Middle Fork Holston River and Tributaries Clean-up Study
Benthic TMDL 2nd TAC Meeting Minutes

Tuesday, July 11, 2023, 1:00pm – 3:00pm
Virginia DEQ Southwest Regional Office
355-A Deadmore St., Abingdon, Virginia

There were 19 attendees for this second TAC meeting including seven DEQ staff and two from the WSSI/JMU contract team.

Attendees

- Hunter Wyatt – Holston River Soil and Water Conservation District
- Laura Hainsworth – Emory and Henry College
- Leroy Sullivan – Washington County Service Authority
- Wayne Turley – Holston River Soil and Water Conservation District
- Ron Seay – Washington County Service Authority
- Tim Lane—Virginia Department of Wildlife Resources
- Audrey Root—Holston River Soil & Water Conservation District
- David Nichols – U.S. Fish and Wildlife Service
- Mike Horne—Evergreen Soil & Water Conservation District
- Jeana Waddle—Evergreen Soil & Water Conservation District
- Bill Miller—Virginia Department of Forestry
- Caleb Rector—Holston River Soil & Water Conservation District
- Jacob Bellinger – Wetland Studies and Solutions, Inc.
- Katie Shoemaker – Wetland Studies and Solutions, Inc.
- Martha Chapman – Virginia Department of Environmental Quality
- Kelly Miller – Virginia Department of Environmental Quality
- Stephanie Kreps -- Virginia Department of Environmental Quality
- Kristy Woodall-- Virginia Department of Environmental Quality
- Craig Lott-- Virginia Department of Environmental Quality
- Rachel Sproles (intern)--Virginia Department of Environmental Quality
- Kyle Kennedy(intern)—Virginia Department of Environmental Quality

Welcome, Project History, and Modeling Background

DEQ Southwest Regional Office Stormwater & Watershed Planning Manager, Kelly Miller, opened the meeting with introductions and discussed the status of the project timeline, our goal today to evaluate the final updates resulting from the last TAC, and next steps. Updates to the Middle Fork Holston and Tributaries TMDL Study were shared as a handout, which is included as Appendix A.

Using the TMDL Study handout, Katie Shoemaker and Jacob Bellinger with WSSI, Inc. gave a brief recap of previous events, AllForX modeling methodology, changes in data inputs based on feedback from the first TAC. These changes included the density of streams based on their intermittent or perennial classification and the use of a new EPA dataset which helped make distinctions. Additionally, the stormwater outfall from one permitted facility was changed to reflect only stormwater and not process water. The updated TMDL also addresses the continued benthic impairment and adjust for future growth, including a proposed expansion to the Hall Creek Wastewater Treatment Plant from 0.633 million gallons/day to 0.950 MGD.

The final study included a split into three regressions to develop the final target loads for each impaired segment. The split between watersheds was necessary based on watershed size as well as the differences in land use from less than 5% to more than 10% impervious area. By doing this, the reductions more accurately reflect the potential sediment loading. As shown in the study document in Figure 5, some watersheds are very close to meeting their targets and may show a zero or negative need for reductions (i.e. 6CMFH055.88 in Figure 5 representing Upper Middle Fork Holston which notes an estimated -7.3% reduction needed in Table 2). However, because we cannot monitor each part of the water in a stream, there is variability expected above and below our existing monitoring values, and all computer simulations have unavoidable flaws including precision of the datasets and as such an explicit margin of safety is included in the final reduction scenarios. With this margin of safety, these watersheds still require a small percent reduction, which is reflective of the Virginia Stream Condition Index (VSCI) scores bouncing above and below the 'healthy' threshold score of 60.

The final study also accounts for current agricultural best management practices (BMPs) already in use and still within their designated life span. These are shown in Table 3. More BMPs are present throughout the watersheds but are aimed at bacteria reductions and thus not credited toward the needed sediment reductions. Additionally, permitted sources are accounted for since their contributions are regulated. The permitted sources are calculated at their maximum allowable discharge based on their permit limits even though many permitted outfalls do not discharge at their maximum allowable level.

The reduction scenarios are based on reasonable and conservative goals. Katie described the calculation as the wasteload allocation (WLA) plus the load allocation (LA) plus a margin of safety (MOS.) The MOS is set at 10% of the TMDL target loading, and an additional 2% of the TMDL target loading is set aside as part of the WLA for future permitted loads. The two and 10 percent set-asides are the DEQ standard starting points developed by Virginia Tech.

A question was asked regarding a distinction between organic and inorganic loadings, with specific interest in how cattle impact loads in the watersheds. In the model, the density of livestock is accounted for when calculating streambank erosion rates, which helps capture those impacts.

Martha Chapman also shared a usual trend in the Virginia Stream Condition Index, or VSCI, in our southwest region. VSCI reflects the biological condition of streams based on sampling. Regional VSCI scores in this area tend to be poor in the spring and great in the fall. This trend may explain why some stream segments in the study are borderline for impaired designation.

Questions were raised regarding new industrial sources at the new industrial park and their impact on using up the future growth allocation, as well as how much of the future growth has already been used since the study began in 2021 were discussed. Only additional permitted loads would be classified as using part of the future growth set aside in the WLA – if future build-out is just added impervious area without associated individual or general VPDES permits these areas wouldn't be using the future growth set-aside. Build-out of added impervious area at scale, regardless of VPDES permitting, would be subject to following stormwater guidelines that would mitigate impacts on the watershed. For planning purposes, this future buildout may also be offset by conservation efforts that are also not included in the study such as nutrient banks, stream restoration, and other conservation efforts. The use of cover crops is also not included since the lifespan is only one year, however, these conservation practices may be reflected in the high-till verses low-till classification on cropland that is included in the computer model.

Reduction Scenario Discussion

Jacob (WSSI) began the discussion regarding the reduction scenarios for each segment. There are five reduction scenarios. The five scenarios can be generally understood as 1) flat reduction across all sources, 2) heavier reductions in the agricultural sources, 3) heavier reductions in the urban sources, 4) larger reductions required on larger sources, and 5) a tailored approach seeking larger reductions in tributary segments so that downstream segments may achieve their goals. The group was asked to evaluate the reduction scenarios for each segment and vote for the most likely and achievable scenario.

Jacob began with Tattle Branch (Table 4.) Large reductions are proposed for this segment. Craig Lott (DEQ) facilitated the discussion. It was noted that the Virginia agricultural BMP known as VSL-1, a permanent vegetative cover on cropland, is shown to give a significant sediment reduction value in Table 3 but historically ranks very low in the Soil and Water Conservation District's prioritization. This seems to be a conflict and should be addressed among the programs. After further discussion, the group voted to endorse Scenario 2 from Table 4 as the most achievable for Tattle Branch.

Moving on, Jacob discussed the Hall Creek allocation scenarios (Table 5.) This segment includes the campus of Emory & Henry College. With an urban component, there could be an opportunity for an urban BMP on the college campus. However, urban practices are very expensive and do not achieve similar results per cost as agriculture practices. After discussion, the group voted to endorse Scenario 2 from Table 5 as the most impactful for Hall Creek.

Next, Jacob discussed the Byers Creek allocation scenario (Table 6.) Byers Creek is the receiving channel for Tattle Branch and Hall Creek and thus will benefit from reductions in those tributaries. There is also an opportunity for stream restoration projects on the Emory & Henry campus although the project will need to meet the campus needs for aesthetics, security, and maintenance. Once again, the group voted to endorse Scenario 2 for Byers Creek due to the heavy sediment reductions on available agricultural land uses.

Moving forward, Jacob discussed the Cedar Creek allocation scenarios (Table 7.) Martha Chapman shared this watershed is going to be difficult to improve due to the presence of bedrock as the predominant streambed geomorphology. Bedrock does not provide the needed habitat to encourage many of the macroinvertebrates used to calculate a VSCI score. VSCI scores may not improve based on needed reductions. It was suggested that another or alternative sampling station be established that would more accurately capture the entirety of the watershed. Until such time a new station can be established, the group voted to endorse Scenario 2 for Cedar Creek.

Next, Jacob discussed the reduction scenarios for Greenway Creek (Table 8.) Greenway Creek has relatively high VSCI scores, bouncing above and below the threshold of 60, and as such less reduction is called for. The group voted to endorse Scenario 2 for Greenway Creek.

Moving to the mainstem, Jacob discussed the reduction scenarios for the Upper Middle Fork Holston (Table 9.) This section includes much of the National Forest as its predominant land cover and only calls for 1-2.9% reductions. The group voted to endorse Scenario 2 for the Upper Middle Fork Holston.

Next, Jacob discussed the reduction scenarios for the Lower Middle Fork Holston above Rt. 91 (Table 10.) This segment includes the river above its intersection with Rt. 91, from the bridge upstream to the confluence of Sulfur Spring Creek. DeBusk Dam is a problem for total suspended solids (TSS) in that it lessens available habitat and sediment is stirred during storm events and remains suspended longer. Katie acknowledged the model struggles with dams in terms of loading and hydrology. Tim Lane confirmed that the habitat will restore itself once the dam is removed. However, the landowners have been opposed to removing the dam. Removing the dam in the future may be a possibility. Also, VSCI scores are less applicable for larger order streams. Given this and coupled with the availability of funding to support agricultural conservation practices, the group voted to endorse Scenario 2 for the Lower Middle Fork Holston above Rt. 91.

Lastly, Jacob discussed the reduction scenarios for the Lower Middle Fork Holston Rt. 91 downstream to Edmondson Dam (Table 11.) There is no monitoring station, and the agency listed this segment based on best professional judgement considering the impairments above this segment. Jacob discussed the mislabeling of cropland as pasture in the land cover dataset – BMPs were present for cropland in this portion of the watershed, which may have changed the land cover classification (long term vegetative cover) and the reflection of that in the calculations. Tim Lane shared the Edmondson Dam is breached and may likely continue to correct its habitat over time. Given this and coupled with the availability of funding to support agricultural conservation practices, the group voted to endorse Scenario 2 for the Lower Middle Fork Holston Rt. 91 to Edmondson Dam.

<u>Summary & Next Steps</u>

In summary, the group understood the breakout and reduction calculations associated with each segment included in the study. The group endorsed Scenario 2; the scenario most focused on reductions from agricultural sources. This was not selected based on a belief that agriculture is the source of all pollution in the watershed, but rather acknowledging agriculture has the only dedicated source of funding for agricultural conservation practices and has the best hope of achieving the most impactful reductions.

The group agreed another TAC meeting was not necessary. Once the final edits are made and the Scenario 2 reductions are incorporated, the document will be ready for a final public meeting and moving through the approval process within DEQ and the State Water Control Board. The group agreed the final public meeting should be held at Emory & Henry College as a central location. Dr. Laura Hainsworth agreed to help with the scheduling logistics.

With nothing further, the meeting concluded at 3:00 p.m.

Attachment: Appendix A

Middle Fork Holston and Tributaries TMDL Study

Second Technical Advisory Committee Meeting
7/11/2023, 1:00 pm, Virginia DEQ Southwest Regional Office

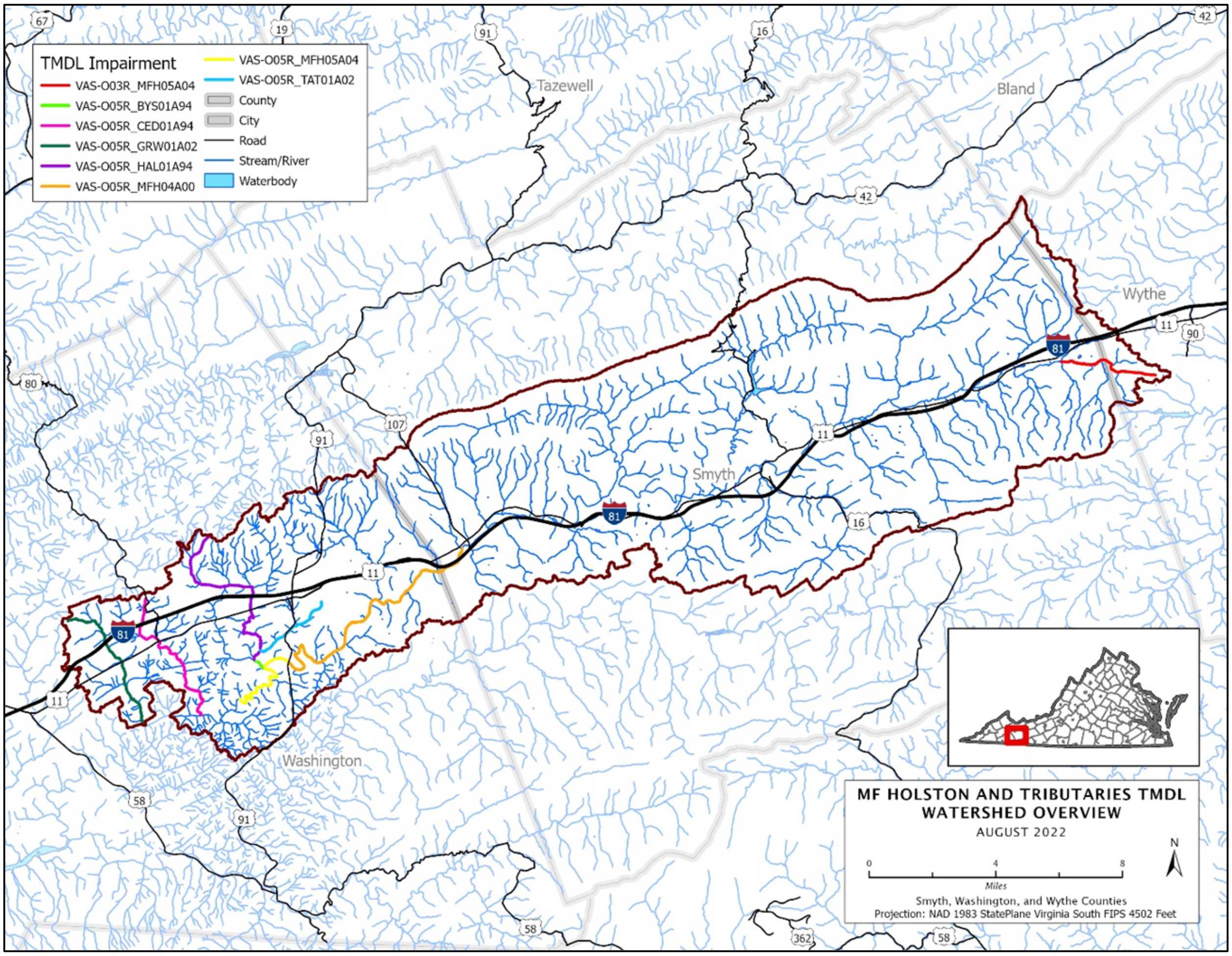

Figure 1. Impairments included in the Middle Fork Holston and Tributaries TMDL study.

1. Brief Re-cap

- The 8 individual impairments included in this study are shown in **Figure 1** and **Figure 2**.
- Benthic Stressor Analysis indicated that sediment is the cause of the benthic impairment in all the impaired streams.
- The TMDL modeling process using GWLF, a spatially-lumped, continuous simulation model used in many EPA-approved TMDL studies. The overall watershed was divided into subwatersheds to calculate sediment loads to the various impairments.

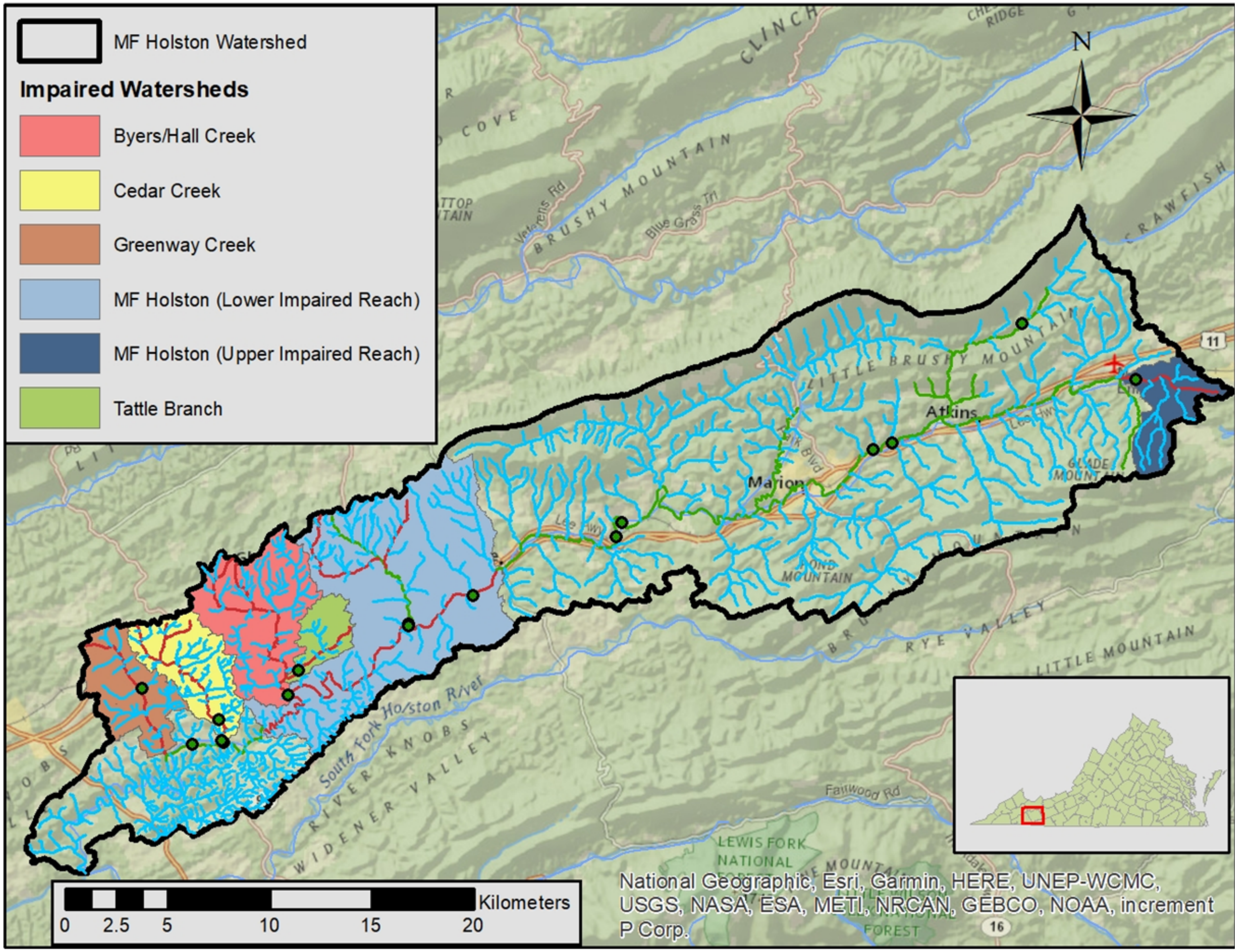

Figure 2 Middle Fork Holston (MF Holston) Impaired Watersheds

2. TMDL Modeling Input Updates

Perennial Streams

There were inconsistencies noted at the previous TAC meeting in the density of perennial streams in the watershed when looking at the USGS National Hydrography Dataset (NHD), as portions of the watershed did not have intermittent streams in a separate category from perennial streams. This inconsistency caused significant variability in streambank erosion in different subwatersheds of the GWLF model. A different dataset, the EPA ORD NHD, was selected for use instead of USGS NHD in the modelling process.

Permitted Loads

Methods for calculating existing and allocated (permitted) loads from non-metallic mineral mining (NMMM) permitted outfalls associated with stormwater flow and not process water were chosen.

There are two NMMM permits in the watershed (**Table 1**). Process water from these facilities are permitted sources of sediment at an average concentration of 30 mg/L TSS. Discharge rates were calculated based on provided DMR data. Outfalls associated with permit VAG840023 are identified as stormwater runoff only, without process water contribution. This permit is instead handled in the same way as Industrial Stormwater General Permits by using a 440 lb/ac/yr TSS loading rate applied to the actively disturbed area to calculate the allocated load.

Table 1. Sediment load associated with the non-metallic mineral mining permit.

Permit No	Facility Name	Watershed	Average Flow (MGD)	Permitted Conc (mg/L TSS)	Typical Load (lb/yr TSS)	Allocated Load (lb/yr TSS)
VAG840023	Cardinal Quarries – Bear Creek Quarry	Lower MF Holston	-	-	-	26,708
VAG840153	Appalachian Aggregates LLC - Glade Stone Plant	Tattle Branch	0.04	30	856.23	3,347

3. The All Forest Load Multiplier (AllforX) Endpoint approach

TMDL development requires an endpoint or water quality goal to target for the impaired watershed(s). Many pollutants have numeric water quality criteria set in regulatory documentation, and it is assumed that compliance with these numeric criteria will lead the waterbody to achieve support of all designated uses. However, sediment doesn't have a numeric criterion established, as the acceptable level of sediment is expected to vary from stream to stream based on a range of contributing factors. Therefore, an alternative method must be used to determine the water quality target for each sediment TMDL.

The method proposed to set TMDL endpoint loads for the MF Holston and Tributaries is called the "all-forest load multiplier" (AllForX) approach, which has been used in developing many sediment TMDLs in Virginia since 2014. AllForX is the ratio of the simulated pollutant load under existing conditions to the pollutant load from an all-forest simulated condition for the same watershed (**Figure 3**). In other words, AllForX is an indication of how much higher current sediment loads are above an undeveloped condition.

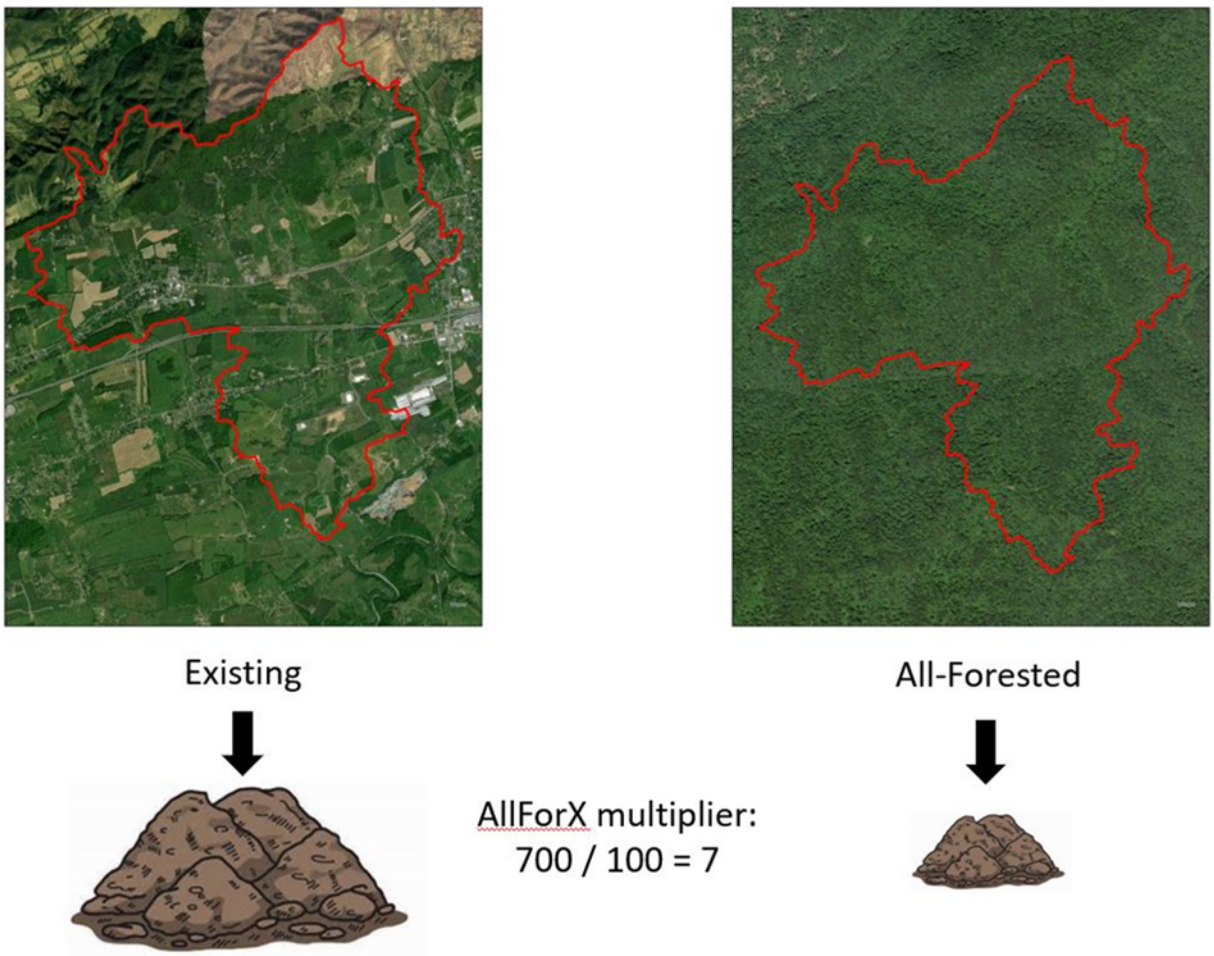

Figure 3 Illustration of determining a hypothetical AllForX multiplier

These multipliers are calculated for both unimpaired and impaired regional watersheds and then a regression is developed based on the relationship between the average Virginia Stream Condition Index (VSCI) scores at monitoring stations and the corresponding AllForX ratio for the watersheds contributing to each of those monitoring sites.

For the MF Holston and Tribs, three AllForX regressions were developed to account for the variety of watersheds and impairments included in the study. Each regression uses the 33rd percentile of VSCI scores within the past 10 years for selected impaired and comparison watersheds. **Figure 44** shows the regression developed for the watersheds with greater than 45,000 acres. **Figure 5** shows the regression developed for watersheds with less than 10,000 acres and impaired watersheds with less than 5.5% impervious landcover. **Figure 6** shows the regression developed for watersheds less than 10,000 acres and impaired watersheds with greater than 10% impervious landcover. Based on achieving an average VSCI score of 60, the target AllForX ratios and calculated target loading rates can be found in **Table 2**.

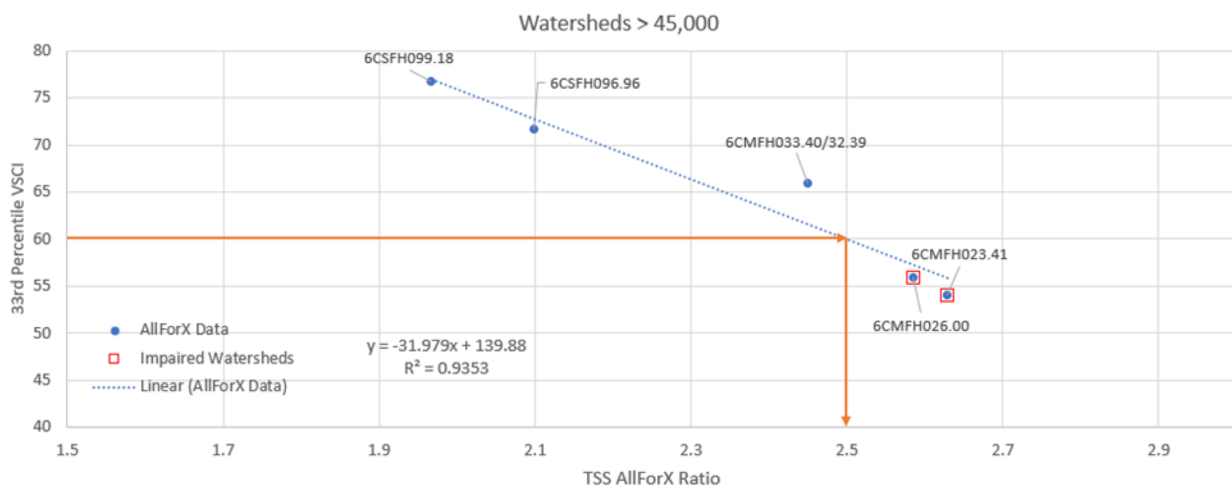

Figure 4. Regression between the 33rd percentile VSCI scores and all-forest multiplier for sediment, resulting in an AllForX target ratio of 2.50 for TMDL watersheds >45,000 ac.

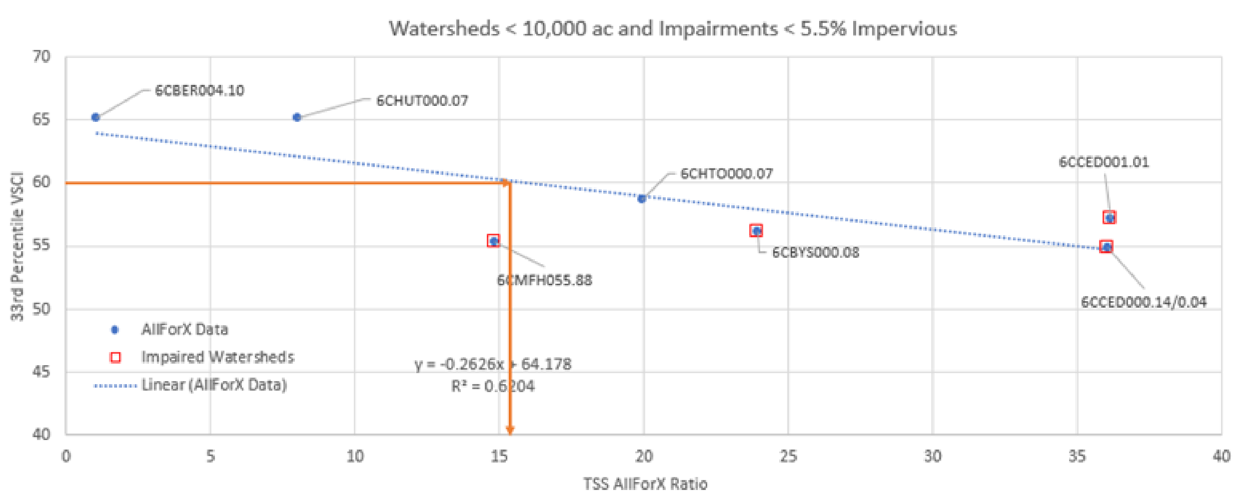

Figure 5. Regression between the 33rd percentile VSCI scores and all-forest multiplier for sediment, resulting in an AllForX target ratio of 15.91 for TMDL watersheds <10,000 ac and <5.5% impervious cover.

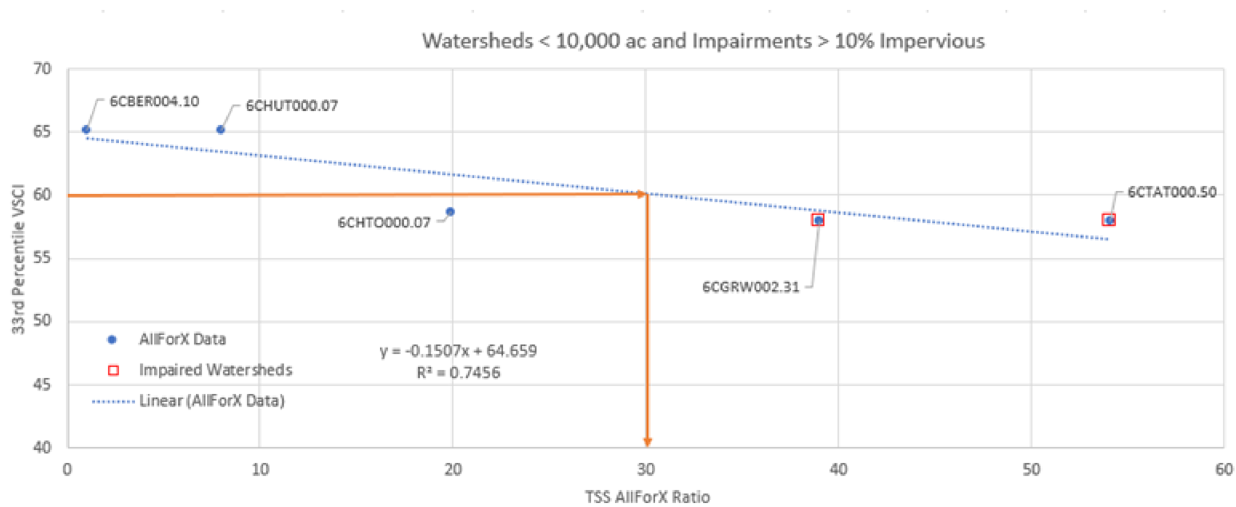

Figure 6. Regression between the 33rd percentile VSCI scores and all-forest multiplier for sediment, resulting in an AllForX target ratio of 30.92 for TMDL watersheds <10,000 ac and >10% impervious cover.

Table 2. Target sediment loading rates and estimated preliminary reductions as determined by AllForX regression for the MF Holston and Trib Watersheds. Existing loads do not incorporate allowable sediment loads from permits or any BMPs present in the watershed.

Impaired Stream	**AllForX Target Ratio**	**TSS Existing** (lb/yr)	**TSS AllForest** (lb/yr)	**TSS Target** (lb/yr)	**Estimated Percent Reduction**
Lower MF Holston, Rt. 91 to Edmondson Dam	2.5	50,830,287	17,533,093	43,795,725	13.8%
Lower MF Holston, upstream of Rt. 91	2.5	43,069,840	15,668,467	39,138,096	9.1%
Upper MF Holston	15.91	1,268,196	85,514	1,360,536	-7.3%
Cedar Creek	15.91	1,218,441	33,796	537,701	55.9%
Byers Creek	15.91	2,509,405	104,791	1,667,235	33.6%
Hall Creek	15.91	2,136,066	87,975	1,399,687	34.5%
Tattle Branch	30.92	735,554	13,619.9	421,069.78	42.8%
Greenway Creek	30.92	1,322,273	39,609	1,224,530	7.4%

Are there any questions on the methods used?

Do the pollutant load targets seem reasonable?

4. Existing Best Management Practices (BMPS)

Existing Best Management Practices (BMPs) that have been implemented within the watersheds were also accounted for in developing the TMDLs. These BMPs that contribute to a sediment 'loading' removal, either by land cover change or a sediment removal fraction, are incorporated into the final TMDL equation (**Table 3**) and associated reductions to sediment loading will be subtracted from the existing loads prior to allocation scenario development. BMP reductions were based on Chesapeake Bay TMDL Model guidance documents and appropriate changes in landcover within the model. Many more BMPs have been implemented in the watersheds but are not included in these calculations. This is because many of these BMPs, such as septic pump outs and replacements, specifically address bacteria and/or nutrient loads, but not sediment.

Table 3 BMPs installed within the MF Holston and Tribs

Receiving Stream	Practice	Count	Extent Installed	Efficacy method (fraction removal, other)	TSS Removal (lb/year)
Lower MF Holston, Rt. 91 to Edmondson Dam	CREP Woodland Buffer Filter Area (CRFR-3)	1	1.04 ac	0.4	1,613
	CREP Stream Exclusion with Grazing Land Management (CRSL-6)	2	4,400 ln. ft	0.4, 0.24*	6,605
	Long Term Vegetative Cover on Cropland (SL-1)**	2	16 ac	Land cover change	29,657
	Stream Exclusion with Grazing Land Management (SL-6)	3	1,600 ln. ft	0.4, 0.24*	17,188
Lower MF Holston, upstream of Rt. 91	CREP Woodland Buffer Filter Area (CRFR-3)	7	24.1 ac	0.4	8,740
	CREP Stream Exclusion with Grazing Land Management (CRSL-6)	4	4,970 ln. ft	0.4, 0.24*	17,986
	Long Term Vegetative Cover on Cropland (SL-1)	1	33 ac	Land cover change	8,867
	Stream Exclusion with Grazing Land Management (SL-6)	8	25,951 ln. ft	0.4, 0.24*	47,385
	Grazing Land Management (SL-10)	2	142.98 ac	0.24	13,019
Upper MF Holston	CREP Woodland Buffer Filter Area (CRFR-3)	3	1.84 ac	0.4	8,071
	CREP Stream Exclusion with Grazing Land Management (CRSL-6)	2	1,146 ln. ft	04., 0.24*	1,884

Receiving Stream	Practice	Count	Extent Installed	Efficacy method (fraction removal, other)	TSS Removal (lb/year)
	Livestock Exclusion with Riparian Buffers for TMDL Imp. (LE-1T)	2	1,300 ln. ft	0.6	2,384
	Stream Exclusion with Grazing Land Management (SL-6)	4	3,660 ln. ft	0.4, 0.24*	20,487
	Grazing Land Management (SL-10)	1	32.5 ac	0.24	8,177
Cedar Creek	Stream Exclusion with Grazing Land Management (SL-6)	1	600 ln. ft	0.4, 0.24*	2,359
Byers Creek	CREP Woodland Buffer Filter Area (CRFR-3)	1	0.48 ac	0.4	371
	Stream Exclusion with Grazing Land Management (SL-6)	2	612 ln. ft	0.4,0.24*	9,209
	Grazing Land Management (SL-10)	1	117.43 ac	0.24	22,050
Hall Creek	CREP Woodland Buffer Filter Area (CRFR-3)	3	6.27 ac	0.4	3,683
	CREP Stream Exclusion with Grazing Land Management (CRSL-6)	3	3,080 ln. ft	0.4, 0.24*	49,759
	Long Term Vegetative Cover on Cropland (SL-1)	1	16.5 ac	Land cover change	11,779
	Stream Exclusion with Grazing Land Management (SL-6)	1	600 ln. ft	0.4, 0.24*	1,416
Tattle Branch	CREP Woodland Buffer Filter Area (CRFR-3)	1	0.36 ac	0.4	300
	CREP Stream Exclusion with Grazing Land Management (CRSL-6)	1	500 ln. ft	0.4, 0.24*	6,714
Greenway Creek	Stream Exclusion with Grazing Land Management (SL-6)	1	150 ln. ft	0.4, 0.24*	7,874

*No more than two times the acreage of the buffer proper gets the filter reduction otherwise landcover change, 0.4 TSS filtered area, 0.24 TSS Grazing management.

**No cropland was identified in the VLCD dataset, so model results of 'poor pasture' were used to generate reductions for SL-1, and the reductions applied to allocation loads of poor pasture.

Do the list of BMPs we have captured seem appropriate for these watersheds?

5. Establishing the TMDL Equation

Once the reduction targets are identified using the AllForX methodology, TMDL equations can be developed for each watershed. A TMDL equation consists of three parts:

$$TMDL = Wasteload\ Allocation + Load\ Allocation + Margin\ of\ Safety$$

Wasteload Allocation (WLA): Sediment load originating from point sources (permitted facilities that discharge the pollutant of concern – sediment in this case). A future growth allocation is often included in the WLA to allow for future permitted sources. In this study 2% of the TMDL is set aside for future growth.

Load Allocation (LA): Sediment load originating from nonpoint sources (land-based loads, anything not a permitted facility)

Margin of Safety (MOS): Since no model is a perfect representation of the real world, a margin of safety is included in the TMDL. MOS can be implicit by incorporating conservative assumptions in the model, such as setting the WLA for facilities to the permitted maximum even though that may be more than their typical load. MOS can also be explicit by setting aside a portion of the TMDL, in this case 10%.

Do the Future Growth Allocations and Margin Of Safety seem reasonable for these watersheds?

6. Allocation Scenarios

Initial allocation scenarios have been developed for sediment to meet or exceed the TMDL targets established in **Table 2**. Preliminary sediment allocation scenarios are presented for MF Holston and Tribs in **Table 4** through **Table 11**. For each stream, Scenario 1 presents an even reduction across all anthropogenic sources. Scenario 2 focuses reductions on agricultural sources, and Scenario 3 focuses reductions on urban sources. Scenario 4 was included to provide a more tailored approach, with greater reductions recommended for the larger sources. In some cases, an additional Scenario 5 is presented, where additional reductions are needed to reasonably meet downstream targets that the impaired watershed contributes to. In these 'Scenario 5's, reductions were applied uniformly across the nested allocation scenarios in order to meet the target allocation for the downstream-most watershed. The allocation scenario reductions are higher overall than the predicted reductions from **Table 2**, due to the inclusion of explicit Margin of Safety and Future Growth allocations in the final TMDL calculation. Input on these scenarios is requested from the Technical Advisory Committee so that an optimal scenario may be selected.

Which allocation scenarios do you prefer for each watershed?

Is a reasonable option presented for each watershed?

Are there other scenarios that would be useful to see?

Table 4 Preliminary allocation scenarios for Tattle Branch sediment loads. Existing and allocated scenarios account for BMPs already implemented in the watershed. Scenario 5 additional reductions were needed for Byers Creek to meet its target allocation and the reduction array was applied uniformly to Tattle Branch in order to achieve that goal.

Tattle Branch Watershed		Scenario 1		Scenario 2		Scenario 3		Scenario 4		Scenario 5	
Source	**Existing TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**
Cropland	116,700	50.2	58,140	66.0	39,690	36.5	74,140	25.0	87,560	61.8	44,600
Hay	12,880	50.2	6,416	66.0	4,381	36.5	8,181	58.6	5,334	61.8	4,922
Pasture	380,900	50.2	189,700	66.0	129,500	36.5	241,900	58.6	157,700	61.8	145,500
Forest	2,008	-	2,008	-	2,008	-	2,008	-	2,008	-	2,008
Trees	3,869	-	3,869	-	3,869	-	3,869	-	3,869	-	3,869
Shrub	2,665	-	2,665	-	2,665	-	2,665	-	2,665	-	2,665
Harvested	-	-	-	-	-	-	-	-	-	-	-
Wetland	327	-	327	-	327	-	327	-	327	-	327
Barren	8,968	50.2	4,466	10.0	8,071	85.0	1,345	15.0	7,623	61.8	3,426
Turfgrass	10,680	50.2	5,321	10.0	9,616	85.0	1,603	15.0	9,082	61.8	4,082
Developed Pervious	2,232	50.2	1,111	10.0	2,009	85.0	335	55.0	1,004	61.8	853
Developed Impervious	164,400	50.2	81,890	10.0	148,000	85.0	24,670	55.0	74,000	61.8	62,810
Streambank Erosion	15,060	50.2	7,500	10.0	13,550	85.0	2,259	15.0	12,800	61.8	5,753
ISW Permits	3,190	-	3,190	-	3,190	-	3,190	-	3,190	-	3,190
NMMM Permits	3,347	-	3,347	-	3,347	-	3,347	-	3,347	-	3,347
Future Growth (2%)	8,421	-	8,421	-	8,421	-	8,421	-	8,421	-	8,421
MOS (10%)	42,110	-	42,110	-	42,110	-	42,110	-	42,110	-	42,110
TOTAL	**778,000**	**46.0**	**420,000**	**45.9**	**421,000**	**46.0**	**420,000**	**45.9**	**421,000**	**56.6**	**338,000**

Table 5 Preliminary allocation scenarios for Hall Creek sediment loads. Existing and allocated scenarios account for BMPs already implemented in the watershed. Scenario 5 additional reductions were needed for Byers Creek to meet its target allocation and the reduction array was applied uniformly to Hall Creek in order to achieve that goal.

Hall Creek Watershed		**Scenario 1**		**Scenario 2**		**Scenario 3**		**Scenario 4**		**Scenario 5**	
Source	**Existing TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**
Cropland	109,900	56.9	47,360	68.8	34,280	46.3	59,000	30.0	76,920	61.8	41,970
Hay	31,390	56.9	13,530	68.8	9,793	46.3	16,860	66.2	10,610	61.8	11,990
Pasture	902,800	56.9	389,100	68.8	281,700	46.3	484,800	66.2	305,100	61.8	344,900
Forest	20,120	-	20,120	-	20,120	-	20,120	-	20,120	-	20,120
Trees	12,710	-	12,710	-	12,710	-	12,710	-	12,710	-	12,710
Shrub	4,986	-	4,986	-	4,986	-	4,986	-	4,986	-	4,986
Harvested	61,140	-	61,140	-	61,140	-	61,140	-	61,140	-	61,140
Wetland	4,968	-	4,968	-	4,968	-	4,968	-	4,968	-	4,968
Barren	37,110	56.9	15,990	25.0	27,830	85.0	5,566	30.0	25,970	61.8	14,170
Turfgrass	14,230	56.9	6,135	25.0	10,680	85.0	2,135	30.0	9,964	61.8	5,437
Developed Pervious	2,321	56.9	1,000	25.0	1,741	85.0	348	50.0	1,161	61.8	887
Developed Impervious	195,900	56.9	84,440	25.0	146,900	85.0	29,390	50.0	97,960	61.8	74,840
Streambank Erosion	141,700	56.9	61,090	25.0	106,300	85.0	21,260	35.0	92,130	61.8	54,140
VA0087378	86,800	-	86,800	-	86,800	-	86,800	-	86,800	-	86,800
Tattle Branch	421,100	-	421,100	-	421,100	-	421,100	-	421,100	-	338,000
Future Growth (2%)	27,990	-	27,990	-	27,990	-	27,990	-	27,990	-	27,990
MOS (10%)	140,000	-	140,000	-	140,000	-	140,000	-	140,000	-	140,000
TOTAL	**2,220,000**	**36.9**	**1,400,000**	**36.9**	**1,400,000**	**36.9**	**1,400,000**	**36.9**	**1,400,000**	**44.1**	**1,240,000**

Table 6 Preliminary allocation scenarios for Byers Creek sediment loads. Existing and allocated scenarios account for BMPs already implemented in the watershed.

Byers Creek Watershed		Scenario 1		Scenario 2		Scenario 3		Scenario 4	
Source	**Existing TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**	**Reductio n (%)**	**Allocation TSS (lb/yr)**
Cropland	29,140	61.8	11,130	70.0	8,741	57.5	12,380	55.0	13,110
Hay	15,580	61.8	5,950	70.0	4,673	57.5	6,620	65.0	5,451
Pasture	443,100	61.8	169,300	70.0	132,900	57.5	188,300	65.0	155,100
Forest	1,747	-	1,747	-	1,747	-	1,747	-	1,747
Trees	4,503	-	4,503	-	4,503	-	4,503	-	4,503
Shrub	950	-	950	-	950	-	950	-	950
Harvested	-	-	-	-	-	-	-	-	-
Wetland	-	-	-	-	-	-	-	-	-
Barren	-	61.8	-	24.5	-	75.0	-	55.0	-
Turfgrass	6,069	61.8	2,318	24.5	4,582	75.0	1,517	50.0	3,035
Developed Pervious	707	61.8	270	24.5	534	75.0	177	56.0	311
Developed Impervious	45,580	61.8	17,410	24.5	34,420	75.0	11,400	56.0	20,060
Streambank Erosion	14,870	61.8	5,682	70.0	4,462	75.0	3,718	56.0	6,544
Hall Creek	1,400,000	-	1,240,000	-	1,240,000	-	1,240,000	-	1,240,000
ISW Permits	2,200	-	2,200	-	2,200	-	2,200	-	2,200
Future Growth (2%)	33,340	-	33,340	-	33,340	-	33,340	-	33,340
MOS (10%)	166,700	-	166,700	-	166,700	-	166,700	-	166,700
TOTAL	**2,160,000**	**22.7**	**1,670,000**	**22.7**	**1,670,000**	**22.7**	**1,670,000**	**22.7**	**1,670,000**

Table 7 Preliminary allocation scenarios for Cedar Creek sediment loads. Existing and allocated scenarios account for BMPs already implemented in the watershed.

Cedar Creek Watershed		Scenario 1		Scenario 2		Scenario 3		Scenario 4	
Source	**Existing TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**
Cropland	150,700	62.0	57,280	68.6	47,330	58.2	63,010	54.0	69,340
Hay	32,530	62.0	12,360	68.6	10,220	58.2	13,600	66.0	11,060
Pasture	758,000	62.0	288,000	68.6	238,000	58.2	316,800	66.0	257,700
Forest	5,202	-	5,202	-	5,202	-	5,202	-	5,202
Trees	7,741	-	7,741	-	7,741	-	7,741	-	7,741
Shrub	1,949	-	1,949	-	1,949	-	1,949	-	1,949
Harvested	867	-	867	-	867	-	867	-	867
Wetland	288	-	288	-	288	-	288	-	288
Barren	-	62.0	-	25.0	-	76.0	-	55.0	-
Turfgrass	16,320	62.0	6,201	25.0	12,240	76.0	3,917	55.0	7,344
Developed Pervious	1,967	62.0	748	25.0	1,475	76.0	472	55.0	885
Developed Impervious	161,100	62.0	61,230	25.0	120,800	76.0	38,670	55.0	72,500
Streambank Erosion	79,410	62.0	30,170	68.6	24,930	76.0	19,060	54.0	36,530
Vehicle Wash Permit	59		914		914		914		914
Domestic Sewage Permits	183		183		183		183		183
Future Growth (2%)	10,750		10,750		10,750		10,750		10,750
MOS (10%)	53,770		53,770		53,770		53,770		53,770
TOTAL	**1,280,000**	**58.0**	**538,000**	**58.0**	**538,000**	**58.0**	**537,000**	**58.0**	**537,000**

Table 8 Preliminary allocation scenarios for Greenway Creek sediment loads. Existing and allocated scenarios account for BMPs already implemented in the watershed.

Greenway Creek Watershed		**Scenario 1**		**Scenario 2**		**Scenario 3**		**Scenario 4**	
Source	**Existing TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**
Cropland	45,890	17.4	37,900	19.3	37,030	10.0	41,300	10.0	41,300
Hay	37,190	17.4	30,720	19.3	30,010	10.0	33,470	18.0	30,490
Pasture	839,600	17.4	693,500	19.3	677,600	10.0	755,700	18.0	688,500
Forest	16,470	-	16,470	-	16,470	-	16,470	-	16,470
Trees	9,453	-	9,453	-	9,453	-	9,453	-	9,453
Shrub	1,895	-	1,895	-	1,895	-	1,895	-	1,895
Harvested	1,046	-	1,046	-	1,046	-	1,046	-	1,046
Wetland	681	-	681	-	681	-	681	-	681
Barren	18,890	17.4	15,600	10.0	17,000	46.6	10,090	7.0	17,570
Turfgrass	14,230	17.4	11,750	10.0	12,810	46.6	7,598	7.0	13,230
Developed Pervious	2,706	17.4	2,235	10.0	2,435	46.6	1,445	18.0	2,219
Developed Impervious	216,600	17.4	178,900	10.0	195,000	46.6	115,700	18.0	177,600
Streambank Erosion	70,500	17.4	58,230	19.3	56,890	10.0	63,450	18.0	57,810
ISW Permits	15,690	-	15,690	-	15,690	-	15,690	-	15,690
Construction Permits	3,232	-	3,232	-	3,232	-	3,232	-	3,232
Domestic Sewage Permits	183	-	183	-	183	-	183	-	183
Future Growth (2%)	24,490	-	24,490	-	24,490	-	24,490	-	24,490
MOS (10%)	122,500	-	122,500	-	122,500	-	122,500	-	122,500
TOTAL	**1,440,000**	**15.3**	**1,220,000**	**15.3**	**1,220,000**	**15.3**	**1,220,000**	**15.3**	**1,220,000**

Table 9 Preliminary allocation scenarios for Upper MF Holston sediment loads. Existing and allocated scenarios account for BMPs already implemented in the watershed.

Upper MF Holston Watershed		**Scenario 1**		**Scenario 2**		**Scenario 3**		**Scenario 4**	
Source	**Existing TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**
Cropland	49,140	2.7	47,820	2.9	47,720	1.5	48,410	1.0	48,650
Hay	33,120	2.7	32,230	2.9	32,160	1.5	32,620	2.9	32,160
Pasture	986,300	2.7	959,700	2.9	957,700	1.5	971,500	2.9	957,700
Forest	36,790	-	36,790	-	36,790	-	36,790	-	36,790
Trees	10,500	-	10,500	-	10,500	-	10,500	-	10,500
Shrub	3,316	-	3,316	-	3,316	-	3,316	-	3,316
Harvested	-	-	-	-	-	-	-	-	-
Wetland	1,811	-	1,811	-	1,811	-	1,811	-	1,811
Barren	-	2.7	-	1.0	-	31.0	-	1.0	-
Turfgrass	2,166	2.7	2,108	1.0	2,144	31.0	1,495	1.0	2,144
Developed Pervious	1,157	2.7	1,125	1.0	1,145	31.0	798	1.0	1,145
Developed Impervious	44,760	2.7	43,550	1.0	44,310	31.0	30,880	1.0	44,310
Streambank Erosion	52,900	2.7	51,470	1.0	52,370	1.5	52,110	2.8	51,420
PWTP Permit	1,608	-	6,853	-	6,853	-	6,853	-	6,853
Future Growth (2%)	27,210	-	27,210	-	27,210	-	27,210	-	27,210
MOS (10%)	136,100	-	136,100	-	136,100	-	136,100	-	136,100
TOTAL	**1,390,000**	**2.2**	**1,360,000**	**2.2**	**1,360,000**	**2.2**	**1,360,000**	**2.2**	**1,360,000**

Table 10 Preliminary allocation scenarios for Lower MF Holston, upstream of Rt. 91 sediment loads. Existing and allocated scenarios account for BMPs already implemented within the watershed. Scenario 5 additional reductions were needed for the Lower MF Holston, Rt. 91 to Edmondson Dam to meet its target allocation and the reduction array was applied uniformly.

Lower MF Holston, upstream of Rt. 91		Scenario 1		Scenario 2		Scenario 3		Scenario 4		Scenario 5	
Source	**Existing TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**
Cropland	235,100	20.1	187,800	21.2	185,300	17.2	194,700	10.0	211,600	27.3	170,900
Hay	209,100	20.1	167,000	21.2	164,700	17.2	173,100	20.2	166,800	27.3	152,000
Pasture	6,906,000	20.1	5,518,000	21.2	5,442,000	17.2	5,718,000	20.2	5,511,000	27.3	5,021,000
Forest	1,128,000	-	1,128,000	-	1,128,000	-	1,128,000	-	1,128,000	-	1,128,000
Trees	122,600	-	122,600	-	122,600	-	122,600	-	122,600	-	122,600
Shrub	70,950	-	70,950	-	70,950	-	70,950	-	70,950	-	70,950
Harvested	17,900	-	17,900	-	17,900	-	17,900	-	17,900	-	17,900
Wetland	7,032	-	7,032	-	7,032	-	7,032	-	7,032	-	7,032
Barren	91,140	20.1	72,820	5.0	86,580	60.0	36,460	10.0	82,030	27.3	66,260
Turfgrass	80,830	20.1	64,580	5.0	76,790	60.0	32,330	10.0	72,750	27.3	58,760
Developed Pervious	14,700	20.1	11,750	5.0	13,970	60.0	5,881	20.2	11,730	27.3	10,690
Developed Impervious	2,452,000	20.1	1,959,000	5.0	2,329,000	60.0	980,700	20.2	1,957,000	27.3	1,782,000
Streambank Erosion	29,290,000	20.1	23,400,000	21.2	23,080,000	17.2	24,250,000	20.2	23,370,000	27.3	21,290,000
Construction Permits	65,170		65,170		65,170		65,170		65,170		65,170
ISW Permits	71,930		71,930		71,930		71,930		71,930		71,930
VA0026379	91,279		91,279		91,279		91,279		91,279		91,279
VA0054381	70,050		70,050		70,050		70,050		70,050		70,050
NMMM Permits	26,710		26,710		26,710		26,710		26,710		26,710
Domestic Sewage Permits	732		732		732		732		732		732
Upper MF Holston	1,361,000		1,361,000		1,361,000		1,361,000		1,361,000		1,361,000
Future Growth (2%)	782,800		782,800		782,800		782,800		782,800		782,800
MOS (10%)	3,914,000		3,914,000		3,914,000		3,914,000		3,914,000		3,914,000
TOTAL	**47,000,000**	**17.0**	**39,100,000**	**17.0**	**39,100,000**	**17.0**	**39,100,000**	**17.0**	**39,100,000**	**27.6**	**36,300,000**

Table 11. Preliminary allocation scenarios for Lower MF Holston, Rt. 91 to Edmondson Dam sediment loads. Existing and allocated scenarios account for BMPs already implemented within the watershed.

Lower MF Holston, Rt. 91 to Edmondson Dam		Scenario 1 (preferred)		Scenario 2		Scenario 3		Scenario 4	
Source	**Existing TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**	**Red. (%)**	**Allocation TSS (lb/yr)**
Cropland	-	27.3	-	30.8	-	19.0	-	25.0	-
Hay	21,230	27.3	15,430	30.8	14,690	19.0	17,190	25.0	15,920
Pasture	562,700	27.3	409,100	30.8	389,400	19.0	455,800	25.0	422,000
Forest	8,338	-	8,338	-	8,338	-	8,338	-	8,338
Trees	4,162	-	4,162	-	4,162	-	4,162	-	4,162
Shrub	668	-	668	-	668	-	668	-	668
Harvested	-	-	-	-	-	-	-	-	-
Wetland	133	-	133	-	133	-	133	-	133
Barren	132,100	27.3	96,000	10.0	118,800	58.0	55,460	35.0	85,840
Turfgrass	2,809	27.3	2,042	10.0	2,528	58.0	1,180	25.0	2,107
Developed Pervious	168	27.3	122	10.0	151	58.0	70	20.0	134
Developed Impervious	20,340	27.3	14,790	10.0	18,310	58.0	8,543	20.0	16,270
Streambank Erosion	43,720	27.3	31,790	30.8	30,260	19.0	35,410	25.0	32,790
Domestic Sewage	91		91		91		91		91
Lower MF Holston, upstream of Rt. 91	39,140,000		36,270,000		36,270,000		36,270,000		36,270,000
Byers Creek	1,667,000		1,667,000		1,667,000		1,667,000		1,667,000
Future Growth (2%)	875,900		875,900		875,900		875,900		875,900
MOS (10%)	4,380,000		4,380,000		4,380,000		4,380,000		4,380,000
TOTAL	**46,900,000**	**6.6**	**43,800,000**	**6.6**	**43,800,000**	**6.6**	**43,800,000**	**6.6**	**43,800,000**

7. Next Steps

Once the preferred allocation scenarios are selected and any additional runs processed, the TMDL study document can be completed, and a draft will be shared with the committee for review. After the TAC has reviewed the document and any comments have been addressed, we will hold a final public meeting to share the study with the local community. This public meeting will be followed by an official 30-day public comment period.

Would you prefer to have another in-person TAC meeting to discuss the document, or through email correspondence?

What is a good location for the final ***public*** *meeting?*

What days of the week and times would work best for the final public meeting?

What are the best ways to get the word out about the meeting?

Do you have any suggestions regarding the final public meeting format and/or content that would make it more engaging?

8. Contact Information

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