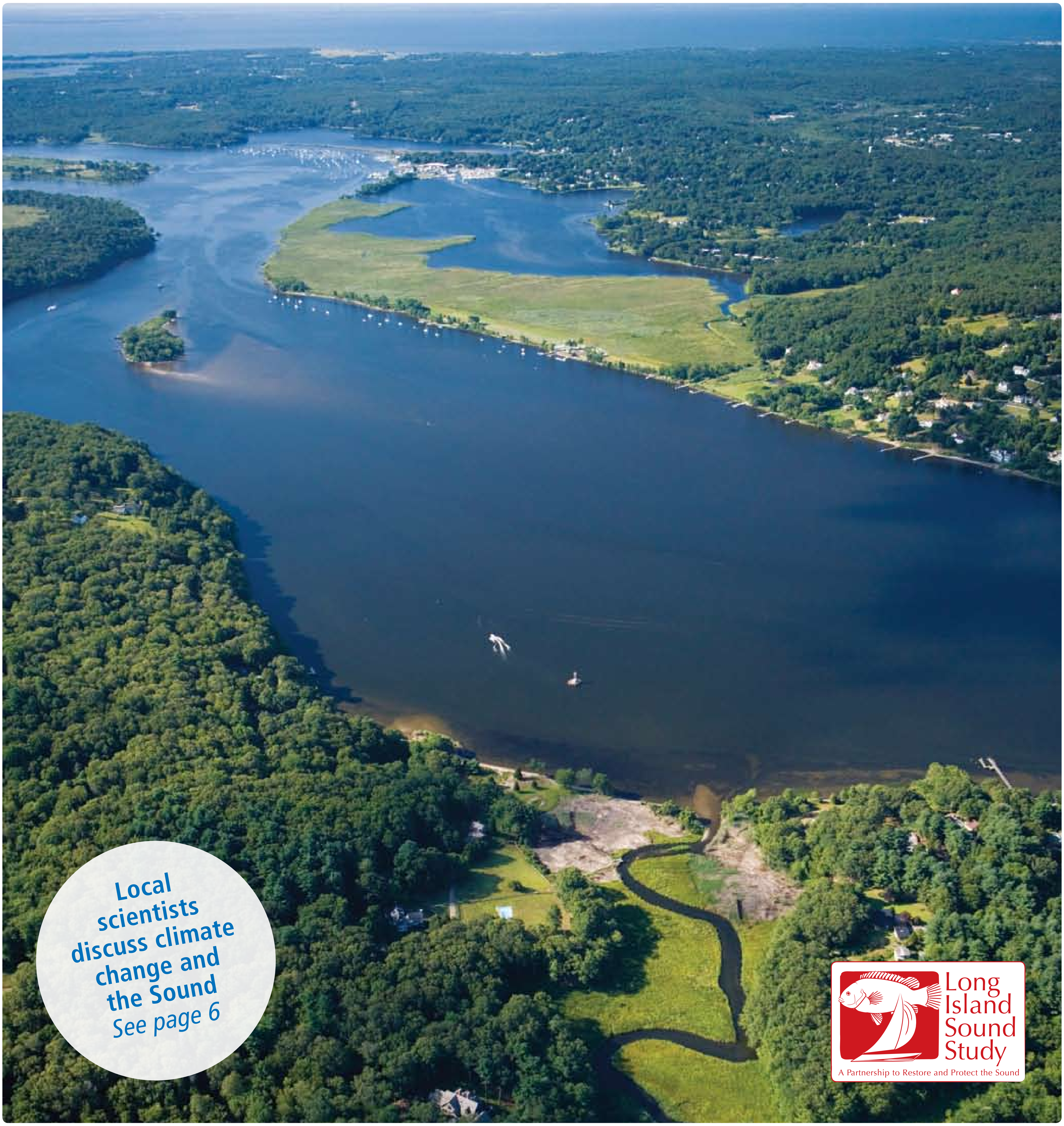
SOUND HEALTH

STATUS AND TRENDS IN THE HEALTH OF LONG ISLAND SOUND {2008}



To see a graphic on how hypoxia occurs, please visit: www.LIShealth.net

{Hypoxia}

◄ CT DEP staff deploy a rosette, a water sampling device, aboard the research vessel *John Dempsey.*

In 2007, the area of depleted oxygen was about four times the size of Manhattan

Imagine if the air around you had only a scarce amount of oxygen. Now, consider what fish and other wildlife in the Sound face every summer when dissolved oxygen levels drop to low levels.

The condition, known as hypoxia, occurs in the Sound every summer when dissolved oxygen levels in bottom waters fall below 3 mg/L. Hypoxia forces some fish and invertebrates to scatter, while making others more susceptible to disease. When concentrations fall below 2 mg/L conditions become suffocating; marine life unable to flee may die.

Since 1987, LISS has tracked the area and duration of hypoxia. In 2007, hypoxia lasted 58 days, and at its peak affected 162 square miles—about four times the size of Manhattan. While the area has been below the 20-year average for the last eight out of 10 years, it still remains a concern. Meanwhile, the duration of hypoxia has been above average for six out of the past 10 years.

Natural factors help trigger hypoxia. As temperatures rise in the summer, the surface water heats ups and forms a distinct layer over the bottom water, which is denser due to higher salinity and cooler temperatures. This “density gradient” can restrict oxygen-rich surface waters from mixing with bottom waters, and the waters can remain hypoxic until wave and wind action, sometimes from a storm, mix the layers.

Humans also have contributed to hypoxia by adding excessive levels of nitrogen into the Sound. In a process called eutrophication, nitrogen acts as a fertilizer, fueling the growth of phytoplankton (microscopic plants sometimes called planktonic algae) in surface waters. The organic matter from the algae, and the waste from animals feeding on it, sinks to the bottom and is consumed by bacteria in a process that uses up oxygen. While nitrogen occurs naturally, human activities have increased the amount discharged into the Sound by 400 percent. Population increases in the watershed, for example, have resulted in more than 150,000 pounds of nitrogen being discharged daily from wastewater treatment plants, which is about 40 percent of the total nitrogen that makes its way into the Sound. Other sources include septic systems, deposition from air emissions from power plants and motor vehicle exhausts, and fertilizer and animal waste. •

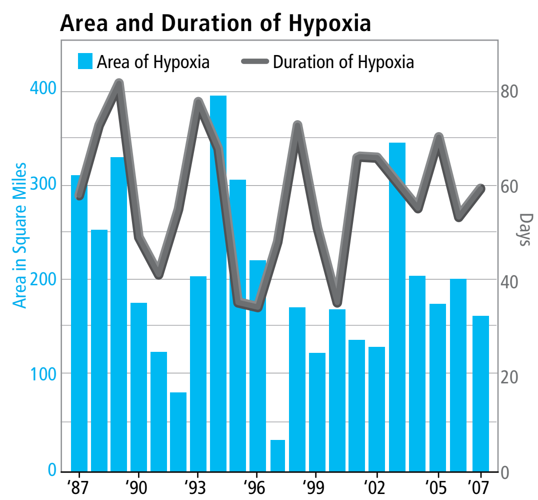
www.LIShealth.net/pods to hear an interview with the CT DEP's Water Quality monitoring crew.

Coastal Waters Face Hypoxic "Dead Zones"

Hypoxia is not just a Long Island Sound problem. Waterbodies on both coasts and the Gulf of Mexico also suffer from low-oxygenated waters. For example, the Gulf of Mexico's “dead zone” off the coast of Texas and Louisiana has covered more than 8,000 square miles, about the size of Connecticut and Delaware combined. Chesapeake Bay has hypoxic waters that can extend hundreds of square miles each summer. In both of these cases, agricultural runoff of fertilizer and animal waste is the largest source of the nitrogen that helps trigger hypoxia.

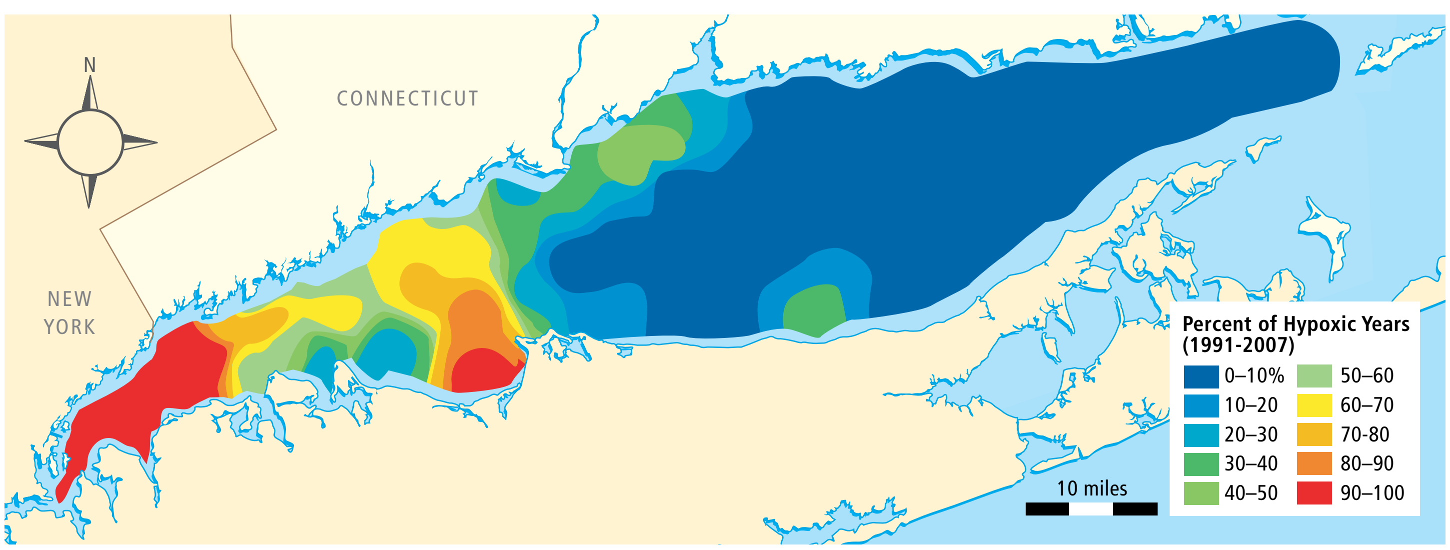
In recent years, several national and international environmental commissions, including the U.S. Commission on Ocean Policy and the United Nations Environmental Programme, have affirmed that eutrophication and hypoxia are among the most significant problems facing coastal waters.

THE DATA



▲ The maximum area of hypoxia has been below the average of 201 square miles for 8 out of the last 10 years, but the duration has been above the average of 57 days for 6 out of the last 10 years.

THE FREQUENCY OF HYPOXIA IN LONG ISLAND SOUND BOTTOM WATERS



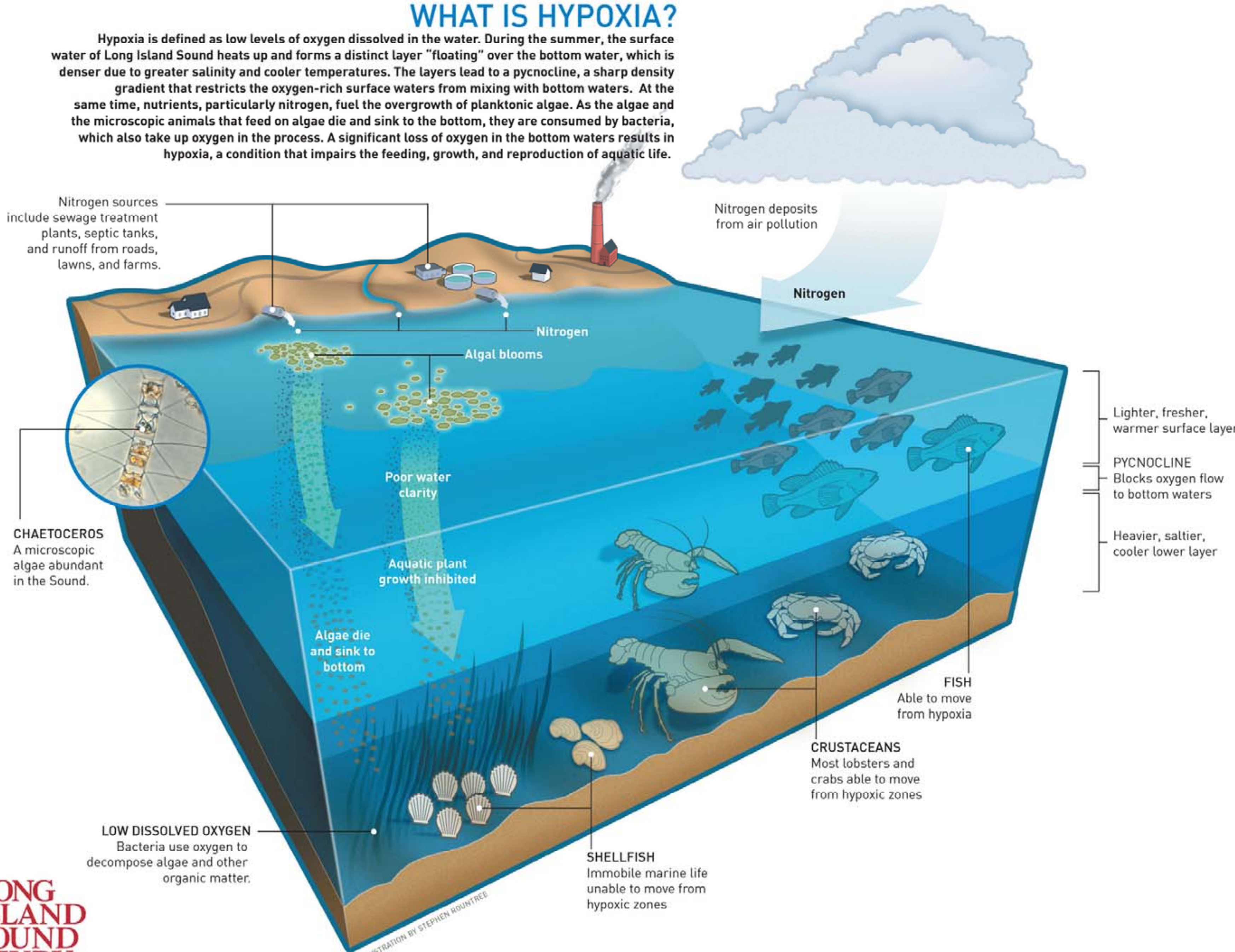
◄ Hypoxic conditions occurred most frequently in the western Sound (areas in red and orange). In extreme hypoxic conditions, some organisms may suffocate and die, while others flee.

CREDITS: *Water Quality Monitoring*, photo by Lloyd Langevin; *Hypoxia* map, by Lucy Reading-Ikkanda/ CT DEP
SOURCES: *Area and Duration of Hypoxia* chart, CT DEP

Hypoxia in Long Island Sound

WHAT IS HYPOXIA?

Hypoxia is defined as low levels of oxygen dissolved in the water. During the summer, the surface water of Long Island Sound heats up and forms a distinct layer "floating" over the bottom water, which is denser due to greater salinity and cooler temperatures. The layers lead to a pycnocline, a sharp density gradient that restricts the oxygen-rich surface waters from mixing with bottom waters. At the same time, nutrients, particularly nitrogen, fuel the overgrowth of planktonic algae. As the algae and the microscopic animals that feed on algae die and sink to the bottom, they are consumed by bacteria, which also take up oxygen in the process. A significant loss of oxygen in the bottom waters results in hypoxia, a condition that impairs the feeding, growth, and reproduction of aquatic life.



LONG ISLAND SOUND STUDY