

LANDSCAPE AND TURF MANAGEMENT

BACKGROUND

Many of New England's lakes, streams, and coastal waters suffer from water quality impairments related to phosphorus and nitrogen pollution (U.S. Environmental Protection Agency, 2011). Fertilizer use on turfgrass is a source of nitrogen and phosphorus to New Hampshire waters. Turf is the largest “crop” in the United States. It is estimated that there is between 225,600 and 330,900 acres of turf in New Hampshire, which would cover between 3.8 to 5.5% of the state, including lawns, municipal fields, and golf courses (Milesi et al., 2005).

Plants will not absorb more phosphorus and nitrogen than they can use. Excess nutrients that are applied to turfgrass can run off the land and into the water. In New Hampshire’s freshwater lakes and rivers, phosphorus is considered the “limiting nutrient” or pollutant, while nitrogen is more of a problem in salt water systems, including estuaries like Great Bay.

Volunteer Lake Assessment Program (VLAP) data from 1985 through 2012 shows an increase in median total phosphorus values and Chlorophyll-a, and a decrease in transparency (DES, 2012c). In the 2009 Lake Nutrient Criteria Assessment study, median values for chlorophyll-a and phosphorus were calculated for 233 lake assessments units in New Hampshire. Twenty-six (11%) of the lakes were on the New Hampshire Section 303(d) list for chlorophyll-a and phosphorus impairments.

While it is understood that fertilizer used on turf that contains phosphorus can contribute to excess phosphorus pollution in freshwater systems, directly connecting phosphorus load data from turf fertilizer applications is challenging.

Total nitrogen load to the Great Bay Estuary in 2009-2011 was 1,225 tons per year. It is difficult to identify a trend in nitrogen loads over time; however, at this time the Great Bay Estuary exhibits many of the classic symptoms of too much nitrogen; low dissolved oxygen in tidal rivers, increased macroalgae growth, and decline in eelgrass. Between 1974 and 2011, data

Photo Caption. Participants try out the turf reflectance meter at the training hosted by the Seacoast Stormwater Coalition.



indicates a significant overall increasing trend for dissolved inorganic nitrogen (DIN) at Adams Point in the estuary, which is of concern. (PREP, 2013).

While it is also difficult to identify direct sources of nitrogen from fertilizer applied to turf, studies from DES in the Great Bay Watershed indicate nitrogen is a significant contribution to water quality impairments in coastal New Hampshire. The Great Bay Nitrogen Nonpoint Source Study (GBNNPSS) (DES, 2014), reports that in the model for delivered loads of nitrogen to the Great Bay Estuary, chemical fertilizer is 15% (130 +/- 20 tons/yr). Lawns contributed 70% of this load or about 10.5% of the total NPS load. Recreational fields, including golf courses, were responsible for just 8% or about 1% of the total NPS load.

Statewide, fertilizer application rates are variable depending on the use and management of the turf. Landscaping fertilizers can be a significant source of phosphorus and nitrogen from areas of residential development and other areas where grass lawns are maintained (e.g. office parks, schools, sports fields, etc.). Though research by DES suggests that professionally-managed turf is better managed than residential lawns.

Different strategies for managing turfgrass are needed depending upon conditions and desired outcomes. Using sound, research-based information to determine how much fertilizer, pesticides, and water turfgrass needs to remain healthy can reduce water quality impacts from nutrients. When fertilizers, either synthetic or organic, are applied **in the proper amounts at appropriate times during the growing season**, lawns can thrive and the risks of nutrients from erosion and fertilizer entering out waterways can be reduced. State and local partners are just beginning to connect turf science and social science research with BMPs associated with reducing water quality impacts from turf management practices.

UNH Cooperative Extension (UNHCE) and NH Sea Grant work with partners and stakeholders to incorporate the latest science into outreach and education efforts. UNHCE also partners with Master Gardeners, Natural Resource Stewards, the NH Landscape Association, the NH Plant Growers Association, and other interested citizens and stakeholders in the Green Industry to provide educational programs such as *Landscaping at the Waters Edge: Ecological Landscape Training* and promote ecologically sound landscape and turf management practices.

In 2011, the DES Coastal Program funded a partnership with DES Watershed Assistance Section, the Seacoast Stormwater Coalition, UNH Cooperative Extension, and University of Connecticut to conduct the *Green Spaces: BMPs to Protect Water Quality: Clean Water, One field at a Time* workshop and guidance. This included incorporating Karl Guillard's (UConn) training on Turf Reflectance Meters to guide nitrogen fertilization on turf managed by professionals.

In 2013, the New England Interstate Water Pollution Control Commission (NEIWPC) worked closely with states and EPA to facilitate *Northeast Voluntary Turf Fertilizer Initiative*: a turf fertilizer stakeholder process to develop a regional set of guidelines for turf fertilizer aimed at protecting water quality. The guidelines were designed to provide consistent recommendations to potentially

alleviate the need for legislation in states that have not passed laws on turf fertilizer, to supplement laws in states that have passed legislation, and to serve as a basis for public education and outreach for any state or municipality. Local and state regulations can complement or reinforce voluntary messaging and behavior change efforts to reduce nutrient pollution from fertilizer. The New Hampshire legislature recently passed the NEIWPC guidelines into state law - the first state in New England to do so.

MEASURES TO CONTROL NPS POLLUTION

REGULATORY PROGRAMS:

- HB 393: Relative to effluent limitations with regard to nitrogen and phosphorus (passed in 2013) limits the nitrogen and phosphorus content of fertilizers sold at retail and intended for use on home lawns.
- RSA 483 B: NH Shoreland Water Quality Protection Act - states that no fertilizer, except limestone, can be used within 25 feet of the reference line. Beyond 25 feet, slow or controlled release fertilizer may be used. Local town ordinances in several New Hampshire towns and cities have restrictions that are more stringent than the SWQPA.
- RSA 431: Dept of Agriculture Soil Conditions - Fertilizers

VOLUNTARY PROGRAMS:

- *Landscaping at the Waters Edge: Ecological Landscape Training*. UNH Cooperative Extension. <http://extension.unh.edu/Sustainable-Landscapes-and-Turf/Landscaping-Waters-Edge>
- *Green Spaces: BMPs to Protect Water Quality. Clean Water, One field at a Time* <http://des.nh.gov/organization/divisions/water/stormwater/bmps-green-spaces.htm>
- Annual Winter and Spring Landscape Conferences for professional landscape and turf businesses
- Biennial Municipal Turf and Grounds Conference for municipal and school employees who manage parks and playing fields
- Master Gardener Course and Natural Resource Stewards volunteer training

GUIDANCE DOCUMENTS:

- *New England Regional Nitrogen and Phosphorus Fertilizer and Associated Management Practice Recommendations for Lawns Based on Water Quality Considerations*. 2008. Karl Guillard (ed.). Turfgrass Nutrient Management Bulletin 0100. College of Agriculture and Natural Resources, University of Connecticut. USDA CSREES project # 2006-51130-03656.
- *Changing Homeowner's Lawn Care Behavior to Reduce Nutrient Losses in New England's Urbanizing Watersheds: the Report of Findings from Social Science Research*. Eisenhauer, B.W. and B. Gagnon. 2008. USDA CSREES project # 2006-51130-03656.
- *Proper Lawn Care in the Protected Shoreland (SP-2)*, New Hampshire Department of

Environmental Services,. 2009 <http://des.nh.gov/organization/commissioner/pip/factsheets/sp/documents/sp-2.pdf>

- *Green Grass Clear Water: Environmentally Friendly Lawn Care Recommendations for Northern New England*. UNH Cooperative Extension https://seagrant.unh.edu/sites/seagrant.unh.edu/files/media/pdfs/extension/lawncare_information_sheet.pdf.
- *Sustainable Landscapes and Turf*. UNH Cooperative Extension. <http://extension.unh.edu/Agriculture/Sustainable-Landscapes-and-Turf>
- *Innovative Land Use Planning Techniques: A Handbook for Sustainable Development, New Hampshire Department of Environmental Services - Chapter 3.6 Landscaping*. NH Association of Regional Planning Commissions, NH Association of Regional Planning Commissions, NH Office of Energy and Planning, and NH Municipal Association. http://des.nh.gov/organization/divisions/water/wmb/repp/documents/ilupt_chpt_3.6.pdf
- *New Hampshire's Turf Fertilizer Law: What You Should Know*. 2014. Margaret Hagen, University of New Hampshire Cooperative Extension Agriculture Fact Sheet. http://extension.unh.edu/resources/representation/Resource004116_Rep5835.pdf
- *Final Report to the New England and New York State Environmental Agency Commissioners Regional Clean Water Guidelines for Turf Fertilizer Formulated for and used on Urban Turf*. NEIWPC, Sept, 2013
- *Great Bay Nitrogen Non-point Source Study*. (R-WD-13-10) New Hampshire Department of Environmental Services, June 2014. <http://des.nh.gov/organization/divisions/water/wmb/coastal/documents/gbnpss-report.pdf>

TABLE 14. LANDSCAPE AND TURF MANAGEMENT GOALS, OBJECTIVES, AND MILESTONES

Landscape & Turf Management (L) Goal. Pollutants from turf management and landscaping practices do not run off or leach to surface or groundwater.							
Objective	Milestone	Measure of Success	Schedule				
			2015	2016	2017	2018	2019
Objective L-1 Fertilizer from turf management and landscaping practices does not degrade water quality.	Milestone L-1.1 NPS partners have access to and understanding of current soil, turf, water quality, and social sciences in order to reduce water quality impacts from landscaping and turf management fertilizer application. <i>Partners: UNH Cooperative Extension, NH Sea Grant, New England Water Pollution Control Commission, DES Pollution Prevention Program, Conservation Districts, Master Gardeners, garden clubs, 319 Grantees, Natural Resource Stewards, opinion leaders, professional landscapers</i>	Measure L-1.1a Report on current science, research, and outreach resources related to water quality and landscaping/turf management to identify gaps and needs to guide future projects and programs.					
		Measure L-1.1b Post relevant information to the DES Watershed Restoration and Protection Forum (blog) quarterly.					
		Measure L-1.1c Present on water quality impacts of landscaping practices, including fertilizer use, at the NH Water and Watershed Conference.					
	Milestone L-1.2 NH residents are aware of best management practices to reduce water quality impacts from landscaping and lawn care activities including fertilizer use. <i>Partners: Great Bay Stewards, UNH Cooperative Extension, UNH Marine Docents, UNH Coastal Research Volunteers</i>	Measure L-1.2a Develop homeowner outreach program components, focused on fertilizer use.					
		Measure L-1.2b Pilot program messages and methods.					
		Measure L-1.2c Implement and evaluate program messages and methods.					
	Milestone L-1.3 Landscaping companies are aware of and incorporate best management practices to reduce water quality impacts from fertilizer applications. <i>Partners: NH Landscape Association, UNH Cooperative Extension, NH Sea Grant, commercial lawn services</i>	Measure L-1.3a Identify barriers to adding water quality options to commercial lawn service menus					
		Measure L-1.3b Develop a plan for enhancing existing NH Landscape Certification Program.					
		Measure L-1.3c Identify opportunities to include water quality friendly recommendations in landscaping curriculum at secondary and post-secondary education institutions.					

TABLE 14 (CONT). LANDSCAPE AND TURF MANAGEMENT GOALS, OBJECTIVES, AND MILESTONES

Objective	Milestone	Measure of Success	Schedule				
			2015	2016	2017	2018	2019
Objective L-1 (cont.)	Milestone L-1.4 Garden Centers and nurseries promote best management practices to reduce water quality impacts from landscaping and fertilizer use. <i>Partners: UNH Cooperative Extension, NH Sea Grant, NH Plant Growers, garden centers, plant nurseries</i>	Measure L-1.4a Create and offer best fertilizer practices outreach options to garden centers and nurseries e.g., shelf talkers, videos, mobile applications, fact sheets, brochures, trainings.					
		Measure L-1.4b Determine the feasibility of revitalizing the Master Gardener at Garden Centers/Nurseries program.					
	Milestone L-1.5 DES Watershed Assistance grantees and partners are educated on and promote the new fertilizer packing law requirements (HB 393), effective January, 2014, which requires specific TN limitations by application rate recommendation on labels of fertilizer bags sold at retail. <i>Partners: UNH Cooperative Extension, NH Sea Grant, NH Plant Growers, garden centers, plant nurseries</i>	Measure L-1.5a Revise UNHCE soil testing recommendations to meet new fertilizer law.					
		Measure L-1.5b Increase the number of soil tests by 5%					
	Milestone L-1.6 Municipal field managers are aware of and use best management practices to reduce water quality impacts from landscaping and turf management. <i>Partners: DES Coastal Program, NH Municipal Association, NH Stormwater Coalitions, UNH Cooperative Extension, UNH Sea Grant</i>	Measure L-1.6a Completed guidance materials to promote and complement the existing <i>Green Spaces: BMPs to Protect Water Quality</i> (Seacoast Stormwater Coalition - NH Coastal Program Grant)					
		Measure L-1.6b Documented municipal turf management practices and barriers to implementing water quality friendly practices					
Measure L-1.6c Develop and distribute promotional materials to all MS4 towns for the use of reflectance meters to measure "green" in municipally managed field grass and reduce fertilize application.							

TABLE 14 (CONT). LANDSCAPE AND TURF MANAGEMENT GOALS, OBJECTIVES, AND MILESTONES

Objective	Milestone	Measure of Success	Schedule				
			2015	2016	2017	2018	2019
Objective L-1 (cont.)	Milestone L-1.1 (cont.)	Measure L-1.6d Develop and implement municipal recognition program for “green” lawns and athletic fields (Green Spaces).					
Objective L-2 Pesticides from turf management and landscaping practices do not degrade water quality.	Milestone L-2.1 Water quality impacts from pesticide use on turf and lawn maintenance are identified. <i>Partners: NH Dept. of Agriculture, Markets, and Food, DES Waste Management Ecological Risk Program, UNH Cooperative Extension, NH Sea Grant,</i>	Measure L-2.1a Report on research of existing toxicity data and impacts of pesticides on water quality.					
		Measure L-2.1b Draft pesticide use report including data on pesticide use for turf and landscape management for registered pesticide applicators.					
		Measure L-2.1c Incorporate pesticide information into fertilizer outreach efforts and materials, where appropriate.					
	Milestone L-2.2 Identified target audiences understand best management practices to reduce water quality impacts from pesticide use in turf and lawn maintenance. <i>Partners: UNH Cooperative Extension, NH Sea Grant, DES Pollution Prevention Program, golf courses, conservation districts, municipalities</i>	Measure L-2.2a Target audiences identified.					
		Measure L-2.2b Develop, distribute, and promote recommendations for control of grubs, weeds, and other pests, including basic integrated pest management (IPM).					