

**SUMMARY OF ACTIONS AND DECISIONS**  
**Open Session: Urban Tree Canopy Expert Panel Stakeholder Forum**  
**Wednesday, June 3, 2015, 1:00PM-4:00PM**  
<http://www.chesapeakebay.net/calendar/event/22656/>

**Welcome and Introduction**

- Jeremy Hanson (Virginia Tech, Chesapeake Bay Program; Panel Coordinator) welcomed participants and reviewed the [agenda](#). He and Neely Law (Center for Watershed Protection; Panel Chair) [summarized](#) the Chesapeake Bay Program's [BMP review process](#) that the Urban Tree Canopy (UTC) expert panel will be following. View the slides, the [BMP Protocol](#), and the [panel's statement of work](#) for more information.

**Panel Introductions**

- Each [panel member](#) present briefly introduced themselves.

**Stakeholder Presentations**

*Dave Nowak, US Forest Service (remotely)*

- Dave discussed urban hydrology and how iTree tools (including iTree-Canopy and iTree-Hydro) can be used to estimate the stormwater volume reduction or other benefits associated with green infrastructure and tree cover.
- View [the presentation](#) for more details.
- Frank Rodgers (Cacapon Institute): How does iTree-Canopy or iTree-Hydro differentiate between tree canopy (TC) over impervious or TC over pervious?
  - Nowak: based on averages for land uses from field information we have.
- Mike Galvin (SavATree): how do impervious vs. pervious compare?
  - Nowak: Best recollection, roughly 10:1. For every 1% of impervious cover you add, you have to plant about 10-12% of tree cover to offset the increase. Depends on other factors, especially rainfall intensities and depths (large vs. small storms).
- Anne Hairston-Strang (MD DNR Forest Service): Role of infiltration. Does the iTree model account for soil types?
  - Nowak: iTree-Hydro does include infiltration and we are working to add or improve routines for infiltration and evapotranspiration. The best place to plant trees over pervious is over the least infiltrating soils. Andretti at SUNY-ESF is working on the different soil types for iTree.
- Barbara Brumbaugh (City of Chesapeake): Why do you believe there was such a difference in the Durham data? Do you have any coastal plain data for the amount of runoff reduced?
  - Nowak: Probably precipitation, but would have to revisit data. Drivers are... We are working to expand and include Coastal Plain. We are trying to build up the database and include other cities or areas to see if the curves and trends hold.
    - Barbara White: Would like to have a similar study in the tidewater area and coastal plain of VA
- Mark Symborski: How much N, P, and sediments, if eventually washed off trees over impervious cover, will end up in the stream system anyway? And how does that affect the pollutant reduction rates for canopy over impervious cover?

- Nowak: Don't know the answer for certain. That would depend on a number of factors; couple deposition and the canopy models. N will dissolve and wash off, but this all depends on event mean concentration (EMC).
- Keith Cline (Fairfax County): determining canopy over impervious, have an idea for how easy it is to estimate that using the imagery and iTree-Canopy?
  - Nowak: Sometimes it is easy if you know where the roads are and you can make pretty good guesses. It becomes tougher in heavily canopied areas, but it is possible with aerial imagery.
- Sally Claggett (USFS): when you look at the Durham curve the reduced runoff curve starts fairly high, which may be an indication of evapotranspiration. At high impervious cover percentages, they are doing poorly due to soil capacity. Do you concur?
  - Nowak: Need to explore the data more. Could also depend on the amount of precipitation. Could be that Durham receives less rainfall.
- Neely Law (CWP): work we've done in older areas of Baltimore suggests that the texture of the soil allows for greater infiltration than would be expected based on hydrologic grouping.
  - Nowak: Could be partly that, but also several other reasons. Also depends on precipitation intensity.
- Mark Symborski (Montgomery County, MD): Are tree leaves that end up in the storm drain system taken into account by the models?
  - Nowak: No. We are estimating the leave drop and nutrients/carbon that would be associated with those leaves, but we do not know where they end up in the overall system so we do not model where they go.
- Justin Hynicka (MD DNR Forest Service): Does the range of calibration data cover the full range of 1-100% or how much of that is extrapolated
  - Nowak: We calibrate to the actual conditions of the watershed based on actual data. Once calibrated the range of 1-100% impervious or 1-100% tree canopy is simulated with all modeling.
- Dave encouraged anyone to share suggestions or thoughts on new needs or applications for the iTree tools. Always welcome thoughts on how to improve or expand the tools.
  - Claggett: As we've been talking, we'd like to know more about the type of urban forest in terms of physical site conditions – what type of understory, age, associated physical characteristics of surrounding area and the associated benefits/modeling outputs.
    - Nowak: difficult to break up by biological data. All they have is cover, not age, etc., which is difficult.
    - Claggett: we are starting to have hi-res imagery for whole watershed to differentiate whatever is possible at that scale.
    - Nowak: if we could break them out by height classes that would help (age distribution).
  - Hairston-Strang: It won't be available for Baltimore for a while, but generally is there a role for the plots?
    - Nowak: probably want to go to LIDAR map, which will help tease out the structural differences. Baltimore is data-rich, but outside is weaker. In the interim, we can use existing iTree plots.
- Law thanked Nowak for taking time to present and respond to questions remotely.

*Neely Law, Center for Watershed Protection*

- Law reviewed some studies that investigated the potential contribution that fallen leaves may have for nutrients in urban catchments. She emphasized that trees are good and more trees are even better. She noted that there have been questions about how important leaf litter may be in the urban nutrient context and how to perhaps consider or address it while evaluating the overall benefits of urban tree cover. There are major data gaps, but a rough estimate comparing upland number from Nowak (2014) in Baltimore City to an outfall number from a recent CWP (2013) study in Easton, there may be an 85% reduction from upland to outfall. Very rough estimate, but it does demonstrate very large losses and transformations along and within the urban drainage network.
  - View [the presentation](#) for more information.
- Law: Comparing phosphorus loads to percent tree cover in catchment area, and tying that to frequency of street sweeping – more trees, more P; more sweeping, more P captured; also seasonal pulse in P conc. of leachate – Spring pulse is probably pollen and seeds, Fall pulse is leaf fall
  - Peter MacDonagh (Kestrel Design Group): Another Minnesota study looked at cost per pound of phosphorus removal \$50-70/lb-P and found that street sweeping was actually extremely cost effective for collecting phosphorus (usually \$350-\$400/lb-P).
- Hairston-Strang: research question relates to benefit of leaf litter organic matter versus detriment – don't want to starve the streams.
- Steve Saari (DDOE): many jurisdictions have leaf litter pickup, and associated compost production – anyone quantify this?
  - Law: trying to quantify, but it is difficult.
- Ted Brown (Biohabitats): can we look at the load differential between runoff reduction benefits of planting trees over impervious cover vs. potential for leaf litter loading with and without street sweeping. In other words could the expert panel show higher removal credit when planting is coupled with street sweeping or would that be double counting?
  - Hanson: Both this UTC and the street cleaning panels have to ensure their definitions do not lead to double counting any part of the credit, leaf litter or otherwise.
  - Law: this accounting question is fundamental to the debate. Leaf litter could be a reduction in the benefit of tree planting, or there are other ways to account for it.
- Eric Sprague (Alliance for the Chesapeake Bay): Forest is not a zero load – urban tree planting may already account for leaf litter since forest cover is the calibration point.
  - Hanson: The info is there, it's a great point, but it's very difficult to parse. It is a known factor, but not a known quantity.
- Saari: Steve Saari: the ultimate question regarding a factor or datum is “what would we do with this?” At programmatic level, the nutrients can't really drive a BMP like street sweeping.
- Claggett: we're basically saying that trees can't keep up with our developed landscape, and how do we manage trees to account for this?
- Rodgers: hard to account, because due to deposition, a tree in Maryland may be collecting and depositing nutrients from Ohio, for example.

*Craig Carson, Montgomery County (MD) Department of Environmental Protection*

- Craig described the county's MS4 program and related aspects of their role in managing stormwater, which includes planting trees and maintaining canopy. The county has adopted UTC goals and has its own tree canopy law. He reviewed MDE's criteria for MS4 credit for reforestation or for individual trees. He noted that the county collects planting date, species, size of tree at installation, location and minimum survival rate for its own records.
  - View [the presentation](#) for more information.
- Claggett: are any of those county credits related to the CBP BMP credit for 100 trees/acre?
  - Carson: WE've only been using the programs we handle in house, so cannot say how they relate to the CBP BMP credits. The canopy law is fairly new and we are still developing the details.
- Saari: are 2 inch DBH (diameter at breast height) trees for stream restoration as well?
  - We usually plant 1.5 inch caliper and continue to measure them while they become fully established. When they reach 2" we count them for credit.
- Law: with the new tree canopy law will there be a mechanism for reporting and tracking the data?
  - Carson: Laura Miller is working on tracking trees planted and developing the new program. Still in early stages. Right now anything we currently have is largely based on what we have established in the restoration credit.
- Galvin described a recent experience with a client and the roadside tree law. Would have been easiest to cut down the trees in a situation, but because of the law they remained as a result of the importance the law places on existing trees. Are you seeing any effort really incentivizing preserving trees versus planting?
  - Carson: recognizing resources is important, and all other benefits of trees.
- Saari talked about tracking mortality in projects they're planting. Are there other mortality tracking efforts in other areas? DC is not tracking mortality in existing and untouched tree stands. There are other activities going on so what we ultimately track and report is not a net increase. Unable to track or report the net change because we don't have mechanisms to capture all the various activities that remove or add trees.
  - Carson: we do monitor trees and track health, but there's a data-intensive threshold that is difficult to overcome.
- Claggett noted the CBP will be compiling high resolution (1m) data for land use and land cover which would include tree canopy across the entire Bay Watershed.

**Discussion**

- Law noted there is a dichotomy for tree canopy and tree planting. On one hand it is considered a very cost-effective practice, but on the other hand it is considered as very difficult from a tracking perspective. She asked for participants for their thoughts about how they would like to see tree planting or tree canopy as a BMP for nutrient and sediment credit, knowing that it has to be tracked, reported and verified.
  - Lou Etgen (Alliance for the Chesapeake Bay): in the agriculture sector there is a credit for nutrient management plans, and maybe a similar approach could apply

here where incentives or credit is given for management or maintenance when we know that certain actions are beneficial.

- Hairston-Strang: the tree canopy assessment is the periodic gut-check since it's impossible to account for and track all the trees dying or being removed.
- MacDonagh: the trajectory for basically every urban area is a continuous loss of trees or green space.
- Galvin: part of this is a learning exercise. It helps to know how many trees are being planted compared to the overall trends or losses.
- Cline: a lot of this is state specific. Maryland has its Forest Conservation Act, but Virginia doesn't have anything like that. Think we should be careful because the specific requirements or implementation issues can vary widely across the jurisdictions.
- Saari: DC planting trees to outrun the mortality, knowing not all new trees will survive. Perhaps we should report a more conservative number to have that buffer in place.
- Etgen: if we had the money to gather the high resolution data every year then we wouldn't have these concerns about tracking these trees annually, but we do not have the money and have to rely on less frequent updates, like every 5 years.
  - Rodgers: what about just using iTree Canopy, take 1-2 days, and any municipality or jurisdiction could handle this level of reporting.
  - Having the land imagery data available in combination with the BMP reporting is useful.
- Law: the BMPs are reported annually. Would it be amenable to only update the tree canopy only every 5 years when the land use is updated with high resolution data?
- Hanson: land use data are updated as often as data are available. The years in between, there must be extrapolations to model/account for the year-to-year changes. Therefore, it's still important to report the BMPs in order to fill in the gaps. Both pieces of info are important so that 5 years from now, we can calibrate the reported data with the actual data, and identify the differences based on location, etc.
- Julie Mawhorter (USFS): The tracking is important for short-term crediting, and also to manage the trees planted.
- Carson: different entities might be competing for the same space – a rain garden in the right of way might be battling the same root space for a tree.
- Hairston-Strang: how can we best improve the Bay? i-Tree Hydro doesn't have the geospatial differentiation. It may be beneficial to somehow allow inclusion of soil type or infiltration rates.
- MacDonagh: Increased soil volume for trees helps increase the success of those trees. We have used up some of the best trees (e.g. elms) and have to increasingly rely on species that may require more specific conditions or may not be as successful in their survival.
- Law: if you look at crediting for runoff reduction practices vs stormwater treatment, the credits are developed based on infiltration and the associated processes even if the reductions are not quantified in terms of the specific mechanisms.
- MacDonagh: first 30 inches of soil depth is where ~80% of nutrient processing occurs.
- Law: We have a lot of people here involved with tree planting projects in some way. Does every tree count?
  - It was noted that UTC assessments sometimes include non-native species.

- Galvin: Every tree counts, but you can't count every tree. It is a tracking and reporting issue.
- MacDonagh: question to me is not should every tree count, but should every tree count equally? If someone is planting trees properly with plenty of soil volume and at a high survival rate, then that is better than improperly planting more trees that won't succeed or live.
- Rodgers: Cacapon collects the same data as Montgomery County: location, date planted, species, stock size. A lot of data is from volunteers. We are going to these plantings and finding that the volunteers are infilling dead trees with new trees, eliminating the direct data-reality connection. Trying to count every planted tree can become a very difficult process.
- Chris Brosch (Virginia Tech, VA DCR): the agriculture nutrient management panel has relied on values from literature to estimate an effectiveness value that we can discount according to other factors that we cannot measure. Could give tree planting a base condition credit, and based on certain program components, apply discounts. If those programs do certain things, the discount can be removed later on, making the credit modular, or "plug and play".
  - Hairston-Strang agreed. Suggest having some simple rate or estimate and build from there.

### **Wrap up and next steps**

- Hanson asked each Panel member to share their biggest take-away messages or lessons learned from the day.
- Galvin: The big eye opener is to think about how much of the overall land cover and land use is really at issue here, i.e. only a percent of urban areas. Take away all agriculture, forest, and parse out everything, and everything else, this BMP is very small.
- Tom Whitlow (Cornell): Seconded Galvin's point – largely supported by the panel's literature synthesis. Makes putting specific credit values on this BMP very difficult.
- Claggett: runoff reduction is something we can sort of measure, but it is just a piece of the nutrient/sediment benefits attributable to canopy. There may be uncertainty in the range, focus should be on additional pieces.
- Cline: Building on what Mike said, we are looking at a small overall piece of the watershed. The amount of planting is a very small component of the larger picture for tree canopy and water quality. It's more about preserving our larger trees and existing canopy. The management of our existing canopy is the truly important piece.
- Susan Day (Virginia Tech): Agree with Keith, but noted that tree planting may not occur or be reported if there isn't a nutrient and sediment credit associated with it.
- MacDonagh: Preserving the canopy and incentivizing the maintenance of that canopy is a more important piece overall. See this as a two-pronged thing, with the focus on preserving existing canopy, with tree planting being a smaller supporting measure.
- Karen Cappiella (CWP): We all seem to be on the same page, and personally like the simplicity of the top-down approach that would be based on periodic updates to hi-res tree canopy and land imagery.
- Day: concern that relying too much on imagery may miss some on-the-ground issues such as the forest health. A future discussion point would be that aerial imagery may not pick up dying forest until it's too late.

- Some of the panelists felt that Urban Forest Management Plan could be a good idea and there are examples of that. Cline noted that for Fairfax County they have many different plans that cover different pieces of their overall tree and forestry management.
  - MacDonagh suggested that penalties for loss of existing canopy may be more effective overall approach.
  - Whitlow: management of forest may include removing largest trees on rotational basis, as part of best management.
  - Galvin: take a logic model format – what are inputs and outputs – canopy in, ecosystem services out.
- Law and Hanson thanked everyone for their time and participation.

## Adjourned

### Participants

Name	Affiliation
<i>Panel members and support</i>	
Neely Law	CWP
Karen Capiella	CWP
Peter MacDonagh	Kestrel Design Group
Susan Day	Virginia Tech
Tom Whitlow	Cornell University
Keith Cline	Fairfax County (VA)
Sally Claggett	USFS
Mike Galvin	SavATree
Jeremy Hanson	Virginia Tech, CBPO
Ari Daniels	CWP
<i>Other in-person participants</i>	
Anne Hairston-Strang	MD DNR Forest Service
Chris Brosch	Virginia Tech, DCR
Eric Sprague	Alliance for the Chesapeake Bay
Frank Rodgers	Cacapon Institute
Jenny McGarvey	Alliance for the Chesapeake Bay
Julie Mawhorter	US Forest Service
Justin Hynicka	MD DNR Forest Service
Lou Etgen	Alliance for the Chesapeake Bay
Rick Fisher	Anne Arundel County DPW
Steve Saari	District of Columbia Department of the Environment
Tuana Phillips	CRC
Kate Baker	Chesapeake Conservancy
Jeff Sweeney	EPA, CBPO
Craig Carson	Montgomery County DEP

<i>Webinar participants</i>	
Dave Nowak	USFS
Barbara White	VA Dept. of Forestry
Barbara Brumbaugh	City of Chesapeake
Barbara Duke	City of Virginia Beach
Bob Goumas	City of Suffolk
Casey Kellner	City of Springfield, MO
Claire Jones	City of Suffolk
Mark Hockley	PA DEP
Chuck Mills	California ReLeaf
Colin Jones	MDA
David gasper	NYS DEC
Dana Coelho	USFS
Dona M Foster	USFS
David	City of Suffolk
Earl Bradley	
Ed Heide	City of Suffolk
Ellen Mussman	Baltimore County, MD
George Onyullo	DDOE
Robert Goo	EPA
Jacob Dorman	City of Suffolk
Jeff White	MDE
Jill Sunderland	HRPDC
Jenny Tribo	HRPDC
Julia Bartens	Davey Resource Group
Justin Shafer	City of Norfolk
Karen Coffman	MD SHA
Kelsey Brooks	VA DEQ
Kate Gordon	MD SHA
Lara Kling	VA DEQ
Marcia Fox	DE DNREC
Mark Symborski	Montgomery County, MD
Markku McGlynn	DDOE
Mary Gattis	Alliance for the Chesapeake Bay, LGAC
Michael Knapp	Montgomery County, MD
Michael Nentwich	City of Norfolk
Nicholai Francis-Lau	MDE
Liz Ottinger	EPA
Ginger Ellis	Anne Arundel County, MD
Robbie Coville	Davey Resource Group
Robin Pellicano	MDE
Sarah Davis	Springfield, MO
Shoshana Risman	George Washington University
Ted Brown	Biohabitats
Tomas Jordan	City of Suffolk
Rob MacPherson	City of Virginia Beach
Chris Kennedy	City of Virginia Beach