

01636500 SHENANDOAH RIVER AT MILLVILLE, WV

Potomac Basin
Shenandoah Subbasin

LOCATION.--Lat 39°16'55", long 77°47'22" referenced to North American Datum of 1927, Jefferson County, WV, Hydrologic Unit 02070007, on left bank 0.4 mi downstream from Cattail Run, 1.0 mi upstream from Millville, 5.0 mi upstream from Harpers Ferry, and at mile 4.7.

DRAINAGE AREA.--3,041 mi².

SURFACE-WATER RECORDS

PERIOD OF RECORD.--April 1895 to March 1909 (monthly discharge published in WSP 1302 and annual maxima), August 1928 to current year (daily discharge and peaks).

REVISED RECORDS.--WSP 951: 1936(M). WSP 1432: 1895-99, 1901-02, 1905, 1907-08, 1932(M), 1935(M). WDR WV-97-1: Drainage area. WDR-US-2006: Drainage area.

GAGE.--Water-stage recorder with satellite telemeter. Datum of gage is 292.44 ft above NAVD 88 (GPS levels). Apr. 15, 1895 to Mar. 31, 1909, nonrecording gage at site 0.8 mi downstream at datum 0.32 ft higher.

REMARKS.--Records good except those for estimated period, which are poor. Some regulation by upstream hydroelectric plants, including that of Potomac Light and Power Company, 0.5 mi upstream from station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of 1870 reached a stage of about 26.4 ft (about the same as the flood of Mar. 18, 1936, at current site and datum), discharge, about 151,000 ft³/s. Flood of May 13, 1924, reached a stage of 21.10 ft (at site and datum in use Apr. 15, 1895 to Mar. 31, 1903), discharge, 119,000 ft³/s.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 15,000 ft³/s and (or) maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Oct 30	2030	29,000	11.42
Feb 1	1400	26,900	11.00
Mar 14	0045	20,200	9.53
May 9	0815	*38,500	*13.16
Jun 12	0915	15,900	8.44
Jul 13	1915	15,800	8.41

Minimum discharge, 470 ft³/s, Oct. 14, gage height, 1.37 ft.

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DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2012 TO SEPTEMBER 2013
DAILY MEAN VALUES

[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	1,010	6,170	960	1,710	21,900	2,890	4,080	2,340	2,050	1,770	1,320	1,160
2	1,020	3,720	934	1,660	e12,900	2,820	4,030	2,220	1,980	1,660	1,370	1,290
3	1,030	2,790	915	1,600	e8,790	2,600	3,940	2,070	2,320	1,620	1,330	1,270
4	1,000	2,270	893	1,570	e6,880	2,440	3,800	1,960	2,610	1,580	1,310	1,120
5	992	1,970	871	1,530	e5,340	2,300	3,630	1,850	2,060	1,550	1,210	1,040
6	1,030	1,750	845	1,510	e4,440	2,310	3,510	1,820	1,880	1,590	1,160	1,010
7	938	1,590	824	1,510	e3,760	2,450	3,390	1,890	2,050	1,550	1,070	933
8	859	1,470	819	1,510	e3,360	2,740	3,240	11,100	2,730	1,560	1,020	891
9	804	1,370	845	1,520	e2,930	3,010	3,050	35,900	4,030	1,410	1,080	862
10	762	1,290	876	1,510	e2,760	2,940	2,890	22,600	4,090	1,370	1,070	795
11	739	1,230	927	1,550	e2,560	3,920	2,790	14,500	6,220	1,340	1,010	802
12	727	1,190	888	1,630	e2,390	6,110	2,780	12,000	14,300	1,390	975	780
13	706	1,330	861	1,810	e2,240	14,700	3,110	9,450	10,900	7,960	983	768
14	674	1,770	838	1,910	e2,190	17,400	3,950	7,440	9,190	9,010	1,060	755
15	677	1,650	833	2,020	e2,130	11,600	4,680	6,000	6,700	5,330	1,080	719
16	677	1,660	810	3,440	e2,080	8,640	4,330	5,110	5,210	4,050	993	699
17	674	1,630	808	7,210	e1,960	7,000	3,970	4,420	4,200	3,260	893	699
18	646	1,540	824	8,140	e1,860	6,090	3,690	3,830	3,620	2,690	836	685
19	768	1,470	815	7,070	e1,800	5,790	3,370	3,410	4,600	2,330	837	673
20	828	1,390	809	5,570	e1,730	6,010	3,350	3,130	5,890	2,100	858	683
21	811	1,330	941	4,520	e1,710	7,080	4,210	2,920	4,210	1,850	986	687
22	734	1,280	991	3,760	e1,680	6,880	4,920	2,760	3,340	2,090	1,170	683
23	709	1,210	1,070	3,220	e1,660	6,110	4,780	3,070	2,750	3,090	1,060	753
24	672	1,140	1,060	2,730	e1,620	5,300	4,180	3,740	2,600	3,880	1,420	760
25	648	1,090	1,200	2,420	e1,520	4,870	3,710	4,010	2,330	2,660	1,760	752
26	634	1,040	1,270	2,140	e1,540	4,780	3,330	3,960	2,160	2,110	1,780	738
27	625	1,040	1,540	2,120	e1,930	4,750	2,960	3,610	2,370	1,850	1,540	712
28	619	1,030	1,770	1,910	2,730	4,650	2,660	3,100	2,280	1,700	1,230	681
29	1,000	1,010	1,780	1,910	---	4,450	2,520	2,740	2,200	1,560	1,160	657
30	13,800	976	1,810	2,090	---	4,220	2,430	2,560	2,020	1,520	1,120	673
31	14,200	---	1,790	12,800	---	4,090	---	2,320	---	1,430	1,100	---
Total	51,013	50,396	32,417	95,600	108,390	170,940	107,280	187,830	122,890	78,860	35,791	24,730
Mean	1,646	1,680	1,046	3,084	3,871	5,514	3,576	6,059	4,096	2,544	1,155	824
Max	14,200	6,170	1,810	12,800	21,900	17,400	4,920	35,900	14,300	9,010	1,780	1,290
Min	619	976	808	1,510	1,520	2,300	2,430	1,820	1,880	1,340	836	657
Cfsm	0.54	0.55	0.34	1.01	1.27	1.81	1.18	1.99	1.35	0.84	0.38	0.27
In.	0.62	0.62	0.40	1.17	1.33	2.09	1.31	2.30	1.50	0.96	0.44	0.30

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1895 - 2013, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	1,898	1,918	2,590	3,200	3,788	5,013	4,378	3,402	2,415	1,442	1,545	1,539
Max	16,250	13,350	8,164	13,470	18,100	17,540	12,840	8,701	10,380	4,809	10,390	14,780
(WY)	(1943)	(1986)	(1973)	(1996)	(1998)	(1936)	(1901)	(1901)	(1972)	(1972)	(1955)	(1996)
Min	343	388	410	475	471	929	992	1,001	643	402	388	411
(WY)	(1931)	(1932)	(1966)	(2002)	(2002)	(1931)	(1981)	(1969)	(1999)	(1966)	(1930)	(1963)

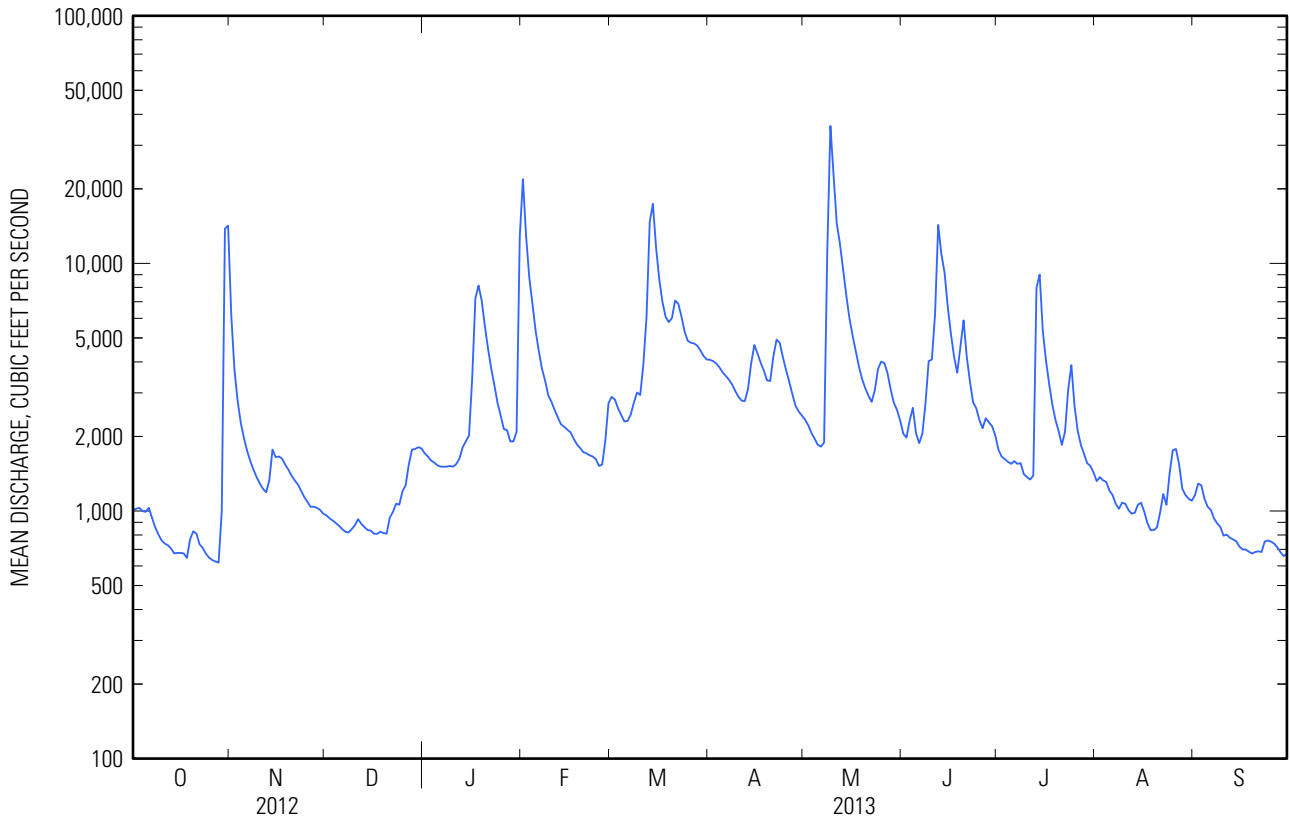
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SUMMARY STATISTICS

	Calendar Year 2012		Water Year 2013		Water Years 1895 - 2013	
Annual total	689,201		1,066,137			
Annual mean	1,883		2,921		2,755	
Highest annual mean					5,618	1996
Lowest annual mean					927	2002
Highest daily mean	14,200	Oct 31	35,900	May 9	192,000	Oct 16, 1942
Lowest daily mean	532	Jul 17	619	Oct 28	194	Jul 24, 1930
Annual seven-day minimum	583	Jul 12	663	Oct 22	240	Sep 7, 1966
Maximum peak flow			38,500	May 9	^a 230,000 Oct 16, 1942	
Maximum peak stage			13.16	May 9	^b 32.40 Oct 16, 1942	
Instantaneous low flow			470	Oct 14	59	Oct 4, 1930
Annual runoff (cfsm)	0.619		0.961		0.906	
Annual runoff (inches)	8.43		13.04		12.31	
10 percent exceeds	3,250		6,000		5,580	
50 percent exceeds	1,450		1,810		1,620	
90 percent exceeds	732		789		610	

^a Highest since 1870.

^b From floodmarks.



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WATER-QUALITY RECORDS

PERIOD OF RECORD.--June 2012 to current year.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: October 1980 to September 1983.

WATER TEMPERATURE: October 1980 to September 1983.

COOPERATION.--This site is sampled as part of the Chesapeake Bay Program's Non-Tidal Monitoring Network in cooperation with the Maryland Department of Natural Resources.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: Maximum, 778 microsiemens, Dec. 29, 1980; minimum, 212 microsiemens, Jan. 17, 1982.

WATER TEMPERATURE: Maximum, 30.0°C, July 20, 21, 1981; minimum, 0.0°C, on many days during winter periods.

WATER-QUALITY DATA

WATER YEAR OCTOBER 2012 TO SEPTEMBER 2013

Part 1 of 4

[%, percent; FNU, Formazin nephelometric units; LED, light-emitting diode; N, nitrogen; P, phosphorus; ft, feet; ft³/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; --, no data; <, less than; E, estimated]

Date	Sample start time	Sample type	Barometric pressure, mm Hg (00025)	Temperature, air, °C (00020)	Discharge, ft ³ /s (00060)	Discharge, instantaneous, ft ³ /s (00061)	Dissolved oxygen, water, unfiltered, mg/L (00300)	Dissolved oxygen, water, unfiltered, % saturation (00301)	pH, water, unfiltered, field, standard units (00400)	Specific conductance, water, unfiltered, µS/cm at 25°C (00095)
10-18-2012	1440	Regular	747	20.0	--	620	11.0	112	8.6	334
10-31-2012	1025	Regular	740	10.0	--	12,600	10.8	94	8.1	153
11-07-2012	1340	Regular	748	7.0	--	1,640	12.0	103	8.4	306
12-12-2012	1145	Regular	762	7.0	--	859	12.0	101	8.3	351
01-17-2013	1310	Regular	753	9.5	--	6,970	11.6	95	8.0	245
01-23-2013	1605	Regular	756	-5.5	--	3,080	13.6	99	8.2	217
02-13-2013	1014	Blank	--	--	--	--	--	--	--	< 5
02-13-2013	1015	Regular	749	10.5	E 2,240	--	12.3	99	8.2	298
03-13-2013	1800	Regular	748	9.0	--	18,200	11.1	96	7.8	222
03-13-2013	1801	Replicate	--	--	--	--	--	--	--	--
03-15-2013	1035	Regular	750	6.0	--	11,700	11.5	96	8.0	169
04-18-2013	0945	Regular	754	18.0	--	3,730	8.2	89	8.0	254
05-10-2013	1035	Regular	751	E 18.0	--	22,800	9.6	95	7.7	140
05-16-2013	0955	Regular	748	27.0	--	5,140	9.1	95	7.8	211
06-13-2013	1750	Regular	738	23.5	--	9,570	7.5	89	7.5	209
07-18-2013	0900	Regular	754	31.0	--	2,850	7.0	90	7.9	248
08-15-2013	1040	Regular	757	20.0	--	1,080	8.3	100	8.5	328
09-10-2013	0910	Regular	757	25.0	--	833	8.1	96	8.4	361

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WATER-QUALITY DATA
WATER YEAR OCTOBER 2012 TO SEPTEMBER 2013

Part 2 of 4

[%, percent; FNU, Formazin nephelometric units; LED, light-emitting diode; N, nitrogen; P, phosphorus; ft, feet; ft³/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; --, no data; <, less than; E, estimated]

Date	Sample start time	Temperature, water, °C (00010)	Turbidity, water, unfiltered, monochrome near infra-red LED light, 780-900 nm, detection angle 90 +/- 2.5 degrees, FNU (63680)	Gage height, ft (00065)	Suspended solids, water, unfiltered, mg/L (00530)	Carbon (inorganic plus organic), suspended sediment, total, mg/L (00694)	Ammonia, water, filtered, mg/L as NH4 (71846)	Ammonia, water, filtered, mg/L as N (00608)	Nitrate plus nitrite, water, filtered, mg/L as N (00631)
10-18-2012	1440	15.4	--	1.59	< 15	0.37	< .013	< .010	0.510
10-31-2012	1025	8.1	--	7.94	216	13.5	.048	.037	.758
11-07-2012	1340	8.1	--	2.64	< 15	.20	< .013	< .010	1.24
12-12-2012	1145	7.7	< 1.0	1.88	< 15	.26	< .013	< .010	.938
01-17-2013	1310	6.2	--	5.49	42	3.85	.018	.014	.761
01-23-2013	1605	2.0	--	3.70	< 15	.60	< .013	< .010	1.11
02-13-2013	1014	--	--	--	< 15	.18	< .013	< .010	< .040
02-13-2013	1015	5.7	2.6	1.76	< 15	.44	< .013	< .010	1.81
03-13-2013	1800	8.5	180	6.01	125	9.62	< .013	< .010	.970
03-13-2013	1801	--	--	--	129	10.8	< .013	< .010	.954
03-15-2013	1035	7.0	210	3.83	92	5.98	.050	.039	.887
04-18-2013	0945	18.7	8.0	4.00	15	1.31	.028	.021	.850
05-10-2013	1035	14.2	130	10.13	158	8.24	.070	.054	.525
05-16-2013	0955	17.0	13	4.78	< 15	1.46	.025	.019	.936
06-13-2013	1750	22.2	--	6.46	96	6.32	.073	.057	1.22
07-18-2013	0900	27.9	15	3.66	23	1.57	.042	.033	1.66
08-15-2013	1040	23.9	4.5	2.30	< 15	.66	.024	.018	.748
09-10-2013	0910	23.5	5.6	1.98	< 15	.78	.033	.026	.874

01636500 SHENANDOAH RIVER AT MILLVILLE, WV—Continued

WATER-QUALITY DATA
WATER YEAR OCTOBER 2012 TO SEPTEMBER 2013

Part 3 of 4

[%, percent; FNU, Formazin nephelometric units; LED, light-emitting diode; N, nitrogen; P, phosphorus; ft, feet; ft³/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; --, no data; <, less than; E, estimated]

Date	Sample start time	Nitrate, water, filtered, mg/L (71851)	Nitrate, water, filtered, mg/L as N (00618)	Nitrite, water, filtered, mg/L (71856)	Nitrite, water, filtered, mg/L as N (00613)	Organic nitrogen, water, filtered, mg/L (00607)	Organic nitrogen, water, unfiltered, mg/L (00605)	Orthophosphate, water, filtered, mg/L (00660)	Orthophosphate, water, filtered, mg/L as P (00671)	Particulate nitrogen, suspended in water, mg/L (49570)
10-18-2012	1440	2.25	0.507	0.010	0.003	< .20	--	0.013	0.004	0.051
10-31-2012	1025	3.33	.752	.017	.005	.44	--	.264	.086	1.30
11-07-2012	1340	5.47	1.24	.010	.003	< .16	--	.032	.011	.034
12-12-2012	1145	4.14	.934	.012	.004	< .14	--	< .012	< .004	.038
01-17-2013	1310	3.35	.757	.012	.004	.29	--	< .012	< .004	.381
01-23-2013	1605	4.88	1.10	.012	.004	< .15	< .12	< .012	< .004	.064
02-13-2013	1014	< .177	< .040	< .003	< .001	< .05	--	< .012	< .004	.019
02-13-2013	1015	7.98	1.80	.018	.005	< .21	--	.013	.004	.030
03-13-2013	1800	4.27	.965	.017	.005	< .22	--	< .012	< .004	.972
03-13-2013	1801	4.20	.949	.017	.005	< .26	--	< .012	< .004	1.10
03-15-2013	1035	3.90	.881	.022	.007	.29	--	.087	.028	.642
04-18-2013	0945	3.74	.844	.019	.006	.21	--	.014	.004	.150
05-10-2013	1035	2.29	.517	.024	.007	.34	--	.113	.037	.835
05-16-2013	0955	4.12	.930	.018	.005	.12	--	.052	.017	.147
06-13-2013	1750	5.30	1.20	.064	.020	.29	--	.222	.072	.678
07-18-2013	0900	7.27	1.64	.062	.019	--	--	.314	.102	.149
08-15-2013	1040	3.28	.742	.020	.006	.40	--	.018	.006	.098
09-10-2013	0910	3.84	.868	.020	.006	.25	--	.030	.010	.082

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WATER-QUALITY DATA
WATER YEAR OCTOBER 2012 TO SEPTEMBER 2013

Part 4 of 4

[%, percent; FNU, Formazin nephelometric units; LED, light-emitting diode; N, nitrogen; P, phosphorus; ft, feet; ft³/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; mm, millimeters; nm, nanometers; °C, degrees Celsius; μS/cm, microsiemens per centimeter; --, no data; <, less than; E, estimated]

Date	Sample start time	Phosphorus, water, filtered, mg/L as P (00666)	Phosphorus, water, unfiltered, mg/L as P (00665)	Total nitrogen, water, filtered, analytically determined, mg/L (62854)	Total nitrogen, water, unfiltered, analytically determined, mg/L (62855)	Total nitrogen, water, unfiltered, mg/L (00600)	Suspended sediment, sieve diameter, percent smaller than 0.0625 mm (70331)	Suspended sediment concentration, mg/L (80154)
10-18-2012	1440	0.009	0.01	0.71	--	0.76	--	2
10-31-2012	1025	.103	.35	1.24	--	2.5	93	242
11-07-2012	1340	.014	.02	1.40	--	1.4	--	3
12-12-2012	1145	.004	< .01	1.08	--	1.1	--	2
01-17-2013	1310	.007	.06	1.06	--	1.4	88	43
01-23-2013	1605	.005	.03	1.25	1.23	1.3	--	5
02-13-2013	1014	< .003	< .01	< .05	--	< .07	--	< .5
02-13-2013	1015	.007	.01	2.02	--	2.0	--	3
03-13-2013	1800	.006	.174	1.20	--	2.2	86	134
03-13-2013	1801	.006	.173	1.21	--	2.3	86	134
03-15-2013	1035	.037	.17	1.22	--	1.9	--	100
04-18-2013	0945	.008	.02	1.08	--	1.2	--	14
05-10-2013	1035	.049	.22	.92	--	1.8	93	170
05-16-2013	0955	.025	.05	1.08	--	1.2	--	20
06-13-2013	1750	.081	.19	1.56	--	2.2	--	91
07-18-2013	0900	.107	.13	1.69	--	1.8	--	22
08-15-2013	1040	.011	.01	1.17	--	1.3	--	8
09-10-2013	0910	.013	.02	1.15	--	1.2	--	6