How water quality, tides and water flow affect algae

- Where freshwater and salt water mix, a water body can become cloudy, reducing light necessary for underwater plants. Freshwater algae decline and decompose, and are replaced by salt-tolerant algae in areas where freshwater and salt water mix.
- Following wet winters, water bodies with fresh/salt water mixtures are prone to algal blooms of the surface scum-forming blue green *Microcystis*.
- As the speed of water flow decreases, a water body may become lake-like and favorable for algal growth. Low water flow during droughts can also increase algal growth.
- Prolonged high tides can cause water to reverse its flow. For example, reversed flow in the St. Johns River has been observed as far upstream as Lake George. Reverse flows delay the water body's ability to disperse pollutants.
- Water clarity improves during the spring dry season in some water bodies when dark-colored runoff decreases. This improvement in water clarity allows light to penetrate the water, which is important for submerged vegetation, but also promotes algal growth if excess nutrients are available.

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St. Johns River Water Management District

ALGAE

How too many nutrients stress a water body

Algae are microscopic plants found in all surface waters and are the vital base of the aquatic food chain. When algae grow too abundantly, they cause numerous problems in waterways.

What are algal blooms and what causes them?

In natural water bodies not impacted by pollution, there are low amounts of essential nutrients, primarily nitrogen and phosphorus. Algae, and other elements of the aquatic ecosystem, are held in balance by the competition for the low amounts of nutrients available. As the supply of nitrogen and phosphorus increases, algae grow at a rate faster than they can be consumed by microscopic aquatic animals.

Too many nutrients spur the growth of too many algae. When algal plants crowd together, the resulting "blooms" block sunlight from reaching underwater plants. Sunlight is vital for the growth of underwater vegetation, which provides food and a place to live and grow for fish and other animals.

An algal bloom can also change the level of dissolved oxygen in the water, overwhelming the natural process of oxygen exchange between the air and water. During the day, photosynthesis (the process in which plants and algae convert light to chemical energy) by algae saturates the water column. At the same time, algae consume dissolved carbon dioxide, leading to an increase in pH that can cause toxic ammonia in the water. At night, or on cloudy days, algae consume oxygen and lower dissolved oxygen to levels that can harm fish. In severe cases, an algal bloom may die suddenly when the algae use up all of the readily available nutrients or encounters unfavorable salinity conditions, which further depletes dissolved oxygen and can result in fish kills.

In addition to lowering oxygen levels, some types of algae produce toxins that can harm fish, wildlife and, potentially, humans, if ingested in sufficient quantities.

Where do excess nutrients come from?

All water bodies have low amounts of nitrogen and phosphorus. Unfortunately, many activities by people inadvertently add additional nitrogen and phosphorus to surface waters, sometimes to the point where the amounts exceed a water body's ability to absorb the pollution and remain healthy. For example, large amounts of nutrients come from some domestic wastewater treatment plants and industrial discharges, and from some agricultural and urban runoff.

In addition, nutrients can seep through soils from fertilizers and from septic tanks, percolating into groundwater. Nutrient pollution of groundwater threatens some Florida springs and their unique flora, and ultimately threatens downstream surface waters.

Cover: Blue-green algae look like a blanket against the shoreline.

Excess nutrients run off the land in developed areas into waterways from storm water.

What is being done to control nutrient pollution?

Individuals, local governments, state agencies and the St. Johns River Water Management District are working to control nutrient pollution.

For example, in the Upper St. Johns River Basin — the St. Johns River's headwaters — the District and the U.S. Army Corps of Engineers have restored and enhanced more than 150,000 acres of marshes in Indian River and Brevard counties. The project has improved water quality and restored fish and wildlife habitat, created recreational opportunities, and reduced stormwater discharges into the Indian River Lagoon.

In the Middle St. Johns River Basin in east-central Florida, the highly urbanized area is home to more than 2 million residents. Here, nutrient problems are being addressed through the acquisition of environmentally significant land, elimination of wastewater discharges, stormwater and wetland protection regulations, development of pollutant load reduction goals, erosion control projects and partnerships with local governments to retrofit problem areas for water quality and flood improvements.

The Marsh Flow-Way at Lake Apopka filters excess nutrients from the lake's water.

Restored marshes at the headwaters of the St. Johns River filter out excess nutrients.

In historic farming areas, such as the Upper Ocklawaha River Basin, Lake Apopka and Orange Creek, excess nutrients polluted surface waters, and resulted in deep organic sediments accumulating on the bottom of the lakes. Restoration work in these areas has included harvesting gizzard shad, filtering lake water through marsh flow-ways at lakes Apopka and Griffin, restoring former farms to marshlands and developing nutrient-loading reduction goals for area lakes.

Issues have been similar in the Lower St. Johns River Basin, where treated domestic and industrial wastewater, as well as lawn and agricultural fertilizers carried by storm water, have all helped feed harmful algal blooms. Work in the lower basin began in the 1980s with the District's development of the basin's Surface Water Improvement and Management plan, which focused on water quality, biological health, sediment management, toxic remediation, public education and intergovernmental coordination.

What can you do to fight nutrient pollution?

Each individual can help protect our waterways from nutrient pollution. Here are some things you can do at home to reduce your impacts.

Fertilize wisely

- Apply fertilizers sparingly, if at all.
- Choose fertilizers with low or no phosphates.
- Follow the manufacturer's directions.
- Choose slow-release fertilizers.
- Fertilize only during the growing season.

Use chemicals responsibly

- Use pesticides, herbicides and fungicides only when needed.
- Apply chemicals responsibly, following directions on the label.
- Apply only on affected areas.
- Consider organic or nontoxic solutions.

Minimize harm from stormwater runoff

- Don't blow yard waste and clippings into storm drains.
- Repair automobile leaks.
- Don't dump oils, chemicals or paint in your yard or down storm drains.
- Dispose of antifreeze, motor oil and batteries at designated collection centers.
- Pick up and properly dispose of pet waste.

Maintain your septic system

- Install your septic system an appropriate distance from nearby waterways.
- Install the system so that rainfall and surface water will flow away from the drainfield and at an appropriate distance from nearby waterways.
- Have the system inspected at least every three years.

If fertilizer or chemicals are used on your lawn, use them wisely, sparingly and according to the label.

- Avoid overuse of household cleaning chemicals.
- Never flush paper towels, newspapers, plastic, diapers, cat litter, rags, sticks or toxic materials, such as pesticides, into the system.
- Keep trees and shrubbery more than 30 feet away from the drainfield.
- Never allow vehicles to drive across or park on the drainfield.

Other tips

- Preserve shoreline and submerged vegetation along your waterfront property.
- Allow natural vegetation to buffer the shoreline and absorb nutrients.
- Maintain proper dock heights to allow light to reach under the dock.
- Design your landscape to temporarily retain rainwater to allow your plants to absorb nitrogen.