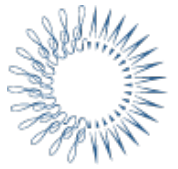


Seabed Mining: “The Dawn of an Industry” and the need for a Precautionary Approach

Washington MRC Summit October 2020

Tom Rudolph, Officer, The Pew Charitable Trusts





THE PEW CHARITABLE TRUSTS

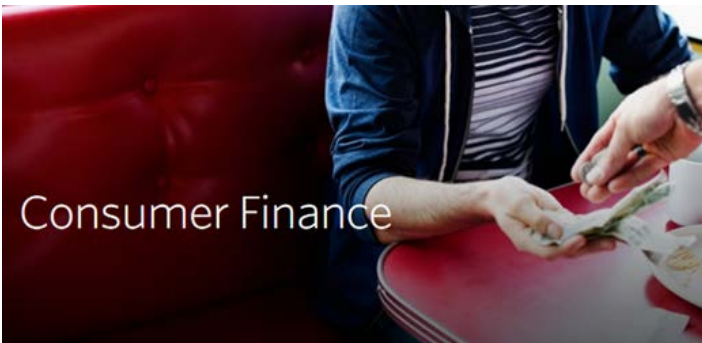
Who we are and what we do



Marine Fellows



Pew Biomedical Scholars



Consumer Finance



Collection

Supermoms Against Superbugs

A group of advocates from across the country who are concerned about the problem of antibiotic resistance



Restore America's Parks



Financial Security and Mobility



Kids' Safe and Healthful Foods Project



Dental Campaign



Goals of the Presentation

- Provide an overview of seabed mining, its effects, and Pew's proposed actions
- Specifics for Washington
- Items for Washington managers, stakeholders, and rightsholders to consider



Seabed Mining Overview- Part 1

- Some useful distinctions:
 - Hard minerals vs. Sand, Gravel and Shell
 - Nearshore vs. Deep Sea
 - Traditional/Artisanal vs. Industrial
 - Existing vs. New

These are somewhat porous and overlapping



Seabed Mining Overview- Part 2

- Four factors in the global emergence of seabed mining for hard minerals
 - Industry/government interest
 - Improving exploratory and extractive technology
 - Increasing demand
 - Depleted terrestrial sources



Seabed Mining Overview- Part 3

• Impacts

- Seafloor biota and habitat: Removal/destruction/mortality
 - Associated loss of biodiversity
- Temperature-related impacts from dewatering returns
- Spatial conflict with existing ocean stakeholders and rightsholders (e.g. fisheries)
- Increased noise
- Sediment-related impacts (benthic and pelagic):
 - Smothering
 - toxicity
 - Turbidity
 - interference with feeding



Seabed Mining Overview- Part 4

- Pew's U.S. Campaign
 - Focused on protection of the most vulnerable areas especially nearshore (e.g. state-managed waters)
 - Focused on the most invasive potential activity (hard mineral exploration and extraction)



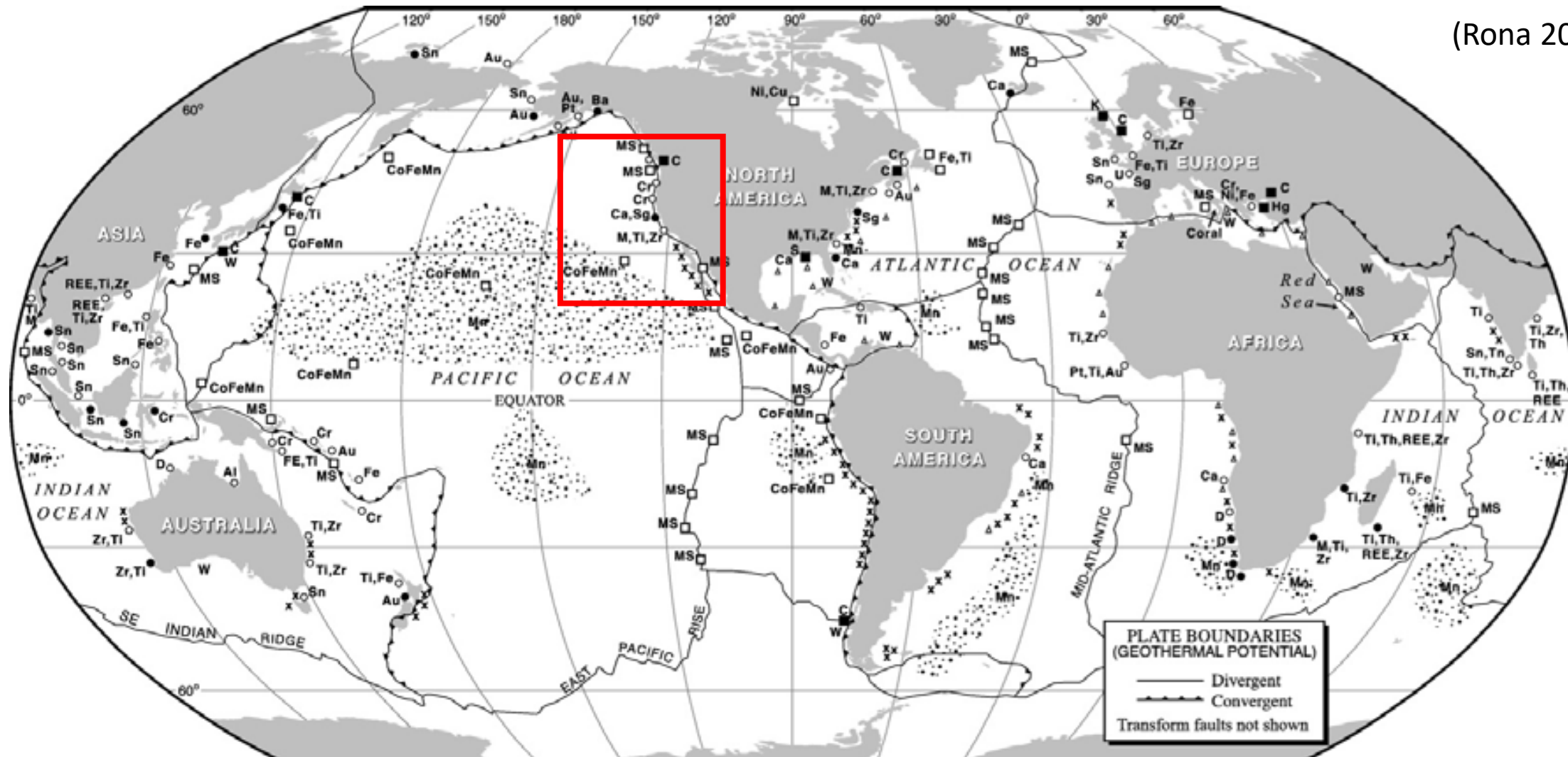


What are they prospecting or mining for? (globally)

Deep-sea minerals: Manganese nodules, polymetallic sulphides, and ferro-manganese crusts. Rich in scarce metals like copper, zinc, nickel, cobalt, gold, silver and rare earth elements.

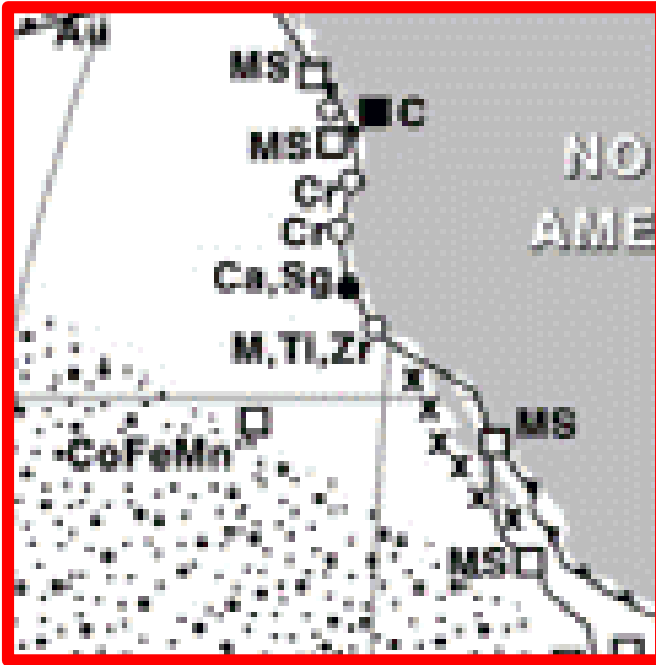
Nearshore areas: metal ores and metal-rich sands (precious and semi-precious metals like gold, iron, titanium, chromite, etc.), marine phosphorites (sedimentary rocks or crusts rich in phosphorus, used mainly as fertilizer), tin, diamonds, etc.



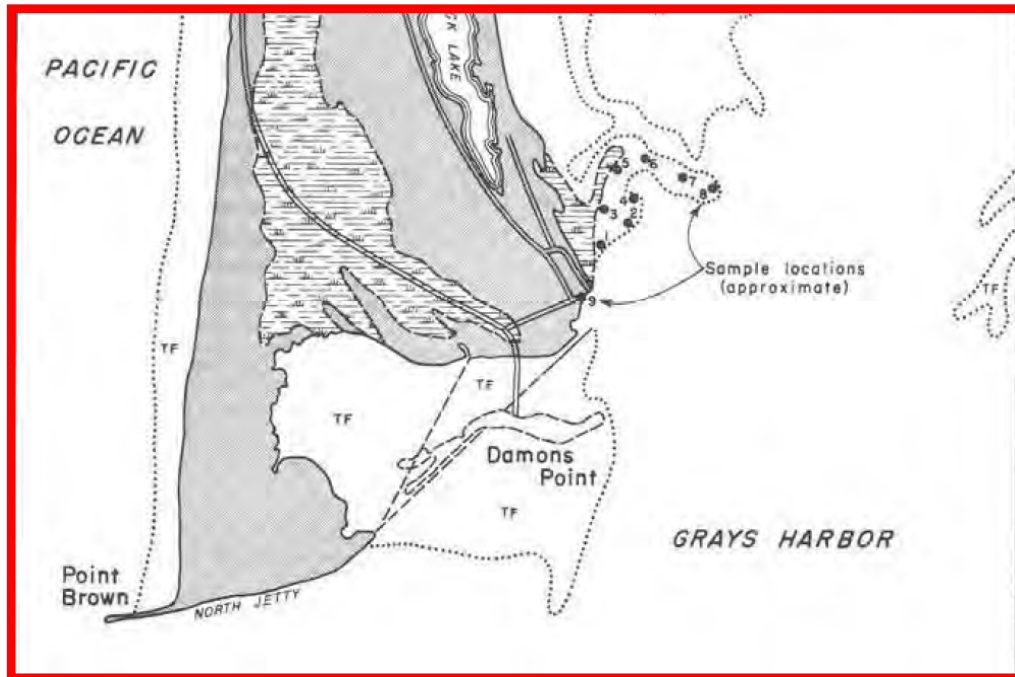


Ag SILVER	Ca LIME MUD, SAND, SHELLS	Hg MERCURY	Ni NICKEL	Sg SILICEOUS SAND, GRAVEL	UNCONSOLIDATED DEPOSITS
Al BAUXITE	Cr CHROMITE	K POTASH	----- PHOSPHORITE	Sn TIN	○ UNDEVELOPED
Au GOLD	Cu COPPER	M MONAZITE	Pt PLATINUM	Th THORIUM	● DEVELOPED
Ba BARITE	D DIAMONDS	MS MASSIVE SULFIDES	REE RARE EARTH ELEMENTS	Ti ILMENITE, RUTILE	□ UNDEVELOPED
c COAL	Fe IRON, MAGNETITE	Mg MAGNESIUM	△ SALT	U URANIUM	■ DEVELOPED
Co COBALT-RICH FERROMANGANESE CRUST	G GEMS	Mn MANGANESE NODULES	S SULFUR	W FRESH WATER	
				Zr ZIRCON	

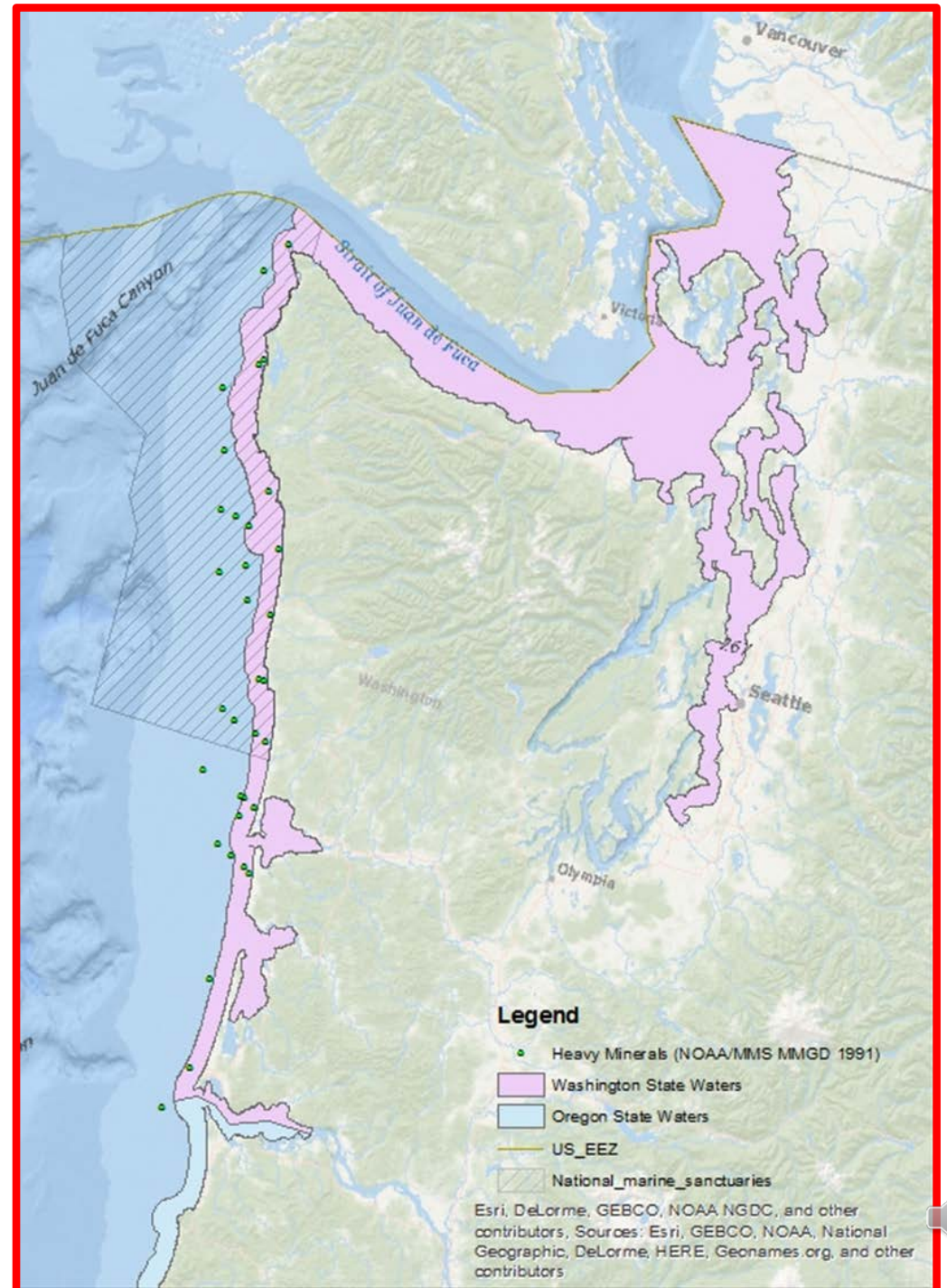




(Rona 2008)



(WA DMG 1964)



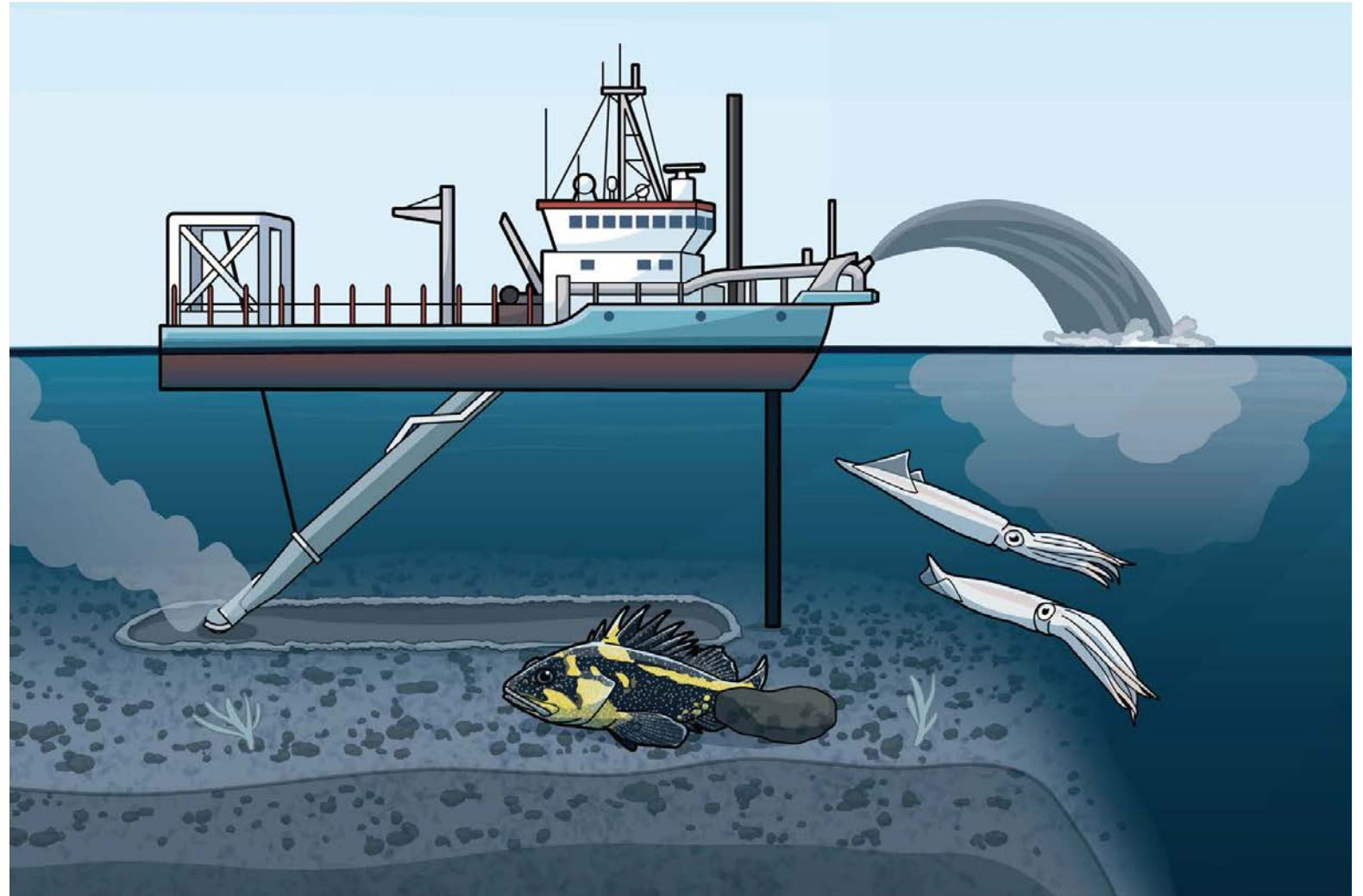
Legend

- Heavy Minerals (NOAA/MMS MMSD 1991)
- Washington State Waters
- Oregon State Waters
- US_EEZ
- National_marine_sanctuaries

Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors, Sources: Esri, GEBCO, NOAA, National Geographic, DeLorme, HERE, Geonames.org, and other contributors

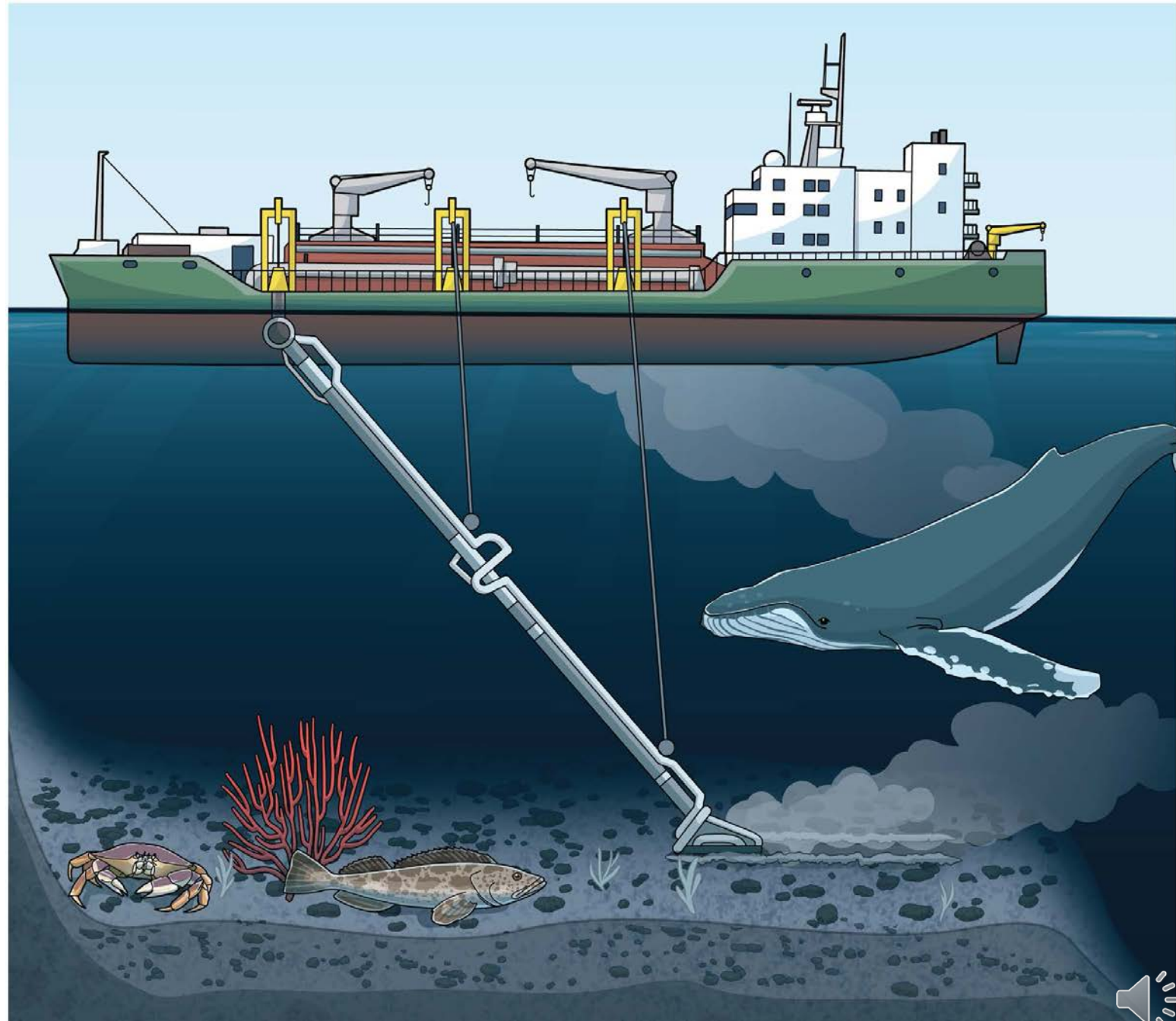
Hydraulic dredges

Hydraulic dredges threaten nearshore areas by destroying plants and animals, harming the seafloor, and polluting the water with waste.



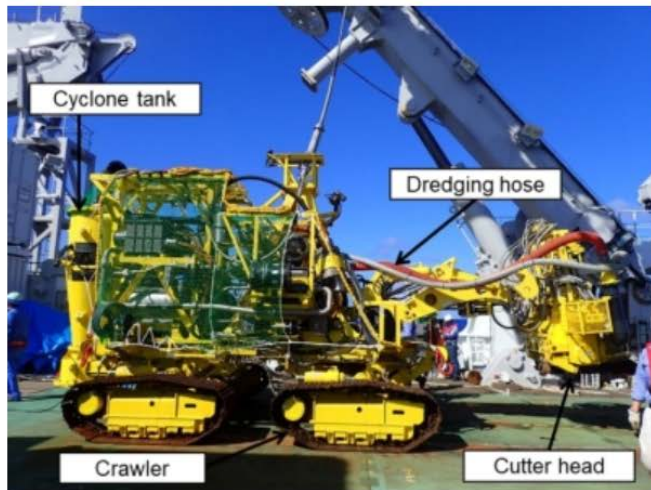
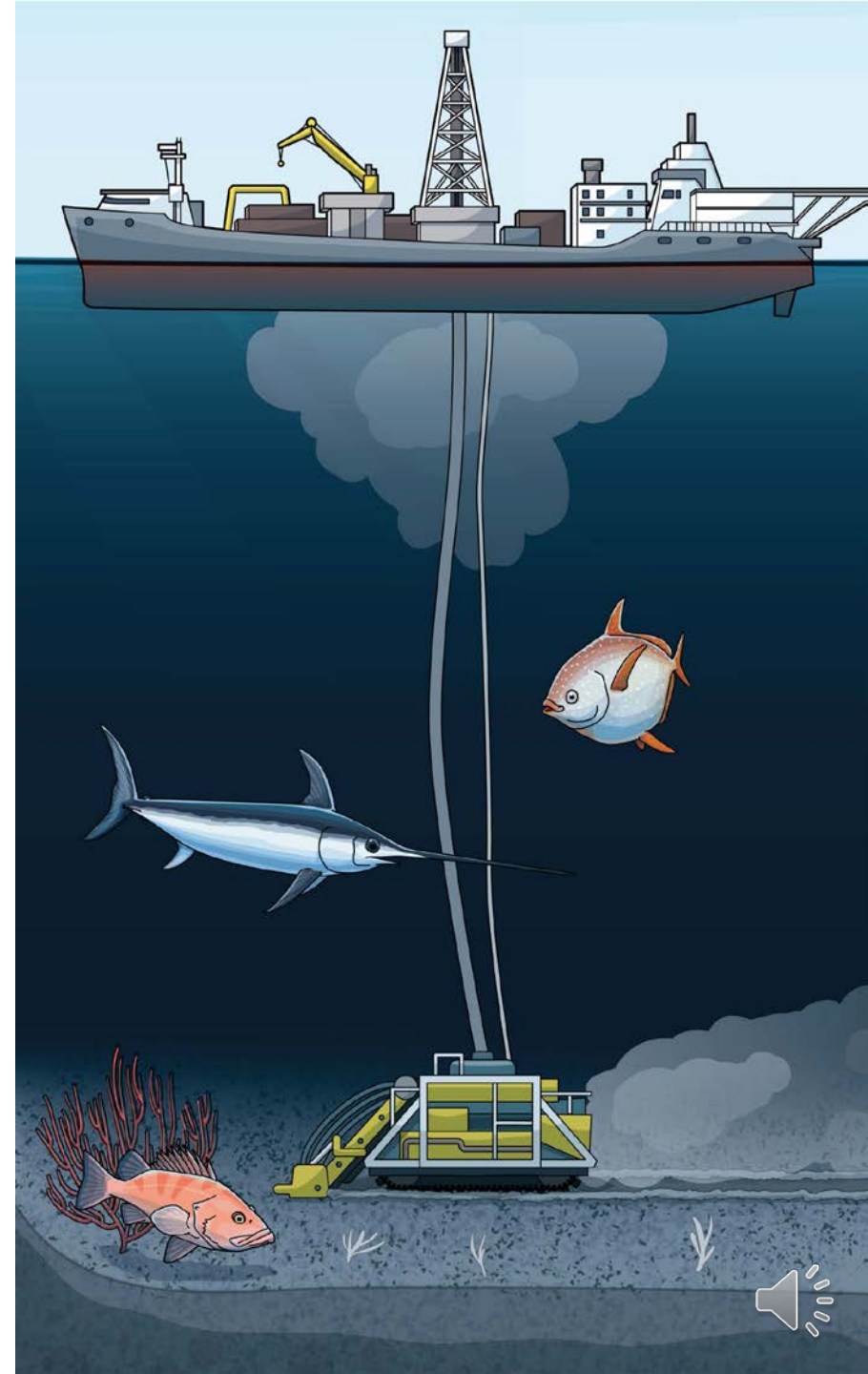
Trailing suction hopper dredges

In addition to noise pollution and physical damage to the ocean floor, the sediment plumes from trailing suction hopper dredges can smother marine plants and wildlife.

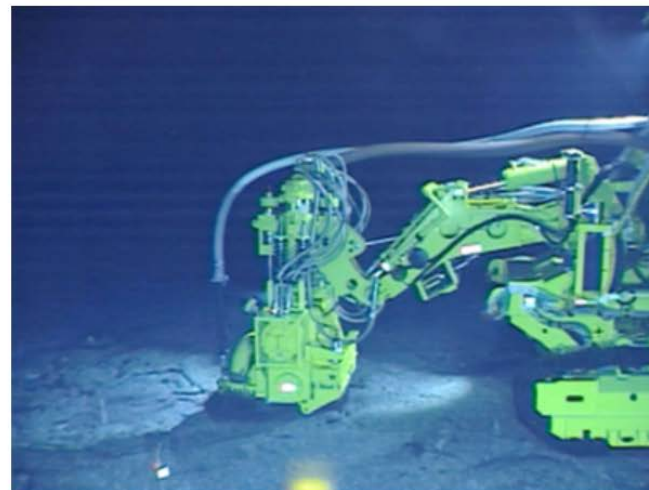


Processing ships and bottom crawlers

In deeper waters, mining the seafloor could involve processing ships and bottom crawlers. Onboard processing can create a discharge plume with harmful concentrations of toxic metals or very fine sediment.

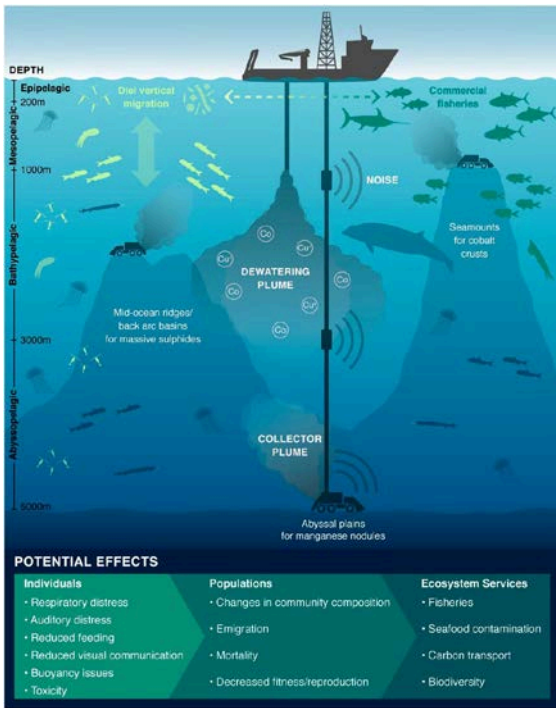


Crust-excavation testing machine



The machine on the seabed





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OPINION

Opinion: Midwater ecosystems must be considered when evaluating environmental risks of deep-sea mining

Jeffrey C. Drazen, Craig R. Smith, Kristina M. Gjerde, Steven H. D. Glenn S. Carter, C. Anela Choy, Malcolm R. Clark, Pierre Dutrieux, Erica C. Chris Hanton, Mariko Hatta, J. Anthony Koslow, Astrid B. Leitner, Aude Pacini, Jessica N. Perelman, Thomas Peacock, Tracey T. Sutton, Les Watling, and H.

PNAS July 28, 2020 117 (30) 17455-17460; first published July 8, 2020 <https://doi.org/10.1073/pnas.1911111117>

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Trends in Ecology & Evolution

SCIENCE & SOCIETY | VOLUME 35, ISSUE 10, P853-857, OCTOBER 01, 2020

Deep-Sea Misconceptions Cause Underestimation of Seabed-Mining Impacts

Craig R. Smith • Verena Tunnicliffe • Ana Colaço • ... Andrew K. Sweetman • Travis Washburn • Diva J. Amon • Show all authors



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journal homepage: www.elsevier.com/locate/pocean

Abyssal food-web model indicates faunal carbon flow recovery and impaired microbial loop 26 years after a sediment disturbance experiment

Daniëlle S.W. de Jonge^{a,b,1,2}, Tanja Stratmann^{b,c,d,*}, Lidia Lins^e, Ann Vanreusel^e,



Washington Policy/Regulatory Status

- Minerals on or under the seabed (state owned aquatic lands) are under jurisdiction of Washington Department of Natural Resources
- WDNR accepts and considers lease applications for marine mineral prospecting or extraction on a case by case basis
- Some areas off Washington coast already afforded some protections from potential marine mining (e.g. ONMS)
- Other agencies involved via permitting, planning, etc.
 - Department of Ecology (CZM Program, Marine Spatial Plan, etc.)
 - Department of Fish and Wildlife



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Questions?

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