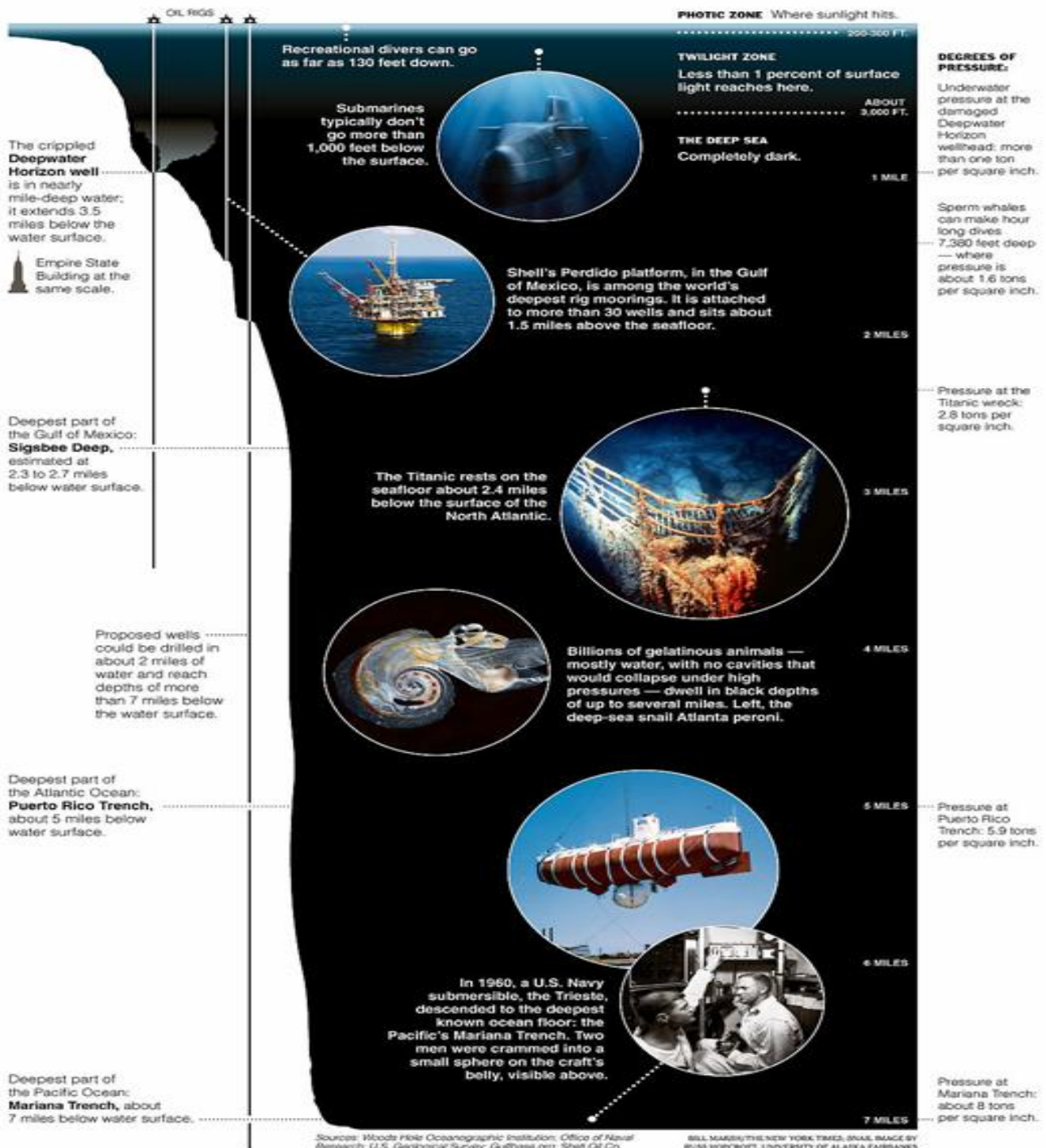


A TOUR OF THE WORLD'S DEPTHS

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Under the Waves, a Deep Unknown

By WILLIAM J. BROAD

STRANGE as it sounds, we know more about distant planets than we do about the deep sea.

Light-years may measure greater distances, but fathoms can be — unfathomable.

Inky darkness, icy temperatures and, most of all, crushing pressures conspire to make deep exploration daunting if not impossible. That is why scientists estimate that humans have glimpsed perhaps only a millionth of what there is down there to see.

That also helps explain why a runaway [oil](#) well on the seabed in the Gulf of Mexico is a massive calamity, with crews struggling to stop the gushing crude. It is the brutal nature of the abyss.

The biggest challenge is water's inherent density. Accumulations crush all but the strongest gear. For every 33 feet of seawater, the pressure exerted on an object increases by the equivalent of what a human experiences at sea level — 14.7 pounds per square inch. At the wellhead, roughly a mile down, that translates into a pressure of more than one ton per square inch.

Technology has responded to a degree. The robots, lights, cameras and other equipment deployed to deal with the crisis are made of titanium, thick glass and other superstrong materials designed to withstand the crushing force. In 1963, lesser pressures at shallower depths [turned the Thresher](#), an American submarine, into a coffin for 129 men.

The abyss thwarts communication, too. Seawater bars most radio signals. Workers instead rely on water's ability to transmit sound, or on cumbersome cables thick with electrical and fiber-optic lines, like those of the tethered robots deployed in the crisis. An umbilical line can weigh tons. By contrast, [Voyager 1](#), the most distant functioning space probe, is using an extremely weak transmitter to beam radio messages back to earth across 10 billion miles of space.

Unrelenting darkness is another barrier to exploring the deep. Sunlight penetrates seawater to a depth of only a few hundred feet. The industry robots working on the seabed around the wellhead need powerful lights. Even then, the rays go only so far. Gloom quickly reasserts itself.

The lack of sunlight means the abyss is perpetually cold — usually a degree or two above freezing. And of course, seawater is salty and highly corrosive, punishing many kinds of materials. But for all of its hostility to understanding, the sea has yielded something that space has yet to: aliens. Amazingly, life manages to thrive in many recesses of the deep sea, including the Gulf of Mexico. The creatures tend to be specially adapted to conditions that would rapidly kill any unprotected human. Scientists have discovered, for example, that the gulf seabed is dotted with oil seeps that support [tube worms](#) — strange beasts that live off food chains rooted in the oil and gas, creating dark ecosystems. An area of the gulf seabed nicknamed Bush Hill is covered with thousands of the creatures, which can grow to six feet and live hundreds of years.

[Charles R. Fisher](#), a professor of biology at [Pennsylvania State University](#), has studied the alien communities and says some are now in the path of the undersea oil plume.

Is that bad? "It's a very complicated question," he replied. "Certainly, they are used to some exposure to oil. We have no idea what the response would be to concentrated oil or the dispersants."

Given the difficulties of deep exploration, learning about the repercussions of the Deepwater Horizon rig disaster on the dark world is likely to pose an even greater challenge than assessing its impact on coastal ecosystems. Or perhaps finding life on Mars.