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Deep Underwater, Oil Threatens Reefs

By JOHN COLLINS RUDOLF

Last September, marine scientists studying deep-sea biology in the northern Gulf of Mexico lowered a submersible robot off the side of a government research vessel and piloted it 1,300 feet to the ocean floor.

There, in complete darkness and near-freezing temperatures, the robot's lights revealed a thriving colony of corals, anemones, fish, crustaceans and other sea life rivaling that of any shallow-water reef in the world. Researchers onboard were elated.

"We flipped on the lights, and there was one of the largest coral reefs in the Gulf of Mexico sitting right in front of us," said Erik Cordes, a marine biologist at Temple University and chief scientist on the vessel, the Ronald H. Brown.

Nine months later, the warm thrill of discovery has cooled into dread. The reef lies just 20 miles northeast of BP's blown-out well, making it one of at least three extensive deepwater reefs lying directly beneath the oil slick in the gulf.

Yet it is not the slick that troubles scientists. They fear a more insidious threat: vast plumes of partly dissolved oil apparently spreading in the deep ocean.

The latest research team in the gulf to detect these plumes observed one extending roughly 22 miles northeast of the well site, in the vicinity of at least two major deepwater reefs, including the one discovered last fall. Preliminary images of the plume show layers of it touching the sea floor. Marine scientists have no firm grasp yet on what the impact on the corals will be, but they are bracing for catastrophe.

"The worst-case scenario is that there's oil coating some of the corals," Dr. Cordes said. "It would basically suffocate them."

The composition and distribution of these plumes remain a mystery, and several government research vessels are aggressively pursuing them in the gulf. Scientists believe that the plumes are not pure oil, but most likely a haze of oil droplets, natural gas and the dispersant chemical Corexit, 210,000 gallons of which has been mixed into the jet of oil streaming from the seafloor.

This oily haze could prove highly toxic to coral reefs. Both oil and dispersants, which chemically resemble dishwashing detergent, hamper the ability of corals to colonize and reproduce. And these effects are amplified when the two are mixed.

Studies on the effects of oil and chemicals on coral are limited to the shallow-water variety, however. Essentially no research has been conducted on their slow-growing deepwater cousins. So BP's spill has prompted scientists to embark on a sudden crash course on the interaction of deep-sea biology with these toxins.

"Everybody's scrambling," said Steve W. Ross, a marine biologist at the University of North Carolina, Wilmington, and an expert on deepwater corals. "There's a lot of evaluation that has to be done."

But some believe that studies on the impact of oil and dispersants should have been done long ago, given the proliferation of drilling rigs in the Gulf of Mexico.

"Some of these studies were proposed years ago, and the agencies decided not to fund them," Dr. Ross said. "We're paying the price for it now."

The BP spill coincides nonetheless with a fertile period of deep-ocean exploration in the Gulf of Mexico. Over the past decade, the Minerals Management Service — the federal agency criticized by lawmakers for its oversight of the offshore drilling industry — has financed extensive research into mapping the life of the deep ocean.

On numerous voyages, researchers have scanned the sea floor for anomalies and deployed submersible robots to search for life in the icy depths. The result has been a string of discoveries across the northern gulf, among them prolific deepwater reefs the size of football fields or larger. The identification of new species has become commonplace.

Yet even as such discoveries have multiplied, little has been done to protect the sea life. An environmental impact statementprepared by the Minerals Management Service in 2007 that covered a vast area of the gulf being opened up to oil and gas drilling, including the lease area where the BP well is located, concluded that drilling posed no serious risk to deepwater reefs. Deep-sea rigs were required to avoid damaging coral sites directly with anchors or pipelines, but few other restrictions on drilling were deemed necessary.

The nearly 1,000-page document mentions only in passing the potential of oil released under high pressure to form undersea plumes, despite previous studies showing the distinct likelihood of such an event.

The study also failed to explore the application of dispersants deep underwater. This use of the chemicals, approved by federal authorities, is essentially unprecedented. It appears to have reduced the extent of the slick, limiting its impact on wetlands, beaches and surface life. But officials know little about its potential impact on life underwater.

"The long-term effects on aquatic life are still unknown," Lisa P. Jackson, the administrator of the Environmental Protection Agency, said at a news conference in May on the use of dispersants.

The application of dispersants is already highly discouraged in areas like the Florida Keys because of their known toxic effects to coral, said Billy D. Causey, Southeast regional director for the National Oceanic and Atmospheric Administration's National Marine Sanctuaries program.

"We consider the dispersed oil more harmful than a sheen passing over the reef," said Dr. Causey, who served as superintendent of the Florida Keys National Marine Sanctuary.

Deepwater reefs have their own distinct biology — they do not rely on photosynthesis for energy, for instance, but scavenge food from the water column — so their sensitivity to such pollutants is deeply uncertain.

If enveloped by toxic plumes, one consequence for reefs could be a sudden lack of oxygen, as bacteria that feed on hydrocarbons rapidly multiply. This would kill off the algae and micro-organisms corals need for food.

"It might be locally catastrophic, particularly if there's an oxygen-depleted mass that develops," said Jeffrey Short, Pacific science director for Oceana, a conservation group, and a former research chemist with the National Oceanic and Atmospheric Administration specializing in oil pollution.

At least a hundred deepwater coral sites have been charted between the Texas and Florida coasts. More remain undiscovered. "We know 1 percent of what's out there in deep waters — perhaps 1 percent," Dr. Causey said.

There is reason to hope that deepwater corals far from the blowout will escape serious harm. Deep-sea currents are slower than surface currents, limiting the ability of the deeper plumes to spread extensively. And oil and chemicals will disperse as they migrate away from the site of the blowout.

The existence of large natural oil seeps into the Gulf of Mexico — estimated as high as one million barrels per year — also suggests that deepwater corals may have adapted to the presence of low-level concentrations of oil.

Still, as more and more oil enters the ocean each day, the likelihood that at least some reefs will be overwhelmed only grows. Anxiety thus runs high among deepwater biologists.

Dr. Cordes, for one, is itching to return to the gulf to examine the reef he discovered last year.

"We're in the process of getting down there sooner rather than later," he said. "I hope for the best and fear for the worst."