Research & Education Committee Report

Prepared by: Hallie Dozier, Chairman
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The Research & Education Committee is charged with the following

Basic Function: Review and selection of research grant, scholarship, and education grant applications.

Responsibilities: Meet regularly with Research and Education sub-committees to review and select applications for scholarships and educational grants.

Related Strategic Initiatives:

Goal 2.1: Determine what we should fund in education and research
Goal 2.2: Manage the processes around making grants and awarding scholarships

Committee Activities.

- The **Research Sub-Committee** met twice via telephone on **November 8**; the first group met to review and select projects for the **John Duling Research Grant Program**, and the second group met via telephone to review and award projects submitted to the **Kimmel Research Grant Program**.
- **TREE Fund received 37 Kimmel applications**; Chairman Dozier eliminated 19 for not meeting program criteria, leaving 18 for committee review.
- Cathy Bentley, Dan Struve, Jim Urban and Chip Brown reviewed these proposals and submitted rankings. Hallie Dozier, Dan Struve and Cathy Bentley participated in the call to discuss the Kimmel applications. Jim Urban recused himself from this discussion due to a potential conflict of interest, and prior to discussion, we eliminated his scoring of the applications for the same reason.
- **TREE Fund received 38 proposals for the John Duling Research Grant**. Prior to review by committee, Chairman Dozier eliminated 15 of these applications for not meeting program criteria, leaving 23 proposals for committee review. Jim Barborinas, George Hudler, Beau Broadbeck, Robert Vanderhoof and Hallie Dozier reviewed these proposals and submitted rankings. Hallie Dozier, Jim Barborinas, Beau Brodbeck, George Hudler, Ward Peterson, and Robert Vanderhoof participated in the review call.

Other items:

The large number of proposals eliminated from review cycles due to program incompatibility raises the question of whether or not it is time for TREE Fund to consider internally driving development of new granting programs. Since the launch of the Kimmel ***International*** Grant Program, we have seen a steep rise in the number of applications from abroad – in particular from developing areas. A few are "traditional" research and so qualify for research grants, but several

would better fit as education programs, and so are eliminated from consideration for research funding *a priori*. Unfortunately, because the education grants we currently offer are restricted domestic K-12 audiences, these proposals also fail to qualify for consideration for education programs. This effectively eliminates the possibility of TREE Fund supporting quality extension/demonstration projects that target a wider age range, and it eliminates the possibility of supporting projects outside of the USA. For example, several worthy community forestry projects from Africa and India – worthwhile, well designed projects that address a real need – have been eliminated from consideration automatically because TREE Fund does not have a funding vehicle that might accommodate such projects.

I urge the Board of Trustees to consider broadening the scope of service beyond current parameters and to examine the potential to develop a vehicle for funding research/demonstration/extension programs that serve a wider audience than we serve at this time.

Funding Recommendations:

We evaluated three Duling project proposals as grant-worthy. **The committee recommends the following projects for funding through the John Duling Research Grant Program** (see **Appendix A** for project summaries):

1. Dr. Adam Berland: “Evaluating virtual street tree surveys as a tool for municipal forest management” $23,030.
2. Dr. Justin Morgenroth: “Measuring tree response to increasing root removal intensities” $24,977.
3. Dr. Brian Kane: “Measuring forces at multiple locations in rigging systems” $25,000.

We evaluated two Kimmel projects as grant-worth. **The committee recommends the following projects for funding through the Jack Kimmel International Research Grant Program (note: CTF will fund one, TF will fund one)** (see **Appendix B** for project summaries):

1. Dr. Francesco Ferrini: “Effect of topping on microclimate condition and human comfort” $10,000.
2. Dr. Camilo Ordonez: “Investigating Street Tree Decline and Mortality in Commercial Urban Spaces Revitalized with Structural Soil Cell Technology to Improve Planting and Maintenance Practices” $10,069.

Objectives for next 3 weeks:

Transition committee chairmanship to George Hudler.

Appendix A: John Duling Research Grant Program – summaries of projects recommended for funding

Dr. Adam Berland, Ball State University, Muncie – *Evaluating virtual street tree surveys as a tool for municipal forest management* $23,030

Street tree inventories are critical to municipal forest management, but many communities cannot afford to conduct field-based inventories. It is possible to characterize street trees by manually interpreting images in Google Street View, which offers a free and user-friendly platform for accessing ground-level photographs taken along roads throughout the USA. We previously conducted a proof-of-concept study demonstrating that a 'virtual survey' in Street View can produce reasonably accurate data about street tree variables relevant to municipal management such as tree abundance, genus, and size class. However, that virtual survey was conducted by a single analyst with expertise in urban forest inventories, so we do not know how well this approach can be carried out by less experienced municipal staff or citizen scientists.

This project will build upon existing research to improve our understanding of the possibilities and limitations of conducting virtual street tree surveys in Google Street View. We will enlist analysts ranging from experts to novices to conduct virtual surveys to record basic tree attributes, and their performance will be evaluated against field data from the same set of streets. We are primarily interested in determining (1) what overall level of data quality can be generated using a virtual survey approach as compared to field surveys; and (2) how data quality varies according to the analyst's level of expertise, and whether citizen scientists can generate reliable data for management purposes. Our results will provide guidance for communities considering implementing this innovative approach for generating street tree inventory data.

Dr. Justin Morgenroth, University of Canterbury, Christchurch - *Measuring tree response to increasing root removal intensities* $24,977

Conflicts often exist between trees in the urban forest and an ever increasing number of buildings, footpaths, new infrastructure and underground utilities. Such conflicts frequently result in the damage or complete removal of tree roots. While avoiding root damage is the most effective strategy for preserving tree health, site constraints can put trees in close proximity with development activities. Currently, arboricultural specialists rely on industry best practice documents informed by relatively few studies when deciding if a given tree can be retained or should be removed during site development. These documents feature largely anecdotal root diameter thresholds for identifying acceptable root removal limits. These thresholds fail to account for the size of the root(s) relative to the size of the tree, and also the total number of roots to be removed. Current best management practices (BMPs) also fail to account for the cumulative effects of repeated root injury resulting from site development and eventual redevelopment or repair.

Funding is requested to help further understand the implications of root removal by examining precisely how trees respond to different root removal intensities. The study proposes to monitor physiological and tree growth responses to various root removal treatments in order to provide information to assist with the proper

management of urban trees. The study has been designed to answer the questions; “How do trees respond to increasing root pruning intensity?” and “what proportion of a tree’s root system can be removed without significantly affecting growth and function?”

Dr. Brian Kane, University of Massachusetts, Amherst - *Measuring forces at multiple locations in rigging systems* $25,000

Arboricultural rigging carries a very high degree of risk. Climbers must estimate how much force will be generated when rigging pieces of wood, and where the cut pieces will move when being rigged. Heavy pieces of wood swinging around or shock-loading the tree have very high momentum. If they collide with the climber or the tree, severe or fatal injury, tree failure, or both can be the result. Despite the risk and the development of new gear and techniques intended to reduce the risk, very few rigorous studies have quantified the forces generated while rigging, making it impossible to know with certainty whether new gear or techniques actually reduce the risk. This proposal describes a project to measure rigging-induced loads at multiple points in a rigging system, and compare the effect of varying components of a rigging system on the loads. In particular, a variety of ropes, blocks, and rigging loads will be tested to determine their effect on loads measured at different points in the rigging system.
These measurements will be used to determine the friction in rigging blocks and lowering devices (e.g., Port-A-Wrap, GRCS). Understanding the effect of friction has important implications for safety. Depending on the amount of friction in a rigging block, failure of the rigging rope or the anchor point (block, sling, or tree) will be more likely. Knowing how much friction a lowering device provides helps tree workers anticipate how many wraps on a lowering device are needed to carry an expected load.

Appendix B: Jack Kimmel International Research Grant Program – summaries of projects recommended for funding

Francesco Ferrini, University of Florence, Florence - *Effect of topping on microclimate condition and human comfort* $10,000

Urban trees create many benefits in terms of thermal comfort and Urban Heat Island (UHI) mitigation during the summer season. These benefits are strictly linked to tree canopy, but the management of the trees in the urban environment includes pruning activities.
The aim of this work is to evaluate the effects of topping on microclimate conditions in the area where tree are planted. We hypothesized that topping can affect temperature of air and soil and air relative humidity. Thus, we want to test the hypothesis that topping do not only depress tree health, but also directly reduces thermal comfort and human well being in cities. The experiment will be conducted using 96 15-year-old maple (Acer spp.) and linden (Tilia spp.) trees. Half of them will be topped in late winter, while the remaining half will be left unpruned, according to a randomized block statistical design with 4 replicates. Sensors for measuring air temperature and relative humidity during the summer season have been placed in early summer 2016 in the area of research. After topping tree growth and physiology will be checked and air and soil temperature, and air relative humidity will be continuously monitored for two years and the effect on human comfort will be calculated by applying biometeorological indices.

Camilio Ordonez, Ryerson University, Toronto - *Investigating Street Tree Decline and Mortality in Commercial Urban Spaces Revitalized with Structural Soil Cell Technology to Improve Planting and Maintenance Practices* $10,069

The challenge of growing trees in commercial and highly-urbanized areas in cities will affect the success of the urban forest enhancement agenda, which is the focus of urban forest management across North America. Structural soil cell technology can improve habitat quality for trees in these spaces and was used most recently to plant trees as part of Toronto's Bloor Street revitalization. These trees faced subsequent decline and high mortality. There is a lack of research on these landscapes and this technology, so it is unclear why these trees failed. Assessing the factors that contributed to their decline and mortality is necessary to guide future decisions about the use of this technology. This will ensure the success of the urban-forest enhancement agenda, reduce costs of tree planting and maintenance, and help companies and cities develop sound guidelines for street plantings in commercial and highly-urbanized areas in cities. This research project will analyse already-existing soil and biophysical data from the Bloor Street trees and use multi-variate regression and contingency analysis techniques to elucidate the factors that have contributed the most to tree decline and mortality in Bloor Street. The information emanating from this project will be made accessible to urban forest managers and other stakeholders through research reports, academic publications, workshops, conference presentations, and webinars, and train one Canadian student in contemporary urban forest issues.