Proposed Credit Duration for Forestry BMPs in the Chesapeake Bay Model

WQGIT Meeting, 08-23-21 [corrected]

This paper is the result of a Forestry Workgroup review of Practice Life and Credit Duration of forest and tree planting BMPs.

REQUEST: With the rationale presented in this paper, the Forestry Workgroup (FWG) is requesting that CBP approve a 15 year credit duration for all forest and tree planting practices (see table). This is supported by the literature and, for agricultural forestry practices, is what was originally spelled out in the Forestry Verification Guidance. The FWG's proposal was presented to the BMP Verification Ad-Hoc Action Team in July, and received its support, with comments.

Definitions

- Practice Life: The length of time a practice is expected to persist. This is primarily used to analyze annualized cost-benefit. The longer the practice life, the lower the cost of establishment/year.

- Credit Duration: The length of time a practice is credited in the National Environmental Information Exchange Network (NEIEN) before it needs to be re-verified.

Forest and Tree Establishment

Tree planting according to a professional plan, and maintenance in the early stages are important practices for increasing the quality of tree cover while minimizing unwanted plant establishment. The Verification Guidance produced by the Forestry Workgroup (last revised in December 2017 and posted on the CBP BMP Verification website) addresses planting, maintenance, and natural regeneration to ensure forest and tree establishment. Planting is usually done by contract, which will often mandate that seedlings which don't survive be replaced. Riparian forest buffers, for instance, will receive multiple visits throughout the contract life with most of these visits happening in the first few years. A mix of state, federal, and non-profit partners are responsible to verify establishment depending on the location and the practice.

Establishment (2-5 years) is the key point of verification, after planting. Once established, forests can grow indefinitely with little maintenance-- even in the event of a natural disaster (flooding, ice storms, etc.) -- as they are the natural land cover for this region. Some practices have a consistently higher standard of planning, implementation, maintenance, and regeneration (natural regeneration can be part of forest plantings per the Verification protocol) which can lead to a higher quality end product.

Both forest and tree planting survival depends on site characteristics, quality of planting stock, species selected for planting, early maintenance, and weather. The primary reason that the practice life for trees/forests is not indefinite, is due to changes in site management. As good planting and maintenance and improved land use decisions are adopted, the practice life will increase in duration.

Most urban tree planting occurs on lawns and community space where site conditions are favorable and where they are expected to grow better and live longer than trees planted along streets. There

are many, diverse programs for tree planting. Note that 1 in 3 trees in urban areas are there because of natural regeneration (Nowak 2012).

Basis for Practice Life

For Forest Plantings:

1. A forest established after 15 years is unlikely to be converted (compared to a grass buffer or single tree). One reason is because it is difficult to remove these trees. Also, multiple landowner surveys have shown that 80-88% of landowners intend to keep their new forest buffer indefinitely (English and Hyberg 2019, Cooper 2005, Fesco 1982).
2. Forests are naturally regenerative.
3. All Forest Plantings (buffers and urban forest planting BMPs) receive management and are often overseen by foresters (receive planting plan, pre-treatment, and maintenance).

Forestry BMPs (Pink= forest buffers Blue-=tree plantings)	Practice Life Span (time that a Practice is expected to persist; used primarily for cost-benefit calculations)		Credit Duration (time that a Practice is held in NEIEN before being needing reverification)	
	Current	Proposed	Current	Proposed
Ag Forest Buffer (w/o fencing- crop)	40 years	70 years	10 years	15 years*
Ag Forest Buffer (w/ fencing- pasture)	30 years	*No change*	10 years	15 years*
Urban Forest Buffer	40 years	*No change*	10 years	15 years*
Ag Tree Planting	40 years	*No change*	10 years	15 years, then modeled as Land Use
Narrow forest buffers (w/o fencing)	40 years	*No change*	10 years	15 years, then modeled as Land Use
Narrow forest buffers (w/ fencing)	25 years	*No change*	10 years	15 years, then modeled as Land Use
Urban tree planting	40 years	*No change*	10 years	15 years, then modeled as Land Use
(Urban) Forest Planting	28 years	40 years	15 years	15 years, then modeled as Land Use
Forest Harvesting BMPs	3 years (period BMPs are needed before land use reverts to undisturbed forest)	*No change*	3 years then reverts to Forest Land Use	*No change*

Basis for Credit Duration

For Forest Buffers:

For buffers, a 15-year credit duration is further supported based on:

Contract length – the great majority of CREP forest buffers have a 15-year contract commitment for annual rental payments, which includes required maintenance. Contracts are administered and performance overseen by USDA. Contracts can be extended another 15 years, after the initial contract period.

Landowner investment— the establishment of a forest takes considerable investment and the landowner is unlikely to convert after establishment (see Practice Life discussion above).

Consultation with forester—forest plantings have a higher bar for planning, implementation and establishment and are therefore more likely to persist.

*** Note for Table: Forest buffers will be modeled as Land Use after 15 years, like the other tree planting practices, but are also eligible for upland credit in NEIEN if re-verified.**

After 15 years, new buffers will need to be verified to maintain the upslope efficiency in NEIEN. The FWG proposes that verified buffers can continue to receive upslope efficiencies, but not land use conversion credit, after 15 years.

How Verification is Performed: The vast majority of forest practices on agricultural land are cost-shared conservation practices. The verification recommendations for buffers and agricultural tree planting in FWG's Verification Guidance closely follow USDA practice, including: standards for the practice, confirming that the trees are planted according to standard, and that newly-planted buffers/trees are successfully established. USDA has a continuing fiduciary responsibility, and the buffer contracts are administered as annual rental payments over the life of the contract. Special attention is also recommended towards the end of contract life, to encourage continuance of cost-shared buffers. Where states and/or non-governmental organizations (NGOs) are funding and implementing forest buffers, verification is augmented by the states and voluntary groups. For example, Maryland has its own verification program; Virginia Department of Forestry is often involved in buffer plantings, and conducts inspections of buffer establishment; the buffer consortium coordinated by Friends of the Rappahannock keeps in regular contact with all cooperating farmers to ensure buffers are growing and healthy.

Whether A Buffer Should Receive Full Credit Upon Implementation: The Riparian Forest Buffer Expert Panel (Belt et al. 2014) debated whether to withhold full practice credit until the planting was grown (~10 years of age) but decided against it. The following was excerpted from their report: "Some forest buffer functions are realized quickly following planting and increase as forest soil and canopy functions are rebuilt… the recommended efficiencies for forest buffers are sufficiently conservative to address any lower efficiency experienced when buffers are new."

Furthermore, there is already little distinction in loading rates for the early stages of a buffer planting. E.g., For the first 2 years of a buffer planting, it functions as a grass buffer which receives 70% the efficiency of a forest buffer. The next 2-10 years of growth, the forest planting looks and functions much like a mixed-open land use, which loads slightly more than forest in CAST (i.e., for nitrogen, forest loads around 1.5 #/acre/yr and Mixed Open loads around 1.8 - 2.0#/acre/yr).

For Urban Tree Planting:

To determine average survivorship of planted trees, scientists look at the population half-life rather than average or mean life expectancy. The population half-life is similar to the median: when 50% of the planted trees will remain living (i.e., survivorship = 50%). For planted urban trees (in street and lawn settings), the population half-life is typically 13-18 years. For "better than normal survivorship" the population half-life is 33-38 years (Hilbert et al 2019). For our purposes, we use the 15-year mark. As one Chesapeake forester put it, "there is no explicit data or reasoning that supports maintaining the shorter (10 year) credit duration." The 15-year credit duration is conservative. Urban and suburban plantings are often replaced or supplemented by natural regeneration.

Furthermore, landowners were shown to replace 25% of trees and local policies including contract provisions indicate a higher rate of replacement especially in the first years of planting (Ko et al 2015).

BMP Verification: The FWG Verification Guidance is coordinated with the Urban Stormwater Verification Guidance. Tree planting practices used for MS4 compliance must be regularly verified, just as stormwater BMPs must be. However, to date, almost all urban tree planting is "voluntary" and performed by NGOs or landowners. Except for Maryland, BMP numbers are very small. State urban forestry programs are building their capacity to assist tree planting efforts, and giving voluntary groups "credit" for their tree planting is an incentive. The FWG Verification Guidance says that greater verification of voluntary tree planting will be related to increased state reliance on these practices for their WIPs. This is in accordance with the principles in the CBP Verification Framework.

Tree Practices and Land Cover Data: Many tree plantings are reported to NEIEN as dispersed practices and are difficult or impossible to revisit. Fortunately, the extent of trees and continued tree survival can be monitored using high resolution land cover imagery. Land cover imagery shows tree mortality instantly and tree growth gradually so as landowners and contractors replace trees, and trees and forests replace themselves, it is the land cover data that provide the best indication of the extent of tree survival and occurrence on the landscape In most of the watershed as in the rest of the country, the impact of tree planting is considerably smaller than the loss of trees to development. The new high-resolution land cover change data is providing further proof of this. Therefore, the Land Use module of CAST gives a more accurate impression of the impact of tree practices on the landscape than NEIEN.

Backout: After studying a GIS analysis made by Iris Allen (MD DNR-Forestry), the FWG decided to recommend that the backout year for forestry practice BMPs be changed from the date of the latest high-resolution land imagery to 15 years prior to the date of the imagery. This proposal was made in May to the Watershed Technical Workgroup (WTWG). The WTWG decided that all forestry and tree planting practices would be backed out of the Chesapeake Assessment and Scenario Tool (CAST) 15 years after the tree is planted.

References

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