



Development of Environmental Threshold Values

*Stakeholder Engagement **Webinar**
on the Report of the Intersessional Expert Group*

The meeting will start shortly



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7 and 8 October 2026

Opening and Welcome

The background is a deep, dark blue space. A bright, glowing horizontal line of light spans the width of the image, just above the horizon. Below the horizon, the foreground is filled with dark, jagged, rocky terrain. Above the horizon, the sky is filled with abstract, wavy, light blue patterns and a dense field of small, glowing blue particles. On the right side, there is a faint, glowing molecular structure or network diagram.

Housekeeping



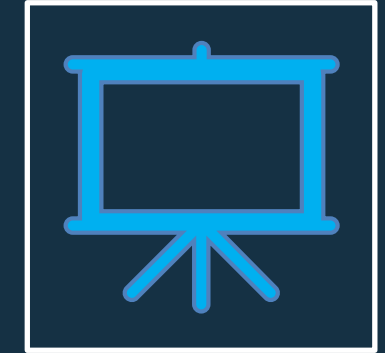
Microphones and cameras are off for the whole session.



Use Q&A at any time;
Include name and organization



The session will last 90 minutes and is held in English.



The webinar will be recorded for documentation and promotional purposes.

Webinar Scope and Objectives



Provide stakeholders with an **overview of the report** and its key findings



Clarify the **scope and methodology** of the proposed framework for threshold development



Encourage informed and constructive **participation in the consultation** process



Provide **guidance** on how stakeholders can prepare and submit comments.



Foster **transparency and inclusive engagement** across ISA Member States and other stakeholders of the Authority

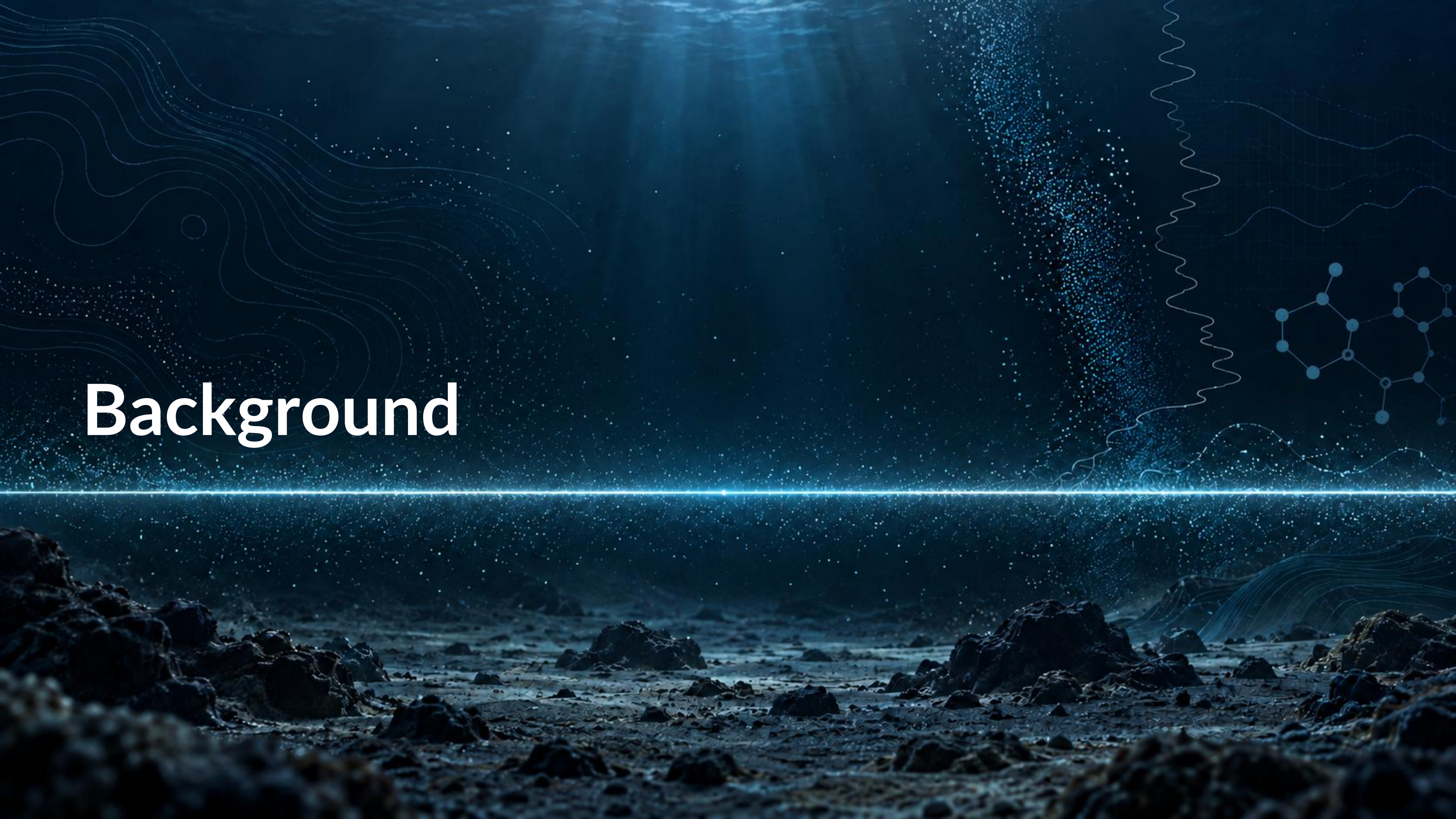
Webinar Format

The event is designed as an **orientation and clarification session**, not a forum for negotiation or detailed technical debate.

Short, focused
presentations

Moderated Q&A
session

Detailed or substantive comments should be submitted
via the **formal consultation process by 2 November 2026**

The background is a deep, dark blue space filled with subtle, wavy digital patterns and a fine mist of light blue particles. A bright, glowing horizontal line of light blue particles stretches across the middle of the frame. The foreground is a dark, rocky, and uneven surface, possibly a beach or a desolate landscape, with some small pools of water reflecting the ambient light. On the right side, there is a faint, stylized molecular structure composed of blue dots and lines.

Background

Council Decision ISBA/27/C/42

Requested threshold values for main pressures

Toxicity

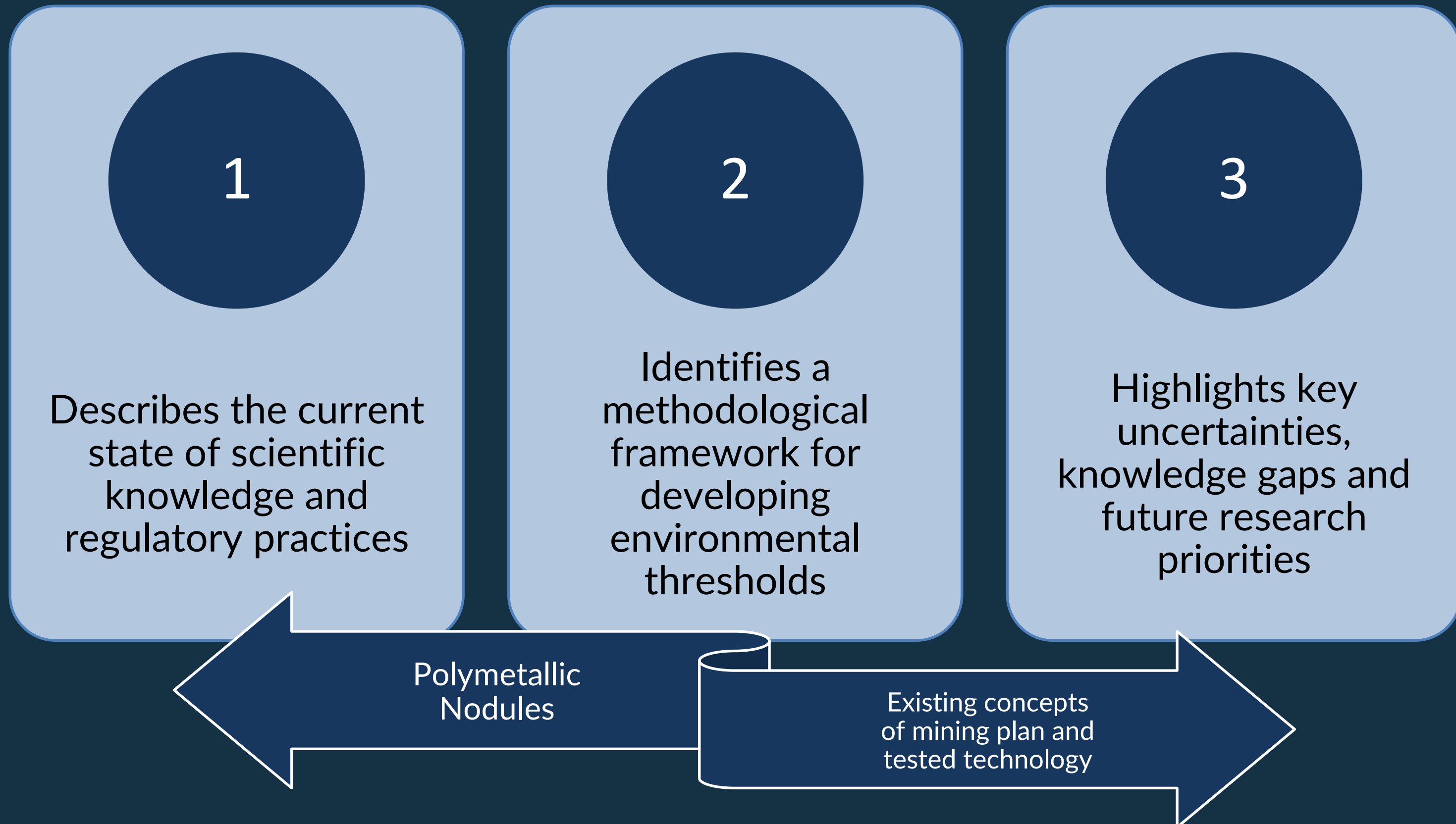
Turbidity and settling of
resuspended sediments

Underwater noise and light
pollution

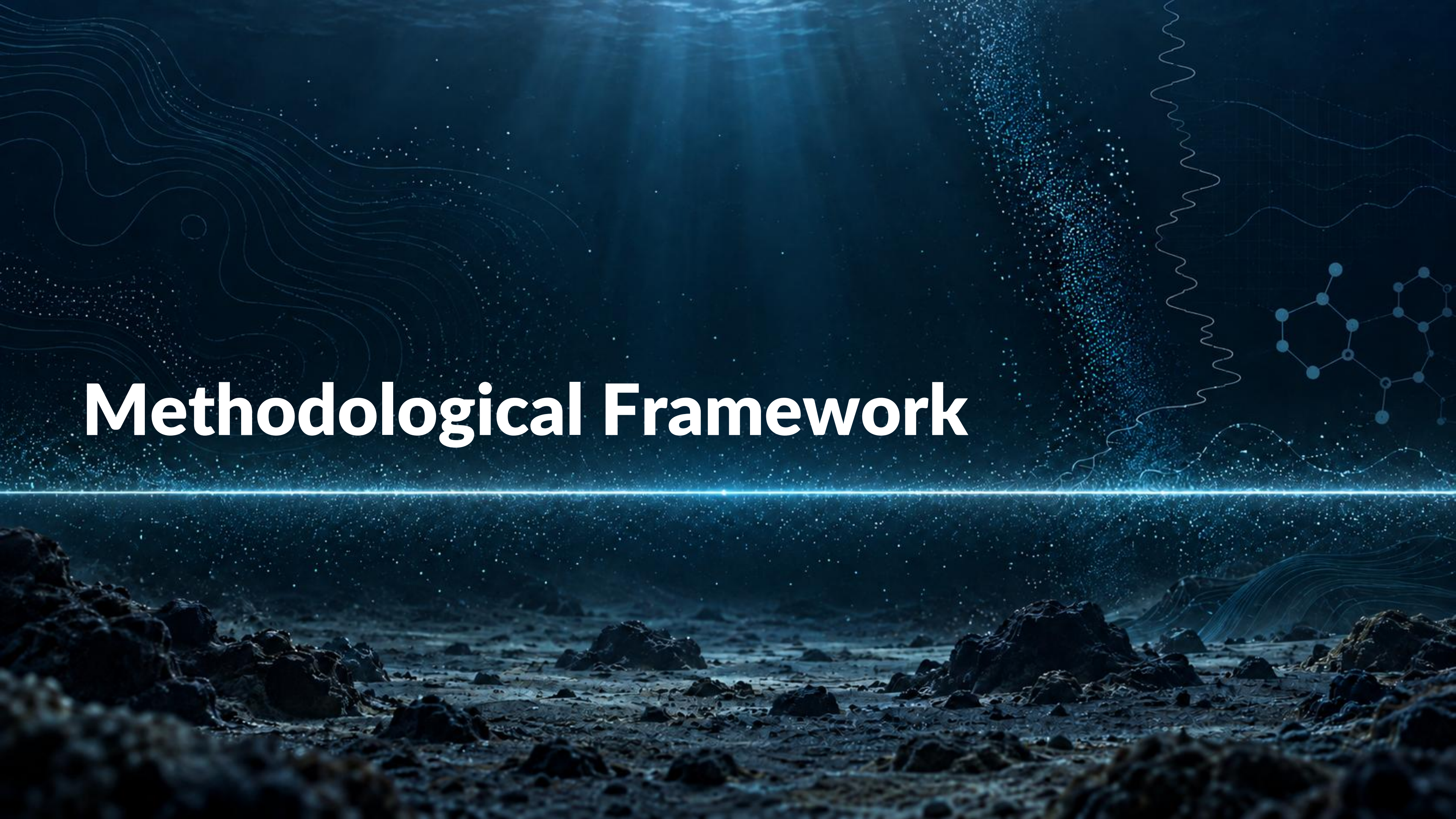
Requested "*binding environmental threshold values, including early warning thresholds
.... including the maximum level of harm that can be considered acceptable*"

Establishment of an intersessional expert group (IEG)

IEG Report: Scope



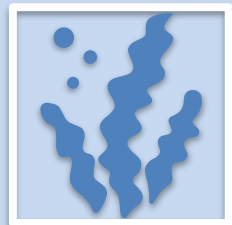
Methodological Framework

The background is a deep blue, almost black, space-like environment. A bright, glowing horizontal line of light cuts across the middle of the frame. Above this line, there are faint, wavy, white lines that resemble topographical maps or sound waves. To the right, there is a cluster of small, blue, interconnected nodes, resembling a molecular structure or a network diagram. The bottom of the image shows a dark, rocky, and uneven surface, possibly a beach or a rocky shore, with some water reflecting the light from the glowing line.

Pressure and Impact Gradients



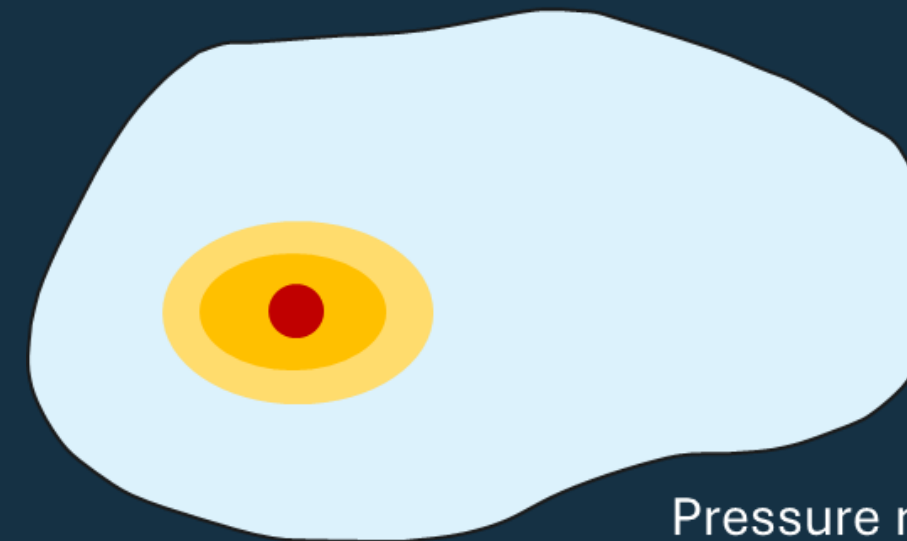
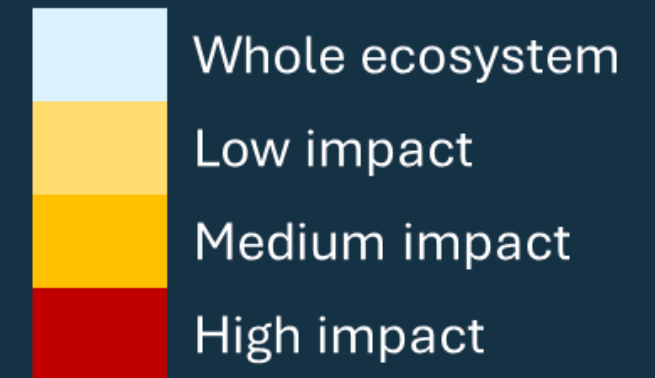
Pressures are the forces or influences exerted by mining that affect the survival, health or behavior of organisms within an ecosystem



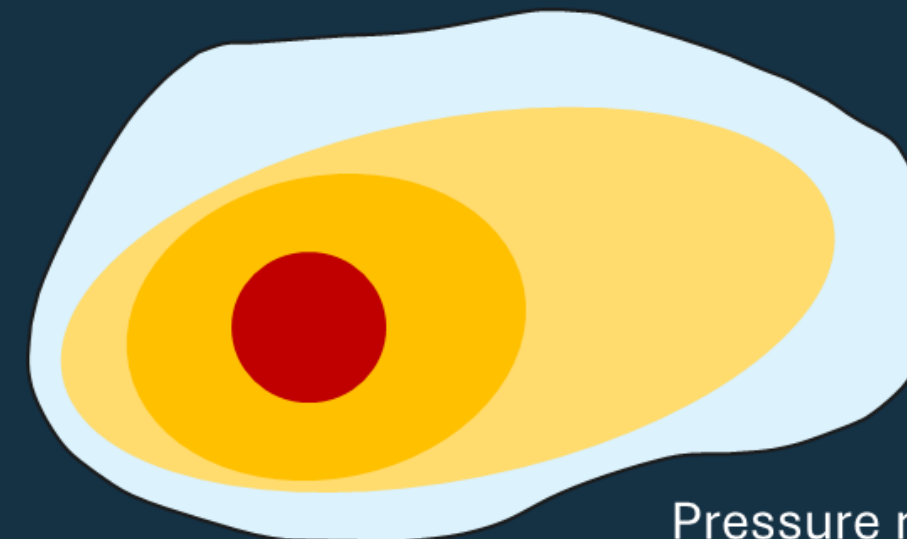
How these pressures will impact an ecosystem depends on the the local environment, the type of disturbance, over how large an area, for how long etc.



Effective management needs to understand both pressures and impacts



Pressure may impact only a small area of the ecosystem

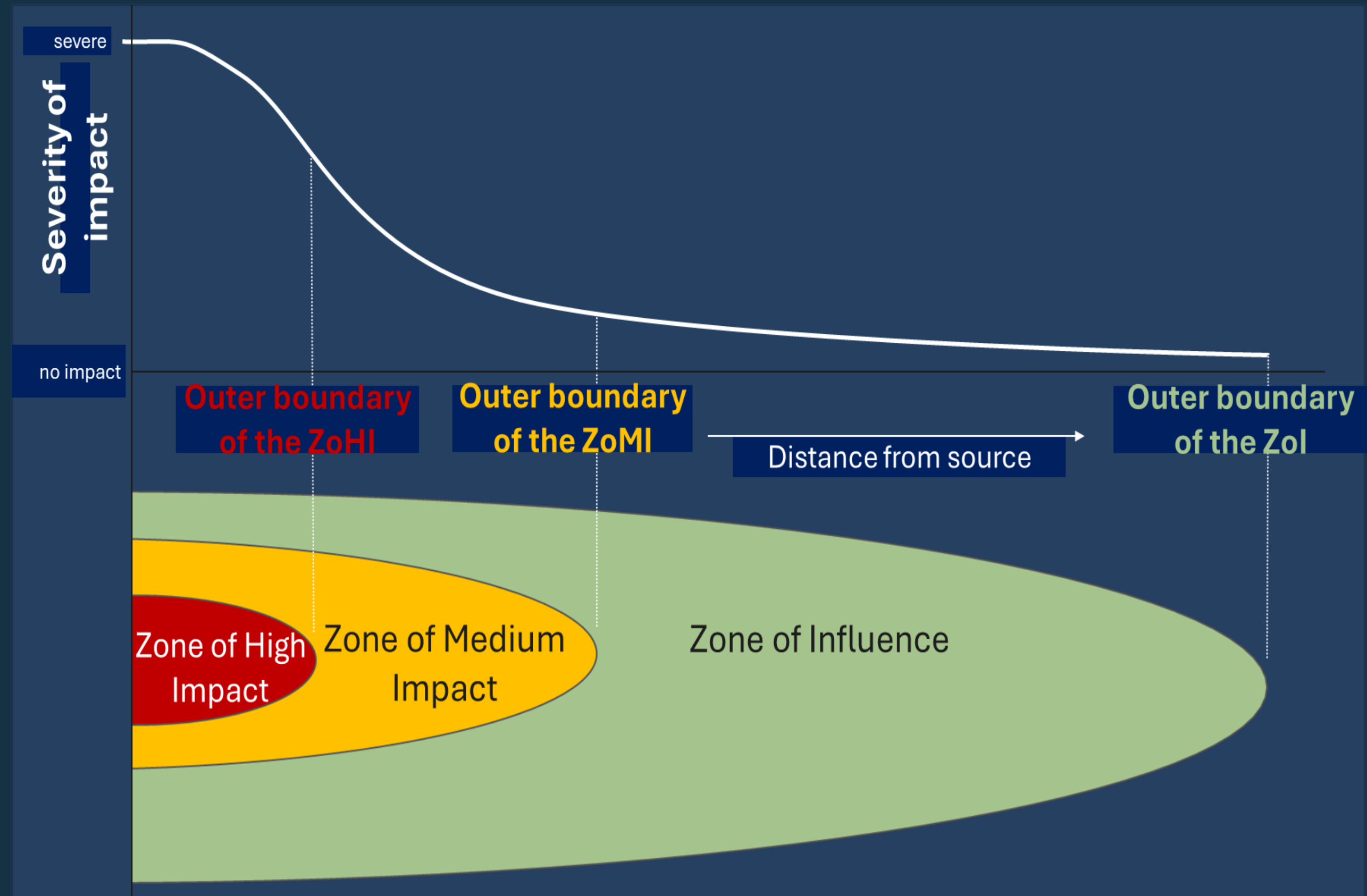


Pressure may impact over a larger area of the ecosystem

Zone-of-Impact Model

Use of Zone of Impacts is a common concept in environmental management

It refers to spatially defined areas around a source of disturbance, each characterized by varying degrees of environmental change along a gradient.



Ecological Reference Points (ERPs)

Are metrics or measures to indicate the status or health of the ecosystem (e.g., % original population, % animals affected)



Define and delimit the areas of different impact identified in the Zone of Impact model



When assessed for a particular mineral resource environment and operation, can help determine ecological thresholds and development of management actions

But the science alone cannot define the actions taken at these reference points and hence turn them into thresholds - **economic, societal, and political considerations are necessary**

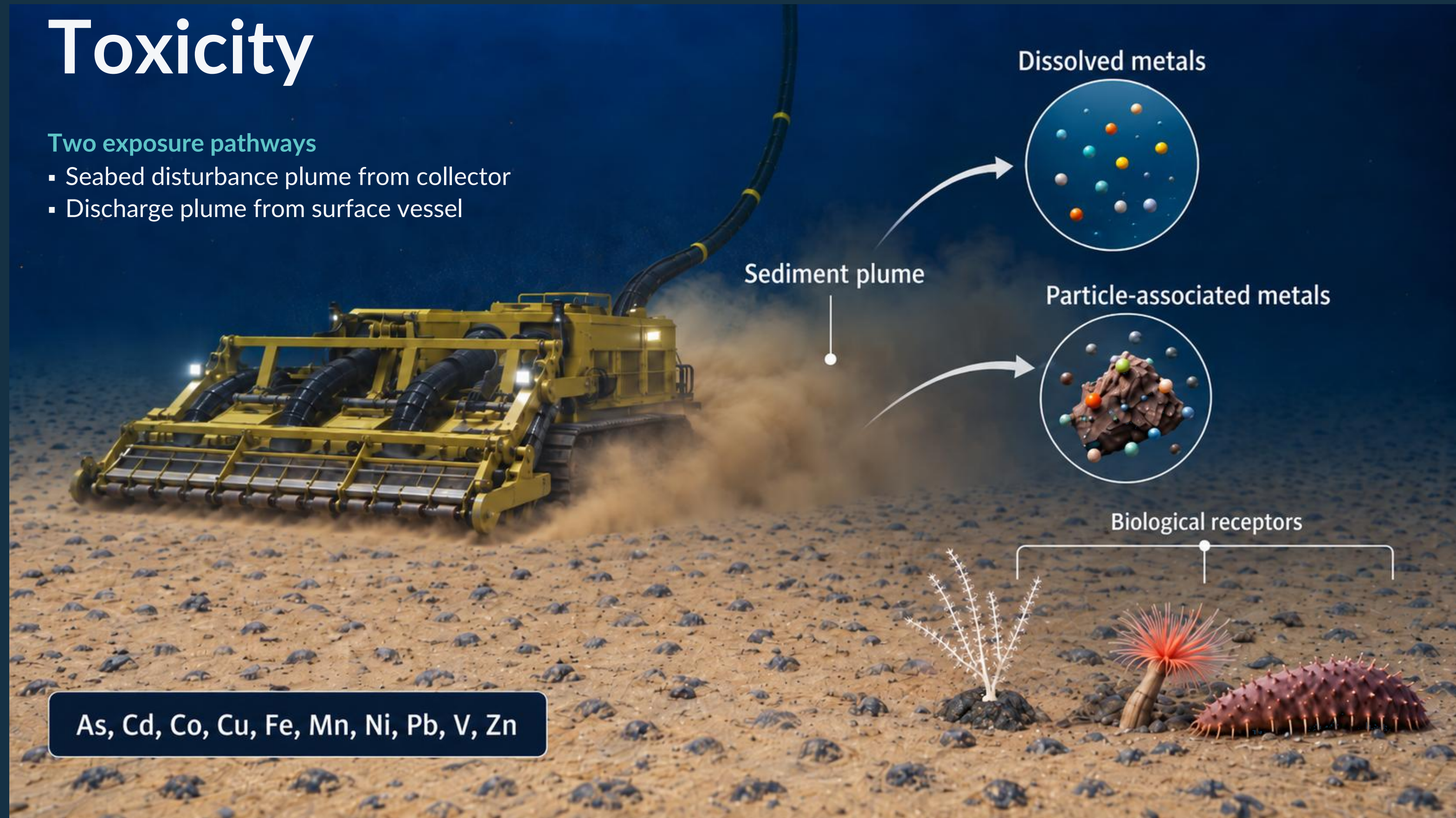
Outcomes of IEG deliberations



Toxicity

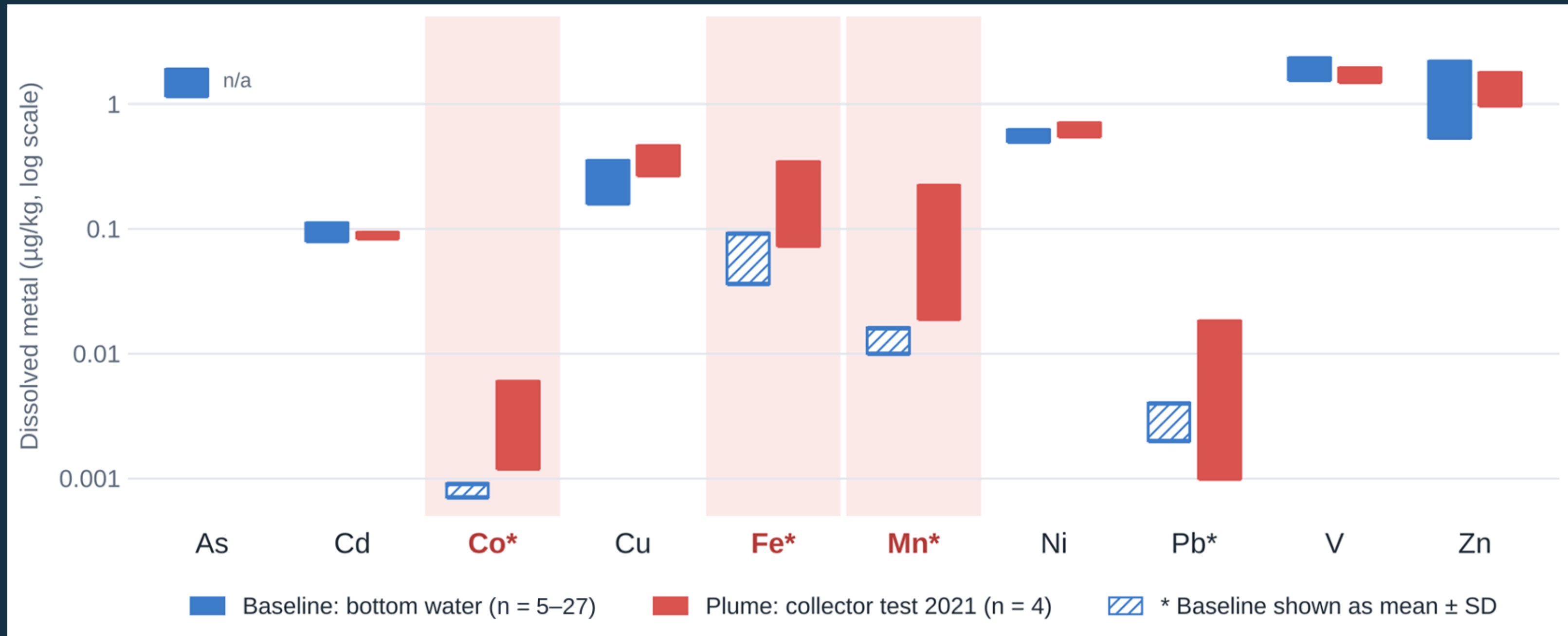
Two exposure pathways

- Seabed disturbance plume from collector
- Discharge plume from surface vessel



Physical (particles) and chemical (metals) stressors act together → integrated assessment

Plume data: limited enrichment of dissolved metals



Source: IEG report, Table 2 · Baseline: bottom water, BGR, GSR and NORI contract areas · Plume: Patania II collector test 2021 (2 days, $\leq 0.037 \text{ km}^2$) · Highlighted: Fe, Mn, Co (enrichment reported) · As: no plume data

Higher concentration $\neq$ proven toxicity → combine chemistry with biological effect data

Interim approaches to ecological reference points (ERPs)

IEG agreed: site- and operation-specific bulk toxicity (elutriate) tests → basis for ERPs and monitoring

1 · Water quality guidelines (e.g. ANZG)

99 % protection → outer limit of ZoI · 80 % → ZoMI

+ Internationally established, effect-based

– Derived for coastal species; CCZ pore-water Cu baseline > 80 % value

2 · Background-based: Mean + n × SD

n = e.g. 1 / 2 / 3 → zone transitions (illustrative)

+ CCZ-specific, objective, reproducible

– No effect data; “n” not constrained; steps may fall below analytical resolution

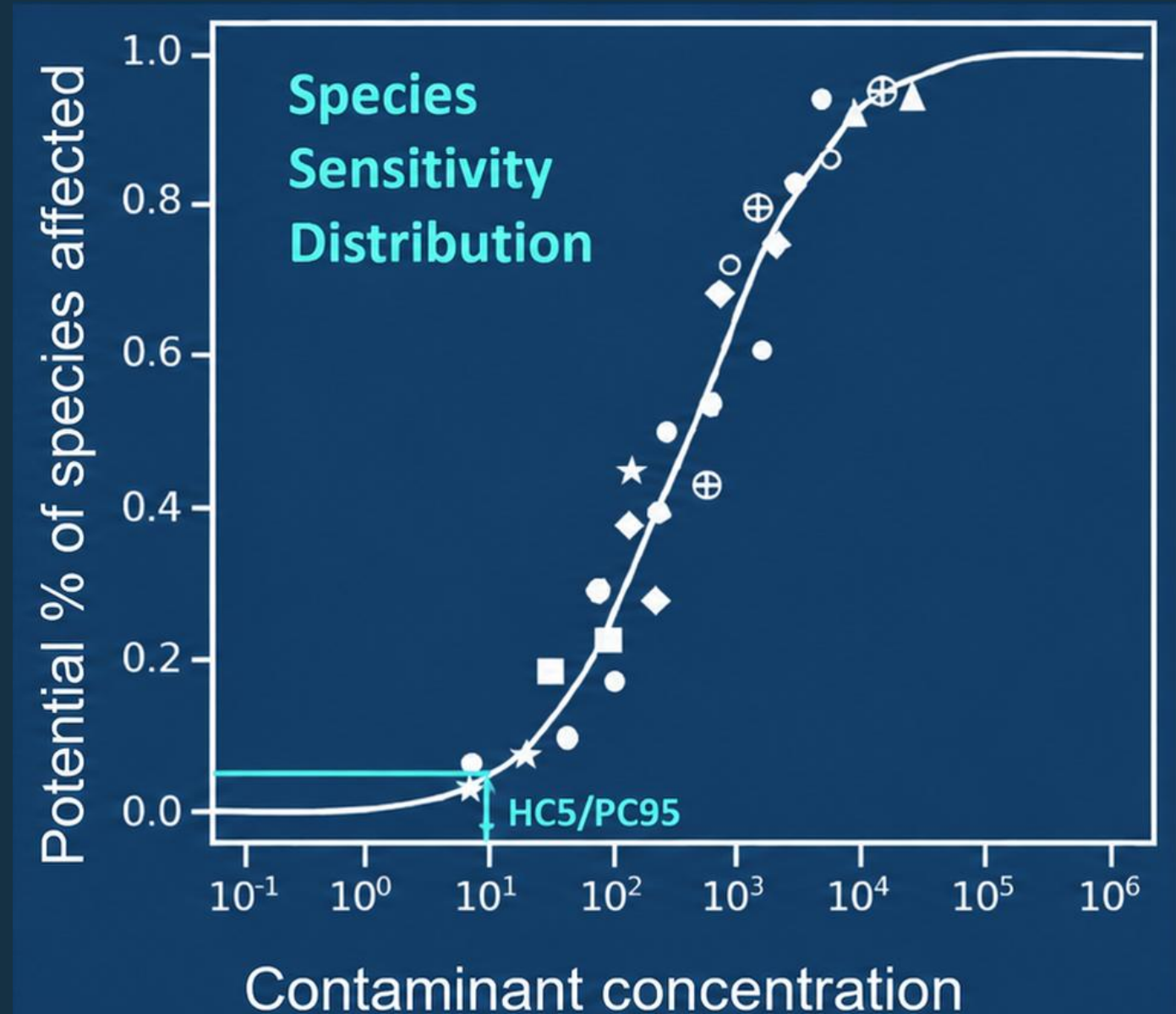


Figure: Schmidt et al. (2025) · HC5/PC95 = 95 % of species protected

Three key uncertainties and research priorities

Evidence so far: only three published studies with abyssal fauna

1

Abyssal species

Toxicity data for nodule-field fauna, including chronic and sublethal effects

2

Deep-sea conditions

How pressure, temperature, oxygen and pH modify metal behaviour and toxicity

3

Standardised methods

Agreed protocols for baselines, toxicity tests and data reporting

Consultation: new data and views on the two interim approaches are welcome

Turbidity

Plume	Turbidity	Settling of resuspended sediment
• Sediment-laden seawater • “seabed disturbance plume” and “discharged plume”(*)	• State of cloudiness measured quantitatively	• Process of settling and redeposition of sediment plume

Previous studies have revealed:

- Turbidity and settling **affect the composition and abundance** of benthic organisms.
- **Adverse effects** on organisms that feed on suspended and deposited matter, including deterioration of the feeding environment, clogging of oral apparatus, tissue loss and damage, decreased reproductive rates, and reduced respiration.

Key aspects addressed by IEG:

Spatial and temporal variation under natural conditions

- Data from turbidity meters, transmissometers, sediment traps etc...

Information from disturbance for impact assessment

- *In situ* experiments (benthic impact experiment), laboratory experiments, shallow water studies, results of collector tests, other industry results

Key aspects addressed by IEG:

Evaluation of effective indicators

- Physico-chemical indicators (e.g. SCOC, TOC);
- Biological indicators (e.g. abundance changes, ecological function).

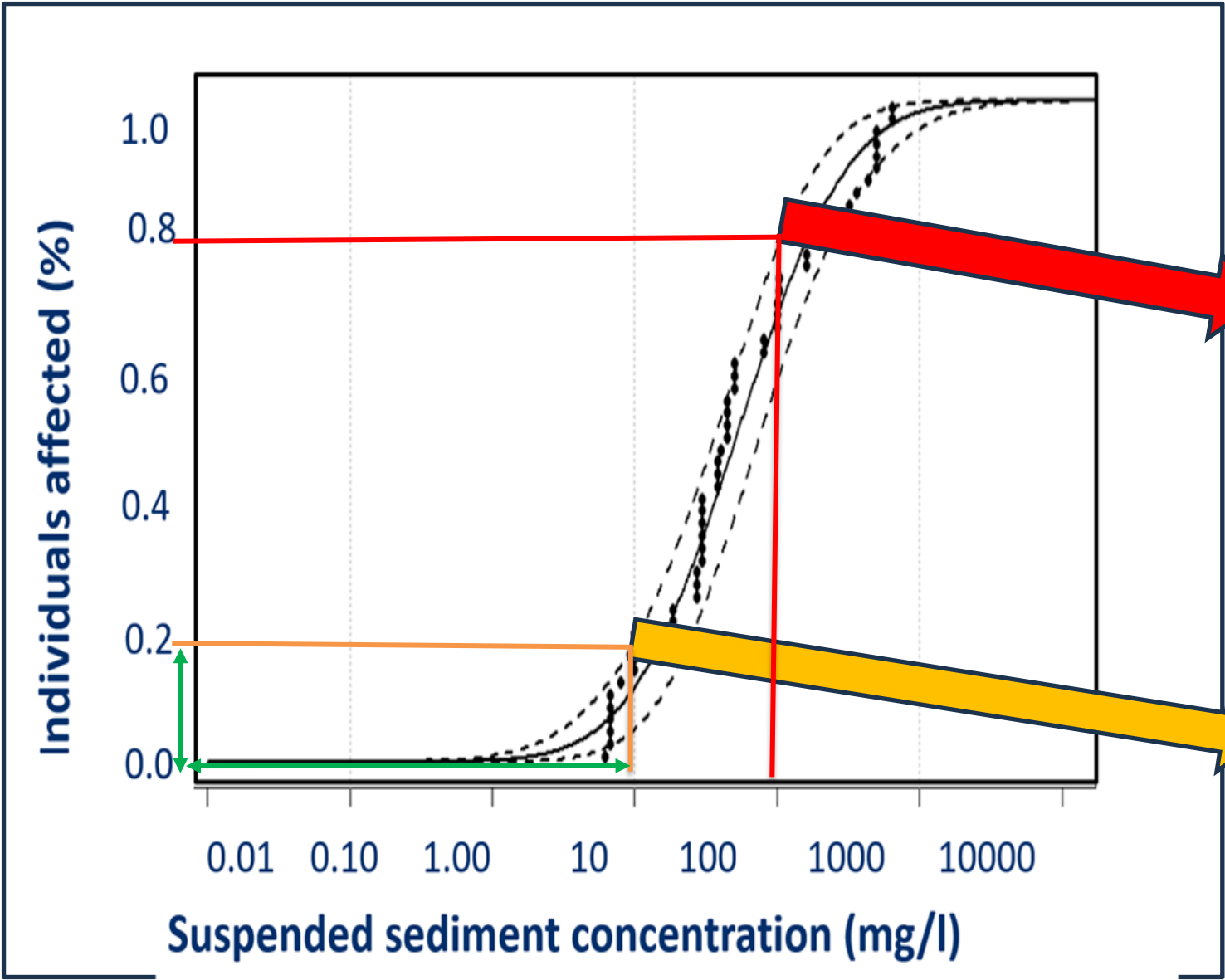
Knowledge gaps

- Equipment and sensor accuracy;
- Experiments based on deep-sea taxa;
- Applicability of shallow water results.

Illustration of results application

SSD for deep-sea corals and sponges
(meta-analysis)

Translation to Zone of Impact

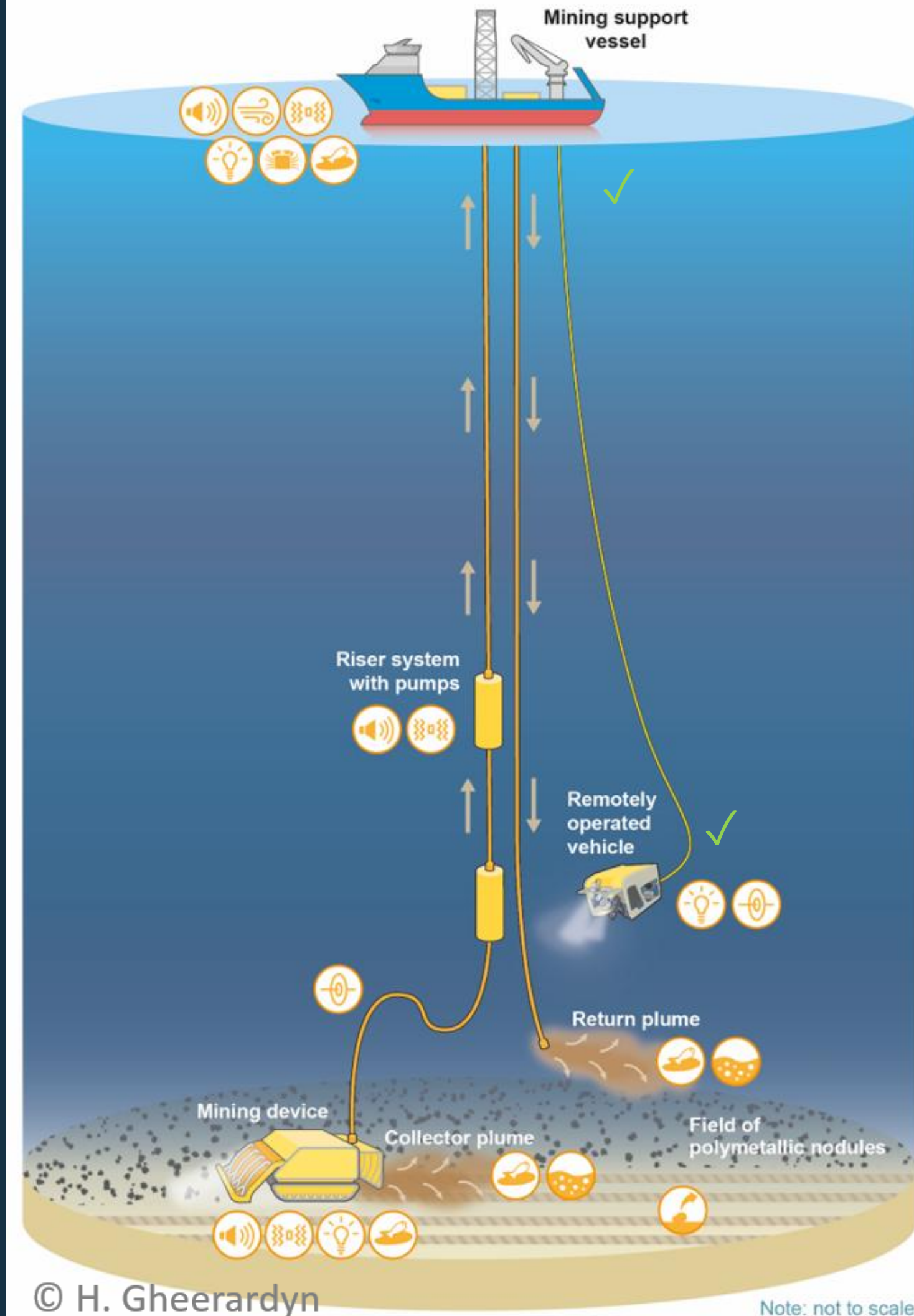


Zone	Impact category	Effects	Turbidity ERP
High Impact	Major	May cause total mortality, change in community/ecosystem, <u>irreversible</u>	Z mg/l
Medium Impact	Moderate	Causes levels of mortality, locally significant	Y mg/l
	Minor	Causes levels of stress, <u>behaviour</u> , low mortality	X mg/l
Zone of Influence	Slight	Natural levels, some stress behaviour	Background + V mg/l)
	Insignificant	Natural levels	Background

Underwater Noise

Known / repurposed components:
mining vessels, surface support

- Extensive research into impacts of noise on marine mammals, fishes and turtles
- Set of hearing group specific reference points available that delineate permanent and temporary injury for marine mammals
- Basic understanding of ambient noise as end of zone of influence



Underwater Noise

Known / repurposed components:
mining vessels, surface support

- Regulatory practice in diverse jurisdictions and across multiple industrial sectors
- These could be used as a starting point for DSM management

MARINE MAMMAL PROTECTION

Marine Mammal Acoustic Technical Guidance & Other Acoustic Tools

NMFS Acoustic Thresholds, Tools, and Technical Guidance

National

On This Page

NMFS Acoustic Thresholds and Tools

NMFS 2024 Updated Technical Guidance (AUD INJ/TTS)

Purpose of the Updated Technical Guidance

Review Process for 2024 Updated Technical Guidance

Previous Versions of Technical Guidance (PTS/TTS)

Revised Technical Guidance (2018)

2016 Technical Guidance

NMFS Acoustic Thresholds and Tools

Acoustic Thresholds

- [Summary of Marine Mammal Protection Act Acoustic Thresholds \(PDF, 7 pages\)](#)
- [Summary of Endangered Species Act Acoustic Thresholds \(Fishes and Sea Turtles\) \(PDF, 16 pages\)](#)
 - ****Note:** Updated sea turtle criteria (September 2025)** - [Updated sea turtle criteria overview \(PDF, 13 pages\)](#)
- [2024 Revision to Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing \(PDF, 193 pages\)](#)
 - [2024 Updated Technical Guidance Overview \(PDF, 16 pages\)](#)

Tools

- [Multi-Species Pile Driving Calculator](#)
 - ****Note:** Updated calculator based on updated sea turtle criteria (September 2025)**



European Commission

JRC SCIENTIFIC AND POLICY REPORTS

Monitoring Guidance for Underwater Noise in European Seas

Part I: Executive Summary

A guidance document within the Common Implementation Strategy for the Marine Strategy Framework Directive

MSFD Technical Subgroup on Underwater Noise

2014



INTERNATIONAL MARITIME ORGANIZATION

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MEPC.1/Circ.906/Rev.1
15 November 2024

REVISED GUIDELINES FOR THE REDUCTION OF UNDERWATER RADIATED NOISE FROM SHIPPING TO ADDRESS ADVERSE IMPACTS ON MARINE LIFE

- 1 The Marine Environment Protection Committee, at its sixty-sixth session (31 March to 4 April 2014), with a view to providing guidance on the reduction of underwater noise from commercial shipping, and following a recommendation made by the Sub-Committee on Ship Design and Equipment (DE), at its fifty-seventh session, approved the *Guidelines for the reduction of underwater noise from commercial shipping to address adverse impacts on marine life* (MEPC.1/Circ.833) (the Guidelines).
- 2 The Marine Environment Protection Committee, at its eightieth session (3 to 7 July 2023), following a comprehensive revision of the Guidelines by the Sub-Committee on Ship Design and Construction (SDC), at its ninth session (23 to 27 January 2023), with a view to increasing awareness, uptake and implementation, approved the *Revised guidelines for the reduction of underwater radiated noise from shipping to address adverse impacts on marine life* (MEPC.1/Circ.906).
- 3 The Marine Environment Protection Committee, at its eighty-second session (30 September to 4 October 2024), having considered draft amendments prepared by the Sub-Committee on Ship Design and Construction (SDC), at its tenth session (22 to 26 January 2024), pertaining to the inclusion of the underwater radiated noise (URN) planning reference chart, approved the annexed *Revised guidelines for the reduction of underwater radiated noise from shipping to address adverse impacts on marine life* (Revised Guidelines).
- 4 Member States are invited to use the annexed Revised Guidelines with the aim of reducing underwater radiated noise from ships and to bring them to the attention of all parties concerned, in particular ship and equipment designers, shipbuilders and shipowners and operators, classification societies, suppliers, manufacturers and other stakeholders.
- 5 Member States and international organizations are also invited to submit information, observations, comments and recommendations based on the practical experience gained through the application of these Revised Guidelines to the Marine Environment Protection Committee.
- 6 These Revised Guidelines will take effect on 1 December 2024.
- 7 This circular revokes MEPC.1/Circ.906.

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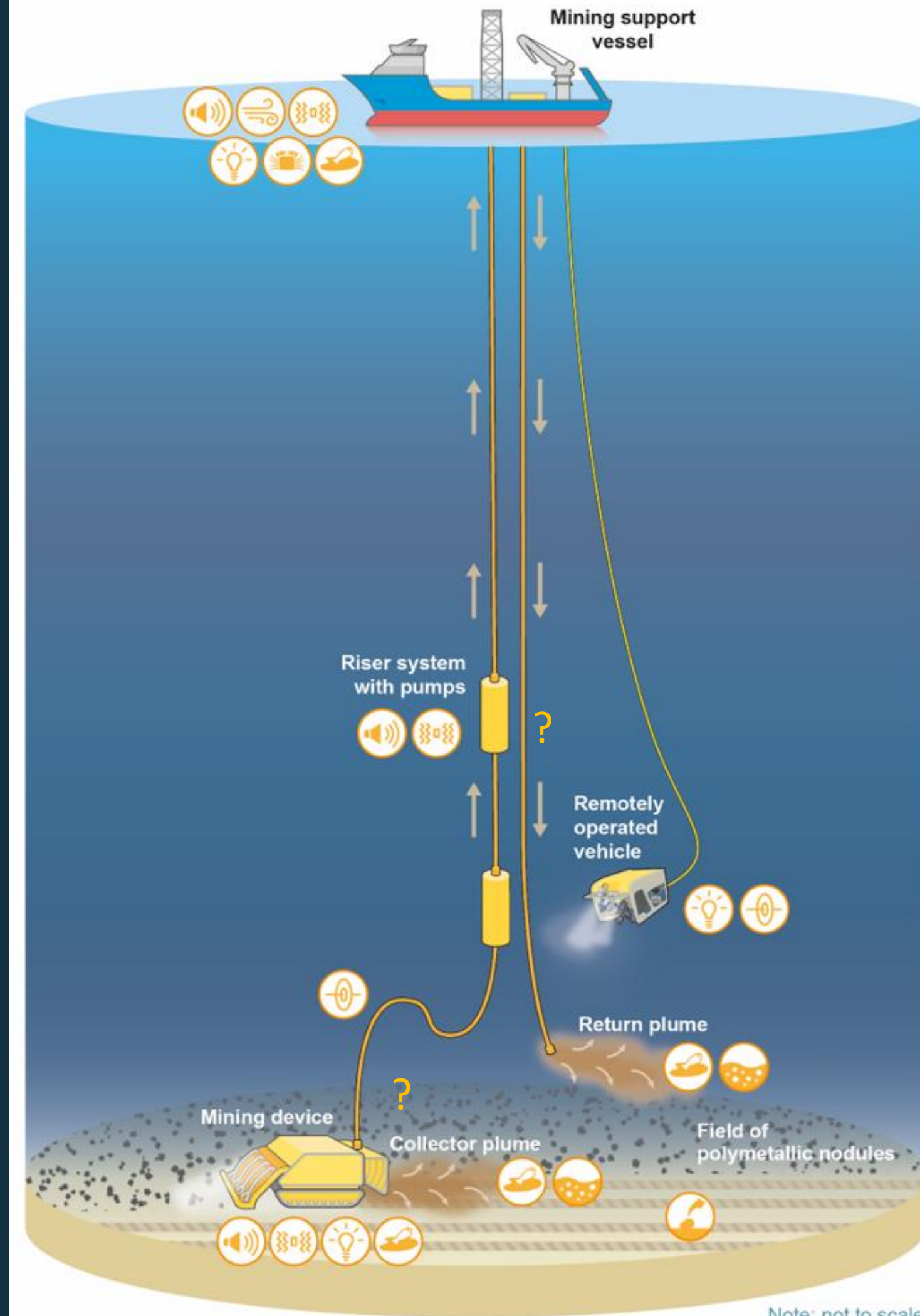


NAVIGATING THE FUTURE. SAFETY FIRST.

Underwater Noise

Novel components:
vertical transport system, seabed collector

- Little research in impacts of noise in midwater and at seabed, particularly for invertebrates
- Very little / no regulatory practice available for consideration as a starting point
- No reference points available that aid in delineation of zones of impact, particularly for invertebrates



Light Pollution

Artificial light is potentially different in spectral makeup and occurs in high intensity or from unnatural source locations at odd times

Surface vessels

Navigation and signalling, safety, equipment operation, emergency operations

COLREGS: types and configurations of lighting for navigation and safety

Int'l Commission on Illumination:

Chromaticity of navigation lights

National guidelines: Minimum luminous intensity

Seabed collector

Lighting the area of mining /monitoring, vehicle maintenance

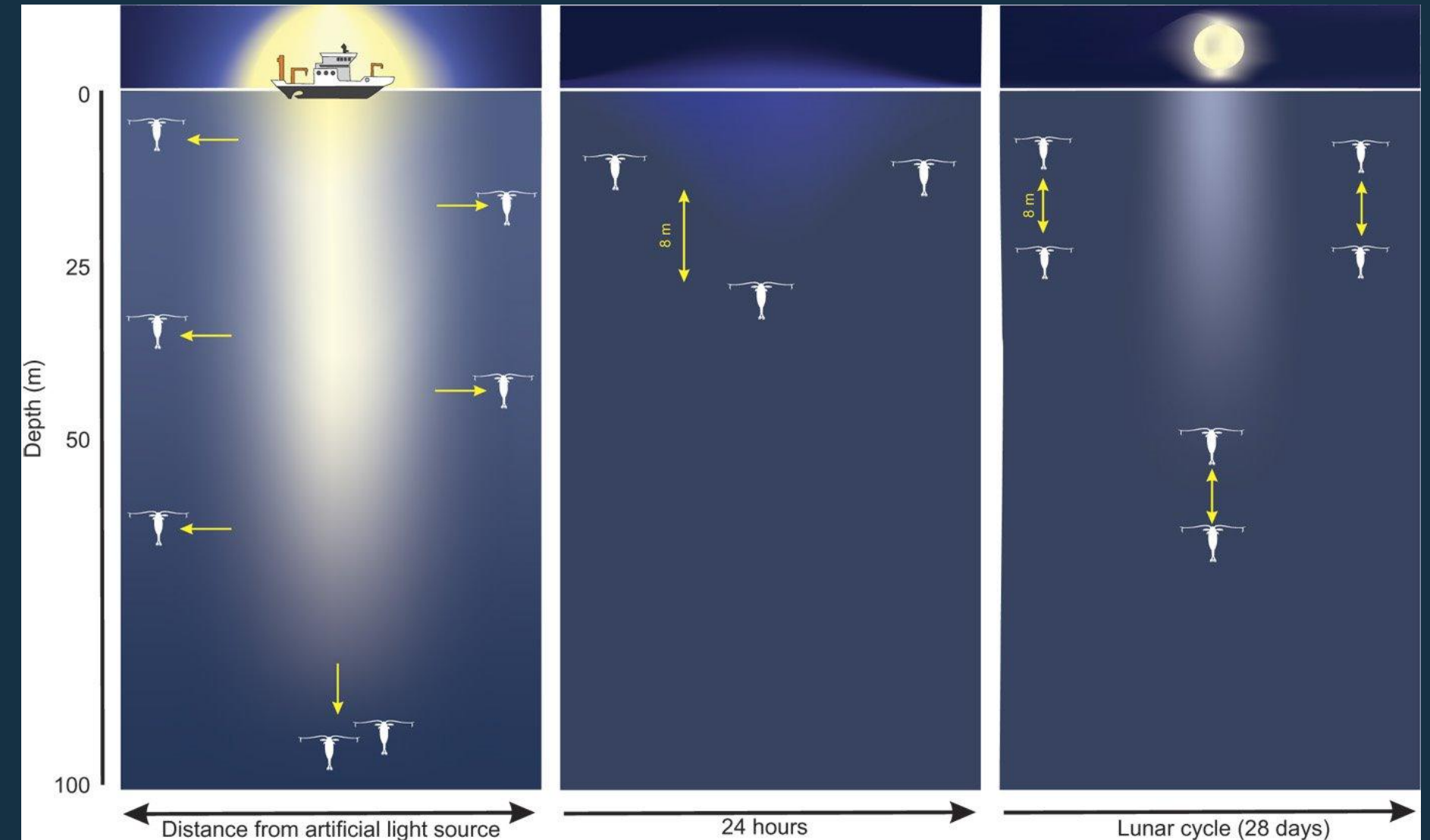
ROVs and AUVs

Imagery, collector maintenance

Light Pollution

Behavioral changes in marine organisms, often related to timing and rhythms:

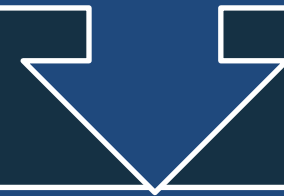
- predation patterns
- spawning synchronization
- inhibition of vertical migration patterns
- changes in life history traits
- masking of navigational cues (e.g. for seabirds and sea turtles)



Ludvigsen et al (2018): light from both a large research vessel and headlamps on a small open vessel induces an avoidance response in the pelagic community down to >80m depth

Light Pollution

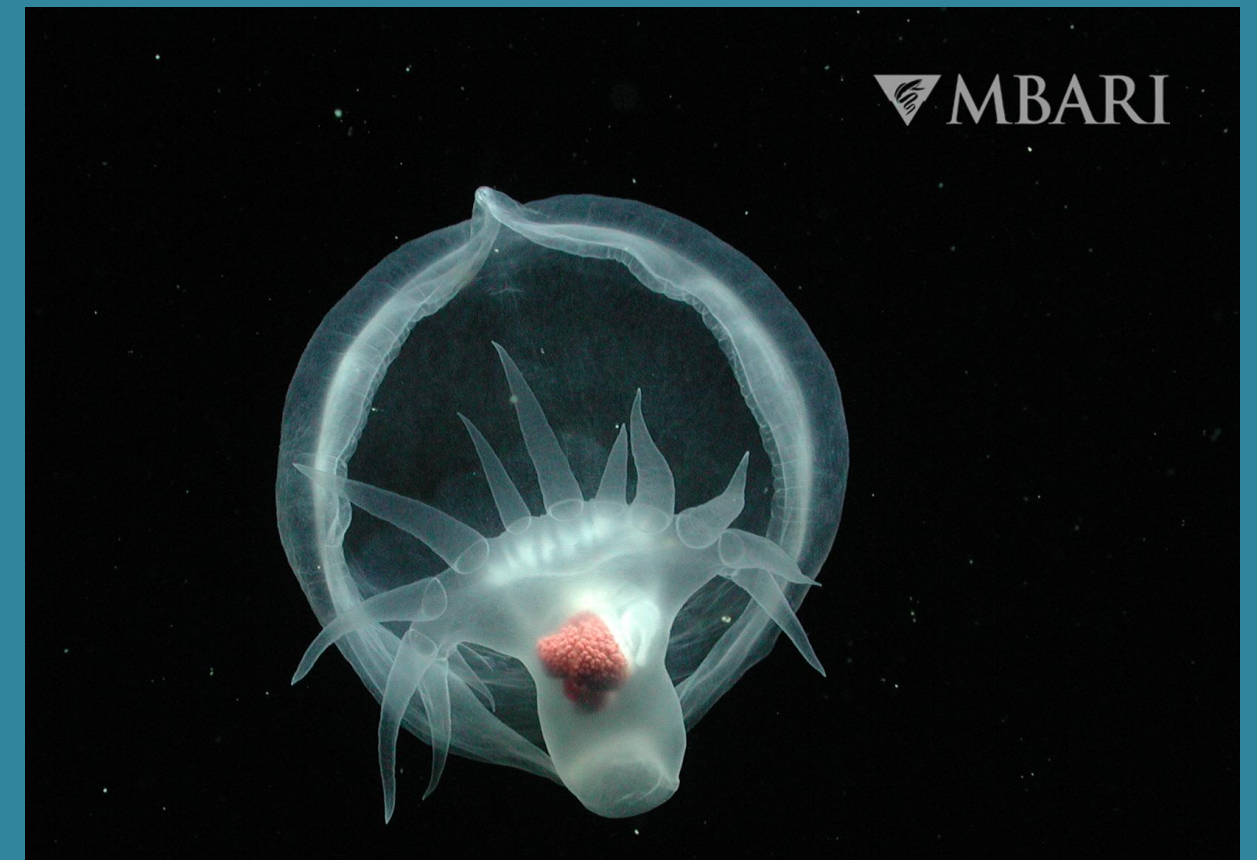
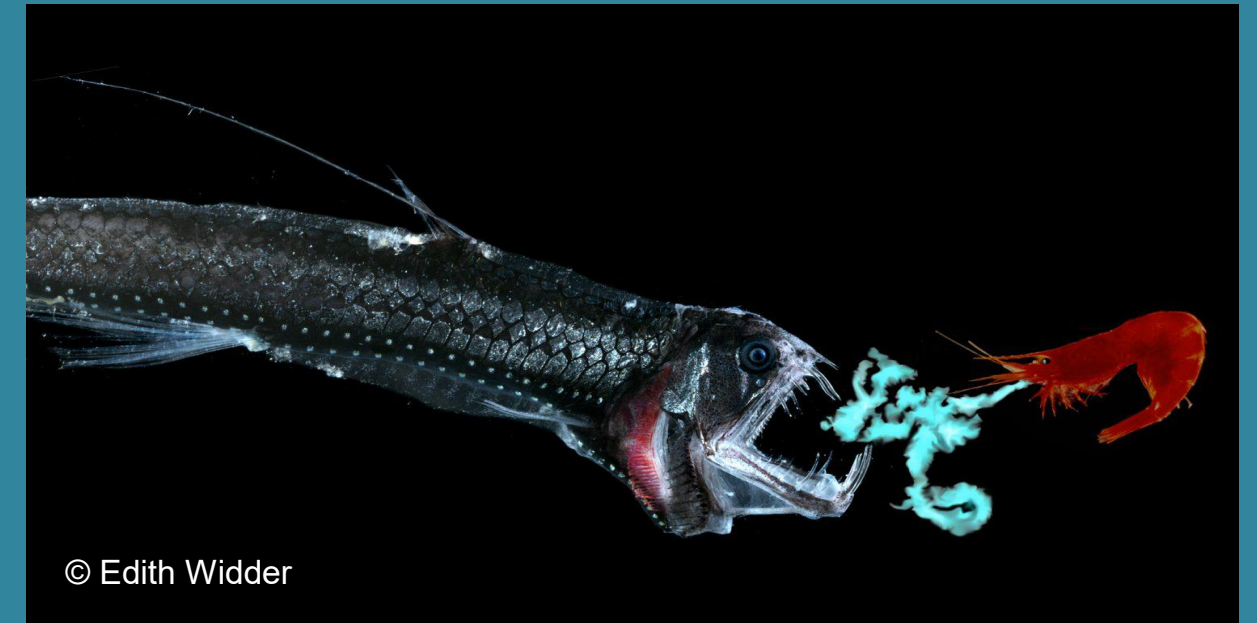
Davies et al (2020) developed an **indicative value of $0.1\mu\text{W m}^{-2} \text{s}^{-1}$ white light** as biologically significant marine light pollution



Critical depth (Z_c) to which biologically detectable light can penetrate the water column for the global coastal ocean



Concept easily translates to distance horizontally from a seabed mining operation



General Remarks

The background is a deep blue, almost black, space-like environment. In the foreground, there are dark, jagged, rocky formations. A bright, glowing horizontal line of light cuts across the middle of the image. Above this line, there are faint, wavy, white lines and a cluster of blue dots connected by lines, resembling a molecular or network structure. The overall atmosphere is mysterious and high-tech.

General Remarks

The IEG proposes a standardized Zone of Impact and Ecological Reference Points approach as a framework that best supports a science-based path towards the development of environmental thresholds.

The approach integrates the impact on the environment with the level of pressures expected from deep sea mining, in a manner already tested and used in other industries.

General Remarks

The IEG report presents a coherent methodology for future elaboration of thresholds.

Key limitations, such as indicator development, consideration of other mineral resources and cumulative effects, help outline a continued work plan towards meeting the request from Council.

Applying this approach to create thresholds will require cooperation with contractors and scientific community to increase data, and data confidence, as well as economic, political and societal input.

Stakeholder Consultation

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Consultation Process

Consultation period: 3 August to 2 November 2026

- Link to IEG report
- Link to template for submissions
- Link to supplementary information (not for consultation)

Consultation webpage:

<https://isa.org.jm/protection-of-the-marine-environment/environment-thresholds/>



International Seabed Authority

Development of
environmental threshold
values

Report of the Intersessional Expert Group (IEG)

Consultation Template

[illegible]

Tabs

1. Instructions
2. Comments
3. Example
4. Options

Submit to: user@isa.org.jm

Subject line:
“Stakeholder Consultation –
IEG Report on
Environmental Threshold
Values”

Explanatory notes

Guiding questions for general comments

Is the proposed framework based on Ecological Reference Points and Zones of Impact clearly described in the IEG report? Are there improvements to be considered for the appropriate use of the Zone of Impact model as a scientific basis for the development of environmental threshold values?

Could the Zone of Impact approach be applied to other resources, with specific considerations for spatial and temporal scale and mining technologies? Could this approach consider other pressures?

Are there additional data and information available and/or ongoing studies that could support the application of the zone of impact approach, such as new sensors (e.g. for seafloor vibration), studies on organism sensitivity for other taxa and/or deep-sea species, modelling tools?

Stakeholders are encouraged to provide comments supported, where possible, by scientific evidence; technical or operational experience; environmental monitoring data; regulatory experience; and/or peer-reviewed literature.

Next Steps

All submissions will be compiled on the webpage and reviewed by the LTC.

A summary of comments received will be prepared and made publicly available.

The LTC will consider the revised IEG report together with stakeholder submissions.

The LTC will formulate recommendations for the Council as per ISBA/27/C/42.

Questions and Answers

The background is a deep blue, almost black, space-like environment. A bright, glowing horizontal line of light blue particles or energy stretches across the middle. Above this line, there are faint, wavy, concentric lines on the left and a more complex, wavy pattern on the right. On the far right, there is a molecular structure composed of blue dots connected by lines, resembling a hexagonal lattice. The bottom of the image shows a dark, rocky, and uneven surface, possibly a beach or a planetary landscape, with some small pools of water reflecting the light.

Closing Remarks

The background is a deep blue, almost black, space-like environment. In the foreground, there are dark, jagged, rocky formations. A bright, glowing horizontal line of light spans the width of the image, just above the rocks. Above this line, there are various abstract patterns: wavy lines on the left, a dense cluster of small blue dots on the right, and a faint molecular structure on the far right. The overall mood is futuristic and high-tech.



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Thank you for attending