft guidelines for the preparation of environmental impact statements (ISBA/27/C/5) • Draft guidelines for the preparation of Environmental Management and Monitoring Plans (ISBA/27/C/6) • Draft guidelines for the preparation of Environmental Management and Monitoring Plans (ISBA/27/C/6/Corr.1)

Thank you again for the opportunity to comment on this document.

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