Current could carry disaster to fragile reef

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This 221-mile coral reef that skirts the tip of Florida -- one of the most important ecosystems on Earth -- stands near the edge of oblivion. Damaged by warming seas and pollution, more than half the reef is already dead. Now it faces a grave threat: the fallout from the exploded Deepwater Horizon oil rig.

Hundreds of thousands of gallons of oil are gushing into the Gulf of Mexico daily, followed by highly toxic chemicals meant to disperse the surface slick. While most of deadly mess is staying near Louisiana, some of it has been swept up by a warm ocean current that travels right over the coral reefs.

A shift in the weather easily could shuttle more of the toxic stew toward the Keys, jeopardizing the reefs and erasing progress from years of research and aggressive conservation.

Stretching from Key Biscayne to the Dry Tortugas, the reefs draw millions of tourists from around the world, provide essential habitat for fish, help turn the sandy beaches white and protect the coast from hurricanes.

"You're not even supposed to touch the coral because it's so fragile. So what is oil going to do?" wondered Dan Goldman, a Brazilian tourist, still wet from snorkeling, after returning aboard the Cruzan Cat.

The bottom line is that no one knows.

The threat is hard to gauge without an accurate picture of how much oil will hurtle through the loop current, which jogs clockwise through the Gulf of Mexico before connecting to the Florida Straits.

Roughly seven days ago the current tapped the growing oil slick and could do so again, as long as the oil is out there.

Federal officials say more than 210,000 gallons are spewing from the well daily, but they have no solid estimate. The real amount could be 10 times more.
Also scientists have not figured out where plumes of oil and dispersants may be traveling below the sea surface. Further, the chemicals used to break up the spill -- about 700,000 gallons so far -- are a trade secret.

The lack of knowledge has some speculating total catastrophe and others shrugging their shoulders. Keys residents say it is impossible to exaggerate the importance of the reef to their life.

**Floating in paradise**

Seven miles off the coast of Key West, the clear turquoise waters provide a vivid window into a colorful undersea world. As soon as Captain Tony Hughes sets anchor, bright schools of fish appear -- yellow tail snapper, toothy barracuda, long silver flashes of tarpon.

Snorkelers plop from the boat deck to float like yellow jellyfish. A king mackerel catapults into the air and tarpon dorsal fins knife the water's surface.

Ben Harper plays over the speaker as Hughes takes in the scene from beneath the wide brim of his straw hat. Stingrays and nurse sharks pass by.

"I can't seem to spend enough time out here," Hughes said, legs crossed on the bow of the Cruzan Cat catamaran. "I try not to worry about things like the oil that are beyond my control."

Yet worry Hughes does, about a globally important reef already stressed by pollution and an oil spill disaster that could put a delicate ecosystem over the edge. Life in the Keys revolves around the reef.

More than 3.3 million tourists visit the Keys each year -- two million in Key West alone -- creating 57,000 jobs that are all tied to the reef in some way.

"I don't think you'd find anyone who would tell you the reef is not the most important thing here," said Millard McCleary, program director for Reef Relief, which works to stem the flow of nutrient runoff and septic tank leaks into the reef environment.

Reef Relief typically relies on a few dozen volunteers to advocate for reef protection, but 1,400 people have signed up to help fight the oil spill.

"They want to see it protected for the reef's sake, but for those who live here that's also our livelihood, so you're seeing the community stand together to protect that," said McCleary, 40, from his office, decorated with murals of sea life and displays teaching visitors about the reef ecosystem.

**Fragile ecosystem**
Coral reefs are ecological rarities, occupying a tiny fraction of space in the ocean. Yet they provide ideal plant and animal habitat and support a quarter of all sea life.

The Florida Keys National Marine Sanctuary was designated by Congress in 1990 in response to the perils facing the reefs.

The year before the sanctuary was created, three ships ran aground on the keys. The Exxon Valdez accident also elevated fears about oil in general, and the proximity of the coral reefs to drilling in the Gulf of Mexico.

"All of these different threats came rather suddenly and Congress moved rather quickly," said Billy Causey, southeast regional director for the National Oceanic and Atmospheric Administration's marine sanctuaries.

Also in response to the threats, NOAA developed plans to protect the coral should oil pose a threat. Causey is optimistic those plans will save the reefs.

Although corals appear to grow like plants, they are actually made up of thousands of tiny animals called polyps.

Healthy polyps eat microscopic animals called zooplankton and host single cells of algae that give them nourishment.

When environmental stress arrives, the algae escape the polyps, stripping them of an important food source. Corals without algae turn white and can eventually die, a process called bleaching.

Warming seas, poor water quality, coastal development and overfishing already have led to widespread bleaching.

In the 1970s, Keys reefs contained about 50 percent to 60 percent living coral. Today that number is 10 percent to 15 percent, Causey said. The recent cold snap also wiped out some of the Keys' hardiest corals.

When reefs die, they crumble or become coated with algae.

The threat of tar balls, oil sludge and clouds of toxic chemicals add another level of stress to an already hurting ecosystem, said Sara Edge, a Florida Atlantic University molecular biologist who monitors corals at the cellular level.

"If it does what's predicted, where it's going to loop around and come up the coast, I would be surprised not to see some impacts," Edge said.

She said the biggest concern is long term. The oil and chemicals used to break up the surface slicks could compromise the ability of coral to fend off diseases, especially if the substances bind into the sediments or linger in crevices.
The dispersants should be very diluted by the time they reach the Keys, but judging what kind of effect they will have, even in small amounts, is a shot in the dark. The ingredients in the dispersants are proprietary.

"I'd need to know what's in it to understand what pathway it would take," Edge said.

Many believe the chemicals could be more harmful to the reef than the oil itself. Keys residents cheered this week when the Environmental Protection Agency ordered BP to switch to a less harmful dispersant. But 700,000 gallons of more toxic chemical already has been dumped in the Gulf and all dispersants harm wildlife.

They break up oil with surfactants that keep molecules from sticking together.

"It will adhere to an organism's surface just like it will adhere to an oil droplet's surface," said Ron Tjeerdema, a professor of environmental toxicology at U.C. Davis who has studied dispersants since the 1980s.

**Way of life jeopardized**

Keys residents, such as Lieber Perez, brag about the best scuba diving and snorkeling in North America. Perez, 34, grew up skin diving in a family of commercial fishermen off the coast of Cuba and has led scuba diving expeditions in Key West for the last 14 years.

Recently his crew unloaded spent oxygen tanks from his dive boat, the Sea Eagle, while another crowd of divers prepared to board.

Scuba divers come from around the world to explore the Keys reefs. Perez gets angry when he thinks about what the oil spill could do to the reefs and the local economy.

"We all depend on the environment for our jobs," Perez said. "It would be very difficult to absorb this blow because the reef is already at a peak, as far as how much stress it can handle."

Out on the reef, the snorkelers on the Cruzan Cat float in the calm water. Tarpon as big as dolphins circle around a frantic school of bait fish.

"Look how friggin' cool that is!" says first mate Kate Hermit, as the circle draws tighter and tarpon jump.

Dripping snorkelers return to the boat with big grins and tales of close encounters with rays, sea turtles, rainbow parrotfish and bug-eyed grouper.

"Did we get a good spot or what!" exclaims Lisa Zabler of Wisconsin.

Hughes smiles and nods.
"I love to see how blown away people get," he said. "I've been in and out of water for eight years now and I still see new things all the time."

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