CONVENTION ON
MIGRATORY
SPECIES

UNEP/CMS/COP14/Doc.27.2.4/Rev.1

14 August 2023

Original: English

CMS

14th MEETING OF THE CONFERENCE OF THE PARTIES
Samarkand, Uzbekistan, 12 – 17 February 2024
Agenda Item 27.2

DEEP-SEA MINING

(Prepared by the Secretariat)

Summary:

This document describes the potential negative impacts of deep-sea mining on cetaceans and their habitats. The document proposes the adoption of a draft Resolution and draft Decisions.

Rev.1 makes consistent the language in Decisions directed to the Scientific Council.

DEEP-SEA MINING

Background

1.   Deep-sea mining (DSM) is the process of retrieving mineral deposits from the deep seabed – the ocean floor below 200 metres.[1] Mining in shallow water has occurred for decades in various locations and its impacts on marine ecosystems are relatively well understood. In contrast, DSM is a comparatively new activity, and the potential impacts are poorly understood. 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).

2.   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 collected biological samples, evaluate loss of diversity, and describe, identify and record species occurrence.[2] Moreover, scientific knowledge of deep-water species and ecosystems is still relatively thin.

3.   While the potential negative effects vary across areas and species, there is consistent scarcity of available data for all areas proposed for mining. 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.

4.   DSM is predicted to increase due to the growing demand for minerals.[3] There are currently no recognized international best practice guidelines for DSM or for mitigating the environmental impacts resulting from DSM.

5.   The International Seabed Authority (ISA), an autonomous international organization established in 1994 under the United Nations Convention on the Law of the Sea (UNCLOS), is charged with regulating exploration for and exploitation of the seabed and subsoil in areas beyond national jurisdiction. In January 2022, ISA published its *Draft standard and guidelines for the environmental impact assessment process.*[4] The Agreement under UNCLOS on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction[5] (BBNJ treaty), currently under negotiation, relates to both the seabed and biodiversity. The draft treaty includes a section on Environmental Impact Assessments (EIAs). However, it is not clear whether these provisions will adequately address potential impacts on marine migratory species. CMS-listed marine species are highly migratory and therefore particularly susceptible to the adverse impacts of DSM.

6.   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

---

[1] Deep-sea mining. IUCN Issues Brief, May 2022
[2] ISA Briefing Paper 02/2016
[3] Many of the targeted materials such as copper, nickel, aluminium, manganese, zinc, lithium and cobalt are currently mined onshore. The target metals are used in many ways, including for electric car batteries and mobile phone batteries. Some of these materials are also used to address the effects of climate change. There is a high demand for these minerals due to both the depletion of terrestrial deposits and an increased demand attributed to emerging markets, population growth, urbanisation and a growing global middle class. (IUCN Issues Brief, May 2022; Chin & Hari, 2020)
[4] The Mining Code (ISA) > Draft standard and guidelines for the environmental impact assessment process (ISBA/27/C/4)
[5] https://www.un.org/bbnj/

biodiversity.[6] The interconnectedness of the ocean means that impacts on marine life in one area, including from activities such as DSM, can impact other areas.

Potential negative effects of deep-sea mining

7. **Environmental**: 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 collected during mining is dumped back into the water column), toxic effects from sedimentation, loss or alteration of habitats, underwater noise, and light pollution (and how that might influence foraging and prey) are among the most likely impacts from DSM. There will be complete defaunation of the entire mining area and 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. In the water column, impacts could include displacement and/or mortality of species (e.g., fish), 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, oxygen depletion, underwater noise, and the risk of entanglement.

8. The current understanding of sediment plume behaviour is primarily limited to near-surface waters, with little information available on mixing behaviour in deeper waters. While empirical studies on the impacts of waste disposal in deeper waters are lacking, research suggests that plumes resulting from waste discharge near the surface, whether intentional or accidental, can be toxic to organisms inhabiting these waters. Additionally, near-surface plumes may contribute to plankton blooms, leading to the bioaccumulation of harmful toxins in the marine food chain. This could affect the movement and migration of species that rely on plankton and fish for sustenance, such as birds, sharks and cetaceans. It is worth noting that 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.[7]

9. **Ecological**: The impact may not be direct, but the influence of DSM could potentially be felt throughout the entire food web. Deep-sea mining will disturb fine sediments from the seafloor, resulting in the formation of suspended particle plumes around the operation. The discharge of wastewater laden with seafloor sediment from production support ships at the surface will exacerbate the situation. 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, and adversely affect both ecosystems and species of ecological and commercial significance. These plumes may lead to the suffocation of animals, pose harm to filter-feeding species, and hinder visual communication and foraging among aquatic animals.[8] 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 significant and lasting impact on seafloor ecosystems.[9]

---

[6] Fauna & Flora International (2020). An Assessment of the Risks and Impacts of Seabed Mining on Marine Ecosystems
[7] Chin, A. and Hari, K. (2020). Predicting the impacts of mining deep sea polymetallic nodules in the Pacific Ocean: A review of Scientific literature. Deep Sea Mining Campaign and Minin Watch Canada.
[8] Deep-sea mining. IUCN Issues Brief, May 2022.
[9] MIDAS (2016). Managing Impacts of Deep Sea Resource Exploitation. Research Highlights.

10.   Studies indicate that seafloor mining could cause significant ecological impacts in deep midwaters that stretch from 200 to 5,000 metres in depth. 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. 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.[10]

11.   **Physiological**: Some marine migratory species are prone to accumulating certain human-generated pollutants. Therefore, seabed toxins released from DSM might accumulate in food webs and have a negative impact on marine mammals and other species. A worst-case scenario could include mortality 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. The extent and the nature of the impacts of DSM will be affected by the composition of the associated discharges, which will vary according to the targeted minerals and other site-related factors. Water currents and temperature, and the types of species that are present will also mediate impacts. Radioactive compounds and other toxic materials might also be released and bioaccumulate with unknown consequences.[11] 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.

12.   **Noise pollution**: 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. The magnitude and nature of the operations vary, but it would be important to understand what form of mining is employed to estimate the likely impacts of noise. Various sources of noise contribute to the marine acoustic environment, such as active acoustic exploration methods (e.g. sonar and seismic surveys), surface vessels, dynamic positions systems, pumps and machinery, as well as the accompanying transport vessels.[12] 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.[13] Impacts would vary by species, sex, behavioural state and even the time of the year; different underwater noise frequencies would also affect species differently. Likely effects could include displacement, masking of communication and navigation (potentially over very large areas), and temporary or permanent hearing threshold shifts for animals that were too close to the operations.

13.   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. The Clarion-Clipperton Zone (CCZ) could be of particular interest to mining companies aiming to exploit polymetallic nodules. The CCZ has an average depth of 5,500 metres and covers an area of approximately

---

[10] Drazen et al. (2020). Midwater ecosystems must be considered when evaluating environmental risks of deep-sea mining. Proceedings of the National Academy of Sciences, Volume 117, Issue 30
[11] Volz, J.B., Geibert, W., Köhler, D. et al. (2023). Alpha radiation from polymetallic nodules and potential health risks from deep-sea mining. Sci Rep 13, 7985 (2023). https://doi.org/10.1038/s41598-023-33971-w
[12] OceanCare (2021). Deep-sea Mining: A noisy affair. Overview and Recommendations
[13] Ibid.

11,650,000 km^2. It provides a habitat for a variety of cetacean species.[14]

14. **Light pollution:** The deep sea is in complete darkness and animals are highly adapted to that environment. Mining operations are likely to introduce large amounts of light to an ecosystem that has evolved in its absence. 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.[15] 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.[16]

15. While there are still many gaps in our knowledge of the true impacts of DSM, many of the **outcomes identified above are likely and expected consequences of DSM operations**. One of the fundamental gaps in our understanding of deep-sea ecosystems is that we simply do not know what is there – and therefore what we might be losing. 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.[17] 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. The spatial and seasonal distribution and abundance of migratory species are also not well understood in most of the regions where DSM is proposed. Therefore, reliably identifying potential impacts, let alone assessing the potential magnitude of any impacts, will be extremely challenging.

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. Given these wide-ranging impacts, such operations are much more likely to affect migratory marine species than previously thought. Some examples of expected impacts on Appendix I species are described below:

   a) The Sperm Whale (*Physeter macrocephalus*) and Cuvier's Beaked Whale (*Ziphius cavirostris*) possess the ability to dive to extraordinary depths. Cuvier's 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.[18]

   b) The Whale Shark (*Rhincodon typus*) 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.[18]

---

[14] Thompson Kirsten F., Miller Kathryn A., Wacker Jake, Derville Solène, Laing Christopher, Santillo David, Johnston Paul (2023). Urgent assessment needed to evaluate potential impacts on cetaceans from deep seabed mining. Frontiers in Marine Science 10: https://doi.org/10.3389/fmars.2023.1095930
[15] Kochevar, R.E. (1998). Effects of Artificial Light on Deep Sea Organisms: Recommendations for ongoing use of artificial lights on deep sea submersibles
[16] IWDG (2022). Deep Sea Mining: A comprehensive Review. Published by the Irish Whale and Dolphin Group.
[17] Chin, A. and Hari, K. (2020). Predicting the impacts of mining deep sea polymetallic nodules in the Pacific Ocean: A review of Scientific literature. Deep Sea Mining Campaign and Minin Watch Canada, 52 pages.
[18] Ibid.

c) Like Whale Sharks, Leatherback Turtles (*Dermochelys coriacea*) 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.[18]

Discussion and analysis

17. 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 physiological effects. DSM would impose cumulative pressures on species, habitats and ecosystems, including those in shallower waters.[19,20] Given the overall lack of knowledge and the likelihood that impacts on migratory species will only become apparent once they are already very severe, IUCN Resolution 122 (2020) stresses the importance of implementing the precautionary principle and the 'polluter pays' principle, and calls for a moratorium on DSM until certain conditions have been met.[21]

18. The 4th 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. The meeting agreed that there was a need to develop comprehensive EIA guidance, which considers the effects of DSM on cetaceans.[22] The CMS Secretariat was also requested to raise the issue to relevant global forums.

19. The *CMS Family Guidelines on Environmental Impact Assessment (EIA) for Marine Noise-generating Activities*[23] has a section on mining activities. While not exclusively focused on deep-sea ecosystems, the guidelines provide a good framework for the development of appropriate EIA guidance.

Recommended actions

20. The Conference of the Parties is recommended to:

a)   adopt the draft Resolution contained in Annex 1 of this document; and

b)   adopt the draft Decisions contained in Annex 2 of this document.

---

[19] Chin, A. and Hari, K. (2020). Predicting the impacts of mining deep sea polymetallic nodules in the Pacific Ocean: A review of Scientific literature. Deep Sea Mining Campaign and Minin Watch Canada, 52 pages.
[20] Fauna & Flora (2023). Update to 'An assessment of the risks and impacts of seabed mining on marine ecosystems'
[21] IUCN WCC-2020-Res-122 *Protection of deep-ocean ecosystems and biodiversity through a moratorium on seabed mining*
[22] UNEP/CMS/PIC/MOS4/Report, Action Point 13
[22] UNEP/CMS/PIC/MOS4/Report, Action Point 13
[23] UNEP/CMS/Resolution 12.14, Annex 1

ANNEX 1

DRAFT RESOLUTION

DEEP-SEA MINING

Mindful that many CMS-listed marine species are highly migratory and migrate in areas beyond national jurisdiction,

Recalling the objectives and principles of the Convention on the Conservation of Migratory Species of Wild animals (CMS), including Article II (1) and Article III (4),

Noting with concern the potential negative impacts of deep-sea mining on marine ecosystems and species, particularly migratory species and their prey, and that deep-sea mining activities are increasing,

Recognizing the importance of marine migratory species and their prey in maintaining healthy and resilient marine ecosystems, and the critical role of these species in supporting the livelihoods and cultural heritage of local communities,

Acknowledging the need for a precautionary approach in addressing the potential environmental, social and economic impacts of deep-sea mining, in areas beyond national jurisdiction,

Recalling the IUCN World Conservation Congress Resolution 122 *Protection of deep-ocean ecosystems and biodiversity through a moratorium on seabed mining* (WCC-2020-Res-122)*,*

Reaffirming the commitments made in Resolution 12.7 *The Role of Ecological Networks in the Conservation of Migratory Species*, Resolution 12.21 *Climate Change and Migratory Species*, and Resolution 12.26 *Improving Ways of Addressing Connectivity in the Conservation of Migratory Species*,

Further reaffirming the principles of the United Nations Convention on the Law of the Sea (UNCLOS), [and the Agreement under UNCLOS on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction], including the duty to protect and preserve the marine environment, and the need for States to cooperate in the conservation and management of marine resources in areas beyond national jurisdiction,

Noting that the International Seabed Authority (ISA), established in 1982 under UNCLOS, is the organization through which State Parties to UNCLOS organize and control all mineral resources-related activities, and *further noting* that ISA has the mandate to ensure the effective protection of the marine environment from harmful effects that may arise from deep-seabed-related activities,

The Conference of the Parties to the
Convention on the Conservation of Migratory Species of Wild Animals

1. *Confirms* that there is a need to better understand the potential effects of deep-sea mining on migratory marine species and their prey and the ecosystems on which they depend, in order to ensure they achieve and maintain a favourable conservation status;

2.   *Urges* Parties, particularly those with interests in deep-sea mining, to consider the potential impacts of deep-sea mining on migratory species and their prey, and to take precautionary measures to prevent, mitigate and monitor such impacts, in accordance with the best available scientific information and the principles of ecosystem-based management;

3.   *Urges* Parties not to engage in deep-sea mining until sufficient and robust scientific information has been obtained to make informed decisions as to whether deep-sea mining can be undertaken without significant damage to the marine environment and its unique fauna, and if so, under what conditions;

4.   *Encourages* Parties to cooperate with each other and with other relevant organizations, including ISA, UNCLOS, and [the Agreement under UNCLOS on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction], in the development and implementation of regulations, guidelines and management measures for deep-sea mining, to ensure the conservation of marine migratory species and their prey; and

5.   *Calls upon* Parties to enhance their monitoring and research efforts to better understand the impacts of deep-sea mining on migratory species and their prey, and to share the results of such efforts through the CMS Scientific Council and other relevant forums, to support informed decision-making.

ANNEX 2

DRAFT DECISIONS

DEEP-SEA MINING

Directed to Parties

14.AA   Parties are requested to:

a)   Inform the Secretariat by 30 June 2024 of any existing EIA guidance that considers the effects of deep-sea mining on migratory marine species and their prey;

b)   Prioritize national research into the impacts of deep-sea mining on migratory marine species and their prey;

c)   Support the work of the Scientific Council to develop EIA guidance that considers the effects of deep-sea mining on migratory marine species and their prey.

Directed to the Scientific Council

14.BB   The Scientific Council is requested to:

a)   Subject to the availability of external funding, develop a report on the state of knowledge with regard to the potential effects of deep-sea mining on migratory marine species and their prey, identifying gaps that need to be addressed before exploitation could be considered;

b)   Based on the results of the above report, and if deemed necessary, develop comprehensive EIA guidance, which considers the effects of deep-sea mining on migratory marine species and their prey that may be required in addition to any other guidance available including from ISA [and the Agreement under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction];

c)   Report to the Conference of Parties at its 15th meeting on the progress in implementing this decision.

Directed to the Secretariat

14.CC   The Secretariat shall facilitate the development of the Scientific Council report on the state of knowledge with regard to the potential effects of deep-sea mining on migratory marine species and their prey, and, if necessary, the EIA guidance that consider the effects of deep-sea mining on migratory marine species and their prey, subject to availability of external resources.