



# LANDSCAPE PERFORMANCE SERIES

## Cusano Environmental Education Center – Philadelphia, PA Methodology for Landscape Performance Benefits

### Environmental

- ***Reduced stormwater runoff generation by 30% by creating meadow instead of a standard lawn.***

This is based upon a runoff curve number comparison between meadow and turf areas. The curve is a measure of site's potential to create runoff for a given land cover condition. The higher the curve number, the greater the potential for runoff. A lower curve number means less water leaving the site (volume of stormwater entering Darby Creek). Lowering the curve number reduces the need for structural stormwater controls, or demand on drainage and stormwater infrastructure. Curve number methodology is based on Urban Hydrology for Small Watersheds TR-55, Roger Cronshey et al, USDA NRCS, June 1986. Poor soils, soil class D were utilized based upon the history of imported fill at the site.

- ***Improved ecological quality of the area by more by creating meadow instead of a standard lawn. According to the Plant Stewardship Index, an assessment of biodiversity based on a site's plant list, the meadow is 7.5 times "more ecological" than a standard lawn.***

The landscape architects designed a 4 acre meadow/old field as the entrance feature, rather than a traditional lawn. The plant stewardship index (PSI) was used to calculate the benefit of this approach versus lawn. The main difference between the two is that the meadow used multiple native species versus the few non-native species used for traditional lawn. The PSI calculator was obtained free from Bowman's Hill Wildflower Preserve [www.bhwp.org.psi](http://www.bhwp.org.psi).

"The plant stewardship index, (PSI) is a thermometer reading of the ecological quality of open land by seeing what plants live there. The index is calculated based on averaging numbers assigned to each plant by a group of leading botanists and ecologists in the state. These numbers are referred to as "CC" or coefficients of conservatism.

They range from 0 to 10 with zero being those "generalist" plants that can be found in any area (including parking lots, plowed fields and other highly disturbed land sites) to ten being "specialist" plants that the botanists have agreed can be found naturally in very specific habitats. Many (although not all) of our threatened and endangered plants have been assigned a 10 because they are so specialized and their required habitats are disappearing.

The average of all these numbers is called the Mean C. The calculation also takes in to account the total diversity of plants on a site [www.bhwp.org.psi](http://www.bhwp.org.psi)."

LAF Fellow Mary Myers, LAF Intern Andrew Hayes, Temple University Lecturer and Applied Ecologist John Munro, and Andropogon Associate Laura Hansplant inventoried the meadow. All plants observed in the June 20<sup>th</sup> 2011 site inventory were used for the PSI calculation (native, non native and invasive). A total of 40 species were identified in the meadow (30 native and 16 non –native). Of the non-native species, 7 were identified by the applied ecologist as being very invasive. The meadow's cover is now a thatch condition caused by exotic and dominant vine form cow vetch, which creates an unnatural, dense thicket at the 1 – 2' height range and shades

out native plants. Thus although there are many native species present in the mix, the meadow is now covered by 50% non-natives. A limitation of PSI is that it does not take into account the *number* of species present in a particular site, only the *type*.

The meadow PSI was compared with the PSI for standard lawn. A horticulture professor acquainted with turfgrass management indicated that 3 main species are used in lawns: *Festuca elatior*, Fescue; *Lolium Perenne*, Perennial Rye; *Poa pratensis*, Bluegrass.

It should be noted that the PSI calculator assigns “native” more narrowly than either the landscape architects or field ecologist. Only 19 species were given native status. PSI does not distinguish between invasive or non-invasive exotics. It assigned the designation of “Introduced” or “I” to 16 plants. 3 plants were not on the state list “n.a.” and 8 others were not ranked.

<b>4 acre area</b>	<b>Standard Lawn 3 non-native species</b>	<b>Meadow non-native and native species</b>
Plant Stewardship Index (PSI)	0	7.47
Total Mean C	0	1.71
Native Mean C	0	3.16
Floristic Quality Index	0	13.76

“As the population of native plants increases, the PSI score will go up. As the population of specialist plants increases, the score will go up (the Mean C will increase slightly). As the diversity of plants increases, the score will go up  
www.bhwp.org.psi .”

According to Botanist Anne Brennan of Bowman’s Hill Wildlife Preserve PSI’s can range from 1 – 100. A site can achieve a score of 100 in theory but it is very rare. Dr. Brennan stated that a range of 10-20 PSI is common for the Philadelphia metropolitan area. Very disturbed sites tend to score below 10 PSI. The Cusano meadow scored 7.47 total PSI. (Anne Brennan telephone communication with Mary Myers, August 5, 2011).”

**Social**

- ***Offers 16 environmental education and outreach programs, including a professional curriculum development program for K-12 educators, twice the number of programs at a similar refuge.***

The CEEC offers more educational opportunities on a total program basis *and* on per acre basis as a comparable wildlife refuge. Bombay Hook National Wildlife Refuge, Smyrna, Delaware is used as a comparison. It is located within an hour’s drive of John Heinz Refuge and has similar habitat and educational outreach. Both are east coast refuges and therefore are close to major population centers.

The Cusano Environmental and Education Center offers professional development curriculum for K- 12 educators (4 free workshops – Project WILD, Project Learning Tree; Project W.E.T., and Energy and Society; 3 classes with a fee for materials – Wonders of Wetlands; Pennsylvania songbirds and Flying WILD) loan boxes (2 types - tree kits and bird kits for classroom education); field trips (counted as 1 program); field trip orientation classes for teachers (counted as 1 program); 3 lesson plans for teachers (habitats, interaction with the environment, birds), 1- junior duck stamp art contest; 1 - Heinz Refuge scouting award. Bombay Hook offers 6 lesson plan programs, and opportunities for field trips (counted as 1 program).

- **Serves 135,000 visitors annually, a fairly high density of 112 visitors per acre.**

In 2010, Cusano/Heinz Wildlife Refuge had 135,000 visitors; Bombay Hook had 119,000 visitors. Heinz has a smaller area: 1,200 acres versus Bombay Hook's 16,251 acres. Therefore annual visitation at the Heinz National Wildlife Refuge is approximately 112 visitors per acre while visitation at Bombay Hook National Wildlife Refuge is approximately 7 visitors per acre. This high rate of visitation may indicate that a wildlife refuge near or within a large city is a positively perceived and appreciated amenity.

### **Economic**

- **Avoided \$2,560 in annual mowing costs by creating meadow instead of a standard lawn.**

Records compiled by client indicate that mowing is done once annually for the entire meadow area. There are no fertilizer or herbicide costs as none are used. Labor per year for mowing meadow areas was 16/hours/year @ \$40/hour = \$640/year. The labor for the turf areas was 80 hours/year @ \$40/hour = \$3,200/year.