

Utah's Approach for Developing Nutrient Standards

The significant rise in excess nitrogen and phosphorus levels (nutrient pollution) in recent years has worsened existing nutrient-related water quality problems across the country. Nutrient pollution impairs drinking water, endangers aquatic life, and threatens recreational uses. The Utah Division of Water Quality (DWQ) has already identified numerous watersheds in the state that are struggling with high nutrient levels. In an effort to reverse this increasing trend, DWQ, in partnership with a wide-ranging group of federal and state stakeholders, established a working group to develop criteria for nitrogen and phosphorous levels and devise nutrient reduction programs to resolve excess nutrient loading in the state's waters.

The Problem

Nitrogen and phosphorus are natural parts of aquatic ecosystems. Both nutrients support the growth of algae and aquatic plants, which provide food and habitat for the fish and smaller organisms that live in the water.

Too much nitrogen and phosphorus, however, creates problems. High levels of nitrogen and phosphorus in streams and lakes cause algae to grow faster than ecosystems can handle. Large growths of algae, called algal blooms, can lead to serious reductions in dissolved oxygen (DO) in the water, in some cases completely eliminating the oxygen on which fish and other aquatic life depend. Low DO levels can result in the deaths of large numbers of fish and other organisms. These algae blooms also alter habitat and food webs, which threaten the health of a wide array of aquatic life, and jeopardize the ecological stability of waterbodies.

Some large algal blooms also release toxins which pose health threats to human and animal life. Cyanobacteria, or blue-green algae, can produce toxins that impact drinking and recreational waters. Humans who swim in or consume cyanobacteria-tainted water, for example, can experience skin irritation, gastroenteritis, or liver damage. These toxins can affect animal life as well. There have been at least two incidents of cattle deaths in recent years associated with blue-green algae in Utah reservoirs. Because these toxins can present serious health hazards, the EPA has made examination of the public health effects of toxin-producing algae a high priority, adding certain algae to their Drinking Water Contaminant Candidate List.

Finally, eutrophic waters (waters that have a high concentration of nitrogen and phosphorous) tend to have slimy, smelly surfaces or bottom substrates. This leads to taste and odor problems that can increase drinking water treatment costs. These same conditions decrease the property and recreation values these waters provide.

Causes

The primary sources of excess nitrogen and phosphorous are often the direct result of human activities. Important human sources include:

- Nitrogen and phosphorus in sewer and septic wastewater systems
- Fertilizers, yard and pet waste, and certain soaps and detergents that enter urban storm water systems
- Improperly managed animal manure, excess fertilizer applied to crops and fields, and soil erosion due to agricultural operations
- Nitrogen emissions from electric power generation, industry, transportation, and agriculture that lead to atmospheric nitrogen deposition in water bodies

Nutrient Criteria and Nutrient Reduction

DWQ is currently at work on a nutrient reduction program designed to safeguard waters under its jurisdiction from nutrient pollution. One component of this program involves determinations on acceptable concentration limits for nutrients. These numeric nutrient water quality criteria will establish nitrogen and phosphorous concentration limits that are protective of the beneficial uses of water bodies. Once established, these criteria will drive water quality assessment and watershed protection strategies and facilitate priority-setting and efficient program implementation, including easier and more cost effective restoration practices at sites identified by the Division for remediation.

The Division has completed economic studies to reflect the costs and benefits associated with the application of nutrient criteria. However, determining the point at which nutrients cease to be beneficial and start to become problematic is not an easy task. The effects of nutrients are mediated by site specific conditions such as channel shading or stream turbulence. DWQ anticipates that it will initially propose statewide criteria for headwaters, with other waterbodies added on a site-specific, as-needed basis. To ensure protection of all waters, DWQ has developed several assessment approaches it will use in the interim to identify streams or lakes in need of more-detailed site-specific investigations.

For DWQ, nutrient criteria development is only one piece of the puzzle. The Division is employing a multi-faceted approach to reduce nutrient pollution. DWQ believes that these nutrient criteria must be accompanied by reasoned implementation procedures that consider both the socioeconomic and ecological implications of nutrient reduction programs. The Division acknowledges the critical importance of addressing nutrient pollution, but believes that the Utah needs to be able to respond to local water quality needs with local solutions.

DWQ's Nutrient Core Advisory Team

The EPA has made nutrient criteria development a national priority and reaffirmed its commitment to partnering with states and stakeholders to accelerate efforts to reduce nutrient pollution nationwide. The EPA believes that it can best ensure progress on this critical water quality issue by engaging states and stakeholders through on-the-ground technical assistance, productive dialogue, and cooperative efforts to implement effective management practices and establish nutrient reduction programs tailored to local conditions.

In response to growing national and state urgency to control excess nutrients, DWQ assembled a core stakeholder group to assist the division in establishing water quality standards for nutrients. The Nutrient Core Team includes representatives from agriculture, drinking water utilities, publicly-owned treatment works (POTWs), environmental interests, recreation, the brine shrimp industry, storm water interests, and academia. Working in conjunction with DWQ support staff, the Team had been meeting quarterly since September 2011 to discuss the best approach for developing nutrient criteria for the state.

DWQ's research team compiled extensive technical data and analyses to support the nutrient criteria development concept plan, including the preparation of an ecological benefit study, a study to quantify the economic benefits and costs of implementing nutrient criteria for surface waters in Utah, and a statewide POTW nutrient removal cost study. DWQ staff have solicited input from stakeholders on the ways nutrient pollution affect their stakeholder group, steps stakeholders are currently taking to address nutrient pollution, and the approach each stakeholder group would suggest to address nutrient pollution. This feedback is an important component of the collaborative effort and confirms DWQ's commitment to find a workable approach for criteria development.

In August 2012, DWQ staff presented the Team with a draft plan for addressing nitrogen and phosphorous pollution. This blueprint outlines the challenges to addressing nitrogen and phosphorous pollution, including socioeconomic, ecological, engineering, and non-point considerations. The centerpiece of the workplan is a toolbox of potential comprehensive and adaptive management solutions, including:

- 1) Nutrient management categories to address site specific concerns (e.g., headwaters, the Great Salt Lake, etc.)
- 2) Numeric standards based on ecological responses in the field, numeric indicators, and narrative criteria, to be phased in based on nutrient management categories.
- 3) Statewide monitoring to identify water bodies with nutrient related problems, including prioritization of impaired sites to ensure remediation efforts and resources focus on areas of greatest need.
- 4) Watershed specific nutrient action plans, including a potential funding mechanism for address diffuse (i.e., non-point) sources of nutrient pollution.
- 5) Watershed-scale nutrient reduction strategies.

Over the next year, DWQ will discuss the specifics of these programs with a broad group of stakeholders. The Division will use the comments or concerns obtained from these conversations with stakeholders to improve the nutrient-reduction framework.