Stakeholder concerns: scientific developments and their implications for the conservation of deep-sea biodiversity

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International Seabed AuthorityIRZ / PRZ Workshop

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Designing IRZs and PRZs in the context of an overall conservation strategy

Background paper: Workshop on the Design and Monitoring of Impact and Preservation Reference Zones: Note for the guidance of invited experts on key issues to be addressed.

Where should IRZs and PRZs be located? How many IRZs and PRZs should there be within each contract area? How large do IRZs and PRZs need to be?

Monitoring: What types of monitoring is needed, for what and how?

Conservation objectives to be established in regulations: Monitoring for impacts and whether ecologically and biologically meaningful limits on impacts risk being (or may be) exceeded

A lot of excellent work has been done these past few days

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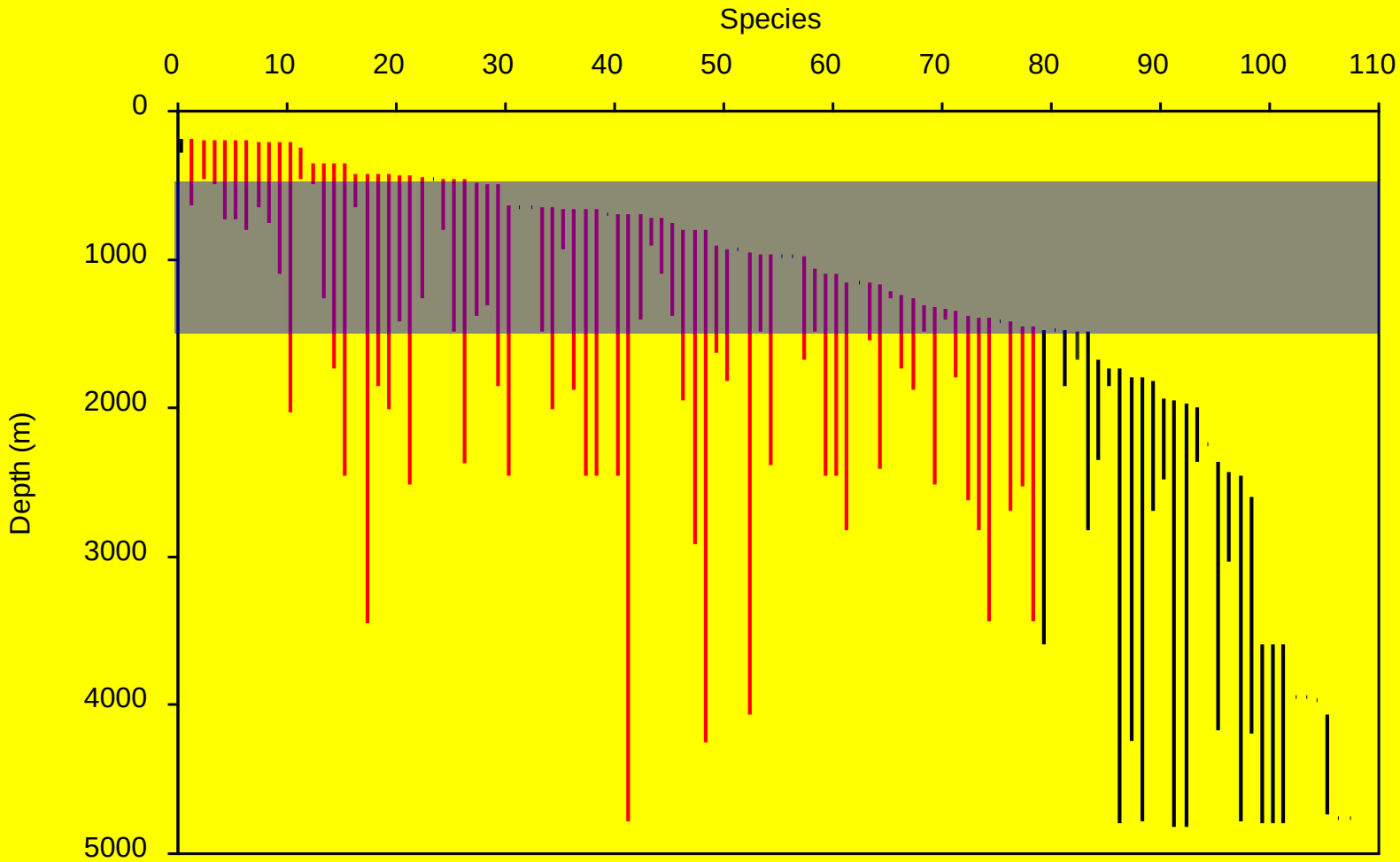
The Porcupine Seabight deep-water fishery and its impact

Fishery at 500 – 1500 m

By-catch includes all 78 species intersecting the fishery



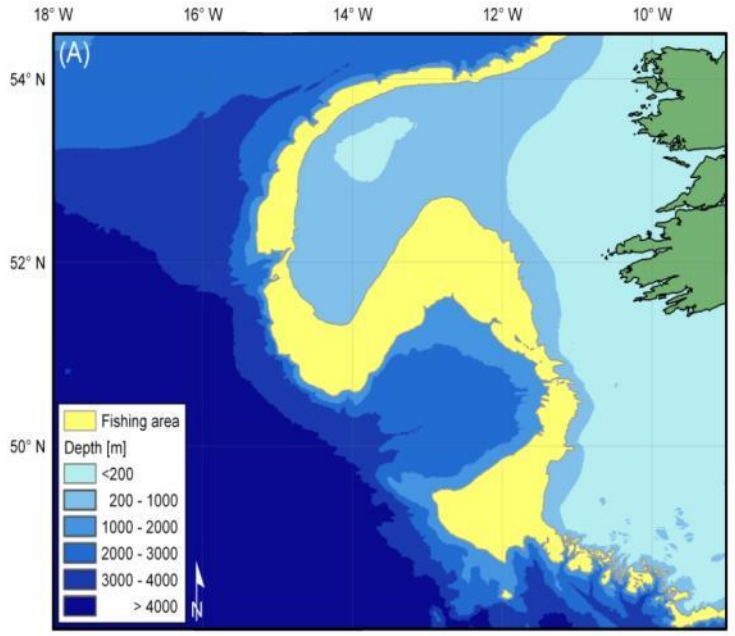
Priede *et al.*(2010) *Marine Ecology* **31:**247-260.
10.1111/j.1439-0485.2009.00330.x

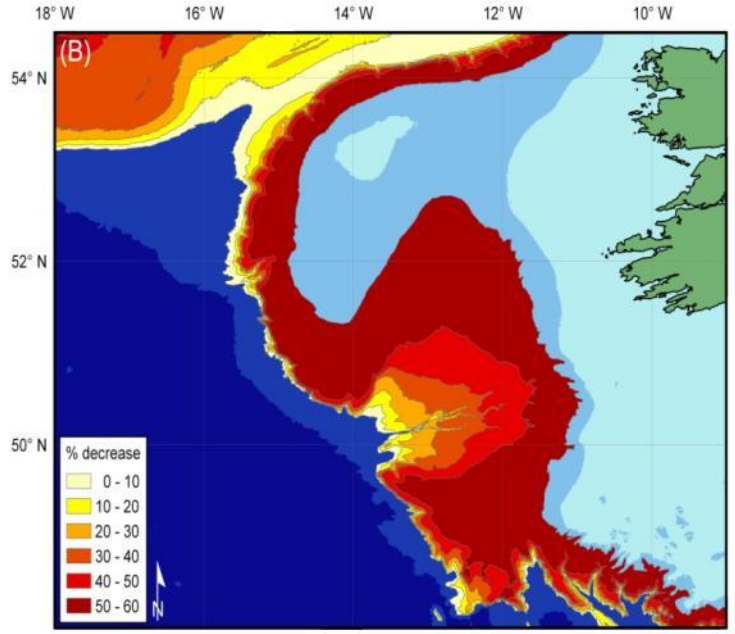
The Porcupine Seabight deep-water fishery and its impact

Fishing Area
52,000 km^2

Reduction in Fish Abundance

Area of Impact
142,000 km^2
2.74 × fishing area





Priede I.G. *et al.* (2011) *ICES Journal of Marine Science*; **68**: 281–289. doi:10.1093/icesjms/fsq045

1995 UN Fish Stocks Agreement: 2nd UNCLOS implementing agreement
Key conservation provisions - Articles 5 & 6

Biodiversity

- **"protect biodiversity in the marine environment" [5(g)**
- minimize impacts on non-target, associated and dependent species [5(f)]
- protect habitats of special concern [6.3(d)]

EIAs

- assess the impacts of fishing, other human activities and environmental factors on target stocks and species belonging to the same
- ecosystem or associated with or dependent upon the target stocks;Assess the impact of fishing on… species belonging to the same ecosystem [5(d)]

Data

- **collect and share, in a timely manner, complete and accurate data [5(j)]**

Precautionary approach

- apply the precautionary approach widely…i**be more cautious when information is uncertain, unreliable or inadequate [6.1 & 6.2]**
- **Not use the absence of adequate scientific information as a reason for postponing or failing to take conservation and management measures [6.2]**
- **Cautious approach to new or exploratory fisheries to allow for assessment of impacts and on that basis potentially allow gradual development of commercial fisheries over time [6.6]**

Enforcement

- implement and enforce conservation and management measures through effective monitoring, control and surveillance [5(l)]

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Biodiversity loss from deep-sea mining

correspondence

Biodiversity loss from deep-sea mining

To the Editor — The emerging deep-sea mining industry is seen by some to be an engine for economic development in the maritime sector[1]. The International Seabed Authority — the body that regulates mining activities on the seabed beyond national jurisdiction — must also protect the marine environment from harmful effects that arise from mining[2]. The International Seabed Authority is currently drafting a regulatory framework for deep-sea mining that includes measures for environmental protection. Responsible mining increasingly strives to work with no net loss of biodiversity[3]. Financial and regulatory frameworks commonly require extractive industries to use a four-tier mitigation hierarchy to prevent biodiversity loss in order of priority, biodiversity loss is to be avoided, minimized, remediated and — as a last resort — offset[4,5]. We argue here that mining with no net loss of biodiversity using this mitigation hierarchy in the deep sea is an unattainable goal.

The first tier of the mitigation hierarchy is avoidance. Potentially useful mitigation strategies in the deep sea include patchwork extraction, whereby some minerals with associated fauna are left undisturbed, or other means to limit the direct mining footprint. Even so, loss of biodiversity will be unavoidable because mining directly destroys habitat and indirectly degrades large volumes of the water column and areas of the seabed due to the generation of sediment plumes that are enriched in bioavailable metals.

Although biodiversity loss within mines is inevitable, innovative engineering design could reduce or minimize some risks to near- and far-field biodiversity. For example, shrouds fitted to cutting equipment might reduce the dispersion of sediment plumes and the footprint of plume impacts such as the burial of organisms. Similarly, vehicle design might limit compaction of seabed sediments. Of course, the efficacy of such efforts in mitigating biodiversity loss would need to be tested.

Remediation addresses the residual loss of biodiversity at and around a mine site after avoidance and minimization interventions. In the deep sea, native species are often slow to recruit and recolonize disturbed habitats. Slow recovery on the scale of decades to centuries, enormous spatial scales of mines for certain mineral resources (a single 30-year operation license to mine metal-rich nodules will involve an area about the size of Austria[6]) and the high cost of working in the deep sea may mean that remediation is unrealistic[7]. Further, the science of deep-sea benthic remediation is a nascent field[8]. It is far from established that remediation of industrial mine sites in the deep sea is feasible for any mineral resource, and we know of no remediation actions that can be applied to the water column.

The last resort in the mitigation hierarchy is in-kind or like-for-like offsets within a biogeographical region. When offsets cannot be located where the affected biodiversity is found, and where the affected biodiversity is important for geographically restricted functions such as connectivity (as is the case for the deep sea), in-kind offsets are not an appropriate mitigation strategy[9]. Out-of-kind offsets[10], such as restoring coral reefs in exchange for loss of deep-sea biodiversity, have been proposed, but this practice assumes that loss of largely unknown deep-sea species and ecosystems is acceptable. We question this assumption on scientific grounds. The relationship between any gain in biological diversity in an out-of-kind setting and loss of biological diversity in the deep sea is so ambiguous as to be scientifically meaningless. Further, compensating biodiversity loss in international waters with biodiversity gains in national waters could constitute a transfer of wealth that runs counter to the Law of the Sea, where benefits from deep seabed mining must accrue to the international community at large, as part of the common heritage of humankind. Given the paucity of other industrial activities in the deep sea (except perhaps fisheries), it is difficult to imagine a scenario where averted risk offsets[10] could apply; that is, where a mining operation could avert biodiversity losses from other activities.

The four-tier mitigation hierarchy used so often to minimize biodiversity loss in terrestrial mining and offshore oil and gas operations thus fails when applied to the deep ocean. Residual biodiversity loss cannot be mitigated through remediation or offsets and the goal of no net loss of biodiversity is not achievable for deep-seabed mining. Focus therefore must be on avoiding and minimizing harm. Most mining-induced loss of biodiversity in the deep sea is likely to last forever on human timescales, given the very slow natural rates of recovery in affected ecosystems. It is incumbent on the International Seabed Authority to communicate to the public the potentially serious implications of this loss of biodiversity and ask for a response. ❐

KARINA ADRON, IN SITU SCIENCE ILLUSTRATION

The Tu'i Malila vent field in the Lau Basin, southwest Pacific. Lau Basin foundation species (*Alviniconcha* spp. snails, *Ifremeria nautilei* snails, and *Bathymodiolus septemdierum* mussels) live in diffuse flow on the surfaces of metal-rich sulfide deposits.

References

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10. *Guidance Notes to the Standard on Biodiversity Offsets* (Business and Biodiversity Offsets Program, 2012).

"Biodiversity losses from deep-sea mining are unavoidable and possibly irrevocable…

the International Seabed Authority … must recognize this risk… to inform discussions about whether deep-seabed mining should proceed, and if so, what standards and safeguards need to be put into place to minimize biodiversity loss..."

C. L. Van Dover1*, J. A. Ardron2, E. Escobar3, M. Gianni4, K. M. Gjerde5, A. Jaeckel6, D. O. B. Jones2, L. A. Levin7, H. J. Niner8, L. Pendleton1,9, C. R. Smith10, T. Thiele11, P. J. Turner1, L. Watling12 and P. P. E. Weaver13 https://t.co/2guvyvGfmC

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ISA regulations

- How much biodiversity loss will the ISA regulations allow or permit?
- Over what time frame will the loss be permitted given that in many/most cases the loss will be irreversible on human timescales?
- Can limits be placed and enforced to be sure that the ‘permissable' loss is not exceeded?

  - Measurable (indicators etc), monitorable, biologically/ecologically meaningful and enforceable limits.

- How will the ISA justify the biodiversity loss – e.g. what is the benefit in relation to the common heritage of humankind that would justify the loss of biodiversity in the Area?

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"Clearly we are in the midst of one of the great extinction spasms of geological history" E.O. Wilson, The Diversity of Life (the Anthropocene)

UN 1st World Ocean Assessment

"This truly vast deep-sea realm constitutes the largest source of species and ecosystem diversity on Earth…There is strong evidence that the richness and diversity of organisms in the deep sea exceeds all other known biomes… and supports the diverse ecosystem processes and functions necessary for the Earth's natural systems to function"

- Climate change related stressors – e.g. deoxygenation, acifdification, temperature changes etc (Sweetman et all 2017; Levin et al 2016)
- Pollution:– plastics, POPs
- Fisheries impacts 200-2000m+ (1st WOA; Clark, ICES, others)

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Ist UN World Ocean Assessment (2016)

Chapter 51: Biological communities on seamounts and other submarine features potentially threatened by disturbance (pages 15-16)

- "The documented widespread extent of deep-water trawl fisheries has led to pervasive concern for the conservation of fragile benthic habitats."

Nth WOA (20XX)?

- "The documented widespread extent of ~~deep-water trawl fisheries~~ *seabed mining in ABNJ* has led to pervasive concern for the conservation of fragile benthic habitats."

- The extent of benthic impacts has been described for local ~~fishing grounds~~ *mining areas* but has not been assessed globally; however, if the impacts of these regional studies are generalized, we can extrapolate that ~~fishing, and in particular deep-water trawling,~~ *seabed mining in ABNJ* has caused severe, widespread, long-term destruction of these environments globally."

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Coherence/Applicability with nternational norms and objectives

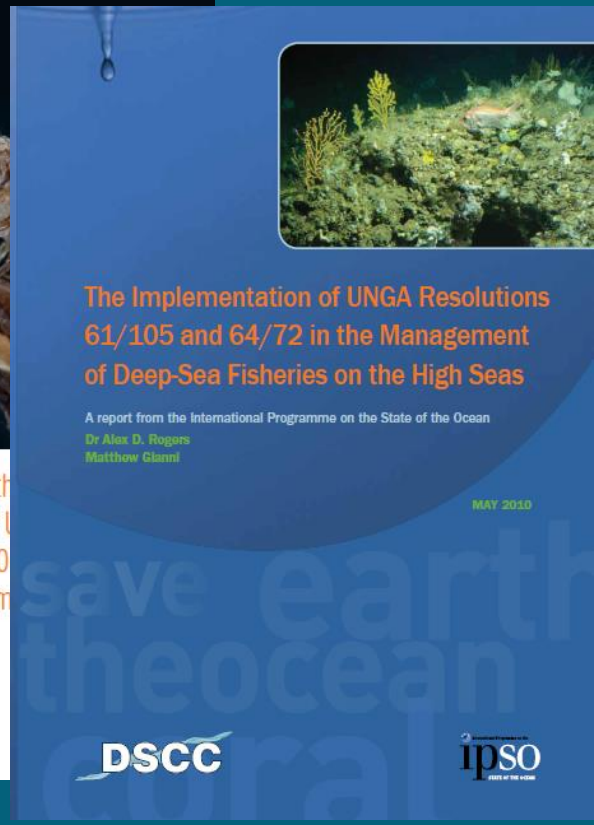
UNCLOS Article 145 “ensure effective protection for the marine environment…the need for protection from harmful effects…and the prevention of damage to the flora and fauna of the marine environment”

Sustainable Development Goal 14.2

“By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans”

Effectively monitoring the environmental impacts of seabed mining through inter alia IRZs and PRZs is critical but we need to know/decide what we’re monitoring for and what we’re monitoring to prevent and how

Thank-you



DSCC

www.savethehighseas.org

And thanks to the Adessium Foundation, Synchronicity Earth, Pew Charitable Trusts, Kaplan Fund, Oceans 5, DSCC member organizations and the many scientists, NGOs and others working on deep-sea biology, ecology and conservation

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Why is this important? What do we know about the deep-sea?

Global Marine Assessment/World Ocean Assessment
Chapter 36F - Open Ocean Deep Sea

- “This truly vast deep-sea realm constitutes the largest source of species and ecosystem diversity on Earth”

- “There is strong evidence that the richness and diversity of organisms in the deep sea exceeds all other known biomes… and supports the diverse ecosystem processes and functions necessary for the Earth’s natural systems to function”

- “Deep-sea ecosystems are crucial for global functioning; e.g., remineralization of organic matter in the deep sea regenerates nutrients that help fuel the oceanic primary production that accounts for about half of atmospheric oxygen production.”

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