

WIN:	23781.00		
Town:	Sinclair		
Route No.	ME162		
Asset ID:	181630		
Lat:	47.17557	Long:	-68.2501

Project Name:	
Stream Name:	n/a
Bridge Name:	n/a
Analysis by:	csh
Date:	3/25/2020

### Peak Flow Calculations by USGS Regression Equations (Hodgkins, 1999 & Lombard/Hodgkins, 2015)

*Enter data in blue cells only!*

	km <sup>2</sup>	mi <sup>2</sup>	ac
A	4.66	1.80	1152.0
W	0.50	0.2	122.5

*Enter data in [mi<sup>2</sup>]*

Watershed Area *DRNAREA*  
Wetlands area (by NWI)

P <sub>c</sub>	556002	5226629
County	Aroostook N	

watershed centroid (E, N; UTM 19N; meters)

*choose county from drop-down menu*

pptA	
A (km <sup>2</sup> )	4.66
W (%)	10.63

Conf Lvl

mean annual precipitation (inches; by look-up)

NWI Wetlands % *STORNWI*

*ver. 2020 Feb 07*

**Worksheet prepared by:**

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**References:**

Hodgkins, G.A., 1999.

Estimating the magnitude of peak flows for streams  
in Maine for selected recurrence intervals  
*WRIR 99-4008*, USGS Augusta, ME

### Watershed Characteristics for Monthly & Daily Flows

EAVG	662
SLOPE	2.78
EMAX	805
WATER	0
PRECIP	38.0
SG	0.00
HGA	0
DIST	196.00

mean basin elevation (ft)

mean basin slope (%)

maximum basin elevation (ft)

percent of drainage basin land cover classified as open water

mean annual precipitation

sand & gravel aquifer as decimal fraction of watershed A

mean basin percentage of hydrological soil group A

distance from the coast (mi)

Ret Pd	Peak Flow Estimate		
	T (yr)	Lower	Upper
1.1		0.99	
2		2.02	
5		3.16	
10		3.96	
25		5.18	
50		6.02	
100		7.04	
500		9.43	

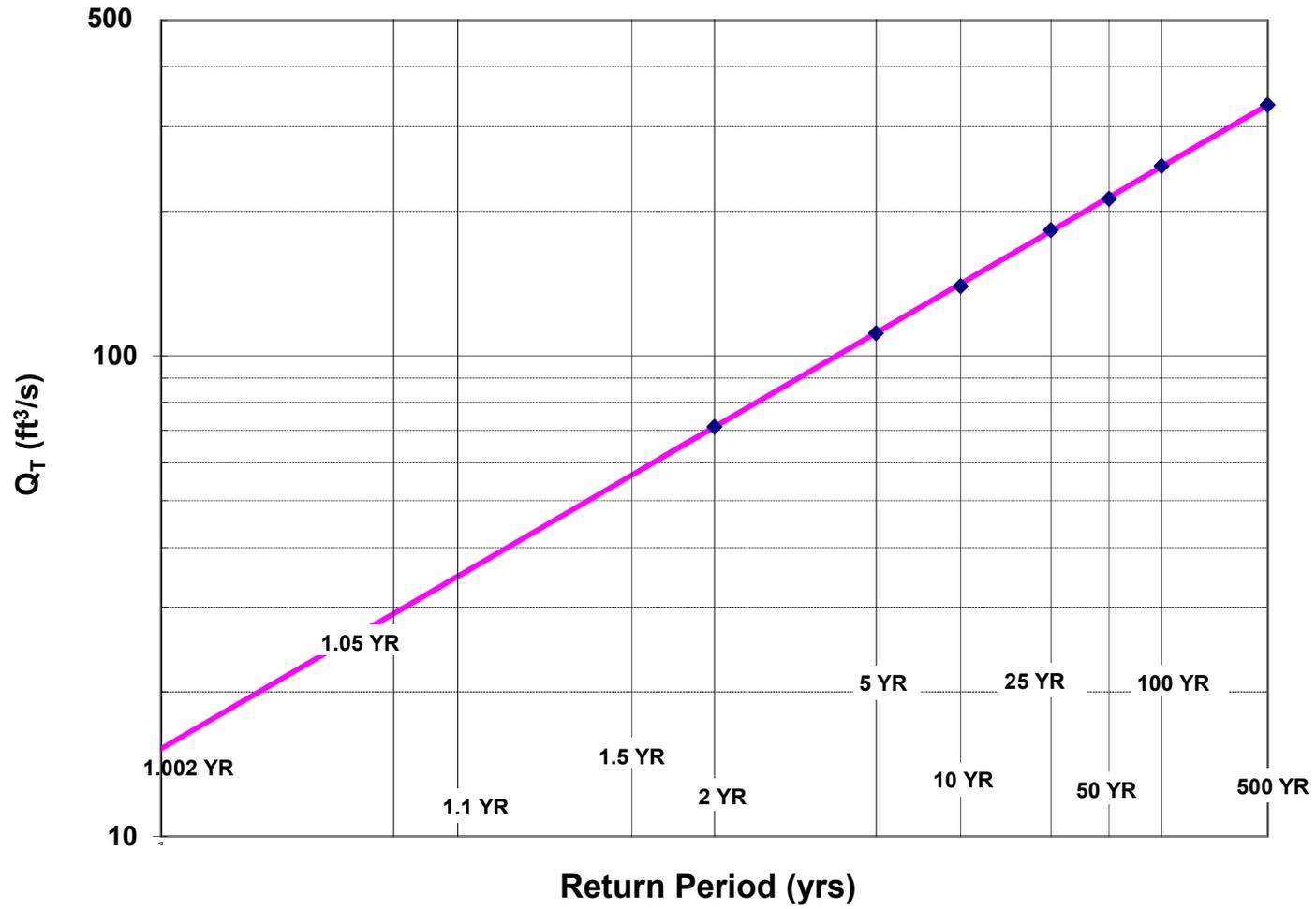
Q <sub>T</sub> (ft <sup>3</sup> /s)
34.8
71.3
111.6
139.8
183.0
212.4
248.6
333.1

Lombard, P.J. & G.A. Hodgkins, 2015.

Peak flow regression equations for small, ungaged streams in  
Maine - Comparing map-based to field-based variables  
*SIR 2015-4059*, USGS, Augusta, ME

$$Q_T = b \times A^a \times 10^{-wW}$$

# Log-Normal Probability Plot



WIN:	23781.00
Town:	Sinclair
Route No.:	ME162
Asset ID:	181630
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Long:	-68.25005

Project Name:	0
Stream Name:	n/a
Bridge Name:	n/a
Analysis by:	csh
Date:	3/25/2020

**DO NOT ENTER ANY DATA ON THIS PAGE; EVERYTHING IS CALCULATED**

**MAINE MONTHLY MEDIAN FLOWS and HYDRAULIC GEOMETRY BY USGS REGRESSION EQUATIONS (2004, 2013, 2015)**

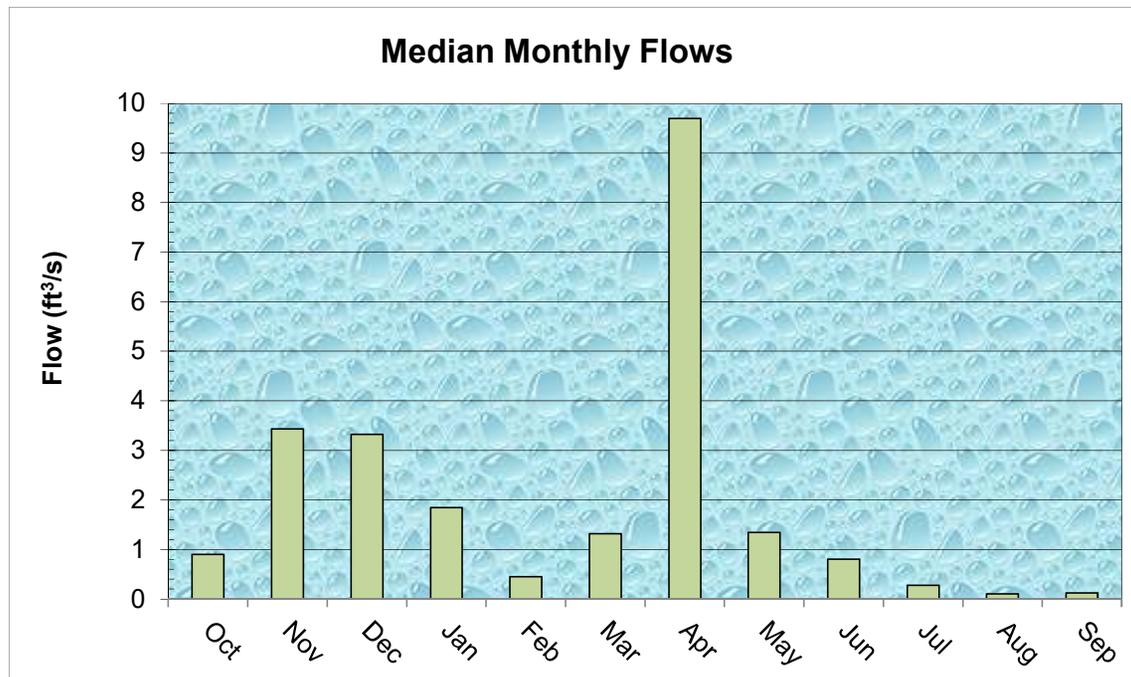
Value	Variable	Explanation
1.80	A	Area (mi <sup>2</sup> )
556002.4	P <sub>c</sub>	Watershed centroid (E,N; UTM; Zone 19; meters)
194.95	DIST	Distance from Coastal reference line (mi)
38.0	pptA	Mean Annual Precipitation (inches)
0.00	SG	Sand & Gravel Aquifer (decimal fraction of watershed area)

Month	Q <sub>median</sub> (ft <sup>3</sup> /s)	(m <sup>3</sup> /s)
Jan	1.85	0.0524
Feb	0.45	0.0128
Mar	1.32	0.0375
Apr	9.70	0.2748
May	1.35	0.0382
Jun	0.81	0.0228
Jul	0.28	0.0079
Aug	0.11	0.0030
Sep	0.12	0.0035
Oct	0.91	0.0256
Nov	3.43	0.0972
Dec	3.33	0.0943

Q <sub>bf</sub>	9.6
ann avg	4.3
ann med	1.7
Q <sub>1.002</sub>	15.2
Q <sub>1.01</sub>	20.4
Q <sub>1.05</sub>	29.1
Q <sub>bf</sub>	39.5

assume v = 4ft/s

W <sub>bf</sub>	13.6	estimated bankfull width (ft)
d <sub>bf</sub>	0.7	estimated bankfull depth (ft)
A <sub>bf</sub>	7.5	estimated bankfull flow area (ft <sup>2</sup> )



**References**

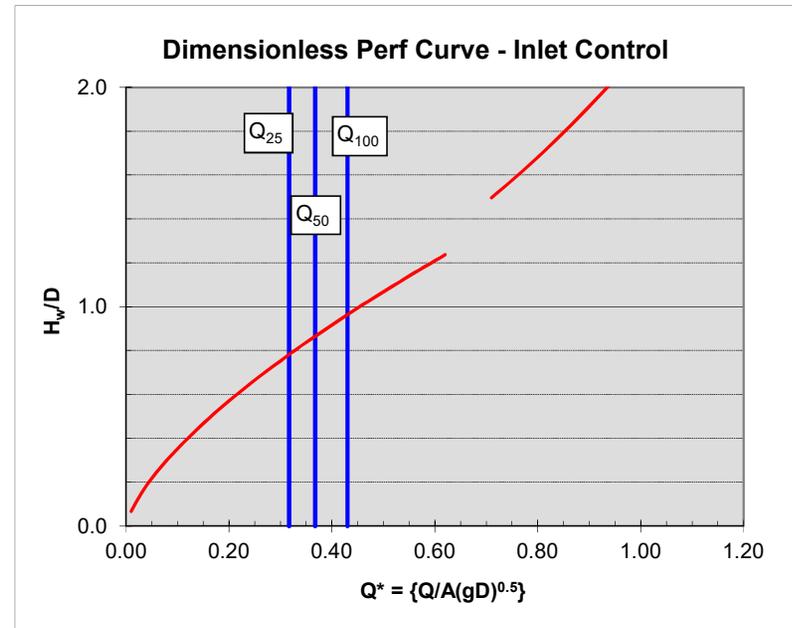
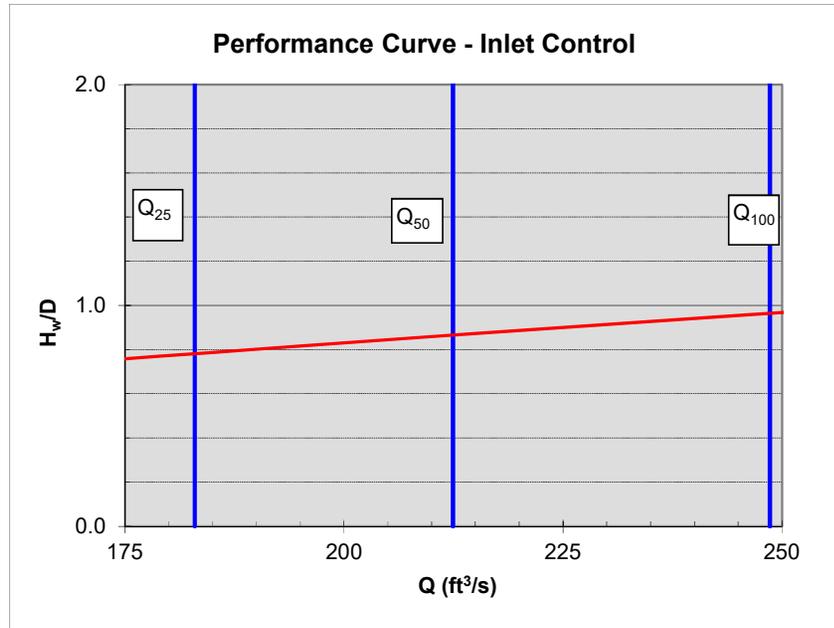
- Dudley, 2013. FY2013 Progress Report - Phase 1 ..., USFWS QRP Project
- Dudley, 2004. Estimating Monthly Streamflows ... , SIR 2004-5026
- Dudley, 2015. Regression Equations for Monthly & Annual Mean..., USGS SIR 2015-5151

**NOTE:** This page is for preliminary sizing only.  
Final design should be done with HY8 or HDS-5

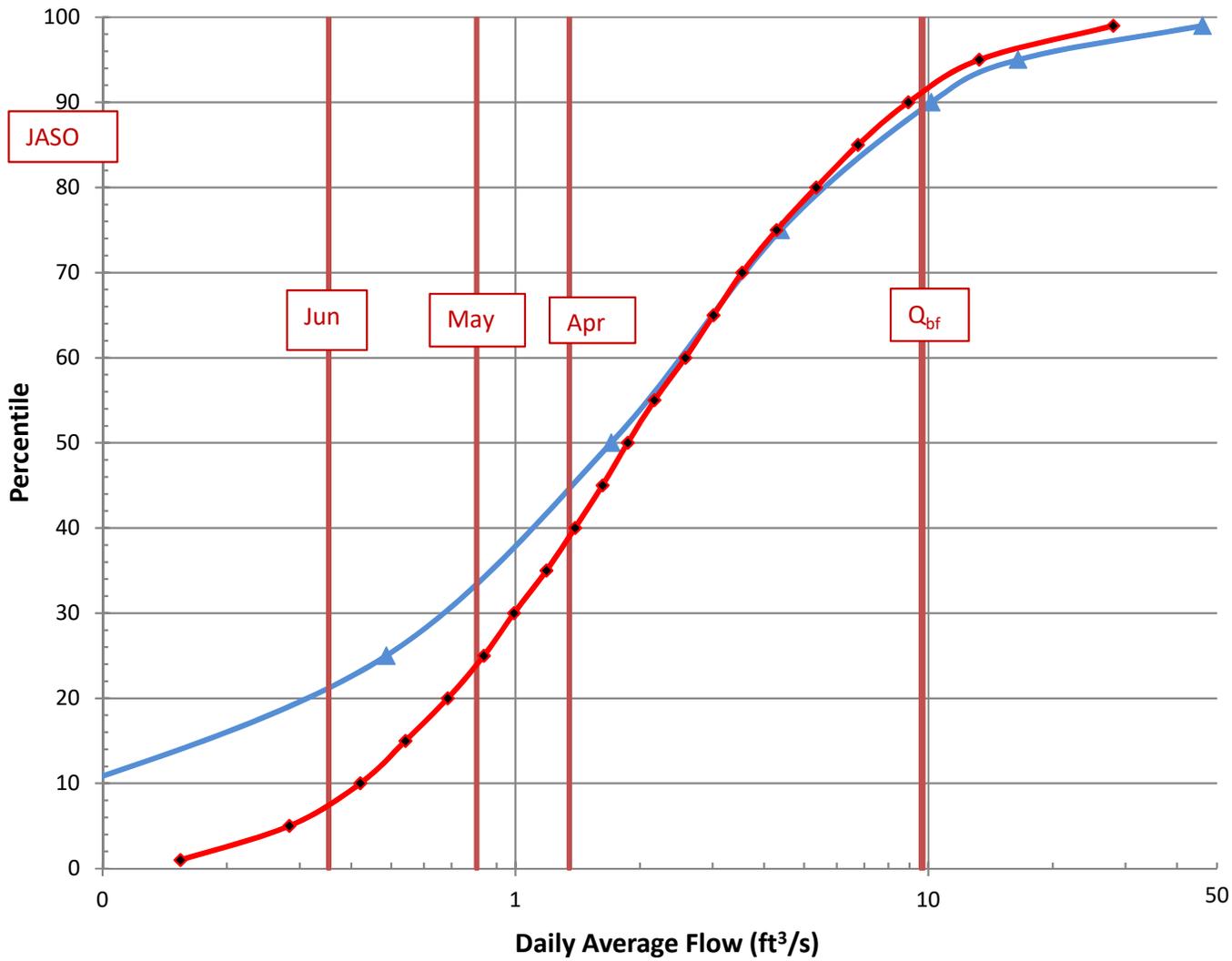
**Preliminary Culvert Sizing - Round & Box Culverts**

Shape:	Round			
Type:	Box 0 ww	Q <sub>25</sub>	183.0	
D or R (ft)	7	Q <sub>50</sub>	212.4	trial D / R = 7.1
w (ft)	12 box width	Q <sub>100</sub>	248.6	trial w: BFW = 13.6
Slope (ft/ft)	0.02			
A (ft <sup>2</sup> )	38.48			
g (ft/s <sup>2</sup> )	32.2			

**Note:**  
culvert dimensions are for open flow area; adjust for lost capacity due to embedding / backfilling (min {2' / 25% rise} embedment)



# Daily Average Flow Distribution



## Daily Avg Flow Dist

$A_{ws} = (mi^2)$  1.8

Q (ft<sup>3</sup>/s)

Pctl	Median	84 <sup>th</sup> pctl
1	0.15	0.27
5	0.28	0.46
10	0.42	0.63
15	0.54	0.79
20	0.69	0.96
25	0.84	1.12
30	0.99	1.28
35	1.19	1.46
40	1.39	1.68
45	1.62	1.90
50	1.87	2.24
55	2.17	2.61
60	2.58	3.07
65	3.02	3.57
70	3.54	4.17
75	4.29	5.01
80	5.35	5.98
85	6.75	7.67
90	8.94	10.30
95	13.27	16.01
99	28.06	36.95

$Q_{bf}$	9.6
$Q_{1.002}$	15.2
$Q_{1.1}$	34.8
$Q_2$	71.3



ST AGATHA

LONG

McLean Brook

LONG LAKE

Image © 2023 Artisan

Google E

# Sinclair/T17R4 23781 ME162 Cross Culvert #181630

Region ID: ME

Workspace ID: ME20200325210650927000

Clicked Point (Latitude, Longitude): 47.17557, -68.25005

Time: 2020-03-25 17:07:08 -0400



Basin Characteristics

<b>Parameter Code</b>	<b>Parameter Description</b>	<b>Value</b>	<b>Unit</b>
DRNAREA	Area that drains to a point on a stream	1.8	square miles
STORNWI	Percentage of storage (combined water bodies and wetlands) from the National Wetlands Inventory	10.63	percent
SANDGRAVAF	Fraction of land surface underlain by sand and gravel aquifers	0	dimensionless
ELEV	Mean Basin Elevation	666.2	feet
BSLDEM10M	Mean basin slope computed from 10 m DEM	2.78	percent
CENTROIDX	Basin centroid horizontal (x) location in state plane coordinates	556002.41	meters
CENTROIDY	Basin centroid vertical (y) location in state plane units	5226628.8	meters
COASTDIST	Shortest distance from the coastline to the basin centroid	196	miles
ELEVMAX	Maximum basin elevation	805.4	feet
LC06WATER	Percent of open water, class 11, from NLCD 2006	0	percent
LC11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	0.18	percent
LC11IMP	Average percentage of impervious area determined from NLCD 2011 impervious dataset	0.00184	percent
PRECIP	Mean Annual Precipitation	38	inches
SANDGRAVAP	Percentage of land surface underlain by sand and gravel aquifers	0	percent
STATSGOA	Percentage of area of Hydrologic Soil Type A from STATSGO	0	percent

Peak-Flow Statistics Parameters<sup>[Statewide Peak Flow DA LT 12sqmi 2015 5049]</sup>

<b>Parameter Code</b>	<b>Parameter Name</b>	<b>Value</b>	<b>Units</b>	<b>Min Limit</b>	<b>Max Limit</b>
DRNAREA	Drainage Area	1.8	square miles	0.31	12

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
STORNWI	Percentage of Storage from NWI	10.63	percent	0	22.2

Peak-Flow Statistics Flow Report[Statewide Peak Flow DA LT 12sqmi 2015 5049]

PII: Prediction Interval-Lower, Plu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SEp
1.01 Year Peak Flood	21.5	ft^3/s	38
2 Year Peak Flood	71.2	ft^3/s	34
5 Year Peak Flood	112	ft^3/s	35
10 Year Peak Flood	140	ft^3/s	37
25 Year Peak Flood	183	ft^3/s	39
50 Year Peak Flood	212	ft^3/s	41
100 Year Peak Flood	248	ft^3/s	42
250 Year Peak Flood	280	ft^3/s	44
500 Year Peak Flood	333	ft^3/s	47

*Peak-Flow Statistics Citations*

**Lombard, P.J., and Hodgkins, G.A.,2015, Peak flow regression equations for small, ungaged streams in Maine– Comparing map-based to field-based variables: U.S. Geological Survey Scientific Investigations Report 2015–5049, 12 p. (<http://dx.doi.org/10.3133/sir20155049>)**

Flow-Duration Statistics Parameters[Statewide Annual SIR 2015 5151]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.8	square miles	14.9	1419

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
SANDGRAVAF	Fraction of Sand and Gravel Aquifers	0	dimensionless	0	0.212
ELEV	Mean Basin Elevation	666.2	feet	239	2120

Flow-Duration Statistics Disclaimers[Statewide Annual SIR 2015 5151]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Flow-Duration Statistics Flow Report[Statewide Annual SIR 2015 5151]

Statistic	Value	Unit
1 Percent Duration	0.00438	ft <sup>3</sup> /s
5 Percent Duration	0.0302	ft <sup>3</sup> /s
10 Percent Duration	0.0888	ft <sup>3</sup> /s
25 Percent Duration	0.487	ft <sup>3</sup> /s
50 Percent Duration	1.71	ft <sup>3</sup> /s
75 Percent Duration	4.39	ft <sup>3</sup> /s
90 Percent Duration	10.2	ft <sup>3</sup> /s
95 Percent Duration	16.5	ft <sup>3</sup> /s
99 Percent Duration	46.2	ft <sup>3</sup> /s

*Flow-Duration Statistics Citations*

**Dudley, R.W.,2015, Regression equations for monthly and annual mean and selected percentile streamflows for ungaged rivers in Maine: U.S. Geological Survey Scientific Investigations Report 2015–5151, 35 p. (<http://dx.doi.org/10.3133/sir20155151>)**

Annual Flow Statistics Parameters<sup>[Statewide Annual SIR 2015 5151]</sup>

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.8	square miles	14.9	1419
SANDGRAVAF	Fraction of Sand and Gravel Aquifers	0	dimensionless	0	0.212
ELEV	Mean Basin Elevation	666.2	feet	239	2120

Annual Flow Statistics Disclaimers<sup>[Statewide Annual SIR 2015 5151]</sup>

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Annual Flow Statistics Flow Report<sup>[Statewide Annual SIR 2015 5151]</sup>

Statistic	Value	Unit
Mean Annual Flow	4.28	ft <sup>3</sup> /s

*Annual Flow Statistics Citations*

**Dudley, R.W., 2015, Regression equations for monthly and annual mean and selected percentile streamflows for ungaged rivers in Maine: U.S. Geological Survey Scientific Investigations Report 2015–5151, 35 p. (<http://dx.doi.org/10.3133/sir20155151>)**

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# Crossing - PA-87x63, Design Discharge - 250.0 cfs

Culvert - Culvert 1, Culvert Discharge - 236.7 cfs

