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Gulf oil spill leaves scientists in uncharted territory

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Maya Totman scouts for tarballs on a remote mangrove beach on Big Pine Key in the Florida Keys where she found several. The pollutants are suspected tarballs from the gulf oil leak that have been washing up in the lower keys. Several samples are being tested to see if they are new or old oil. Totman who runs Florida Keys Wildlife Rescue on Big Pine says the oil threatens the very basis of all fish and wildlife in the keys if it gets into the mangrove shores.

With the first tendril of a monstrous slick creeping into the loop current, the impacts of the Gulf of Mexico oil disaster soon could be felt from the reefs of the Florida Keys to the beaches of Miami-Dade and Broward and beyond.

Or perhaps hardly felt at all.

Much like engineers concocting schemes to cap BP's deep-sea gusher, scientists also are working uncharted waters, struggling for fundamental answers about a spill unlike any seen before: How much oil is really floating on the surface? How much lies beneath? Will a little or a lot get pulled into the loop?

Without those answers and many more, experts admit they can only speculate about what the pipeline of current might pump into the Florida Straits. Best case: More tar balls like the ones washing up this week from Dry Tortugas National Park to Bahia Honda. Worst: Submerged clouds of toxic oil and chemical dispersant poisoning reefs.

For South Florida, it's a sliding scale most scientists put closer to ugly annoyance than ecological catastrophe, but also warn could wind up anywhere between.

``We just don't have enough information to make very wise guesses about what's going to happen,'' said Richard Dodge, dean of Nova Southeastern's Oceanographic Center and head of the National Coral Reef Institute.

Some frustrated researchers contend a dearth of data from BP and the National Oceanic and Atmospheric Administration, the science agency charged with tracking the spill, is adding to the uncertainty of projecting and assessing damage.

``We have been screaming from day one for data,'' said Peter Ortner, a fisheries biologist at the University of Miami who studies pelagic species like the rare bluefin tuna in the Gulf. ``What is the vertical distribution? What is the oil particle size? How is it changing over time?''

The blown-out well, which has spewed at least 5.5 million gallons of crude and likely multiple times more by some experts' estimates, already ranks among the nation's worst environmental catastrophes.

Oil thick as pudding has begun washing into the Mississippi Delta, a vast and rich brackish estuary -- the absolute worst place for it. Marshes rank as the most vulnerable of all habitats in an Environmental Sensitivity Index in the government's official oil response manual. Drifting across spawning grounds for bluefin tuna and other fish, the blob could wipe out larvae and much of the next generations.

With the well still gushing a month after the Deepwater Horizon exploded and sank, many scientists are more worried than ever. But they remain uncertain about potential ripple effects across the wider Gulf.

On Tuesday, NOAA Administrator Jane Lubchenco acknowledged what oceanographers in Florida and elsewhere had been saying for weeks: An eddy whirling off the Loop had sucked in ``light oil'' in the southern tip of the slick.

But Lubchenco downplayed any significant threat to Florida -- at least an imminent one. She said the bulk of the slick remained ``dozens of miles'' north of the Loop and the eddy also might spit it out back to the north. Still, NOAA forecast some small amount reaching waters off Key West within 10 days -- twice the time predicted by a team from the University of South Florida.

Lubchenco said she expected dilution and weathering would reduce it to some combination of thin strips of mayonnaise-like ooze mixed with tar balls, much like suspect blobs scooped up this week in the Lower Keys. Some 20 from Key West's Fort Zachary Taylor were Fedexed to a Connecticut lab to determine if they're from the spill or a passing ship.

She also cast some doubt on a discovery of vast oil plumes suspended deep below the surface -- raising the specter of an unseen menace potentially as damaging as the surface slick, particularly to reefs and bottom life.

The working theory of researchers is that chemical dispersants, applied experimentally at the seafloor in hopes of reducing the growing slick, broke some oil into fine droplets that remain trapped by denser or colder sea water above. Lubchenco called their find an ``anomaly'' that needs further analysis, but said her agency was going to devote more resources to sub-surface impacts.

At 2,000 and 4,000 feet, whatever is there would be out of the influence of the shallower Loop Current, UM's Ortner said.

``If you really break this stuff up, it could be there for months,'' he said. ``It might never get out of the Gulf of Mexico.''

It could also could slowly rise over time, but nobody knows for sure because nobody has even recorded such plumes before.

``Not to my knowledge,'' said Poojitha Yapa, a professor of civil and environmental engineering at Clarkson University in Potsdam, N.Y., who developed the computer modeling NOAA uses to track the slick.

A model is only as good as what goes into it, and most spill science has focused on a surface slick relatively easy to track. What goes on beneath the waves -- particularly in the deep ocean where crushing pressures and frigid water change the behavior of oil -- isn't well understood or been widely studied.

Much of the data for Yapa's model, developed in the late 1990s, came from an industry-backed test off Norway called Project Deep Spill. The current spill presents an array of unforeseen complexities, he said -- a slick of both old oil and new, constantly replenished for a month, and perhaps much longer, from a source a mile down.

Now, he said, he's conferring daily with NOAA to improve the model, pumping in new data, which he said NOAA asked him not to discuss.

In another media conference Tuesday, a team of federal wildlife scientists said the slick would generate ground-breaking research as it exacts a toll they expect to be significant and ripple through the Gulf for decades.

In the end, scientists will likely chronicle only a small fraction of the expected turtle and bird deaths, said Barbara Schroeder, NOAA fisheries national sea turtle coordinator.

``Most of those mortalities will never make their way to shore to be counted,'' she said.