



CONNECTICUT'S NITROGEN CONTROL PROGRAM

THE LONG ISLAND SOUND TMDL

FREQUENTLY ASKED QUESTIONS

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What is a Total Maximum Daily Load (TMDL)?

A TMDL or Total Maximum Daily Load establishes the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards and allocates that amount to all contributing sources. Contributing sources of pollutants include point sources, nonpoint sources, and natural background sources taking into consideration seasonal variations. The TMDL is also reduced by a margin of safety calculation to account for any lack of knowledge about effluent limitations and water quality. In essence, a TMDL defines the maximum amount of a pollutant that a waterbody can naturally absorb and still be healthy.

What is a water quality standard?

Connecticut's water quality standards designate the uses for each waterbody (e.g., drinking water supply, contact recreation (swimming), and aquatic life support (fishing)) and the scientific criteria to support that use. In Long Island Sound (LIS), aquatic life support has been identified as the major area of concern. Low concentrations of dissolved oxygen (DO) in the bottom waters of the Sound during the summer months can kill or drive away many bottom dwelling organisms. Connecticut's DO standard of 6.0 mg/l is violated each summer from New Haven west to Greenwich. Similarly, New York's standard of 5.0 mg/l is violated in the western half of the Sound.

What is the water quality standard for dissolved oxygen in Long Island Sound?

When the first standards were established by Connecticut in 1971, a simple, sound-wide criterion of 6.0 mg/l was adopted for DO. Over the last decade, field and laboratory research conducted by the USEPA's Environmental Research Laboratory in Narragansett, Rhode Island and CT DEP's Marine Fisheries Division have shown that DO levels between 6.0 and 3.5 mg/l in bottom waters resulted in few adverse effects, primarily to marine organism larval stages. Hence, a DO interim goal of at least 3.5 mg/l was agreed upon for management planning purposes. CT DEP has proposed to EPA revised oxygen standards for Long Island Sound, but until they are adopted, the TMDL must address the existing standards. Because bottom water DO often falls as low as 1.0 mg/l, a revised standard will not alter nitrogen removal plans detailed in the TMDL.

Why do we need a TMDL for Long Island Sound?

CT DEP, in cooperation with New York State Department of Environmental Conservation (NYSDEC) and the federal EPA, has been investigating LIS water quality problems since 1985 through the National Estuary Program's Long Island Sound Study (LISS). Nitrogen has been identified as the primary pollutant causing low DO conditions, or **hypoxia**, rendering much of the Sound's bottom waters unhealthy each summer. Nitrogen fuels the growth of algae, which eventually decays, consuming oxygen in the process. There is enough nitrogen added by human activity to cause a severe hypoxia problem each summer, often with oxygen levels falling below 1 or 2 mg/l, well below state standards. Because of this, CT and NY are required by federal law to reduce nitrogen through the implementation of the TMDL.

When does the TMDL take effect?

The TMDL for LIS was developed by Connecticut and New York and submitted to the USEPA in January 2001. The USEPA approved the LIS TMDL on April 3, 2001. The TMDL will be implemented in phases. Phase 1 & 2 have already been completed and phase 3 forms the substance of the TMDL. The TMDL takes effect immediately with phase 3 implementation by 2014 and planning for phases 4 and 5 to be completed in the next few years.

What is the TMDL for Long Island Sound?

Within CT and NY, the TMDL identified nearly 48 thousand tons per year (**ttpy**) of nitrogen coming from point sources (primarily sewage treatment plants or "STPs") and nonpoint sources (e.g., stormwater runoff) as the baseline condition as delivered to Long Island Sound. (It is important to distinguish how much nitrogen reaches the Sound compared to how much is discharged from a pipe upstream, because nitrogen is naturally attenuated (lost or consumed) during transport to the Sound. The more distant the source, the more nitrogen attenuation occurs. Therefore, end-of-pipe loads of nitrogen are higher in aggregate.) The TMDL requires CT & NY to remove nearly 24 **ttpy** of nitrogen from the baseline level by 2014. This reduction, from CT and NY combined, constitutes the TMDL of nitrogen that can be discharged to LIS without significantly impairing its health. Most of the nitrogen comes from point sources (almost 38 **ttpy**), which are emphasized in the TMDL's reduction plan.

Connecticut's portion of the point source baseline is 10,500 tons per year at end of pipe. Connecticut will need to remove about 6670 tons of this nitrogen load by 2014, a nearly 64% reduction. (See the CT DEP Total Maximum Daily Load fact sheet for more details)

What is a Waste Load Allocation?

A Waste Load Allocation (WLA) is the portion of a receiving water's TMDL that is allocated to one of its existing or future point sources of pollution. CT and NY have identified Sewage Treatment Plants (STPs) as the primary point source of nitrogen (pollutant) in the LIS drainage basin. Therefore, all the STPs located in the two states within the LIS drainage basin as a whole were allocated a certain portion of the TMDL of nitrogen going into Long Island Sound. Then individual nitrogen waste load amounts were allocated to each STP (see the CT DEP Waste Load Allocation fact sheet for more detail.)

How will the Sewage Treatment Plants Remove so much Nitrogen?

Nitrogen in sewage is primarily in the form of ammonia, even at a standard secondary level of treatment. With added aeration of sewage, the ammonia is naturally converted by bacteria to nitrite and finally nitrates. Many STPs in CT are required to convert ammonia to nitrate because ammonia is toxic to aquatic life at high enough levels. But, conversion to nitrate, while an important step in the nitrogen removal process, does not solve the nutrient enrichment problem in LIS because, like ammonia, nitrate also stimulates plant growth. To remove the nitrate, treatment plants must establish low oxygen conditions where anaerobic bacteria thrive and convert the nitrate to nitrogen gas, effectively removing it from the wastestream. To meet the TMDL requirement, the 81 STPs in CT will need to modify, upgrade, or build whole new treatment systems to remove the nitrogen. Many plants already have done just that and attained remarkable reductions to date. (See the CT DEP Waste Load Allocation and TMDL fact sheets for additional information)

How much will it cost to implement the TMDL and who's going to pay for it?

The bill to remove nitrogen from STPs in CT and NY will be in the range of \$1 - 2 billion over the 15-year management period, ending in 2014. CT's share is expected to be in the \$700 - 900 million range. Funding, as a combination of low-interest loans and grants, with available grant portions for nitrogen removal up to 30%, will come from state revolving funds established for STP upgrades and infrastructure needs.

Will all the STPs have to upgrade?

In order to meet dissolved oxygen standards for Long Island Sound, all 81 CT treatment plants, as a group, would have to meet the nearly 64% removal requirement specified in the TMDL at end of pipe. This does not necessarily require each plant to individually meet the 64% requirement -- some could do more and others less -- provided the overall reduction goal is met. The CT DEP has proposed to the State Legislature, a bill to establish an innovative Nitrogen Credit Exchange Program. If adopted by the Legislature, it would set up a mechanism for municipalities to exchange reduction credits, with higher reductions occurring at STPs where it would be more cost-effective. Where marginal nitrogen removal costs are higher, a municipality might elect to purchase credits from the exchange. (See the CT DEP Nitrogen Credit Exchange Program fact sheet).

What is New York required to do?

The TMDL is a joint submission to EPA by the states of CT and NY. Both states are under the same requirements to meet the nitrogen load reductions specified in the TMDL. Each state is assigned an equal percent nitrogen reduction and must abide by the 15-year schedule, although they have the flexibility to apportion reductions among sources as most appropriate for their setting.

Are there other sources contributing nitrogen into the Sound?

Yes. In addition to the point and nonpoint source reduction requirements for CT and NY specified in the TMDL, large loads of nitrogen come from northern states (MA, VT, NH) and via the atmosphere from stack and mobile emissions of oxides of nitrogen throughout the eastern half of the U.S. The TMDL sets up a schedule for EPA in conjunction with contributing states to develop final Phase 4 and 5 plans for nitrogen sources from out-of-state and from the atmosphere. Phase 4 and 5 only minimally involve CT and their outcome will not affect nitrogen control plans in CT and NY.

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