
WAAC

Watershed Alliance of Adams County

South Mountain Watershed Workshop

March 16, 2019

About WAAC

- Formed in 2000 by ACCD
- 501(c)3 non-profit, volunteer organization
- 9 member BOD
- Supported by the ACCD Watershed Specialist
- Addresses water resource issues in Adams County
- adamswatersheds.org

WAAC Goals

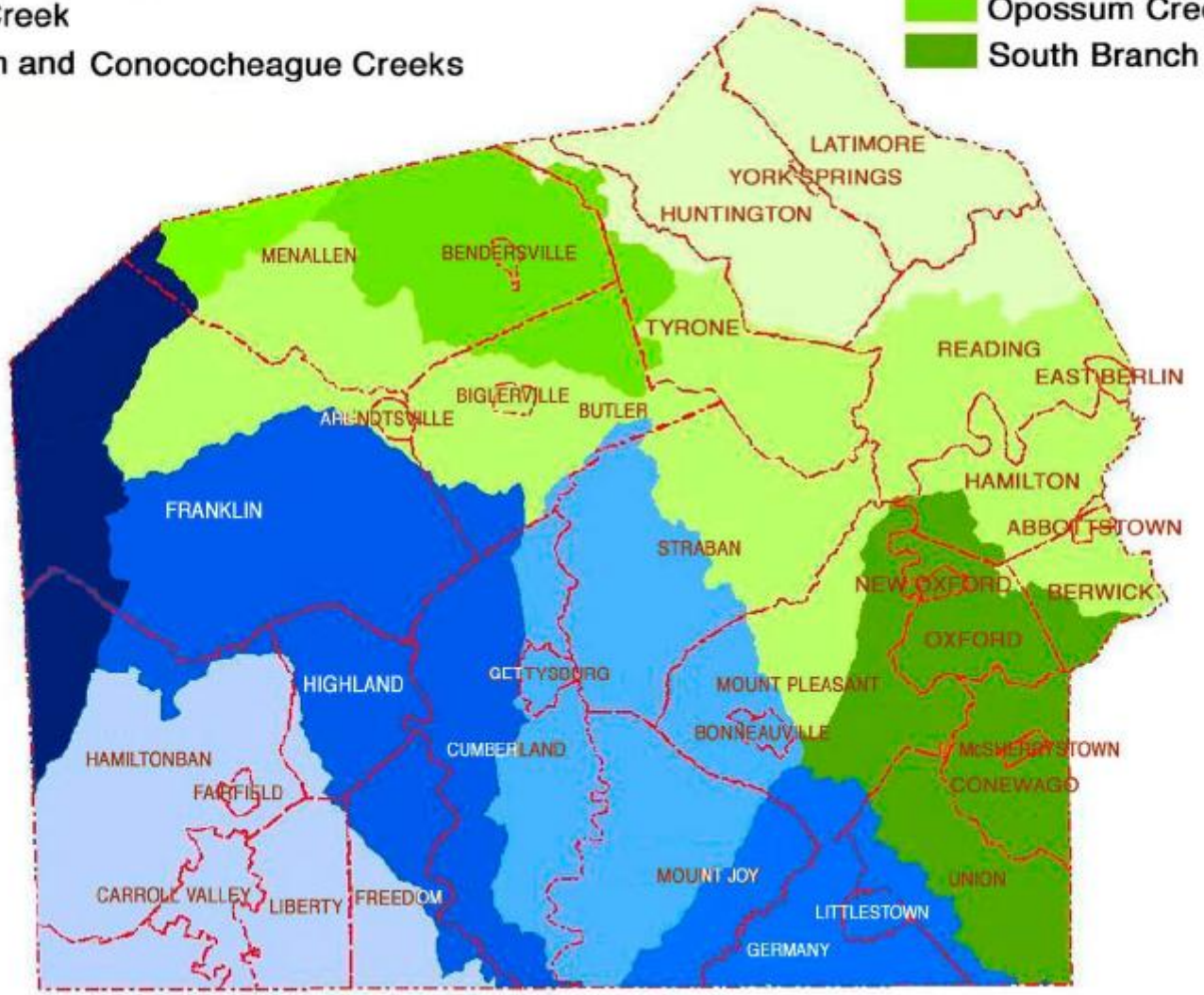
- Help residents better understand the complex watershed issues affecting Adams County.
- Encourage sound water management and land use practices that will promote a sustainable watershed resource.
- Support a county-wide water monitoring program and data base to use for evaluating water resources.
- Identify and carry out watershed improvement projects.
- Maintain the viability and sustainability of the Watershed Alliance of Adams County.

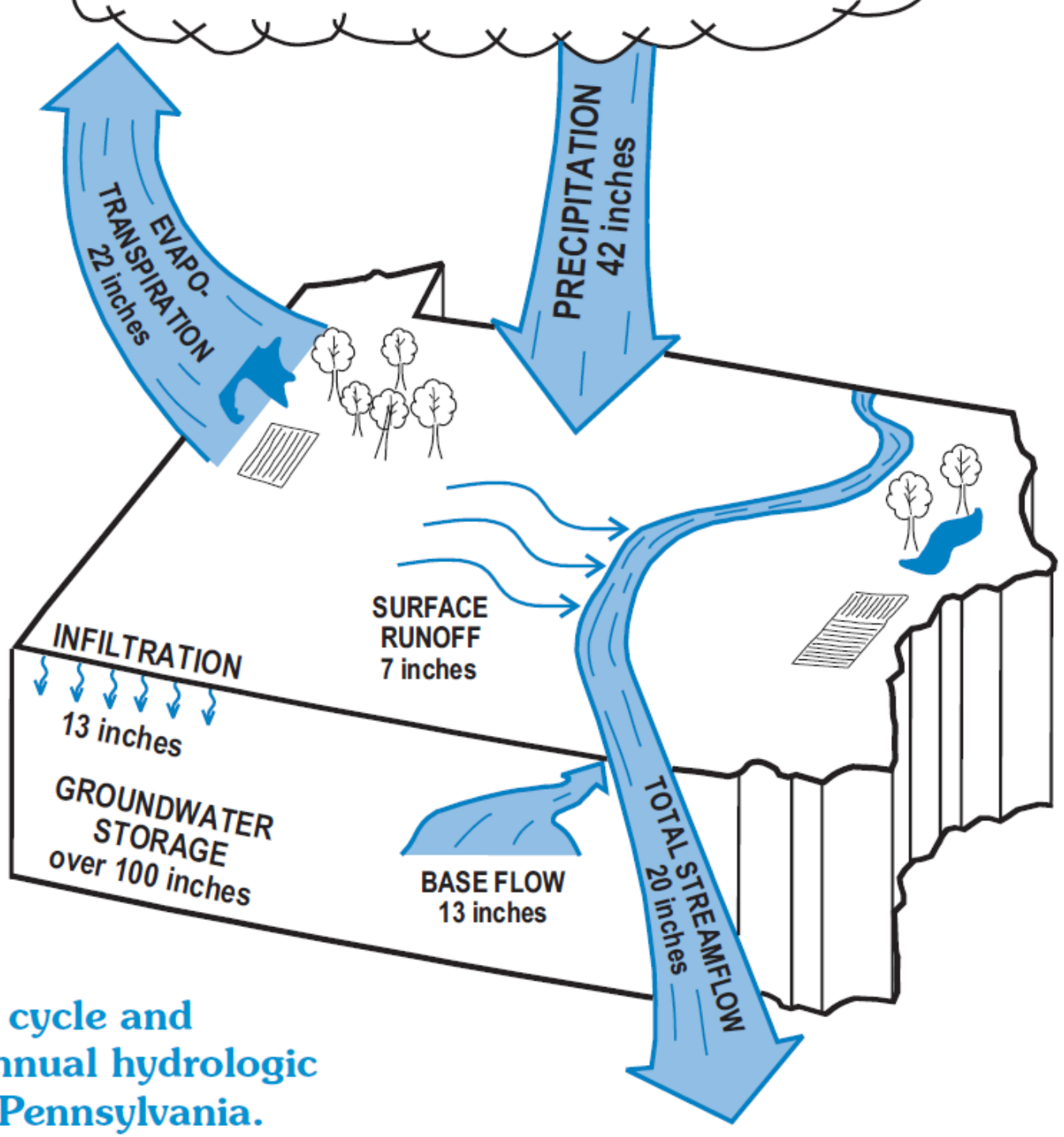
Potomac River Basin

- Toms and Middle Creeks
- Rock Creek
- Piney and Alloway Creeks
- Marsh Creek
- Antietam and Conococheague Creeks

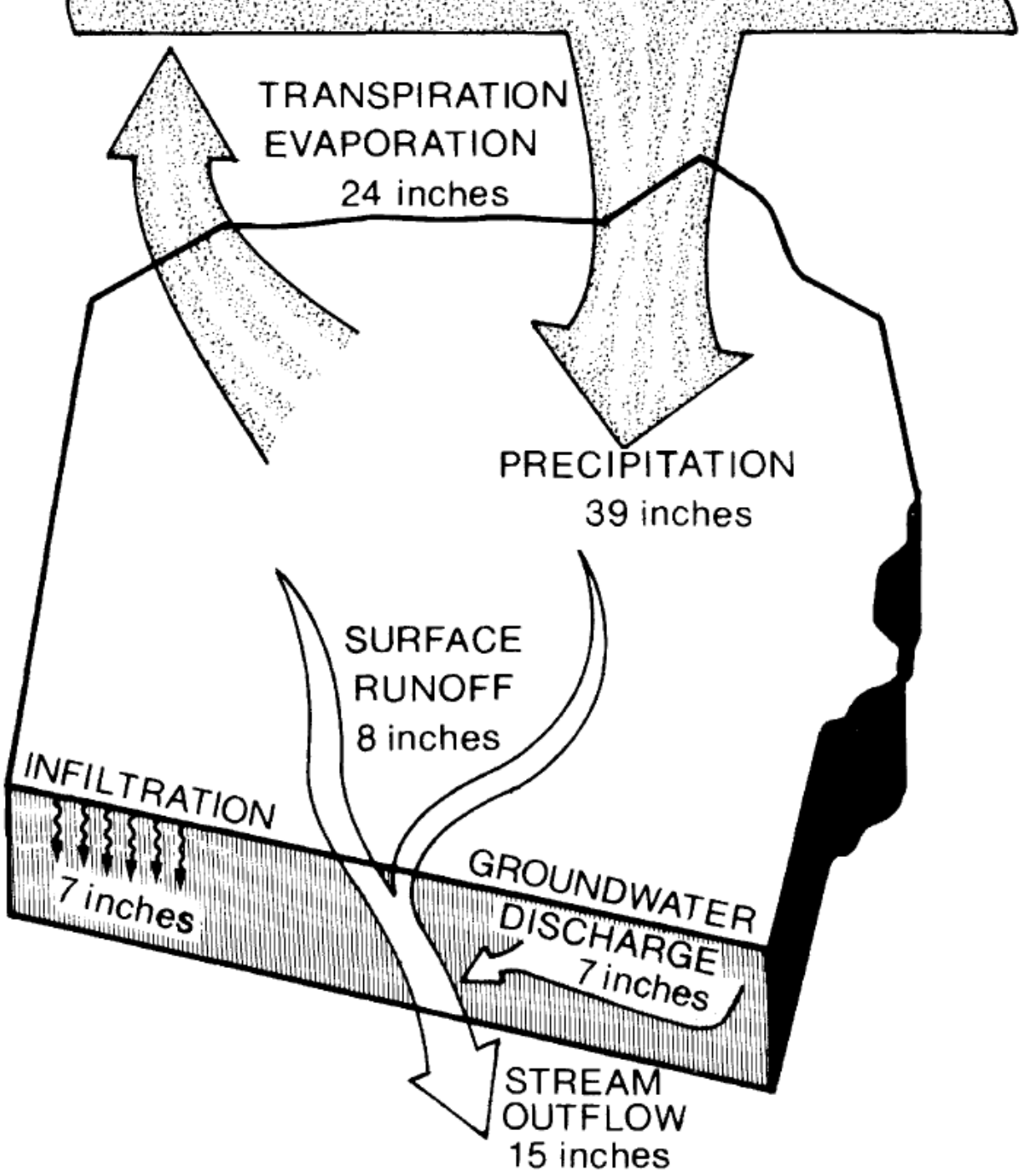
Susquehanna River Basin

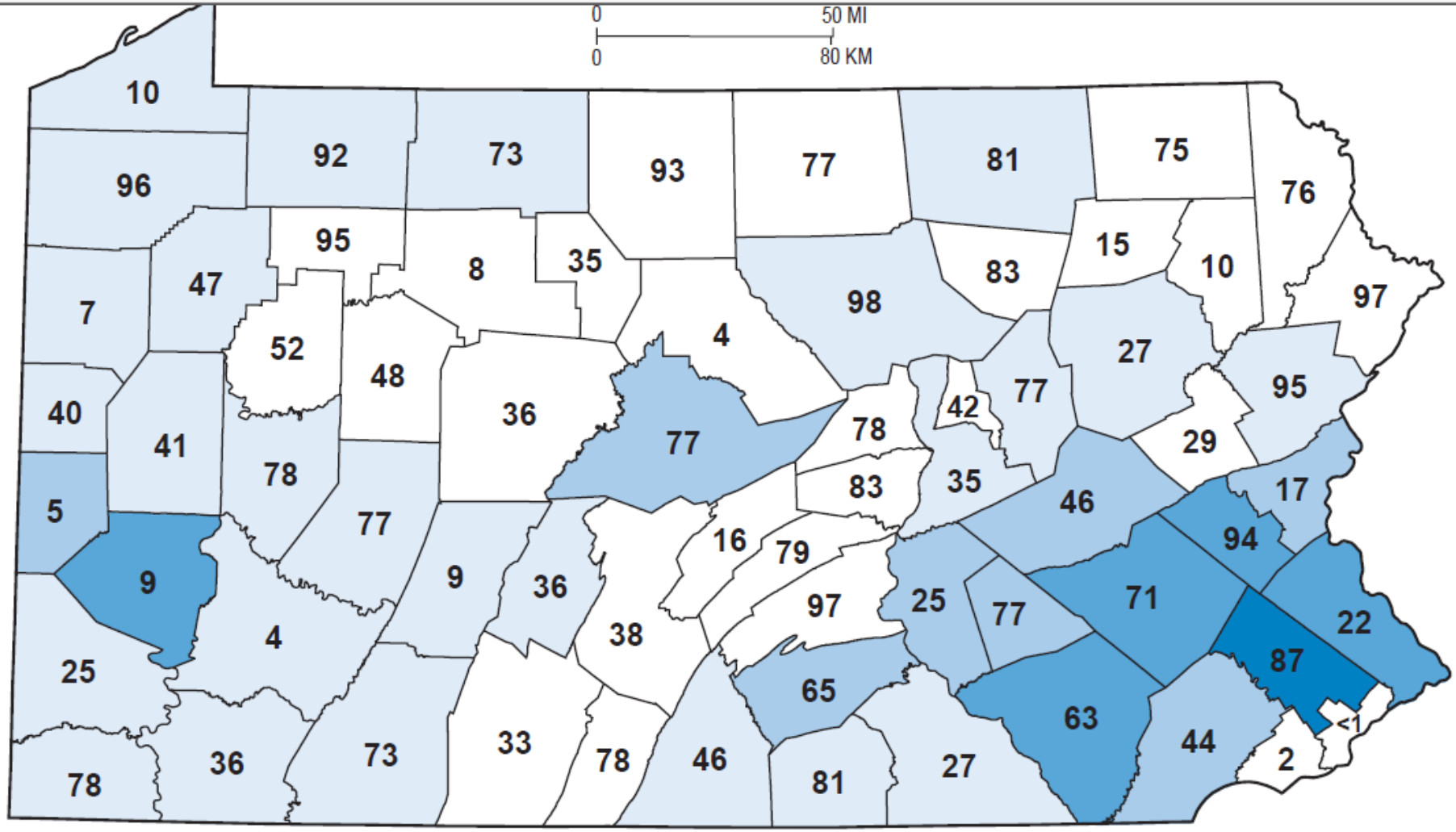
- Bermudian Creek
- Conewago Creek
- Mountain Creek
- Opossum Creek
- South Branch Conewago Creek





The water cycle and average annual hydrologic budget in Pennsylvania.


TRANSPIRATION
EVAPORATION
24 inches
PRECIPITATION
39 inches
SURFACE
RUNOFF
8 inches
INFILTRATION
7 inches
GROUNDWATER
DISCHARGE
7 inches
STREAM
OUTFLOW
15 inches


0
50 MI
0
80 KM
10
96
92
73
93
77
81
75
76
95
8
35
98
83
15
10
97
7
47
52
48
4
27
40
41
36
77
78
42
77
95
29
78
83
35
46
17
5
9
77
9
36
16
79
94
97
25
77
71
22
4
38
87
25
65
63
<1
44
36
73
33
78
46
81
27
2
78
EXPLANATION
0–5
6–20
21–40
41–63
148
Amount of groundwater used in millions of gallons per day
44
Percentage of total water use

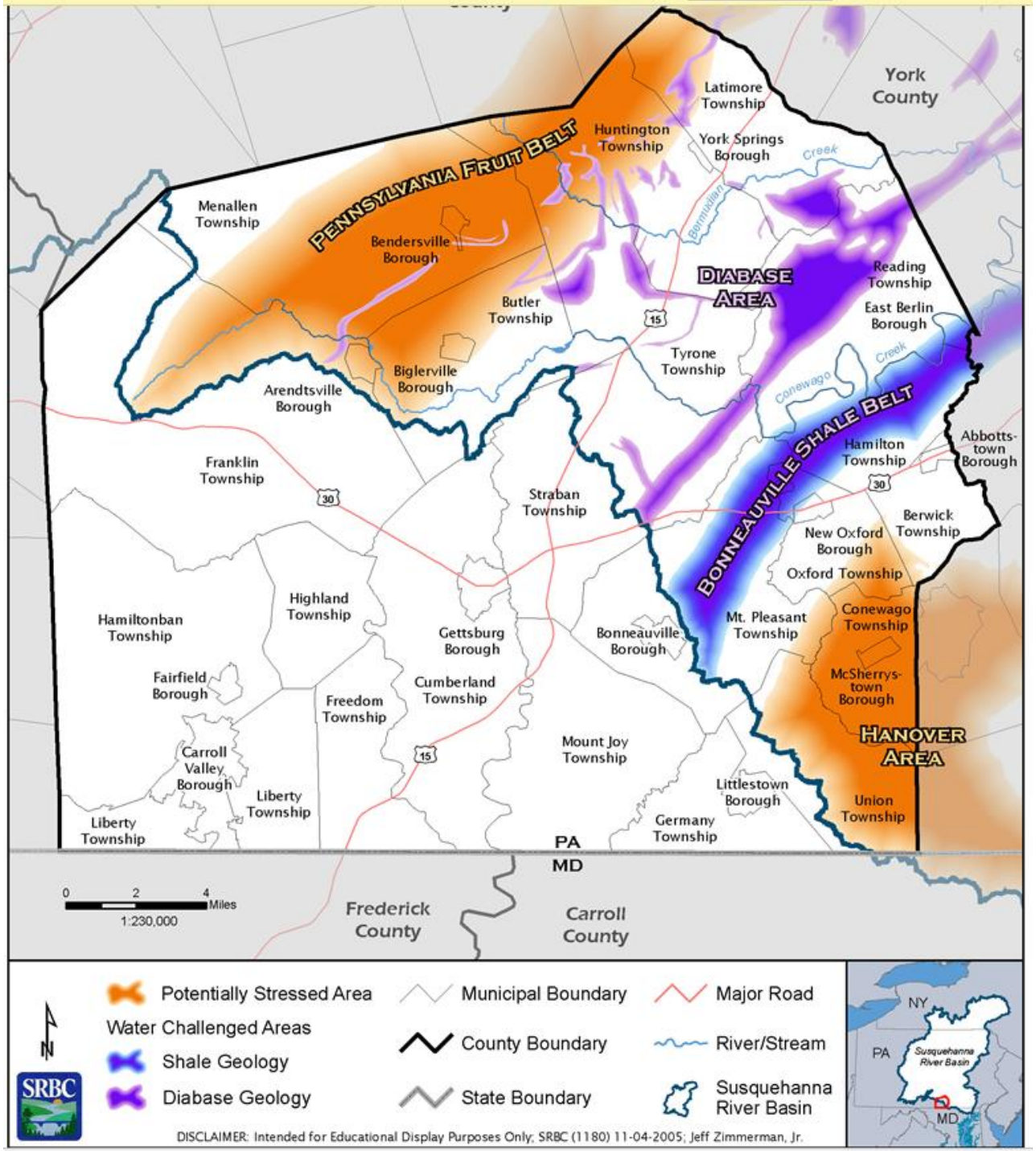
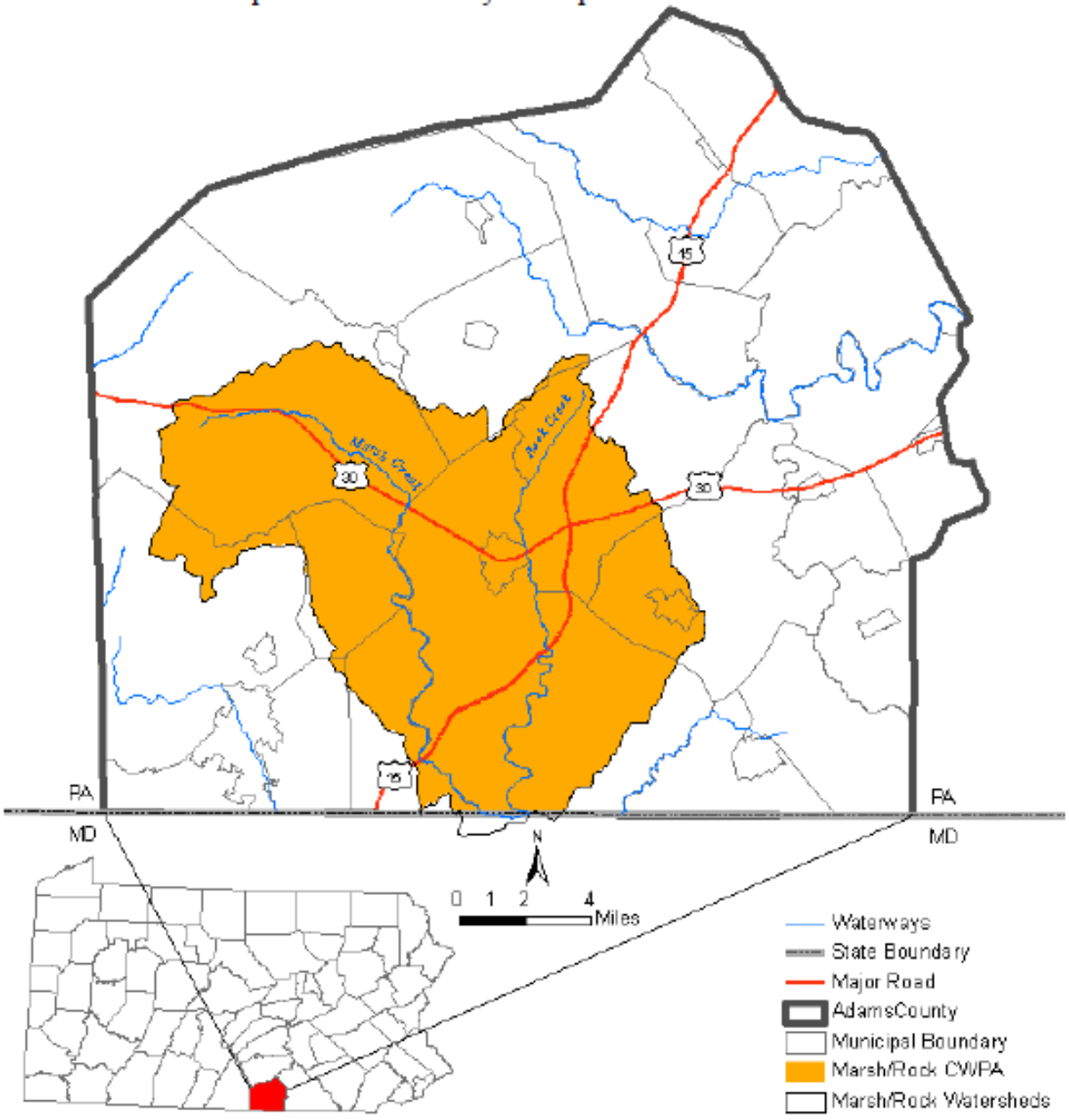

York County
Latimore Township
Huntington Township
York Springs Borough
Pennsylvania Fruit Belt
Menallen Township
Bendersville Borough
Diabase Area
Reading Township
East Berlin Borough
Butler Township
Tyrone Township
Biglerville Borough
Arendtsville Borough
Conewago Creek
Bonneauville Shale Belt
Abbotts-town Borough
Hamilton Township
Franklin Township
Straban Township
Berwick Township
New Oxford Borough
Oxford Township
Highland Township
Hamiltonban Township
Gettsburg Borough
Bonneauville Borough
Mt. Pleasant Township
Conewago Township
Fairfield Borough
Cumberland Township
McSherrys-town Borough
Freedom Township
Hanover Area
Carroll Valley Borough
Mount Joy Township
Littlestown Borough
Liberty Township
Union Township
Germany Township
PA
MD
0 2 4 Miles
1:230,000
Frederick County
Carroll County
Potentially Stressed Area
Water Challenged Areas
Shale Geology
Diabase Geology
Municipal Boundary
County Boundary
State Boundary
Major Road
River/Stream
Susquehanna River Basin
NY
PA
Susquehanna River Basin
MD
SRBC
DISCLAIMER: Intended for Educational Display Purposes Only; SRBC (1180) 11-04-2005; Jeff Zimmerman, Jr.

Figure 1. Location of CWPA in Adams County, Pennsylvania. Note: The Marsh and Rock creek watersheds extend into Maryland. The CWPA is comprised of the Pennsylvania portion of the watersheds.



USGS 01574000 West Conewago Creek near Manchester, PA

PROVISIONAL DATA SUBJECT TO REVISION

Available data for this site | Time-series: Current/Historical Observations | GO

Click to hide station-specific text

STATION.--01574000 WEST CONEWAGO CREEK NEAR MANCHESTER, PA
LOCATION.--Lat 40`04'56", long 76`43'13", York County, Hydrologic Unit 02050306, on left bank 500 ft upstream from bridge on State Highway 181, 0.6 mi downstream from Little Conewago Creek, and 1.5 mi north of Manchester. On Sept 13, 2017 the gage was relocated to Lat 40`04'50.9", long 76`43'6.21" referenced to North American Datum of 1927, York County, PA, Hydrologic Unit 02050306, on right bank 80 ft upstream from bridge on Stage Highway 181, 0.7 mi downstream from Little Conewago Creek, and 1.5 mi north of Manchester.
DRAINAGE AREA.--510 square miles.
PERIOD OF RECORD.--October 1928 to current year. Prior to October 1931, published as Conewago Creek near Manchester.
GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 263.68 ft above National Geodetic Vertical Datum of 1929.
COOPERATION.--Station established and maintained by the U.S. Geological Survey. Funding for the operation of this station is provided by the Pennsylvania Department of Environmental Protection and the U.S. Geological Survey.
GAGE HEIGHTS OF IMPORTANCE.-
Supplied by USGS: Maximum recordable gage height (stage sensor operational limit) - 28.2 ft; Data transmitter operational limit - 28.7 ft;
Supplied by NWS: No flood stage has been determined for this station.

This station managed by the PAWSC New Cumberland Office.

Available Parameters	Available Period
☐ All 2 Available Parameters for this site	
☑ 00060 Discharge	1985-10-01 2019-03-13
☑ 00065 Gage height	2007-10-01 2019-03-13

Output format
- ◉ Graph
- ○ Graph w/ stats
- ○ Graph w/o stats
- ○ Graph w/ (up to 3) parms
- ○ Table
- ○ Tab-separated

Days (7)

-- or --

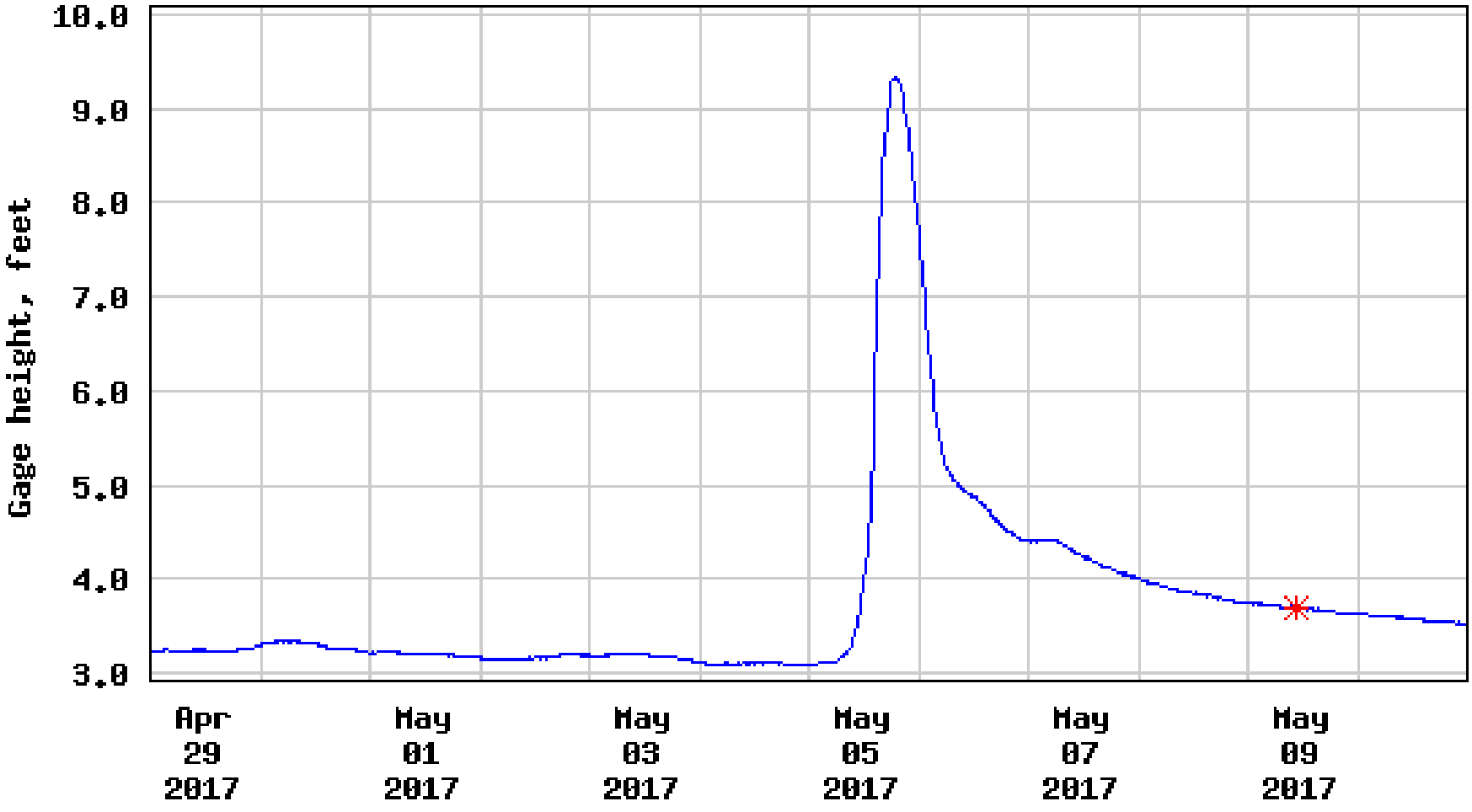
Begin date 2019-03-06

End date 2019-03-13

GO

USGS

USGS 01573825 West Conewago Creek at East Berlin, PA

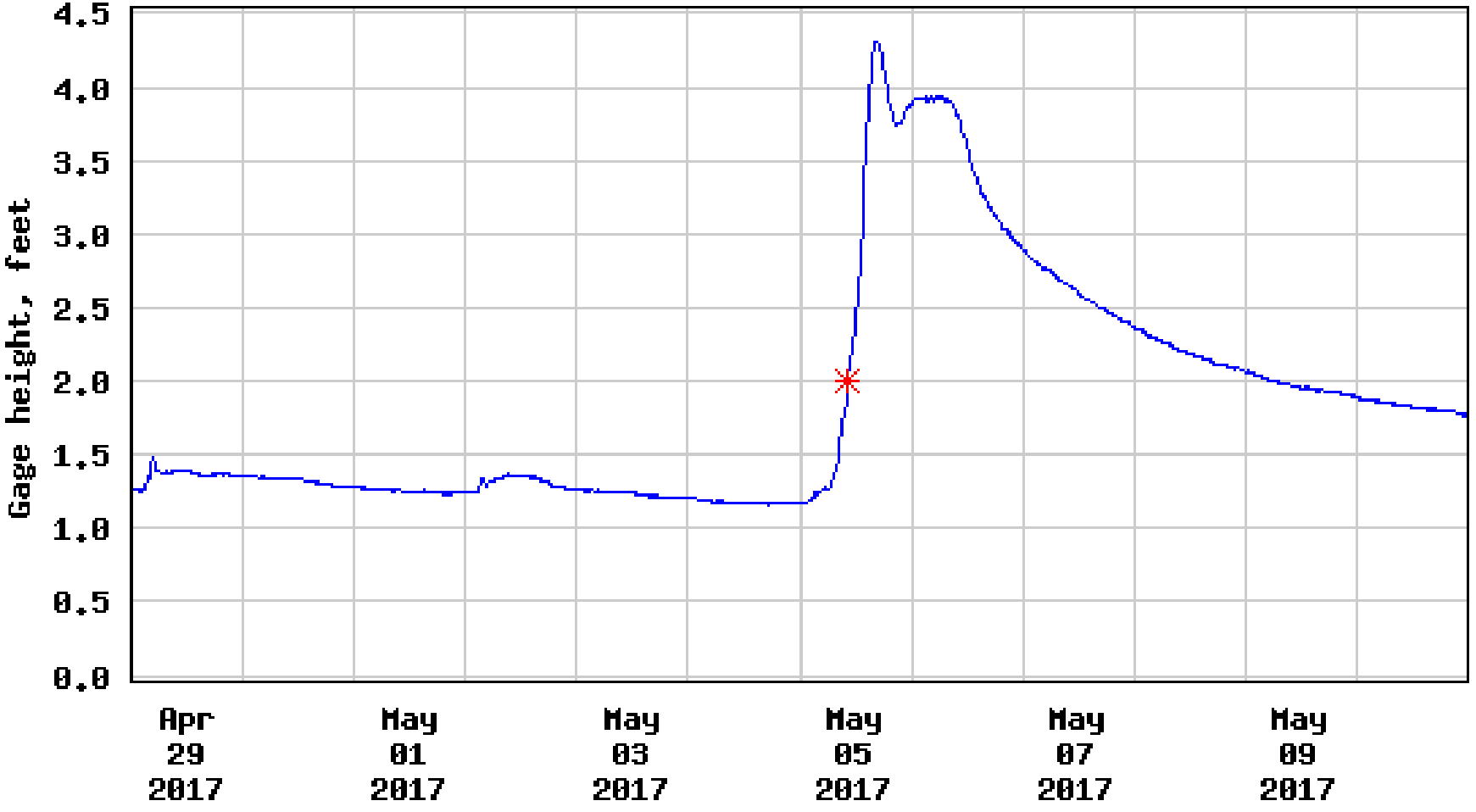


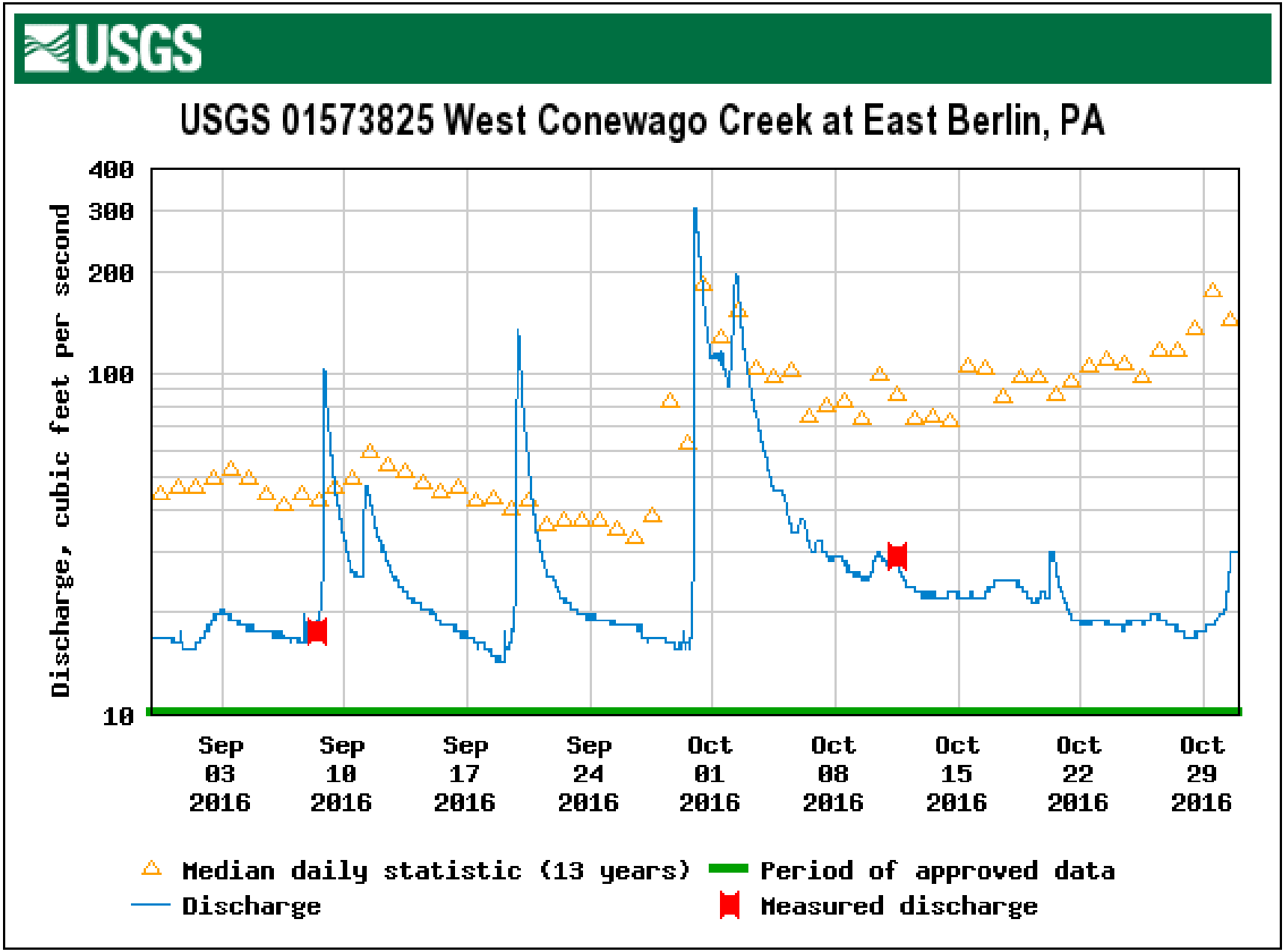
---- Provisional Data Subject to Revision ----

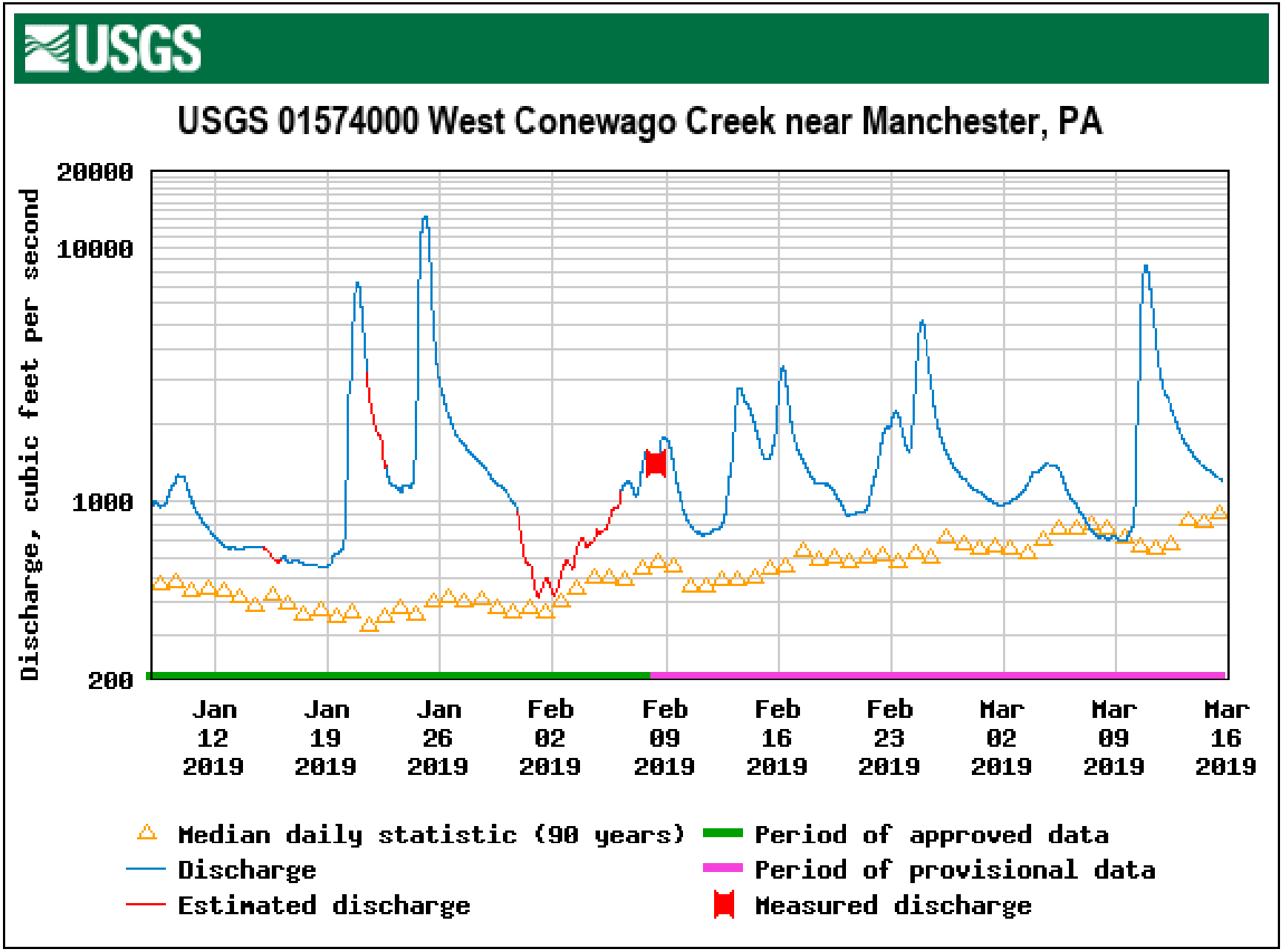
— Gage height ✳ Measured gage height

USGS

USGS 01571500 Yellow Breeches Creek near Camp Hill, PA



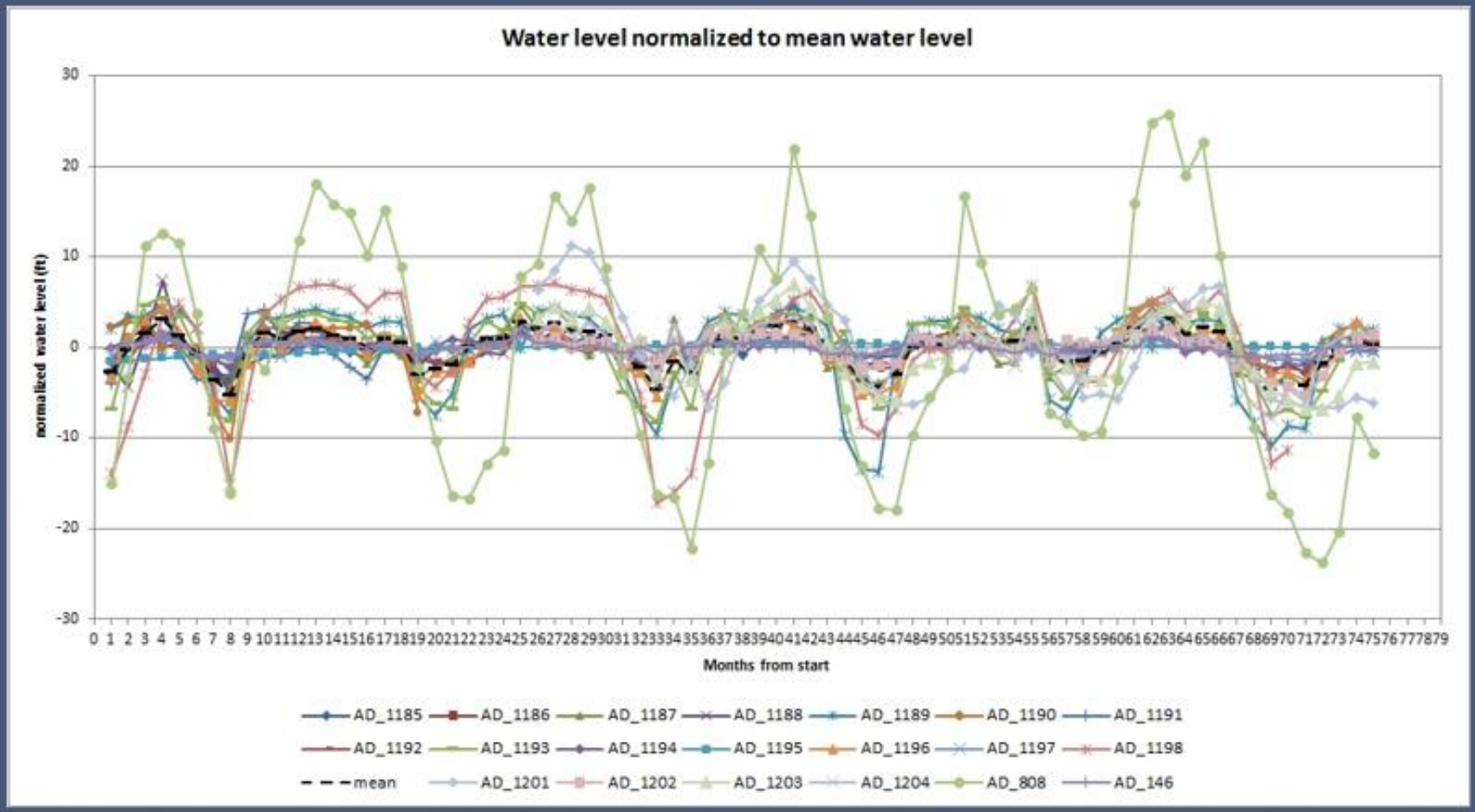

USGS
USGS 01573825 West Conewago Creek at East Berlin, PA
Discharge, cubic feet per second
400
300
200
100
10
Sep 03 2016
Sep 10 2016
Sep 17 2016
Sep 24 2016
Oct 01 2016
Oct 08 2016
Oct 15 2016
Oct 22 2016
Oct 29 2016
Median daily statistic (13 years)
Discharge
Period of approved data
Measured discharge


USGS
USGS 01574000 West Conewago Creek near Manchester, PA
Discharge, cubic feet per second
20000
10000
1000
200
Jan 12 2019
Jan 19 2019
Jan 26 2019
Feb 02 2019
Feb 09 2019
Feb 16 2019
Feb 23 2019
Mar 02 2019
Mar 09 2019
Mar 16 2019
Median daily statistic (90 years)
Discharge
Estimated discharge
Period of approved data
Period of provisional data
Measured discharge

Water Level Network

Interstate Commission on the Potomac River Basin

Long term water levels



Interstate Commission on the Potomac River Basin

SECTION 1713: RIPARIAN BUFFERS AREAS

The following standards shall be applicable to Riparian Buffer Areas in any location of the Township.

A. Delineation: The Riparian Buffer Area shall be delineated in accordance with the following parameters.

1. Second Order Streams: The minimum width of the Riparian Buffer Area shall be twenty-five (25) feet from the defined edge of the stream at bank full flow.

2. Third Order and Higher Order Streams: The minimum width of the Riparian Buffer Area shall be fifty (50) feet from the defined edge of the steam at bank full flow.

3. Riparian Buffer Map: The Riparian Buffer Areas shall be shown upon the map attached to and made part of this Ordinance, which map is dated, and designated as the

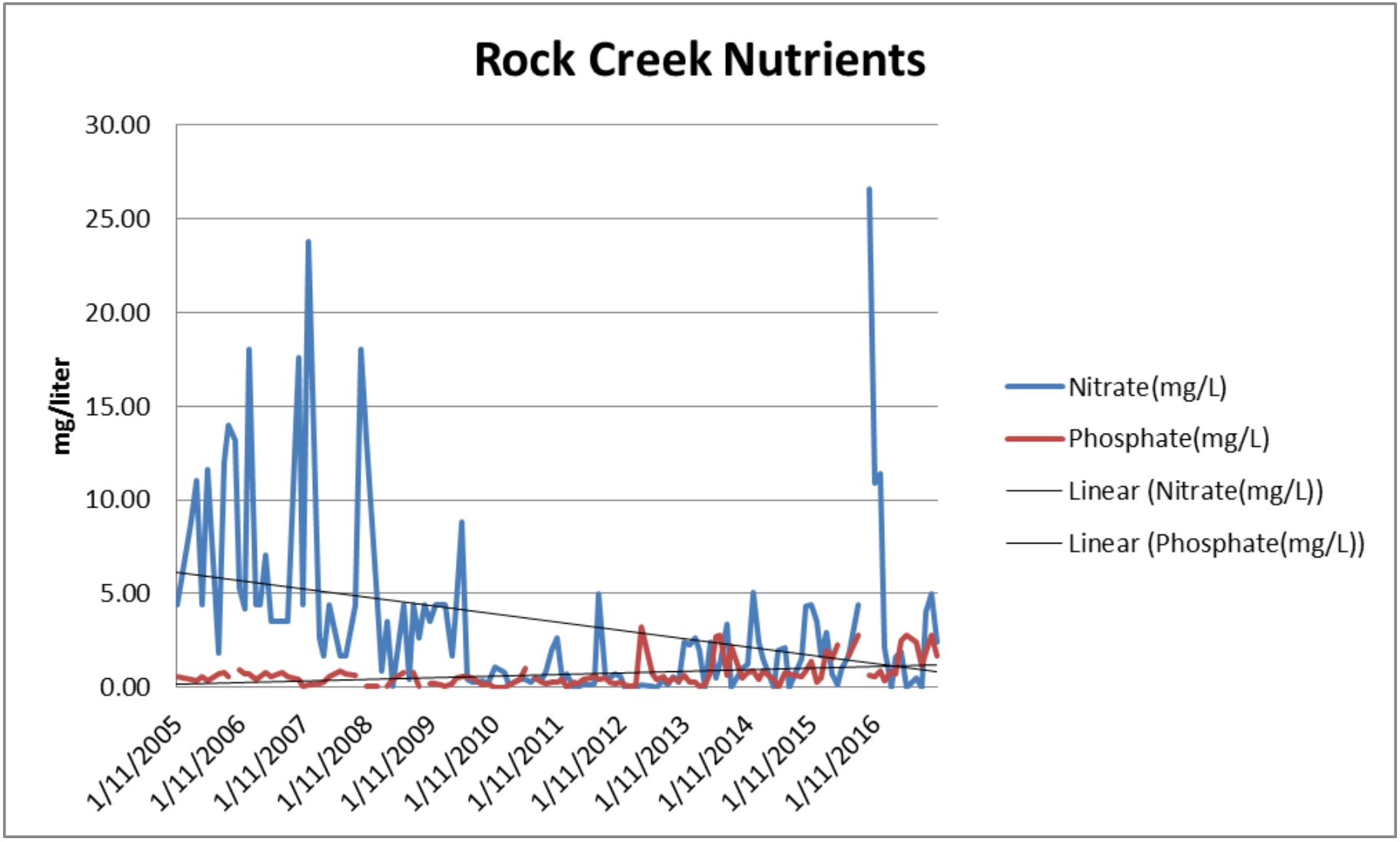
"Hamiltonban Township Zoning Map – Riparian Buffer Areas." The said map and all notations, references, and other data shown therein are hereby incorporated into this Ordinance as if all were fully described herein.

B. Management of Existing Riparian Buffers: Riparian Buffer Areas shall be managed in accordance the following provisions.

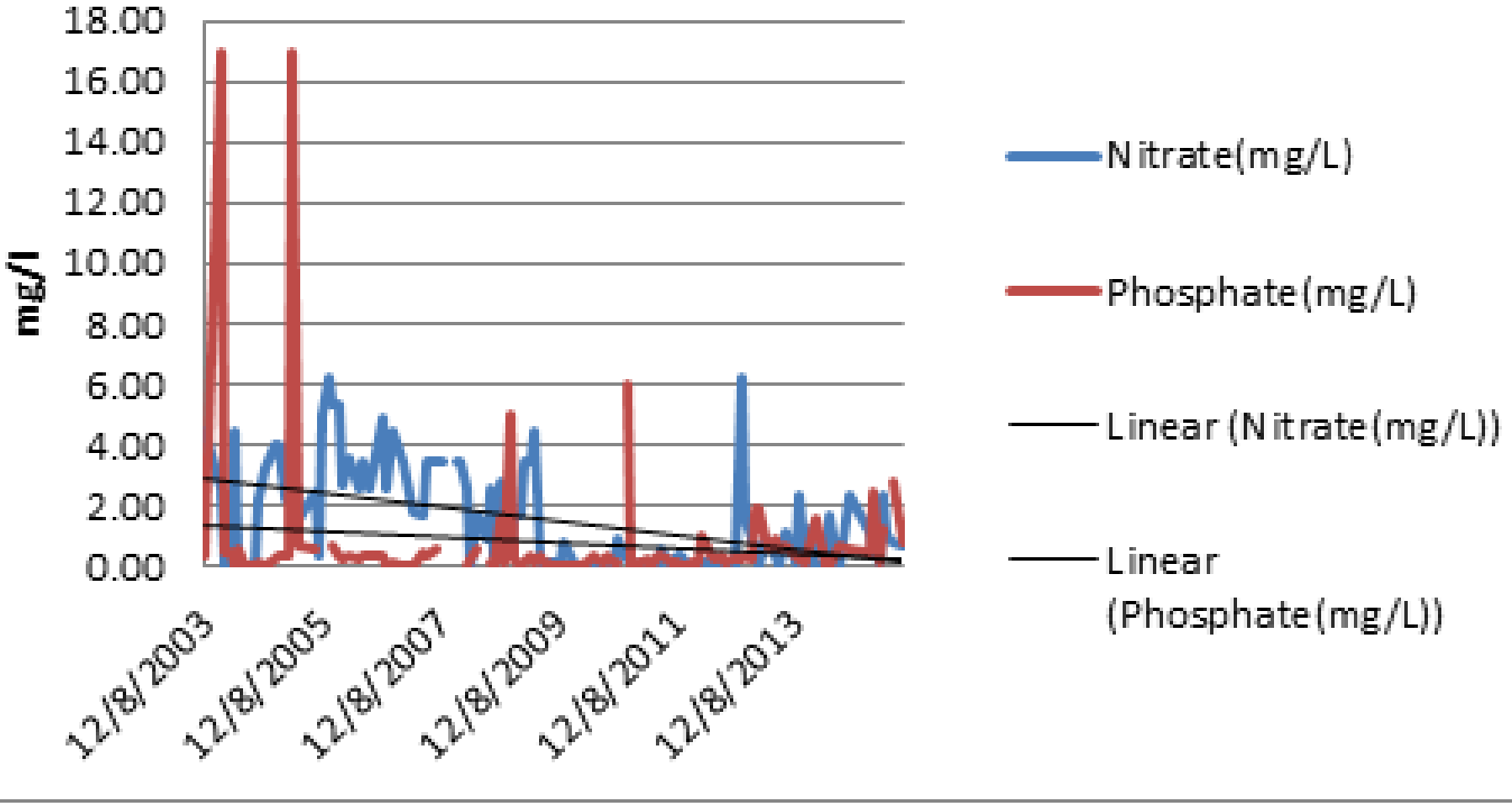
1. Where forest vegetation exists within a Riparian Buffer Area, such forest vegetation shall be maintained. Dead trees, diseased trees, or hazardous trees that jeopardize public safety may be removed.

Watershed Alliance of Adams County partnered with the Conservation District, volunteers, and local college students to plant over 3 acres of riparian buffer

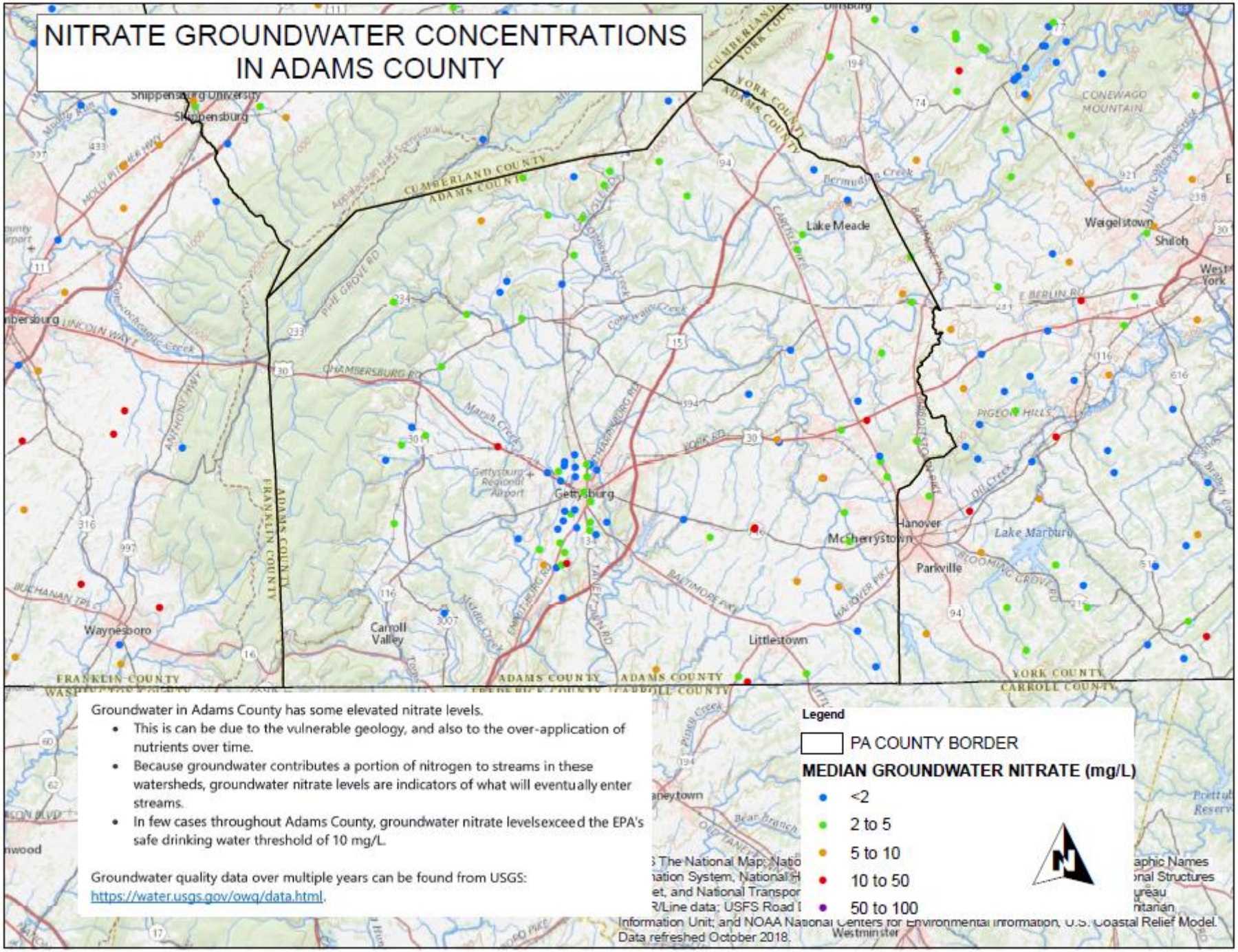
Priority Initiative 1: Reporting and Tracking						
1.1	Initiate additional water quality monitoring sites that promote long-term trend evaluation at key locations in Adams County	Additional sites as needed to evaluate Adams County progress as well as progress for specific land uses or projects in the county Additional monitoring capabilities needed at monitoring station at East Berlin and Bridgeport Stations to analyze nitrogen and phosphorus Increase technical capacity to be able to evaluate loading trends Work w/ state so citizen stream monitoring data can be utilized It is important to monitor implementation progress in terms of water quality, not just using the model	WAAC, USGS, DEP, USGS, Conservation District	Adams County	2025	A c


Rock Creek Nutrients
mg/liter
30.00
25.00
20.00
15.00
10.00
5.00
0.00
1/11/2005
1/11/2006
1/11/2007
1/11/2008
1/11/2009
1/11/2010
1/11/2011
1/11/2012
1/11/2013
1/11/2014
1/11/2015
1/11/2016
Nitrate(mg/L)
Phosphate(mg/L)
Linear (Nitrate(mg/L))
Linear (Phosphate(mg/L))

Marsh Creek Nutrients



NITRATE GROUNDWATER CONCENTRATIONS IN ADAMS COUNTY



Groundwater in Adams County has some elevated nitrate levels.

- This is can be due to the vulnerable geology, and also to the over-application of nutrients over time.
- Because groundwater contributes a portion of nitrogen to streams in these watersheds, groundwater nitrate levels are indicators of what will eventually enter streams.
- In few cases throughout Adams County, groundwater nitrate levels exceed the EPA's safe drinking water threshold of 10 mg/L.

Groundwater quality data over multiple years can be found from USGS: https://water.usgs.gov/owq/data.html.

Data refreshed October 2018.

Gettysburg Municipal Authority

Adams County, PA

Source Water Protection Plan

Executive Summary

Clean, safe drinking water is often taken for granted. Many people have no idea where their water comes from, how it is purified, or how it arrives at their sink. Protecting the raw water supply has been increasingly recognized as a critical element in the overall mission of delivering a safe and reliable supply of drinking water to consumers. Comprehensive source water protection not only benefits the water supply, but ultimately the economic, social, and environmental well-being of a community.

Project Background

Gettysburg Municipal Authority delivers drinking water to a population of approximately 12,000 people in Adams County, southcentral Pennsylvania. GMA's mission is to provide a safe, adequate, reliable, and cost-effective supply of water, while planning for future growth, and continuing to meeting all guidelines pertaining to water and wastewater services. In 2015, GMA initiated a project with the Pennsylvania Department of Environmental Protection (DEP) Source Water Protection Technical Assistance Program (SWPTAP) to develop a thorough and complete source water protection program.

DRAFT Critical Area Resource Plan
Marsh and Rock Creek Watersheds
Adams County, Pennsylvania

Prepared for
Pennsylvania Department of Environmental Protection
in partial fulfillment of the requirements of
Grant No. 4300222545

Prepared by
Heidi L.N. Moltz
James B. Palmer

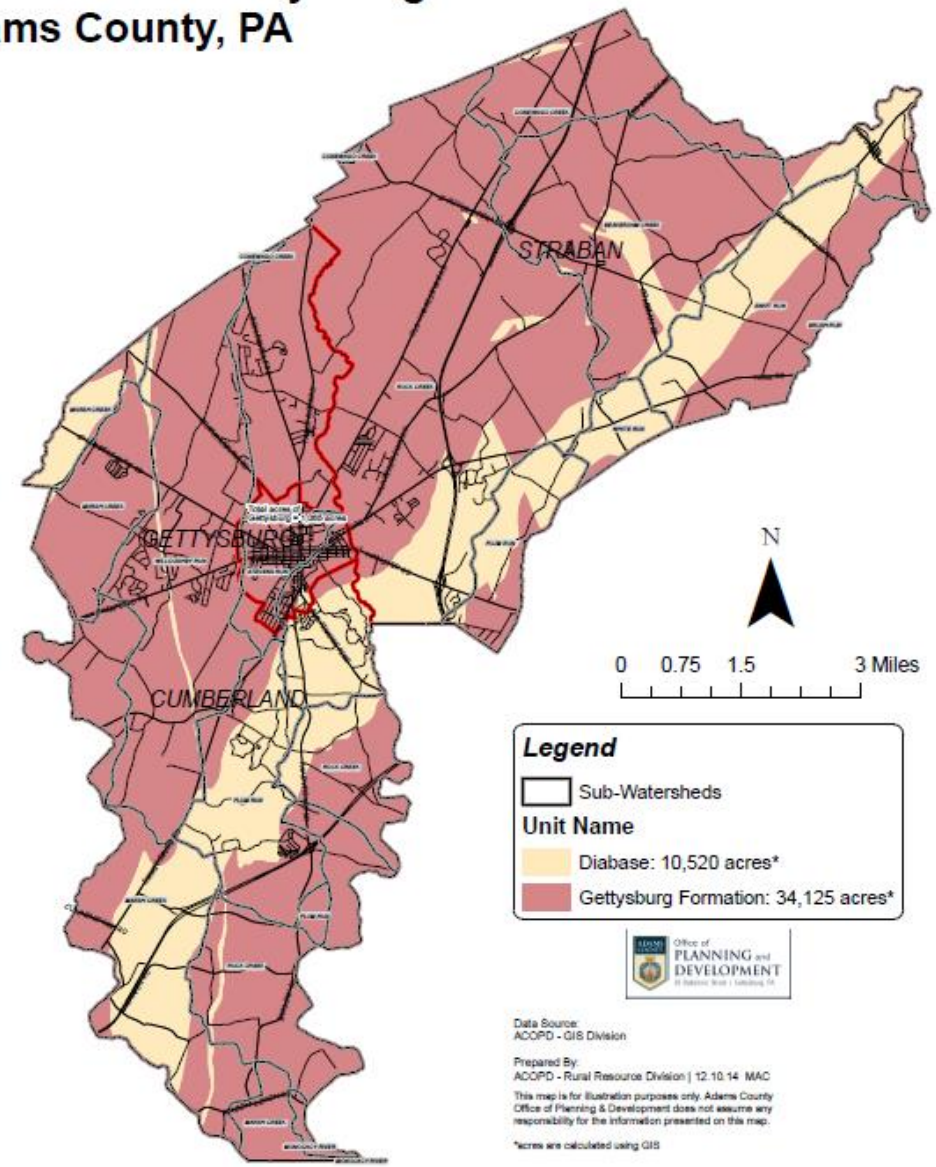
Appendix B Excerpt from: *Base Flow and Impervious Cover In West Conewago Creek Watershed Upstream of East Berlin*, GeoServices, Ltd., 2009.

Table 4. Hydrogeologic Unit Calculation of Recharge (Base Flow)
The Watershed Alliance of Adams County
West Conewago Creek Watershed

Geologic Unit	*Gerhart and Lazorchick Hydrogeologic Unit*	*Model Recharge Per Unit (mgd/mi^2)*	*Square Miles of Geologic Unit above Gage*	*Calculated Recharge (mgd)*	*Calculated Recharge (cfs)*
Sedimentary Strata at Jacksonwald & Aspers	5	0.34	0.6	0.2	0.3
Diabase	NA	0.00	15.3	0.0	0.0
Bonneauville Shale Belt	5	0.12	21.3	2.6	3.9
Gettysburg Formation	5	0.34	46.3	15.7	24.3
Heidlersburg Member of Gettysburg Formation	5	0.34	10.8	3.7	5.7
New Oxford Conglomerate	5	0.34	0.5	0.2	0.3
New Oxford Formation	5	0.34	16.9	5.8	8.9
Quartz Fanglomerate	18	0.20	10.0	2.0	3.1
Conestoga Formation	7	0.51	16.3	8.3	12.9
Chickies Formation	7	0.51	1.6	0.8	1.2
Kinzers Formation	7	0.51	4.8	2.4	3.8
Ledger Formation	7	0.51	1.9	1.0	1.5
Vintage Formation	7	0.51	1.5	0.8	1.2
Antietam and Harpers Formations (undivided)	8	0.31	10.2	3.1	4.9
Antietam Formation	8	0.31	0.1	<0.1	<0.1
Mont Alto Member of Harpers Formation	8	0.31	0.1	<0.1	<0.1
Weverton and Loudon Formations (undivided)	8	0.31	4.6	1.4	2.2
Marburg Schist	10	0.46	11.9	5.5	8.5
Marburg Schist	10	0.46	5.1	2.4	3.7
Greenstone Schist	NA	0.52	3.7	1.9	3.0
Metarhyolite	NA	0.52	30.3	15.8	24.4
Metabasalt	NA	0.52	4.9	2.5	3.9
TOTALS			**218.8**	**76.1**	**117.8**
Average annual watershed recharge (mgd/mi^2)				0.348	
Average annual watershed recharge (inches)				7.2	

mgd = million gallons per day
cfs = cubic feet per second
mi^2 = square mile

Geologic map of
Cumberland - Gettysburg - Straban
Adams County, PA



Other water uses in the planning area but outside the GMA service area would include industrial and commercial users. This information can be obtained from Act 220 registrations or field surveys that could enumerate the commercial/industrial water uses outside the GMA service area. The following table lists these other uses:

GenOn Power Plant	0.0894 mgd
Valley Quarries	0.9320 mgd
Commercial, Industrial and Superfund Sites (Act 220)	0.1240 mgd
PA American Water Co., Lake Heritage	0.1130 mgd
Total	1.2584 mgd

The estimated total water use in the planning area is as follows:

GMA and CWS's	1.7550 mgd
Private Wells	0.0374 mgd
Agriculture	0.2841 mgd
Other	1.2584 mgd
Total	3.3349 mgd

CONSIDER GROUNDWATER QUALITY

There are some areas of groundwater contamination in the planning area. Further investigation has revealed that there are three superfund sites and a few former industrial sites with groundwater contamination in the planning area, all of which are undergoing treatment. The size of the area affected by these sites is less than 120 acres in total. The relatively small area plus that the contamination is contained and undergoing treatment indicates that these would have minimal impact on groundwater availability.

EVALUATE FINAL GROUNDWATER AVAILABILITY ESTIMATE

Based on the calculated estimates above, the amount of groundwater available during a 1-in-30 year drought is 8.782 mgd. The estimated current usage is 3.3349 mgd. Therefore, the amount of groundwater available for future use is estimated to be 8.782 mgd minus 3.3349 mgd equaling 5.4471 mgd.