

Potential interactions between deep-sea mining and tuna fisheries

Jesse van der Grient

DJ Amon, B-J Dobush, JC Drazen, D McCauley, N Nathan

Deep-sea mining should be considered

- What is deep-sea mining?
- How might deep-sea mining impact tuna fisheries?
- What is the potential overlap between deep-sea mining areas and the WCPFC Convention Area?
- What is the state of deep-sea mining regulation?

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Potential interactions between deep-sea mining and tuna fisheries



Authors

Diva J. Amon¹, Bobbi-Jo Dobush², Jeffrey C. Drazen³, Douglas McCauley¹, Neil Nathan¹, Jesse M.A. van der Grient⁴

¹ Marine Science Institute, University of California, Santa Barbara, Santa Barbara, CA, USA

² The Ocean Foundation, USA

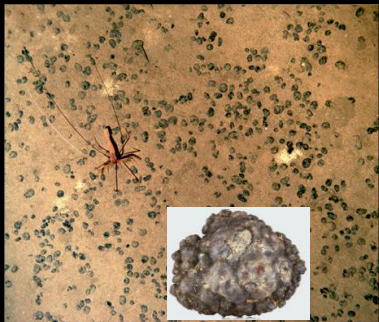
³ University of Hawaii at Manoa, Honolulu, HI, USA

⁴ South Atlantic Environmental Research Institute, Stanley, Falkland Islands

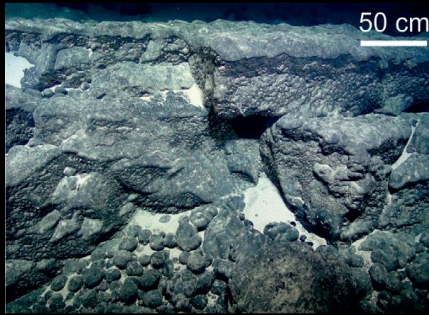
Prepared in collaboration with The Ocean Foundation

Deep-sea mining

Deep-sea mineral deposits
(>200 m depth)



Polymetallic nodules

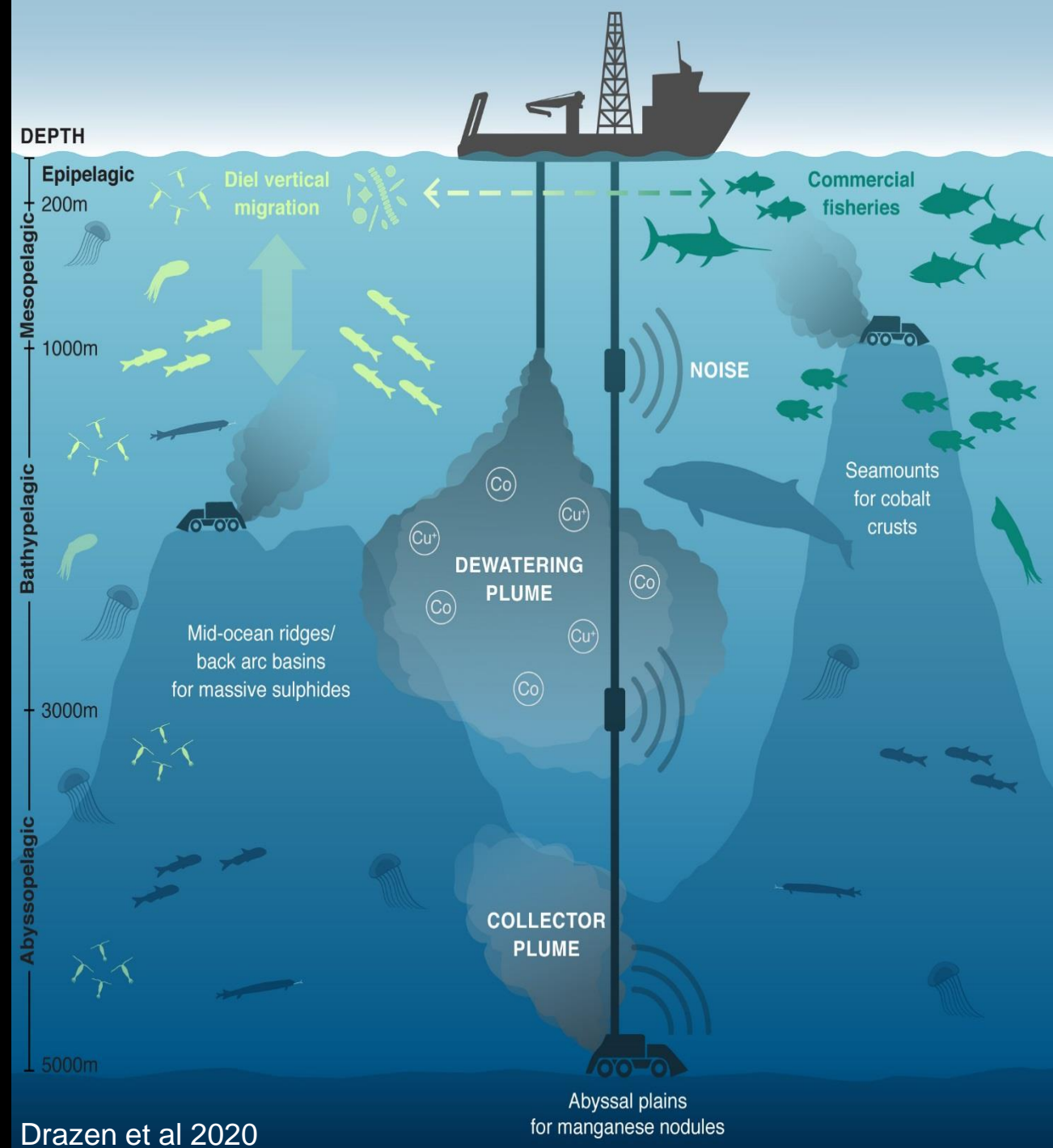


Cobalt-rich crusts



Seafloor massive sulfides

Occur in WCPFC
Convention Area



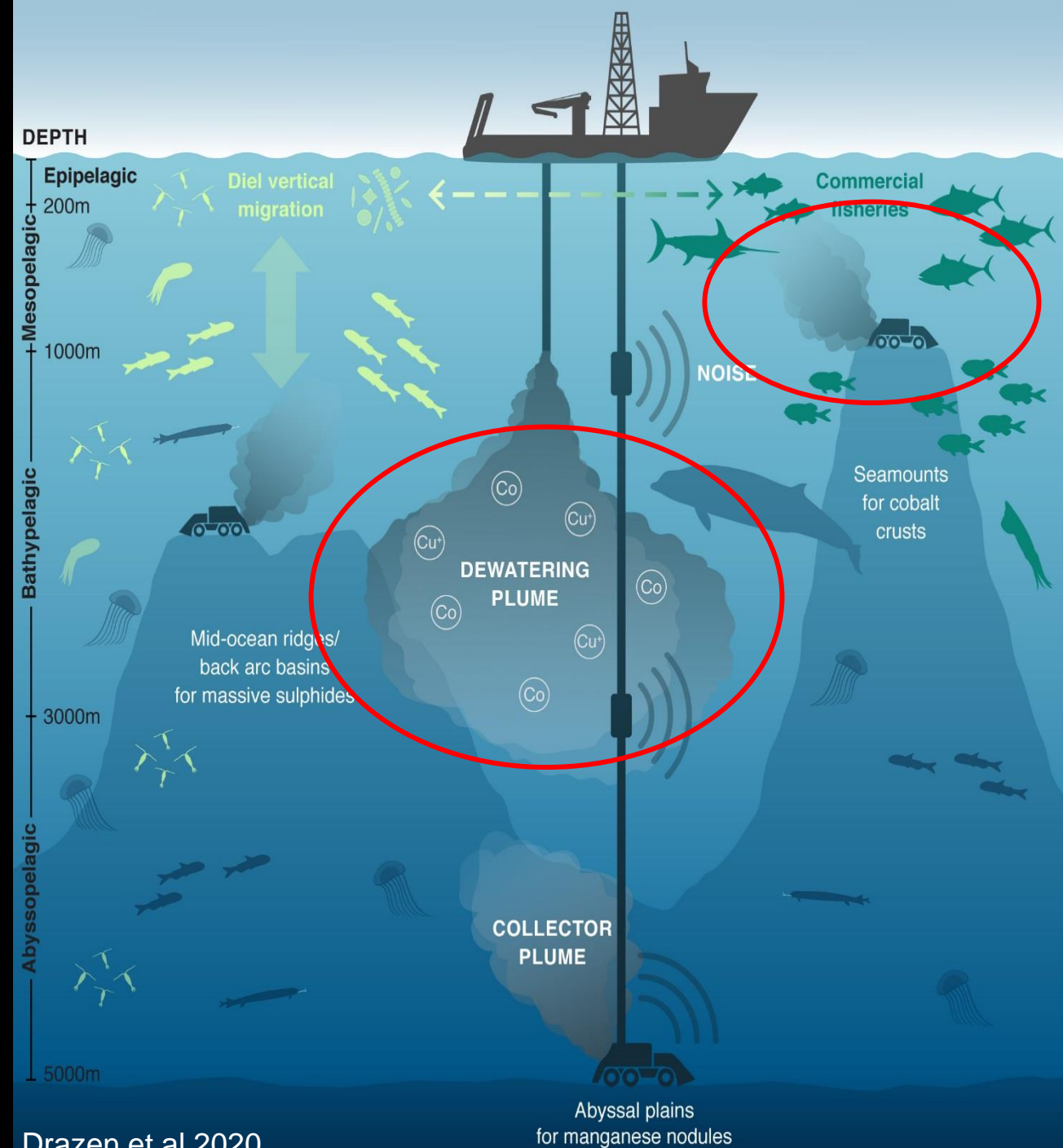
Deep-sea mining will have benthic and pelagic impacts

Benthic impacts can extend into the water column

- Especially at seamounts

Pelagic impacts less understood

- Very little or no data



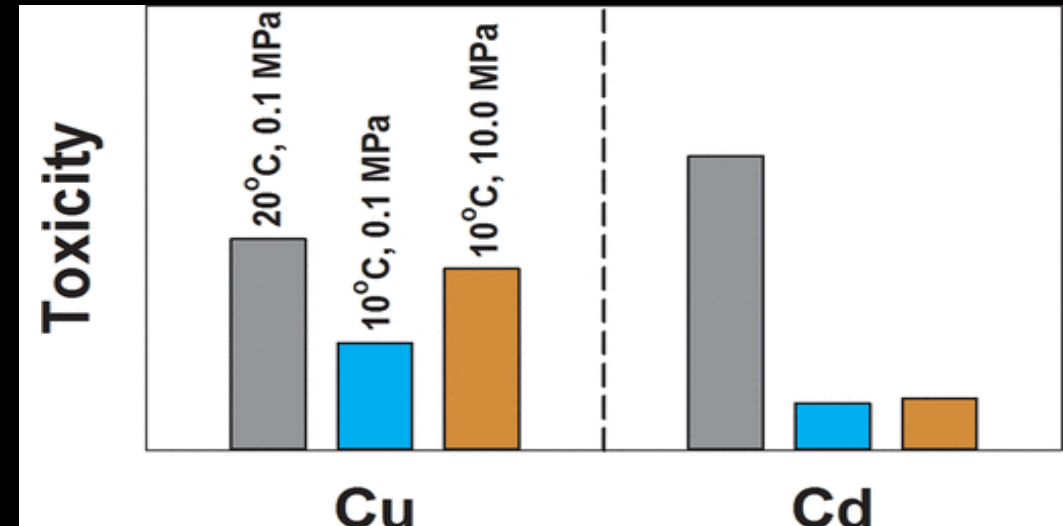
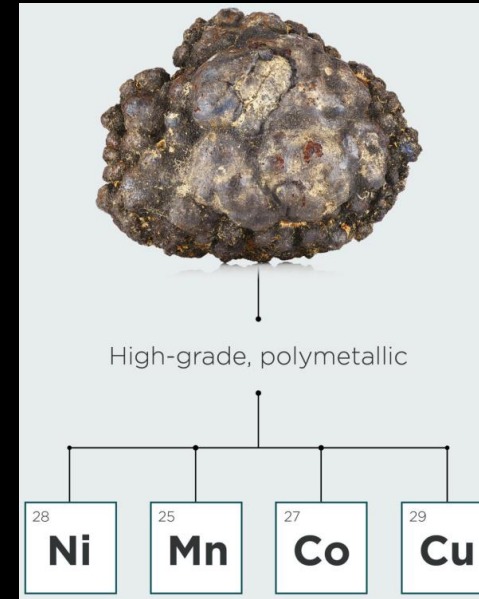
Deep-sea mining has benthic and pelagic impacts

Expected pelagic impacts include:

- Elevated sediment concentrations
- Dissolved metals in plumes
- Noise pollution
- Increased boat traffic

Expected effects include:

- Respiratory distress
- Auditory distress
- Reduced feeding
- Reduced visual communication
- Buoyancy issues
- Metal toxicity

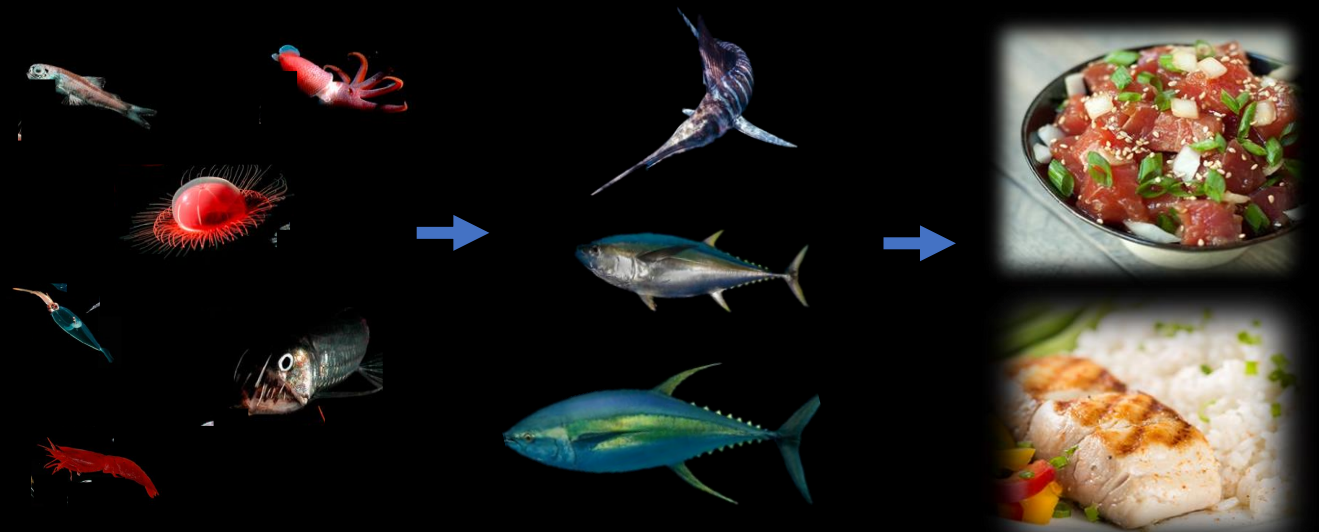


Brown et al. 2017

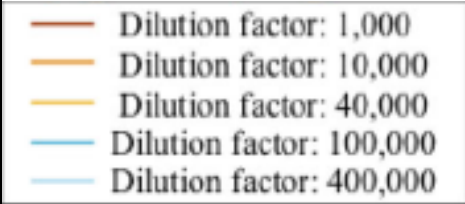
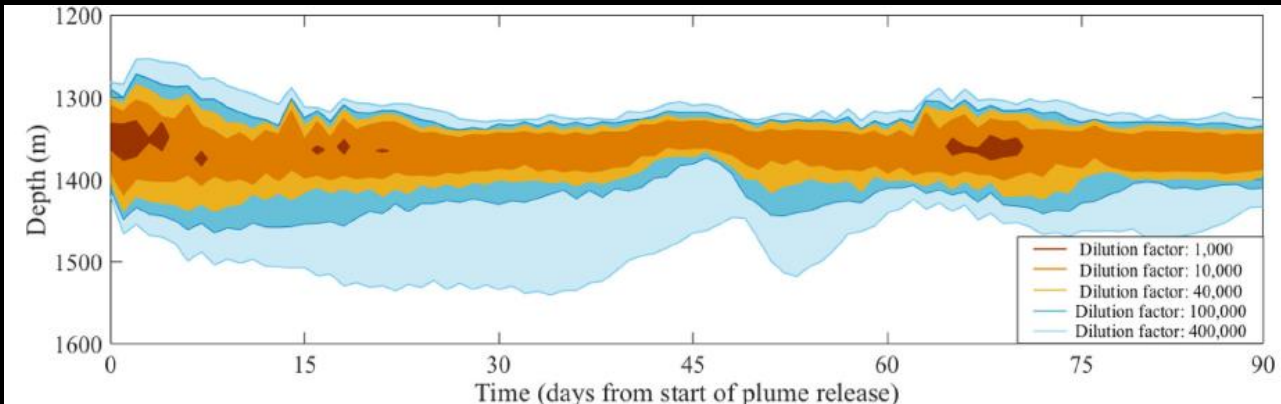
The deep sea has links to our dinner plates

Expected effects on fisheries include:

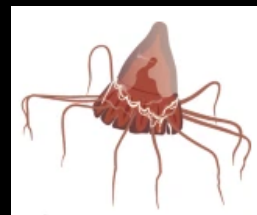
- Avoidance of area
- Reduced foraging
- Seafood contamination via prey
 - Can potentially lead to overreaction in consumer behaviour



Scale of pelagic impacts could be extensive



Healthy



Unhealthy

Stenvers et al. 2023

Plumes may:

- Extend ≥ 10 -50 km from release (Muñoz-Royo et al. 2021)
- Cover a large volume
 - 50,000 m³ per day or one freight train (Oebius et al. 2001)
 - 1500 – 3000 km³ per year (Quillon et al. 2022)

Noise may:

- Exceed 120 dB re 1 μ Pa in 4-6-km radius (Williams et al. 2022)

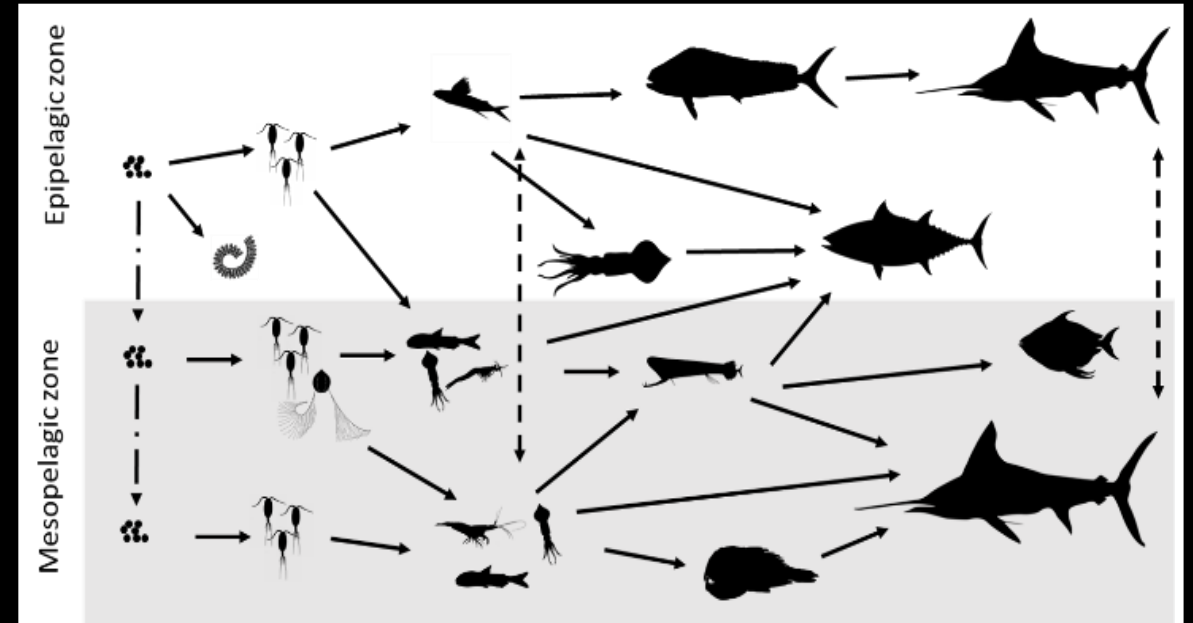
Scale:

- 1 polymetallic nodule contract area = 75,000 km²
- 1 cobalt-rich crust contract area = 3000 km²

Overlap between high-seas fisheries and mining areas will depend on metric used

Direct impact from infrastructure

- Potential clash between gear
 - Number of boats and associated gear
 - Hours of operation in area
 - Requires consideration of all fishing operations in an area
- Could be avoided by sharing location
 - Note that fishing vessels may need flexibility as fishes move depending on the environment
- Does not incorporate mining-related impacts
 - Mining plumes
 - Noise
 - Trophic cascades



Overlap between high-seas fisheries and mining areas will depend on metric used

Spatial overlap in terms of catches

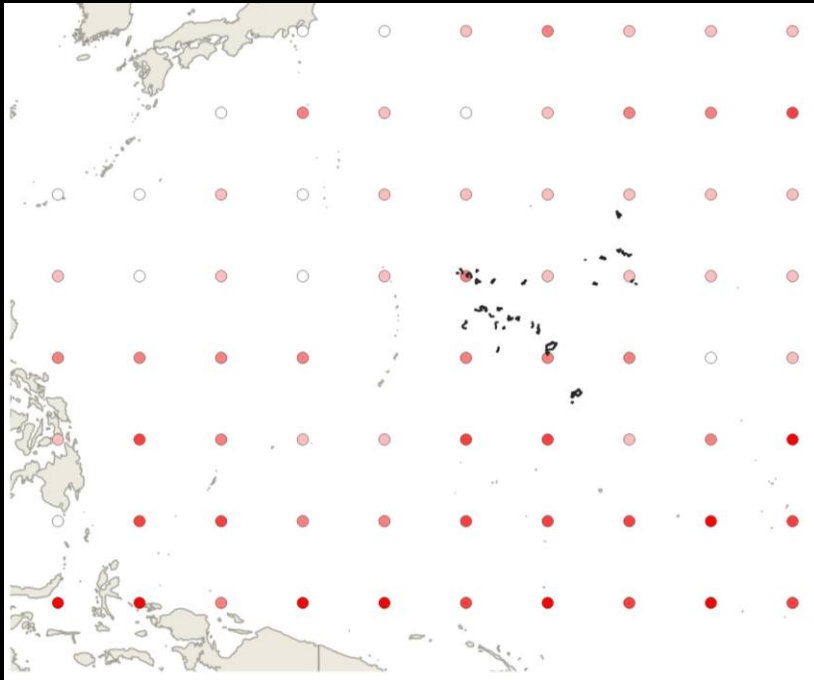
- Where are catches obtained?
 - Are fisheries operating in mining areas?
 - How does this relate to the wider area?
- More consideration of spatial spread of mining-related impacts
 - Spread of impacts is poorly understood
 - Does not consider type of impact
- Focused on tunas as these species make up most of catches in high-seas areas overlapping with mining areas

$$Overlap (\%) = \frac{Catch\ in\ PCZ}{Catch\ in\ RFMO} \times 100$$

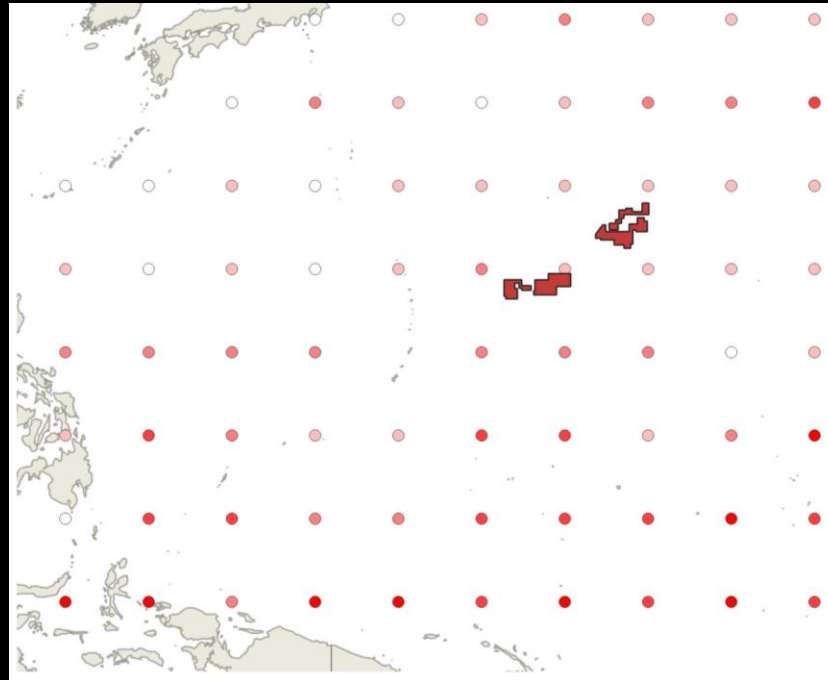
Catch = average annual RFMO-reported catch (2005-2015)

There is spatial overlap between deep-sea mining areas and tuna fisheries

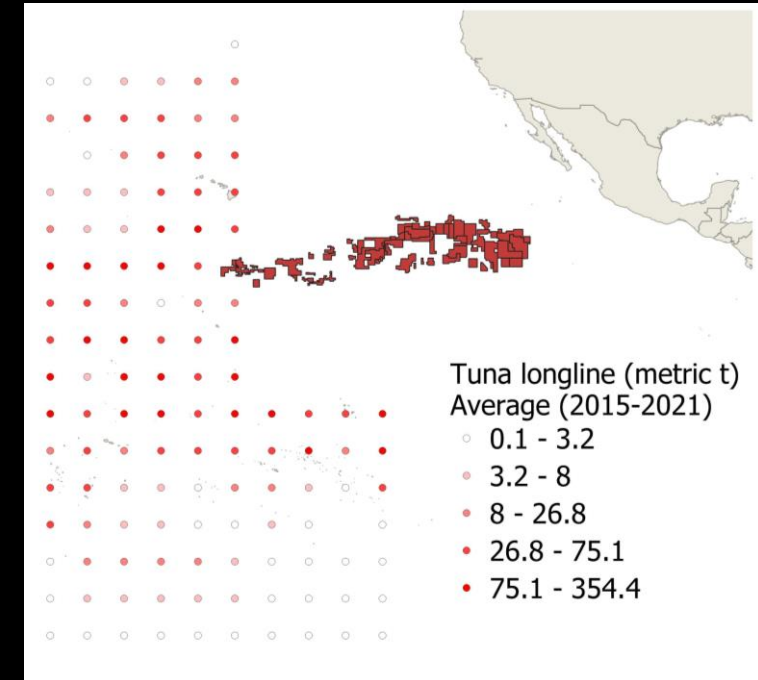
PCZ - Cobalt-rich crusts



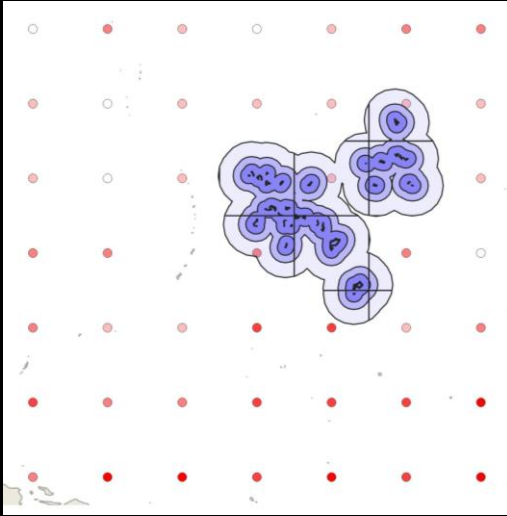
PCZ - Polymetallic nodules



CCZ – Polymetallic nodules



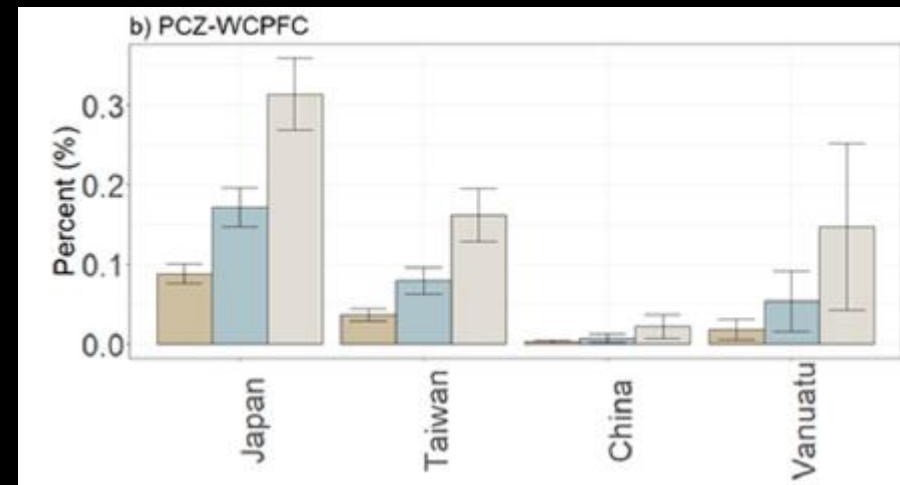
Overlap will depend on spread of impacts, but it is not equal between fishing Nations



$$\text{Overlap (\%)} = \frac{\text{Catch in PCZ}}{\text{Catch in RFMO}} \times 100$$

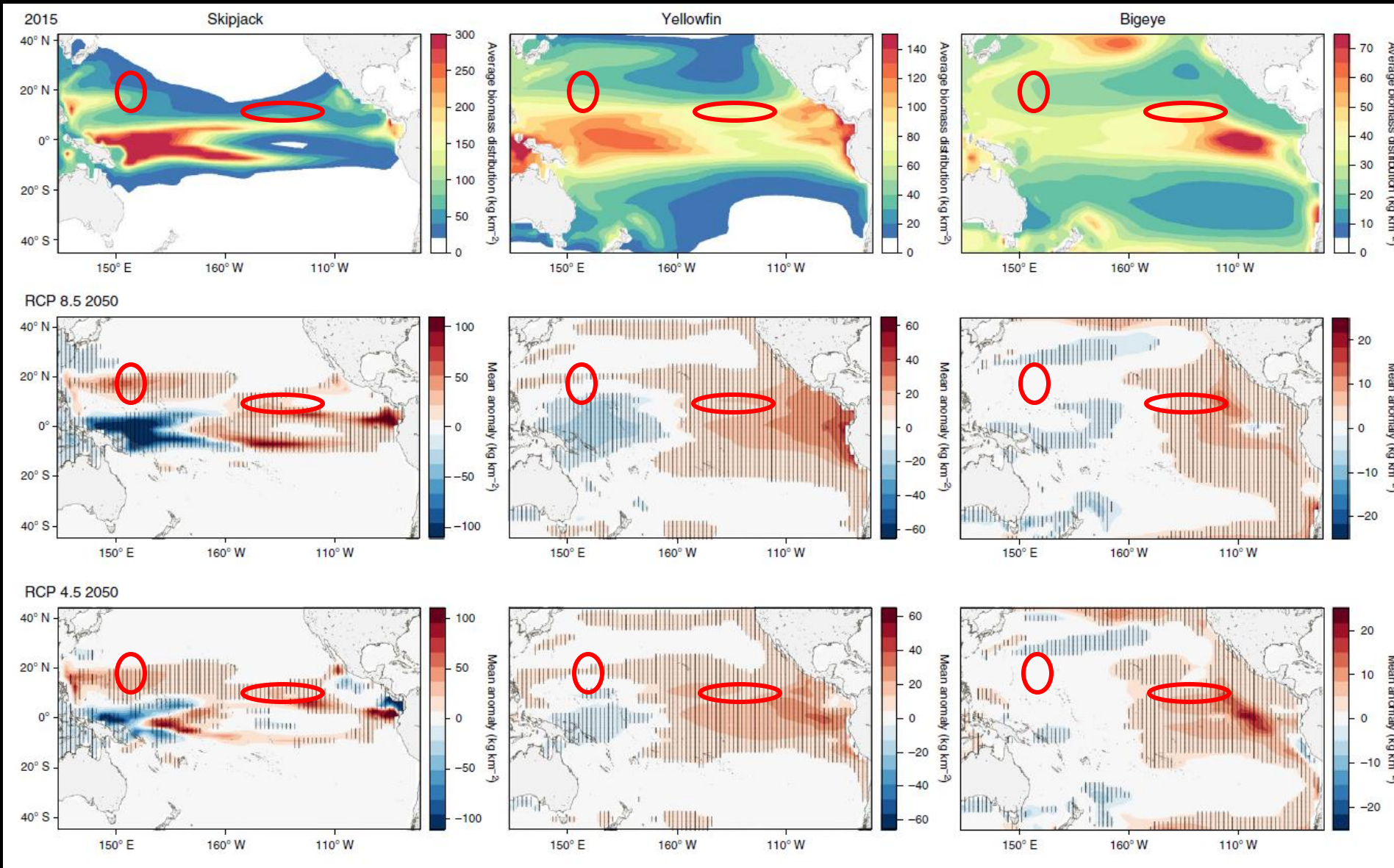
Catch = average annual RFMO-reported catch (2005-2015)

Zone of influence	Total (%)	Bigeye tuna (%)	Yellowfin tuna (%)
50 km	0.06	0.14	0.18
100 km	0.12	0.29	0.37
200 km	0.22	0.55	0.70



Note: nodule areas not calculated!

Will climate change change overlap ?



Migration effect?

Mining national waters?

Mining code is currently being developed at the ISA

- International Seabed Authority:
 - No commercial mining yet
 - Mining tests have been conducted
- Now is the time to engage
 - Discussions on regulations has accelerated
 - Regulations not finished
 - Regulations discuss 'other ocean users'
 - E.g., sea cables (International Cable Protection Committee is an observer)
 - Fisheries are not well represented
 - First commercial license application in 2024?



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Options moving forward

- High-seas fisheries and the Blue Economy
 - Interest of stakeholder should be considered
- WCPFC could request Observer status
- Develop mechanisms for information exchange
 - Ensure resources and time for WCPFC staff to engage on deep-sea mining and fisheries interactions
 - Engage with WCPFC Member States on deep-sea mining and fisheries interactions
 - Especially ISA delegates
- Encourage ISA to consider ecosystem-based management
 - Consider other ocean users in Mining Code and Regional Environmental Management Plan (REMP)

Acknowledgements

