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Report of the Chair of the Legal and Technical Commission on the work of the Commission at its twenty-sixth session

Review of the implementation of the Environmental Management Plan for the Clarion-Clipperton Zone

Report and recommendations of the Legal and Technical Commission

I. Introduction

1. The present report provides a review of the overall progress in implementing different elements of the environmental management plan for the Clarion-Clipperton Zone, including the effectiveness of the network of areas of particular environmental interest. The report builds on a previous review of the progress made in implementing the environmental management plan for the Clarion-Clipperton Zone by 2016 and further actions to be taken until 2021 (ISBA/22/LTC/12). The report presents further actions to be undertaken after the present review to advance the implementation of the environmental management plan, including the proposed establishment of four additional areas of particular environmental interest to improve the effectiveness of the network of areas of particular environmental interest.

2. The environmental management plan for the Clarion-Clipperton Zone sets out the vision, goals and strategic aims for environmental management in the Clarion-Clipperton Zone, which include, inter alia, adopting a holistic approach to facilitate exploitation of seabed mineral resources in an environmentally responsible manner, maintaining regional biodiversity as well as ecosystem structure and function across the Clarion-Clipperton Zone, and enabling the preservation of representative and unique marine ecosystems. The goals of the environmental management plan for the Clarion-Clipperton Zone include facilitating cooperative research for a better understanding of environmental conditions within the Clarion-Clipperton Zone to inform the adoption of future rules, regulations and procedures.

3. The vision, goals and strategic aims were subsequently reflected in, and implemented within the context of, the strategic plan of the International Seabed Authority for the period 2019–2023 (ISBA/24/A/10), the high-level action plan of the Authority for the period 2019–2023 (ISBA/25/A/15 and ISBA/25/A/15/Corr.1) and

* New dates of the in-person meetings originally scheduled for July 2020.

the action plan of the Authority in support of the United Nations Decade of Ocean Science for Sustainable Development (ISBA/26/A/4), which were adopted by the Assembly in 2018, 2019 and 2020, respectively.

4. Specifically, strategic direction 3.2 of the strategic plan and its corresponding high-level actions on the development, implementation and review of regional environmental management plans are also directly relevant to the implementation and current review of the environmental management plan for the Clarion-Clipperton Zone. Strategic direction 3.3 highlights the commitment of the Authority to facilitating public access to environmental information.

5. In line with strategic direction 4.1 of the strategic plan and its corresponding high-level actions, efforts are to be invested in promoting and encouraging the conduct of marine scientific research with respect to activities in the Area, with particular emphasis on research related to the environmental effects of activities in the Area. Such efforts would contribute to a better understanding of potential environmental impacts that may arise from activities in the Area and support science-informed development, implementation and review of rules, regulations and procedures designed to ensure effective protection of the marine environment in the Clarion-Clipperton Zone.

6. In alignment with the aforementioned strategic directions and corresponding high-level actions, the Action Plan of the International Seabed Authority in support of the United Nations Decade of Ocean Science for Sustainable Development identified six strategic research priorities, which have relevance to the implementation of the environmental management plan for the Clarion-Clipperton Zone. The expected short- and long-term outputs of the Action Plan will contribute to, inter alia, advancing scientific knowledge and enhancing the assessment of biodiversity and ecosystem functions in the Clarion-Clipperton Zone; improving the understanding of potential harmful effects; promoting the development of environment-friendly technologies for activities in the Area, as well as technological innovations for ocean observation and monitoring; and promoting dissemination, exchange and sharing of scientific data and research outputs.

II. Review of the implementation of the environmental management plan for the Clarion-Clipperton Zone

A. Review process

7. The environmental management plan for the Clarion-Clipperton Zone, which is flexible and dynamic in nature, was conceived with the aim of enabling a periodic review of its implementation. Under paragraph 42 of the plan, the Commission is responsible for keeping the areas of particular environmental interest under review and determining their suitability or need for adjustment, particularly as this relates to the number of areas of particular environmental interest and their size and location.

8. Under paragraph 46 of the environmental management plan, it was determined that the plan would be subject to a periodic external review by the Commission every two to five years, as required, and updated at least two years in advance of the end of the plan in 2016.

9. In July 2016, the Commission considered a report prepared by the secretariat (ISBA/22/LTC/12), which referred to the progress made in the implementation of the environmental management plan for the Clarion-Clipperton Zone during 2012–2016 and detailed the further progress expected by 2021, in time for the next review. The report also included the suggestion, based on data collected by contractors, that two

additional areas of particular environmental interest be created to fill spatial gaps in the network of areas of particular environmental interest (para. 19). In its deliberations, the Commission decided to convene a technical workshop to assess the suitability or need for amendment of the areas so as to enable the Commission to be better informed when making a recommendation to the Council of the International Seabed Authority in that regard.

10. At the twenty-second session in July 2016, the Council requested that the workshop to review progress on the implementation of the environmental management plan for the Clarion-Clipperton Zone be convened before the twenty-third session in 2017.

11. In line with this request, the Commission decided to establish a dedicated working group. The working group expressed the view that the current environmental management plan for the Clarion-Clipperton Zone contained two types of area-based planning measures, namely, areas of particular environmental interest outside contract areas, and impact reference zones and preservation reference zones within each contract area. Accordingly, the working group suggested the convening of two separate workshops, one related to areas of particular environmental interest and the other related to the design and implementation criteria for reference zones. The working group considered it important to follow the same scientific approach as outlined in paragraphs 26 to 29 of the environmental management plan for the Clarion-Clipperton Zone, in its assessment of additional areas of particular environmental interest. Since new data were expected from sampling in areas of particular environmental interest by contractors and international scientific programmes, the working group suggested deferring the workshop on areas of particular environmental interest until those new data were available in 2018.

12. During its twenty-fourth session in 2018, the Council took note of the Authority's strategy for the development of regional environmental management plans, as well as the challenges associated with compiling available data and identifying scientific gaps (ISBA/24/C/8, para. 9).

13. Subsequently, during the first part of the twenty-fifth session, the Council considered a programme of work for the implementation of the Authority's strategy for the development of regional environmental management plans for the Area for the period 2019–2020 (ISBA/25/C/13). In line with this programme of work as well as the Assembly's new budgetary programme on regional environmental management plans, an expert workshop was organized to support the review of the environmental management plan for the Clarion-Clipperton Zone in October 2019.

14. Accordingly, in October 2019, an expert workshop on deep Clarion-Clipperton Zone biodiversity synthesis was organized by the Authority, in collaboration with the Deep Clarion-Clipperton Zone Project of the University of Hawaii, in Friday Harbor, United States of America. Its main objectives were (a) to review and analyse recent sea-floor ecosystem data from the Clarion-Clipperton Zone; (b) to synthesize patterns of biodiversity, biogeography, genetic connectivity, ecosystem function and habitat heterogeneity along and across the Clarion-Clipperton Zone; and (c) to assess the representativeness of the existing network of areas of particular environmental interest in relation to contract areas.[1]

15. In February 2020, the Commission was briefed on the outcomes of the Deep Clarion-Clipperton Zone biodiversity synthesis workshop, as summarized in a note by the secretariat (ISBA/26/LTC/2, sect. II). The Commission also held a half-day informal workshop, which included presentations of key results derived from the

[1] The report of the workshop on deep CCZ biodiversity synthesis is available at https://isa.org.jm/files/files/documents/deep_ccz_biodiversity_synthesis_workshop_report_-_final.pdf.

Deep Clarion-Clipperton Zone biodiversity synthesis workshop. Building on these discussions, the Commission acknowledged the need for additional areas of particular environmental interest in the Clarion-Clipperton Zone to improve representativity and address spatial gaps in the existing network of areas of particular environmental interest.

16. At its meetings in July 2020, the Commission continued to make further progress with respect to the review of the implementation of the environmental management plan for the Clarion-Clipperton Zone and, in particular, with respect to the work of the working group of the Legal and Technical Commission encompassing the background and rationale for the establishment of additional areas of particular environmental interest. The Commission decided to continue its work intersessionally, with a view to advancing the preparation of recommendations for consideration by the Council.

B. Review of the implementation of operational aspects of the environmental management plan for the Clarion-Clipperton Zone

17. The review of progress made in the implementation of operational aspects of the environmental management plan for the Clarion-Clipperton Zone, as outlined in sections VI–X of the plan, is summarized in table 1 below. The table includes information on the implementation of actions identified during the last review, held in 2016 (ISBA/22/LTC/12, para. 13).

18. Significant progress has been made in achieving the objectives of the environmental management plan for the Clarion-Clipperton Zone, including through, inter alia, the establishment and review of the network of areas of particular environmental interest, the launch of the International Seabed Authority database DeepData as a central repository of environmental data collected by contractors, the convening of taxonomic standardization workshops and the convening of an expert workshop to support formulation of guidance on the design of impact reference zones and preservation reference zones.

19. It should be noted that the environmental management plan for the Clarion-Clipperton Zone is underpinned by a long-term perspective, and some objectives and priority actions can be implemented as contractors make further progress in their exploration activities and development of environmental management systems, in particular through the transition towards exploitation activities. Accordingly, suggestions on further actions to advance the implementation of the current environmental management plan after the review are also summarized in table 1.

III. Proposed updates to the environmental management plan for the Clarion-Clipperton Zone, in particular with regard to the effectiveness of the network of areas of particular environmental interest

20. A proposal for the establishment of four additional areas of particular environmental interest has been put forward, drawing on the results of the Deep Clarion-Clipperton Zone workshop (as referred to in para. 15 above) and on the intersessional work of the working group of the Commission (see figure III of the annex to the present report). The scientific rationale for selecting the additional areas of particular environmental interest is presented in the annex and examined briefly below. The selection takes into consideration the internationally accepted criteria for

assessing networks of marine protected areas[2] (e.g., representativeness, replication and connectivity).

21. The collation and analysis of available data conducted through the Deep Clarion-Clipperton Zone workshop supported the original design of the network of areas of particular environmental interest, by confirming that the main environmental drivers of biodiversity patterns across the Clarion-Clipperton Zone that were used were appropriate. While biodiversity data available at the workshop were not adequate by themselves to assess the representativity of the network of areas of particular environmental interest, the distribution of key environmental variables could be used to meet the workshop's objectives.

22. A habitat classification analysis was undertaken to identify habitat classes reflecting different combinations of particulate organic carbon fluxes, topography and nodule abundance. This analysis was considered to provide the best summary of available scientific information on the spatial distribution of habitats and biodiversity.

23. The analysis identified 24 habitat classes: 10 are common in areas of particular environmental interest, 6 are underrepresented in areas of particular environmental interest but common in contract/reserved areas and 4 are absent from areas of particular environmental interest. In addition, six habitat classes are not represented or are represented in only one area of particular environmental interest, signifying that replication is limited in the current network. An overview of the geographical distribution and environmental characteristics of the habitat classes is presented in the annex.

24. The results derived from the Deep Clarion-Clipperton Zone workshop showed that connectivity varies between taxa, with a gradient of dispersal and species distributions with distance. The results supported both the current recommended size of areas of particular environmental interest for the hosting of sustainable populations and the need to consider the distance between neighbouring areas of particular environmental interest with a view to improving connectivity between them.

25. The selection of the additional areas of particular environmental interest would allow underrepresented and/or rare habitat classes, primarily in nodule-rich habitats, to be protected in one or multiple areas of particular environmental interest (see annex). Careful placement of additional areas of particular environmental interest would also reduce spatial gaps between neighbouring areas of particular environmental interest, leading to an improved connected network.

26. Thus, the scientific rationale behind the proposed establishment of four additional areas of particular environmental interest lies in the recognition of a need for improvement in representativity, replication and connectivity, which will strengthen the effectiveness of the network of areas of particular environmental interest in the Clarion-Clipperton Zone.

IV. Recommendations

27. In the light of the progress reported in implementing the environmental management plan for the Clarion-Clipperton Zone, including further actions to advance implementation within the context of the current environmental management

[2] See annex II, entitled "Scientific guidance for selecting areas to establish a representative network of marine protected areas, including in open ocean waters and deep-sea habitats", to decision IX/20, entitled "Marine and coastal biodiversity", adopted by the Conference of the Parties to the Convention on Biological Diversity at its ninth meeting, held in Bonn from 19 to 30 May 2008 (UNEP/CBD/COP/9/29, annex I).

plan for the Clarion-Clipperton Zone, as identified in table 1 of the present report, the Commission:

(a) Recommends that the Council take note of the review of the environmental management plan for the Clarion-Clipperton Zone and approve the addition of four areas of particular environmental interest, as described in the annex to the present report, in order to enhance the effectiveness of the network of areas of particular environmental interest;

(b) Requests the secretariat to continue to facilitate the implementation of the environmental management plan for the Clarion-Clipperton Zone, focusing in particular on the further actions identified in table 1.

Table 1
Summary of the review of progress in the implementation of the operational aspects of the environmental management plan for the Clarion-Clipperton Zone

Index	*Objectives/measures in the environmental management plan for the Clarion-Clipperton Zone*		*Status of implementation*	*Further actions*
Operational objectives: entire Clarion-Clipperton Zone (ISBA/17/LTC/7, sect. VI, para. 37)				
O1	Establish periodically updated environmental baseline data for the region	Implemented	International Seabed Authority database DeepData has been developed and was publicly launched in July 2019 as a central repository for data and information on mineral resources and environmental characteristics, submitted by contractors and obtained from their exploration activities. Pursuant to this public launch, environmental data can be made accessible to the public through DeepData (Through the action indicated directly above, a further action identified during the last review as described in ISBA/22/LTC/12, para. 13, was implemented)	Continuous efforts related to data analysis and synthesis are required to identify any gaps in the environmental baseline data in support of undertaking environmental impact assessments and to address them through sampling programmes. Ensuring consistency of data entered in and populating the database with historical data (pre-2016) can improve the utility of DeepData
O2	Undertake cumulative environmental impact assessments as necessary based on exploitation proposals	Not yet applicable	There have been no submissions of an application for exploitation in the Clarion-Clipperton Zone	Undertake an expert workshop or workshops and/or studies to assess cumulative environmental impact assessments in the Clarion-Clipperton Zone, including qualitative modelling approaches, building on experience from those undertaken as part of regional environmental management plan workshops for the northern Mid-Atlantic Ridge and Pacific Northwest regions (Through the action indicated directly above, a further action identified during the last review

Index	*Objectives/measures in the environmental management plan for the Clarion-Clipperton Zone*	*Status of implementation*		*Further actions*
				and described in ISBA/22/LTC/12, para. 13, will be implemented)
O3	Consider the environmental risks to the Clarion-Clipperton Zone posed by technological developments in mining technologies	Not yet applicable	Most contractors are still engaged in the early stages of technological development for mining operations	In addition to actions noted above, promote coordinated research initiatives for an improved understanding of potential risks arising from exploitation activities through in situ and ex situ observation and experimentation. Efforts should continue to ensure that technological developments apply also to mitigation of impacts
	Operational objectives: contract areas (ISBA/17/LTC/7, para. 38)			
O4	Ensure the application of the best available environmental practices and techniques	In progress	This objective has been addressed through the adoption and implementation of relevant regulations, rules and procedures, as well as the environmental policy of the Authority. Through the review of contractors' annual reports and periodic reports, the Commission and the secretariat assess progress in achieving this objective and provide feedback	This objective is to be further addressed through continuous review of annual and periodic reports, as well as the establishment of environmental standards and guidelines, designed to complement the draft regulations for exploitation of mineral resources in the Area. Scientific and technical workshops may be held to bring together experts from certain disciplines, as required
O5	Assemble and disseminate the environmental data collected by contractors for the purposes of impact assessment	Implemented	International Seabed Authority database DeepData has been developed and was publicly launched in July 2019 as a central repository for data and information on mineral resources and environmental characteristics, submitted by the contractors and obtained from their exploration activities. Pursuant to this public launch, environmental data can be made accessible to the public through DeepData	Continuous efforts related to data analysis and synthesis are required to identify gaps in environmental baseline data in support of undertaking environmental impact assessments and to address them through sampling programmes. This may involve regular efforts to synthesize across contractor data sets and evaluate impact

Index	*Objectives/measures in the environmental management plan for the Clarion-Clipperton Zone*		*Status of implementation*	*Further actions*
			Environmental impact assessments have been conducted by two contractors for a collector test in the Clarion-Clipperton Zone. The reports have been made publicly available through the International Seabed Authority website[3] (Through the action indicated directly above, a further action identified during the last review as described in ISBA/22/LTC/12, para. 13, was implemented)	assessment at a regional scale (along the lines of Deep Clarion-Clipperton Zone workshop activities)
O6	Establish guidelines for impact and preservation reference areas	In progress	An International Seabed Authority workshop on the design of impact reference zones and preservation reference zones in the Area was convened in 2017. The Commission addressed the results of that workshop in its revision of recommendation ISBA/19/LTC/8 (see ISBA/24/C/9, para. 15), which was issued as document ISBA/25/LTC/6/Rev.1 and Corr.1. International Seabed Authority Technical Study No. 21 and Briefing Paper 02/2018, both on that subject, have been published (Through the action indicated directly above, a further action identified during the last review as described in ISBA/22/LTC/12, para. 13, is being implemented)	Drawing on the results of the 2017 workshop, and the plans of contractors to establish areas for impact reference zones and preservation reference zones, guidelines need to be developed, through collaboration with contractors and scientific experts, in order to ensure the effective establishment and scientifically robust design of those reference zones and their specific application to environmental impact assessment, taking into account revised recommendation ISBA/25/LTC/6/Rev.1 and Corr.1
O7	Develop plans to ensure responsible environmental management to enhance the recovery of habitats and faunal communities	Not yet applicable	There have been no submissions of an application for exploitation in the Clarion-Clipperton Zone	This objective is to be considered before contractors apply for exploitation contracts, possibly within the context of developing environmental management and monitoring plans and/or closure plans

[3] See www.isa.org.jm/minerals/environmental-impact-assessments.

Index	*Objectives/measures in the environmental management plan for the Clarion-Clipperton Zone*	*Status of implementation*	*Further actions*
			(Through the action indicated above, a further action identified during the last review, as described in ISBA/22/LTC/12, para. 13, will be implemented)
	Operational objectives: areas of particular environmental interest (ISBA/17/LTC/7, para. 39)		
O8	Protect biodiversity and ecosystem structure and function by a system of representative sea-floor areas closed to mining activities. The system must be in place before additional mining claims further compromise the ability to develop a scientifically robust design	Implemented	The network of areas of particular environmental interest is in place and is being further developed in the light of new data and information available	Additional areas of particular environmental interest are recommended in this document with a view to enhancing the effectiveness of the network of areas of particular environmental interest
O9	Include a wide range of the habitat types present in the Clarion-Clipperton Zone within the areas of particular environmental interest	Implemented	The Deep Clarion-Clipperton Zone biodiversity synthesis workshop (October 2019) conducted a comprehensive scientific synthesis of available data and information and a review of the effectiveness of the current network of areas of particular environmental interest. Details are included in the annex to the present document	Establishment of additional areas of particular environmental interest is recommended in this document to increase representation of habitat types with a view to enhancing the effectiveness of the network of areas of particular environmental interest
O10	Establish an area of particular environmental interest system to avoid overlap with the current distribution of claimant and reserved areas	Implemented	None of the existing areas of particular environmental interest overlap with existing contract and reserved areas	
O11	Provide a degree of certainty to existing and prospective contractors by laying out the location of areas closed to mining activities	Implemented	The locations of existing areas of particular environmental interest are clearly laid out in the Plan. In accordance with a decision of the Council (ISBA/18/C/22), until further review of the areas of particular environmental interest by the Commission or the Council, no application for a plan of work for exploration or exploitation in the	

Index	*Objectives/measures in the environmental management plan for the Clarion-Clipperton Zone*	*Status of implementation*	*Further actions*	
		existing areas of particular environmental interest should be granted		
	Management objectives: entire Clarion-Clipperton Zone (ISBA/17/LTC/7, sect. VII, para. 40)			
M1	Collate information from environmental impact assessments produced by contractors and supplemented where appropriate by other sources	Implemented	(Same as O5) International Seabed Authority database DeepData has been developed and was publicly launched in July 2019 as a central repository for data and information on mineral resources and environmental characteristics submitted by contractors and obtained from their exploration activities. Pursuant to this public launch, environmental data can be made accessible to the public through DeepData Environmental impact assessments have been conducted by two contractors for a collector test in the Clarion-Clipperton Zone. The reports have been made publicly available via the International Seabed Authority website[4]	Continuous efforts related to data analysis and synthesis are required to identify any gaps in the environmental baseline data in support of undertaking environmental impact assessments and to address them through sampling programmes. This may involve regular efforts to synthesize across contractor data sets and evaluate impact assessment at a regional scale (along the lines of Deep Clarion-Clipperton Zone workshop activities)
M2	Consider the cumulative impacts of mining and other human activities	Not yet applicable	(Same as O2) There have been no submissions of an application for exploitation in the Clarion-Clipperton Zone	Undertake an expert workshop or workshops and/or studies to assess cumulative environmental impact assessments in the Clarion-Clipperton Zone, including qualitative modelling approaches, building on experience from those undertaken as part of regional environmental management plan workshops for the northern Mid-Atlantic Ridge and Pacific Northwest regions

[4] See www.isa.org.jm/minerals/environmental-impact-assessments.

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				(Through the action indicated above, a further action identified during the last review, as described in document ISBA/22/LTC/12, para. 13, will be implemented)
M3	Exchange information on new and developing technologies and their potential environmental impacts	Not yet applicable	(Same as O3) Most contractors are still engaged in the early stages of technological development for mining operations	(Same as O3) In addition to actions noted above, promote a coordinated research initiative for improved understanding of potential risks from exploitation activities through in situ and ex situ observation and experimentation. Efforts should continue to ensure that technological developments apply also to mitigation of impacts
	Management objectives: contract areas (ISBA/17/LTC/7, sect. VII, para. 41)			
M4	Contractors will apply the principles of ISO 14001 to the development of their site-specific environmental management plans	Not yet applicable	There have been no submissions of an application for exploitation in the Clarion-Clipperton Zone	This objective is to be addressed through the implementation of environmental standards and guidelines, currently being developed and designed to complement the draft regulations for the exploitation of mineral resources, with those standards and/or guidelines being developed, in particular, for baseline data collection, environmental impact assessments, environmental impact statements, environmental management and monitoring plans, and environmental management systems (Through the action indicated above, a further action identified

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				during the last review, as described in document ISBA/22/LTC/12, para. 13, will be implemented)
M5	Contractors will provide their environmental data from the Clarion-Clipperton Zone on an annual basis to the secretariat, as required by the Mining Code. The secretariat will use existing database systems and new procedures as required to organize the data into uniform formats and incorporate them with other available data from the Zone, into publicly available and easily accessible databases	Implemented	(same as O1) International Seabed Authority database DeepData has been developed and was publicly launched in July 2019 as a central repository for data and information on mineral resources and environmental characteristics, submitted by contractors and obtained from their exploration activities. Pursuant to this public launch, environmental data can be made accessible to the public through DeepData (Through the action indicated directly above, a further action identified during the last review, as described in ISBA/22/LTC/12, para. 13, was implemented)	(same as O1) Continuous efforts related to data analysis and synthesis are required to identify any gaps in the environmental baseline data in support of undertaking environmental impact assessments, and to address them through sampling programmes. Ensuring consistency of data entered in and populating the database with historical data (pre-2016) can improve the utility of DeepData
M6	Contractors will provide in their environmental management plans the designation of the required impact and preservation reference zones for the primary purposes of ensuring preservation and facilitating monitoring of biological communities impacted by mining activities	In progress	The annual reports and five-year periodic review reports submitted by contractors indicate that they are at various stages of the process of establishing impact and preservation reference zones. The reference zones are in general established for the purposes of environmental impact assessments associated with the testing of mining equipment. While some contractors have established such reference zones on a preliminary basis, with adjustments to be made based on further baseline data, others have not established such zones	(Same as O6) Drawing on the results of the 2017 workshop, and the plans of contractors to establish areas for impact and preservation reference zones, guidelines need to be developed, through collaboration with contractors and scientific experts, in order to ensure the effective establishment and scientifically robust design of those reference zones and their specific application for environmental impact assessment, taking into account revised recommendation ISBA/25/LTC/6/Rev.1 and Corr.1 (Through the action indicated above, a further action identified

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			during the last review, as described in ISBA/22/LTC/12 para. 13, is being implemented)
M7	Contractors are required to minimize potential impacts on established preservation zones, and the International Seabed Authority should consider the potential for impact on established preservation zones in evaluating any application for a mining licence	Not yet applicable	There have been no submissions of an application for exploitation in the Clarion-Clipperton Zone	Potential impacts on established preservation reference zones that are likely to arise from future exploitation activities will vary from one application to another. Accordingly, these impacts will need to be evaluated on a case-by-case basis
M8	Contractors are encouraged to collaborate with each other and independent experts to identify guidelines for uniform application in the designation of reference zones under the guidance of the International Seabed Authority	In progress	(same as O6) An International Seabed Authority workshop on the design of impact reference zones and preservation reference zones in the Area was convened in 2017. The Commission addressed the results of this workshop in its revision of recommendation ISBA/19/LTC/8 (see ISBA/24/C/9, para. 15), which was issued as ISBA/25/LTC/6/Rev.1 and Corr.1. International Seabed Authority Technical Study No. 21 and Briefing Paper 02/2018, both on this subject, have been published (Through the action indicated directly above, a further action identified during the last review, as described in, ISBA/22/LTC/12, para. 13, is being implemented)	(Same as O6) Drawing on the results of the 2017 workshop, and the plans of contractors to establish areas for impact reference zones and preservation reference zones, guidelines need to be developed, through collaboration with contractors and scientific experts, in order to ensure the effective establishment and scientifically robust design of these reference zones and their specific application for environmental impact assessment, taking into account revised recommendation ISBA/25/LTC/6/Rev.1 and Corr.1
M9	Contractors will include in their environmental management plans specific measures that will maximize the potential for the recovery of biota impacted by their activities in the Clarion-Clipperton Zone	Not yet applicable	(same as O7) There have been no submissions of an application for exploitation in the Clarion-Clipperton Zone	(Same as O7) This objective is to be considered when contractors initiate exploitation activities, possibly within the context of developing environmental management and

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				monitoring plans, as well as closure plans (Through the action indicated above, a further action identified during the last review, as described in ISBA/22/LTC/12, para. 13, will be implemented)
	Management objectives: areas of particular environmental interest (ISBA/17/LTC/7, sect. VII, para. 42)			
M10	The Legal and Technical Commission should keep under review the areas of particular environmental interest and determine their suitability or need for amendment. This will involve holding a workshop of scientific/marine reserve/ management specialists to peer-review and critique the existing proposal and any new data and information from the contractors	Implemented	(Same as O9) The Deep Clarion-Clipperton Zone biodiversity synthesis workshop (October 2019) conducted a comprehensive scientific synthesis of available data and information and a review of the effectiveness of the current network of areas of particular environmental interest. Details are included in the annex to the present document (Through the action indicated directly above, a further action identified during the last review, as described in ISBA/22/LTC/12, para. 13, was implemented)	(Same as O9) Establishment of additional areas of particular environmental interest is recommended in this document, with a view to enhancing the effectiveness of the network of areas of particular environmental interest
	Implementation (ISBA/17/LTC/7, sect. VIII, paras. 44–45)			
I1	The present Environmental Management Plan should be implemented progressively by the secretariat as directed by the Legal and Technical Commission, taking into account external expert views as appropriate. Additional resources may be needed to take these objectives forward and this should be the subject of a separate detailed proposal to be developed by the secretariat	Implemented	The Plan has been implemented progressively by the secretariat as directed by the Commission. Since 2019, a dedicated annual budget has been allocated to support the development and review of regional environmental management plans	Implementation of further actions identified in the present table can continue to be facilitated by the secretariat in consultation with the Commission, subject to the availability of the necessary financial resources

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	Review (ISBA/17/LTC/7, sect. IX, para. 46)			
R1	The Environmental Management Plan will be subject to periodic external review by the Legal and Technical Commission (every two to five years, as required) and updated at least two years in advance of the end of the plan in 2016 (coinciding with the end of currently granted exploration licences for six of the contractors in the Clarion-Clipperton Zone)	In progress	The Commission has carried out a review of progress in the implementation of the environmental management plan for the Clarion-Clipperton Zone, and formulated recommendations on the establishment of additional areas of particular environmental interest, as summarized in section IV of the present review	In future, the Commission will continue to review the implementation of the environmental management plan for the Clarion-Clipperton Zone every two to five years
	Recommended priority action (ISBA/17/LTC/7, sect. X, paras. 47–52)			
P1	The secretariat will set up a working group or an expert consultant group, including contractor experts, to facilitate the establishment of environmental databases using contractors and selected external data sources. That task should be initiated as soon as possible and before the end of 2011. The group will work with secretariat staff to develop the required procedures and protocols and publicly available and easily accessible databases	Implemented	(same as O1 and M5) The International Seabed Authority database DeepData has been developed and was publicly launched in July 2019 as a central repository for data and information on mineral resources and environmental characteristics, submitted by contractors and obtained from their exploration activities. Pursuant to this public launch, environmental data can be made accessible to the public through DeepData The collation and dissemination of environmental data obtained from contractors have been achieved through DeepData Reporting templates (see ISBA/21/LTC/15, annex IV) have been adopted for collection and organization of digital data in a coherent format. The templates are currently being updated In September 2020, the secretariat convened a workshop on DeepData – with the	(same as O1 and M5) Continuous efforts will be made to improve the functionalities and structure of DeepData, as a comprehensive global repository of data submitted by contractors based on their exploration and any future exploitation activities

Index	*Objectives/measures in the environmental management plan for the Clarion-Clipperton Zone*		*Status of implementation*	*Further actions*
			participation of members of the Legal and Technical Commission, contractors and various other stakeholders – which addressed aspects of digital data submission to the International Seabed Authority and exchange of non-confidential data with other ocean-related global databases. The outcomes of the workshop are being incorporated in the data management strategy that is currently being finalized by the International Seabed Authority (Through the action indicated above, a further action identified during the last review, as described in ISBA/22/LTC/12, para. 13, was implemented)	
P2	The contractors have carried out significant environmental work in the Clarion-Clipperton Zone. When all of the resultant data have been standardized in a central database, it should be reviewed in order to assess the biogeography of the Zone and the areas of particular environmental interest, and used to assist in the environmental management of the region	Implemented	Environmental data submitted by the contractors were analysed and synthesized for the workshop on Deep Clarion-Clipperton Zone biodiversity synthesis to support the assessment of the effectiveness of the network of areas of particular environmental interest. The data collected by contractors are compiled on a continuous basis in the International Seabed Authority DeepData database	Develop region-wide programmes on habitat classification and mapping, including in areas of particular environmental interest, for continued review and assessment of biogeography in the Clarion-Clipperton Zone, including the validation of habitat classification as presented in the annex to the present report. Contractors will be encouraged to sample to a greater extent in areas of particular environmental interest, and meetings will be set up to enable discussion of the development of a robust sampling programme in areas of particular environmental interest
P3	The secretariat will retain a set of expert consultants to facilitate data standardization, including taxonomic	Implemented	A series of taxonomic standardization workshops were convened: on megafauna in Wilhelmshaven, Germany (2013); on	Efforts have also been initiated to further standardize taxonomic data in DeepData through collaboration

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	intercalibration, across contractor data sets and the Clarion-Clipperton Zone		macrofauna in Uljin-gun, Republic of Korea (2014); and on meiofauna in Ghent, Belgium (2015). The outcomes of the workshop held in the Republic of Korea were published in International Seabed Authority Technical Study No. 13 and Briefing Paper 01/2015 and the outcomes of the workshop held in Germany were published in Briefing Paper 02/2014 In September 2020, the secretariat convened an online workshop on deep-sea taxonomic standardization aimed at addressing taxonomic knowledge gaps in a scientifically robust, coherent and collaborative manner. The outcomes have been published in the report of the workshop[5] (Through the action indicated above, a further action identified during the last review, as described in ISBA/22/LTC/12, para. 13, was implemented)	with the World Register of Marine Species. Drawing on the outcomes of the workshop on Deep Sea Taxonomic Standardization, a road map towards building a long-term collaborative framework for deep-sea taxonomists will be prepared and implemented
P4	The secretariat will host a workshop including contractor representatives and expert consultants. The objective of the workshop will be to develop specific guidelines for use by contractors in establishing impact and preservation reference zones	In progress	(Same as O6) An International Seabed Authority workshop on the design of in the Area was convened in 2017. The Commission addressed the results of this workshop in its revision of recommendation ISBA/19/LTC/8 (see ISBA/24/C/9, para. 15), which was issued as document ISBA/25/LTC/6/Rev.1 and Corr.1. ISA Technical Study No. 21 and Briefing Paper 02/2018, both on this subject, have been published (Through the action indicated directly above, a further action identified during the last	(Same as O6) Drawing on the results of the 2017 workshop, and the plans of contractors to establish areas for impact reference zones and preservation reference zones, guidelines need to be developed, through collaboration with contractors and scientific experts, in order to ensure the effective establishment and scientifically robust design of those reference zones and their specific application for environmental impact assessment, taking into account

[5] Available at https://isa.org.jm/files/files/documents/WS%20Report_Taxonomic%20Standardization.pdf.

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			review, as described in, ISBA/22/LTC/12, para. 13, is being implemented)	revised recommendation ISBA/25/LTC/6/Rev.1 and Corr.1
P5	The secretariat will complete a cumulative impact assessment for seabed mining in the Clarion-Clipperton Zone	Not yet applicable	There have been no submissions of an application for exploitation in the Clarion-Clipperton Zone	(Same as O2) Undertake an expert workshop or workshops and/or studies to assess cumulative environmental impact assessments in the Clarion-Clipperton Zone, including qualitative modelling approaches, building on experience from those undertaken as part of regional environmental management plan workshops for the northern Mid-Atlantic Ridge and Pacific Northwest regions (Through the action indicated directly above, a further action identified during the last review, as described in ISBA/22/LTC/12, para. 13, will be implemented)
P6	The International Seabed Authority will aim to periodically (for example, every 5 to 10 years) issue a publicly available environmental quality status report for the region, based on the data and information compiled from contractors and independent science	In progress	International Seabed Authority database DeepData has been developed and was publicly launched in July 2019 as a central repository for data and information on mineral resources and environmental characteristics submitted by contractors and obtained from their exploration activities. Pursuant to this public launch, environmental data can be made accessible to the public through DeepData The collation and dissemination of environmental data obtained from contractors have been achieved through International Seabed Authority database DeepData	Guidance by the Commission is needed on the contents and format of environmental quality status reports as well as on how data analysis and synthesis can be conducted for this purpose (Through the action indicated above, a further action identified during the last review, as described in ISBA/22/LTC/12, para. 13, is being implemented)

Annex

Scientific rationale for the establishment of four additional areas of particular environmental interest (APEIs) proposed to enhance the effectiveness of the network of areas of particular environmental interest in the Clarion-Clipperton Zone

1. Within the context of the review of the implementation of the environmental management plan for the Clarion-Clipperton Zone (see sect. II.A, paras. 7–10, above), the workshop on Deep Clarion-Clipperton Zone biodiversity synthesis[1] focused on analysing available data to evaluate the current understanding of biodiversity patterns and trends across the Clarion-Clipperton Zone. The outcomes were submitted to the Commission in document ISBA/26/LTC/2 and discussed by the Commission during its meetings (see paras. 15–16 above). The discussions centred on addressing the effectiveness of the current network of areas of particular environmental interest in the Clarion-Clipperton Zone and consideration of the need to establish additional areas of particular environmental interest so as to close some gaps in the existing network. In particular, consideration was given to the siting of new areas of particular environmental interest to ensure the effective protection of representative habitats. Key scientific conclusions from the workshop include the following:

(a) The main environmental drivers of biodiversity patterns support the variables used in the original design of the network of areas of particular environmental interest, namely, particulate organic carbon (i.e., a measure of food availability); depth; topography (abyssal plain or seamount); and substrate (nodule or sediment). This confirms the scientific approach (which divides the Clarion-Clipperton Zone into nine particulate organic carbon zones), applied previously in the context of designing the location of areas of particular environmental interest with a view to capturing habitat representativity. This also supports the inclusion of seamounts and abyssal hills in areas of particular environmental interest;

(b) There is a predominance of localized distributions among taxa in the Clarion-Clipperton Zone and many species may have ranges of less than 200 kilometres (km). The full size of the areas of particular environmental interest (160,000 km^2), as specified in environmental management plan for the Clarion-Clipperton Zone (including a core area measuring 200 km in length by 200 km in width surrounded by a 100 km buffer zone) (see ISBA/17/LTC/7, para. 25), is appropriate for maintaining populations and preserving local biodiversity in such areas. However, as coverage of areas of particular environmental interest is restricted to the outer perimeter of the Clarion-Clipperton Zone, the biodiversity of the central regions is inadequately represented;

(c) Connectivity varies between taxa, with a gradient of connectivity over distances ranging from 10s km to 1000s km. The concept of a linked network is accepted as the basis for current best practice for designing marine protected areas but there is no single “optimal” spacing of areas of particular environmental interest to ensure connectivity between them.

2. An assessment of the distribution of environmental factors and their coverage within areas of particular environmental interest was part of the data compilation and synthesis process undertaken by the Deep Clarion-Clipperton Zone workshop. A description of those environmental factors and an evaluation of the representativity of each factor in areas of particular environmental interest have since been published

[1] See International Seabed Authority, *Report of the Deep CCZ Biodiversity Synthesis Workshop, Friday Harbor, Washington, United States of America, 1–4 October* 2019 (2020).

by Washburn and others (2021).[2] From their work, the following relevant conclusions were drawn:

(a) Near-bottom water characteristics (water mass, oceanographic parameters, water chemistry) are relatively consistent across the Clarion-Clipperton Zone;

(b) Particulate organic carbon fluxes, nodule abundance, sediment characteristics, depth and topography vary between Clarion-Clipperton Zone subregions (the nine particulate organic carbon zones) and their areas of particular environmental interest;

(c) Much of the environmental variability in northern and southern parts of the Clarion-Clipperton Zone is captured in the areas of particular environmental interest, but central and south-east areas are not well represented in the current nine areas of particular environmental interest.

3. The Deep Clarion-Clipperton Zone workshop developed a habitat classification analysis (subsequently published in McQuaid and others, (2020)[3]) which combined data on the distribution of the agreed main environmental drivers of biodiversity in the region. The variables used were:

(a) Topography (seamounts-ridges/abyssal plain) (based on General Bathymetric Chart of the Oceans (GEBCO)_2014 and ArcGIS Benthic Terrain Modeler analysis);

(b) Particulate organic carbon (based on a global model of particulate organic carbon at the seabed from Lutz and others, 2007);

(c) Nodule abundance (kilograms per square kilometre) (substrate composition: soft to hard) (based on International Seabed Authority geological model 2010, with some additional data provided by Charles Morgan).

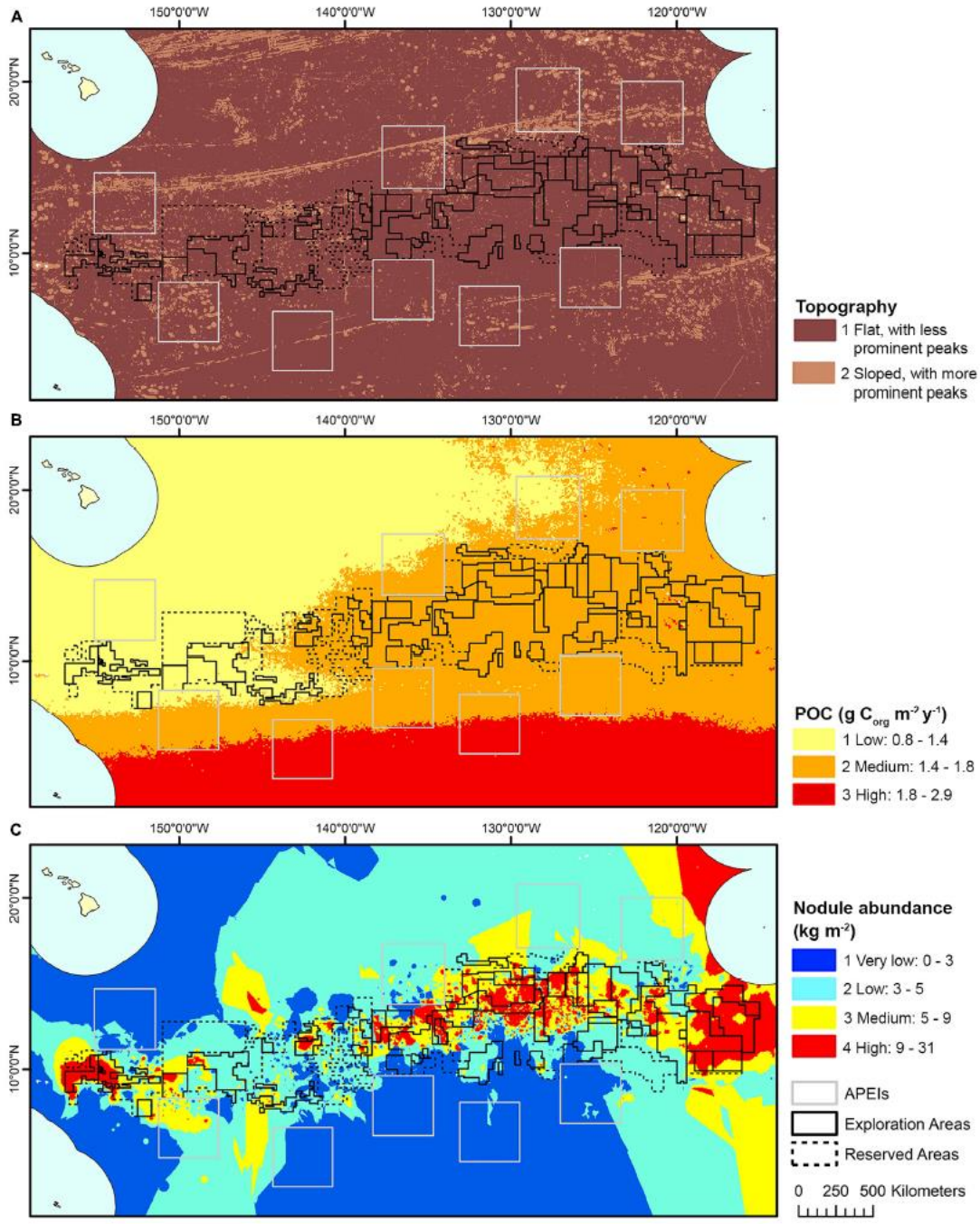
4. The data were run through a clustering technique to evaluate the “optimal” number of categories within each variable. The distributions of each environmental variable and its categories are shown in figure I.

[2] Travis W. Washburn and others, “Environmental heterogeneity throughout the Clarion-Clipperton Zone and the potential representativity of the APEI network”, *Frontiers in Marine Science*, vol. 8 (30 March 2021), p. 319.

[3] Kirsty A. McQuaid and others, “Using habitat classification to assess representativity of a protected area network in a large, data-poor area targeted for deep-sea mining”, *Frontiers in Marine Science*, vol. 7 (9 December 2020), p. 1066.

Figure I

Data layers for topography, particulate organic carbon and nodule abundance used in classification modelling (from McQuaid and others (2020), figure 4)



5. The data were input to a further clustering technique which resulted in 24 classes representing different combinations of the three environmental variables (figure II). The characteristics of those classes are presented in table 1 of the present annex.

Figure II

Plot of the final 24 habitat classes across the Clarion-Clipperton Zone (with the existing nine areas of particular environmental interest (APEIs) shown for reference) (based on McQuaid and others (2020)

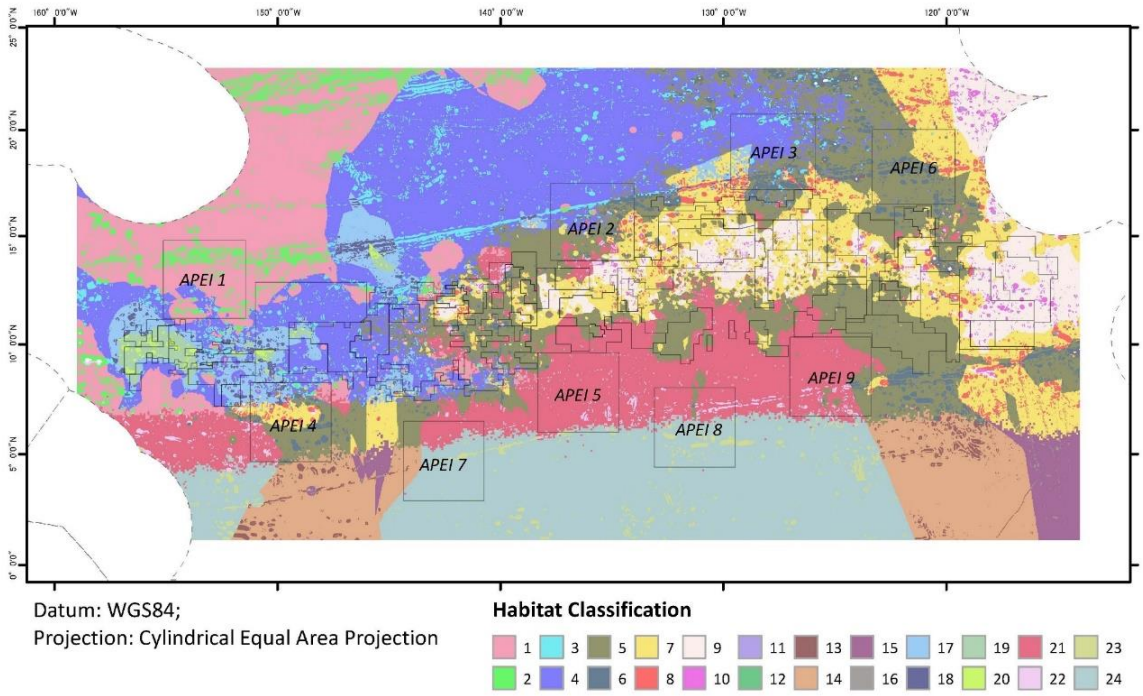


Table 1

Summary of characteristics, area and percentage cover of each habitat class in the model domain

Habitat	*Nodule abundance*	*Particulate organic carbon flux*	*Topography*	*Area (km²)*	*Area (%)*
1	Very low	Low	Flat, with some small topographic features	1 052 374	9.92
2	Very low	Low	Sloped, with more prominent peaks and troughs	218 987	2.07
3	Low	Low	Sloped, with more prominent peaks and troughs	220 739	2.08
4	Low	Low	Flat, with some small topographic features	1 759 294	16.59
5	Low	Medium	Flat, with some small topographic features	1 468 301	13.85
6	Low	Medium	Sloped, with more prominent peaks and troughs	245 334	2.31
7	Medium	Medium	Flat, with some small topographic features	958 727	9.04
8	Medium	Medium	Sloped, with more prominent peaks and troughs	154 538	1.46
9	High	Medium	Flat, with some small topographic features	555 026	5.23
10	High	Medium	Sloped, with more prominent peaks and troughs	53 771	0.51
11	High	High	Sloped, with more prominent peaks and troughs	1 009	0.01
12	High	High	Flat, with some small topographic features	649	0.01
13	Low	High	Sloped, with more prominent peaks and troughs	55 868	0.53
14	Low	High	Flat, with some small topographic features	633 839	5.98
15	Medium	High	Flat, with some small topographic features	165 471	1.56
16	Medium	High	Sloped, with more prominent peaks and troughs	9 031	0.09
17	Medium	Low	Flat, with some small topographic features	268 422	2.53

Habitat	*Nodule abundance*	*Particulate organic carbon flux*	*Topography*	*Area (km²)*	*Area (%)*
18	Medium	Low	Sloped, with more prominent peaks and troughs	63 625	0.60
19	High	Low	Flat, with some small topographic features	68 727	0.65
20	High	Low	Sloped, with more prominent peaks and troughs	17 345	0.16
21	Very low	Medium	Flat, with some small topographic features	1 062 069	10.02
22	Very low	Medium	Sloped, with more prominent peaks and troughs	61 674	0.58
23	Very low	High	Sloped, with more prominent peaks and troughs	72 448	0.68
24	Very low	High	Flat, with some small topographic features	1 437 057	13.55

Note: Areas differ slightly from those in McQuaid and others (2020) owing to the different mapping projection used by the International Seabed Authority.

6. For each habitat class, the area contained within the nine existing areas of particular environmental interest, within current exploration contract or reserved areas and outside the areas of particular environmental interest and contract/reserved areas (referred to as “other Clarion-Clipperton Zone areas”) was calculated within the model domain. The results are tabulated in table 2.

Table 2
Coverage of the 24 habitat classes within existing contract/reserved areas, areas of particular environmental interest or other Clarion-Clipperton Zone areas (outside areas of particular environmental interest/contract/reserved areas); and their modelled nodule abundance rating

Habitat class	*Total area (km²)*	*Number of areas of particular environmental interest*	*Percentage in contract or reserved areas*	*Percentage in areas of particular environmental interest*	*Percentage in other Clarion-Clipperton Zone areas*	*Nodule cover*
1	1 142 505	6	4	11	86	Very low
2	240 740	4	3	15	82	Very low
3	241 329	5	10	11	79	Low
4	1 928 272	7	13	8	79	Low
5	1 557 203	8	31	18	51	Low
6	264 740	8	10	28	62	Low
7	1 019 185	6	41	9	50	Medium
8	165 080	5	21	16	63	Medium
9	593 231	2	62	0.4	38	High
10	57 997	2	53	1	46	High
11	1 125	0	21	0	79	High
12	714	0	49	0	51	High
13	56 480	5	0.04	1	99	Low
14	636 650	4	0.06	3	97	Low
15	166 478	0	1	0	99	Medium
16	9 228	1	6	1	93	Medium
17	280 487	5	35	8	57	Medium
18	66 355	4	31	9	60	Medium
19	70 899	1	69	0.3	30	High
20	17 923	1	57	0.2	43	High
21	1 086 811	6	12	36	52	Very low

Habitat class	*Total area (km²)*	*Number of areas of particular environmental interest*	*Percentage in contract or reserved areas*	*Percentage in areas of particular environmental interest*	*Percentage in other Clarion-Clipperton Zone areas*	*Nodule cover*
22	63 133	7	13	37	50	Very low
23	72 864	5	0	23	77	Very low
24	1 443 516	5	0	13	87	Very low

7. As regards existing areas of particular environmental interest, among the 24 habitat classes:

(a) Ten are common (>10 per cent area) in areas of particular environmental interest, and a further four have >5 per cent area within areas of particular environmental interest;

(b) Three are absent from areas of particular environmental interest (classes 11, 12 and 15);

(c) Six are poorly represented in areas of particular environmental interest, but common in contract/reserved areas (classes 9, 10, 11, 12, 19 and 20);

(d) Four are poorly represented in areas of particular environmental interest, and uncommon in contract/reserved areas but common in other Clarion-Clipperton Zone areas (classes 13, 14, 15 and 16);

(e) Six habitat classes are represented in 0 or only one area of particular environmental interest (classes 11, 12, 15, 16, 19 and 20), indicating that their replication is limited in the current network.

8. Habitat classes 9, 10, 11, 12, 19 and 20 are particularly underrepresented in the existing network of areas of particular environmental interest relative to the contract/reserved areas. This is important because those habitat classes, in particular 9, 10, 19 and 20 (primarily nodule-rich), are potentially at higher risk from the impacts of future exploitation activities in the Clarion-Clipperton Zone. In addition, fauna associated with nodules are often endemic (i.e., they have a highly localized distribution) and specific to nodules. Ensuring a better representation of those habitat classes is the main rationale for the proposed establishment of four additional areas of particular environmental interest.

9. Classes 11 and 12 occur in very small areas, as these are typically associated with seamounts and knolls. The inclusion of seamounts in areas of particular environmental interest is routinely considered under the operational objectives for areas of particular environmental interest in the environmental management plan for the Clarion-Clipperton Zone,[4] and because of their small size, they are not prioritized here.

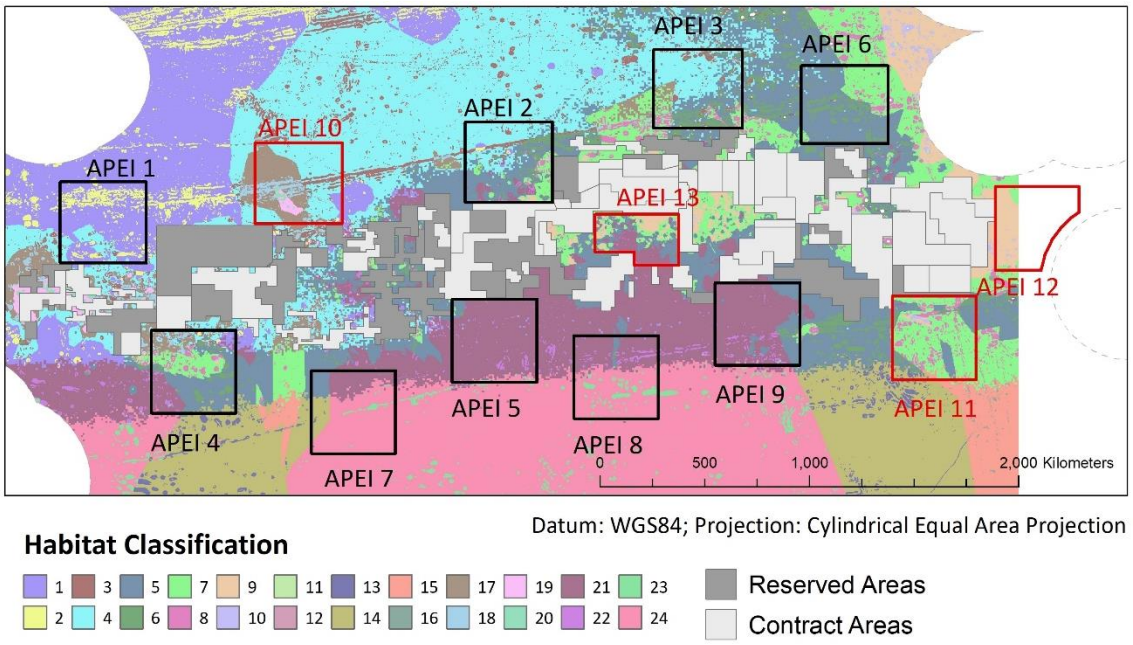
10. Although classes 13, 14, 15 and 16 are also poorly represented in areas of particular environmental interest, high proportions of them are found in other Clarion-Clipperton Zone areas (outside areas of particular environmental interest/contract areas/reserved areas); hence, they are less vulnerable at this stage to impact from potential exploitation activities.

11. In order to improve the coverage of habitat classes from the nodule-rich areas, as well as close the large spatial gaps in the existing network of areas of particular environmental interest, four new areas of particular environmental interest are proposed (figure III). The coordinates of the proposed new areas of particular environmental interest are given in appendix I below. The area of each habitat class

[4] See ISBA/17/LTC/7, para. 39.

included in the existing and proposed new areas of particular environmental interest is given in appendix II.

Figure III
Map of habitat class distribution, and location of existing areas of particular environmental interest (black polygons) and proposed new areas of particular environmental interest (red polygons)



12. Areas of particular environmental interest 10 and 11 are positioned in alignment with the existing areas of particular environmental interest to close the gaps in spatial coverage to the north-west and south-east of the Clarion-Clipperton Zone and improve the likelihood of connectivity between areas of particular environmental interest. These are full-sized areas of particular environmental interest (160,000 km^2).

13. Areas of particular environmental interest 12 and 13 are positioned in the central region of the Clarion-Clipperton Zone to augment the inclusion of nodule-rich areas and associated faunal communities in the network of areas of particular environmental interest. Area of particular environmental interest 12, which is located to the east of existing contract areas, was shaped taking into consideration boundaries of exclusive economic zones. Proposed area of particular environmental interest 13 is in the central region of the Clarion-Clipperton Zone and surrounded by contract areas and reserved areas, which affects its shape and size.

14. The benefits of the proposed areas of particular environmental interest accrue primarily to habitat classes 9, 10, 15, 19 and 20. These include the four key target classes that are particularly underrepresented in existing areas of particular environmental interest relative to the contract/reserved areas (table 3).

Table 3
Representativity benefits accruing to five habitat classes from establishment of the four proposed areas of particular environmental interest

Habitat class	*No. of APEIs now/after*	*APEI 10 (km^2)*	*APEI 10 (%)*	*APEI 11 (km^2)*	*APEI 11 (%)*	*APEI 12 (km^2)*	*APEI 12 (%)*	*APEI 13 (km^2)*	*APEI 13 (%)*
		160 000		*160 000*		*126 740*		*87 000*	
9	2/5			2 934	1.83	38 055[a]	85.78	15 851	18.21
10	2/5			1 639	1.02	1 077[a]	2.43	755	0.87
15	0/1			2 882	1.80				
19	1/2	5 733	3.58						
20	1/2	2 128	1.33						

Note: Column head "No. of APEIs now/after" refers to the number of areas of particular environmental interest (APEIs) where the habitat class is currently represented within the existing network ("now") and the number of APEIs in which the habitat class would be represented following the establishment of the four proposed areas ("after"). Percentage ("%") applies to the area of particular environmental interest, not to the habitat class.

[a] The model domain does not extend eastward into the full area of particular environmental interest. The areas presented here are based on the actual model result, covering 44,363.51 km^2.

15. The representativity gains include the following:

(a) Large areas of several habitat classes (especially habitat class 9 and most others with a size >1,000 km^2) are included;

(b) Replication of classes within areas of particular environmental interest is improved (habitat class 15 becomes included in one area of particular environmental interest; all other classes double the number of areas of particular environmental interest). Whereas small portions of nodule-rich habitat classes 9 and 10 are currently found in other areas of particular environmental interest, the establishment of new areas of particular environmental interest 12 and 13 provides extensive areas of those classes with an east-west separation along the nodule belt axis, further improving the likelihood of protection of representative faunal communities;

(c) A number of other habitat classes are included in these new areas of particular environmental interest (see appendix II below). It is noteworthy that the proportion of habitat classes varies between proposed areas of particular environmental interest 12 and 13. This highlights the value of both proposed new areas of particular environmental interest with respect to capturing differences in biodiversity at more localized scales across the Clarion-Clipperton Zone;

(d) Although not included in the benthic classification analysis, proposed areas of particular environmental interest 12 and 13 underlie mid-water layers of the oxygen minimum zone. As existing areas of particular environmental interest lie outside the core oxygen minimum zone, they may not represent or protect pelagic fauna from mining impacts (Perelman and others, 2021).[5]

16. The connectivity gains include the following:

(a) Areas of particular environmental interest are all separated by less than 1,000 km;

[5] Jessica N. Perelman and others, "Mesopelagic scattering layer behaviors across the Clarion-Clipperton Zone: implications for deep-sea mining", *Frontiers in Marine Science*, vol. 8 (10 May 2021), p. 492.

(b) There is a clear east-west improvement with the addition of areas of particular environmental interest 10 and 11. Area of particular environmental interest 10 bridges the previous gap of almost 1,500 km between areas of particular environmental interest 1 and 2, with distances of 530 km and 560 km, respectively, between area of particular environmental interest 10 and areas of particular environmental interest 1 and 2. The distance between areas of particular environmental interest 11 and 9 is 440 km;

(c) There is an improved north-south linkage. Area of particular environmental interest 12 potentially enables connectivity between the north-eastern Clarion-Clipperton Zone (existing area of particular environmental interest 6) and the south-eastern Clarion-Clipperton Zone (through the establishment of new area of particular environmental interest 11), with separation distances of 550 km and 230 km, respectively. New area of particular environmental interest 13 links multiple areas of particular environmental interest across the central portion of the Clarion-Clipperton Zone, with the distance between adjacent existing areas of particular environmental interest being of the order of 250–450 km.

17. It should be noted, in the context of the above potential gains, that:

(a) The use of environmental variables as surrogates for faunal communities may not yield perfect results. However, the environmental variables selected have proved to be biologically meaningful, and the classification techniques are well accepted in the scientific literature. Nonetheless, it is strongly recommended that ground truthing still be utilized to validate the new – as well as existing – areas of particular environmental interest;

(b) The sizes of areas of particular environmental interest 12 and 13 are less than was specified as part of the original design criteria under the environmental management plan for the Clarion-Clipperton Zone. The results of the Deep Clarion-Clipperton Zone workshop supported the original recommendation that the size of the core area of each area of particular environmental interest should be 200 km by 200 km to sustain populations (see p. 28 of the report of the workshop). This has been maintained in the two new areas of particular environmental interest, but the specification that the core area be surrounded by an additional buffer zone with a width of 100 km, to reduce the risk of impact from an adjacent mining operation, has not been fully met. However, according to expert scientific advice, the protection of representative communities in this central region of the Clarion-Clipperton Zone is more important than maintaining the full size of the area of particular environmental interest.

Appendix I

Turning-point coordinates of the proposed new areas of particular environmental interest

No. of area of particular environmental interest	*Turning point*	*Longitude (W)*	*Latitude (N)*
10	1	-143.02903562	16.51540244
	2	-143.03569098	12.90819823
	3	-146.76934701	12.92150894
	4	-146.76934701	16.51540244
11	1	-119.41500000	9.75000000
	2	-115.82173886	9.75000000
	3	-115.82173886	6.09797525
	4	-119.41500000	6.09797525
12	1	-115.00000000	14.55973692
	2	-111.40673887	14.55973692
	3	-111.40673887	13.42341576
	4	-111.69237261	13.22552848
	5	-111.70006678	13.22006580
	6	-111.70764414	13.21444879
	7	-111.71510144	13.20867985
	8	-111.72243554	13.20276144
	9	-111.72805527	13.19805427
	10	-111.73359705	13.19325935
	11	-111.73905948	13.18837788
	12	-111.74444113	13.18341115
	13	-111.74529520	13.18261015
	14	-111.75433034	13.17389966
	15	-112.17153125	12.75946259
	16	-112.17803583	12.75285234
	17	-112.18440180	12.74611347
	18	-112.19062652	12.73924880
	19	-112.19670745	12.73226116
	20	-112.19870198	12.72985098
	21	-112.19937819	12.72904101
	22	-112.20067299	12.72751926
	23	-112.20352212	12.72409647
	24	-112.20746902	12.71937727
	25	-112.21405850	12.71107310
	26	-112.22044878	12.70262037
	27	-112.22663640	12.69402367
	28	-112.56221479	12.21499694
	29	-112.56735339	12.20748540
	30	-112.56935049	12.20438235
	31	-112.57231324	12.19985801

No. of area of particular environmental interest	*Turning point*	*Longitude (W)*	*Latitude (N)*
	32	-112.57430346	12.19675077
	33	-112.57717256	12.19217014
	34	-112.57913822	12.18904695
	35	-112.58380799	12.18124520
	36	-112.58911951	12.17190996
	37	-112.59420459	12.16245356
	38	-112.59906042	12.15288130
	39	-112.60368428	12.14319857
	40	-112.84799418	11.61434722
	41	-112.85165849	11.60618591
	42	-112.85515842	11.59795480
	43	-112.85849262	11.58965713
	44	-112.86165982	11.58129613
	45	-112.86528725	11.57104003
	46	-112.86866345	11.56070089
	47	-112.87178648	11.55028471
	48	-112.87465458	11.53979750
	49	-113.02085257	10.97740552
	50	-113.02298127	10.96885631
	51	-113.02494094	10.96026774
	52	-113.02673084	10.95164307
	53	-113.02835032	10.94298557
	54	-113.03013487	10.93211755
	55	-113.03165091	10.92120978
	56	-113.03289760	10.91026875
	57	-113.03387420	10.89930094
	58	-113.03740133	10.85321114
	59	-115.00000000	10.85321114
	60	-115.00000000	14.55973692
13	1	-128.58333300	13.33333300
	2	-128.58333300	11.08330000
	3	-130.50000000	11.08330000
	4	-130.50000000	11.66667552
	5	-132.17659413	11.66666700
	6	-132.17659414	13.33333300

Appendix II

Habitat classes, by size of area occupied in existing and proposed new areas of particular environmental interest

Habitat Class	Total Area (sq.km)	APEI 01		APEI 02		APEI 03		APEI 04		APEI 05		APEI 06		APEI 07		APEI 08		APEI 09		APEI 10		APEI 11		APEI 12		APEI 13	
		(sq.km)	(%)	(sq.km)	(%)	(sq.km)	(%)	(sq.km)	(%)	(sq.km)	(%)	(sq.km)	(%)	(sq.km)	(%)	(sq.km)	(%)	(sq.km)	(%)	(sq.km)	(%)	(sq.km)	(%)	(sq.km)	(%)	(sq.km)	(%)
1	1052374.43	106,796.17	67.10%	2,006.60	1.26%	0.00	0.00%	4,540.17	2.85%	861.48	0.54%	0.00	0.00%	0.00	0.00%	79.46	0.05%	93.88	0.06%	4,542.28	2.83%	0.00	0.00%	0.00	0.00%	0.00	0.00%
2	218987.72	31,568.26	19.83%	971.31	0.61%	0.00	0.00%	869.93	0.55%	38.14	0.02%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	650.02	0.41%	0.00	0.00%	0.00	0.00%	0.00	0.00%
3	220739.40	2,417.95	1.52%	7,347.82	4.60%	10,856.93	6.80%	2,994.22	1.88%	0.00	0.00%	81.96	0.05%	0.00	0.00%	0.00	0.00%	0.00	0.00%	9,869.87	6.16%	0.00	0.00%	0.00	0.00%	0.00	0.00%
4	1759294.40	18,389.11	11.55%	52,234.71	32.72%	68,430.56	42.87%	6,987.64	4.38%	81.97	0.05%	1,422.37	0.92%	0.00	0.00%	0.00	0.00%	81.97	0.05%	73,358.74	45.77%	0.00	0.00%	0.00	0.00%	0.00	0.00%
5	1468301.90	0.00	0.00%	50,475.38	31.61%	34,211.08	21.43%	49,657.43	31.14%	4,293.87	2.68%	88,894.48	57.78%	11,105.64	6.97%	3,284.58	2.06%	27,903.26	17.49%	0.00	0.00%	25,805.39	16.13%	0.00	0.00%	26,442.53	30.37%
6	245334.76	0.00	0.00%	12,144.21	7.61%	18,781.95	11.77%	12,308.12	7.72%	325.67	0.20%	21,555.12	14.01%	4.94	0.00%	262.78	0.17%	2,881.52	1.81%	0.00	0.00%	9,178.03	5.74%	0.00	0.00%	827.05	0.95%
7	958727.06	0.00	0.00%	16,035.52	10.04%	11,680.96	7.32%	25,649.83	16.08%	181.29	0.11%	35,465.69	23.05%	0.00	0.00%	0.00	0.00%	764.92	0.48%	0.00	0.00%	86,214.37	53.88%	4,898.61	11.04%	16,273.98	18.69%
8	154538.00	0.00	0.00%	3,069.69	1.92%	7,251.26	4.54%	8,430.98	5.29%	0.00	0.00%	5,835.37	3.79%	0.00	0.00%	0.00	0.00%	281.47	0.18%	0.00	0.00%	22,512.31	14.07%	332.93	0.75%	526.88	0.61%
9	555026.17	0.00	0.00%	2,196.57	1.38%	0.00	0.00%	370.50	0.23%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	2,933.57	1.83%	38,054.87	85.78%	15,851.16	18.21%
10	53771.18	0.00	0.00%	406.24	0.25%	0.00	0.00%	200.94	0.13%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	1,638.88	1.02%	1,077.10	2.43%	754.79	0.87%
11	1009.06	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%
12	649.75	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%
13	55868.94	0.00	0.00%	0.00	0.00%	57.51	0.04%	198.48	0.12%	0.00	0.00%	185.78	0.12%	322.98	0.20%	7.89	0.00%	0.00	0.00%	0.00	0.00%	2,119.20	1.32%	0.00	0.00%	0.00	0.00%
14	633839.97	0.00	0.00%	0.00	0.00%	0.00	0.00%	4,100.52	2.57%	0.00	0.00%	156.70	0.10%	14,567.04	9.15%	31.56	0.02%	0.00	0.00%	0.00	0.00%	5,962.95	3.73%	0.00	0.00%	0.00	0.00%
15	165471.29	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	2,882.19	1.80%	0.00	0.00%	0.00	0.00%
16	9031.46	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	81.37	0.05%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	438.93	0.27%	0.00	0.00%	0.00	0.00%
17	268422.86	0.00	0.00%	598.35	0.37%	7,341.71	4.60%	12,899.53	8.09%	5.85	0.00%	136.29	0.09%	0.00	0.00%	0.00	0.00%	0.00	0.00%	51,175.40	31.93%	0.00	0.00%	0.00	0.00%	0.00	0.00%
18	63625.86	0.00	0.00%	13.92	0.01%	1,008.49	0.63%	4,849.63	3.04%	0.00	0.00%	23.30	0.02%	0.00	0.00%	0.00	0.00%	0.00	0.00%	12,792.60	7.98%	0.00	0.00%	0.00	0.00%	0.00	0.00%
19	68727.35	0.00	0.00%	0.00	0.00%	0.00	0.00%	233.58	0.15%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	5,733.09	3.58%	0.00	0.00%	0.00	0.00%	0.00	0.00%
20	17345.10	0.00	0.00%	0.00	0.00%	0.00	0.00%	43.22	0.03%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	2,127.95	1.33%	0.00	0.00%	0.00	0.00%	0.00	0.00%
21	1062069.16	0.00	0.00%	10,255.67	6.42%	0.00	0.00%	21,923.55	13.75%	142,495.38	88.77%	0.00	0.00%	29,778.07	18.70%	54,966.80	34.52%	119,118.14	74.66%	0.00	0.00%	311.41	0.19%	0.00	0.00%	25,724.03	29.55%
22	61674.52	0.00	0.00%	1,901.49	1.19%	0.00	0.00%	2,844.36	1.78%	5,028.94	3.13%	0.00	0.00%	187.83	0.12%	5,955.34	3.74%	6,834.16	4.28%	17.10	0.01%	4.87	0.00%	0.00	0.00%	659.45	0.76%
23	72448.50	0.00	0.00%	0.00	0.00%	0.00	0.00%	86.32	0.05%	1,039.78	0.65%	0.00	0.00%	3,209.22	2.02%	11,906.28	7.48%	330.19	0.21%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%
24	1437057.24	0.00	0.00%	0.00	0.00%	0.00	0.00%	279.02	0.17%	6,164.99	3.84%	0.00	0.00%	100,050.16	62.84%	82,726.05	51.96%	1,256.74	0.79%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%
Total	10604336.09	159,171.48	100.00%	159,657.49	100.00%	159,620.47	100.00%	159,467.98	100.00%	160,517.36	100.00%	153,838.43	100.00%	159,225.89	100.00%	159,220.75	100.00%	159,546.23	100.00%	160,267.04	100.00%	160,002.10	100.00%	44,363.51	100.00%	87,059.88	100.00%

: Existing Habitat Classes

: No Habitat Classes

Note: Percentages represent the size of the area occupied by each habitat class as a proportion of the size of each existing and proposed new area of particular environmental interest. The figures in the "Total Area" column (second from left) represent the total area occupied by each habitat class within the entire Clarion-Clipperton Zone.