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NTEP *Comings and Goings*

Volume 1, Issue 6
December 2010

Dear Kevin,

In this issue of NTEP *Comings and Goings,* we highlight new developments in the Environmental Protection Agency's approach to reducing nutrients that impact the Chesapeake Bay, profile the NTEP trials and other research at Cornell University, and continue our series on NTEP data collection methods.

If we can help you with anything or answer any of your questions, please feel free to contact us (301-504-5125, kmorris@ntep.org).



In this time of reflection, we want to thank everyone for their support in 2010. We hope that this can be a season to reconnect with loved ones, share good food with family and friends, and enjoy giving to others.

We wish you the merriest of Holidays, a Happy New Year and a prosperous 2011!!

In This Issue

NTEP data collection: methodology and technology (part three of a series)

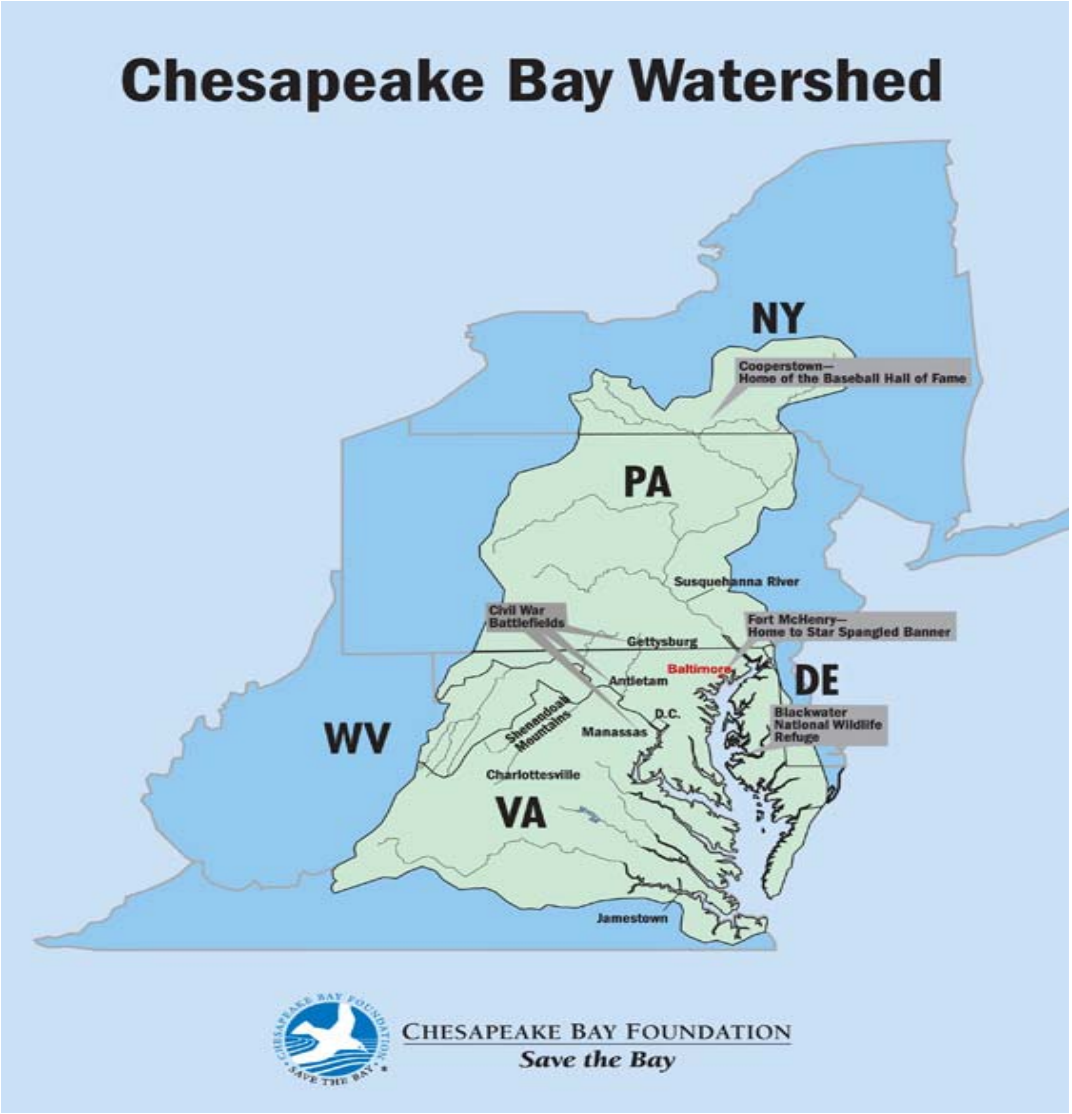
In part three of this multi part series, we discuss NTEP data collection methodology and technology.

The evaluation of turfgrass species and cultivars is a difficult and complex issue. Furthermore, turfgrass evaluation is generally a *subjective* process based on visual estimates of factors like genetic color, stand density, leaf texture, uniformity, and quality. These factors can not be measured in the same way as other agricultural crops

The most effective method of assessing turfgrass is a visual rating system that is based on the turfgrass evaluator's judgement. Subjective measures of th

NTEP data collection: methodology and technology (part three)

EPA releases its plan to reduce nutrients and sediment in the Chesapeake Bay; targets turfgrass acreage reductions



The Chesapeake Bay watershed includes this country's largest estuary, covers parts of six states and the District of Columbia, is home to 17 million people, and includes 3.8 million acres of turfgrass.

The Chesapeake Bay is the the largest estuary in the USA, meaning it contains tidal waters that are protected by land, creating a unique environment for fish, shellfish, aquatic organisms and wildlife. The Bay watershed, over 64,000 sq. miles comprising portions of six states and Washington, DC, is home to 17 million people, various industries, much agriculture and 3.8 million acres of turfgrass (the largest crop in the watershed). The U.S. Environmental Protection Agency's Chesapeake Bay Program has noted that for decades, water quality, some fish and shellfish species and other organisms in the Bay have been declining. EPA has identified excess nitrogen, phosphorous and sediment as the main culprits in this decline.

Since progress in stopping this decline and efforts to restore the Bay have been slow, President Obama signed an Executive Order directing EPA to coordinate and implement Bay cleanup efforts. This action is 'raising the bar' on Bay cleanup by creating mandated pollution reduction levels, setting deadlines for meeting these levels, and forcing the states in the watershed to develop innovative programs to reduce pollution. **In addition, EPA has noted that the Chesapeake Bay initiative will likely serve as a model for future pollution reduction efforts in other U.S.**

type are always subject to criticism and concern. However, it is a well-established fact that properly trained observers can effectively discern subtle differences betwee turfgrasses, using the visual rating system.

NTEP evaluators are trained in the field and classroom.

Turfgrass quality, the most important characteristic measured, is not a measure of yield or nutritive value. Turfgrass quality is a measure of aesthetics (i.e. density, uniformity, texture, smoothness, growth habit and color), and functional utility.

Quality ratings are require to be collected monthly during the growing season Our training sessions indicate that color, density and percent plot cover highly influence a rater's quality scores. Other important factors affecting quality ratings are freedor from disease and other stresses. Overall, turfgras quality ratings are the bes indicator of cultivar performance.

Turf quality here is due to color, texture & density differences

Quality, as well most of th other NTEP *subjective* measures, are rated on a scale of 1-9, where 9=bes highest quality, finest leaf texture, darkest color, no disease, etc. Evaluators use either the "5" or "6" score as minimum acceptable for quality, but quality is relative to the species. For instance, a high quality tall fescue wil

watersheds.

As a result of the Executive Order, EPA released its Guidance for Federal Land Management in the Chesapeake Bay Watershed. This document lays out EPA's ideas and thoughts on strategies to reduce pollution from Federal-government owned lands in the watershed. Of particular interest to us is **Chapter 3: Urban and Suburban**, which discusses ways to reduce pollution from urban and suburban runoff. Section 5 of Chapter 3 addresses turf management on federal lands and claims that even though properly maintained turf areas provide water quality benefits, that *conversion of turf to native landscapes is environmentally beneficial*. Debating this point would take multiple newsletters; suffice to say we feel we have the science on our side. *Our view is that turf's environmental benefits are well documented and that large-scale conversion to native landscapes is neither practical nor wholly beneficial.*

In any case, EPA is pressing forward with this program and has developed a draft Total Maximum Daily Load (TMDL) document, which outlines, in more specifics, the level of pollutant reduction from each of 92 Bay segments (not just land owned by the federal government). EPA is now requiring Watershed Implementation Plans (WIP's) from each state and DC, which detail specific actions that will be taken to reduce pollutants. There is some indication that *turfgrass acreage reductions or turf restrictions in new developments will be proposed*, along with the reduction of nitrogen and phosphorous fertilizer applied to turf.

All of us are concerned about the Bay's health, and for the general public good, we favor actions to reduce the pollutants that cause the Bay's decline. However, we stress that the **best science must be used** to determine the course to take as these actions will adversely affect businesses and employees in many industries. Any action taken must assure that it will result in a net positive benefit for the Chesapeake Bay and its 17 million inhabitants. Stay tuned for future developments in this saga!

NTEP Trial location spotlight: Ithaca, NY

Spartan hard fescue (L) and Cascade chewings fescue (R), shown growing at Ithaca, NY demonstrate striking differences in performance and appearance

Close proximity to your field research is not enjoyed by all turfgrass researchers, some having to shuttle 40 miles or more one way to their main research facility (some researchers must use off-site locations for certain studies, traveling several hundred miles round trip to visit and inspect). However, the Cornell University Turfgrass Program is fortunate in that they have the Bluegrass Lane Turf and Landscape Research Center on the east edge of the Ithaca, NY campus.

never have quality close t a high quality bentgrass. Of course, one is used mainly for general purpose turf (tall fescue) and the other is more specialized i its use (close cut on golf courses).

Other factors, such as establishment rate, genet color, leaf texture and spring greenup are require characteristics for collectio as well. These factors an others such as fall color retention, are **descriptive characteristics**, i.e. they describe the grass and its ability to establish and grow.

Genetic color differences in perennial ryegrass

Other factors, such as response to diseases, insects, cold, heat, drough or traffic are **performance characteristics**. These characteristics demonstrat a grass' ability to withstar a biological, environmenta mechanical or functional stress. Except in the instance of an induced or applied stress (like simulated traffic or drought), performance characteristics are only rated if they occur naturall in the field.

Disease differences in Ky. bluegrasses

NTEP evaluators are traine to obtain consistency and uniformity in their evaluations. For instance, only one person should collect data for a particula trial, since ratings are a subjective measure and often vary from one evaluator to another. Evaluators are taught to first, before rating, inspec

The NTEP turfgrass trials are located at the 28 acre Bluegrass Lane facility, which is adjacent to the university's Robert Trent Jones golf course. Center researchers include Dr. Martin Petrovic, a professor in the Dept. of Horticulture and Dr. Frank Rossi, associate professor and extension turfgrass specialist in the Hort. Dept. A weed ecologist, Dr. Jenny Kao-Kniffin, entomologist Dr. Dan Peck and IPM specialist Dr. Jennifer Grant are also turf team members.

Dr. Petrovic's research focus is on the impacts of pesticides and nutrients on turfgrass systems and the environment. Marty's technician, Jeff Barlow, helps coordinate the NTEP drought trial, of which Marty is the Principal Investigator (PI). Dr. Rossi is the PI on the fine fescue and Kentucky bluegrass NTEP trials at the center, as well as the bentgrass trials at Bethpage State Park (on Long Island). Frank's research interests, besides cultivar evaluation, include the ecological aspects of turf management.

Although Kentucky bluegrass is a mainstay in Empire state lawns, Dr. Rossi is promoting fine fescue as a lower fertility, more environmentally friendly species. Due to their wear tolerance and versatility, Kentucky bluegrass and perennial ryegrass are still mainstays on golf courses and athletic fields. Dr. Rossi's focus is on cultivars and management systems that lower inputs, while still providing turf's functional benefits.

The fifth year of the 2005 Kentucky Bluegrass test shows significant weed invasion in some entries

Dr. Petrovic's research for NTEP includes the 2009 Cool-Season Drought Trial, of which Cornell is one of three locations using rainout shelters. In addition, two locations in the western U.S. are evaluating the drought trial using reduced irrigation levels.

The Cornell trial's first drought initiation was conducted in fall 2010. The facility consists of four 12' x 12' blocks each of three soil types - loam, silt loam and sand. Each entry is planted in a one-meter square plot within each soil type. The first data from this trial will be available in spring 2011.

the trial to make sure fertilizer, mowing and irrigation have been applie uniformly. Evaluators are instructed to 'walk the tria to determine the scoring range potential that day (for instance, are most plots in the acceptable range, are there very high or very low plots present, etc.). Also, evaluators are asked to rate on cloudy days, if possible, to minimize shadows and glare. All of this, and more, is done to prepare for good evaluations.

Evaluators should rate an entire trial in one day, if possible. If weather or other factors prevent this, evaluations should stop at the end of a replication an resumed the next day at the next replication. All o this ensures better consistency as conditions (and hence performance) can change daily.

Because turfgrass evaluations are *qualitative not quantitative*, using current methods, NTEP has investigated the use of ne digital technology methods.

Thus far, in our opinion, th most promising technology uses a digital camera, in conjunction with a constar light source, to collect images that can be downloaded and analyzed.

A 'light box' is moved from plot to plot, a digital camera on top

The light box has a hole ir the top for the digital camera's lens, as well as a generator attached to power the light source.

The Cornell rainout shelter on tracks. The shelter automatically closes if sensors detect measurable rainfall.

Entries in a silt loam soil block showing some drought stress after 40 days without rainfall or irrigation

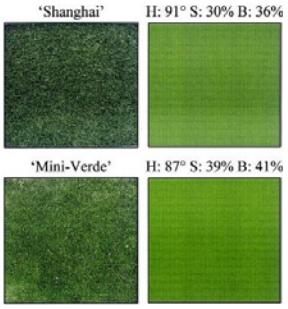
Dr. Petrovic is also heavily involved in measuring runoff and infiltration from turfgrass areas. His main research interest is the flow of pesticides and fertilizer from turfgrass managed at different levels. A summary of Dr. Petrovic's most recent work indicates **unfertilized Ky. bluegrass/ weedy lawn turf has *more* nutrient runoff than a fertilized, dense stand of primarily Ky. bluegrass** because a healthy stand of turfgrass provides a denser above-ground canopy than weeds. The nitrogen applied allows bluegrass to maintain a healthy, dense stand and outcompete weeds. Dr. Petrovic does caution using excessive rates of nitrogen and phosphorous during establishment; as a less dense turf cover initially can lead to increased runoff.

Underneath of the light box. Note the light bulb inside

Termed DIA, or digital image analysis, this technique can quantify color and percent green cover (or percent brown) o a plot by identifying the number of green (or brown) pixels . Drs. Doug Karcher and Mike Richardson at the University of Arkansas hav pioneered the DIA technique and have writte extensively on it. Color analysis is one of their initial research efforts.

After collection, the digita images are processed using macros created specifically for this purpose. These macros produce images that 1) visually show green or brown cover (whether this be live/dead tissue, diseased on grass or bare soil) and 2), calculate a percentage of pixels that are green or brown.

DIA is extremely useful fo measuring factors such as green color retention durin drought or rate of recovery from a physical damage, such as a golfer's divot. Also, measuring actual turfgrass color is quite useful with DIA. *NTEP is utilizing DIA to collect percent green cover from the new drought studies (see adjacent article).*



Dr. Petrovic's sloped runoff plots - Note plastic cover over basin that collects runoff. Some plots have been removed and will be replaced with new treatments.

Hue angle (H), saturation (S), and brightness (B) measured in two bermudagrasses

Thanks for reading again, in this issue about what is happening at NTEP. If you have any questions, comments or suggestions, please feel free to contact me at 301-504-5125 or kmorris@ntep.org.

Sincerely,

Kevin Morris
Executive Director
National Turfgrass Evaluation Program

Quantifiable turfgrass quality ratings are the 'Ho Grail' of turf evaluations, a the subjective nature of quality would be eliminated. All ratings from all locations would b based on the same characteristics, with high precision and accuracy.

The problem with this approach is that the facto that influence turf quality, and the percentage each contributes to a quality score, would be set by NTEP. One group would b defining turf quality, the most important factor, for the entire industry. *Subjective ratings, even though they are highly variable, represent the views of broad swaths of customers, which we feel is more important than a single definition of turf quality.*

Next month: data submission, analysis and presentation

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