Environmental Studies Program: Studies Development Plan | FY 2024–2025

Field	Study Information
Title	Developing a Critical Minerals Environmental Assessment Framework (CMEAF) for Critical Minerals Activities
Administered by	Marine Minerals Program
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Procurement Type(s)	Interagency Agreement
Performance Period	FY 2024–2026
Final Report Due	TBD
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Problem	The Outer Continental Shelf (OCS) contains many of the critical mineral (CM) resources needed to supply the domestic and global alignment towards increased green energy sources. BOEM needs to expand its environmental framework for managing the development of CM resources.
Intervention	BOEM will engage researchers through the National Academies of Sciences, Engineering, and Medicine (NASEM) to develop a comprehensive framework to oversee CM activities.
Comparison	This study will assist BOEM in the development of robust NEPA-compliant environmental analyses for a new line of activity with few existing analogues.
Outcome	This study will provide essential information for environmental analysts when evaluating exploratory prospecting requests, lease sale requests, lease sales, and monitoring of extractive activities.
Context	All OCS areas that may contain critical mineral resources, including the Extended Continental Shelf.

BOEM Information Need(s): Information needed by analysts related to the habitats where critical minerals (CM) occur (e.g., baseline conditions of the surrounding environment, relevant parameters, potential impacts of exploration and recovery activities, and mitigation options) is sparse. Documentation of prospecting, extraction, monitoring, and mitigation methods, data, and references are found in scientific journals, governmental publications, and industry literature. In the event of an unsolicited request for a lease sale (30 CFR 581.11), BOEM has the obligation to inform the applicant within 45 days whether the steps leading to a lease sale will be initiated. BOEM staff need recent, focused, and reliable references and guidelines to expeditiously evaluate the initial request as well as the continuous in-depth environmental analyses following the initial 45-day request response period. This project will develop a Critical Minerals Environmental Analyses Framework (CMEAF), consisting of identifying references, guidelines, and baseline data needs necessary for effective stewardship of OCS

resources and environments. In the longer term, BOEM also needs to identify and prioritize information needs that can be addressed by future CM studies.

Background: The U.S. is lagging other nations in domestic CM planning and investments, including scientific research on CM in the U.S. Exclusive Economic Zone (EEZ). The International Seabed Authority (ISA) has jurisdiction over deep sea mining in international waters and has issued 31 contracts for exploration and exploitation of deep-sea minerals, primarily polymetallic nodules in the Clarion-Clipperton Fracture Zone (CCZ), which covers about 1,700,000 square miles between Hawaii and Mexico (Sharma, 2017). Although work related to environmental assessment and baseline data collection has been performed internationally, those analyses do not conform with or fulfil the requirements of environmental analyses performed in the U.S. under the National Environmental Policy Act (NEPA) and the ecosystem of associated laws and regulations. A series of recent Executive Orders (i.e., EO 13817, EO 13953, EO 14017) recognize this issue and direct federal agencies to take actions to bolster development of domestic CM resources. BOEM's Marine Minerals Program (MMP) has a series of rules regulating competitive mineral prospecting (30 CFR 580), leasing (30 CFR 581), and operations (30 CFR 582).

Critical minerals are found as polymetallic nodules ("nodules") on abyssal plains, ferromanganese crusts ("crusts") on the flanks of seamounts, seafloor massive sulphides (SMS) associated with hydrothermal vents (e.g., "black smokers"), phosphorites, and nearshore placer deposits ("placers"). Nodules, which contain manganese, cobalt, nickel, and other minerals, accrete on the abyssal seabed, have attracted the most interest from industry and will likely be the first type of deep-sea mineral to be mined (Mizell et al., 2022). Nodule recovery is expected to have fewer environmental impacts compared to mining crusts and SMS deposits and is the primary, but not exclusive, focus of this study's efforts.

During 2021 BOEM received inquiries about Bureau regulations governing CM leasing and the type of environmental information needed to support such decisions in the BOEM regions. In 2022, the Inflation Reduction Act expanded some aspects of BOEM's oversight to include portions of the territorial EEZ where nodules are thought to occur. In light of potential impending requests to develop OCS critical mineral resources, BOEM needs this CMEAF project to inform environmental assessment guidance related to prospecting, leasing, and developing offshore CM, culminating in a comprehensive document that addresses the CM affected environment, the impact of CM recovery, transport, and refining processes, baseline data needed to assess these systems, and the environmental impacts associated with various prospecting and operational methods. The primary focus will be on nodules.

Related projects, funded by the Marine Minerals Program, are planned that will generate a series of references covering CM resource evaluation (started in FY22), including prospecting, mining, and the novel and complex extraction technologies used to execute these operations, existing environmental documentation (starting in FY23), and economic guidance (starting in FY24). These three reviews will document the mineral resources, associated environment, and economic guidance needed to evaluate CM activity requests and will assist analysts as they develop information for decision-makers. The MMP studies may provide useful information to the CMEAF study proposed here, which will inform environmental analyses.

The CMEAF study will also benefit related initiatives, including the Status of the Outer Continental Shelf (SOCS) project, and the National Offshore Critical Minerals Inventory (NOCMI), hosted within the existing Marine Minerals Information System (MMIS). The baseline data requirements identified by the CMEAF will inform the development of the MMIS as it expands to contain CM data.

Objectives: This study will improve BOEM environmental analyses by developing a series of critical minerals environmental assessment framework (CMEAF) documents.

- The focus of this study is to identify information needs, determine which baseline environmental parameters should be gathered, and collect and collate existing information.
- The CMEAF should identify, describe, and prioritize information gaps that can be addressed by future CM environmental studies, including studies related to:
    - Identifying the environmental analyses information needed and data gaps associated primarily with nodules, while crusts, SMS, phosphorites, and placers will collectively receive less attention.
    - Identifying assessment needs specific to CM prospecting, leasing, and operations (i.e., testing, mining, decommissioning), culminating in a comprehensive document, which will describe: habitats where CM are found; the surrounding ecosystem; environmental impacts, including cumulative effects, associated with CM prospecting and operations actions; potential mitigations to reduce the impacts of CM actions; broader impacts of the associated CM transport and refining processes (e.g., vessel traffic, emissions, climate impact); and baseline data needed to assess these systems.
- All CMEAF documents will be accompanied by copies of referenced materials for MMP analyst use in developing further environmental assessment protocols. Development of specific standards, sampling methods, and detailed implementation guidelines are not anticipated to be part of this project.

Methods: BOEM will work with the National Academies of Sciences, Engineering, and Medicine (NASEM) to facilitate the implementation of this study by engaging affiliated academic partners to develop authoritative environmental recommendations in collaboration with BOEM staff and in conjunction with a series of workshops to solicit pertinent information related to environmental assessment of deep sea mineral activities from stakeholders (e.g., non-governmental organizations, environmental groups, industry, Tribes and other indigenous groups). Existing pertinent information from similar efforts (e.g., sand and gravel, renewable energy studies, oil and gas studies, terrestrial resource studies, the International Seabed Authority's draft environmental guidelines) can provide a starting point for these workshops. The information will be synthesized into a written report.

Specific Research Question(s):

1. What is the baseline environment associated with deep sea critical mineral resources?
2. What are the potential impacts associated with deep sea critical mineral prospecting and operations activities?
3. What are potential mitigations that can be applied to deep sea critical mineral prospecting and operations activities?

Current Status: N/A

Publications Completed: N/A

Affiliated WWW Sites: N/A

References:

Mizell K, Hein JR, Au M, Gartman A. 2022. Estimates of metals contained in abyssal manganese nodules and ferromanganese crusts in the global ocean based on regional variations and genetic types of nodules. In: Sharma R, editor. Perspectives on deep-Sea mining. Cham (Switzerland): Springer Cham. p. 53–80.

Sharma R. 2017. Deep-sea mining: current status and future considerations. In: Sharma R, editor. Perspectives on deep-Sea mining. Cham (Switzerland): Springer Cham. p. 3–21.