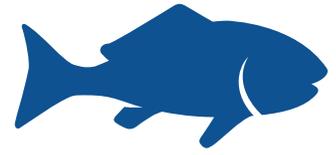


Post-Hurricane Odors

Is there something fishy going on?



THE BASICS

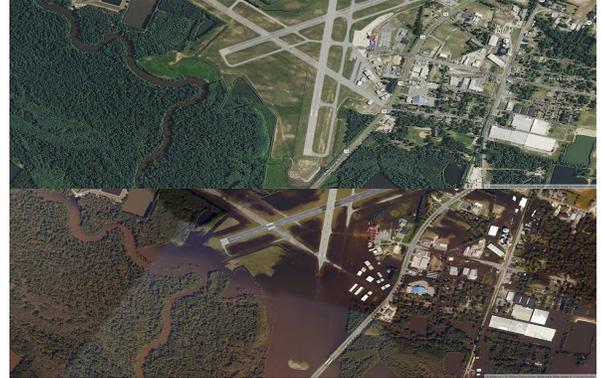
Storm events can cause a lot of changes.

Big storms can bring a lot of water. Some of that water comes downhill from the rain and some gets pushed uphill by the tides. New water, or more water, in a place can cause a lot of changes. Some of these changes, like fish kills, can be seen. Others cannot be seen, but have other unpleasant results, like bad odors. These changes are natural. Things will return to normal, but it will take some time.

WANT TO KNOW MORE?

Things will go back to normal, but it may take a while.

Hurricanes and tropical storms bring a lot of water with them. Some of the water can soak into the ground, but the rest of it must make its way downhill into streams, rivers, lakes, and the ocean. As this water flows downhill, the water has a lot of energy. The water will take other water, sediments (e.g., sand, silt, small broken-down pieces of rock), and dead plant or animal materials downhill with it. These dead plant or animal materials must be broken down over time. Some bacteria start to break down the materials and use up the oxygen in the water that fish need to live. When there is not enough oxygen left in the water, many fish can die resulting in fish kills. Other bacteria that break things down create very strong odors. These odors are normal and may be noticed within a few days of heavy rain events. Things will return to normal, and the animals will recover, but it may take several weeks or months for that to occur.



Pitt-Greenville Airport October 2016

image by NOAA



Greenville, NC October 2016

wikimedia image by The ed17



Fish Kill



LET'S GET TECHNICAL

Physical, chemical, and biological changes can cause the odors.

Still or low-flowing waters often have lower amounts of free oxygen available for the organisms that live there and require oxygen to survive. Heavy rain events will often force some of the ordinarily contained low-oxygen water downhill into otherwise normally oxygenated water. This may decrease the oxygen level in local downhill waters and may change the biological and chemical processes that occur.

Sediments located in still or low-flowing water may have anaerobic bacteria living in them. Some of these bacteria produce hydrogen sulfide gas, which has that "rotten egg" odor. The energy of the extra water from the storm flowing through these normally still or low-flowing areas can stir up a lot of the sediments, also releasing any hydrogen sulfide odors associated with the sediments into the water. This may cause the water or areas nearby to smell like "rotten eggs."

The extra water can also transport organic debris into new areas. This organic debris will be decomposed, or broken down, over time. Decomposition of the organic debris is a multistage process resulting from the work of a variety of microorganisms like bacteria. Later stages of these processes can result in unpleasant odors. Decomposition of organic debris has two major steps, aerobic and anaerobic.

Step 1 (Aerobic): The process begins in water that has a lot of oxygen (aerobic conditions). Bacteria that live well in aerobic conditions begin to break down and digest (or eat) the organic debris. These aerobic bacteria use a lot of oxygen while they are breaking down the materials and will continue until there is no longer enough oxygen for them.

- The aerobic bacteria use a large amount of oxygen, usually causing a big drop in oxygen levels in the water within a few days of the heavy rain event.
- This drop in oxygen level makes it difficult for other animals that need the oxygen in the water, like fish, to survive. This may result in fish appearing near the surface "gulping for air" or it may result in fish kills.

Step 2 (Anaerobic): The aerobic bacteria cannot survive without the oxygen, so the anaerobic bacteria begin to decompose the remaining organic debris. The final stage of this process involves bacteria that produce methane gas, thus creating a very strong odor that can be smelled in or near the water.

Key Terms:

Organic debris – dead plant or animal material

Aerobic – requiring free oxygen

Anaerobic – an absence of free oxygen