

[Dan Froomkin](#)

froomkin@huffingtonpost.com | HuffPost Reporting

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Where's The Oil? Your Government Doesn't Really Know

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For more than three weeks now, crude oil has been erupting out of a pipe a mile underneath the surface of the Gulf of Mexico. A new analysis of seafloor video indicates that nearly 70,000 barrels could be gushing out every day, NPR [reports](#). That figure is at least 10 times the U.S. Coast Guard's original estimate of the flow, and "the equivalent of one Exxon Valdez tanker every four days."

And nobody really knows where it is, or where it's headed.

Federal officials are carefully tracking the trajectory of the oil that's made it to the water's surface and, increasingly, on shore. They even put out a daily [map](#).

But there's never been an oil spill this big and this deep before. Nor have authorities ever used chemical dispersants so widely.

As a result, some scientists suspect that a lot, if not most, of the oil is lurking below the surface rather than on it, in a gigantic underwater plume the size and trajectory of which remain largely a mystery.

Oil on the surface can be fairly easily spotted by helicopter and satellite. But tracking an underwater plume is a much more complicated task, which thus far appears confined to one lonely improvising research vessel whose crew had been planning to hunt shipwrecks.

[Rick Steiner](#), a University of Alaska marine conservationist who recently spent more than a week on the Gulf Coast, said the National Oceanic and Atmospheric Administration [NOAA] risks wildly underestimating the damage caused by the massive spill.

"If you don't look, you won't find, and they're not looking in the right places," Steiner told the Huffington Post.

Most major oil spills occur right at the surface, he explained. This one is entirely different.

With a spill this deep, the oil starts off extremely dense and under pressure. Some of it breaks up or dissolves into the water on the way up, and some of it makes it all the way to the surface. But some will "stabilize in the water column" maybe as low as 200 to 300 meters off the seabed, Steiner said. "Then it starts drifting with the current."

"I'm virtually certain that a lot of this oil hasn't even surfaced yet," he said. "What we don't know is the trajectory and direction of this subsurface toxic plume."

That's critically important information, both in order to assess what sorts of habitats the oil may be wiping out, and because "this stuff can pop up in surprising places, weeks if not months from now," he said.

Another aspect of this spill that's unusual is the widespread use of chemical dispersants, applied both at the source and on the surface. Oil sprayed with dispersants on the surface, for instance, breaks into small droplets -- which could then remain suspended in the water column, Steiner said.

Doug Helton, an emergency response coordinator in Seattle who is NOAA's trajectory expert, told HuffPost on Thursday that measuring and tracking the oil beneath the surface is beyond NOAA's abilities at this point.

"We have some ideas of how it's working," he said.

"We think that for the most part the oil is surfacing," he added. And referring to a [video](#) that shows oil billowing out and up from the pipe, he noted that "you can see it's not staying there."

But tracking oil underwater "is a harder problem because you can't just fly out with a helicopter to look at it or see it from a satellite," he said. "It's not a simple answer."

"We have models of how oil behaves when it releases from the sea floor," he said. The models suggest that the oil from this spill is spreading out in a huge cone, a mile high and about two miles across, initially. Then, he said "we can look at currents." But the currents are not uniform at different depths.

"We have some testing that's trying to understand what the fate of that oil is, subsurface, but that's a problem," he said. "It's a lot easier problem to model the stuff that's on the surface."

As it happens, science journalist Mark Schrope is reporting for *Nature* magazine from aboard the National Institute for Undersea Science and Technology research vessel Pelican, which is spending the week taking water samples in the Gulf.

"As far as we know, this is the only research ship working in the region, Schrope wrote on [Monday](#).

The mission, evolving on the fly, is a daunting one for the team. Most of the scientists are doing work outside their normal bounds, and they're preparing to deploy equipment that in some cases they've never seen before. They'll be doing their best to fill a growing list of requests from colleagues for samples and data, all aimed at better understanding the spill and what its long-term impacts might be.

On [Tuesday](#), Schrope described finding "countless small dead jellyfishes known as by-the-wind sailors, or *Verella vellela*, and known to be susceptible to oil. Normally these animals, about the size of two fingers together, are blue and float on the surface with a triangular sail rising above the water. But those we see here are transparent and floating upside down, many stained with oil."

"So where is the oil now? " Schrope asked on [Wednesday](#). "That's really the guiding question of the whole expedition. The team will not be able to say for sure this week what's happening."

And on [Thursday](#), Schrope wrote about how the scientists were developing a hypothesis: That there's a layer of dispersed oil about two thirds of a mile down. "This could be coming straight from the... gushing well, where the response team is now adding dispersants directly, and prevented from surfacing by the ocean's complex interplay of currents, density differences, and other factors," Schrope wrote. He continued:

Eventually the team found that farther away from ground zero the layer was lower... This might show the oil, likely aggregated with plankton and other organic material, is settling out over time....

The team is now on a quest to define the bounds of this strange plume. NIUST chief scientist Arne Diercks compares the effort to hunting shipwrecks, which is one of the things the group would have been doing on this expedition if they had not been diverted to oil research.

Defining the plume will only tell a small piece of what's going on here, though. As for the larger questions of what will happen to the plume, how far it will drift, and what effect it might have on life in the deep, assuming it is in fact oil? "I don't know," says [Vernon Asper, an oceanographer with the NIUST team], "I just don't know. But that's why we're here."

Should NOAA be assigning more resources to track the underwater plume? Would that even work? What do you think is happening to the oil? If you have some expertise in any of these topics, e-mail Dan Froomkin at froomkin@huffingtonpost.com.