absorbed in the ground, which leads to runoff. Problems that result from this runoff are higher water temperatures from the hot pavement, higher velocity and volume of water over shorter time periods (streams peak higher and quicker causing more erosion of the stream channel), and higher concentrations of pollutants being washed off the pavement.

AMD pollution in this subbasin was minimal and was concentrated mostly in a small northeastern section of the subbasin. Only seven sites showed possible effects due to AMD, and those effects were very slight for most of those sites. Restoration efforts by watershed groups and local government may have helped these watersheds.

Some of the highest quality watersheds within this subbasin were Sherman, Powell, Clarks, Stony, West Branch Mahantango, and North Branch Mahantango Creeks. Some watersheds that also rated well overall were Muddy, Deer, Octoraro, Conowingo, and sections of West Conewago Creeks. Although these watersheds contained a large amount of agricultural land and did have higher nutrient levels, they did not have heavy urban influence. They also appeared to be more forested, especially around the stream corridor. A naturally vegetated area surrounding the stream serves to protect the stream and provides necessary habitat to the aquatic insects and fish.

Some of the most degraded watersheds were Shamokin, Mahanoy, Armstrong, Paxton, Chiques, Conestoga, and Conodoguinet Creeks. Shamokin and Mahanoy Creeks were impacted by AMD, Armstrong Creek was potentially impacted by agriculture, Paxton Creek by urban development, and Chiques, Conestoga, and Conodoguinet Creeks by a mix of agriculture and urban development. The sampling in this survey was a one-time event, so replicate sampling would be needed to truly identify problems in these watersheds. However, this survey indicates where additional study is needed, such as in the case of limestone streams. A different analysis may improve impairment level determinations, since limestone stream macroinvertebrate populations have unique characteristics. These populations are often abundant, dominated by a few taxa such as *Ephemerella* (mayfly), Amphipoda (freshwater crustacean), Isopoda (freshwater crustacean), and Chironomidae (midges), and have few stonefly taxa. This is due to limestone streams tending to have low gradient, constant temperatures, high alkalinity, and high aquatic plant production.

Efforts should be made to restore the most degraded watersheds and protect the higher quality ones within this subbasin. Agricultural BMPs can be used to limit the impacts associated with farming operations. Information on these practices and other conservation methods can be obtained from county conservation district offices *(http://www.pacd.org/)*. Grant opportunities to alleviate AMD impacts and more information on remediation technologies also are available in county conservation district offices and from the Eastern Pennsylvania Coalition for Abandoned Mine Reclamation *(http://www.orange-waternetwork.org/)*. Urban stormwater problems can be minimized with low impact development and by allowing for groundwater recharge areas. More information on urban pollution remediation can be obtained from the Center for Watershed Protection through its Urban Subwatershed Restoration Manual Series *(http://www.cwp.org/)* and from the PADEP's Pennsylvania Stormwater Best Management Practices Manual *(http://www.dep.state.pa.us/dep/deputate/watermgt/wc/subjects/stormwatermanagement/BMP%20Manual/BMP%20Manual.htm)*.

The Lower Susquehanna Subbasin Survey, Year 2 assessment is being conducted in the Yellow Breeches Watershed and is focusing on bacterial monitoring and recreational and drinking water impacts in this highly used watershed. The study began in February 2006 and includes the mainstem Yellow Breeches, Cedar Run, Mountain Creek, Stony Run, Dogwood Run, and Trout Run. The study will help assess levels of bacterial contamination in the Yellow Breeches Watershed, documenting seasonal variability of bacteria levels, identifying sources of bacterial pollution, and providing information on differences in abundance of fecal coliform, enterococci, and *Escherichia coli (E. coli)*. More information on this project is available from SRBC.

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APPENDIX

Sample Site #	Station Name	Latitude	Longitude	Location Description	Drainage (sq. miles)	Reference Category
1	ARMS 0.1	40.4841944	76.9317778	Armstrong Creek upstream of Route 147 bridge near Halifax, Dauphin Co.	32.3	67b
2	BEAV 0.6	40.2703333	76.7413056	Beaver Creek at third bridge from the mouth on Pleasant View Drive at Pleasant View, Dauphin Co.	26.8	67a
3	BERM 1.2	39.9988333	76.9414167	Bermudian Creek at Blue Hill School Road bridge near Detters Mill, York Co.	109.1	64L
4	BERM 11.0	40.0014444	77.0586667	Bermudian Creek at Latimore Valley Road/Pondtown Road east of York Springs, Adams Co.	44.2	64ac
5	CCLC 0.4	40.1301389	76.2315556	Cocalico Creek at Log Cabin Road covered bridge near Millport, Lancaster Co.	138.9	64L
6	CCLC 12.2	40.1691111	76.2203056	Cocalico Creek upstream of Royer Road bridge west of Ephrata, Lancaster Co.	66.1	64d
7	**CEDR 0.1**	**40.2251972**	**76.9063303**	**Cedar Run upstream of Creek Road bridge at Eberlys Mill, Cumberland Co.**	**12.5**	**67a**
8	**CHIQ 20.0**	**40.206005**	**76.3942978**	**Chiques Creek at Elizabeth Road bridge north of Manheim, Lancaster Co.**	**18.3**	**64ac**
9	CHIQ 3.0	40.0632615	76.5154102	Chiques Creek upstream of bridge at Marietta Pike near Marietta, Lancaster Co.	108.0	64L
10	CLRK3.8	40.3871111	76.9414444	Clarks Creek at Route 225 bridge north of Dauphin, Dauphin Co.	40.0	67cd
11	CNTG 0.9	39.9342	76.3858	Conestoga River along River Road in Safe Harbor Park, Lancaster Co.	472.5	64L
12	CNTG 22.6	40.05	76.2775	Conestoga River at Penn Railroad bridge in Lancaster City, Lancaster Co.	322.0	64L
13	CNTG 32.7	40.1299722	76.1993611	Conestoga River at SR 1010 bridge near Brownstown, Lancaster Co.	125.7	64L
14	CNTG 43.9	40.1381	76.0605	Conestoga River at Quarry Road near Weaverland, Lancaster Co.	48.2	64d
15	CNWG 1.8	39.7245278	76.1833611	Conowingo Creek near mouth at state line, Cecil Co./Lancasater Co.	33.3	64ac
16	CODO 0.6	40.0522592	76.6550881	Codorus Creek near mouth at Codorus Furnace, York Co.	276.6	64L
17	CODO 22.4	39.8791	76.8529	Codorus Creek at Hershey Road end downstream of Spring Grove, York Co.	75.5	64d
18	CODO 33.0	39.8221	76.8885	Codorus Creek along SR 3047 downstream of Lake Marburg outflow confluence, York Co.	40.0	64ac
19	CODO 34.1	39.8099	76.8726	Codorus Creek at SR 3051 bridge upstream of Lake Marburg outflow confluence, York Co.	13.2	64ac
20	CONO 1.3	40.2605278	76.9348889	Conodoguinet Creek upstream of Poplar Church Road near Camp Hill, Cumberland Co.	502.3	67L
21	CONO 28.8	40.2366944	77.1448611	Conodoguinet Creek upstream of Middlesex Road near Carlisle, Cumberland Co.	396.0	67L
22	CONO 51.8	40.1774722	77.4543056	Conodoguinet Creek at SR 4006 bridge near Newville, Cumberland Co.	208.8	67L
23	CONO 66.0	40.1045278	77.5606944	Conodoguinet Creek at Burnt Mill Road bridge north of Shippensburg, Franklin Co.	107.3	67L
24	DEEP 1.2	40.6381389	76.6079722	Deep Creek at Mill Road bridge near Sacramento, Schuylkill Co.	31.3	67b
25	DEER 1.2	39.6226944	76.1644722	Deer Creek upstream of Stafford Road bridge near Susquehanna State Park, Harford Co.	169.3	64L
26	DEER 30.1	39.6755556	76.4506111	Deer Creek upstream of Fawn Grove Road at Eden Mill Park, Harford Co.	61.3	64ac
27	EBOC 5.3	39.8306111	76.0175556	East Branch Octoraro Creek at John Evans Memorial Park near Cream, Lancaster Co./Chester Co.	75.6	64ac
28	ECON 0.0	40.1472222	76.6993056	East Conewago Creek at second bridge upstream from mouth near Falmouth, Lancaster Co./Dauphin Co.	51.3	64ac
29	ELKN 0.1	40.8702222	77.4588333	Elk Creek upstream of Pine Creek near Coburn, Centre Co.	56.8	67a
30	EMAH 0.2	40.6098889	76.9295833	Mahantango Creek at Route 147 bridge near Paxton, Dauphin Co.	164.2	67L
31	EMAH 17.1	40.6601667	76.68575	Mahantango Creek in park at Klingerstown, Schuylkill Co.	44.6	67b
32	EPIN 0.1	40.6614444	76.6927778	Pine Creek near Klingerstown, Schuylkill Co.	77.0	67b
33	EPIN 12.7	40.6275278	76.62075	Pine Creek at Spring Glen, Schuylkill Co.	28.5	67cd
34	HAMM 0.2	40.161	76.23375	Hammer Creek at mouth along Cocalico Road near Millway, Lancaster Co.	35.2	64d
35	KRTZ 1.5	40.0152778	6.5395	Kreutz Creek at Cool Creek Road in Wrightsville, York Co.	32.8	64d
36	LCHQ 0.4	40.0793275	76.5070022	Little Chiques Creek upstream of Iron Bridge Road, Lancaster Co.	43.1	64d
37	LCNT 1.7	39.9525	76.3697	Little Conestoga River at mouth near Rockhill, Lancaster Co.	65.5	64d
38	LCON 1.5	40.0882222	76.7271667	Little Conewago Creek at mouth in Conewago Heights, York Co.	65.4	64ac
39	LRLN 0.8	40.8931667	77.2038056	Laurel Run at SR 3020 north of Laurelton, Union Co.	10.5	67b
40	LRSL 0.5	40.3224444	77.378	Laurel Run upstream of Laurel Run Road bridge near Landisburg, Perry Co.	22.1	67cd
41	LSHM 0.8	40.8587778	76.7665556	Little Shamokin Creek near mouth at Sunbury, Northumberland Co.	29.0	67b
42	LSWT 0.6	40.4081111	76.4740833	Little Swatara Creek at mouth near Jonestown, Lebanon Co.	99.0	67b
43	LTRT 0.1	40.23425	77.1385833	Letort Spring Run at Route 11 bridge near Carlisle, Cumberland Co.	21.8	67a
44	MDDY 3.3	39.7726111	76.31625	Muddy Creek at SR2024 (Paper Mill Road) near Coal Cabin Beach, York Co.	132.8	64L
45	MHNY 0.3	40.7262778	76.8375	Mahanoy Creek at Route 147 bridge near Herdon, Northumberland Co.	157.1	67L
46	MIDD 0.2	40.177389	76.241278	Middle Creek upstream of Middle Creek Road bridge north of Millway, Lancaster Co.	31.5	64d
47	MIDL 0.7	40.7731667	76.8984444	Middle Creek near mouth at Kantz, Snyder Co.	157.9	67L
48	MIDL 24.7	40.7626944	77.2099167	Middle Creek upstream of Route 235 bridge near Beaver Springs, Snyder Co.	33.5	67b
49	MILL 0.3	40.0041	76.3016	Mill Creek at Elkman Road bridge near Lyndon, Lancaster Co.	56.4	64d
50	MISP 0.5	40.0983889	77.5612222	Middle Spring Run along Burnt Mill Road north of Shippensburg, Cumberland Co.	45.2	67a
51	MNDA 0.1	40.3087778	76.6710556	Manada Creek at mouth in Sand Beach, Dauphin Co.	32.2	67b
52	MNTN 3.0	40.1073333	77.1815278	Mountain Creek along Route 34 upstream of Mount Holly Springs, Cumberland Co.	45.0	67cd*
53	MUDD 0.2	40.1716	76.1057	Muddy Creek upstream of Frysville Road near Frysville, Lancaster Co.	49.3	64d
54	NBMY 0.0	39.8079167	76.4758611	North Branch Muddy Creek near mouth at Muddy Creek Forks, York Co.	43.8	64ac
55	NMHT 0.0	40.6475	76.9661	North Branch Mahantango Creek at mouth near Mahantango, Snyder Co.	37.1	67b
56	NMID 0.7	40.7745833	77.1980278	North Branch Middle Creek at Benfer, Snyder Co.	26.1	67b
57	OCTO 1.0	39.6598889	76.1533333	Octoraro Creek at railroad bridges near Rowlandsville, Cecil Co.	209.9	64L
58	PAXT 0.5	40.2473056	76.8648889	Paxton Creek at Greenway bridge in Harrisburg, Dauphin Co.	27.3	67b
59	PAXT 8.4	40.3087222	76.8498889	Paxton Creek upstream of Progress Avenue bridge near Harrisburg, Dauphin Co.	11.2	67b
60	PENN 30.0	40.8633889	77.2376667	Penns Creek at Glen Iron, Union Co.	254.1	67L
61	PENN 5.0	40.8270556	76.8687222	Penns Creek at Selinsgrove, Snyder Co.	364.3	67L
62	PENN 50.6	40.8574444	77.4844444	Penns Creek upstream of Elks Creek near Coburn, Centre Co.	90.1	67a
63	POWL 0.1	40.42025	76.9593889	Powell Creek upstream of Peters Mountain Road near Powells Valley, Dauphin Co.	37.8	67b
64	PQEA 15.2	39.9559306	76.2498387	Pequea Creek along Shiprock Road upstream of Big Beaver Creek, Lancaster Co.	99.1	64d
65	PQEA 3.3	39.90562	76.32814	Pequea Creek at Route 324 bridge near Colemansville, Lancaster Co.	150.2	64L
66	QUIT 0.3	40.35225	76.6116944	Quittapahilla Creek at first bridge from mouth in Valley Glen, Lebanon Co.	77.3	67b
67	SBCC 1.2	39.8614167	77.0739444	South Branch Conewago Creek at Rout 30 bridge near New Oxford, Adams Co.	67.6	64ac
68	SBCD 0.4	39.9140036	76.7535406	South Branch Codorus Creek near mouth at Rails-To-Trails crossing, York Co.	116.4	64L
69	SBCD 3.6	39.8952789	76.7436608	South Branch Codorus Creek upstream of East Branch Codorus Creek at Reynolds Mill, York Co.	68.3	64ac
70	SBEV 2.5	39.941188	76.2205289	Big Beaver Creek at Krantz Mill Road near Refton, Lancaster Co.	17.3	64d
71	SBMY 0.0	39.8077222	76.4763333	South Branch Muddy Creek near mouth at Muddy Creek Forks, York Co.	28.1	64ac
72	SHAM 2.7	40.8434444	76.8045278	Shamokin Creek at Route 147 bridge in Sunbury, Northumberland Co.	136.9	67L
73	SHRM 2.0	40.3803611	77.0825556	Sherman Creek at Dellville bridge in Dellville, Perry Co.	240.9	67L
74	SHRM 27.5	40.3513611	77.33525	Sherman Creek upstream of SR 3011 bridge near Loysville, Perry Co.	99.1	67a
75	SPRG 0.0	40.2860833	76.6786667	Spring Creek at mouth near Hershey, Dauphin Co.	24.0	67a
76	STON 0.4	40.3765556	76.9169722	Stony Creek along Stony Creek Road near Dauphin, Dauphin Co.	34.4	67cd
77	SUSQ 44.5	40.0372	76.5236	Susquehanna River upstream of Route 30 bridge near Columbia, Lancaster Co.	26007.0	River
78	SUSQ 77.0	0.3456	76.9204	Susquehanna River at Fort Hunter boating access area, Dauphin Co.	23519.2	River
79	SUSQ 94.0	40.49	76.9433	Susquehanna River near Halifax boating access area, Dauphin Co.	19642.0	River
80	SUSQ 106.0	40.6608	76.9142	Susquehanna River between McKees Half Falls and Dalmatia, Northumberland Co.	19206.8	River
81	SUSQ 122.0	40.8119	76.8415	Susquehanna River between Selinsgrove and Selinsgrove Junction, Northumberland Co.	18442.7	River
82	SWAT 2.3	40.2053333	76.713	Swatara Creek downstream of the Pennsylvania Turnpike bridge near Middletown, Dauphin Co.	560.6	64L
83	SWAT 21.7	40.3525556	76.61675	Swatara Creek upstream of Quittapahilla Creek near Valley Glen, Lebanon Co.	355.2	67L
84	SWAT 39.0	40.413	76.4858611	Swatara Creek at Route 22 near Jonestown, Lebanon Co.	191.6	67L
85	SWAT 56.0	40.5441944	76.3823611	Swatara Creek between Upper and Lower Little Swatara Creeks in Pine Grove, Schuylkill Co.	74.0	67b
86	TRDL 0.0	40.2506389	77.0066667	Trindle Spring Run near mouth north of Mechanicsburg, Cumberland Co.	17.8	67a
87	WBOC 4.3	39.8510556	76.1101111	West Branch Octoraro Creek upstream of SR 2010 bridge at State Gamelands No. 136, Lancaster Co.	30.1	64ac
88	WCON 2.9	40.0812778	76.7165556	Conewago Creek at Route 181 bridge in Conewago Heights, York Co.	512.4	64L
89	WCON 20.4	40.0644722	76.8633056	Conewago Creek at bridge crossing off Conewago Road near Gifford Pinchot State Park, York Co.	388.5	64L
90	WCON 35.5	40.0011111	76.9203333	Conewago Creek upstream of Bermudian Creek near Detters Mill, York Co.	263.1	64L
91	WCON 56.3	39.8986	77.0844	Conewago Creek at Route 394 bridge near New Chester, Adams Co.	106.3	64L
92	WCON 66.5	39.9243056	77.2095556	Conewago Creek upstream of SR 4013 bridge near Table Rock, Adams Co.	39.1	64ac
93	WICO 0.3	40.5368611	76.9622778	Wiconisco Creek at Route 147 bridge in Millersburg, Dauphin Co.	116.4	67L
94	WMHT 2.2	40.6476667	76.9656667	West Branch Mahantango Creek upstream Route 104 bridge near Mahantango, Snyder Co.	46.9	67b
95	WPIN 0.8	40.8675833	77.4562778	Pine Creek upstream of Elk Creek near Coburn, Centre Co.	93.4	67a
96	YLBR 3.4	40.2240833	76.86075	Yellow Breeches Creek at Bridge Street in New Cumberland, Cumberland Co./York Co.	218.5	67L
97	YLBR 35.7	40.1259722	77.2191667	Yellow Breeches Creek upstream of Burnt House Road near Barnitz, Cumberland Co.	55.7	67a

Sites in green were not sampled in 1996

**MNTN 3.0 grouped with 67cd since no other stations were in its subecoregion category*