Does the turfgrass industry have a defensible rate of Nitrogen required to produce a functional and aesthetically pleasing turf?

Establishing a defensible N rate is required as a result of the offensive assertion that N serves only aesthetic (cosmetic) purposes and leads to increased N loss into surface and subsurface water bodies. Urban grasslands (turf in urban environments) serves a variety human needs and an important role in the functioning of urban environments. However there is a growing misunderstanding that an urban grassland can provide these benefits with little or no applied supplemental N and that when applied the N pollutes water.
Cornell University has been conducting research on Long Island's groundwater resources for over 50 years as it relates to potential contamination from chemicals and fertilizers applied to grasslands. In those 50 years the Cornell Turfgrass Program has conducted 12 studies and three large scale nutrient education and reduction programs on Long Island to preserve water quality. In fact, a comprehensive N management review was conducted for Suffolk County in 2010 and is available @
http://healthylawns.suffolkcountyny.gov/bmps/FinalReport_Edited_01_19_11.pdf.

The only turfgrass textbook on soil fertility (Carrow et al., 2001), recommends nitrogen fertilizer amounts from an annual 40 to 60 lbs of N per acre for average grassland to 130 to 260 lbs. N per acre for high maintenance grassland. Soil properties have a significant influence on N rate, as does the age of site, drainage, amount of traffic, shade and irrigation. For example, sandy well-drained soils may require more nitrogen, more traffic requires more nitrogen, irrigated lawns need more nitrogen, shady lawns need less nitrogen, older turf areas need less nitrogen, removing clipping requires more nitrogen. In general the higher the expectation of visual turf quality especially when combined with traffic requires more N.

So how can a defensible N rate be determined based on these factors. In short the most responsible method is to work backward from the potential for off-site movement. In this case the data are more specific, reveal the impressive ability grasses have to scavenge for N, and are more dependent on soil type and water movement. Long term studies investigating leaching of N in Michigan on Kentucky bluegrass lawn grown on moderately well drained soil for over 25 years found that annual N rates <100 lbs actual N per acre do not result in N leaching above background levels. Longer term (60-100 yrs) predictive models suggest between 83 and 95 lbs of actual N per acre will eliminate N leaching. More recent research at Cornell University found 20 lbs per acre of actual soluble N could be applied in a single application on a sandy soil with no risk of leaching, poorly drained soils could receive 30 lbs of soluble N before leaching occurred from a single application. Finally, restricting N application in Spring and Autumn when the average air temperatures are below 50F will significantly reduce N leaching when leaching potential is greatest on LI.

The risk of not applying N fertilizer or supplying in an amount too low to sustain growth has also been shown to have negative effects on water quality. Cornell University research conducted on Long Island indicated that when Phosphorus levels in the soil are above 28ppm (>80% of soil samples indicate this level in NY) a turf with low shoot density (inadequate N) will have large

increases in sediment runoff and associated P loss to runoff. Additionally, from a climate change perspective research at Purdue University found that maintaining active growing grasslands with proper N fertilization increases carbon sequestration, improves water infiltration during high rainfall events, and does not contribute to increased emissions from mowing.

Therefore, the defensible annual N rate for Long Island is between 80-100 lbs of actual N depending on the age of the turf and clippings management and a single applications of soluble N should not exceed 20 lbs actual N per acre.