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Tuesday, Jul 22, 2008

Posted on Sun, Jul. 13, 2008

Fishing for a dead zone

Scientists study oxygen in water along Strand

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Four years ago, area anglers watched the whole ocean turn on its head.

Live minnows in bait buckets at the end of fishing piers died within minutes.

Deepwater fish - jack crevalle and ribbonfish - suddenly started skirting the surf.

Fish kills were reported, but strangest of all was the flounder.

"It was weird. It was one right after another," said Ron Lovelace, who recalled that he and his friends caught 50 or 60 flounder from one spot on Apache Pier in Horry County in two days. "We caught so many dadgum flounder, it wasn't even funny."

As fishermen celebrated their catches, scientists soon identified an immediate culprit: Low oxygen levels in the water were causing the fishes' bizarre behavior.

A water-quality monitoring station was established, and this week underwater robots crawled the ocean floor to gather more data.

But as scientists begin to see the coastal Carolina sea bottom clearly for the first time, they fear what was called a bonanza in 2004 may soon be known by a much more ominous name: a dead zone, a local instance of what they say shows troubling signs of becoming a worldwide phenomenon.

"The fact that this is a global problem that seems to be increasing, there must be something acting on that scale," said Coastal Carolina University professor Eric Koepfler.

If those concerns are correct - if a regular summertime cycle of oxygen loss is becoming established off the coast - there is no telling what will happen to the fish populations, the scientists said.

Cycles of death

The world's oceans have all experienced major periods of low oxygen, or even no oxygen, said Tom Grothues, a Rutgers University marine-biology professor who brought the subaquatic robots to the Grand Strand last week. Such prehistoric conditions, at their extremes, may have helped create the world's oil fields.

What is different now is how quickly dead zones are appearing in places they had never before been known.

One of the best-documented dead zones is a swath of the Gulf of Mexico that this year reached the size of Maryland. Newer sites have appeared off the New Jersey coast, or in the Pacific Northwest.

Specific conditions

The specific conditions depleting the oxygen appear to be slightly different in each location, the scientists say.

In the Gulf, nutrient-laden Mississippi River water creates a cycle of algae growth and death that sucks the oxygen out of the water bottom. In other areas, it can be related to ocean-bottom geography or changing wind and current patterns.

In the Grand Strand, the most obvious cause appears to be stormwater runoff, the same kind that leads officials to close beaches after heavy storms. During dry periods, bacteria and pollutants build up on roads and parking lots. When it rains, that mixture is washed into the water, where the bacteria consume the oxygen as they grow.

"Everyone seems to be honing in on fish," Koepfler said. "Fish are just an indicator of water quality."

The best indicators

Often, sea life is the best indicator of a dead zone. In the Gulf, scientists watch fishing boats skirt the edge of it, while crabs and other bottom dwellers flip at the surface, trying to breathe.

A dead zone's effect on fish depends how quickly it appears, Grothues said. When it forms suddenly, fish die. When oxygen levels slowly sink, they move away, maybe inland, or maybe to other waters.

Even if the combination of a dead zone and a fishing bonanza dramatically depletes the flounder population one year, fish lay so many eggs that their numbers can bounce back easily, Grothues said.

But if large areas of the coastal waters become stripped of oxygen every year, it is unclear how the fish - and the area's fishing industry - will be affected over time.

"Fishermen are very smart, because they are dependent on it," Grothues said. "They tend to suffer initially, then react."

As part of the present research project, CCU graduate student Christian Johnson surveys Apache Pier fishermen three times a week, hoping to compare their reports of how much they caught to the scientists' data.

"Universally, all the fishermen say it's not as good as it used to be," Johnson said.

Off the Apache Pier, where Lovelace estimates he spends half his year fishing, he said he worries that sharks are coming to shore more frequently, perhaps chasing fish driven away from low-oxygen conditions farther offshore.

The pier and its fish-cleaning tables, Johnson noted, would be an ideal place for sharks to feed, if they become that aggressive.

"It's basically a buffet for sharks," Johnson said. "All they have to do is show up and eat."

Monitoring, data collection

The possibility of a Coastal Carolina dead zone is so new that many marine biologists around the country are unaware of it, Grothues said, until his team at Rutgers was contacted for last week's research.

Last week, Grothues brought a small yellow torpedo-shaped robot to help measure oxygen levels along the entire coastline. With a blinking red light on top, it traveled for miles on its own, collecting more than 33,000 data points and surfacing only occasionally to update its global positioning system coordinates.

"I'm sure this must freak some people out, if it comes up next to them in a boat," Grothues said.

The last few days' research has illustrated how difficult dead zones are to study. High winds and bad weather mixed up the water while the robot collected data, increasing the amount of oxygen.

Once the winds die down again, however, the oxygen levels will likely drop, but the research robots will have left.

A different sort of view is provided by the monitoring station on the Apache Pier, which for about two years has tracked all kinds of water-quality variables - of use to both scientists and fishermen.

"I religiously look at that thing," said Lovelace, a retired engineer. "If I'm at home, I can look at that and about tell what's going on."

At the station, the water has never seen such low levels as in 2004, but 2006 saw prolonged periods that were close. Koepfler speculates that drought conditions in 2007 and 2008 have reduced runoff in those years, keeping oxygen levels higher.

The Apache station, for all its value, is just one point on the entire coast, where conditions can vary widely. By contrast, similar stations are set up on oil rigs across the Gulf of Mexico.

"For our coast, there is no good data," Koepfler said. "We really don't have a long-term data set. That's been part of the problem."

With almost every prediction or analysis about the cause of the dead zone or its possible effects, the scientists beg for caution. They are only speculating, they say, because there is so little data and so much to measure.

"We don't have a handle on it yet," Grothues said.

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