



TITLE 5 SEPTIC SYSTEMS AND NITROGEN POLLUTION

NITROGEN POLLUTION FROM TITLE 5 SEPTIC SYSTEMS IS DEGRADING OUR COASTAL WATERS



Above: A sign of a clean, healthy marine environment—excellent water clarity and lush blades of eelgrass.



Above and below: Examples of nitrogen pollution. Murky water and an overgrowth of algae due to nitrogen pollution overtaking an eelgrass bed and smothering shellfish.



LEFT PHOTOS 1&2:
JOE COSTA (www.buzzardsbay.org/eelgrass)

LEFT PHOTO 3:
JOE COSTA & GEORGE HAMPSON

It is surprising to many people to learn that properly functioning Title 5 septic systems are causing nitrogen pollution problems in Buzzards Bay and its harbors and coves. These state-approved systems serve as the traditional solution to household wastewater disposal in areas without centralized sewer treatment plants. While they adequately treat for most types of bacteria, they do not remove more than 25% of the nitrogen in your wastewater. It isn't something a homeowner is or is not doing when caring for their system—Title 5 systems simply are not designed to remove nitrogen.

The nitrogen from a Title 5 septic system—located anywhere in the Buzzards Bay watershed—moves through the watershed to the Bay. A watershed is that area of land which drains to a common waterbody through groundwater and surface water. In other words, nitrogen moves through a septic system into groundwater where it will travel until it emerges directly into the Bay, or where it emerges in a river which discharges to the Bay.



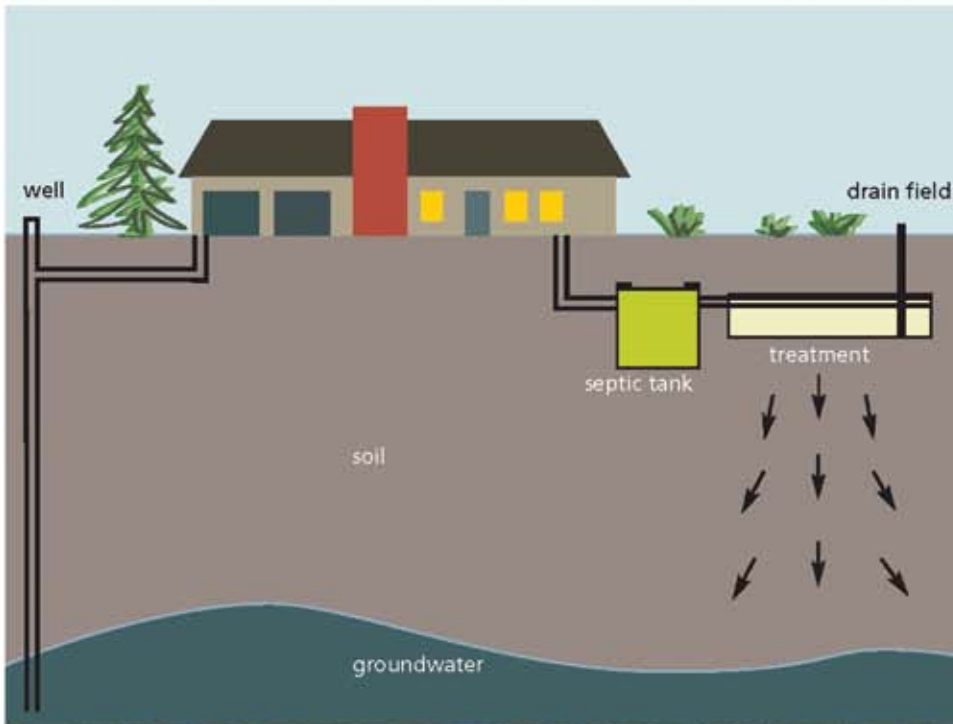
THE PROBLEM WITH NITROGEN

Once known for their clear waters, underwater eelgrass meadows and abundant bay scallop harvests, today you are more likely to find Buzzards Bay's nearshore waters clouded and murky. Under the surface, their bottoms may be covered in algae which deprives the water of life-giving oxygen for fish and shellfish. In some areas, these impacts can lead to bad odors, algae-covered shorelines and even fish kills.

For more than half of the Bay's harbors and coves, the signs of this decline are already clearly visible. The decline is being driven by increasing nitrogen pollution from poorly-planned sprawl development in the Bay watershed and inadequate wastewater treatment in all of our communities. It is the greatest long-term threat to the health of the Bay and the largest source of nitrogen pollution is presently from onsite Title 5 septic systems.

While nitrogen is a natural and essential part of all marine ecosystems, excess nitrogen adversely affects water quality and degrades habitat impacting marine organisms including fish and shellfish. Similar to overfertilizing your garden, nitrogen pollution in marine ecosystems stimulates the growth of plants (algae and phytoplankton). These undesirable algae consume oxygen and reduce or eliminate the amount of oxygen in the water. This process of water quality decline creates a chain reaction of negative impacts known as eutrophication.

HOW A TITLE 5 SEPTIC SYSTEM WORKS



A properly functioning Title 5 septic system includes a buried septic tank, a distribution box and a drain field or leach field. Whatever a homeowner flushes or drains through a home's plumbing first enters the septic tank where the waste is held long enough for the solids and liquids to separate; the solids settle to the bottom of the tank and the liquid waste exits the tank through the distribution box to the leach field. Modern leach fields are usually made up of perforated PVC pipes laid in stone-filled trenches. The liquid escapes through the perforated PVC pipes and into the soil where the properties of the soil remove bacteria before it enters the groundwater (or water table) below your home.

WHAT KIND OF SYSTEMS DO WORK?

Today, many new technologies have been developed to treat wastewater more effectively than Title 5 systems. Most likely, there is not one system that will work for every neighborhood. Removing nitrogen from our Watershed will require solutions uniquely tailored to our communities. Below is a brief description and comparison of the available wastewater technologies.

TECHNOLOGY SUMMARY

Title 5 Septic Systems

Traditional wastewater solution for rural and lower density suburban communities. These systems are not designed to treat for nitrogen and therefore contribute a significant amount of nitrogen pollution to coastal waters.

NITROGEN REMOVAL*

25%

Nitrogen Reducing Septic Systems

Also known as Innovative and Alternative (I/A) systems, these systems add an additional treatment process to a Title 5 system. They are required under Massachusetts regulations to reduce nitrogen from 40mg/L to 19mg/L, or, in other words, to achieve 50% nitrogen removal. There are several different types of these systems available. **These systems should be considered as a potential wastewater solution for rural and lower density suburban communities.** The initial installation or upgrade cost is approximately \$12,000 - \$15,000 more than a Title 5 system.

50%

Cluster or Shared Systems

These systems treat wastewater from more than one home but less than a traditional centralized sewer system. This technology includes a small collection system and small wastewater treatment facility and typically serves a neighborhood located far away from centralized sewer. **This technology should be considered as a potential wastewater solution for rural and suburban communities.** These systems typically reduce nitrogen from 40mg/L to 5 or 10mg/L. Sharing a system can lower the cost per home.

75%

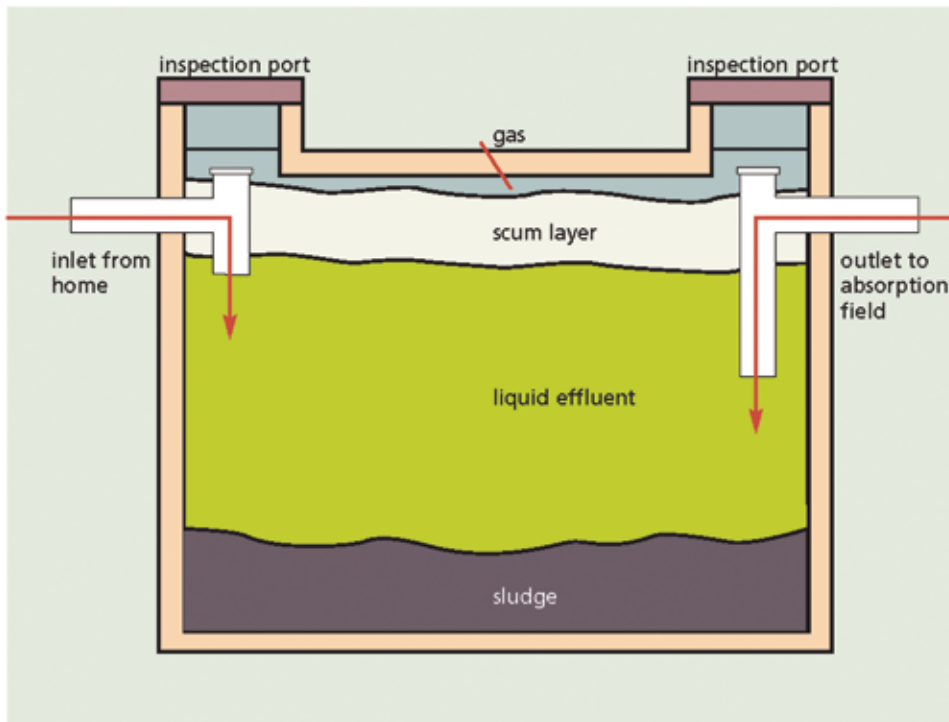
Centralized Sewer Plant with Nitrogen Removal

Traditional wastewater solution for densely developed suburban communities and cities. It consists of a collection system that collects wastewater and conveys it to a wastewater treatment plant designed to remove nitrogen, and a discharge location. **This technology typically achieves the best nitrogen removal reducing nitrogen in wastewater from 40mg/L to as low as 3mg/L.** In the Buzzards Bay watershed, only the towns of Falmouth and Wareham have centralized sewer plants with nitrogen removal.

93%

* The technologies and nitrogen removal rates are approximations and based on the best information available at the time of publication.

SECTION VIEW OF SEPTIC TANK



SEPTIC SYSTEMS DO TREAT FOR BACTERIA

The treatment provided in a properly functioning Title 5 septic system targets bacteria and viruses found in domestic wastewater, not nitrogen. As the leach field discharges the liquid beneath the surface, the waste is stripped of the majority of bacteria before it reaches groundwater and the Bay. Typically, the greater the separation between the groundwater (water table) and the leach field, the better bacteria treatment is achieved.

SEPTIC SYSTEMS DO NOT TREAT FOR NITROGEN

The primary source of nitrogen in a septic system comes from our urine. A Title 5 septic system can generate approximately six pounds of nitrogen per person per year. Nitrogen, unlike bacteria, moves through soils rather than attaching to them. **Nitrogen easily finds its way to the groundwater where it ultimately resurfaces into one of our rivers or directly into our Bay.** Once there, it triggers water quality decline.

NEXT STEPS

COMPREHENSIVE WASTEWATER MANAGEMENT PLANNING TO REMOVE NITROGEN POLLUTION

Understanding the nitrogen problem and how to fix it is a **complex process and requires public understanding** of the causes and various tools available to address it. There is no "one size fits all" solution to this problem. We encourage communities combating water quality decline due to nitrogen pollution to first determine how much nitrogen needs to be removed from Title 5 septic systems (as well as other sources) and then what technology will best accomplish that task.

DETERMINING HOW MUCH NITROGEN NEEDS TO BE REMOVED

The Massachusetts Department of Environmental Protection and the University of Massachusetts School for Marine Science and Technology have partnered to form the Massachusetts Estuaries Project (MEP) which is performing comprehensive studies on every estuary in southeastern Massachusetts polluted by nitrogen. The goal of the MEP is to determine what amount of nitrogen is safe for each individual estuary.

Communities who have partnered with the MEP receive a technical report detailing all the sources of nitrogen to the estuary and how much nitrogen is coming from each source, including nitrogen from Title 5 septic systems. The report also **includes a specifically tailored model for communities to use to determine what wastewater approach will meet the estuary's safe nitrogen limit and therefore restore coastal water quality.**

DETERMINING WHICH WASTEWATER OPTIONS ACHIEVE NITROGEN LIMITS

Most communities will employ a mix of the above described wastewater technologies to meet the nitrogen limits established by the MEP. An assessment of wastewater technologies, together with the MEP report, will allow a community to determine how much nitrogen from existing Title 5 septic systems must be removed and assess which technologies will be most appropriate to achieve that level of removal. **This is an essential planning tool for communities.**

A SUGGESTED STEP BY STEP APPROACH COMMUNITIES CAN TAKE:

1. Partner with the MEP to determine the amount of nitrogen that needs to be removed to restore healthy waters.
2. Establish a nitrogen management committee within the town to research and discuss the various strategies to reduce nitrogen pollution from wastewater.
3. Identify the best set of strategies and technologies which achieve the necessary, and most cost-effective, nitrogen reductions.
4. Obtain State regulatory approval and financing.



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The WRWA extends sincere thanks to the Coalition for Buzzards Bay for allowing us to reproduce this information. An informed citizenry is critical to improving the health of Buzzards Bay and the Westport River. Please visit: www.savebuzzardsbay.org for more information.

TERMS TO KNOW AND UNDERSTAND:

BUZZARDS BAY WATERSHED

The area of land which drains by groundwater or surface water to Buzzards Bay. The Buzzards Bay watershed includes all or part of 17 towns and covers 432 square miles. Towns in the Buzzards Bay watershed are Acushnet, Bourne, Carver, Dartmouth, Fairhaven, Fall River, Falmouth, Gosnold, Marion, Mattapoisett, Middleborough, New Bedford, Plymouth, Rochester, Wareham, Westport, and Tiverton, R.I.

ESTUARY

Bodies of water, such as Buzzards Bay and its nearshore harbors and coves, where the ocean meets the mouth of a river or stream. Their unique make up provides important habitat for shellfish and eelgrass as well as serves as breeding grounds for marine animals. Estuaries are particularly sensitive to nitrogen pollution.

EUTROPHICATION

Degraded water quality caused by nitrogen pollution resulting in low oxygen levels, poor water clarity, and possible fish kills.

MEP

The Massachusetts Estuaries Project (MEP) is a partnership between the Massachusetts Department of Environmental Protection and The University of Massachusetts School for Marine Science and Technology. For more information, see www.oceanscience.net/estuaries

NITROGEN

A naturally occurring element, it is essential for all life. It naturally cycles through the land, water, and air. Excess quantities of nitrogen, however, pollute coastal waters and threaten drinking water supplies.

TITLE 5 SEPTIC SYSTEM

Traditional onsite method of disposing of wastewater and treating for bacteria. "Title 5" refers to the section of the Massachusetts Sanitary Code under which septic systems are regulated.



The Westport River Watershed Alliance (WRWA) is a nonprofit, citizens group formed in 1976

to protect and conserve the natural resources of the Westport River and its 100-square mile watershed located in Southeastern Massachusetts. The Westport River watershed encompasses the Massachusetts communities of Westport, Dartmouth, Fall River, and Freetown as well as Tiverton and Little Compton in Rhode Island. This informational mailer was funded by the generosity of the Rathmann Family Foundation.

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