

BUSH KILL BASIN

01439500 BUSH KILL AT SHOEMAKERS, PA
(Pennsylvania Water-Quality Network Station)

LOCATION.--Lat 41°05'17", long 75°02'17", Monroe County, Hydrologic Unit 02040104, on right bank 30 ft downstream from bridge on township route 523, 0.1 mi downstream from Saw Creek, 0.7 mi northwest of Shoemakers, and 2.0 mi southwest of Bushkill.

DRAINAGE AREA.--117 mi².

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1908 to current year. Monthly discharge only for some periods, published in WSP 1302. Prior to October 1928, published as Bushkill Creek near Shoemakers; October 1928 to September 1952, published as Bushkill Creek at Shoemakers.

REVISED RECORDS.--WSP 756: Drainage area. WSP 1202: 1921, 1932(M), 1933, 1935-36, 1938(M), 1939-40, 1942, 1945, 1946(M), 1948(M). WSP 1302: 1909-15, 1920(M), 1922-29. WDR PA-89-1: 1988.

GAGE.--Water-stage recorder. Datum of gage is 421.13 ft above National Geodetic Vertical Datum of 1929. Sept. 19, 1908, to Aug. 12, 1938, nonrecording gage, and Aug. 13, 1938, to June 20, 1956, water-stage recorder at site 50 ft upstream at same datum.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Several measurements of water temperature were made during the year. Satellite telemetry at station.

PEAK DISCHARGES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,100 ft³/s and maximum (*):

Date	Time	Discharge ft ³ /s	Gage Height (ft)	Date	Time	Discharge ft ³ /s	Gage Height (ft)
Oct. 12	0545	1,130	3.41	June 1	1645	1,110	3.38
Mar. 22	0145	2,200	4.54	June 22	1015	*2,340	*4.68

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	65	212	278	395	e150	e180	632	137	820	267	65	95
2	57	201	249	871	e150	e200	606	133	929	230	207	220
3	49	183	e200	724	e150	e260	586	125	743	198	197	245
4	50	167	e190	637	e220	e220	523	120	744	176	548	261
5	59	157	e180	562	e200	e200	510	118	652	159	765	222
6	57	227	e180	509	e160	e260	477	118	543	142	719	168
7	47	230	e170	464	e160	e220	435	118	604	130	516	134
8	42	197	e160	432	e150	e200	410	118	792	126	454	118
9	37	182	e150	417	e140	e220	386	120	644	123	374	105
10	36	173	e140	405	e140	e220	386	117	547	120	441	88
11	367	175	e280	362	e140	e200	388	115	473	121	404	78
12	1050	207	e400	e300	e130	e190	381	117	477	120	407	70
13	760	300	e380	e280	e120	e220	355	112	631	113	333	74
14	560	271	507	e260	e110	e230	327	106	545	99	277	93
15	430	246	572	e240	e120	e240	305	99	548	89	226	137
16	495	266	523	e230	e100	274	291	94	438	83	210	145
17	774	632	453	e220	e240	461	268	89	370	74	182	118
18	624	815	396	e200	e200	763	250	84	372	69	156	105
19	520	700	365	e190	e140	964	241	82	357	82	139	118
20	443	597	486	e190	e130	1030	230	73	373	66	124	125
21	375	530	609	e180	e120	2000	217	89	956	62	117	119
22	322	519	535	e170	e180	1970	210	102	2220	164	113	111
23	280	540	487	e170	e360	1540	190	93	1860	163	103	638
24	245	474	441	e160	e300	1180	175	108	1280	164	89	771
25	225	425	433	e160	e260	942	165	118	928	143	80	591
26	365	384	420	e160	e220	801	176	273	705	127	75	501
27	372	369	391	e150	e200	723	190	336	551	106	72	435
28	310	338	360	e150	e190	613	169	285	445	103	64	683
29	273	310	335	e160	---	652	156	264	366	90	59	688
30	251	292	308	e160	---	840	146	222	311	74	65	546
31	233	---	300	e150	---	730	---	224	---	66	61	---
TOTAL	9773	10319	10878	9658	4880	18743	9781	4309	21224	3849	7642	7802
MEAN	315	344	351	312	174	605	326	139	707	124	247	260
MAX	1050	815	609	871	360	2000	632	336	2220	267	765	771
MIN	36	157	140	150	100	180	146	73	311	62	59	70
CFSM	2.69	2.94	3.00	2.66	1.49	5.17	2.79	1.19	6.05	1.06	2.11	2.22
IN.	3.11	3.28	3.46	3.07	1.55	5.96	3.11	1.37	6.75	1.22	2.43	2.48

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 2003, BY WATER YEAR (WY)

MEAN	124	209	263	258	271	433	429	303	200	128	98.0	93.7
MAX	773	643	841	807	706	1119	1002	773	919	747	864	569
(WY)	1956	1933	1997	1979	1909	1936	1993	1989	1972	1945	1955	1933
MIN	7.74	13.6	21.7	44.2	39.7	156	141	90.7	32.8	13.4	8.33	4.39
(WY)	1965	1965	1999	1981	1934	1981	1985	1941	1962	1999	1964	1964

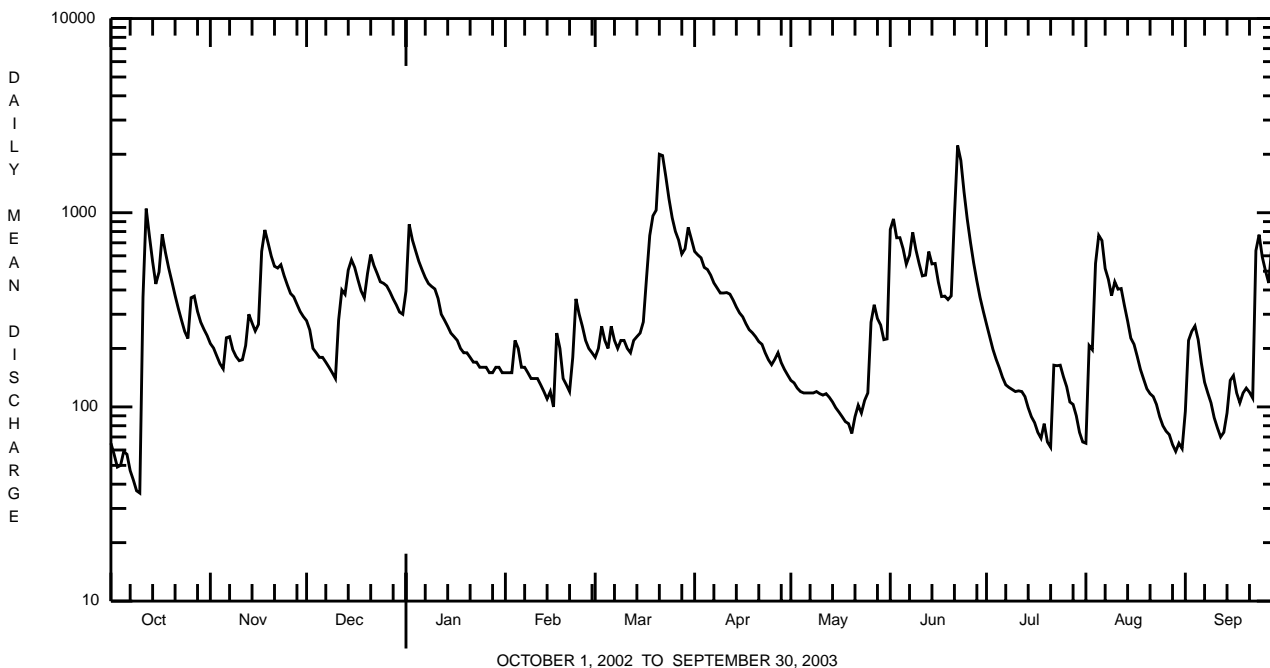
e Estimated.

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SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1909 - 2003	
ANNUAL TOTAL	83038.8		118858		234	
ANNUAL MEAN	228		326		419	
HIGHEST ANNUAL MEAN					1928	
LOWEST ANNUAL MEAN					95.4	
HIGHEST DAILY MEAN	1070	Jun 7	2220	Jun 22	11800	Aug 19 1955
LOWEST DAILY MEAN	8.0	Sep 14	36	Oct 10	2.6	Sep 25 1964
ANNUAL SEVEN-DAY MINIMUM	9.5	Sep 9	47	Oct 4	2.7	Sep 21 1964
MAXIMUM PEAK FLOW			2340	Jun 22	a 23400	Aug 19 1955
MAXIMUM PEAK STAGE			4.68	Jun 22	b 13.95	Aug 19 1955
INSTANTANEOUS LOW FLOW					2.6	Sep 25 1964
ANNUAL RUNOFF (CFSM)	1.94		2.78		2.00	
ANNUAL RUNOFF (INCHES)	26.40		37.79		27.16	
10 PERCENT EXCEEDS	517		652		521	
50 PERCENT EXCEEDS	160		224		160	
90 PERCENT EXCEEDS	22		89		27	

a From rating curve extended above 2,600 ft³/s on basis of slope-area measurement of peak flow.
b From floodmark.



OCTOBER 1, 2002 TO SEPTEMBER 30, 2003

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01439500 BUSH KILL AT SHOEMAKERS, PA--Continued
(Pennsylvania Water-Quality Network Station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--April 2002 to current year.

REMARKS.--Other data for the Water-Quality Network can be found on pages 430-470. Some values for "dissolved" parameters exceed values for the corresponding "total" parameter. These results are within the limits of analytical precision and methods.

COOPERATION.--Samples were collected as part of the Pennsylvania Department of Environmental Protection Water-Quality Network (WQN) with cooperation from the Pennsylvania Department of Environmental Protection.

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Time	Agency collecting sample, code (00027)	Agency analyzing sample, code (00028)	Instantaneous discharge, cfs (00061)	Sampling method, code (82398)	Dissolved oxygen, mg/L (00300)	pH, water, unfltrd field, std units (00400)	Specif. conductance, wat unfltrd, μ S/cm 25 degC (00095)	Temperature, water, deg C (00010)	Hardness, water, unfltrd, mg/L as CaCO3 (00900)	Calcium water, unfltrd, mg/L (00915)	Calcium water unfltrd recover-able, mg/L (00916)	Magnesium, water, unfltrd, mg/L (00925)	
Date		Magnesium, water, unfltrd recover-able, mg/L (00927)	ANC, wat unfltrd fixed end pt, lab, mg/L as CaCO3 (00417)	Acidity water, unfltrd heated, mg/L as CaCO3 (70508)	Sulfate water, unfltrd, mg/L (00945)	Residue on evap. at 105degC, wat fltrd, mg/L (00515)	Residue total at 105 deg. C, suspended, mg/L (00530)	Ammonia water, unfltrd, mg/L as N (00610)	Nitrate water, unfltrd, mg/L as N (00620)	Nitrite water, unfltrd, mg/L as N (00615)	Ortho-phosphate, water, unfltrd, mg/L as P (70507)	Phosphorus, water, unfltrd, mg/L (00665)	Total nitrogen, water, unfltrd, mg/L (00600)	BOD, water, unfltrd 5 day, 20 degC, mg/L (00310)
NOV 2002														
04...	1430	1028	9813	166	30	12.7	6.6	40	5.0	13	3.14	3.4	1.06	
JAN 2003														
09...	1330	1028	9813	413	30	12.7	6.4	40	2.8	11	2.86	2.9	.98	
MAR														
04...	1520	1028	9813	E220	30	14.3	7.0	58	.1	15	3.96	4.1	1.24	
MAY														
07...	1740	1028	9813	118	30	10.2	6.8	47	15.7	12	3.33	3.2	1.02	
JUL														
01...	1300	1028	9813	269	30	10.3	6.7	37	20.1	11	2.75	2.8	.96	
SEP														
09...	1130	1028	9813	108	30	9.8	7.2	44	17.9	12	3.18	3.2	.98	

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WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Alum- inum, water, unfltrd recovery, µg/L (01106)	Alum- inum, water, unfltrd recovery, µg/L (01105)	Copper, water, unfltrd recovery, µg/L (01040)	Copper, water, unfltrd recovery, µg/L (01042)	Iron, water, unfltrd recovery, µg/L (01046)	Iron, water, unfltrd recovery, µg/L (01045)	Lead, water, unfltrd recovery, µg/L (01049)	Lead, water, unfltrd recovery, µg/L (01051)	Mangan- ese, water, unfltrd recovery, µg/L (01056)	Mangan- ese, water, unfltrd recovery, µg/L (01055)	Nickel, water, unfltrd recovery, µg/L (01065)	Nickel, water, unfltrd recovery, µg/L (01067)	Zinc, water, unfltrd recovery, µg/L (01090)
NOV 2002 04...	71	100	<4	<4	60	90	<1.0	<1.0	2.5	7.9	<4.0	7.1	5.8
JAN 2003 09...	56	65	<4	<4	50	70	<1.0	<1.0	2.8	6.2	<4.0	<4.0	5.1
MAR 04...	42	70	<4	<4	50	100	<1.0	<1.0	3.1	10	<4.0	<4.0	<5.0
MAY 07...	37	55	<4	<4	40	70	<1.0	<1.0	2.8	9.5	<4.0	<4.0	<5.0
JUL 01...	67	100	<4	<4	140	180	<1.0	<1.0	4.4	10	<4.0	<4.0	5.4
SEP 09...	43	57	<4	<4	110	150	<1.0	<1.0	4.5	10	<4.0	<4.0	10

Date	Zinc, water, unfltrd recovery, µg/L (01092)
NOV 2002 04...	6.5
JAN 2003 09...	5.8
MAR 04...	6.4
MAY 07...	<5.0
JUL 01...	6.1
SEP 09...	20

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BIOLOGICAL DATA
BENTHIC MACROINVERTEBRATES

REMARKS.--Samples were collected using rapid bioassessment protocols for benthic macroinvertebrates using a D-Frame net with a mesh size of 500 µm. Samples represent counts per 100 (approximate) subsamples.

Date	8/6/02
Benthic Macroinvertebrate	Count
Nemertea (PROBOSAS WORMS)	
Enopla	
Hoplonemertea	
Tetrastemmatidae	
<u>Prostoma</u> sp	2
Mollusca	
Gastropoda (SNAILS)	
Basommatophora	
Ancylidae	
<u>Ferrissia</u> sp	1
Bivalvia (CLAMS)	
Veneroida	
Sphaeriidae	
<u>Sphaerium</u> sp	9
Annelida	
Oligochaeta (AQUATIC EARTHWORMS)	
Lumbriculida	
Lumbriculidae	3
Insecta	
Ephemeroptera (MAYFLIES)	
Baetidae	
<u>Acentrella</u> sp	1
<u>Baetis</u> sp	4
Ephemerellidae	
<u>Dannella</u> sp	4
Heptageniidae	
<u>Epeorus</u> sp	6
<u>Heptagenia</u> sp	2
<u>Stenonema</u> sp	5
Isonychiidae	
<u>Isonychia</u> sp	2
Leptophlebiidae	1
Odonata	
Coenagrionidae (DAMSELFLIES)	
<u>Argia</u> sp	1
Gomphidae (DRAGONFLIES)	4
Plecoptera (STONEFLIES)	
Perlidae	
<u>Paragnetina</u> sp	1
Trichoptera (CADDISFLIES)	
Apataniidae	
<u>Apatania</u> sp	3
Brachycentridae	
<u>Brachycentrus</u> sp	1
Glossosomatidae	
<u>Glossosoma</u> sp	1
Helicopsychidae	
<u>Helicopsyche</u> sp	1

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01439500 BUSH KILL AT SHOEMAKERS, PA--Continued

BIOLOGICAL DATA
BENTHIC MACROINVERTEBRATES--Continued

Date	8/6/02
Benthic Macroinvertebrate	Count
Trichoptera (CADDISFLIES)	
Hydropsychidae	
<u>Cheumatopsyche</u> sp	17
<u>Hydropsyche</u> sp	3
Philopotamidae	
<u>Chimarra</u> sp	4
Coleoptera (BEETLES)	
Elmidae (RIFFLE BEETLES)	
<u>Oulimnius</u> sp	1
<u>Stenelmis</u> sp	4
Psephenidae (WATER PENNIES)	
<u>Psephenus</u> sp	2
Diptera (TRUE FLIES)	
Chironomidae (MIDGES)	
Tipulidae (CRANE FLIES)	
<u>Antocha</u> sp	1
Total Organisms	105