Chesapeake Bay Field Office

Northeast Region

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Nutrient Pollution

What are nutrients?
Nutrients are substances that all living organisms need for growth and reproduction. Two major nutrients, nitrogen and phosphorus, occur naturally in water, soil, and air. Nutrients are present in animal and human waste and chemical fertilizers. All organic material such as leaves and grass clippings contains nutrients.

How do nutrients enter the Bay?
Nutrients can find their way to the Bay from anywhere within the 64,000 square mile watershed. All streams, rivers and storm drains in this huge area eventually lead to the Chesapeake. The activities of over 13.6 million people in the watershed have overwhelmed the Bay with excess nutrients. Nutrients come from a wide range of sources, which include sewage treatment plants, industry, agricultural fields, lawns, and even the atmosphere. Nutrient inputs are divided into two general categories, point sources and nonpoint sources.

Point sources
Sewage treatment plants, industries, and factories are the major point sources. These facilities discharge wastewater containing nutrients directly into a waterway. Although each facility is regulated for the amount of nutrients that can be legally discharged, at times, violations still occur.

Nonpoint sources
Nonpoint sources pose a greater threat to the Chesapeake ecosystem, as they are much harder to control and regulate. Nonpoint source nutrients are usually carried to a waterway by rainwater runoff. Rain picks up nutrients from the land and travels either directly overland to a waterway or soaks into

groundwater, which eventually feeds into streams. Farm fertilizers and animal manure comprise a large portion of nonpoint source nutrients. Other nonpoint sources originate from the urban environment and include lawn fertilizers, septic tanks, organic material, and discharge from boat toilets.

What are the problems?

Excess nutrients cause algae populations to grow rapidly, or "bloom." An overabundance of algae contributes to two problems in the Bay: reduction in sunlight and reduction in dissolved oxygen. Algae occur as tiny single-celled plants called phytoplankton or as larger seaweeds which look like leafy "slime"; growing on rocks and jetties. Phytoplankton blooms turn the water brown or blue-green and prevent essential sunlight from reaching rooted underwater plants known as **submerged aquatic vegetation (SAV).**

Excess nutrients also cause algae to grow directly on the leaves of SAV, further limiting essential sunlight. Without this sunlight, the plants die. Many shellfish, fish, and waterfowl depend on SAV as their primary habitat and food source.

The second problem created by widespread algal blooms occurs when the algae die, sink to the bottom, and decay. During the decay process, bacteria consume large amounts of dissolved oxygen from the water. This causes extremely low levels of dissolved oxygen in large areas of the Bay. Because warm water holds less oxygen than cool water, this problem worsens in the summer. With out oxygen, many organisms perish.

Impacts on fish and wildlife

The nutrient-related decline of submerged aquatic vegetation has eliminated essential habitat for many fish, shellfish, and other aquatic life. SAV is a rich nursery ground, providing food and habitat for juvenile fish. Molting crabs hide from predators in the grass beds. Larger fish such as sea trout, bluefish, perch, pickerel, and drum patrol the grass beds in search of food. Many small and interesting creatures including pipefish, seahorses, mud crabs, spider crabs, and several kinds of shrimp and minnows inhabit the underwater grass beds.

>Loss of submerged aquatic vegetation has contributed to a substantial reduction in the once massive flocks of waterfowl that darkened the skies of Chesapeake winters. Populations of redhead ducks have declined markedly with the loss of SAV. Other species, such as the Canada goose, American widgeon, and canvasback, have had to change their feeding habits to include other sources of food.

The low oxygen conditions created by excess nutrients have severely impacted life in the Bay. Since 1960, there has been a substantial increase in the amount of Bay bottom with dangerously low levels of dissolved oxygen. Bottom-dwelling, or benthic, organisms including worms, clams, oysters, crabs, and many smaller invertebrates are an essential link in the food web. With the decline of these benthic organisms, the entire Chesapeake ecosystem is altered.

Correcting the problem

Actions are being taken to reduce nutrient inputs to the Bay. Sewage treatment plants and industries are installing nutrient removal equipment. Many farmers are developing nutrient management plans for their farms. Streamside forest buffers,

manure pits, and proper fertilizer applications are "best management practices" farmers can use to help reduce nutrient runoff into waterways. Some counties require stormwater management ponds in new construction projects. Primarily designed to trap sediment, the ponds can provide some nutrient removal as well. As the population of the Bay watershed grows, the challenge to reduce nutrients increases.

Signs of progress!

The 1987 Chesapeake Bay Agreement, a Federal/State/private partnership, calls for a 40 percent reduction in nutrient inputs to the Bay by the year 2000. Progress toward this goal is evident. Phosphorus inputs to the Bay from point and nonpoint sources are declining. Upgrades at the watershed's largest sewage treatment plant in Washington, D.C. have paid off; more SAV, fish, and waterfowl now inhabit the upper Potomac River. Yet, a continued effort from governments, businesses, citizen groups, and individuals is necessary to reach the nutrient reduction goal.

What You Can Do

- Follow directions when applying fertilizers; don't apply before storms.
- Plant streamside vegetation.
- Pump out septic tanks regularly.
- Pump boat waste to an onshore facility.

Last updated: January 6, 2011