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# Israeli shark hot spot created by ancient landslide set to become nature reserve



Clockwise from top left: A blackmouth catshark, *Isidella elongata*, black coral and a bioluminescent crab, all by the Palmahim Slide.

*University of Haifa and Israel Oceanographic and Limnological Research*

## Ruth Schuster

Four million years ago, a section of the coastal shelf off what is today Palmahim Beach collapsed. The result was a huge landslide that

created an anomaly on the seabed featuring tumbled rocks, undersea hills and valleys, and myriad nooks and crannies for life to skulk unseen. That area, the Palmahim Slide, has

become a battleground between ecologists, oil barons and deep-sea fishers.

Because of its unique conditions, the Palmahim Slide has also become a hot spot of biodiversity featuring rare

sharks a-breeding, unusual deep-sea corals that thrive in the pitch-black depths, cold seeps spewing methane and brine that are thronged by odd marine life, and blue-fin tuna congregating in the surface waters.

On Wednesday, the Palmahim Slide (aka the Palmahim Disturbance) was declared a "hope spot" by Mission Blue – an international, California-based marine conservation nonprofit founded by oceanographer Dr. Sylvia Earle.

This declaration could expedite the effort to protect 850 square kilometers (328 square miles) of the landslide area, which covers about 1,000 square kilometers of seafloor. Among other things, that would preclude destructive hydrocarbon exploration and trawling.

If the Mediterranean seabed consists mostly of flat mud and sand, the Palmahim Slide area is a giant bathymetric irregularity. That simply means that the seabed



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is complex in this area, with mounds and valleys and generally geological character.

Like the famed prehistoric Storegga Slide that generated mega-tsunamis in the North Sea 8,000 years ago, this slide may have also resulted from a continental shelf collapse. But while the Storegga Slide was sudden and violent, the Palmahim Slide may have been creeping and gradual.

In any case, the marks of the landslide begin at 100 meters depth off Palmahim Beach and continue for about 30 kilometers, up to a depth of 1,200 meters. The effect the landslide had was to deform the seabed over 850 square kilometers (in a J-shape).

Because the deformation features geological complexity, it is a hotbed of biodiversity, explain Hadas Gann-Perkal and Dr. Ateret Shabtay of the Society for the Protection of Nature in Israel, which has been fighting for years for Israel to recognize it as a nature reserve.

Fish and other animals

shelter in nooks and crannies, sedentary life-forms like clinging to the exposed rocks: "There are more ecological niches, more habitats," Gann-Perkal says: "It's like an oasis in the desert."

### Brine pools on the seabed

In recent years, Dr. Yizhaq Makovsky of the University of Haifa and the Israel Oceanographic and Limnological Research institute discovered cold seeps and deep-water corals in the slide too. Neither had been observed in this region, the SPNI says.

The corals live from 450 to 800 meters in depth. Unlike their cousins in shallow warm waters, they cannot have a symbiotic relationship with algae because no light reaches such depths. They can survive on low levels of nutrients, Gann-Perkal explains – but in fact, the waters in the vicinity of the Palmahim Slide are unusually nutrient-rich, which explains its explosion of fish.

That may help explain why the Palmahim Slide is a hot spot for deep-sea sharks to reproduce: ghost sharks, blackmouth catsharks, dog sharks and more. Note that

all sharks in the Mediterranean Sea are endangered due to overfishing; absolutely all.

The area is also a hotbed for tuna sex (with each other, that is). The tasty fish have been observed thronging the area in May through June, and why else would they do that? In contrast to the sharks and corals, tuna prefer higher levels of the water column, Gann-Perkal says.

If the tuna is pelagic and likes the top of the water column, why would they converge on the Palmahim Slide and not just reproduce all over the Mediterranean? What is special for them?

The assumption that the tuna come to mate is based on a model, not observation, Shabtay qualifies. The model shows that seabed disturbances cause currents that lift nutrients from the seafloor. "Disturbances like this tend to be rich in nutrients in the pelagic part of the water column" – which means more animals living there, which means more food for tuna, she sums up. She adds that Atlantic bluefin tuna do not seem to have many reproduction sites in the Mediterranean.

It bears adding that this isn't the only geological anomaly in the Mediterra-



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nean. "The deep sea remains relatively undiscovered," Gann-Perkal observes. "It's very expensive to research. But in the southeast Mediterranean Sea, this structure is unique to the best of our knowledge."

In the deeper zones of the slide, the cold seeps of methane hypersaline water host fragile communities based on chemosynthetic microbes (with no light, there is no photosynthesis). Up the chain of life at the spot, we find everything from clams to crustaceans, sea urchins, delicate sea stars and tubeworms – and eating all these, fish, fish, fish. Sharks are fish too.

The hypersaline brine pools on the seabed can be

30 times as salty as the seawater. It may seem odd, but there is little exchange of water between these brine pools and the seawater in which they sit, Gann-Perkal says.

All this helps explain how fragile the ecosystem is. One deep-sea fishing trawler, one exploration drill for oil and natural gas, wreaks havoc in a way that nature wouldn't cause there for thousands of years, Shabtay says.

Declaring the slide a "hope spot" has no regulatory significance, but Blue Marine and its founder have international clout, Gann-Perkal says. "When [Earle] declares somewhere to be a hope spot and thinks it should be protected – then

it probably should be."

Indeed, the Environmental Protection Ministry agreed, stating as much on June 8 – which was World Oceans Day – and has issued draft regulation for public comment. Only about 4 percent of Israel's territo-

rial waters is protected and if the proposal happens, the proportion of protected water in the exclusive economic zone will reach 2 percent, the SPNI says.

It bears adding that the Mediterranean turns out to also be a hotbed of natural

gas, which Israel has been exploiting. In 2019, the Energy Ministry allocated a section within the Palmahim Slide for gas exploration. The SPNI is urging a permanent ban on any exploration within miles of the slide.