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Evaluating the Attractiveness of *Coreopsis* spp. wild-types and cultivars to pollinators

Abstract: Habitat loss is viewed as a primary cause of pollinator population declines. Managed meadows and gardens provide benefits to wildlife, including pollinating insects. Given the interest in planting flowers for pollinators, lists of recommended varieties have been produced by professional organizations and amateurs alike. These lists serve as a good starting point but are often not grounded in empirical data. *Coreopsis* is a popular garden plant and a frequent component of commercial pollinator seed mixes. The aim of this study is to compare the ecological role of commercially available *Coreopsis* plants. It is hypothesized that pollinating insects exhibit preferences based on color and other floral traits. To address this question 4 species of wild-type *Coreopsis* and 13 cultivars were evaluated for their attractiveness to pollinating insects. Data was collected between June and August 2014 from *Coreopsis* plants in the Mount Cuba Center trial garden (Hockessin, Delaware). Flower visitors were observed and recorded to morphospecies. To assess which visual floral traits were correlated with pollinator visitation, inflorescence diameter, inflorescences per plant, inflorescence color and pattern, plant height, and number of flowers per inflorescence were measured. Correlating visitation with floral traits may explain the differential attraction of pollinators to *Coreopsis* flowers.

David Ray

The Nature Conservancy, MD/DC Chapter

Atlantic White-Cedar Stand History and Rehabilitation Prospects

Abstract: Efforts to understand the history and dynamics of Atlantic white-cedar (AWC) communities within the Nassawango Creek Watershed were undertaken to help inform various aspects of projects aimed at re-establishing and rehabilitating AWC across the ownership. We used a combination of local knowledge, aerial imagery and ancillary GIS layers (e.g. soils and wetlands), and extensive field transects to identify areas where AWC either currently exists or was known to have been present historically. This information has been assembled using GPS/GIS mapping and spatial analysis, through a dendrochronological study (analysis of tree rings), and observations of natural regeneration. Results presented in this poster suggest there is considerable potential to rehabilitate degraded AWC stands, an aspect of this effort that we have recently begun working on.



Larry Murrell

Air Infusion removes Biomat-Lining of Septic Stone-Filled Trench in less than Six Hours: New Protocol to Restore Impaired Septic System Function

It is widely recognized that soil decline of residential properties in New Jersey follows a pattern of 1) water-logging, 2) anaerobic-bacteria-generated toxins impairing plant health, 3) compaction, 4) rapid erosion, and 5) rising water tables. Use of pesticides and inorganic fertilizers accelerate the compaction and erosion in a vicious cycle. These negative impacts on soil health have a domino effect causing chronically high, usually perched water tables, contributing to water-logging and basement flooding. What is not widely recognized is that the soil surrounding the trenches of septic systems, also called drainfields or laterals, is highly susceptible to water-logging and the increasing water tables found all along the Eastern Seaboard. A high water table for septic fields promotes rapid formation of a 1-2" thick black biomat that forms in the surrounding soil. This biomat leads to compromised water flow from the stone-filled trench, or drainfield, into the septic field, and eventually to complete failure of the septic system.

We have found that an effective way to attack the biomat of a septic system in a one-step procedure that destroys the biomat and allows the entrained waste water in the gravel train to surge into the soil of the septic field, literally saturating the soil of the field. Once this entrained waste water is transferred to the soil, natural aerobic bacteria digest the remains of the biomat and any toxins present in the field. This new protocol is effective because it saturates void spaces in the trench, and then saturates the entire septic field with aerated water. The restoration process is cost effective and takes only 6 - 8 hours to complete for each trench of a septic system. With our protocol, the entire biomat is destroyed by uniform air-infusion to the entire trench, and subsequently to the entire field.

Samantha Nestory and Judy Hough- Goldstein

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Entomology and Wildlife Ecology

Mechanical control methods for Japanese stiltgrass (*Microstegium vimineum*)

Abstract: Japanese stiltgrass (*Microstegium vimineum*) is an invasive grass that poses a major threat to native biodiversity and restoration efforts in invaded areas. While there are recommended control methods, few studies have scientifically quantified the efficacy of these control methods. A previous study determined that mowing any time after midsummer reduces the *M. vimineum* population, so we expanded upon this study to determine the effect of mowing height on *M. vimineum* populations. We established small plots at two sites that were dominated by *M. vimineum*. Vegetation surveys were conducted for each plot and then plots were mowed at one of three different heights (10 cm, 5 cm, 0 cm) in late summer before seed set. After 5 weeks, prior to senescence, all vegetation in the plots was harvested. Seed spikelets were counted, dried, and weighed. Vegetation was sorted into *M. vimineum* vegetation and all other vegetation, then dried and weighed. Results show that mowing at any of the three heights significantly reduced seed production and seed biomass of *M. vimineum*. Mowing at 10 cm reduced seed production by 85.9% and mowing at ground level reduced seed production by 99.5%. Seed biomass was reduced by 92.1% when plots were mowed 10 cm and by 99.5% when mowed at ground level. The results demonstrate that mowing below 10 cm before seeding occurs can significantly reduce *M. vimineum* reproductive output and could be integrated into an effective management program, which could increase the success of restoration efforts.

Monica Gagliardi

Temple University School of Environmental Design
ML Architect Student

Oxford Wetland Sanctuary: What Nature Intended

Abstract: In the era of global climate change, wetlands are a vital resource, providing the link to a resilient social, economic and environmental future. The Oxford Wetland Sanctuary goes beyond simply connecting people to nature, it uses a metric—the Evaluation for Planned Wetlands (EPW)—to restore a wetland, ensuring a highly impactful design based on science. The project incorporates creative social engagement, educational programming and economic opportunities.

Wetland mitigation banking represents an important economic component of the environmental sector, showcasing synergies between effective environmental protection and economic expansion while elevating the value of wetlands in society.

The plan uses strategic micro grading and native re-vegetation to create a complex system that absorbs rainwater and slowly releases it to the aquifer; absorbs chemicals and filters pollutants while supporting immense biodiversity; and provides refuge for wildlife and humans alike.

The trail system invites the public to experience and learn about the sanctuary through interpretive signage, citizen science opportunities and an education center—which seconds as an event venue to generate revenue and increase public engagement.

The poster presented will graphically walk viewers through the Oxford Wetland Sanctuary design process by exploring: context, existing conditions, opportunities and constraints, illustrative master plan, illustrative detail plan, vegetation and hydrology plan, grading plan, construction details, EPW scoring, and illustrative perspectives.



Grace Savoy-Burke

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Department of Entomology

Native Bee Diversity in a Network of Mid-Atlantic Woodlands

Abstract: Wild pollinators provide an essential ecosystem service, but despite their value to the health of native plants, crops and ornamental gardens we still know surprisingly little about the community structure of native and introduced bees. Forest ecosystems in particular have been markedly overlooked as habitat for bees, although they support diverse communities and can potentially serve as reservoirs to export bees into agricultural fields and gardens. Evaluating different forest types for their value as habitat for native bees is an important step towards identifying critical areas for pollinator conservation and understanding how bee communities interact with the landscape. In a community effort utilizing citizen scientists, we surveyed bees in more than 100 forest fragments throughout Maryland and Delaware. Collection sites represent a variety of forest types with regard to area, woody plant composition, successional stage and surrounding land use. By correlating bee diversity, abundance and species composition with forest traits and geography we will reveal patterns in bee distribution across a range of forest types and a regional landscape, as well as establishing a baseline for future monitoring of bee populations in the Mid-Atlantic.

Teresa Doss

Biohabitats

Utilizing Vacant Lands to Address Ecosystem Service Deficiencies

Abstract: Utilizing vacant lots, a resource available to the majority of large urban areas, to introduce or enhance ecosystem services with green infrastructure within a city can result in a multitude of benefits for the urban environment. In addition, green infrastructure solutions are often less expensive than their engineered equivalents, and studies have shown local economic benefits to reducing vacant lot space. Using the ArcGIS model builder, we constructed dynamic models that utilize ecological, infrastructural and cadastral data to locate sites and identify the ecosystem services that those sites might best support. The model also creates a ranking system that allows sites to be prioritized for maximum effect. Models can be adjusted to emphasize certain aspects of the data to create a ranking system that accurately depicts clients' needs – whether it is for water quality improvement, ecological restoration, or climate change resiliency. Field assessment of selected sites can be used to augment the models, adding site-specific data to the analysis and providing ground-truthing to desktop results.

New York City used this technique in developing the Jamaica Bay Watershed Ecological Atlas. Building on the Jamaica Bay Watershed Protection Plan and NYC's Waterfront Revitalization Plan, this plan was built by first inventorying all known city-owned open space areas within the Jamaica Bay watershed. The locations of these known open spaces were mapped using a Geographical Information System database and then each open space area was visited by a team of ecologists, water resources engineers, and landscape architects to compile gather existing conditions data, take photographs, and then develop conceptual restoration plans for each site using green infrastructure tools.

The overall goal of developing the Jamaica Bay Watershed Ecological Atlas is to allow NYC and others to easily identify and track future restoration projects, as well as prioritize identified green infrastructure opportunities.

Brandon Haynes

Syracuse University

State University of New York - College of Environmental Science and Forestry

Ecological Engineering

Assessment of spent mushroom waste from *Pleurotus ostreatus* cultivation for removal of *E. coli* from wastewater

Abstract: The USEPA recently found elevated levels of pathogenic bacteria to be the leading cause of surface water contamination in the United States, and many current best management practices for reducing bacteria levels in runoff leading to surface waters do not consistently achieve the required levels. Mycofiltration is an experimental practice in which water is filtered through substrate containing fungal mycelium or fruiting bodies for water quality improvement. While research has demonstrated the antimicrobial effect of chemical extracts from *Pleurotus ostreatus* and has documented the fungus's natural predation on bacteria colonies, this experiment examines the potential of spent mushroom waste from *P. ostreatus* cultivation, which consists of mycelium and degraded sawdust, for reducing pathogenic bacteria levels in water. If successful, it would allow a waste product from mushroom cultivation to be converted into a product useful for water quality improvement.

Spent mushroom waste and sawdust (not containing mycelium) were exposed to both diluted municipal wastewater and sterile, buffered dilution water. Treatments consisted of 30g substrate saturated with 120ml water and were treated as completely mixed batch reactors. Water samples were taken during a 6-hour period and analyzed using membrane filtration and a b-glucuronidase-staining selective growth media (mColiBlue24) to estimate *E. coli* concentration. The observed concentrations in the samples were compared to the initial concentration in the wastewater to evaluate the effectiveness of the substrates for removal. Spent mushroom waste achieved approximately 50% removal after 40 minutes of contact time compared to only about 25% removal in the non-mycelium sawdust. However, bacteria levels in both treatments began increasing between 1-3 hours and reached levels substantially greater than the initial concentration after 6 hours. Sterilized substrates were also examined (non-pressurized steam and autoclave) and generally resulted in little bacteria reduction during the first 60 minutes followed by increasing reduction over 3-6 hours.





Jonas Hamberg

SUNY ESF

Modeling restoration potential of aquatic plants in the Hudson River after loss due to storm events

Abstract: Two storm events in 2011 (Hurricane Irene and Tropical Storm Lee) caused a loss of over 90 % of the stock of the dominant submerged aquatic vegetation (SAV) species, *Vallisneria americana* in the Hudson River Estuary. Recovery in the 2012, 2013 and 2014 seasons has been slow, leading to scientists and managers connected to the river discussing if restoration should be conducted. If large scale restoration were to take place, hundreds of hectares of SAV beds would need to be restored through seeding, transplanting or other techniques with investments of hundreds of thousands of dollars and thousands of man hours of work.

With potentially damaging storm events recurring decadal and potentially becoming stronger due to climate change (IPCC 2013), there is a need to look into how long we can expect restoration to sustain the plant population and if it is long enough that the benefits outweigh the investment cost. I use STELLA modeling software to look at long term loss dynamics of a species of submerged aquatic vegetation in the Hudson River to determine if large scale restoration could be feasible and sustainable. The work incorporates data from experiments done during the summer in the river as well as data from monitoring systems and predicted climate change data.

STELLA is a graphic interface software that allows for dynamic modeling of large scale systems over long periods of time. The model created takes into consideration the extent and historic stock of *V. americana*, physical parameters of the river, storm return, modeled storm damage to the stock as well as management decision and budget to restore. The model runs for 100 years and can be modified to take into considerations different political, budgetary and climatic scenarios.

The main take away from running the model is that the cost of restoration needs to be lowered to be able to reach a scale where restoration can affect the total stock in the estuary. With labor costs being the biggest cost of restoration, I argue that the model shows the need for volunteer/citizen science involvement in the restoration process.