DEEP-OCEAN STEWARDSHIP INITIATIVE

Executive Committee

As the organizers of a global coalition of ocean experts, the Executive Committee of the Deep Ocean Stewardship Initiative (DOSI) thanks the US Office of Science and Technology Policy, the Council on Environmental Quality, and the Ocean Policy Committee as a whole for this opportunity to comment on key aspects of a US National Strategy for a Sustainable Ocean Economy. We would like to provide input from a deep-ocean perspective on the topic of "*An Informed and Responsive National Strategy.*"

Question 1: Are there gaps in our knowledge of the ocean, coasts, and Great Lakes that need to be addressed to support sustainable ocean management?

Response: While the deep ocean is understood better now than ever before, the difficulty of accessing and studying its environments means that there is still much to learn. Earlier this very year, a team of scientists aboard Schmidt Ocean Institute's Research Vessel *Falkor (too)* made a discovery that is revolutionizing our understanding of hydrothermal vent ecosystems. Many people have seen pictures of the gardens of giant tubeworms, snails, and other animals that live above hydrothermal vents, but this year's expedition also found the same species *below* the seafloor—suggesting that tubeworms and other animals may colonize new habitats by traveling beneath the seafloor itself. This discovery is just one example of the new findings experts are making about the deep ocean every year thanks to financial support of deep-sea exploration and science, and many of these findings have implications for sustainable ocean management.

To ensure that use of the deep ocean in US jurisdiction is sustainable, more research is required on topics including:

- The presence and distribution of deep-ocean habitats and ecosystems of the US EEZ.
- What species live in deep-ocean habitats of the US EEZ
- Ecological aspects of these deep-ocean species and communities, including their trophic relationships, life histories, as well as how they vary over space and time
- The functions of deep-ocean species, habitats and ecosystems
- How deep-ocean species and habitats are connected with each other, with shallower ecosystems, and with the surface (such as when larvae from one area support healthy populations in another)

- The identification and quantification of the ecosystem services that the deep ocean and its inhabiting species provide to humans, including their roles in the carbon cycle, productivity, and genetic resource potential.
- The processes that occur in the deep sea and monitoring the changes to make robust forecasts with climate change and uses of the ocean
- The impacts of human activities on deep-ocean ecosystems and the services they provide
- How multiple stressors, such as but not limited to warming, acidification, deoxygenation, fishing, and seabed mining, may interact to affect deep-ocean ecosystems and the services they provide

Continued effort by NOAA's Office of Ocean Exploration and Research as well as other federal offices, academia, and non-governmental research institutions, along with expanded research partnerships and international cooperation, can help to fill these important knowledge gaps and make new discoveries that enhance our knowledge of how the deep ocean functions.

Question 2: Are there opportunities to improve how we manage the use of marine ecosystems to maximize their benefits while minimizing the human impacts on them?

Response: Avoiding serious harm and minimizing other impacts is essential in any marine environment, but especially in the deep sea. Deep-ocean ecosystems are highly vulnerable to impact, often showing little recovery over decadal to millennial timescales. With our current knowledge, restoration in the deep ocean is impractical and very expensive. Further, the deep ocean is not as well understood or monitored as shallower or terrestrial ecosystems, so evidence-based decision-making and forecasting can be challenging.

The above characteristics are often not aligned with the concept of sustainable use, so activities must be considered carefully. As such, when considering uses that could have significant impacts on deep-ocean areas of the US EEZ, regulators should first consider the precautionary approach and avoid these impacts. In cases where this is not possible, it is important to ensure that the relevant Environmental Impact Statements meaningfully consider the latest science on the topics listed in our response to the first question to ensure that impacts are minimized. In situations where not enough environmental baseline information is available for evidence-based decision-making, use should be avoided or weighed carefully against the risks and/or tradeoffs. Around the world, regulations managing the ocean often focus on shallow environments while failing to account for the very different circumstances of deep and low-light environments. Measures chosen to manage waters under US jurisdiction should reflect these differences, with relevant regulations updated as such. Effective management also requires long-term monitoring and enforcement, which will be necessary for improving regulations as we learn more about the deep ocean. This monitoring and enforcement will require sufficient staff and budget capacity. Special

attention should be given to monitoring especially, as long-term information is required to better understand the impact of stressors like climate change and to forecast biodiversity trends in the deep sea.

Question 3: How can the United States advance its commitment to a precautionary approach to seabed mining and other emerging ocean industries?

Response: To apply a precautionary approach to seabed mining and other potential industries in the US jurisdiction, the US would first need to achieve a level of knowledge that allows for evidence-based decision-making and robust forecasting. In 2021, Amon *et al.* published a paper describing the topics that would require further study to enable evidence-based decision-making about mining the international seabed. These topics are also summarized in a DOSI Policy Brief. While the National Strategy for a Sustainable Ocean Economy will focus exclusively on US jurisdiction, many of the research topics identified in this paper are required to adequately understand deep-ocean ecosystems in the US EEZ as well. These topics include species taxonomy, trophic and symbiotic relationships, ecosystem functions, contaminant toxicity, and more. The paper also identified that several decades, as well as significant resources, will be needed to close these knowledge gaps in international waters; again, this may be similar for the US EEZ.

The US should consider how seabed mining and other emerging industries may interact with current ocean uses also affecting biodiversity. Elsewhere, a recent study has indicated that future seabed mining may overlap with important tuna fisheries. This conflict may be worsened by a shift in tuna fishery locations due to climate change, which emphasizes the need to study and account for the complex interactions between different stressors (many of which already exist, such as pollution and overfishing). Climate change in particular requires consideration when designating protected areas in connection with deep-sea resource extraction, collecting baseline data, conducting EIAs, and considering ecosystem resilience and connectivity. To capture these cumulative effects, holistic integrated management and long-term monitoring should be essential components of both new and ongoing uses affecting the deep ocean.

In addition, the need for deep-sea mineral extraction by the US should be carefully considered in light of rapidly changing electric car battery technology, novel recycling, re-use and redesign efforts, and environmental risks relative to extraction on land. The possibility of designing new energy models with the help of materials sciences research should also be evaluated.

Question 4: What co-management and co-stewardship practices are needed to meet ocean, coasts, and Great Lakes Sustainability?

Response: While the deep ocean may appear distant from communities on land, local participation and traditional knowledge are still essential to sustainable management. Many deep-ocean uses target or impact species and ecosystems in the deep ocean that are linked to those people rely on in shallower waters. Traditional knowledge is necessary for the management of deep-seabed mining internationally and is relevant for activities within the US EEZ. Meaningful and continuing engagement with stakeholders, including those with a more abstract interest in a healthy ocean, can help ensure that decisions on protective measures or new ocean uses are sustainable, viewed as legitimate, and promote a healthy and resilient ocean. This engagement can include knowledge sharing, cooperative Marine Spatial Planning, co-management, problem resolution for overlapping resource use, and other options. Consideration should be given to the different value systems of stakeholders, including those calling attention to the inherent existence value of ocean life. When beginning this engagement, it is important to provide clear expectations for the level of influence stakeholders will have on decisions. Supporting meaningful engagement in this way can help lead to effective decisions while also contributing to community understanding of the deep ocean.

Thank you once again for this opportunity to comment on important considerations for this National Strategy.

Sincerely,

The Executive Committee of the Deep Ocean Stewardship Initiative (DOSI)
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As well as: *DOSI Minerals Working Group Co-Leads Jesse van der Grient, Patricia Esquete, and Sabine Gollner, and DOSI Director of Communications Brandon Gertz*