LONG ISLAND SOUND STUDY

A Partnership to Restore and Protect The Sound

THE IMPACT OF ATMOSPHERIC NITROGEN DEPOSITION ON LONG ISLAND SOUND

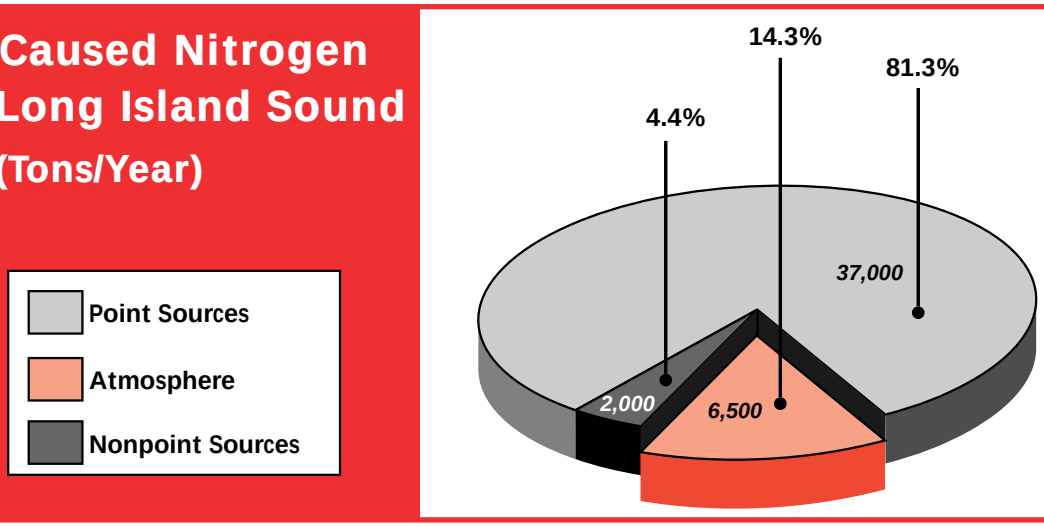
The Long Island Sound Comprehensive Conservation and Management Plan (CCMP) identifies low dissolved oxygen, or hypoxia, as the most serious water quality impairment in the Sound. The annual summertime occurrence of hypoxia in the deeper waters of western Long Island Sound reduces the amount of healthy habitat necessary to support fish and shellfish. The CCMP identifies excessive discharges of nitrogen, a nutrient, as the primary cause of hypoxia, and sewage treatment plants as the primary source of this excess nitrogen. To address this problem, the Long Island Sound Study (LISS) is implementing a phased approach to reducing nitrogen loads to the Sound from sewage treatment plants, industrial dischargers, and nonpoint sources.

These phased nitrogen reductions, however, may not raise dissolved oxygen to levels necessary to support all life stages of marine organisms in Long Island Sound. Additional measures will likely be required to achieve the states' water quality standards for dissolved oxygen. These measures may include advanced treatment at sewage treatment plants upstream of the Connecticut border, several "non-treatment" techniques, and reductions in atmospheric nitrogen loadings, the subject of this fact sheet.

Recent research has brought to light the importance of managing atmospheric sources of nitrogen if water quality objectives are to be met and maintained in Long Island Sound. The primary sources of atmospheric nitrogen are emissions generated by various combustion processes that use fossil fuels (e.g., energy production, fueling of motor vehicles and other machinery).

While atmospheric sources of nitrogen were always considered in estimating nitrogen loads to Long Island Sound, they only included direct deposition to surface waters of the Sound. Direct deposition contributes only 6.3 percent of the human-caused load of nitrogen to the Sound from the Connecticut and New York portions of the watershed. However, atmospheric nitrogen is also deposited upland and on surface waters adjacent to the Sound and is carried into the Sound when rain falls or as particles settle during dry periods. Nitrogen is carried with stormwater runoff from coastal areas, with rivers and streams from throughout the drainage basin, and with currents moving into the Sound from the Atlantic Ocean and New York Harbor. This is called "indirect deposition."

Human-Caused Nitrogen Loads to Long Island Sound (Tons/Year)

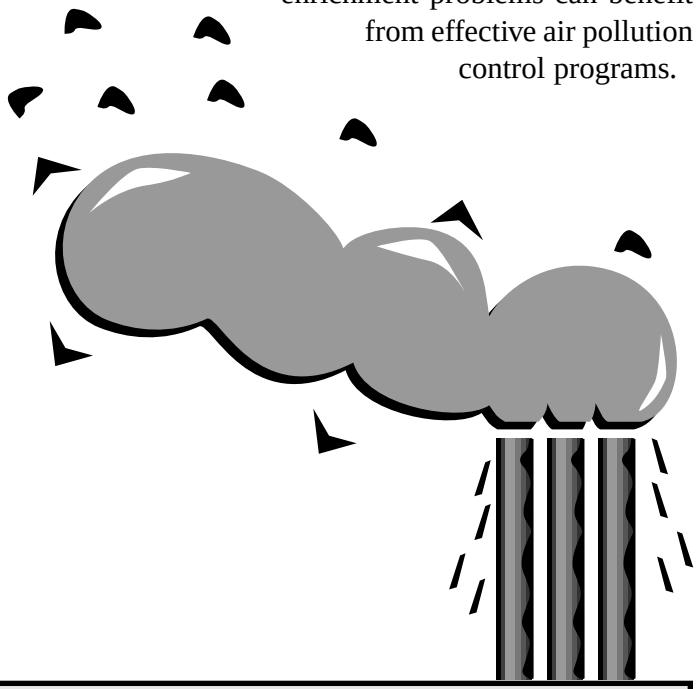


The LISS recently prepared an estimate of the indirect deposition of nitrogen to Long Island Sound from the Connecticut and New York portions of the watershed. Based on this analysis, the combined direct and indirect deposition of nitrogen from atmospheric sources is estimated to be 14.3 percent of the human-caused load to the Sound.

Oxides of nitrogen (NOx) contribute to both the atmospheric nitrogen that reaches the Sound and ground-level ozone, which causes human health problems when it reaches dangerous levels in the air. Through the Ozone Transport Assessment Group, air pollution managers from the eastern states have submitted specific recommendations to EPA for reducing NOx emissions to address the problem of ozone.

Computer modeling by the Chesapeake Bay Program has estimated that reducing NOx emissions through implementation of the mandatory Clean Air Act requirements will result in significant improvements in dissolved oxygen levels in Chesapeake Bay. Such modeling has not been performed for Long Island Sound. However, simple calculations that apply Chesapeake Bay derived estimates to the New York and Connecticut portions of the watershed suggest that implementation of the Clean Air Act could achieve around 5 percent of the Long Island Sound nitrogen reduction target.

When direct and indirect sources of nitrogen are considered together as a single source, atmospheric nitrogen is probably the second most important cause of hypoxia in Long Island Sound after point source discharges. In addition to improving dissolved oxygen levels in the Sound, the control of NOx emissions will reduce ground-level ozone. Hence, an opportunity exists to achieve both air and water quality management goals through aggressive implementation of the Clean Air Act. Long Island Sound and other estuaries along the east coast that have nitrogen enrichment problems can benefit from effective air pollution control programs.



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