

Zhang Jiansong/Xinhua/Alamy

# The Western Pacific Ocean

Underwater seamounts need to be studied as mining interest grows

## Overview

Seamounts are large underwater mountains found throughout the world's oceans. Home to deep-sea corals, mollusks, crustaceans, and large schools of fish, they are often classified as biodiversity hot spots. And yet these vital ecosystems remain poorly studied. By one estimate, less than 4 percent of the world's seamounts have been directly sampled.<sup>1</sup> In the Western Pacific Ocean, the mineral-rich crusts of these mountains are attracting the interest of potential deep-sea miners.

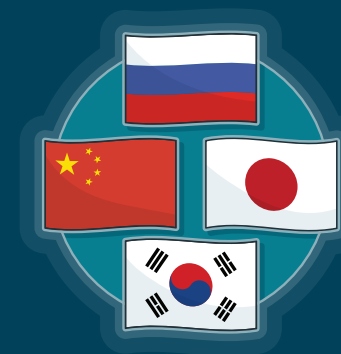
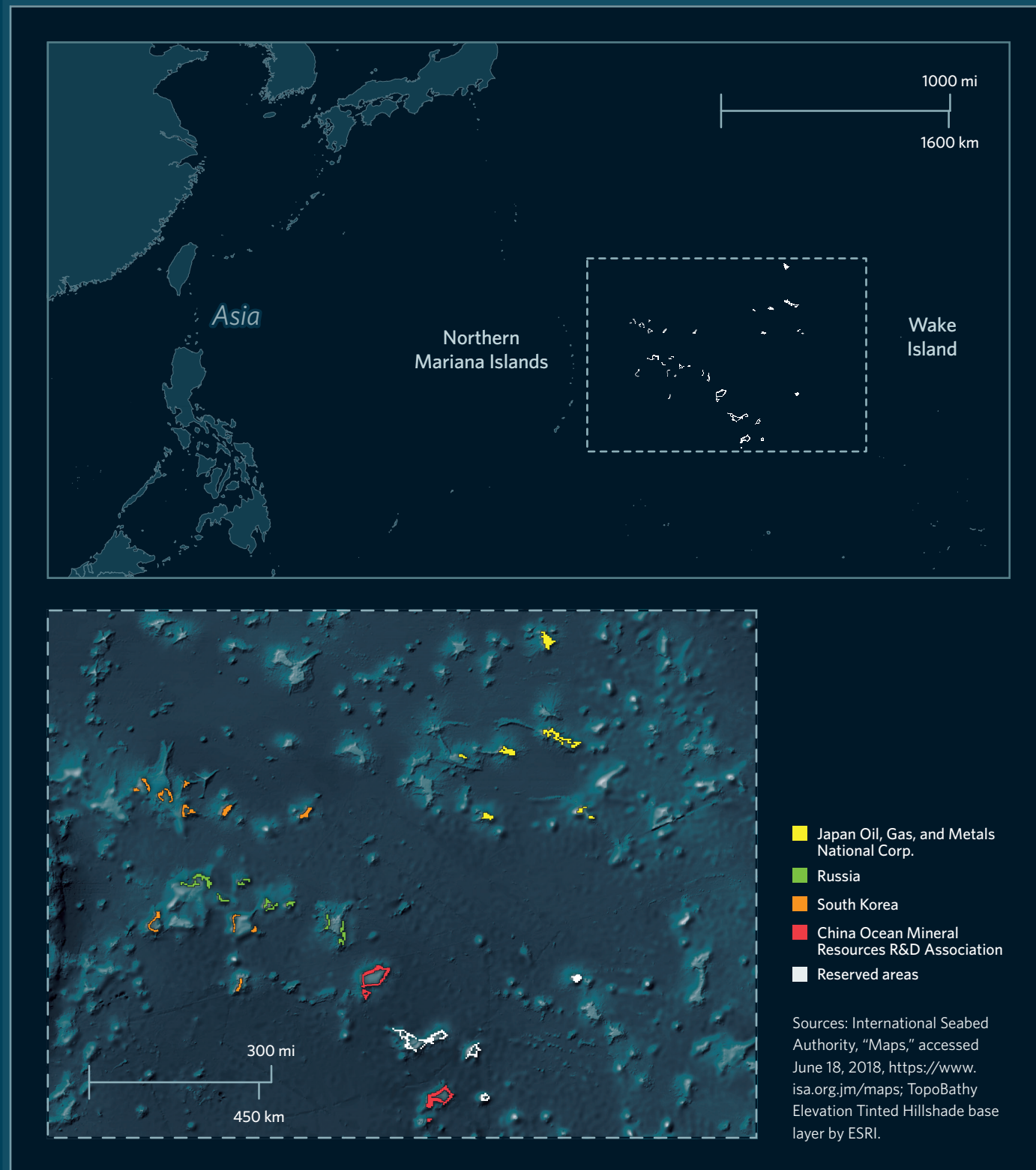
Cobalt, nickel, copper, platinum, and rare earth elements are found within the outermost crusts covering the flanks and summits of seamounts in the Western Pacific. Mining seamounts would involve removing the cobalt-rich outer layer—eliminating or degrading habitats and causing significant ecosystem impacts in the process. Sediment plumes could smother life forms even beyond the mining zones.

Given their significance as habitat and biodiversity hot spots, seamounts may require protections to minimize damage from mining. Because so much remains unknown about seamounts and nearby habitats, a precautionary approach is needed when it comes to exploration and potential mineral extraction.

The International Seabed Authority (ISA) is responsible for managing the mineral resources of the high seas “for the benefit of mankind.” Under the U.N. Convention on the Law of the Sea, the ISA is tasked with both managing seabed mining and protecting the marine environment from harmful effects of that mining. The authority is drafting rules that will attempt to honor both imperatives. The Pew Charitable Trusts and other international conservation organizations are calling for an environmentally precautionary code, one feature of which would be the establishment of large ecologically important no-mining zones in areas such as the Western Pacific.

# Features of the Western Pacific Ocean

The seamounts of the Western Pacific are under exploration for deep-sea mining



**Russia, China, Japan, and South Korea** hold International Seabed Authority exploration contracts for cobalt-rich ferromanganese crusts in the Western Pacific.



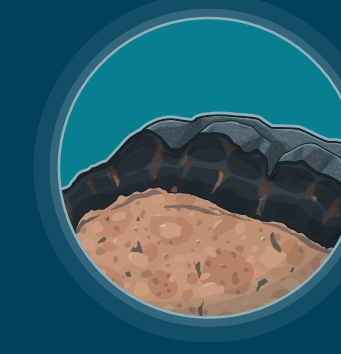
**Corals are found** on seamounts at depths of 2,000 meters (about 1.2 miles) and can be hundreds to thousands of years old.



**The communities living on seamounts** change with ocean depth. Little sampling has been done below 2,000 meters, and much remains unknown at these depths.



**Many seamounts** are dead, sunken volcanoes known as guyots. They have steep sides and flat table-like tops, similar to underwater mesas.<sup>2</sup>



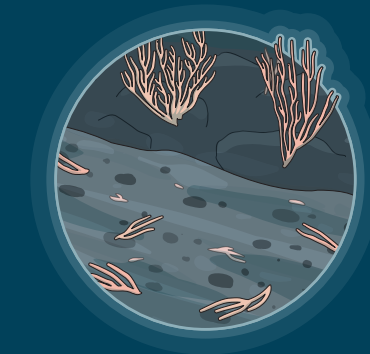
**Hydrogenetic crusts** form on seamounts when dissolved metals precipitate out of seawater and adhere. Crusts grow extremely slowly, at just 1 to 5 millimeters per million years.<sup>3</sup>



**Dense aggregations** of fish, zooplankton, and other sea life can be found near seamounts due to the effects these mountains have on ocean currents and food availability.



**Seamounts** often have distinct geomagnetic signatures and may serve as navigation aids for fish such as tunas and sharks that detect magnetic fields.<sup>4</sup>



**Bottom trawl fishing** destroys habitat and creatures up to 2,000 meters below. Recovery times for deep-sea mining could be similar to bottom trawling, taking decades, or even centuries.<sup>5</sup>

## Endnotes

- 1 Kristina O. Kvile et al., "A Global Assessment of Seamount Ecosystems Knowledge Using an Ecosystem Evaluation Framework," *Biological Conservation* 173 (2014): 108–20, <https://doi.org/10.1016/j.biocon.2013.10.002>.
- 2 Sergei Petukhov et al., "Geodynamic Features of the Northwestern Part of the Magellan Seamounts, Pacific Ocean," *Journal of Geography and Geology* 7, no. 1 (2015): 35–45, <http://dx.doi.org/10.5539/jgg.v7n1p35>.
- 3 Secretariat of the Pacific Community, "Cobalt-Rich Ferromanganese Crusts: A Physical, Biological, Environmental, and Technical Review," vol. 1C, eds. Elaine Baker and Yannick Beaudoin, [http://dsm.gsd.spc.int/public/files/meetings/TrainingWorkshop4/UNEP\\_vol1C.pdf](http://dsm.gsd.spc.int/public/files/meetings/TrainingWorkshop4/UNEP_vol1C.pdf).
- 4 Kim N. Holland and R. Dean Grubbs, "Fish Visitors to Seamounts: Tunas and Billfish at Seamounts," in *Seamounts: Ecology, Fisheries, & Conservation*, eds. Tony J. Pitcher et al. (Oxford: Blackwell Publishing, 2007), 189–201; Feodor Litvinov, "Fish Visitors to Seamounts: Aggregations of Large Pelagic Sharks Above Seamounts," in *Seamounts: Ecology, Fisheries, & Conservation*, eds. Tony J. Pitcher et al. (Oxford: Blackwell Publishing, 2007), 202–06.
- 5 Malcolm R. Clark et al., "The Ecology of Seamounts: Structure, Function, and Human Impacts," *Annual Review of Marine Science* 2 (2010): 253–78, <http://dx.doi.org/10.1146/annurev-marine-120308-081109>.

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**Contact:** Leah Weiser, officer, communications

**Email:** [lweiser@pewtrusts.org](mailto:lweiser@pewtrusts.org)

**Phone:** 202-540-6304

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