

Meeting Summary for South Fork Rivanna TMDL Development

Technical Advisory Committee Meeting #2

February 23, 3:00 p.m. – 5:00 p.m.

Participants

Ashley Hall (Stantec)	Gene Haffey
Vicki Metcalf	Rachel Pence (RCA)
Lisa Wittenborn (RCA)	Craig Lott (DEQ)
Marilyn Smith (RCA)	Kelli Park (DEQ)
Dominique Lavorata	Tara Wyrick (DEQ)
Kathryn Nepote	Sara Jordan (DEQ)
Kim Biasioli (Albemarle Co.)	Sara Bottenfield (DEQ)
Laurel Williamson (Albemarle Co.)	Nesha McRae (DEQ)
Lizabeth Palmer (Albemarle Co. BOS)	Katie Shoemaker (3E)
Leah Potts	May Sligh
Jay Willer (Albemarle Co. BOS)	Robert Brent (JMU)
Murial (last name not provided)	

Overview and Recap

Nesha McRae began the meeting with an overview of meeting objectives and topics requiring input from the Technical Advisory Committee (TAC). Nesha explained that the TAC would be asked to:

- share their thoughts on the selection of watershed models for the project area
- evaluate the process used for developing TMDL targets (i.e. pollutant reduction scenarios)
- review land use data and reflect on changes in land use in subwatersheds
- review information on permitted sources of the pollutants of concern will also be shared with the group.

The group moved on to review the results of the benthic stressor analysis, which was completed for each of the 13 impaired streams in the watershed. Sediment was identified as a stressor for all of the streams, while total phosphorus was identified as an additional stressor for the 3.5 mile segment of the South Fork Rivanna River downstream of the reservoir. Additionally, nitrogen was identified as a stressor in the unnamed tributary of Parrott Branch in Crozet. After reviewing the pollutants of concern, the group was provided with a summary of next steps in the TMDL development process including: 1) estimating pollutant loads coming from each land use in each subwatershed 2) modeling the path of those pollutants to the stream and 3) developing pollutant reduction scenarios that will result in the restoration of stream health.

TMDL Modeling

Katie Shoemaker explained how models can be used as a tool to simulate what is happening on the ground and in turn, in the stream. Once a computer model is developed for the watershed, we can modify it and develop hypothetical scenarios that will allow us to reach an endpoint where we think we

will see meaningful improvement in stream health. Katie offered the caveat that there are no perfect models, and that you need the right amount of detail to get accurate results within a reasonable time frame. Katie moved on to explain that the Hydrologic Simulation Program Fortran (HSPF) would be used to model nitrogen (in X-Trib to Parrott Branch), sediment, and phosphorus in the South Fork Rivanna River watershed. This model has been used throughout Virginia to develop a number of TMDLs due to its ability to provide continuous simulation of precipitation and hydrology within a watershed. Katie explained how HSPF simulates the actual stream network by breaking it up into different chunks that feed into one after the other.

In order to simulate nutrient and sediment movement into and out of the South Fork Rivanna Reservoir, an additional model will be necessary. Katie explained how the BATHTUB model will be nested within the HSPF model to simulate nutrient cycling within the reservoir and the movement of sediment in and out of the reservoir. Katie shared a map of the SF Rivanna River watershed, showing it broken out into a number of smaller subwatersheds. These subwatersheds were identified based on the location of the impaired stream segments and the location of monitoring stations. In addition, the overall size of each subwatershed was considered with the intent of establishing a relatively even distribution across the watershed. She explained that each subwatershed can be modeled individually, and that the HSPF model can simulate how they interact with each other, moving upstream to downstream.

Katie explained how a TMDL equation is developed. It will include:

- a wasteload allocation (WLA) for permitted point sources and future growth
- a load allocation (LA) that includes everything coming off of the land and streambanks in the watershed
- a margin of safety (MOS), which serves as a buffer and provides us with additional certainty that achieving the TMDL target will result in restored stream health.

Katie noted that TMDLs can be developed for pollutants with numeric criteria in addition to pollutants without such criteria that are expected to be more variable between different watersheds (e.g. sediment). There are two strategies for developing TMDL endpoints in these situations:

- The reference watershed approach uses a single reference watershed that the impaired watershed is then compared to.
- The All-Forested Load Multiplier (AllForX) method, which was first used in Virginia since 2014. This method uses many other watersheds for comparative purposes (both healthy and unhealthy).

Katie explained that we are considering using the AllForX method for the South Fork Rivanna River watershed, and explained the process of developing an AllForX multiplier and developing a regression analysis using selected reference watersheds.

Q&A Session: Modeling and Reference Watersheds

Katie asked the TAC to weigh in on this methodology and asked for suggested watersheds to serve as a reference in this process. One participant asked whether the relationship between stressors and stream health is linear. Nesha explained that this relationship isn't perfect and that there is quite a bit of variability in environmental data. Robert Brent added that often relationships in the natural world are not linear, but that use of the AllForX model across the state has demonstrated a pretty nice agreement between VSCI scores and the AllForX multiplier.

Watershed Land Cover

Katie shared a land use map with the group, showing modified land cover data for the South Fork Rivanna River watershed, which was provided by Virginia Tech's Department of Biological Systems Engineering. Virginia Tech will be partnering with us on this project by providing HSPF model files that they have already developed for the South Fork Rivanna River as part of another TMDL project. This will save us a lot of time and effort. Katie reviewed land cover estimates for each subwatershed within the project area.

Q&A Session: Land Cover

Following this review, Katie paused and asked the group for their input on the land use distributions that she shared. One participant asked whether we are looking at past land use in the watershed, noting historic agricultural land use in the Ivy Creek watershed and incised stream banks. Katie explained that we consider previous land cover in the benthic stressor analysis, but that for modeling purposes, we are looking at more current land use as a snapshot in time. A participant asked what year the land use data is from. Katie explained that the land cover dataset used in the study is based on aerial imagery taken from 2014-2016, and is referred to as the 2016 VGIN Land Cover Dataset.

A participant responded that she thought that the estimates were reasonable but that there has been a lot of land use conversion in the Upper Ivy Creek watershed from agricultural to x-urban prior to 2016. Another participant noted that there has been considerable development in the Crozet area since 2016. Nesha suggested checking with the county to identify areas where there has been a substantial amount of recent growth. Katie thought that this was a possibility, but reminded participants that the VSCI data being used in the study is from a long period of time, extending back before 2016.

Another participant noted that it would be nice if floodplain disconnection including how it impacts streambank erosion and causes incision could be considered in the model. Katie responded that HSPF includes a way to calculate that source of sediment and related rate of erosion, which could be adjusted if streams have become more incised over time with higher banks and more erosion. A participant noted that it would be great if we could get out and walk the stream to verify these kinds of changes. Nesha responded that this would be great, but that it can be challenging with private property rights and current health concerns.

Another participant suggested that it would be helpful to look at the relationship between development after 2016 and VSCI scores. Nesha responded that a temporal regression was performed for VSCI scores in each watershed to see how scores changed over time. These analyses did not indicate that VSCI scores had changed significantly over time, though the data window extended prior to 2016. A participant added that flooding events in 2018 caused major erosion and entrenchment in Ivy Creek, Little Ivy Creek and Mechums River, asking how this is taken into account. Nesha noted that these high flow events were considered when reviewing VSCI data collected during this period. Katie added that when developing the model, we are looking at a range of years depending on where we can get temperature and precipitation data from, which is input into the model at a daily or even hourly rate. Then we run the model for a 10 year period to get an average loading rate that captures seasonal aspects of runoff along with longer term variations in climate data.

A participant asked whether small farms and ponds in the watershed are impacting stream health in the watershed. Nesha responded that patterns in diurnal oxygen data collected below impoundments in Fishing Creek lacked the typical cyclical pattern we see between evening and afternoon. This suggests

that the impoundments in Fishing Creek may be trapping sediment and nutrients, causing dissolved oxygen concentrations in the ponds to drop. As a result, water discharged from the ponds has consistently low dissolved oxygen concentrations with far less fluctuation. Nesha added many of these ponds may be acting as sediment traps, which may actually help to improve water quality downstream.

Permitted Sources

Katie reviewed point source permits currently issued to facilities in the watershed. She explained that we will be looking at both existing pollutant loads from these operations in addition to allocated loads, which will be part of the TMDL wasteload allocation (WLA). For permitted facilities, the existing loads will be based on discharge monitoring reports (when available). Allocation scenarios will be based on the permitted flow rate and pollutant limits in the permits. Katie review the various permit types including MS4 permits in the watershed, which include Albemarle County and VDOT. These loads are based on permitted area and the kinds of land cover that are actually there. We have two ways of addressing these sources, they can either be combined into an aggregated WLA, or they can be spelled out separately in the WLA (disaggregated). In the recent North Fork Rivanna TMDL, the decision was made by MS4 permit holders to have their allocations aggregated.

Q&A Session: MS4 Permits

Katie asked VDOT and Albemarle County, the two Ms4 permit holders in the watershed, what their preference was regarding aggregation/disaggregation. VDOT's preference is to have their WLA aggregated. Albemarle County agreed to follow back up with DEQ as to their preference for how their WLA should be assigned. Nesha added that the default practice with current TMDL development efforts is to aggregate these loads.

Land Disturbance and Erosion and Sediment Control

Katie discussed the methodology that will be used to develop a WLA for permitted construction sites. She explained that acres included in this allocation are based on an annual average of disturbed acreage. This methodology accounts for the fact that construction is often staged, meaning that the entire area covered in a land disturbance permit will not be disturbed at the same time. We consider the length of time the site has permit coverage and the total acres covered to come up with this annual estimate.

Katie discussed how erosion and sediment control practices are credited with reducing sediment. She explained that when installed properly, these practices can have an 85% efficiency when it comes to preventing transport of sediment off of the site. This value can be adjusted downward if practices are not implemented in accordance with specifications.

Q&A Session: Land Disturbance and Erosion and Sediment Control

Katie asked participants whether they thought that E&S measures were implemented properly, and whether estimates of disturbed acreage were accurate for each watershed. One participant noted that the estimate for Ivy Creek seemed low. Another participant commented that he lives in Crozet and has seen terrible implementation of erosion and sediment control measures at a recent development there. Nesha asked if this was in the Lickinghole Creek watershed where we have previously heard concerns about runoff from construction sites. The participant responded that this development was in Lickinghole Creek. Nesha suggested taking a closer look at construction acres in this watershed. Katie asked participants about development patterns in the Powell Creek watershed, which has seen quite a bit of urbanization in recent years. A participant suggested reaching out to Albemarle County's

Community Development Department to get a better handle on these estimates and problems noted. A participant asked about the origins of the 85% efficiency number and whether it accounts for large precipitation events, which are becoming more and more common. Katie explained that the value is not depending on precipitation, but that it came from the Chesapeake Bay Expert Panel and that it likely did account for how effective these practices are under numerous conditions. Katie offered to share this documentation from the Expert Panel with the group.

Next Steps

Katie completed her review of permits in the watershed and asked the group if they had any further comments on permits. With no further comments, the group moved on to discuss next steps in the TMDL development process. Nesha discussed the current project timeline. She explained that incorporation of multiple models into the project has created some uncertainty with the project timeline. At the next TAC meeting, we will be reviewing and discussing allocation scenarios for land uses in each watershed. Nesha noted that it will be really important to have good participation at this meeting as local input is critical to make sure scenarios seem fair and equitable while also practical. Nesha explained that a date has not been set for the next meeting, but that it will likely be held in late spring/early summer. In the meantime, she will send an update out in a month or two to keep the committee updated on our progress. No further comments were made and the meeting was adjourned.