Keeping A Wary Eye On The Gulf

Gulf of Mexico hurricane expert Pat Fitzpatrick has spent the past few months studying one particular – and thoroughly frightening – aspect of the April 20 BP oil spill. His challenging assignment: putting together a weather forecast that will predict what happens to all that spilled crude oil in the event of a Category 5 hurricane.

When Hurricane Katrina slammed into the coast of Louisiana five years ago, it sent an 18-foot-high storm surge crashing and boiling through Pat Fitzpatrick's living room.

A veteran meteorologist who specializes in predicting the intensity of hurricanes, Fitzpatrick (Ph.D. '95) had evacuated the low-lying marshlands north of New Orleans a few hours before the monster storm blasted ashore, killing more than 1,800 people and causing more than $90 billion in property damage.

Fitzpatrick was able to escape the giant storm's fury by heading inland toward higher ground. But his house on the shore of Lake Pontchartrain was smashed to smithereens . . . and all he found when he returned were a few roof shingles sticking up out of the mud.

Armed with a hefty insurance payout, Fitzpatrick rebuilt his home from scratch, and this time he made sure it was high enough and structurally sound enough to withstand all but the mightiest of hurricanes.

What he didn't count on, however, was the possibility of a major oil spill from deep-water drilling out in the Gulf of Mexico. Should such an event ever occur, it could vastly increase the devastation caused by a major hurricane.

On April 20th of this year, the unthinkable happened. Triggered by an explosion and fire that killed 11 people and injured 17 others, the BP oil spill sent up to 200 million gallons of raw crude gushing into the Gulf.

"The economic impact of the spill has been horrendous, and the jury is still out on how it will affect the Gulf ecosystem," says the 45-year-old Fitzpatrick, who grew up a few miles down the road in the New Orleans suburb of Metairie. "At this point, there are a whole lot of unanswered questions about what the ultimate impact will be.

"For starters, nobody really knows how all those millions of gallons of oil will affect the spawning of fish, crabs, and other forms of marine life. Will we start to see a die-off of some species in a year or so? The dispersants that were used to break up the oil

are also a big unknown: we know they're toxic to some species, but we've never had a situation where they were used so extensively before."

Hurricanes and Oil Spills

Pat Fitzpatrick is a nationally recognized expert on the destructive effects of hurricanes, and he's spent much of the past 25 years studying how they can damage property and destroy human life, while also triggering massive erosion of ecologically protected wetlands and barrier islands, especially along the vulnerable coastlines of states such as Louisiana and Mississippi. Major hurricanes can also do enormous environmental damage by pushing high volumes of saltwater into freshwater regions, killing many different kinds of marine life, he says.

Having spent so many years studying these dangerous hurricane effects, Fitzpatrick was recently assigned by several state and federal maritime research agencies to work on an especially troubling problem: estimating the potential impact of a storm like Katrina on a major oil spill in the Gulf of Mexico.

After several weeks of studying the problem, however, Fitzpatrick says it's still "way too early" to tell. "One of the problems we face is that we don't really have many metrics to work with," explains the scientist. "The federal government recently announced, for example, that up to 75 percent of the oil has evaporated or been eaten by bacteria or otherwise been eliminated from Gulf waters.

"A number of marine scientists have questioned that estimate, and it seems quite dubious to me as well. But even if it's accurate, you've still got an immense quantity of crude oil out there. Where is it, exactly, and what's the likelihood that it could be driven ashore during a major hurricane?

"Another key problem," adds the longtime weather researcher and meteorology professor at Mississippi State University's GeoResources Institute, "is that we don't know much about the form the oil is taking. Is it riding high in the water column, in the form of miles-wide plumes that could be pushed ashore by hurricane-driven winds? Or is it mostly in the form of 'sheen' at present, which would make it far less threatening to the shoreline?"

Hoping for answers, Fitzpatrick is building several computer models that simulate how the oil might impact coastal regions, with each based on different control factors such as the oil's location and the storm conditions operating on it during landfall. So far, he says, oil pollution in the Gulf states has been relatively mild – even though there has been significant oil coverage of beaches and bay bottoms around Louisiana's Barataria Bay, at the mouth of the Mississippi River and along the ecologically fragile northeast Louisiana marshlands and barrier islands.

BOB RATLIFF, MISSISSIPPI STATE UNIVERSITY

Tar balls stuck to a cigarette pack

In a worst-case scenario, Fitzpatrick says, a major hurricane might force large quantities of currently submerged oil to the surface and then drive it into environmentally sensitive areas, causing widespread destruction of plant and animal life. By killing off marshland grasses in fringe areas, this scenario could also accelerate destructive coastal erosion.

So what's the bottom line, as of Labor Day, 2010? "Right now, I think we face a relatively small risk of having a hurricane push enough oil ashore to cause another disaster," Fitzpatrick says. "So far we've been fortunate, and most areas have escaped major oiling. If a substantial amount of the oil really has dissipated, or has been converted to tar balls on beaches and sheen on the surface, then I think we'd probably be okay during a Katrina-like storm.

"But I really don't think we're out of the woods yet. In recent weeks I've been constructing lots of these 'what-if' scenarios on the computer . . . and a scenario where you get millions of gallons of oil being pushed ashore by a hurricane is one of them. It could happen, but I just don't think it's very likely. We should remain vigilant, however, and we should certainly remain prepared."

To accomplish that, Fitzpatrick recommends that Gulf coast homeowners take appropriate measures to board up their homes before hurricanes, while also making sure their home insurance coverage makes them eligible to recover fully in a situation where hurricane-driven oil from a spill leaves them struggling with toxic pollution.

Destined to Study Storms

Raised along the Louisiana seacoast, where he spent "thousands of hours" catching redfish and speckled trout in the remarkably fertile waters of the Gulf, Fitzpatrick loves to point out that he was born at the height of a hurricane. "We were living in New Orleans in 1965 when Betsy struck," recalls the storm-chasing scientist, "and it was a major event. To be on the safe side, my mother checked into a downtown hospital early, and I was born while the winds and water were still subsiding."

After discovering in high school that he had a knack for science and math, "Fitz" (his nickname growing up) decided he wanted to learn more about hurricanes and wound up earning both a B.S. and an M.S. in meteorology at Texas A&M. And when he got a call from nationally renowned weather researcher Professor Bill Gray at Colorado State inviting him to join the CSU Ph.D. program, he jumped at the chance.

For Fitzpatrick, who spent several years teaching meteorology and doing research at Jackson State University in Mississippi before signing on with Mississippi State's GeoResources Institute in 2001, the hurricane lessons he learned in Fort Collins are now standing him in good stead. "I've been fascinated by hurricanes since I was kid," he says with an exuberant smile, "and the great thing about this job is that now I get to think about them year-round!"

by Tom Nugent