Urban Tree Canopy Panel

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Water Quality Goal Implementation Team

Photo credits:
http://www.saveitlancaster.com/resources/all-about-trees/street-trees/
https://www.google.com/earth/

Overview

- Discussion and request for approval of BMP expert panel report for WQGIT approval
  - Urban Tree Canopy Expansion (+ Urban Forest Planting)
- Highlight comments and responses
- Describe BMPs and credit
- Discuss any final questions or comments before calling for decision.

Panel Membership

Name	Affiliation
Panel Members	
Karen Cappiella	Center for Watershed Protection
Sally Claggett	US Forest Service, CBPO
Keith Cline	Fairfax County (VA)
Susan Day*	Virginia Tech
Michael Galvin	SavATree
Peter MacDonagh	Kestrel Design Group
Jessica Sanders	Casey Trees
Thomas Whitlow	Cornell University
Qingfu Xiao	University of California-Davis
Panel Support	
Neely Law (Chair)	Center for Watershed Protection
Jeremy Hanson (Coordinator)	Virginia Tech, CBPO
Brian Benham	Virginia Tech (Project Director)
Marcia Fox	DE DNREC (WTWG rep)
Ken Hendrickson	EPA Region 3 (Regulatory Support)
David Wood	CRC, CBPO (CBP modeling team rep)

Urban Tree Canopy Expert Panel

- The Forestry Work Group convened an Expert Panel to determine pollution control performance estimates for the BMP of expanded urban tree canopy as part of the Phase 6 Chesapeake Bay Watershed Model (CBWM).
- March 2015 – June 2016
- The Expert Panel (EP) recommendations are based on review and synthesis of the literature, best professional judgement and the approved tree canopy land use loading rates for nitrogen, phosphorus and sediment.

Current status

- FWG approved the panel's recommendations with contingency that the FWG's proposed 2nd-tier BMP (Urban Forest Planting) is considered alongside the panel's recommendations.
- Approval by WTWG Sept 1, 2016
- Seeking approval for both Phase 6 BMPs by the WQGIT today

At the start of the EP process…

- Reviewed Phase 5 Urban Tree Planting definition
- Land use conversion BMP from urban pervious to forest land use
- CAST documentation (June 23 2015 version):
  - Urban tree planting is planting trees on urban pervious areas at a rate that would produce a forest-like condition over time. **The intent of the planting is to eventually convert the urban land use to forest**. If the trees are planted as part of the urban landscape, with no intention to covert the area to forest, then this would not count as urban tree planting.
- In addition to this definition, the FWG defined the Urban Tree Planting BMP as:
  - Planting trees in an urban or residential environment with the intent to increase and sustain the tree canopy. **Planting 100 trees is equivalent to converting one acre of urban land to forest.** Tree replacement may need to occur but cannot be "counted" as an additional planting.

Rationale for New Credit

- Improve definition and supporting documentation for credit
- “Every tree counts” perspective
  - Enable to report and track all trees planted
- New Phase 6 land uses
  - Tree Canopy over Turfgrass
  - Tree Canopy over Impervious

Image sources:
http://www.baltimorecountymd.gov/sebin/t/a/400bigtreesale130315.jpg
http://urbanforestry.frec.vt.edu/STREETS/images/DSC00031.JPG
http://www.nature.org/cs/groups/webcontent/@web/@missouri/documents/media/tree-planting-1.jpg

Major Comments and Responses

- BMP needs to address “forest” plantings → Forestry Work Group provided “Urban Forest Planting BMP” to add to EP recommendation
  → Changed BMP names: Urban Tree Canopy Expansion & Urban Forest Planting
- Clarify how the revised BMP is tracked towards milestones and used as model input between land use updates → Removed and streamlined text describing methods for future land use updates.
- Continued concern about tree canopy land use loading rates expressed → Addendum to Appendix B documenting issues for future reference

Phase 6: Two BMPs on the table

Combination of panel's and FWG's recommendations would distinguish between projects that seek to create forest-like conditions from trees planted along a street or over fertilized turf. Both are included in Appendix F.

Urban Tree Canopy Expansion

- "…defined as the planting of trees in an urban area that are not part of a riparian forest buffer, structural BMP (e.g. bioretention, tree planter), or do not conform to the definition of the Urban Forest Planting BMP. The land use area conversion factor is based on the panel's recommendation of 144 sq ft average of canopy per tree planted. Thus, 300 newly planted trees are equivalent to 1 acre of tree canopy land use; however, this is not a planting density requirement and each tree converts 1/300 an acre of either pervious or impervious developed area to tree canopy land uses. This BMP does not require trees to be planted in a contiguous area."

Urban Forest Planting

- "…defined as tree planting projects in urban or suburban areas that are not part of a riparian buffer, structural BMP, or urban tree canopy expansion BMP, with the intent of establishing forest ecosystem processes and function. This requires that urban forest plantings be documented in a planting and maintenance plan that meets state planting density and associated standards for establishing forest conditions, including no fertilization and minimal mowing as needed to aid tree and understory establishment. Under this BMP, trees are planted in a contiguous area as documented in the planting plan and the acreage of this BMP is converted from the developed land use into forest in the modeling tools."

Urban Tree Canopy Expansion BMP Credit & Verification

- Expert Panel used i-Tree Forecast tool to project annual growth of newly planted trees based on defined initial conditions. Method accounts for annual tree mortality and range of conditions.
- Credit of 144 ft^2 per tree planted (1 tree converts 1/300 acre). No planting density requirements. Trees do not need to be planted contiguously.
- Land Use Change BMP to “Tree Canopy Over Impervious” or “ Tree Canopy over Turfgrass”
- Cumulative and stackable (i.e., urban nutrient management)

Table 8. Tree canopy relative land use loading rates based on the underlying land use land cover (Source: Hynicka and Divers 2016)

Land Use	Total Nitrogen Reduction (%)	Total Phosphorus Reduction (%)	Total Sediment Reduction (%)
Canopy over Turfgrass	23.8	23.8	5.8
Canopy over Impervious	8.5	11.0	7.0

Image source: http://urbanforestry.frec.vt.edu/STREETS/images/TreeAssessment.jpg

Urban Tree Canopy Expansion BMP
Credit & Verification

- Lifespan of BMP credit based on the time period until it is mapped as a land use in the CBWM (minimum 10 years after planting)
- Report number of Trees Planted, location, underlying land use, date
- EP guidance on verification does not require replanting as method accounts for mortality, 2.5 - 5%
- EP dbl counting language from report

Image source: https://environment.arlingtonva.us/trees/plant-trees/recommended-trees/

Urban Forest Planting BMP Credit & Verification

- Land Use Conversion BMP from Pervious to Forested land uses
  - 1:1 acre conversion
- Requires that
  - Trees are planted in a contiguous area as documented in the planting plan
  - Planting and maintenance plan that meets state planting density and associated standards for establishing forest conditions,
  - No fertilization and minimal mowing as needed to aid tree and understory establishment.
- Cumulative, but not stackable
- Credit duration is 15 years

Image source: http://www.baltimorecountymd.gov/sebin/p/k/Mount-Vista-Tree-after.jpg

Recommendations: Research and Management Needs

Research

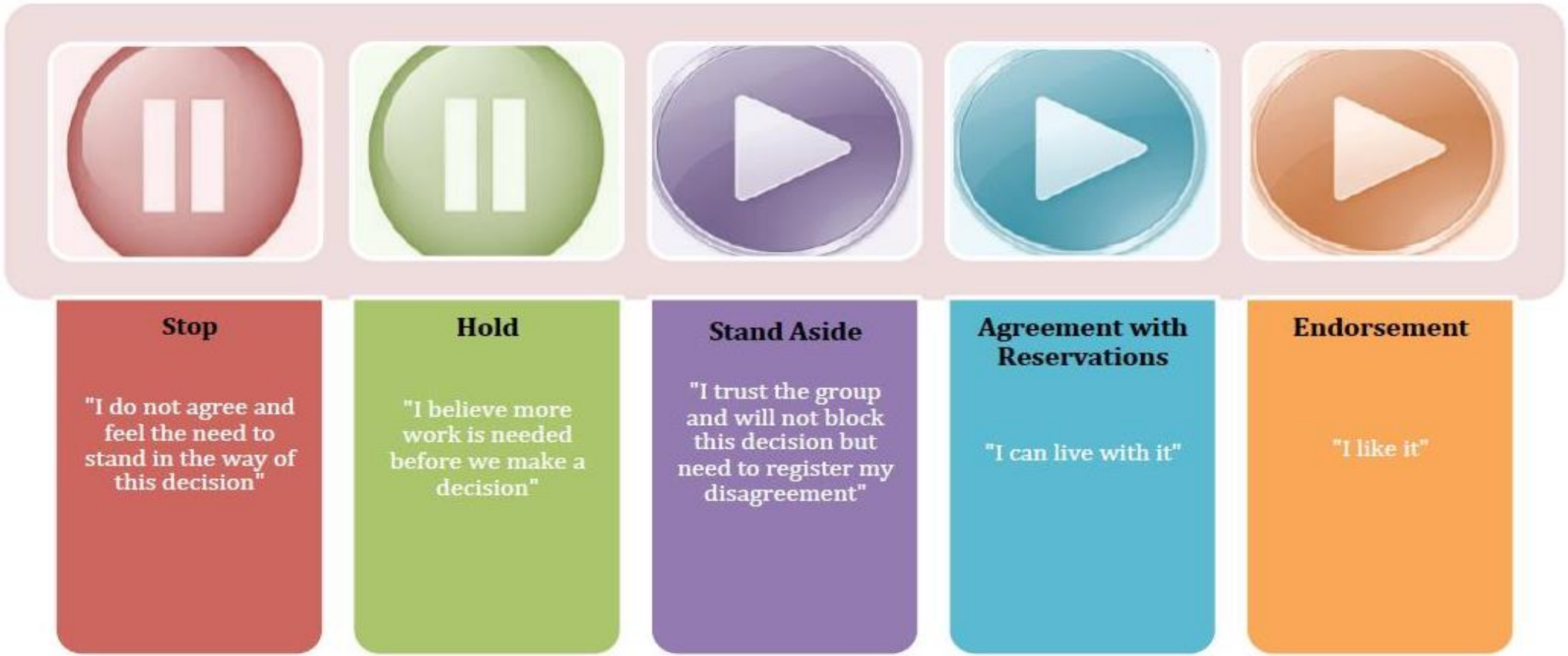
1) Evaluate the effect of tree canopy, non-forested lands on water quality.
2) There is a need for collection of multi-year field data that explicitly measures nutrient fluxes associated with areas of tree canopy.
3) CBP partnership can consider whether to adjust, drop, or keep this land-use/BMP as presently recommended for future model versions.
4) Support research to characterize and quantify the impact of leaf litter on nutrient contributions to the urban mass balance
5) Continued research on the effect of soils on tree canopy growth in urban watersheds.

Recommendations: Research and Management Needs

Management

1) Jurisdictions review and adopt guidance for tree planting and post planting care
2) Jurisdictions use tools to evaluate the net loss/gain of tree canopy beyond the Chesapeake Bay land use update.
3) The UTC BMP credit be reevaluated after 2025 to account for the increase in credit post 2025 as trees mature
4) Develop BMP's that address the conservation and maintenance of existing tree canopy.

Consensus Continuum



Adapted from UMD, CLOC

Bonus UTC slides

(If needed for discussion)

Overview of comments received

- Comments from nine individuals or entities received during initial 30-day comment period, including:
  - MDE
  - MD DNR (2)
  - VA DEQ
  - WV DEP
  - Baltimore County
  - Arlington County (2)
  - USFS (Ken Belt)

In general, responses suggest support for BMP that would provide credit for variable planting scenarios/conditions. No technical comments received on method for recommended credit (using i-Tree Forecast), however, continued concerns about land use loading rate.

Overview of comments: general topics

- Comments covered a range of topics, some were on overarching issues and some on specific statements or parts of the report. The comments fall into the following categories:
  - Comments calling for an option to credit plantings that create forest-like conditions, distinct from tree plantings over turf or impervious areas. This relates to the FWG proposal for an “urban forest planting” BMP
  - Tracking and reporting
  - Modeling
  - Land use loading rate
  - Future research and management needs
  - Editorial

Phase 5 Urban Tree Planting BMP definition

Current Urban Tree Planting definition(s) does not distinguish between types of planting projects or understory conditions.

Model documentation

- "Urban tree planting is planting trees on urban pervious areas at a rate that would produce a forest-like condition over time. The intent of the planting is to eventually convert the urban area to forest. If the trees are planted as part of the urban landscape, with no intention to covert the area to forest, then this would not count as urban tree planting." (CAST SourceData, BMP definitions)

FWG BMP Verification Guidance

- "Credit is applied according to the number of new acres (net gain) of tree cover, i.e., amount of canopy expansion. If trees are not planted in a contiguous area, such as for street trees, then number of trees can be converted to acres using the following conversion factor:

  100 trees = 1 acre of new tree cover

- All tree planting data is aggregated and submitted to the state by a locality, for further aggregation to the CB model per land-river segment." (BMP Verification Framework, Appendix B – Forestry BMP Verification Guidance)

Overview of responses

- Tracking and reporting (MD, Arlington Co, Baltimore Co, VA DEQ)
  - Will clarify how the revised BMP is tracked towards milestones and used as model input between land use updates. Will remove or revise some of the previous language regarding imagery updates.
- Modeling (MD, Arlington Co, Baltimore Co, VA DEQ)
  - Clarified definitions and some text to reflect current modeling and land use definitions and procedures.
- Land use loading rate (VA DEQ, Ken Belt)
  - Loading rates were reviewed and approved by the partnership, but continued concern noted. Summary of comments will be provided as an addendum to Appendix B for the partnership's reference for future model updates.
- Editorial
  - Typos, grammatical or other miscellaneous edits will continue to be made. Not covering these in this or other presentations.

See response-to-comment materials posted online for more information; some further changes are in the works based on recent discussions with VA DEQ and others.

Canopy Area Estimate

- Science-based and conservative
- i-tree Forecast applies empirical relationships based on extensive field work (see footnote p.23).
- Conditions simulated in the model represent 'urban' growth, or less than ideal growth conditions. For example,
  - Estimate for canopy area for a single tree takes into account an annual mortality (2.5 to 5%)
  - Growth conditions simulated limited by amount sunlight (crown light exposure) vs all open space or full sunlight
- Method is conservative using 10-yr growth vs maturity

Broadleaf deciduous, large	10 yr area, min	10-yr area ,max
Platanus acerifolia - London planetree	153	201
Quercus michauxii - Swamp chestnut oak	201	226
Quercus phellos - Willow oak	78	113
Ulmus americana - American elm	176	226
Broadleaf deciduous, medium		
Acer rubrum - Red maple	113	176
Betula nigra - River birch	133	201
Nyssa sylvatica - Black tupelo	50	78
Ostrya virginiana - Eastern hophornbeam	46	66
AVERAGE	**118.75**	**160.875**

Source: Source: http://dendro.cnre.vt.edu/predictions/canopy.cfm