Crooked Run, Stony Creek and Pughs Run Community Engagement Meeting #2

December 16, 2024

Edinburg Public Library

1. Updates to existing sediment load estimates

Following the last community meeting, updates were made to watershed model inputs for the three watersheds. While none of the updates resulted in significant changes to sediment loading estimates, minor adjustments were made and are shown in Table 1 and Figures 1-3 below.

Table 1. Existing sediment loads in the Crooked Run, Stony Creek and Pughs Run watersheds.

Category	Existing sediment loading rate (metric tons/year)		
	Crooked Run	Stony Creek	Pughs Run
Cropland	199	974	142
Pasture	53.4	918	56.7
Animal feeding operations	3.34	10.3	4.30
Hay	83.9	371	159
Forest	23.2	385	50.2
Harvested forest	-	41.6	-
Barren	-	9.81	-
Developed pervious	25.3	140	34.3
Tree	11.1	137	35.1
Developed impervious	10.6	192	25.7
Streambank erosion	7.18	2,149	33.9
Permitted	0.08	85.4	0.25

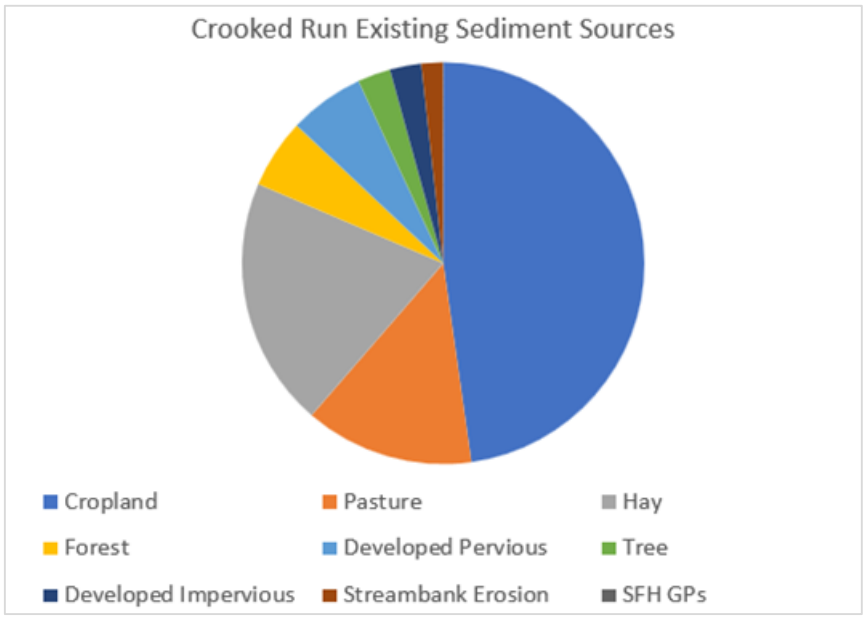

Figure 1. Existing sediment loads from sources in the Crooked Run watershed.

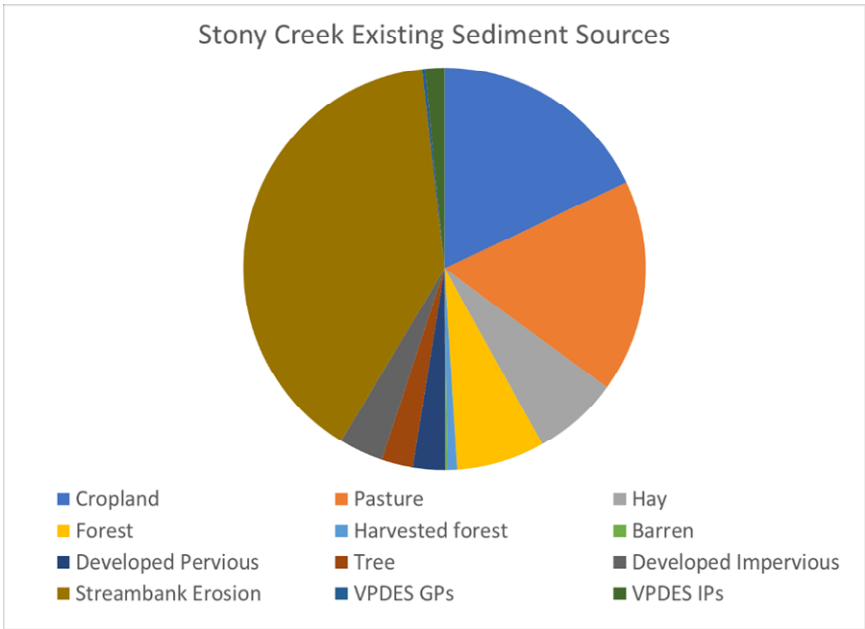

Figure 2. Existing sediment loads from sources in the Stony Creek watershed.

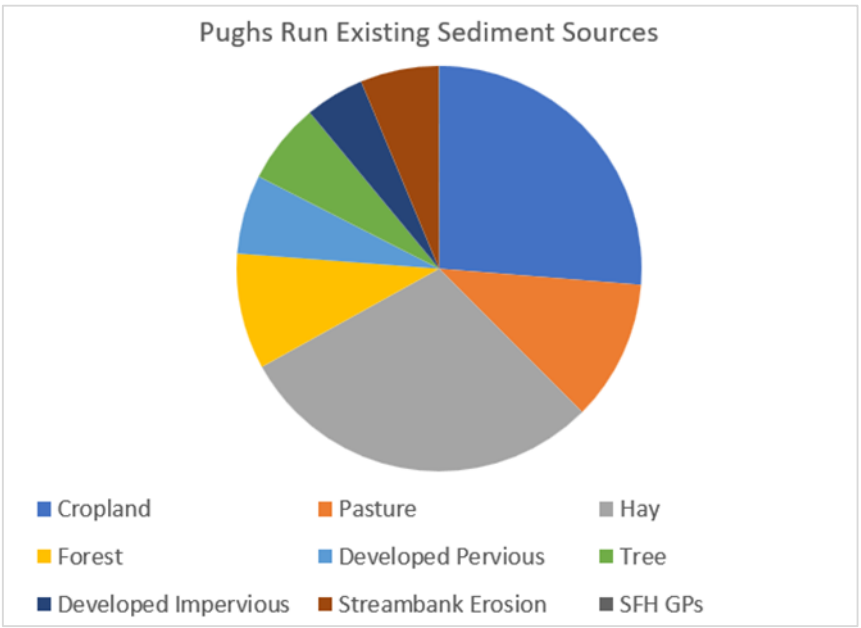

Figure 3. Existing sediment loads from sources in the Pughs Run watershed.

2. Setting sediment reduction targets

A key component of the TMDL study for Crooked Run, Stony Creek and Pughs Run is the establishment of pollutant reduction goals. While Virginia has water quality criteria that regulate the concentration of some pollutants in our waterways, there are no such criteria for sediment. Therefore, an alternative method must be used to determine the water quality targets for sediment in the TMDL study.

The All Forest Load Multiplier (AllForX) Endpoint Approach

The AllForX approach has been used to establish sediment reduction targets in many TMDLs studies completed 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 (see illustration in Figure 4). In other words, AllForX is an indication of how much higher current sediment loads are above an undeveloped condition.

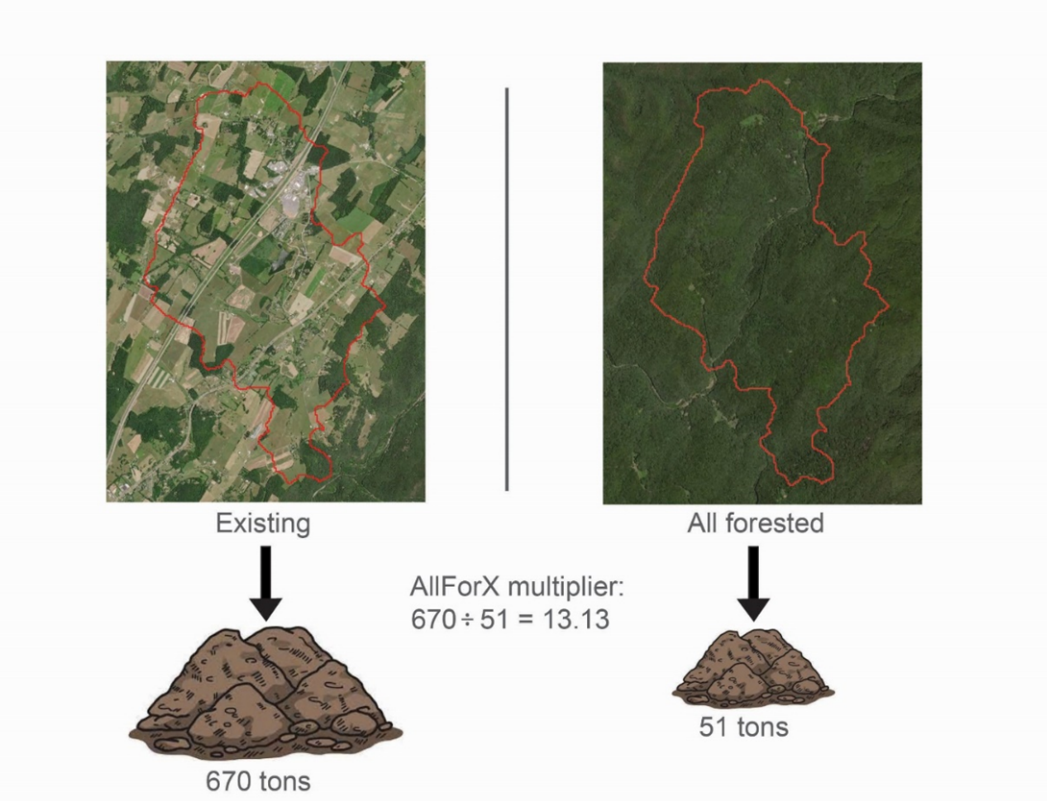

Figure 4. Illustration of establishment of AllForX multiplier for a watershed

These multipliers are calculated for the TMDL watersheds as well as a group of unimpaired and impaired comparison watersheds. A regression is then developed between the average Virginia Stream Condition Index (VSCI) scores at each TMDL or comparison monitoring station and the corresponding AllForX ratio for the watersheds contributing to that monitoring site. This regression can be used to quantify the value of AllForX threshold that corresponds to the benthic health threshold (VSCI < 60) as shown in the preliminary regression in Figure 5. The pollutant TMDL load can then be calculated by applying the AllForX threshold ratio to the all-forest simulated pollutant load of the TMDL study watershed.

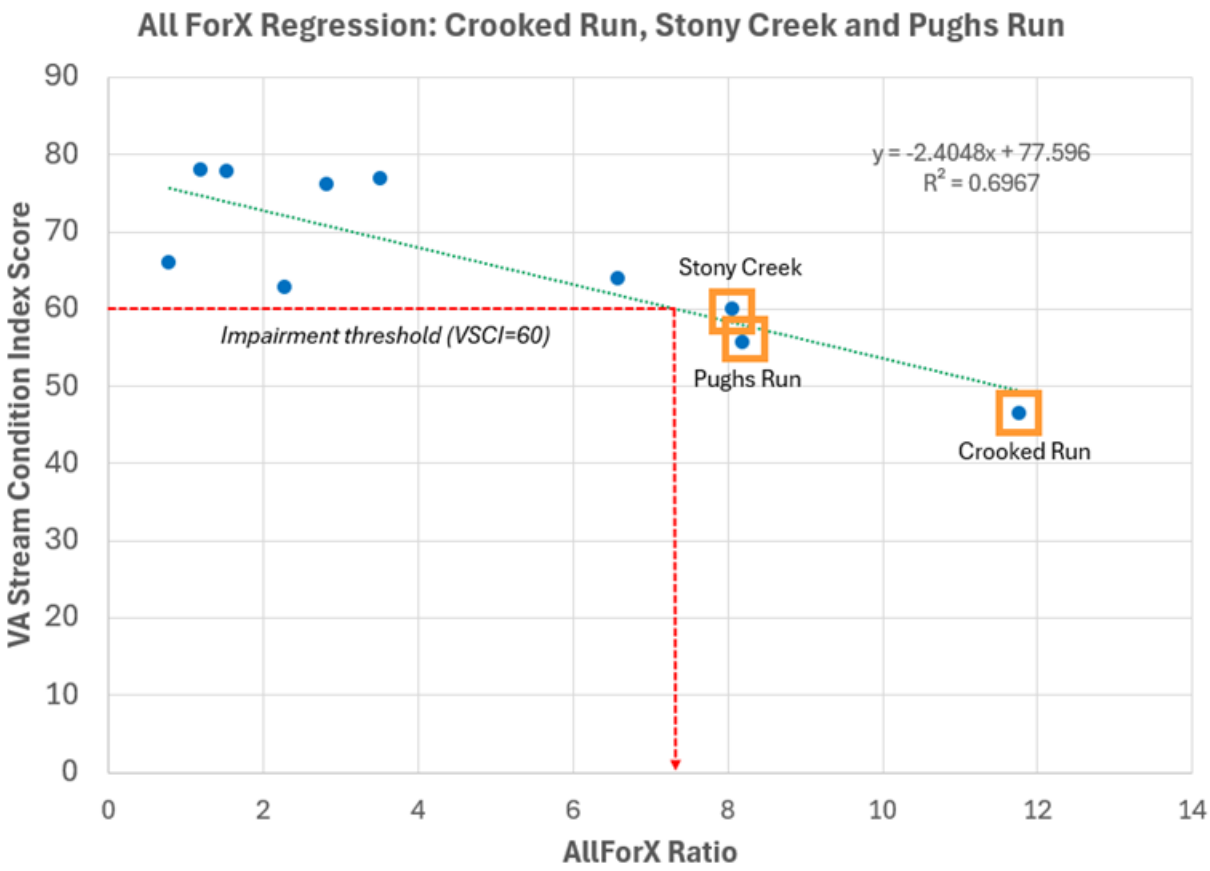

Figure 5. Sediment AllForX regression for Crooked Run, Stony Creek and Pughs Run (AllForX target ratio = 7.32)

So what does this figure tell us?
Figure 6 illustrates how the AllForX regression was applied in the Crooked Run watershed. If we can reduce the sediment load to Crooked Run by 38%, we will hit the AllForX target ratio of 7.2, which is the point at which average stream health scores fall above 60 (the threshold for impairment). Results for the three impaired watersheds are shown in Table 2.

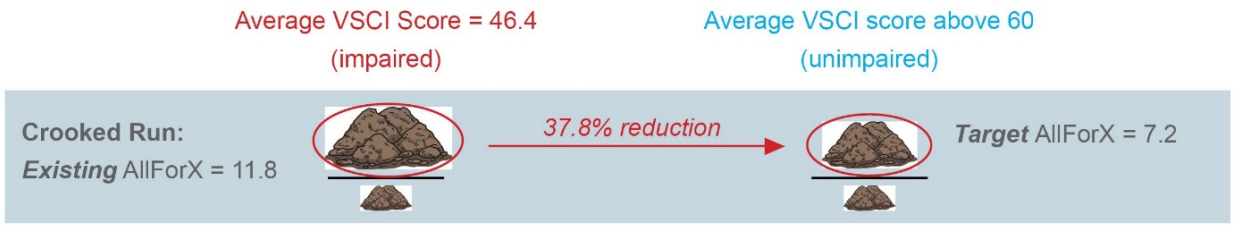

Figure 6. Illustration of application of AllForX ratio to determine sediment endpoint for the Crooked Run watershed.

Table 2. AllForX regression results for Crooked Run, Stony Creek and Pughs Run

Watershed	**TSS Existing** (tons/yr)	**TSS AllForest** (tons/yr)	**TSS Target** (tons/yr)	**Estimated % Reduction**
Crooked Run	423	36	263	37.8%
Stony Creek	5,468	678	4,963	9.2%
Pughs Run	553	67	493	10.8%

Sediment reduction scenarios

Four sediment reduction scenarios were developed for each watershed. The first scenario focuses the greatest reductions on the largest sediment sources in the watershed. The second scenario assigns equal reductions to all sources. The third scenario focuses solely on agricultural sediment sources and the fourth scenario focuses solely on urban/residential sources.

Table 3. Crooked Run sediment reduction scenarios

Categories	**Existing load (metric tons/yr)**	**Scenario 1**		**Scenario 2**		**Scenario 3**		**Scenario 4**	
		% Reduction	**Allocation (metric tons/yr)**	**% Reduction**	**Allocation (metric tons/yr)**	**% Reduction**	**Allocation (metric tons/yr)**	**% Reduction**	**Allocation (metric tons/yr)**
Cropland	199.47	60.0%	79.79	48.7%	102.33	55.0%	89.76	0.0%	199.47
Pasture	56.79	45.0%	31.24	48.7%	29.13	55.0%	25.56	0.0%	56.79
Hay	83.93	36.0%	53.72	48.7%	43.06	55.0%	37.77	0.0%	83.93
Forest	23.25	-	23.25	-	23.25	-	23.25	-	23.25
Developed Pervious	25.33	30.0%	17.73	48.7%	12.99	0.0%	25.33	100.0%	24.33
Tree	11.05	-	11.05	-	11.05	-	11.05	-	11.05
Developed Impervious	10.58	30.0%	7.40	48.7%	5.43	0.0%	10.58	100.0%	9.58
Streambank	7.18	10.0%	6.46	48.7%	3.68	0.0%	7.18	100.0%	6.18
SFH GPs	0.08	-	0.08	-	0.08	-	0.08	-	0.08
VSMP GPs	0.29	-	0.29	-	0.29	-	0.29	-	0.29

Margin of Safety (10%)	-	-	26.30	-	26.30	-	26.30	-	26.30
Future Growth Set Aside (2%)	-	-	5.26	-	5.26	-	5.26	-	5.26
TOTAL	**418**		**262.56**		**262.85**		**262.40**		**446.51**

Table 4. Pughs Run sediment reduction scenarios

Categories	**Existing load (metric tons/yr)**	**Scenario 1**		**Scenario 2**		**Scenario 3**		**Scenario 4**	
		% Reduction	**Allocation (metric tons/yr)**	**% Reduction**	**Allocation (metric tons/yr)**	**% Reduction**	**Allocation (metric tons/yr)**	**% Reduction**	**Allocation (metric tons/yr)**
Cropland	142.72	30.0%	99.91	24.0%	108.47	30.1%	99.76	0	142.72
Pasture	61.06	30.0%	42.74	24.0%	46.40	30.1%	42.68	0.0%	61.06
Hay	159.69	25.0%	119.76	24.0%	121.36	30.1%	111.62	0.0%	159.69
Forest	50.18	-	50.18	-	50.18	-	50.18	-	50.18
Developed Pervious	34.30	11.0%	30.53	24.0%	26.07	0.0%	34.30	100.0%	0.00
Tree	35.15	-	35.15	-	35.15	-	35.15	0.0%	35.15
Developed Impervious	25.68	11.0%	22.85	24.0%	19.52	0.0%	25.68	100.0%	0.00
Streambank	33.91	5.0%	32.22	24.0%	25.77	0.0%	33.91	100.0%	0.00
SFH GPs	0.25	-	0.25	-	0.25	-	0.25	-	0.25
VSMP GPs	0.41	-	0.41	-	0.41	-	0.41	-	0.41
Margin of Safety (10%)	-	-	49.33	-	49.33	-	49.33	-	49.33
Future Growth Set Aside (2%)	-	-	9.87	-	9.87	-	9.87	-	9.87
TOTAL	**543.34**		**493.19**		**492.77**		**493.13**		**508.65**

Table 5. Stony Creek sediment reduction scenarios

Categories	Existing load (metric tons/yr)	Scenario 1		Scenario 2		Scenario 3		Scenario 4	
		% Reduction	Allocation (metric tons/yr)	% Reduction	Allocation (metric tons/yr)	% Reduction	Allocation (metric tons/yr)	% Reduction	Allocation (metric tons/yr)
Cropland	974.20	25.0%	730.65	22.1%	758.90	46.7%	519.25	0.0%	974.20
Pasture	928.62	25.0%	696.46	22.1%	723.39	46.7%	494.95	0.0%	928.62
Hay	371.92	8.0%	342.16	22.1%	289.72	46.7%	198.23	0.0%	371.92
Forest	385.14	-	385.14	-	385.14	-	385.14	-	385.14
Harvested forest	41.64	5.0%	39.56	22.1%	32.44	0.0%	41.64	0.0%	41.64
Barren	9.81	-	9.81	-	9.81	-	9.81	-	9.81
Developed Pervious	140.04	5.0%	133.04	22.1%	109.09	0.0%	140.04	42.8%	80.10
Tree	137.09	-	137.09	-	137.09	-	137.09	-	137.09
Developed Impervious	192.05	5.0%	182.45	22.1%	149.61	0.0%	192.05	42.8%	109.85
Streambank	2,149.98	25.0%	1,612.48	22.1%	1,674.83	0.0%	2,149.98	42.8%	1,229.79
SFH GPs	1.53	-	1.53	-	1.53	-	1.53	-	1.53
VSMP GPs	11.88	-	11.88	-	11.88	-	11.88	-	11.88
ISW GP: George's Chicken	4.10	-	4.10	-	4.10	-	4.10	-	4.10
PWTP GP: Edinburg WTP	0.66	-	0.66	-	0.66	-	0.66	-	0.66
VPDES IP: Edinburg STP	7.25	-	7.25	-	7.25	-	7.25	-	7.25

VPDES IP: Stony Sanitary District STP	24.87	-	24.87	-	24.87	-	24.87	-	24.87
VPDES IP: Georges Chicken	46.98	-	46.98	-	46.98	-	46.98	-	46.98
Margin of Safety (10%)	-	-	496.29	-	496.29	-	496.29	-	496.29
Future Growth Set Aside (2%)	-	-	99.26	-	99.26	-	99.26	-	99.26
TOTAL	**5,427.76**		**4,961.67**		**4,962.85**		**4,961.01**		**4,960.98**

Next steps

- Finalize reduction scenarios
- Draft clean up study report
- Review of report by stakeholders
- Planning for final public meeting