

QUESTION: Why is “Managed Turf” a source of nutrients and pollution?

It's not the turf itself, rather it's (1) the process of preparing the ground for the turf (clearing, grading, compacting with the equipment, and then a few inches of topsoil back on top creates a significant change in infiltrative capacity – a HSG B soil easily becomes a C or D soil); and (2) the way we manage turf (fertilizers, pesticides, grass clippings, etc.).

The CWP staff discussed this issue extensively with the Virginia Turf Council, among others, and we were all in agreement that turf intensive land uses, such as schools, parks, golf courses, etc., typically under the control of a single owner or property manager, could readily benefit from the use of an urban nutrient management plan. The fact that such a plan would be hard to regulate or enforce by the local program or DCR is certainly an issue, but that shouldn't trump the fact that the creation and management of turf generates higher pollutant concentrations than impervious cover and more runoff (and therefore load) than the pre-developed ground cover.

Impervious cover is considered a very efficient conveyor of TP, TN, etc. The source of the load is atmospheric deposition, adjacent pervious land cover, and other potential landscape sources – not the pavement itself. The fact that impervious cover significantly increases the volume of runoff therefore means it also increases the load.

If compacted soil within the managed turf areas of a development site (commercial or residential) also increases the runoff volume as compared to the existing condition (as demonstrated through the research of Dr. Robert Pitt and others) then it stands to reason that it too will increase the nutrient load. If the turf is also a source of increased nutrients beyond atmospheric deposition due to management practices, then the increase is magnified by both increased volume and increased concentration.

Here is the link to Stuart Schwartz's presentation on soil compaction, given at the CWP's "Rooftop to the Bay" conference in Staunton, VA, in March 2009:

<http://www.cwp.org/cbstp/Resources/d2s3a-ss-ppt.pdf>

His research was presented as a work in progress, and he offered a compelling argument that adding soil amendments to the developed condition soil horizon made a measureable difference in porosity and infiltrative capacity. He demonstrated through his numerous site studies that the developed condition soil horizon is typically not much different than asphalt in terms of the hydrologic response – encountered over and over. He is promoting soil amendments as a way to reduce runoff volume from existing urban areas, where tearing out pavement is not an acceptable option, but restoring the pervious hydrologic capacity of open soils is.

DCr is also separately providing a copy of Tom Schueler's paper: The Clipping Point, and the Runoff Reduction Method Technical Memo with Appendices (provides the basis for the derivation of the Rv for managed turf).

[Pollutant export from various land uses in the Upper Neuse River Basin](#)

[jstor.org](#) [PDF] DE Line, NM White, DL Osmond, GD ... - Water Environment ..., 2002 - ingentaconnect.com

... Turner and Miller (1982) reported that intensively **managed turf** grass in Maryland can receive ... The high fertilizer application rates and low nutrient export from **turf** reported in past ... collection of a considerable amount of monitoring data to characterize **pollutant loads** from different ...

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[Nutrient flux in storm water runoff and baseflow from managed turf](#)

[usda.gov](#) [PDF] KW King, JC Balogh, RD Harmel - Environmental **Pollution**, 2007 - Elsevier

... Environmental **Pollution** Volume 150, Issue 3, December 2007, Pages 321-328. ... Of the land uses in the urban landscape, **turf** is the most intensively **managed** (Shuman et al ... 2005) and [Winter and Dillon, 2006]); however, nitrogen and phosphorus loading from the **turf** systems is ...

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[msu.edu](#) [PDF] KW King, JC Balogh - Trade Journal Publication, 2008 - archive.lib.msu.edu

... 2,4-D and chlorothalo- nil concentrations and **loads** are consistent with those previously reported on plot-scale studies. 108 GeMJune 2008 ... 2007. Nutrient flux in surface runoff and baseflow from **managed turf**. Environ- mental **Pollution** 150: 321-328. ...

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[Fungicide and Nutrient Transport with Runoff from Creeping Bentgrass Turf](#)

PJ Rice, BP Horgan - International Turfgrass Society Research ..., 2009 - ars.usda.gov

... Extrapolation of measured runoff **loads** to estimated environmental concentrations in a receiving ... be used in model simulations to predict non-point source **pollution** potentials and ... Technical Abstract: Runoff from **managed turf** may contain pesticides and nutrients that contribute ...

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[\[PDF\] Appendix D. Sources of Nitrogen in Developed Areas](#)

[ehnr.state.nc.us](#) [PDF] A Deposition - h2o.ehnr.state.nc.us

... studies by turfgrass researchers generally shows that grass, when **managed** properly, can ... Nitrate Levels in Soil Water Depending on **Turf** Management Strategies (from Schueler 1994 ... Even properly functioning septic systems can deliver significant **pollutant loads** to groundwater ...

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[\[PDF\] Nutrient Loss from a Golf Course Watershed](#)

[msu.edu](#) [PDF] N LOSSES, F **TURF** - turf.lib.msu.edu

... Environmental **Pollution** 133:243-253. ... through subsurface drainage from the golf course **turf** were dependent on temperature, precipitation, and **turf** management factors such as the magnitude and timing of applied fertilizer. At the more intensively **managed** site, higher ...

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[\[PDF\] National Management Measures to Control Nonpoint Source Pollution from Urban Areas](#)

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... This activity can result in high **loads** of nutrients, metals, and hydrocarbons being carried to ... A large body of literature by **turf** researchers shows that healthy and well-**managed turf** grass can ... Since gas stations have high potential loadings and **pollutant** profiles similar to those of ...

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