APPENDIX C

C-1. BLUESTONE RIVER

C-1.1 Watershed Information

The Bluestone River watershed is in the southwestern portion of the New River watershed and drains approximately 448 square miles in West Virginia as shown in Table C-1-1. The dominant landuse in the watershed is forest, which covers 74.5 percent of the watershed. Other significant landuse types include grassland (14.8 percent), and urban/residential (4.7 percent). All other individual land cover types account for 6.0 percent of the total watershed area. There are 29 impaired streams in the watershed, including the Bluestone River, which are addressed in this total maximum daily load (TMDL) development effort. Figure C-1-1 shows the impaired segments and Table C-1-2 displays waterbody/impairment combinations for which TMDLs are developed. This appendix addresses all TMDL watersheds that drain to Bluestone River. Pipestem Creek, although coded as the first tributary of Bluestone River (WVKNB-1) is considered to be a direct drainage to the New River because it flows into the New River arm of Bluestone Lake. As such, the Pipestem Creek TMDL watershed is addressed in Appendix D Upper New River.

Table C-1-1. Modeled landuse types in the Bluestone River watershed

Landuse Type	Area of Watershed		Percentage
	Acres	Square Miles	
Water	3,418.4	5.3	1.2%
Wetland	237.2	0.4	0.1%
Barren	689.3	1.1	0.2%
Forest	213,816.2	334.1	74.5%
Grassland	42,511.1	66.4	14.8%
Cropland	224.0	0.4	0.1%
Pasture	9,094.3	14.2	3.2%
Urban/Residential	13,481.5	21.1	4.7%
Mining	2,723.1	4.3	1.0%
AML	704.4	1.1	0.3%
Total Area	286,899.5	448.3	100.0%

Table C-1-2. Waterbodies and impairments for which TMDLs have been developed

TMDL Watershed	Code	Trout	Stream Name	Fe	Al	pH	Se	FC	BIO
Bluestone River	WVKNB		Bluestone River					**X**	**X**
Pipestem Creek	WVKNB-1		Pipestem Creek					**X**	
Little Bluestone River	WVKNB-3-A		Suck Creek					**X**	
Little Bluestone River	WVKNB-3-C-1-D		UNT/Jumping Branch RM 2.0					**X**	
Little Bluestone River	WVKNB-3-C-1-E		UNT/Jumping Branch RM 2.5					**X**	
Mountain Creek	WVKNB-5	**T**	Mountain Creek					**X**	
Mountain Creek	WVKNB-5-B		North Fork/Mountain Creek					**X**	
Brush Creek	WVKNB-12		Brush Creek	**X**				**X**	**X**
Brush Creek	WVKNB-12-B	**T**	Laurel Creek					**X**	
Brush Creek	WVKNB-12-H		Glady Fork					**X**	
Brush Creek	WVKNB-12-J		South Fork/Brush Creek					**X**	
Brush Creek	WVKNB-12-J-2		Middle Fork/South Fork/Brush Creek					**X**	
Camp Creek	WVKNB-13	**T**	Camp Creek					**X**	
Wolf Creek (WVKNB-15)	WVKNB-15		Wolf Creek (WVKNB-15)					**X**	
Rich Creek (WVKNB-18)	WVKNB-18		Rich Creek (WVKNB-18)	**X**				**X**	
Blacklick Creek	WVKNB-22		Blacklick Creek					**X**	
Blacklick Creek	WVKNB-22-A		Rocky Branch					**X**	
Blacklick Creek	WVKNB-22-C		Barn Branch					**X**	
Widemouth Ck	WVKNB-28		Widemouth Creek					**X**	
Widemouth Ck	WVKNB-28-B		Righthand Fork/Widemouth Creek	**X**				**X**	**X**
Widemouth Ck	WVKNB-28-C		Lefthand Fork/Widemouth Creek					**X**	
Crane Creek	WVKNB-30	**T**	Crane Creek	**X**				**X**	**X**
Crane Creek	WVKNB-30-C		Belcher Branch	**X**					
Crane Creek	WVKNB-30-D.5		UNT/Crane Creek RM 4.5					**X**	
Simmons Creek	WVKNB-33		Simmons Creek	**X**				**X**	**X**
Laurel Fork	WVKNB-34.5		Laurel Fork					**X**	**X**
Butt Hollow	WVKNB-35		Butt Hollow					**X**	
Brush Fork	WVKNB-36		Brush Fork	X				**X**	**X**
Neil Hollow	WVKNB-37		Neil Hollow					**X**	

Note:
UNT = unnamed tributary.
FC indicates fecal coliform bacteria impairment
BIO indicates a biological impairment

Before establishing TMDLs, WVDEP performed monitoring in each of the impaired streams in the New River watershed to better characterize water quality and refine impairment listings.

Monthly samples were taken at 77 stations (station locations can be viewed using the ArcExplorer project) throughout the Bluestone River watershed from July 1, 2004, through June 30, 2005. Monitoring suites at each site were determined based on past water quality data, field reconnaissance, and the use of statewide geographic information system (GIS) coverages to locate point and non-point sources that cause stream impairments. Streams potentially impaired by metals and low pH were sampled monthly and analyzed for a suite of parameters including acidity, alkalinity, total iron, dissolved iron, total aluminum, dissolved aluminum, total suspended solids (TSS), pH, sulfate, and specific conductance. Monthly samples from streams potentially impaired by fecal coliform bacteria were analyzed for fecal coliform bacteria, pH, and specific conductance. In addition, benthic macroinvertebrate assessments were performed at specific locations on the biologically impaired streams during the pre-TMDL monitoring period. Instantaneous flow measurements were also taken at strategic locations during pre-TMDL monitoring.

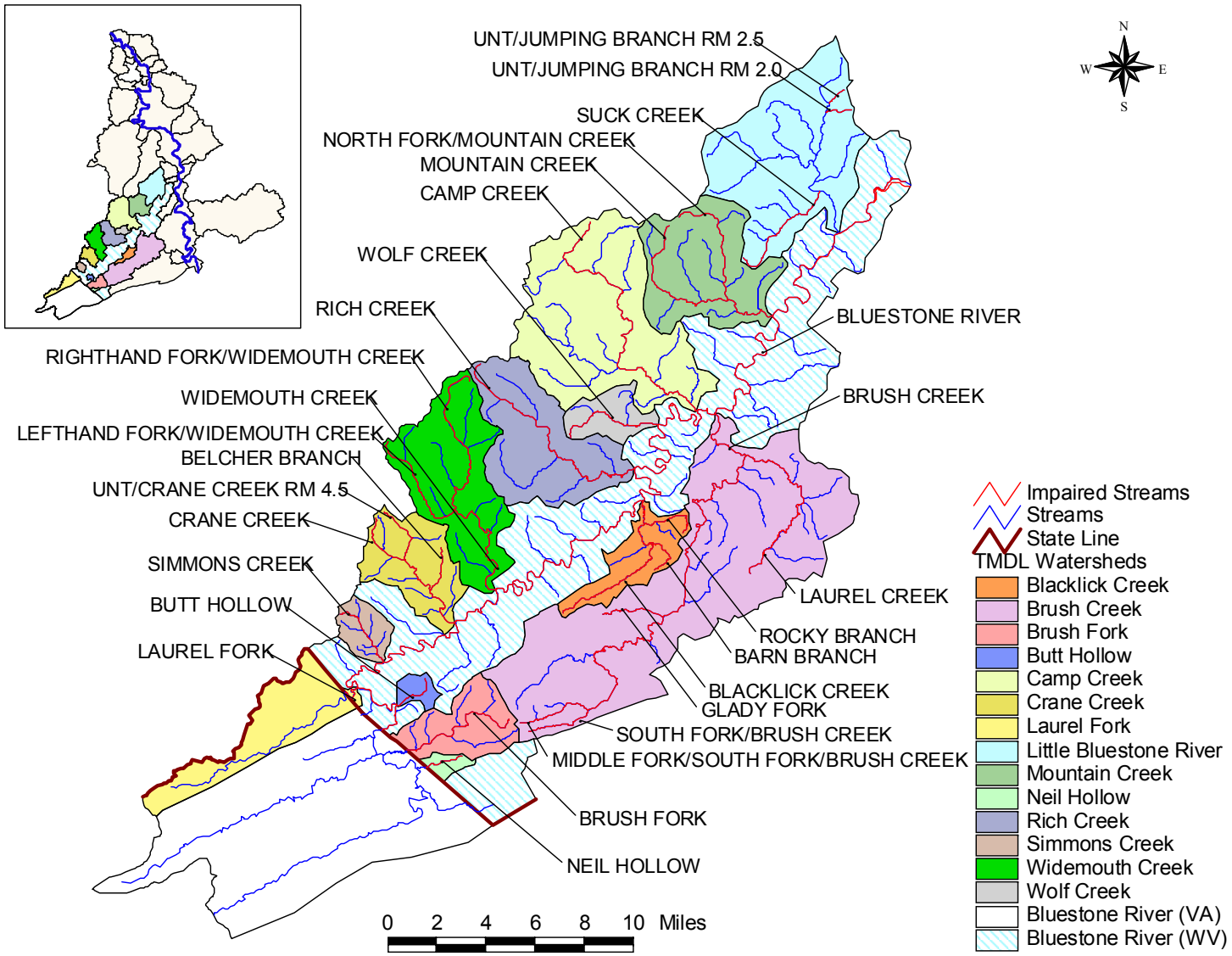

Figure C-1-1. Impaired waterbodies under TMDL development in the Bluestone River watershed

C-1.2 Iron Sources

This section identifies and examines the potential sources of iron impairment in the Bluestone River watershed. Sources can be classified as point sources (specific sources subject to a permit) or nonpoint sources (diffuse sources). Mining and non-mining-related permitted discharges are potential iron point sources. Potential iron nonpoint sources include non-permitted sources such as abandoned or forfeited mine sites, sediment producing land disturbance activities, and streambank erosion. Controls of sediment-producing sources were determined to be necessary in order to meet water quality criteria for total iron during critical high-flow conditions.

Pollutant sources were identified using statewide (GIS) coverages of point and nonpoint sources, and through field reconnaissance. As part of the TMDL process, WVDEP documented pollution sources by describing the pollutant source in detail, collecting Global Positioning System data, and if necessary, collecting a water quality sample for laboratory analysis. WVDEP personnel recorded physical descriptions of the pollutant sources, such as the number of outfalls, the source of the outfalls, and the general condition of the stream in the vicinity of each outfall. These records were compiled and electronically plotted on maps using GIS software. This information was used in conjunction with other information to characterize pollutant sources. Mining-related point and nonpoint sources are shown in Figure C-1-2, and specific details relative to these and other sources are discussed in the following sections.

C-1.2.1 Iron Point Source Inventory

As described in the TMDL Report, the National Pollutant Discharge Elimination System (NPDES) program, established under Clean Water Act Sections 318, 402, and 405, requires permits for the discharge of pollutants from point sources. Iron point sources can be classified into two major categories: permitted non-mining point sources and permitted mining point sources.

In the Bluestone River watershed there are three mining-related NPDES permits with 24 outlets. Because those NPDES permits contain iron effluent limitations, the regulated discharges were determined to be contributing point sources of iron.

There are 15 sites in the watershed registered under the Multi-Sector StormwaterGeneral Permit. That permit regulates stormwater associated with industrial activity (non-mining). All regulated outlets are subject to benchmark values for total iron and/or TSS. Those general permit registrations were determined to be contributing point sources of iron.

Permit and outlet information is provided in Appendix G of the Technical Report, which shows the name of each responsible party and the total number of outlets that discharge to the Bluestone River watershed. Appendix G of the Technical Report also contains specific data for each permitted outlet including effluent type, drainage area, pump capacity, and permit limits for each of the mining-related NPDES outlets. Permit number and the concentration limits for aluminum, iron and TSS are shown for industrial stormwater permits in Appendix G.

Construction Stormwater Permits

The discharges from construction activities that disturb more than one acre of land are legally defined as point sources and the sediment introduced from such discharges can contribute iron and aluminum to waterbodies. WVDEP issues a General NPDES Permit (permit WV0115924) to regulate stormwater discharges associated with construction activities with a land disturbance greater than one acre. These permits require that the site have properly installed best management practices (BMPs), such as silt fences, sediment traps, seeding / mulching, and riprap, to prevent or reduce erosion and sediment runoff. The BMPs will remain intact until the construction is complete and the site has been stabilized. Individual registration under the general permit is usually limited to less than one year.

There are 16 active construction sites with a total disturbed acreage of 229.41 acres registered under the Construction Stormwater General Permit in the Bluestone River watershed. Although specific wasteload allocations are not prescribed for these sites, an area-based allocation for all site registrations under the permit is provided for each Bluestone River subwatershed and the existing disturbed acreage conforms to the subwatershed allocations.

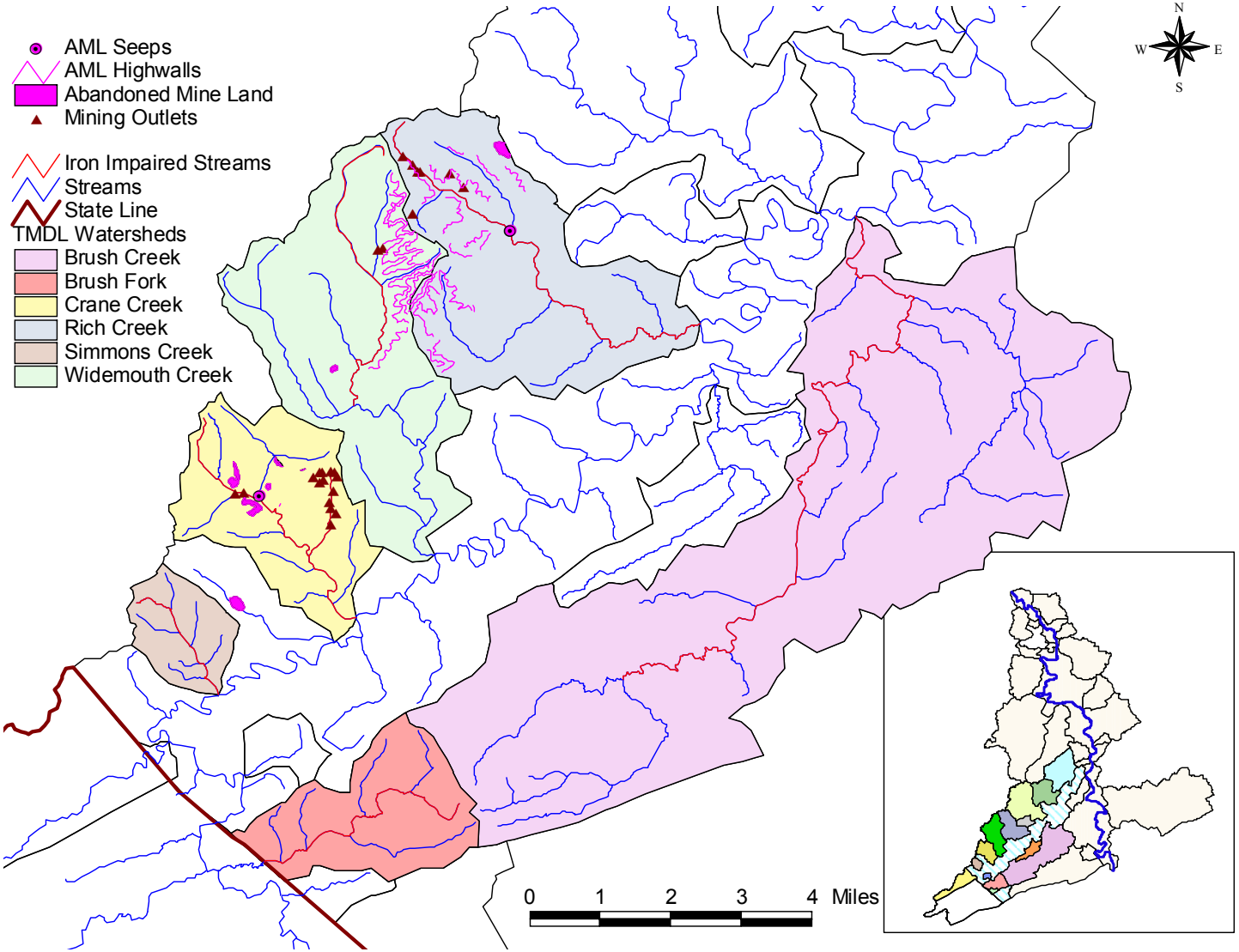

Figure C-1-2. Mining-related sources in the Bluestone River Watershed

C-1.2.2 Iron Nonpoint Sources

In addition to point sources, nonpoint sources also contribute to iron water quality impairments in the Bluestone River watershed. Nonpoint sources are diffuse, non-permitted sources. Abandoned mine lands (AML) and facilities that were subject to the Surface Mining Control and Reclamation Act of 1977, and forfeited their bonds or abandoned operations can be a significant non-permitted source of iron. Non-mining land disturbance activities can also be a nonpoint source of iron, causing iron to enter waterbodies as a component of sediment. Examples of such land disturbance activities are agriculture, forestry, oil and gas wells, streambank erosion, roads, and urban and residential lands. The applicable land-disturbing activities in the Bluestone River watershed are discussed below.

Abandoned Mine Lands and Bond Forfeiture Sites

Based on the identification of a number of abandoned mining activities in the Bluestone River watershed, AMLs comprise approximately 704 acres and are a significant non-permitted source of metals and pH impairment in the watershed. WVDEP's Office of Abandoned Mine Lands identified the locations of AML in the Bluestone River watershed. In addition, source tracking efforts by WVDEP's Division of Water and Waste Management (DWWM) identified and characterized two abandoned mine seeps (AML seeps).

WVDEP's Division of Land Restoration, Office of Special Reclamation, provided bond forfeiture information and data. This information included the status of both land reclamation and water treatment activities. Bond forfeiture sites are not present in the Bluestone River watershed.

Land-Disturbance Activities

Land disturbance can increase sediment loading to impaired waters. The control of sediment-producing sources has been determined to be necessary to meet water quality criteria for total iron during high-flow conditions. Nonpoint sources of sediment include forestry operations, oil and gas operations, agriculture, stormwater from construction sites less than one acre, and stormwater from roads and urban and residential land in non-MS4 areas. Additionally, streambank erosion represents a significant sediment source throughout the watershed. Upland sediment nonpoint sources are summarized below.

During the pre-TMDL sampling period there were 13 registered timber harvest sites in the watershed. The watershed also contains 41 active oil and gas wells, which, based on the survey by WVDEP's Office of Oil and Gas, are estimated to comprise 60 acres of disturbed area.

The length and area of paved roads were calculated using the Census 2000 TIGER/Line files roads coverage for West Virginia. Information on unpaved roads from TIGER was supplemented by digitizing any unpaved roads shown on topographic maps that were not included in the TIGER shapefile. There are 18 miles of paved roads and 93 miles of unpaved roads in the Bluestone River watershed. The upland loading of sediment and iron from residential and urban landuses and roads is not generally significant, with pollutant reductions prescribed in approximately 15% of the Bluestone River subwatersheds.

The sediment loadings from non-pasture grasslands and forested areas are not considered to be significant sediment or iron sources. Iron loadings from those landuses are categorized as "background" in the load allocations and are not reduced from existing conditions. Agricultural landuses (pasture and cropland) are not prevalent and are also included in the unreduced background loadings.

C-1.3 Fecal Coliform Bacteria Sources

This section identifies and examines the potential sources of fecal coliform bacteria in the Bluestone River watershed. Sources can be classified as either point sources or nonpoint sources. Potential point sources include effluent discharges of sewage treatment facilities and collection system overflows. Potential nonpoint sources of fecal coliform bacteria include failing or nonexistent on-site sewage disposal systems, stormwater runoff from pasture and cropland, direct deposition of wastes from livestock, and stormwater runoff from residential and urban areas.

C-1.3.1 Fecal Coliform Bacteria Point Sources

There are 41 permitted sewage treatment facilities with 42 outlets discharging in the Bluestone River watershed.

Individual NPDES Permits

WVDEP issues individual NPDES permits to both publicly owned and privately owned wastewater treatment facilities. Publicly owned treatment works (POTWs) are relatively large facilities with extensive wastewater collection systems, whereas private facilities are usually used in smaller applications such as subdivisions and shopping centers. Six POTWs discharge treated effluent from six outlets in the watershed. Two additional permits (3 outlets) exist for privately owned facilities. The treated effluents of individually permitted facilities are not significant sources of fecal coliform bacteria because they are permitted to discharge only at limits more stringent than water quality criterion.

Overflows

Combined sewer overflows (CSOs) are outfalls from POTW sewer systems that carry untreated domestic waste and surface runoff. CSOs are permitted to discharge only during precipitation events. Sanitary sewer overflows (SSOs) are unpermitted overflows that occur as a result of excess inflow and/or infiltration to POTW separate sanitary collection systems. Both types of overflows contain fecal coliform bacteria. SSOs have not been identified within the Bluestone River watershed. Outlet number C002 of NPDES Permit WV0023094 is a CSO for the City of Princeton's POTW collection system that discharges into Brush Creek. The City intends to achieve fecal coliform criteria (200 counts/100 mL) in the discharge. The wasteload allocation for outlet 002 is consistent with those intentions.

General Sewage Permits

General sewage permits are designed to cover like discharges from numerous individual owners and facilities throughout the state. General Permit WV0103110 regulates small, privately owned sewage treatment plants ("package plants") that have a design flow of less than 50,000 gallons

per day (gpd). General Permit WV0107000 regulates home aeration units (HAUs). HAUs are small sewage treatment plants primarily used by individual residences where site considerations preclude typical septic tank and leach field installation. Both general permits contain fecal coliform effluent limitations identical to those in individual NPDES permits for sewage treatment facilities. Within the watersheds addressed by this report, 25 facilities are registered under the "package plant" general permit and eight are registered under the "HAU" general permit.

C-1.3.2 Fecal Coliform Bacteria Nonpoint Sources

Pollutant source tracking by WVDEP personnel identified scattered areas of high population density without access to public sewers in the Bluestone River watershed. Human sources of fecal coliform bacteria from these areas include sewage discharges from failing septic systems, and possible direct discharges of sewage from residences (straight pipes). WVDEP source tracking information yielded an estimate of 3,477 unsewered homes in the Bluestone River watershed. A septic system failure rate derived from geology and soil type was applied to the number of unsewered homes to calculate nonpoint source fecal coliform loading from failing septic systems. Figure C-1-3 shows the geographic distribution of estimated failing septic system nonpoint sources in the watershed. Failing septic systems and/or straight pipe discharges are a significant fecal coliform bacteria source in the Bluestone watershed with pollutant reductions prescribed in 259 of 272 subwatersheds.

Stormwater runoff is another potential nonpoint source of fecal coliform bacteria in both residential/urban and rural areas. Runoff from residential areas can deliver the waste of pets and wildlife to the waterbody. In addition, rural stormwater runoff can transport significant loads of bacteria from livestock pastures, livestock and poultry feeding facilities, and manure storage and application. Bacteria loading in stormwater runoff from agricultural landuses are significant in parts of the watershed, with pollutant reductions prescribed in approximately 33 percent of the modeled subwatersheds. Stormwater runoff from urban/residential areas is problematic in limited areas, with pollutant reductions prescribed in less than 10 percent of the modeled subwatersheds.

A certain "natural background" contribution of fecal coliform bacteria can be attributed to deposition by wildlife in forest and grassland areas. Accumulation rates for fecal coliform bacteria in those areas were developed using reference numbers from past TMDLs, incorporating wildlife estimates obtained from the Division of Natural Resources. Although wildlife contributions of fecal coliform bacteria were considered in modeling, they were not found to be a significant source, and reductions were not prescribed.

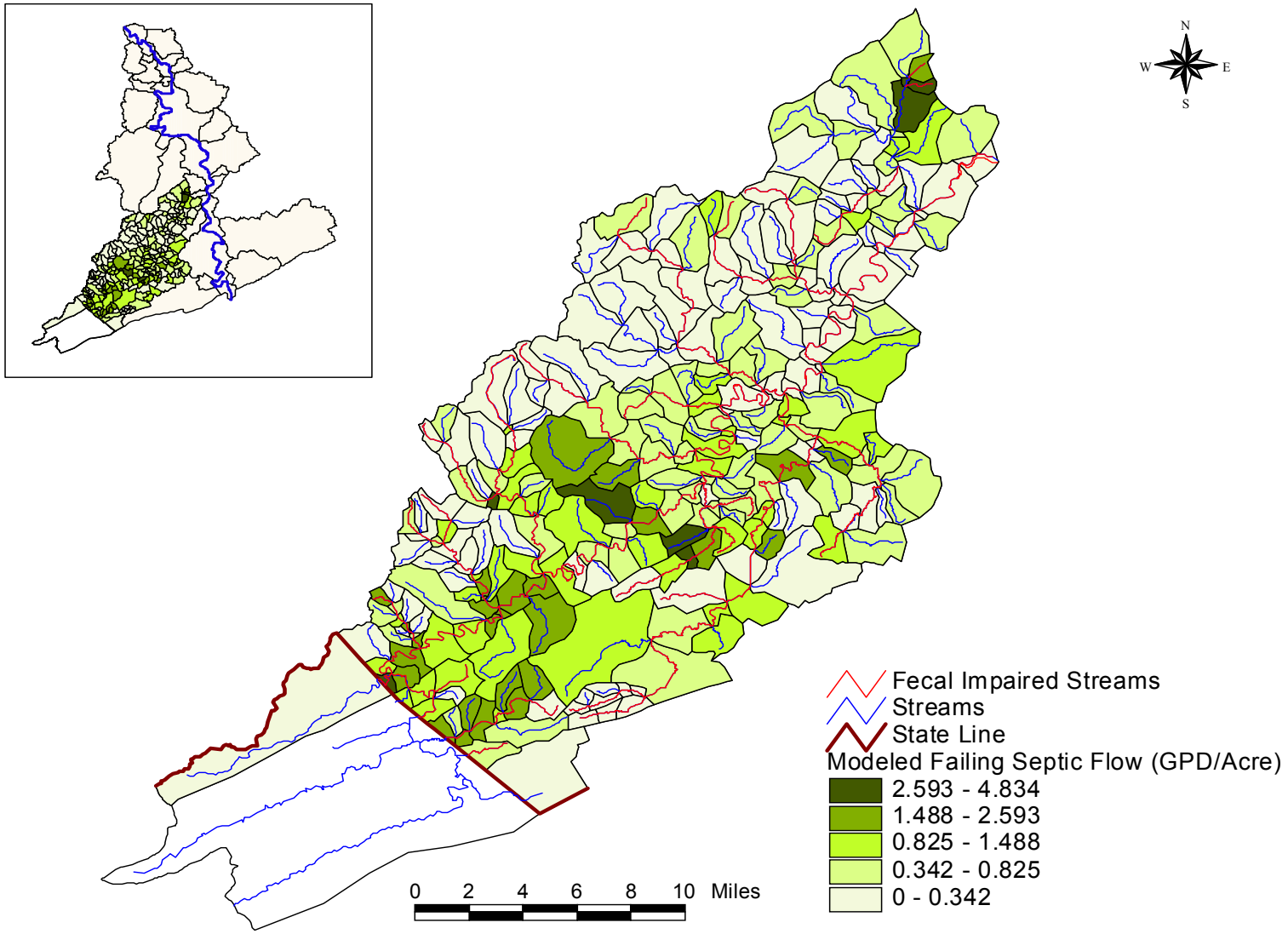

Figure C-1-3. Graphical representation of failing septic system flows in the Bluestone River watershed

C-1.4 Stressors of Biologically Impaired Streams

The Bluestone River watershed has six biologically impaired streams for which TMDLs have been developed. These streams are identified in Table C-1-3 along with the biological stressors of the streams' benthic communities and the TMDLs required to address these impairments. A stressor identification (SI) process was used to evaluate and identify the primary stressors of impaired benthic communities. The SI process is detailed in Section 4 of the main TMDL Report with additional information provided in the Technical Report. Where identified as the biological stressor, organic enrichment was linked to violations of the numeric criteria for fecal coliform bacteria. WVDEP determined that implementation of fecal coliform TMDLs would remove untreated sewage and animal waste, thereby reducing the organic and nutrient loading causing the biological impairment. Therefore, fecal coliform TMDLs will serve as a surrogate where organic enrichment was identified as a stressor. All streams where the SI process indicated sedimentation as a causative stressor also exhibited impairment pursuant to total iron water quality criteria. WVDEP determined that the sediment reductions that are necessary to ensure compliance with iron criteria exceed those necessary to resolve biological impairments. As such, the iron TMDLs presented for the subject waters are appropriate surrogates for necessary sediment TMDLs.

Organic enrichment and sedimentation stressors are associated with the biological impairment of Laurel Fork (WVKNB-34.5). The majority (98%) of the Laurel Fork drainage area is within the State of Virginia. Virginia has also determined that Laurel Fork is biologically impaired and has developed bacteria and sediment TMDLs. WVDEP is developing a fecal coliform TMDL for the West Virginia portion of the stream that incorporates the Virginia TMDL output as a boundary condition and applies the allocation methodology described in Section 8.5.2 to sources in the West Virginia portion of the watershed (208 acres). This TMDL, coupled with the Virginia sediment and bacteria TMDLs will resolve the biological impairment of Laurel Fork.

Numerous biological assessments have been performed in Bluestone River between the Virginia/West Virginia border and the headwaters of Bluestone Lake. Most indicate an unimpaired biological condition. The exceptions are the two assessments performed in the River immediately (50 meters) downstream of Laurel Fork. This location is strongly influenced by the contribution of Laurel Fork. The Laurel Fork bacteria and sediment TMDLs, Virginia and West Virginia bacteria TMDLs for the Bluestone River, and the Virginia Bluestone River sediment TMDL will resolve the biological impairment.

Table C-1-3. Significant stressors of biologically impaired streams in the Bluestone River watershed

Stream	Code	Biological Stressors	TMDLs Required
Bluestone River	WVKNB	Organic enrichment Sedimentation	Fecal coliform (Bluestone River and Laurel Fork fecal coliform TMDLs) (Virginia sediment TMDL)
Brush Creek	WVKNB-12	Organic enrichment Sedimentation	Fecal coliform Iron
Righthand Fork/Widemouth Creek	WVKNB-28-B	Organic enrichment Sedimentation	Fecal coliform Iron
Crane Creek	WVKNB-30	Organic enrichment Sedimentation	Fecal coliform Iron
Simmons Creek	WVKNB-33	Organic enrichment Sedimentation	Fecal coliform Iron
Laurel Fork	WVKNB-34.5	Organic enrichment Sedimentation	Fecal coliform (Virginia sediment and fecal coliform TMDLs)
Brush Fork	WVKNB-36	Organic enrichment Sedimentation	Fecal coliform Iron

C-1.5 TMDLs for the Bluestone River Watershed

C-1.5.1 TMDL Development

A top-down methodology was followed to develop these TMDLs and allocate loads to sources. Headwaters were analyzed first because they have a profound effect on downstream water quality. Loading contributions were reduced from applicable sources for these water bodies, and TMDLs were developed. Refer to Section 8.5.2 of the TMDL Report for a detailed description of the allocation methodologies used in developing the pollutant-specific TMDLs.

The TMDLs for iron, fecal coliform bacteria and biological impairments are shown in Tables C-1-4 through C-1-6. The TMDLs for iron are presented as average daily loads, in pounds per day. The TMDLs for fecal coliform bacteria are presented in number of colonies per day. All TMDLs were developed to meet TMDL endpoints under a range of conditions observed throughout the year.

The fecal coliform TMDL for the Bluestone River does not include loadings from Pipestem Creek (WVKNB-1) because Pipestem Creek exits into Bluestone Lake and the watershed is considered a direct drainage to the Upper New River.

Iron Allocations for Troutwaters

Crane Creek (WVKNB-30) is a troutwater that requires a total iron TMDL. Implementation of the described methodology for troutwater iron TMDLs does not assure complete attainment of the chronic aquatic life protection iron criterion. Non-attainment is predicted in response to extreme precipitation events or a series of significant storms that elevate instream TSS and iron

concentrations. The magnitudes of the predicted exceedances under the initial allocation scenarios were not extreme, but exceedances were predicted much more often than the once per three year frequency prescribed by the criterion. Criterion attainment would require pollutant reductions from existing sources that are well beyond practical levels, coupled with significant reductions of undisturbed upland and streambank background loadings, and no construction stormwater allowances.

Therefore, phased implementation of the TMDLs is proposed, under which the source allocations necessary to universally achieve the iron criterion for warmwater fisheries (1.5 mg/L, 4-day average, once per three years average exceedance frequency) are implemented concurrently with additional study of the situation. WVDEP has initiated planning of a special monitoring effort for minimally impacted and documented viable troutwaters upon which model refinements and/or alternative criterion decision-making may be based. For additional information and a detailed description of the iron allocations for troutwaters, please refer to the Section 8.5 of the main report.

C-1.6 TMDL Tables: Metals and pH

Table C-1-4. Iron TMDLs for the Bluestone River watershed

Major Watershed	Stream Code	Stream Name	Metal	Load Allocation (lbs/day)	Wasteload Allocation (lbs/day)	Margin of Safety (lbs/day)	TMDL (lbs/day)	Trout water
Crane Creek	WVKNB-30	Crane Creek	Iron	38	47	4	90	Yes
Crane Creek	WVKNB-30-C	Belcher Branch	Iron	1	9	1	11	No
Brush Creek	WVKNB-12	Brush Creek	Iron	427	46	25	498	No
Rich Creek (WVKNB-18)	WVKNB-18	Rich Creek	Iron	88	55	8	150	No
Widemouth Creek	WVKNB-28-B	Righthand Fork/Widemouth Creek	Iron	40	13	3	57	No
Simmons Creek	WVKNB-33	Simmons Creek	Iron	24	3	1	28	No
Brush Fork	WVKNB-36	Brush Fork	Iron	45	6	3	54	No

UNT = unnamed tributary, RM = river mile, NA = not applicable

C-1.7 TMDL Tables: Fecal Coliform Bacteria

Table C-1-5. Fecal coliform bacteria TMDLs for the Bluestone River watershed

Major Watershed	Stream Code	Stream Name	Parameter	Load Allocation (counts/day)	Wasteload Allocation (counts/day)	Margin of Safety (counts/day)	TMDL (counts/day)
Bluestone River	WVKNB	Bluestone River	Fecal coliform	3.45E+12	4.97E+10	1.84E+11	3.68E+12
Little Bluestone River	WVKNB-3-A	Suck Creek	Fecal coliform	4.61E+09	NA	2.43E+08	4.85E+09
Little Bluestone River	WVKNB-3-C-1-E	UNT/Jumping Branch RM 2.5	Fecal coliform	2.09E+09	9.09E+06	1.11E+08	2.21E+09
Little Bluestone River	WVKNB-3-C-1-D	UNT/Jumping Branch RM 2.0	Fecal coliform	9.72E+10	NA	5.11E+09	1.02E+11
Mountain Creek	WVKNB-5	Mountain Creek	Fecal coliform	3.01E+10	NA	1.58E+09	3.16E+10
Mountain Creek	WVKNB-5-B	North Fork/Mountain Creek	Fecal coliform	3.36E+11	4.32E+10	2.00E+10	3.99E+11
Brush Creek	WVKNB-12	Brush Creek	Fecal coliform	8.49E+10	4.02E+09	4.68E+09	9.36E+10
Brush Creek	WVKNB-12-B	Laurel Creek	Fecal coliform	1.38E+11	1.14E+10	7.84E+09	1.57E+11
Brush Creek	WVKNB-12-H	Glady Fork	Fecal coliform	4.53E+10	NA	2.38E+09	4.77E+10
Brush Creek	WVKNB-12-J	South Fork/Brush Creek	Fecal coliform	6.63E+09	NA	3.49E+08	6.98E+09
Brush Creek	WVKNB-12-J-2	Middle Fork/South Fk/Brush Ck	Fecal coliform	1.06E+11	3.79E+06	5.56E+09	1.11E+11
Camp Creek	WVKNB-13	Camp Creek	Fecal coliform	2.63E+10	NA	1.38E+09	2.77E+10
Camp Creek	WVKNB-15	Wolf Creek	Fecal coliform	8.76E+10	NA	4.61E+09	9.22E+10
Rich Creek	WVKNB-18	Rich Creek	Fecal coliform	3.12E+10	1.93E+08	1.65E+09	3.30E+10
Blacklick Creek	WVKNB-22	Blacklick Creek	Fecal coliform	4.98E+09	NA	2.62E+08	5.25E+09
Blacklick Creek	WVKNB-22-A	Rocky Branch	Fecal coliform	3.87E+09	1.35E+07	2.04E+08	4.09E+09
Blacklick Creek	WVKNB-22-C	Barn Branch	Fecal coliform	5.72E+10	6.14E+08	3.04E+09	6.09E+10

Major Watershed	Stream Code	Stream Name	Parameter	Load Allocation (counts/day)	Wasteload Allocation (counts/day)	Margin of Safety (counts/day)	TMDL (counts/day)
Widemouth Creek	WVKNB-28	Widemouth Creek	Fecal coliform	9.82E+09	NA	5.17E+08	1.03E+10
Widemouth Creek	WVKNB-28-C	Lefthand Fork/Widemouth Creek	Fecal coliform	2.18E+10	NA	1.15E+09	2.29E+10
Widemouth Creek	WVKNB-28-B	Righthand Fork/Widemouth Creek	Fecal coliform	3.36E+10	NA	1.77E+09	3.53E+10
Crane Creek	WVKNB-30	Crane Creek	Fecal coliform	4.93E+09	NA	2.60E+08	5.19E+09
Crane Creek	WVKNB-30-D.5	UNT/Crane Creek RM 4.5	Fecal coliform	8.14E+09	NA	4.28E+08	8.57E+09
Simmons Creek	WVKNB-33	Simmons Creek	Fecal coliform	1.17E+09	NA	6.15E+07	1.23E+09
Laurel Fork	WVKNB-34.5	Laurel Fork	Fecal coliform	9.40E+10	NA	4.95E+09	9.90E+10
Butt Hollow	WVKNB-35	Butt Hollow	Fecal coliform	5.15E+10	NA	2.71E+09	5.42E+10
Brush Fork	WVKNB-36	Brush Fork	Fecal coliform	4.59E+09	NA	2.42E+08	4.84E+09
Neil Hollow	WVKNB-37	Neil Hollow	Fecal coliform	4.59E+09	NA	2.42E+08	4.84E+09

NA = not applicable; UNT = unnamed tributary.

"Scientific notation" is a method of writing or displaying numbers in terms of a decimal number between 1 and 10 multiplied by a power of 10. The scientific notation of 10,492, for example, is 1.0492×10^4.

C-1.8 TMDL Tables: Biological

Table C-1-6. Biological TMDLs for the Bluestone River watershed

Stream	Biological Stressor	Parameter	Load Allocation	Wasteload Allocation	Margin of Safety	TMDL	Units
Bluestone River (WVKNB)	Organic enrichment	Fecal coliform	3.45E+12	4.97E+10	1.84E+11	3.68E+12	(counts/day)
	Sedimentation	(Virginia Sediment TMDL)	Virginia sediment TMDL for the Virginia portion of Laurel Fork				
Brush Creek (WVKNB-12)	Organic enrichment	Fecal coliform	8.49E+10	4.02E+09	4.68E+09	9.36E+10	(counts/day)
	Sedimentation	Iron	427	46	25	498	(lbs/day)
Righthand Fork/Widemouth Creek (WVKNB-28-B)	Organic enrichment	Fecal coliform	3.36E+10	NA	1.77E+09	3.53E+10	(counts/day)
	Sedimentation	Iron	40	13	3	57	(lbs/day)
Crane Creek (WVKNB-30)	Organic enrichment	Fecal coliform	4.93E+09	NA	2.60E+08	5.19E+09	(counts/day)
	Sedimentation	Iron	38	47	4	90	(lbs/day)
Simmons Creek (WVKNB-33)	Organic enrichment	Fecal coliform	1.17E+09	NA	6.15E+07	1.23E+09	(counts/day)
	Sedimentation	Iron	24	3	1	28	(lbs/day)
Laurel Fork (WVKNB-34.5)	Organic enrichment	Fecal coliform	9.40E+10	NA	4.95E+09	9.90E+10	(counts/day)
	Sedimentation	(Virginia Sediment TMDL)	Virginia sediment TMDL for the Virginia portion of Laurel Fork				
Brush Fork (WVKNB-36)	Organic enrichment	Fecal coliform	4.59E+09	NA	2.42E+08	4.84E+09	(counts/day)
	Sedimentation	Iron	45	6	3	54	(lbs/day)

NA = not applicable; UNT = unnamed tributary.

"Scientific notation" is a method of writing or displaying numbers in terms of a decimal number between 1 and 10 multiplied by a power of 10. The scientific notation of 10,492, for example, is 1.0492×10^4.