Spring 2018 TREE Fund Grant Awards
Research Grant Project Summaries

Hyland R. Johns Grant
Andrew Hirons, PhD and Henrik Sjöman, PhD, Myerscough College, UK

"Enhancing the performance of urban storm water management schemes with tree selection: developing a new approach to accessing waterlogging tolerance in temperate trees"

The increasing prominence of stormwater management schemes provides excellent opportunities for the integration of trees into new urban developments; however, there is considerable uncertainty over which species will perform best in these schemes. A notable feature of landscapes designed to manage stormwater is that the substrates used are very free draining. This means that the tree species used must be tolerant to periods of both waterlogging and drought (water deficit).

This project aims to develop a new trait that can be used to develop robust recommendations on the tolerance of trees to waterlogging. This will form part of a constellation of traits that can be used to characterise the tolerance of species to a suite of key stressors in urban landscapes.

As sapflow in trees integrates the aerial and underground environments it has significant value in assessing the physiological activity of different species under contrasting environmental conditions. This study will look at the decline in sapfow under waterlogging and use this to quantitatively evaluate a range of species' waterlogging tolerance. Further data will be collected on the species' drought tolerance. It is anticipated that this information will transform the confidence of recommendations for stormwater management and provide a model for others in the research community to quantitatively evaluate tolerance to waterlogging. The overall goal of the project is to improve the confidence of tree selection for stormwater management schemes and sites prone to waterlogging.

Safe Arborist Techniques Fund Grant
Alexander Laver and James Shippen, PhD, Tree Logic (Working with Coventry University, UK)

"Optimised techniques for arboreal activities"

Recent advances in biomechanical motion analysis equipment has enabled the measurement of three-dimensional human movement within environments previously inaccessible. Previously motion analysis was performed using optical tracking equipment which, whilst accurate, was unsuitable for use outside and excluded its application to tree climbing. However motion capture equipment is now available which uses inertial tracking sensors and can operate in more realistic scenarios such as within the canopy of a tree. With this kit we are going to be able to map the movements of a tree climber as they climb, the data will then give us a body map showing the skeleton and muscle structure of the climber. We plan to record different access and climbing methods to analyse the effect on the climber body. We then plan to look at the task in the tree and work positioning options when undertaking those tasks. Having captured this information we can target a study, working with the climbers of mixed experience to see if climbers adapts their method to compensate for the stress and strains of the method or task. We hope this will guide us to recommend the best climbing methods for climbers to learn and master, to keep them fit and health and in the industry for a full and long career.

Utility Arborist Research Fund Grant
John Goodfellow, Bio-Compliance Consulting, Inc.

"The cost-effectiveness of integrated vegetation management"

There are 450,000 miles of transmission line operating at 35-765 kV across North America, with a total land area being managed as electric transmission rights-of-way (ROW) estimated at between 9-11 million acres. There are an additional 306,000 miles of natural gas and liquid petroleum pipeline in North America, representing an estimated 2 million areas of land. The researchers believe that less than half the total land areas in ROW is currently being managed under an IVM regime.

A project team led by John W. Goodfellow, and including SUNY College of Environmental Science and Forestry professors Chris Nowak Ph.D. and John Wagner Ph.D., recently completed a project that defined the economic business case for Integrated Vegetation Management (IVM) on electric transmission ROW. The scope of that project applied least-cost economic analysis methods that focus exclusively on the direct cost to the utility of IVM practices. That approach limited any consideration of the benefits of IVM to simply avoided cost. However, indirect costs and benefits of IVM are important considerations.

The project being proposed will supplement the least-cost project, broadening the assessment to include consideration of the many benefits of IVM, and will result in a more holistic assessment that includes both economic considerations and environmental externalities associated with IVM. This will be accomplished by applying a cost-effectiveness analysis method to empirically combine monetary costs of a management action with outcomes produced from that action that can also be quantified, but that are not easily monetized. The project will also update and broaden the focus of the original least-cost study to include application of IVM methods on pipeline ROW. The goal is to produce a reference that will be useful to practitioners in selecting the least-costly and most beneficial ROW vegetation management techniques from a longer-term perspective of sustainability.

Carolyn Mahan, Ph.D., (Penn State University) and Phillip Charlton, Ph.D., will be collaborating with Mr. Goodfellow and Dr. Nowak for this expanded study.

Sponsored Grant
Carolyn G. Mahan, PhD, Penn State Altoona
"Long term effects of electrical right-of-way vegetation management on floral and faunal communities"

This project will continue, replicate, and expand the research and outreach efforts on the effects of right-of-way maintenance on floral and faunal communities at State Game Lands (SGL) 33 in Centre County, Pennsylvania and Green Lane Research and Demonstration Area (GLR&D), in southeastern Pennsylvania. The research team will be collecting data to understand the response of native bees and breeding birds midway through the treatment cycle on both the SGL 33 and GLR&D sites. The research team will also evaluate floral and faunal response to right-of-way management on a third study area in central Pennsylvania. This third area will be one that is 100 feet wide and has been managed using typical integrated vegetation management techniques. Finally, the project will add an examination of ground beetle diversity (using pitfall traps) to the existing research design at all three research locations. Ground beetles are useful as sensitive environmental indicators and can help evaluate if vegetation management treatments affect soil communities and processes. All research will be conducted in cooperation with the Center for Pollinator Research and the Frost Entomological Museum at Penn State University.
Note: This project is sponsored by Asplundh Tree Experts, LLC, Corteva Agriscience, Agriculture Division of DowDuPont, FirstEnergy Corp; PECO Energy Company (an Exelon Company).