

JOHNSON CREEK WATERSHED TMDL

Bradford County

Prepared for:

Pennsylvania Department of Environmental Protection



May 6, 2011

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TMDL SUMMARIES

1. The impaired stream segments addressed by this Total Maximum Daily Load (TMDL) are located in Rome, Orwell, Warren, Pike, Herrick, and Wysox Townships in Bradford County, Pennsylvania. The stream segments drain approximately 28.6 square miles as part of State Water Plan subbasin 4D. The aquatic life existing uses for Johnson Creek, including its tributaries, are cold water fisheries and migratory fishes (25 Pa. Code Chapter 93).
2. Pennsylvania's 2008 303(d) list identified 12.73 miles within the Johnson Creek Watershed as impaired by sediment from agricultural land use practices and road runoff. The listings are based on data collected in 2003 through the Pennsylvania Department of Environmental Protection's (PADEP's) Surface Water Monitoring Program. In order to ensure attainment and maintenance of water quality standards in the Johnson Creek Watershed, mean annual loading for sediment will need to be limited 17,327.2927 pounds per day (lbs/day).

The major components of the Johnson Creek Watershed TMDL are summarized below.

Johnson Creek Watershed Components	Sediment (lbs/day)
TMDL (Total Maximum Daily Load)	17,327.2927
WLA (Wasteload Allocation)	-
MOS (Margin of Safety)	1,732.7293
LA (Load Allocation)	15,594.5634

3. Mean annual sediment loading is estimated at 28,175.3927 lbs/day. To meet the TMDL, the sediment loading will require a reduction of 45 percent.
4. There are no point sources addressed in these TMDL segments.
5. The adjusted load allocation (ALA) is the actual portion of the load allocation (LA) distributed among nonpoint sources receiving reductions, or sources that are considered controllable. Controllable sources receiving allocations are hay/pasture, cropland, developed lands, and streambanks. The sediment TMDL includes a nonpoint source ALA of 14,837.5772 lbs/day. Sediment loadings from all other sources, such as forested and wetland areas, were maintained at their existing levels. Allocations of sediment to controllable nonpoint sources, or the ALA, for the Johnson Creek Watershed TMDL is summarized below.

Johnson Creek: Adjusted Load Allocations for Sources of Sediment			
Pollutant	Allocated Loading (lbs/day)	Adjusted Load Allocation (lbs/day)	% Reduction
Sediment	28,175.3927	14,837.5772	47

6. Ten percent of the Johnson Creek Watershed sediment TMDL was set-aside as a margin of safety (MOS). The MOS is that portion of the pollutant loading that is reserved to account

for any uncertainty in the data and computational methodology used for the analysis. The MOS for the sediment TMDL is 1,732.7293 lbs/day.

7. The continuous simulation model used for developing the Johnson Creek Watershed TMDL considers seasonal variation through a number of mechanisms. Daily time steps are used for weather data and water balance calculations. The model requires specification of the growing season and hours of daylight for each month. The model also considers the months of the year when manure is applied to the land. The combination of these actions accounts for seasonal variability.

WATERSHED BACKGROUND

The Johnson Creek Watershed is approximately 28.6 square miles in area. The headwaters of Johnson Creek are located inside the eastern portion of Bradford County, a few miles north of Le Raysville, Pa. The watershed is located on the U.S. Geological Survey (USGS) 7.5 minute quadrangles of Little Meadows, Windham, Rome, and Le Raysville, Pa. The stream flows west-southwest out of Pike Township to its confluence with Wysox Creek. The major tributaries to Johnson Creek include Jerome Creek, South Creek, Beaver Creek, and several unnamed tributaries (UNTs). Smaller towns include Potterville, Orwell, Wells Hollow, and Allis Hollow. State Route 467 travels east/west from the mouth and the majority of the watershed. Numerous township roads provide access to the Johnson Creek Watershed and its tributaries.

The TMDL watershed is located within the Glaciated Low Plateau Section of the Appalachian Plateau physiographic province. The highest elevations are located in the eastern portion of the watershed area near Chaffee Corners. The total change in elevation in the watershed is approximately 980 feet from the headwaters to the mouth.

The majority of the rock type in the upland portions of the watershed is interbedded sedimentary (95 percent), predominantly associated with the Catskill Formation (Figure 1). The remaining rock types found in the watershed are sandstone (5 percent), predominantly associated with the Lock Haven Formations.

The Volusia-Mardin-Lordstown series is the predominant soil type in the TMDL watershed. This soil is listed as a very stony-silt-loam soil and is mostly associated in the lowlands of the watershed (Figure 2). Other dominant soils in the watershed consist of Wellsboro-Oquaga-Morris and Chenango-Pope-Holly.

Based on GIS datasets created in 2001, land use values were calculated for the TMDL watershed. Forested was the dominant land use at approximately 70 percent (Figure 3). Agricultural land uses account for approximately 26 percent of the watershed. Developed areas are 4 percent of the watershed, covering low-intensity residential and transitional. Riparian buffer zones are suboptimal (Figure 4) in some of the agricultural lands. Livestock also have unlimited access to streambanks in certain parts of the watershed, resulting in streambank trampling and severe erosion.

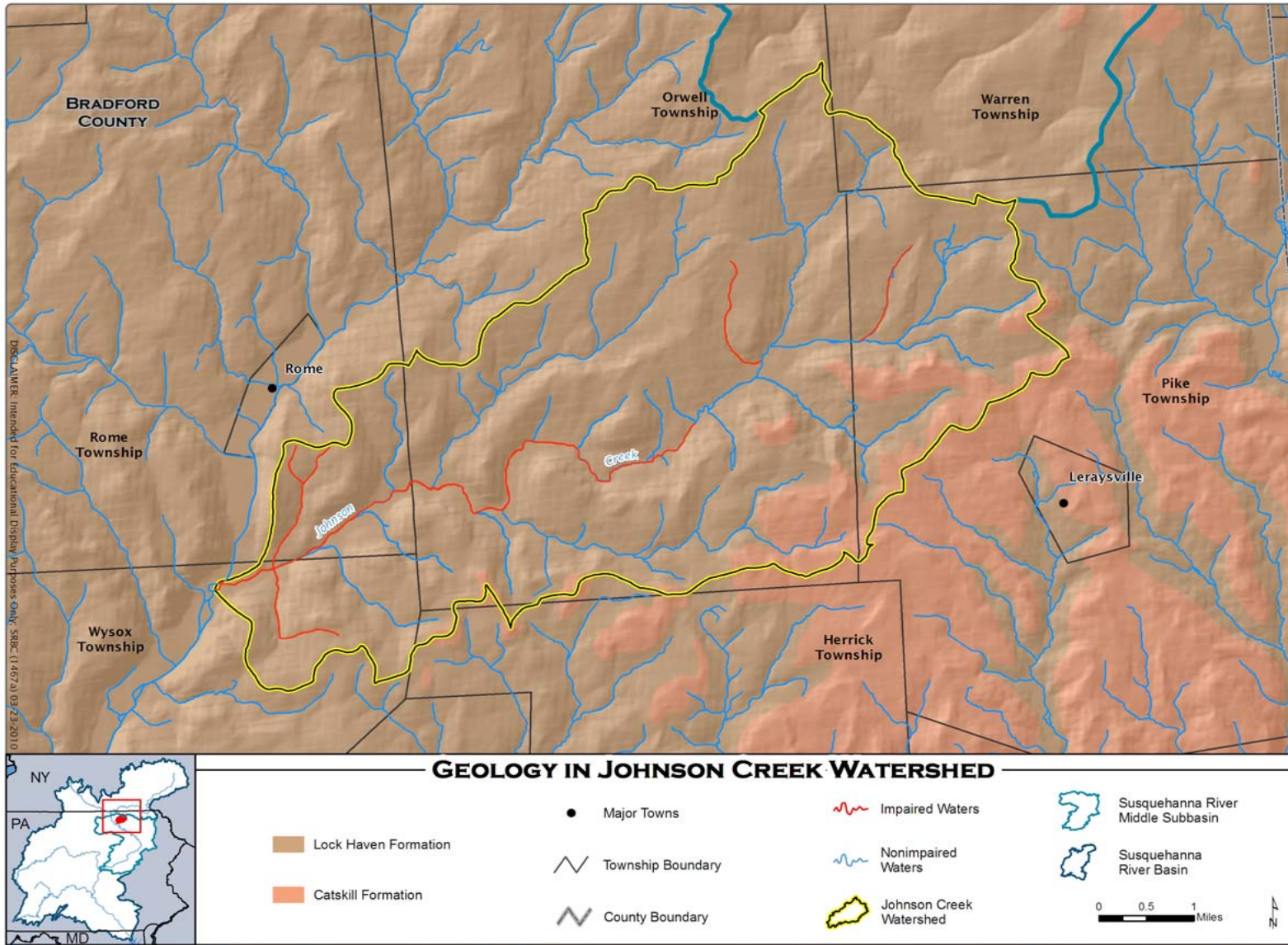


Figure 1. Geology Map of Johnson Creek Watershed

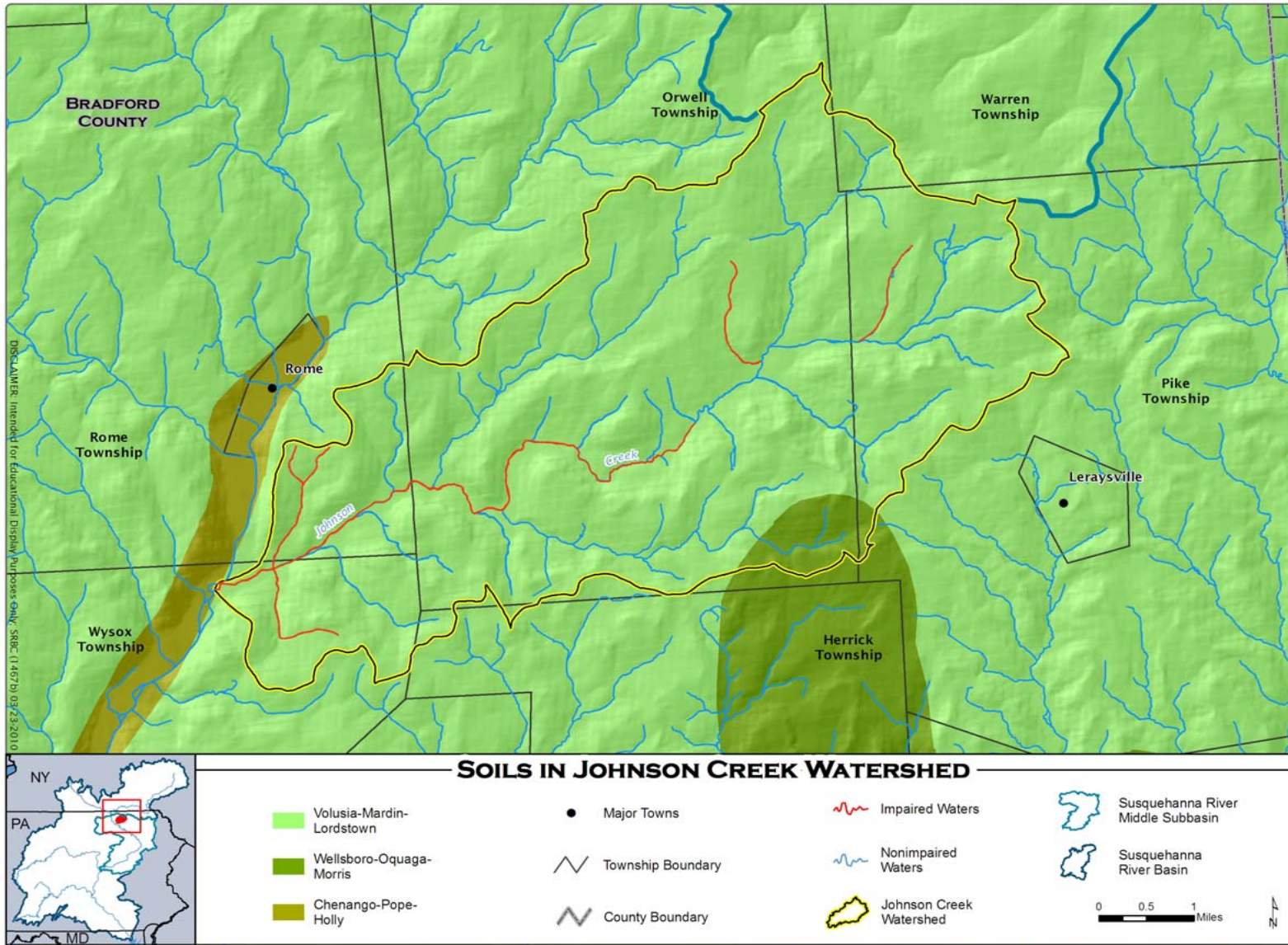


Figure 2. Soils Map of Johnson Creek Watershed

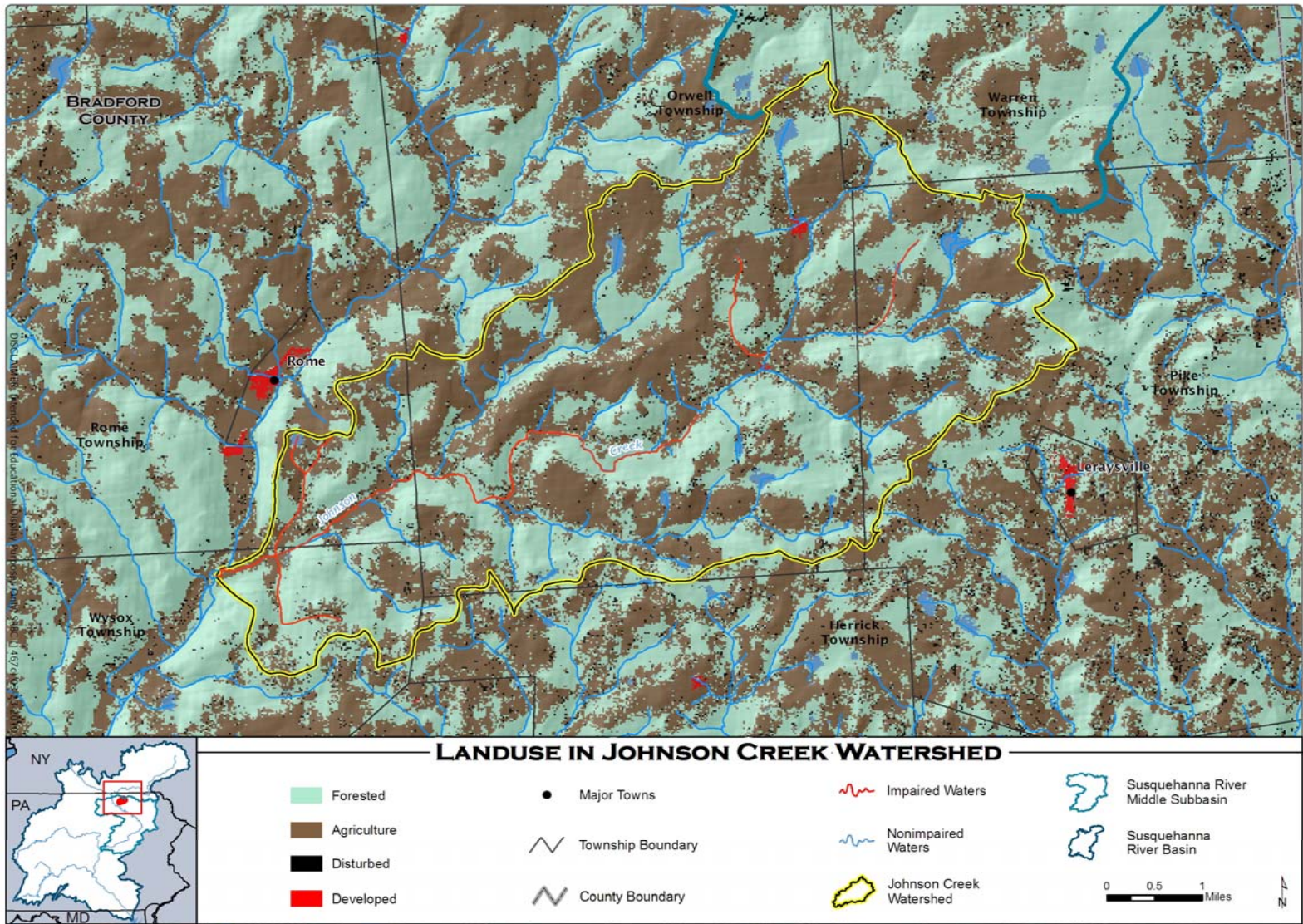


Figure 3. Land Use Map of Johnson Watershed



Figure 4. Evidence of Streambank Erosion in the Johnson Creek Watershed (However, the installation of riparian buffers has been completed to help remediate this section of the stream.)

Surface Water Quality

Pennsylvania's 2008 edition of the 303(d) list(s) identifies 12.73 miles of the Johnson Creek Watershed as impaired by siltation emanating from agricultural practices (Table 1).

Table 1. Integrated Water Quality Monitoring and Assessment Report Listed Segments

State Water Plan (SWP) Subbasin: 4D				
HUC: 02050106 – Upper Susquehanna – Tunkhannock				
Watershed – Johnson Creek				
Source	EPA 305(b) Cause Code	Miles	Designated Use	Use Designation
Agriculture*	Siltation	12.73	CWF, MF	Aquatic Life

* Please see Attachment H – Johnson Creek Impairments for more details.

In general, soil erosion is a major problem in the Johnson Creek Watershed. Unrestricted access of livestock to streams results in trampled streambanks, excessive stream sedimentation, and sparse streamside buffers and riparian vegetation. Large areas of row crops and use of conventional tillage, as well as unrestricted cattle access to streams, combine to leave the soil vulnerable to erosion. Many of the streams in the subbasin are extremely muddy for several days after summer thunderstorms. The resulting high sediment can make water unfit to drink, smother aquatic life and fish eggs, clog fish gills, and block sunlight into the creeks and rivers. Runoff from road construction also can be an additional, although temporary, source of stream sedimentation.

APPROACH TO TMDL DEVELOPMENT

Pollutants & Sources

Sediment has been identified as the pollutant causing designated use impairments in the Johnson Creek Watershed TMDL, with the source(s) listed as agricultural and road runoff. At present, there are no point source contributions within the segments addressed in this TMDL.

As stated in previous sections, a large portion of the land use is agriculture. Pasture and croplands extend right up to the streambanks with little to no riparian buffer zones present. Livestock have unlimited access to streambanks throughout most of the watershed. Based on visual observations, streambank erosion is severe in most reaches of the streams.

Reference Watershed Approach

The TMDL developed for the Johnson Creek Watershed addresses sediment. Because neither Pennsylvania nor the U.S. Environmental Protection Agency (USEPA) has instream numerical water quality criteria for sediment, a method was developed to implement the applicable narrative criteria. The method for these types of TMDLs is termed the “Reference Watershed

Approach.” Meeting the water quality objectives specified for this TMDL will result in the impaired stream segment attaining its designated uses.

The Reference Watershed Approach compares two watersheds: one attaining its uses and one that is impaired based on biological assessments. Both watersheds ideally have similar land use/cover distributions. Other features such as base geologic formation should be matched to the extent possible; however, most variations can be adjusted for in the model. The objective of the process is to reduce the loading rate of pollutants in the impaired stream segment to a level equivalent to the loading rate in the nonimpaired, reference stream segment. This load reduction will result in conditions favorable to the return of a healthy biological community to the impaired stream segments.

Selection of the Reference Watershed

In general, three factors are considered when selecting a suitable reference watershed. The first factor is to use a watershed that the PADEP has assessed and determined to be attaining water quality standards. The second factor is to find a watershed that closely resembles the impaired watershed in physical properties such as land cover/land use, physiographic province, and geology/soils. Finally, the size of the reference watershed should be within 20-35 percent of the impaired watershed area. The search for a reference watershed for the Johnson Creek Watershed to satisfy the above characteristics was done by means of a desktop screening using several GIS coverages, including the Multi-Resolution Land Characteristics (MRLC), Landsat-derived land cover/use grid, the Pennsylvania’s streams database, and geologic rock types.

West Branch Meshoppen Creek was selected as the reference watershed for developing the Johnson Creek Watershed TMDL. West Branch Meshoppen Creek is located just northeast of Meshoppen, in Susquehanna and Wyoming counties, Pa. (Figure 5). The watershed is located in State Water Plan subbasin 4G, a tributary to the Meshoppen Creek, and protected uses include aquatic life and recreation. The tributary is currently designated as a Cold Water Fishery (25 Pa. Code Chapter 93). Based on PADEP assessments, West Branch Meshoppen Creek is currently attaining its designated uses. The attainment of designated uses is based on sampling done by PADEP as part of its State Surface Water Assessment Program.

Drainage area, location, and other physical characteristics of the impaired segments of the Johnson Creek Watershed were compared to the West Branch Meshoppen Creek Watershed (Table 2). Forested land is a dominant land use category in the Johnson Creek Watershed (70 percent) and West Branch Meshoppen Creek (73 percent). The geology, soils, and precipitation in both are also similar (Table 2).

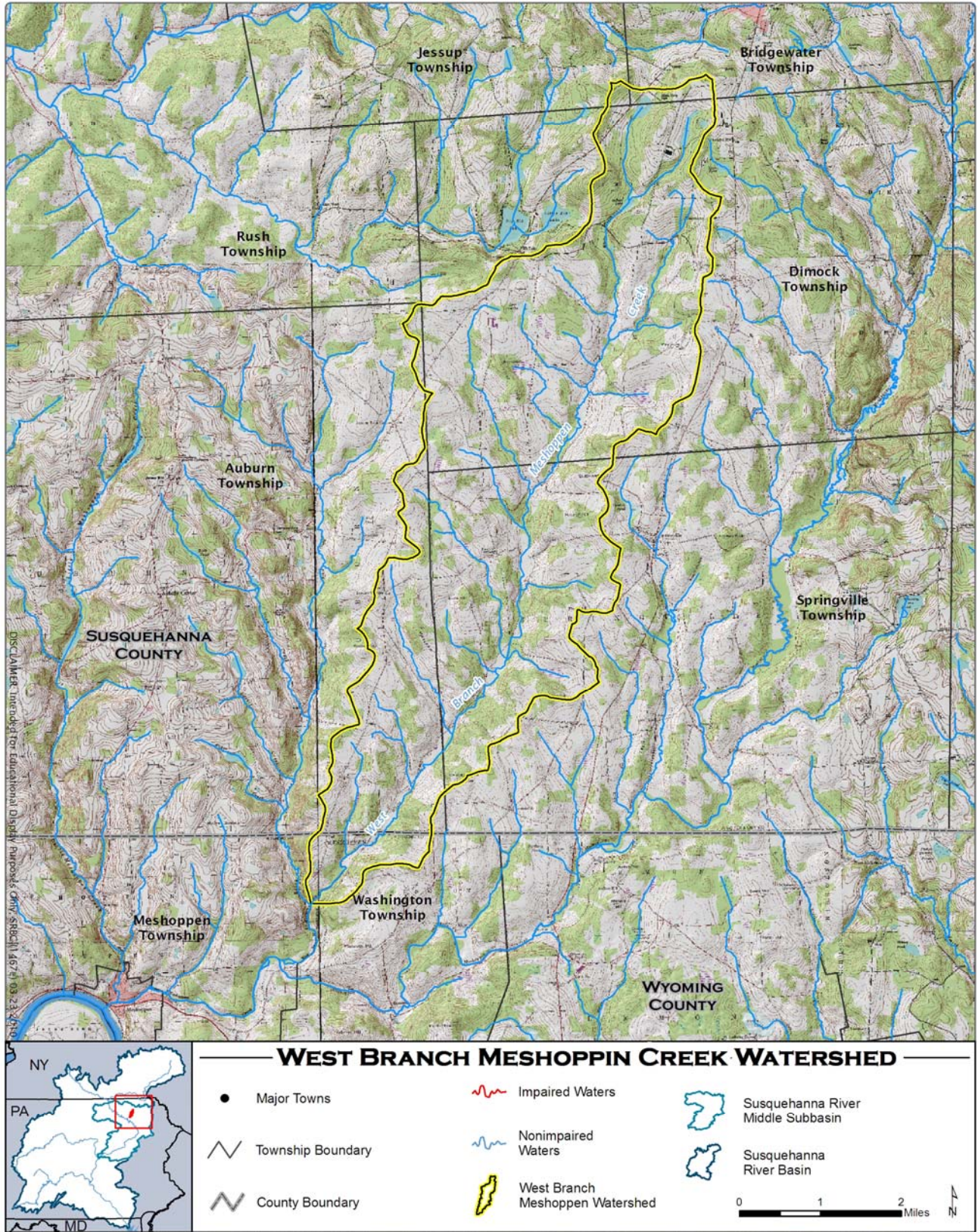


Figure 5. Location Map for Reference Watershed West Branch Meshoppen Creek

Table 2. Comparison between Johnson Creek Watershed and West Branch Meshoppen Creek Watershed

Attribute	Watershed	
	Johnson Creek Watershed	West Branch Meshoppen Creek
Physiographic Province	Glaciated Low Plateau Section: Appalachian Plateaus (100%)	Glaciated Low Plateau Section: Appalachian Plateaus (100%)
Area (mi²)	28.6	23.0
Land Use	Agriculture (25.73%) Development (3.76%) Forested (70.49%)	Agriculture (23.74%) Development (3.66%) Forested (72.59%)
Geology	Catskill Formation (95%) Lock Haven Formation (5%)	Catskill Formation (100%)
Soils	Volusia-Mardin-Lordstown (~95%) Wellsboro-Oquaga-Morris (≤5%) Chenango-Pope-Holly (<1%)	Wellsboro-Oquaga-Morris (100%)
Dominant HSG	Volusia-Mardin-Lordstown A (0%) B (0%) C (100%) D (0%) Wellsboro-Oquaga-Morris A (0%) B (0%) C (95%) D (5%) Chenango-Pope-Holly A (26%) B (37%) C (20%) D (17%)	Berks-Weikert-Bedington A (0%) B (0%) C (95%) D (5%)
K Factor	Volusia-Mardin-Lordstown (0.23) Wellsboro-Oquaga-Morris (0.25) Chenango-Pope-Holly (0.30)	Wellsboro-Oquaga-Morris (0.25)
20-Yr. Ave. Rainfall (in)	38.5	40.5
20-Yr. Ave. Runoff (in)	0.20	0.20

Watershed Assessment and Modeling

The TMDL for the impaired segments of the Johnson Creek Watershed was developed using the ArcView Generalized Watershed Loading Function model (AVGWLF) as described in Attachment C. The AVGWLF model was used to establish existing loading conditions for the impaired segments of the Johnson Creek Watershed and the West Branch Meshoppen Creek reference watershed. All modeling inputs have been attached to this TMDL as Attachments D and E.

The AVGWLF model produced information on watershed size, land use, and sediment loading. The sediment loads represent an annual average over a 24-year period, from 1975 to 1998, and for the Johnson Creek and West Branch Meshoppen Creek Watersheds, respectively. This information was then used to calculate existing unit area loading rates for the two watersheds. Acreage and sediment loading information for both the impaired watershed and the reference watershed are shown in Tables 3 and 4, respectively.

Table 3. Existing Sediment Loads for the Johnson Creek Watershed

Pollutant Source	Acreage	Sediment	
		Mean Annual Loading (lbs/day)	Unit Area Loading (lbs/ac/day)
HAY/PAST	3,187.7	2,377.6164	0.7427
CROPLAND	1,532.1	19,031.6164	12.4219
FOREST	12,718.5	756.0000	0.0594
WETLAND	207.6	0.9863	0.0048
Unpaved Rd	74.1	460.6575	6.2167
TRANSITION	66.7	49.9726	0.7492
LO INT DEV	551.0	161.9178	0.2939
Streambank	-	5,356.6907	-
TOTAL	18,337.7	28,175.3927	1.5365

Table 4. Existing Sediment Loads for the West Branch Meshoppen Creek Watershed

Pollutant Source	Acreage	Sediment	
		Mean Annual Loading (lbs/day)	Unit Area Loading (lbs/ac/day)
HAY/PAST	2,826.9	2,608.9863	0.9229
CROPLAND	669.7	6,195.1781	9.2507
FOREST	10,449.5	811.5616	0.0773
WETLAND	195.2	1.6438	0.0084
Coal Mines	51.9	41.2603	0.7950
Unpaved Rd	81.5	655.1233	8.0383
TRANSITION	81.5	383.7808	4.7090
LO INT DEV	326.2	420.4384	1.2889
Streambank	-	2,803.0099	-
TOTAL	14,732.4	13,920.9825	0.9449

TMDLS

The targeted TMDL value for the Johnson Creek Watershed was established based on current loading rates for the West Branch Meshoppen Creek reference watershed. Biological assessments have determined that West Branch Meshoppen Creek is currently attaining its designated uses. Reducing the loading rate of sediment in the Johnson Creek Watershed to levels equivalent to those in the reference watershed will provide conditions favorable for the reversal of current use impairments.

Background Pollutant Conditions

There are two separate considerations of background pollutants within the context of this TMDL. First, there is the inherent assumption of the reference watershed approach that because of the similarities between the reference and impaired watersheds, the background pollutant contributions will be similar. Therefore, the background pollutant contributions will be considered when determining the loads for the impaired watershed that are consistent with the loads from the reference watershed. Second, the AVGWLF model implicitly considers background pollutant contributions through the soil and the groundwater component of the model process.

Targeted TMDLs

The targeted TMDL value for sediment was determined by multiplying the total area of the Johnson Creek Watershed (18,337.7 acres) by the appropriate unit-area loading rate for the West Branch Meshoppen Creek reference watershed (Table 5). The existing mean annual loading of sediment to Johnson Creek Watershed (28,175.3927 lbs/day) will need to be reduced by 45 percent to meet the targeted TMDL of 17,327.2927 lbs/day.

Table 5. Targeted TMDL for the Johnson Creek Watershed

Pollutant	Area (ac)	Unit Area Loading Rate West Branch Meshoppen Creek Reference Watershed (lbs/ac/day)	Targeted TMDL for Johnson Creek (lbs/day)
Sediment	18,337.7	0.9449	17,327.2927

Targeted TMDL values were used as the basis for load allocations and reductions in the Johnson Creek Watershed, using the following two equations:

1. $TMDL = WLA + LA + MOS$
2. $LA = ALA + LNR$

where:

TMDL = Total Maximum Daily Load
WLA = Waste Load Allocation (point sources)
LA = Load Allocation (nonpoint sources)
ALA = Adjusted Load Allocation
LNR = Loads not Reduced

Margin of Safety

The MOS is that portion of the pollutant loading that is reserved to account for any uncertainty in the data and computational methodology used for the analysis. For this analysis, the MOS is explicit. Ten percent of the targeted TMDL for sediment was reserved as the MOS. Using 10 percent of the TMDL load is based on professional judgment and will provide an additional level

of protection to the designated uses of Johnson Creek Watershed. The MOS used for the sediment TMDLs is shown below.

Johnson Creek Watershed:

$$\text{MOS (sediment)} = 17,327.2927 \text{ lbs/day (TMDL)} \times 0.1 = 1,732.7293 \text{ lbs/day}$$

Adjusted Load Allocation

The ALA is the actual portion of the LA distributed among those nonpoint sources receiving reductions. It is computed by subtracting those nonpoint source loads that are not being considered for reductions (loads not reduced or LNR) from the LA. Sediment reductions were made to the hay/pasture, cropland, developed areas (sum of LO_INT_DEV, Coal mines and TRANSITION), and streambanks. Those land uses/sources for which existing loads were not reduced (FOREST, and WETLANDS) were carried through at their existing loading values (Table 6).

Table 6. Load Allocations, Loads not Reduced, and Adjusted Load Allocation for Johnson Creek

	Sediment (lbs/day)
Load Allocation	15,594.5634
Loads not Reduced	756.9863
FOREST	756.0000
WETLANDS	0.9863
Adjusted Load Allocation	14,837.5772

TMDLs

The sediment TMDL established for the Johnson Creek Watershed consists of a LA, ALA, and MOS. The individual components of the TMDL are summarized in Table 7.

Table 7. Load Allocations, Loads not Reduced, and Adjusted Load Allocation for Johnson Creek

Component	Sediment (lbs/day)
TMDL (Total Maximum Daily Load)	17,327.2927
MOS (Margin of Safety)	1,732.7293
LA (Load Allocation)	15,594.5634
LNR (Loads not Reduced)	756.9863
ALA (Adjusted Load Allocation)	14,837.5772

CALCULATION OF SEDIMENT LOAD REDUCTIONS

The ALA established in the previous section represents the annual total sediment load that is available for allocation between contributing sources in the Johnson Creek Watershed. The ALA for sediment was allocated between agriculture, developed areas, and streambanks. LA and reduction procedures were applied to the entire Johnson Creek Watershed using the Equal Marginal Percent Reduction (EMPR) allocation method (Attachment F). The LA and EMPR procedures were performed using MS Excel, and results are presented in Attachment G.

In order to meet the sediment TMDL, the load currently emanating from controllable sources must be reduced (Table 7). This can be achieved through reductions in current sediment loadings from cropland, from hay/pasture, developed areas, and streambanks (Table 8).

Table 8. Sediment Load Allocations and Reductions for Johnson Creek Watershed

Pollutant Source	Acres	Unit Area Loading Rate (lbs/ac/day)		Pollutant Loading (lbs/day)		% Reduction
		Current	Allowable	Current	Allowable (LA)	
Sediment						
Hay/Pasture	3,178.7	0.7427	0.4745	2,367.6164	1,512.6221	36
Cropland	1,532.1	12.4219	6.1872	19,031.6164	9,479.4272	50
Developed	348.4	1.9304	1.2333	672.5479	429.6772	36
Streambanks	-	-	-	5,346.6255	3,415.8506	36
Total				27,418.4062	14,837.5771	46

CONSIDERATION OF CRITICAL CONDITIONS

The AVGWLF model is a continuous simulation model which uses daily time steps for weather data and water balance calculations. Monthly calculations are made for load based on the daily water balance accumulated to monthly values. Therefore, all flow conditions are taken into account for loading calculations. Because there is generally a significant lag time between the introduction of sediment to a waterbody and the resulting impact on beneficial uses, establishing these TMDLs using average annual conditions is protective of the waterbody.

CONSIDERATION OF SEASONAL VARIATIONS

The continuous simulation model used for these analyses considers seasonal variation through a number of mechanisms. Daily time steps are used for weather data and water balance calculations. The model requires specification of the growing season and hours of daylight for each month. The model also considers the months of the year when manure is applied to the land. The combination of these actions by the model accounts for seasonal variability.

RECOMMENDATIONS FOR IMPLEMENTATION

TMDLs represent an attempt to quantify the pollutant load that may be present in a waterbody and still ensure attainment and maintenance of water quality standards. The Johnson Creek Watershed TMDL identifies the necessary overall load reductions for sediment currently causing use impairments and distributes those reduction goals to the appropriate nonpoint sources. Reaching the reduction goals established by this TMDL will only occur through Best Management Practices (BMPs). BMPs that would be helpful in lowering the amounts of sediment reaching Johnson Creek include the following: streambank stabilization and fencing; riparian buffer strips; strip cropping; conservation tillage; stormwater retention wetlands; and heavy use area protection, among many others.

The community of producers within the watershed represents one of the more agriculturally cooperative within the county. Over the past several years, a substantial investment of public, private, and multi-agency resources have gone into planning (Chesapeake Bay Program, Nutrient Management Program, NRCS) and Best Management Practice implementation Contributions from NRCS-EQIP, NRCS-AMA, NRCS-WRP, NRCS – CCPI, CB Special Projects, ARRA/ Stimulus represent nearly \$1 million in cash expenditures alone. Active groups in the area include the Bradford County Conservation District the Wysox Creek Watershed Association. These groups have completed stream bank stabilization for approximately 1,270 feet in stream length to date. This includes three locations where approximately 2,180 tons of rip-rap filled gabions were installed in Johnson Creek Watershed. Wysox Creek Watershed Association worked with Rivers Unlimited on another project in implementing nearly 2,000 feet of natural stream channel design enhancement which included 8 rock cross vanes, 3 rock J-hooks, 2 rock vanes, and 2 log vanes in the Johnson Creek Watershed.

Additionally, Five (5) farms within the watershed have been placed under Agriculture Conservation Easement, representing approximately 1,433 acres. These operators have committed to Comprehensive Nutrient Management and Resource Management System Planning, the highest level of planning labeled by NRCS and the Conservation District. Other Cooperators have implemented notable and consistent planning and practice implementation. The Wysox Creek Watershed Association and Bradford County Conservation District have also completed a geomorphic assessment (2006).

The Natural Resources Conservation Service maintains a *National Handbook of Conservation Practices* (NHCP), which provides information on a variety of BMPs. The NHCP is available online at http://www.ncg.nrcs.usda.gov/nhcp_2.html. Many of the practices described in the handbook could be used in the Johnson Creek Watershed to help limit sediment impairments. Determining the most appropriate BMPs, where they should be installed, and actually putting them into practice, will require the development and implementation of restoration plans. Development of any restoration plan will involve the gathering of site-specific information regarding current land uses and existing conservation practices. This type of assessment has been ongoing in the Johnson Creek Watershed, and it is strongly encouraged to continue.

By developing a sediment TMDL for the Johnson Creek Watershed, PADEP continues to support design and implementation of restoration plans to correct current use impairments. PADEP welcomes local efforts to support watershed restoration plans. For more information about this TMDL, interested parties should contact the appropriate watershed manager in PADEP's Northcentral Regional Office (570-327-3636).

PUBLIC PARTICIPATION

A notice of availability for comments on the draft Johnson Creek Watershed TMDL was published in the Pa. Bulletin on June 5, 2010, and *The Daily Review* newspaper on June 1, 2010, to foster public comment on the allowable loads calculated. A public meeting was held on June 15, 2010, at the Wysox Volunteer Fire Company Auxiliary to discuss the proposed TMDL. The public participation process (which ended on July 5, 2010) was provided for the submittal of comments. Comments and responses are summarized in Attachment I.

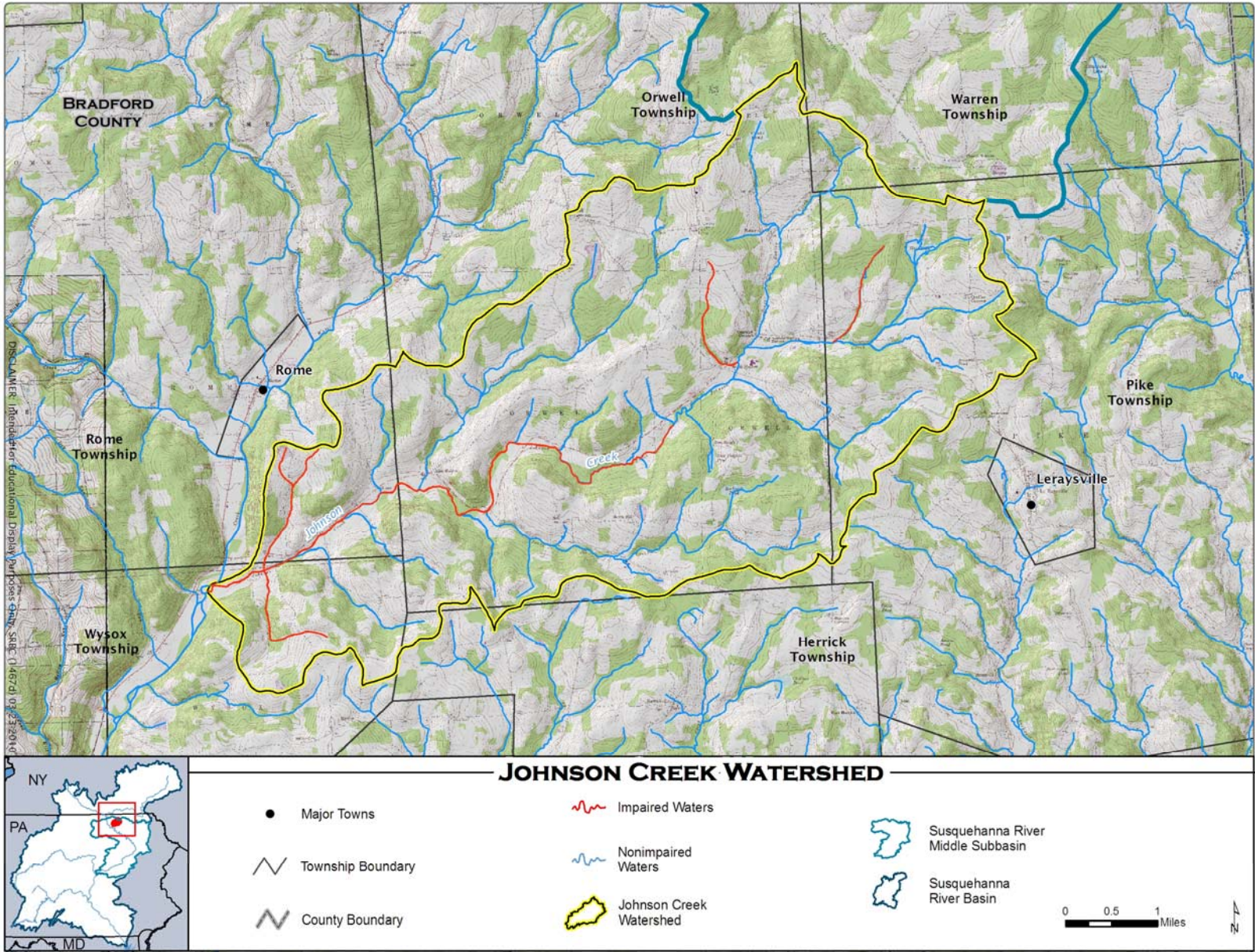
Notice of final TMDL approval will be posted on the PADEP's web site.

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Attachment A

Johnson Creek Watershed Impaired Waters



DISCLAIMER: Intended for Educational Display purposes only. State of New York, 2019

Attachment B

Information Sheet for the Johnson Creek Watershed TMDL

What is being proposed?

Total Maximum Daily Load (TMDL) plans have been developed to improve water quality in the Johnson Creek Watershed.

Who is proposing the plans? Why?

The Pennsylvania Department of Environmental Protection (PADEP) is proposing to submit the plans to the U.S. Environmental Protection Agency (USEPA) for review and approval as required by federal regulation. In 1995, USEPA was sued for not developing TMDLs when Pennsylvania failed to do so. PADEP has entered into an agreement with USEPA to develop TMDLs for certain specified waters over the next several years. This TMDL has been developed in compliance with the state/USEPA agreement.

What is a TMDL?

A TMDL sets a ceiling on the pollutant loads that can enter a waterbody so that it will meet water quality standards. The Clean Water Act requires states to list all waters that do not meet their water quality standards even after pollution controls required by law are in place. For these waters, the state must calculate how much of a substance can be put in the water without violating the standard, and then distribute that quantity to all the sources of the pollutant on that waterbody. A TMDL plan includes waste load allocations for point sources, load allocations for nonpoint sources, and a margin of safety. The Clean Water Act requires states to submit their TMDLs to USEPA for approval. Also, if a state does not develop the TMDL, the Clean Water Act states that USEPA must do so.

What is a water quality standard?

The Clean Water Act sets a national minimum goal that all waters be “fishable” and “swimmable.” To support this goal, states must adopt water quality standards. Water quality standards are state regulations that have two components. The first component is a designated use, such as “warm water fishes” or “recreation.” States must assign a use or several uses to each of their waters. The second component relates to the instream conditions necessary to protect the designated use(s). These conditions or “criteria” are physical, chemical, or biological characteristics such as temperature and minimum levels of dissolved oxygen, and maximum concentrations of toxic pollutants. It is the combination of the “designated use” and the “criteria” to support that use that make up a water quality standard. If any criteria are being exceeded, then the use is not being met and the water is said to be in violation of water quality standards.

What is the purpose of the plans?

The Johnson Creek Watershed is impaired due to sediment emanating from agricultural runoff, road runoff, and other nonpoint sources. The plans include a calculation of the loading for sediment that will correct the problem and meet water quality objectives.

Why was the Johnson Creek Watershed selected for TMDL development?

In 2008, PADEP listed segments of the Johnson Creek Watershed under Section 303(d) of the federal Clean Water Act as impaired due to causes linked to sediment.

What pollutants do these TMDLs address?

The proposed plans provide calculations of the stream's total capacity to accept sediment.

Where do the pollutants come from?

The sediment related impairments in the Johnson Creek Watershed come from nonpoint sources of pollution, primarily overland runoff from developed areas and agricultural lands, as well as from streambank erosion.

How was the TMDL developed?

PADEP used a reference watershed approach to estimate the necessary loading reduction of sediment that would be needed to restore a healthy aquatic community. The reference watershed approach is based on selecting a nonimpaired watershed that has similar land use characteristics and determining the current loading rates for the pollutants of interest. This is done by modeling the loads that enter the stream, using precipitation and land use characteristic data. For this analysis, PADEP used the AVGWLF model (the Environmental Resources Research Institute of the Pennsylvania State University's Arcview-based version of the Generalized Watershed Loading Function model developed by Cornell University). This modeling process uses loading rates in the nonimpaired watershed as a target for load reductions in the impaired watershed. The impaired watershed is modeled to determine the current loading rates and determine what reductions are necessary to meet the loading rates of the nonimpaired watershed. The reference stream approach was used to set allowable loading rates in the affected watershed because neither Pennsylvania nor USEPA has instream numerical water quality criteria for sediment.

How much pollution is too much?

The allowable amount of pollution in a waterbody varies depending on several conditions. TMDLs are set to meet water quality standards at the critical flow condition. For a free flowing stream impacted by nonpoint source pollution loading of sediment, the TMDL is expressed as an annual loading. This accounts for pollution contributions over all streamflow conditions. PADEP established the water quality objectives for sediment by using the reference watershed approach. This approach assumes that the impairment is eliminated when the impaired watershed achieves loadings similar to the reference watershed. Reducing the current loading rates for sediment in the impaired watershed to the current loading rates in the reference watershed will result in meeting the water quality objectives.

How will the loading limits be met?

Best Management Practices (BMPs) will be encouraged throughout the watershed to achieve the necessary load reductions.

How can I get more information on the TMDL?

To request a copy of the full report, contact William Brown at (717) 783-2938 between 8:00 a.m. and 3:00 p.m., Monday through Friday. Mr. Brown also can be reached by mail at the Office of Water Management, PADEP, Rachel Carson State Office Building, 400 Market Street, Harrisburg, PA 17105 or by e-mail at wbrown@state.pa.us.

How can I comment on the proposal?

You may provide e-mail or written comments postmarked no later than July 5, 2010 to the above address.

Attachment C

AVGWLF Model Overview & GIS-Based Derivation of Input Data

The TMDL for the Johnson Creek Watershed was developed using the Generalized Watershed Loading Function or GWLF model. The GWLF model provides the ability to simulate runoff, sediment, and nutrient (nitrogen and phosphorus) loadings from the watershed given variable-size source areas (e.g., agricultural, forested, and developed land). It also has algorithms for calculating septic system loads, and allows for the inclusion of point source discharge data. It is a continuous simulation model, which uses daily time steps for weather data and water balance calculations. Monthly calculations are made for sediment and nutrient loads, based on the daily water balance accumulated to monthly values.

GWLF is a combined distributed/lumped parameter watershed model. For surface loading, it is distributed in the sense that it allows multiple land use/cover scenarios. Each area is assumed to be homogenous in regard to various attributes considered by the model. Additionally, the model does not spatially distribute the source areas, but aggregates the loads from each area into a watershed total. In other words, there is no spatial routing. For subsurface loading, the model acts as a lumped parameter model using a water balance approach. No distinctly separate areas are considered for subsurface flow contributions. Daily water balances are computed for an unsaturated zone as well as a saturated subsurface zone, where infiltration is computed as the difference between precipitation and snowmelt minus surface runoff plus evapotranspiration.

GWLF models surface runoff using the Soil Conservation Service Curve Number (SCS-CN) approach with daily weather (temperature and precipitation) inputs. Erosion and sediment yield are estimated using monthly erosion calculations based on the Universal Soil Loss Equation (USLE) algorithm (with monthly rainfall-runoff coefficients) and a monthly composite of KLSCP values for each source area (e.g., land cover/soil type combination). The KLSCP factors are variables used in the calculations to depict changes in soil loss erosion (K), the length slope factor (LS), the vegetation cover factor (C), and conservation practices factor (P). A sediment delivery ratio based on watershed size, transport capacity, and average daily runoff is applied to the calculated erosion for determining sediment yield for each source area. Surface nutrient losses are determined by applying dissolved nitrogen and phosphorus coefficients to surface runoff and a sediment coefficient to the yield portion for each agricultural source area. Point source discharges also can contribute to dissolved losses to the stream and are specified in terms of kilograms per month. Manured areas, as well as septic systems, can also be considered. Urban nutrient inputs are all assumed to be solid-phase, and the model uses an exponential accumulation and washoff function for these loadings. Subsurface losses are calculated using dissolved nitrogen and phosphorus coefficients for shallow groundwater contributions to stream nutrient loads, and the subsurface submodel only considers a single, lumped-parameter contributing area. Evapotranspiration is determined using daily weather data and a cover factor dependent upon land use/cover type. Finally, a water balance is performed daily using supplied or computed precipitation, snowmelt, initial unsaturated zone storage, maximum available zone storage, and evapotranspiration values. All of the equations used by the model can be viewed in GWLF Users Manual.

For execution, the model requires three separate input files containing transport-, nutrient-, and weather-related data. The transport (TRANSPRT.DAT) file defines the necessary parameters for each source area to be considered (e.g., area size, curve number, etc.), as well as global parameters (e.g., initial storage, sediment delivery ratio, etc.) that apply to all source areas. The

nutrient (NUTRIENT.DAT) file specifies the various loading parameters for the different source areas identified (e.g., number of septic systems, urban source area accumulation rates, manure concentrations, etc.). The weather (WEATHER.DAT) file contains daily average temperature and total precipitation values for each year simulated.

The primary sources of data for this analysis were Geographic Information System (GIS) formatted databases. A specially designed interface was prepared by the Environmental Resources Research Institute of the Pennsylvania State University in ArcView (GIS software) to generate the data needed to run the GWLF model, which was developed by Cornell University. The new version of this model has been named AVGWLF (ArcView Version of the Generalized Watershed Loading Function).

In using this interface, the user is prompted to identify required GIS files and to provide other information related to “non-spatial” model parameters (e.g., beginning and end of the growing season, the months during which manure is spread on agricultural land, and the names of nearby weather stations). This information is subsequently used to automatically derive values for required model input parameters, which are then written to the TRANSPRT.DAT, NUTRIENT.DAT, and WEATHER.DAT input files needed to execute the GWLF model. For use in Pennsylvania, AVGWLF has been linked with statewide GIS data layers such as land use/cover, soils, topography, and physiography; and includes location-specific default information such as background nitrogen and phosphorus concentrations and cropping practices. Complete GWLF-formatted weather files also are included for 80 weather stations around the state.

The following table lists the statewide GIS data sets and provides an explanation of how they were used for development of the input files for the GWLF model.

GIS Data Sets	
DATASET	DESCRIPTION
Censustr	Coverage of Census data including information on individual homes septic systems. The attribute <i>usew_sept</i> includes data on conventional systems, and <i>sew_other</i> provides data on short-circuiting and other systems.
County	The County boundaries coverage lists data on conservation practices, which provides C and P values in the Universal Soil Loss Equation (USLE).
Gwnback	A grid of background concentrations of N in groundwater derived from water well sampling.
Landuse5	Grid of the MRLC that has been reclassified into five categories. This is used primarily as a background.
Majored	Coverage of major roads. Used for reconnaissance of a watershed.
MCD	Minor civil divisions (boroughs, townships, and cities).
Npdespts	A coverage of permitted point discharges. Provides background information and cross check for the point source coverage.
Padem	100-meter digital elevation model. Used to calculate landslope and slope length.
Palumrlc	A satellite image derived land cover grid that is classified into 15 different land cover categories. This dataset provides land cover loading rate for the different categories in the model.
Pasingle	The 1:24,000 scale single line stream coverage of Pennsylvania. Provides a complete network of streams with coded stream segments.
Physprov	A shapefile of physiographic provinces. Attributes <i>rain_cool</i> and <i>rain_warm</i> are used to set recession coefficient.
Pointsrc	Major point source discharges with permitted nitrogen and phosphorus loads.
Refwater	Shapefile of reference watersheds for which nutrient and sediment loads have been calculated.
Soilphos	A grid of soil phosphorous loads, which has been generated from soil sample data. Used to help set phosphorus and sediment values.
Smallsheds	A coverage of watersheds derived at 1:24,000 scale. This coverage is used with the stream network to delineate the desired level watershed.
Statsgo	A shapefile of generalized soil boundaries. The attribute <i>mu_k</i> sets the k factor in the USLE. The attribute <i>mu_awc</i> is the unsaturated available capacity, and the <i>muhsg_dom</i> is used with land use cover to derive curve numbers.
Strm305	A coverage of stream water quality as reported in Pennsylvania's 305(b) report. Current status of assessed streams.
Surfgeol	A shapefile of the surface geology used to compare watersheds of similar qualities.
T9sheds	Data derived from a PADEP study conducted at PSU with N and P loads.
Zipcode	A coverage of animal densities. Attribute <i>aeu_acre</i> helps estimate N & P concentrations in runoff in agricultural lands and over manured areas.
Weather Files	Historical weather files for stations around Pennsylvania to simulate flow.

Attachment D

AVGWLF Model Inputs for the Johnson Creek Watershed

Johnson Creek Watershed Nutrient Input File

Runoff Coefficients by Source			Nitrogen and Phosphorus Loads from Point Sources and Septic Systems							
Rural Runoff	Dis N mg/L	Dis P mg/L	Point Source Loads/Discharge			Septic System Populations				
			Month	Kg N	Kg P	Discharge MGD	Normal Systems	Pond Systems	Short Cir Systems	Discharge Systems
Hay/Past	2.9	0.178	Jan	0.0	0.0	0.0	387	0	81	0
Cropland	2.9	0.178	Feb	0.0	0.0	0.0	387	0	81	0
Forest	0.19	0.006	Mar	0.0	0.0	0.0	387	0	81	0
Wetland	0.19	0.006	Apr	0.0	0.0	0.0	387	0	81	0
Unpaved_Rd	2.9	0.2	May	0.0	0.0	0.0	387	0	81	0
Transition	2.9	0.2	Jun	0.0	0.0	0.0	387	0	81	0
	0	0	Jul	0.0	0.0	0.0	387	0	81	0
	0	0	Aug	0.0	0.0	0.0	387	0	81	0
	0	0	Sep	0.0	0.0	0.0	387	0	81	0
Manure	2.44	0.38	Oct	0.0	0.0	0.0	387	0	81	0
Urban Build-Up	N Kg/ha/d	P Kg/ha/d	Nov	0.0	0.0	0.0	387	0	81	0
Lo_Int_Dev	0.012	0.002	Dec	0.0	0.0	0.0	387	0	81	0
	0	0								

Groundwater (mg/L)		Tile Drainage (mg/L)			Per capita tank effluent		Growing season N/P uptake		Sediment	
N (mg/L)	P (mg/L)	N	P	Sed	N (g/d)	P (g/d)	N (g/d)	P (g/d)	N (mg/Kg)	P (mg/Kg)
0.887	0.019	15	0.1	50	12	2.5	1.6	0.4	3000.0	522.0

Johnson Creek Watershed Transport Input File

Rural LU	Area (ha)	CN	K	LS	C	P	Month	Ket	Day Hours	Season	Eros Coef	Stream Extract	Ground Extract
Hay/Past	1290	75	0.231	3.132	0.03	0.45	Jan	0.65	9.2	0	0.12	0	0
Cropland	620	82	0.231	3.741	0.42	0.45	Feb	0.7	10.3	0	0.12	0	0
Forest	5147	73	0.231	3.253	0.002	0.52	Mar	0.73	11.7	0	0.12	0	0
Wetland	84	87	0.232	0.256	0.01	0.1	Apr	0.9	13.3	1	0.3	0	0
	0	0	0	0	0	0	May	0.99	14.5	1	0.3	0	0
	0	0	0	0	0	0	Jun	1.05	15	1	0.3	0	0
	0	0	0	0	0	0	Jul	1.08	14.8	1	0.3	0	0
	0	0	0	0	0	0	Aug	1.1	13.7	1	0.3	0	0
	0	0	0	0	0	0	Sep	1.11	12.3	1	0.3	0	0
	0	0	0	0	0	0	Oct	1.12	10.7	1	0.12	0	0
	0	0	0	0	0	0	Nov	0.97	9.5	0	0.12	0	0
	0	0	0	0	0	0	Dec	0.89	9	0	0.12	0	0

Bare Land	Area (ha)	CN	K	LS	C	P
Unpaved_Rd	30	87	0.231	3.537	0.1	1
Transition	27	87	0.231	0.533	0.1	0.8

Urban LU	Area (ha)	CN	K	LS	C	P
Lo_Int_Dev	223	83	0.23	1.05	0.08	0.2
	0	0	0	0	0	0

Init Unsat Stor (cm)	10	Initial Snow (cm)	0	Recess Coefficient	0.1
Init Sat Stor (cm)	0	Sed Delivery Ratio	0.125	Seepage Coefficient	0
Unsat Avail Wat (cm)	8.24283	Tile Drain Ratio	0.5	Sediment A Factor	4.1895E-04
		Tile Drain Density	0	Sed A Adjustment Factor	1

Attachment E

AVGWLF Model Inputs for the West Branch Meshoppen Creek Reference Watershed

West Branch Meshoppen Creek Nutrient Input File

Runoff Coefficients by Source			Nitrogen and Phosphorus Loads from Point Sources and Septic Systems									
Rural Runoff	Dis N mg/L	Dis P mg/L	Point Source Loads/Discharge			Septic System Populations						
			Month	Kg N	Kg P	Discharge MGD	Normal Systems	Pond Systems	Short Cir Systems	Discharge Systems		
Hay/Past	2.9	0.219	Jan	0.0	0.0	0.0	462	0	13	0		
Cropland	2.9	0.219	Feb	0.0	0.0	0.0	462	0	13	0		
Forest	0.19	0.006	Mar	0.0	0.0	0.0	462	0	13	0		
Wetland	0.19	0.006	Apr	0.0	0.0	0.0	462	0	13	0		
Coal_Mines	0.012	0.002	May	0.0	0.0	0.0	462	0	13	0		
Unpaved_Rd	2.9	0.2	Jun	0.0	0.0	0.0	462	0	13	0		
Transition	2.9	0.2	Jul	0.0	0.0	0.0	462	0	13	0		
	0	0	Aug	0.0	0.0	0.0	462	0	13	0		
	0	0	Sep	0.0	0.0	0.0	462	0	13	0		
	0	0	Oct	0.0	0.0	0.0	462	0	13	0		
Manure	2.44	0.38	Nov	0.0	0.0	0.0	462	0	13	0		
Urban Build-Up	N Kg/ha/d	P Kg/ha/d	Dec	0.0	0.0	0.0	462	0	13	0		
Lo_Int_Dev	0.012	0.002										
	0	0										

Groundwater (mg/L)		Tile Drainage (mg/L)			Per capita tank effluent		Growing season N/P uptake		Sediment	
N (mg/L)	P (mg/L)	N	P	Sed	N (g/d)	P (g/d)	N (g/d)	P (g/d)	N (mg/Kg)	P (mg/Kg)
0.34	0.014	15	0.1	50	12	2.5	1.6	0.4	3000.0	742.0

West Branch Meshoppen Creek Transport Input File

Rural LU	Area (ha)	CN	K	LS	C	P	Month	Ket	Day Hours	Season	Eros Coef	Stream Extract	Ground Extract
Hay/Past	1144	75	0.25	3.379	0.03	0.45	Jan	0.66	9.3	0	0.12	0	0
Cropland	271	82	0.25	2.42	0.42	0.45	Feb	0.72	10.3	0	0.12	0	0
Forest	4249	73	0.25	3.674	0.002	0.52	Mar	0.75	11.7	0	0.12	0	0
Wetland	79	87	0.25	0.413	0.01	0.1	Apr	0.91	13.3	1	0.3	0	0
Coal_Mines	21	87	0.25	3.932	0.1	0.1	May	1.0	14.5	1	0.3	0	0
	0	0	0	0	0	0	Jun	1.05	15	1	0.3	0	0
	0	0	0	0	0	0	Jul	1.08	14.7	1	0.3	0	0
	0	0	0	0	0	0	Aug	1.1	13.7	1	0.3	0	0
Bare Land	Area (ha)	CN	K	LS	C	P	Sep	1.11	12.3	1	0.3	0	0
Unpaved_Rd	33	87	0.25	3.971	0.1	1	Oct	1.12	10.7	1	0.12	0	0
Transition	33	87	0.25	2.908	0.1	0.8	Nov	0.98	9.5	0	0.12	0	0
Urban LU	Area (ha)	CN	K	LS	C	P	Dec	0.9	9	0	0.12	0	0
Lo_Int_Dev	132	83	0.25	3.982	0.08	0.2							
	0	0	0	0	0	0							

Init Unsat Stor (cm)	10	Initial Snow (cm)	0	Recess Coefficient	0.1
Init Sat Stor (cm)	0	Sed Delivery Ratio	0.133	Seepage Coefficient	0
Unsat Avail Wat (cm)	12.0624	Tile Drain Ratio	0.5	Sediment A Factor	3.8476E-04
		Tile Drain Density	0	Sed A Adjustment Factor	1

Attachment F

Equal Marginal Percent Reduction Method

The Equal Marginal Percent Reduction (EMPR) allocation method was used to distribute Adjusted Load Allocations (ALAs) between the appropriate contributing nonpoint sources. The load allocation and EMPR procedures were performed using the MS Excel and results are presented in Attachment G. The five major steps identified in the spreadsheet are summarized below:

1. Calculation of the TMDL based on impaired watershed size and unit area loading rate of the reference watershed.
2. Calculation of Adjusted Load Allocation based on TMDL, Margin of Safety, and existing loads not reduced.
3. Actual EMPR Process.
 - a. Each land use/source load is compared with the total ALA to determine if any contributor would exceed the ALA by itself. The evaluation is carried out as if each source is the only contributor to the pollutant load of the receiving waterbody. If the contributor exceeds the ALA, that contributor would be reduced to the ALA. If a contributor is less than the ALA, it is set at the existing load. This is the baseline portion of the EMPR.
 - b. After any necessary reductions have been made in the baseline, the multiple analyses are run. The multiple analyses will sum all of the baseline loads and compare them to the ALA. If the ALA is exceeded, an equal percent reduction will be made to all contributors' baseline values. After any necessary reductions in the multiple analyses, the final reduction percentage for each contributor can be computed.
4. Calculation of total loading rate of all sources receiving reductions.
5. Summary of existing loads, final load allocations, and percent reduction for each pollutant source.

Attachment G

Equal Marginal Percent Reduction Calculations for the Johnson Creek Watershed TMDL

Attachment H

Johnson Creek Impaired Segment Listing

**Pennsylvania Integrated Water Quality Monitoring and Assessment Report
Streams, Category 5 Waterbodies, Pollutants Requiring a TMDL**

Stream Name

Use Designation (Assessment ID)

Source

Cause

Date Listed

TMDL Date

Hydrologic Unit Code: 02050106 - Upper Susquehanna-Tunkhannock

Johnson Creek

HUC: 02050106

Aquatic Life (5274) - 3.28 miles; 5 Segment(s)*

Agriculture	Siltation	2004	2017
Road Runoff	Siltation	2004	2017

Aquatic Life (5277) - 1.45 miles; 3 Segment(s)*

Agriculture	Siltation	2004	2017
Road Runoff	Siltation	2004	2017

Aquatic Life (5817) - 0.75 miles; 2 Segment(s)*

Agriculture	Siltation	2004	2017
Road Runoff	Siltation	2004	2017

Aquatic Life (5839) - 1.07 miles; 2 Segment(s)*

Agriculture	Siltation	2004	2017
Road Runoff	Siltation	2004	2017

Johnson Creek (Unt 30064)

HUC: 02050106

Aquatic Life (5837) - 1.44 miles; 1 Segment(s)*

Road Runoff	Siltation	2004	2017
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Johnson Creek (Unt 30065)

HUC: 02050106

Aquatic Life (5817) - 1.51 miles; 3 Segment(s)*

Agriculture	Siltation	2004	2017
Road Runoff	Siltation	2004	2017

Johnson Creek (Unt 30066)

HUC: 02050106

Aquatic Life (5817) - 0.53 miles; 2 Segment(s)*

Agriculture	Siltation	2004	2017
Road Runoff	Siltation	2004	2017

Johnson Creek (Unt 30096)

HUC: 02050106

Aquatic Life (5064) - 1.44 miles; 3 Segment(s)*

Road Runoff	Siltation	2004	2017
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Johnson Creek (Unt 30102)

HUC: 02050106

Aquatic Life (5008) - 1.27 miles; 3 Segment(s)*

Road Runoff	Siltation	2004	
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**Pennsylvania Integrated Water Quality Monitoring and Assessment Report
Streams, Category 5 Waterbodies, Pollutants Requiring a TMDL**

Stream Name

Use Designation (Assessment ID)

Source

Cause

Date Listed

TMDL Date

Report Summary

Watershed Summary

	Stream Miles	Assessment Units	Segments (COMIDs)
Watershed Characteristics	58.60	7	143

Impairment Summary

Source	Cause	Miles	Assessment Units	Segments (COMIDs)
Agriculture	Siltation	8.59	4	17
Road Runoff	Siltation	12.73	7	24
		12.73 **	7 **	24 **

**Totals reflect actual miles of impaired stream. Each stream segment may have multiple impairments (different sources or causes contributing to the impairment), so the sum of individual impairment numbers may not add up to the totals shown.

Use Designation Summary

	Miles	Assessment Units	Segments (COMIDs)
Aquatic Life	12.73	7	24

Attachment I

Comment & Response Document for the Johnson Creek Watershed TMDL

COMMENTOR: Bradford County Conservation District

**Johnson Creek Watershed TMDL
Bradford County Conservation District Comments**

The following comments are being submitted for consideration by both the PA Department of Environmental Protection (DEP) and the US Environmental Protection Agency (EPA) in the development of Total Maximum Daily Loads (TMDL) for Johnson Creek, Bradford County, PA, by the Bradford County Conservation District.

It is important to state for the record that Johnson Creek, as part of the Wysox Creek Watershed, has had a number of major focused efforts, both to document impacts to water quality and also to address those documented impacts over the last several years. In 2004 to 2006 DEP awarded a significant Growing Greener grant to the Wysox Creek Watershed Association to conduct a geomorphic assessment of the entire watershed. A subsequent grant was awarded to begin addressing high priority stream channel instability within the Johnson Creek Watershed. In 2008, in response to the newly identified impairments in the Wysox Creek Watershed, the Bradford County Conservation District, under a PA DEP ACRE grant, contacted and visited the vast majority of farms in the watershed with the purpose of identifying needs and utilizing that information to target technical and financial resources to the agricultural operators. From 2008 to present, the Conservation District has received specially targeted funding through the USDA Natural Resources Conservation Service to develop conservation and nutrient management plans and for the installation of agricultural best management practices. It is unfortunate that little, if any of this data was researched or utilized in the development of the draft document dated June 5th, 2010. Since the TMDL specifically addresses sediment in the Johnson Creek Watershed, the following comments and support materials are relevant to sediment loadings.

Comment:

- Table 1 lists approximately 13 miles of impaired stream segments. This includes 10 miles attributed to agriculture and 3 miles attributed to road runoff. When looking at Table 3, the load allocations do not reflect the information in Table 1. Table 3 lists 21,470 lbs./day sediment loading from agricultural sources or 76% of the total, while listing only 162 lbs./day from low intensity developed (which includes road runoff) or .5%, and 5,357 lbs./day from streambanks or 19%. This information is inconsistent with the above cited studies and inventories as well as the original impairment determinations. Use of the AVGWLF model in lieu of actual field data appears to put the focus on non-validated sources and could result in resources allocation to the wrong areas within the watershed. In fact, the AVGWLF attributes sediment contributions from non-tilled hay and pasture ground at 2,376 lbs./day, a fourteen-fold increase over road runoff and nearly half of streambank contributions.

Response:

Table 3 has been adjusted to illustrate the impact of unpaved roads. Unpaved roads, hay/pasture and cropland landuses have different loading rates generated by AVGWLF and are not adjusted based on a ranking of total miles of impairment.

Comment:

- It is believed that with ongoing investigations, a significantly greater impairment influence stemming from streambank erosion will be acknowledged and notably less from agriculture than what has been previously documented and described. As the Conservation and District Staff have brought forth in numerous meetings and venues, in many instances, the erosion and sedimentation taking place is not coming FROM the field but IS the field...the far greater sediment load being the stream flow eating away the farm field, versus erosion and delivery from stormwater flowing across/ over the fields.

Response:

Stream flow erosion is captured in the “streambank” criteria in the Table 3. The stream bank erosion is much smaller in area than the “CROPLAND” criteria in Table 3. There is an estimated 1,537 acres of cropland in Johnson Creek and when you combine insufficient riparian buffers and tilling of floodplains there is a more significant conveyance of sediment to the stream.

Comment:

- The middle segment and main stem, comprising roughly 25,000 feet, contains only 3,200 feet (a liberal estimate using GIS mapping) of agricultural interface; that interface being primarily toward one side of the Creek. The remaining land cover is predominantly wooded.

Response:

Impairments do not only include land use practices that are directly adjacent to the listings (303d list) but, also account for contributing upstream listings.

Comment:

- Looking at aerial photos and topographic images of the impaired segments, one can readily observe notable occurrences of braided channels and elevated eroded banks that have limited if any correlation to their proximity to agricultural land.

Response:

Again, impairment listings account for land use practices adjacent and upstream of the actual segment.

Comment:

- A map or listing of the middle segment was not available or attained during the ACRE survey of 2006-8; however, inventory and evaluative assessments were conducted on the (23) operations identified within the then-impaired segments of Johnson Creek.

Response:

The TMDL creates a “snapshot” of what conditions represent in the watershed consistent to timing of impairment listing. The TMDL does not focus on making site specific adjustments in the watershed.

Comment:

- The community of producers within the watershed represents one of the more agriculturally cooperative within the county. Over the past several years, a substantial investment of public, private, and multi-agency resources have gone into planning (Chesapeake Bay Program, Nutrient Management Program, NRCS) and Best Management Practice implementation Contributions from NRCS-EQIP, NRCS-AMA, NRCS-WRP, NRCS – CCPI, CB Special Projects, ARRA/ Stimulus represent nearly \$1 million in cash expenditures alone.

Response:

This will be noted in the “Recommendations for Implementation” as past/ongoing efforts in the watershed.

Comment:

- Nearly 22,000 feet of riparian buffer have been implemented within the Wysox Creek watershed since 2000 through the NRCS Conservation Reserve Enhancement Program; a notable portion along Johnson Creek and its tributaries. Using an average width of (50) feet, this represents the establishment of roughly (25) acres of riparian forest buffer.

Response:

Thank you for the estimates of past/ongoing work in the Wysox Creek watershed. Johnson Creek watershed specific stats provided by the Bradford County Conservation District have been incorporated in the “Recommendations for Implementation” section of the TMDL.

Comment:

- Five (5) farms within the watershed have been placed under Agriculture Conservation Easement, representing approximately 1,433 acres. These operators have committed to Comprehensive Nutrient Management and Resource Management System Planning, the highest level of planning labeled by NRCS

and the Conservation District. Other Cooperators have implemented notable and consistent planning and practice implementation.

Response:

This will be noted in the “Recommendations for Implementation” as past/ongoing efforts in the watershed.

Comment:

- The Wysox Creek Geomorphic Assessment (March 2006) attributes the majority of sediment impairment in the watershed to stream channel instability as a result of a number of land use practices and channel “maintenance” activities that are unrelated to agriculture (see attached highlighted excerpts attached).

Response:

The report can be noted in the “Recommendations for Implementation” section as past/ongoing work. The TMDL addresses impairments and sources cited by the Commonwealth in the 303(d) list, which in this case includes siltation emanating from agriculture and road runoff.

The establishment of a TMDL with its alleged sources of impairment and required load reductions, have significant implications toward the allocation of resources (including but not limited to public and private funding and personnel). If the assignment of required reductions is not properly placed, any amount of effort directed at the stated problem may likely be ineffective. For this reason, it is strongly encouraged that the above comments and contributions be thoroughly examined and considered.

In summary, it is perhaps beneficial to improve prioritization, information-sharing, and cooperation to curb or better address the present emphasis toward the formation of a TMDL on this and other county watersheds. Counter to the current movement toward more restriction and regulation, it appears that this watershed holds ample promise to be taken off the impaired list. While there are still significant sediment sources that contribute to Johnson Creek impairment, at the very least it would seem that targeting those sources already specifically identified would lend considerable efficiency to that of “identification by model”.

COMMENTOR: Wysox Creek Watershed Association

Comment:

This letter is in reference to the assignment of total maximum daily loads (TMDL's) to Johnson Creek located in Bradford County, PA.

I am the chairman of the Wysox Creek Watershed Association (WCWA) of which Johnsons Creek is a tributary. Prior to my assumption of the chairmanship I worked for USDA's SCS/NRCS for 40+ years prior to my retirement. For the last 25 years I have been a resident of the Johnsons Creek watershed and prior to that was a resident for 6 years of the reference watershed, the West Branch of Meshoppen Creek.

I do, not have an argument with the imposition of TMDLs by Pennsylvania Department of Environmental Protection, Susquehanna River Basin Commission or the Environmental Protection Agency.

I agree with the contents of the first one-third of the report that Johnsons Creek is adversely impacted by accelerated stream bank erosion and sediment from the extensive system of dirt and gravel roads within the watershed. I agree with the report's findings that cattle having uncontrolled access to the stream are the partial cause of stream degradation.

I disagree with the remaining two-thirds of the report which unfairly and incorrectly identifies the farm community as the sole cause of the degradation of Johnsons Creek due to sediment. Those farmers which allow their cattle to have uncontrolled access to the stream are in part the cause of Johnsons Creek degradation, but they are in the minority of farmers. These farmers should be made aware of their contribution to the degradation of Johnsons Creek and be made to halt the degradation. The farm community as a whole has made great strides in correcting animal access to the creek.

An example of these strides are shown in Figure 4 of this report. Although Figure 4 is shown as what is wrong with Johnsons Creek, it represents what the farm community has done to limit animal access. This area of the creek which is represented in Figure 4 in fact shows the reestablishment or replanting of the forest riparian buffer, the erection of a fence to control cattle access to the creek, the installation of an alternative water supply for the cattle and a controlled stream crossing which allows the use of the pasture on both sides of the creek.

Immediately below Figure 4 is an example of extreme stream bank erosion. The section of stream which is shown in Figure 4 is affected by siltation which is conveyed downstream to this reach of stream. The upstream land use is not agriculture, but forest, wildlife and residential land. Stream bank erosion and the contribution of dirt and gravel roads is the cause of this situation. This is indicative of the watershed.

Another example of identifying the agricultural community for the degradation of Johnsons Creek can be found in the tables which compares the sediment loads within Johnsons Creek with the West Branch of Meshoppen Creek. Under the land use "hay/past" in comparing the sediment contribution Johnsons Creek watershed supplies less 0.7428 lbs/ac/day than the referenced watershed which is 0.9229 lbs/ac/day.

The stream bank erosion is caused by natural forces: water runoff, velocity and force of the water and the soils in the watershed. The stream bank erosion is not to be accepted as

a natural state of affairs because the area has glacial till soils. The Bradford County Conservation District and the Pennsylvania Department of Environmental Protection have repeatedly shown that these stream banks can and have been made stable. The stream bank instability is not a cause of the glacial till soils, but the glacial till soils are sensitive to improper manipulation. The improper past manipulation is what has caused the stream bank erosion.

In summary I would like to say that E agree with the report's initial premise that accelerated stream bank erosion and the sediment contribution from dirt and gravel roads are the primary causes of the degradation of Johnsons Creek. The report unfairly and inaccurately targets the farm community when the causative agents within that community are limited.

Thank you,
John C. George, Chm
RR 1, BOX 200B
Rome, PA 18837
Phone: 570-247-2066

Response:

As noted above, the Johnson Creek TMDL addresses solely siltation/sediment as a result of agriculture and road runoff. In addition to unrestricted cattle access there are many other causes to sediment introduction to the stream stemming from agriculture. Conventional tillage and large areas of row crops are some that also contribute loading. It is noted and applauded the efforts that have been taken in the watershed to install stream bank fencing and planting of riparian buffers. However, positive results to the watershed do not happen “overnight” these new BMPs take time to restore conditions to maximum effectiveness. The use of AVGWLF serves as a “generalized watershed” view of the current watershed and does not call for site specific data where you can account for individual environmentally conscious landowner(s).

Figure 4 in the report was used to show the bank erosion on the left side of the stream. During the public meeting this picture was used twice to point out the cut-banks on the left bank and later shown to give credit to current efforts in the watershed. Additional language will be added in the caption to show that there is some remediation in place to remain consistent with presentation at the public meeting.

The loadings in Tables 3 and 4 of the report are shown as a step in the TMDL process and used for illustrative purposes on where loads are assigned to. The TMDL only uses the total “Unit Area Loading (lbs/ac/day)” in tables 3 and 4 for analysis.

Some stream bank erosion is natural but excessive stream bank erosion is not natural (outside of normal high flow scouring events). As a result, AVGWLF provides reductions needed for stream bank erosion in watersheds that exhibit excessive erosion. Glacial till soils are a natural process resulting from a natural cycle of the earth.

Therefore, these soils potentially sensitive to man induced activities such as runoff coming from roads and agriculture.