WIN:	24237.00	**Project Name:**	
Town:	Union	**Stream Name:**	Allen Brook
Route No.	ME17	**Bridge Name:**	n/a
Asset ID:	46462	**Analysis by:**	csh
Lat:	44.21636 **Long:** -69.2725	**Date:**	6/5/2020

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

Enter data in blue cells only!

ver. 2020 Feb 07

	km²	mi²	ac	*Enter data in [mi²]*
A	4.92	1.90	1216.0	Watershed Area *DRNAREA*
W	0.32	0.1	79.0	Wetlands area (by NWI)

P_c	479259	4897699	watershed centroid (E, N; UTM 19N; meters)
County	Knox		*choose county from drop-down menu*
pptA			mean annual precipitation (inches; by look-up)
A (km²)	4.92	**Conf Lvl** 0.67	
W (%)	6.50		NWI Wetlands % *STORNWI*

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

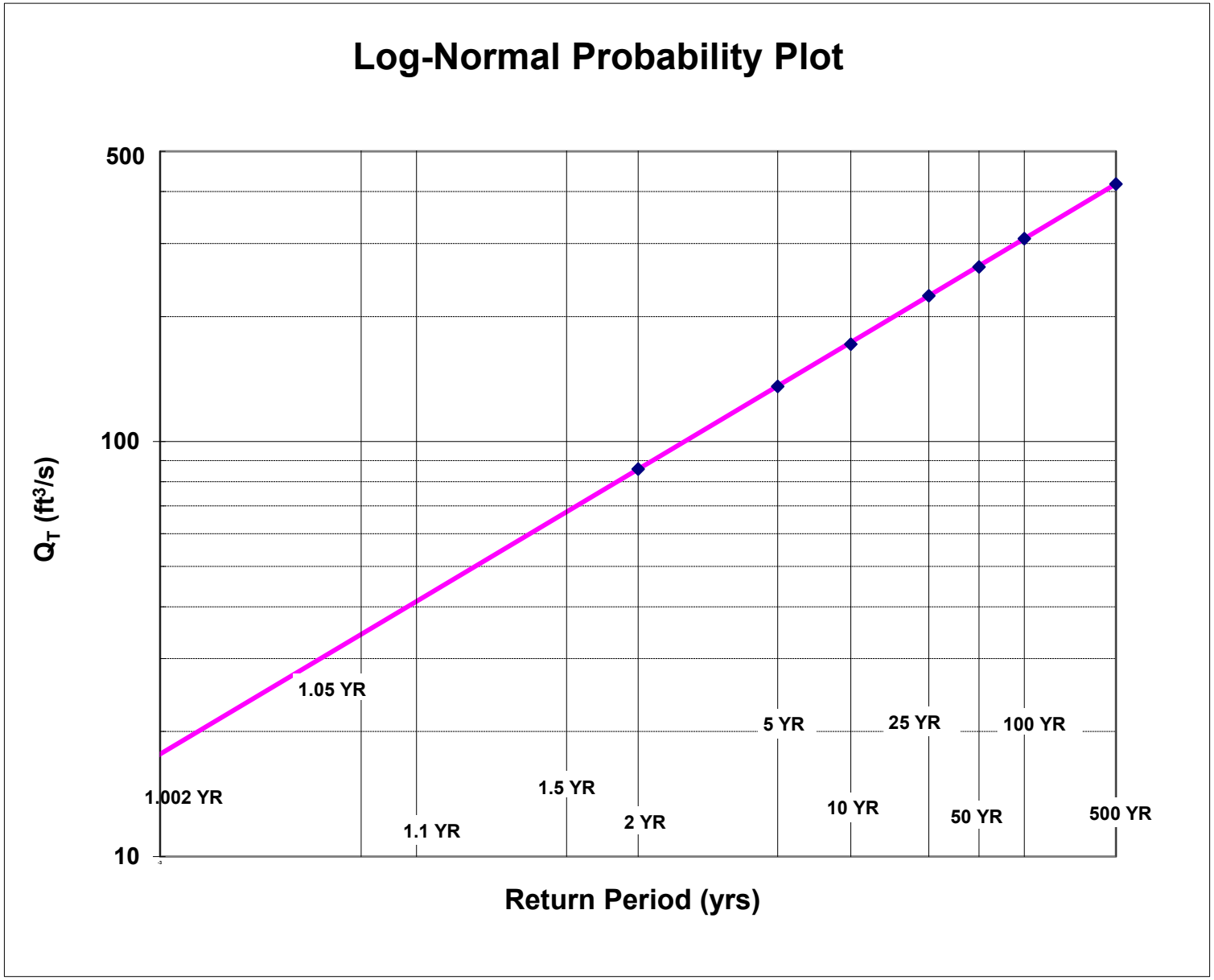
Watershed Characteristics for Monthly & Daily Flows

EAVG	294	mean basin elevation (ft)
SLOPE	12.2	mean basin slope (%)
EMAX	699	maximum basin elevation (ft)
WATER	0	percent of drainage basin land cover classified as open water
PRECIP	46.7	mean annual precipitation
SG	0.00	sand & gravel aquifer as decimal fraction of watershed A
HGA	1.27	mean basin percentage of hydrological soil group A
DIST	43.00	distance from the coast (mi)

Ret Pd T (yr)	Peak Flow Estimate Lower	Q_T (m^3/s)	Upper	Q_T (ft^3/s)
1.1		1.17		41.2
2		2.43		85.8
5		3.84		135.8
10		4.86		171.7
25		6.36		224.7
50		7.46		263.5
100		8.73		308.3
500		11.82		417.2

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
500
100
10
Q_T (ft^3/s)
1.002 YR
1.05 YR
1.1 YR
1.5 YR
2 YR
5 YR
10 YR
25 YR
50 YR
100 YR
500 YR
Return Period (yrs)

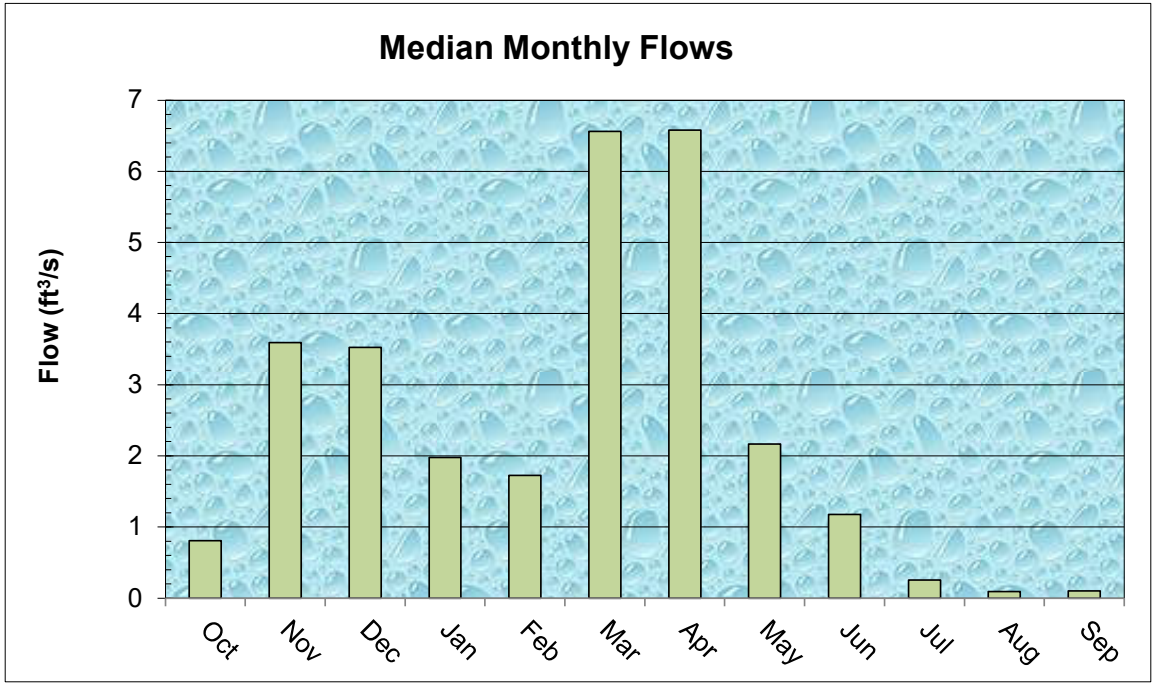
WIN:	24237.00	**Project Name:**	0
Town:	Union	**Stream Name:**	Allen Brook
Route No.	ME17	**Bridge Name:**	n/a
Asset ID:	46462	**Analysis by:**	csh
Lat:	44.21636 **Long:** -69.27245	**Date:**	6/5/2020

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
	1.90	*A*	Area (mi^2)
479259	4897699	P_c	Watershed centroid (E,N; UTM; Zone 19; meters)
	42.83	*DIST*	Distance from Coastal reference line (mi)
	46.7	*pptA*	Mean Annual Precipitation (inches)
	0.00	*SG*	Sand & Gravel Aquifer (decimal fraction of watershed area)

Month	Q_{median} (ft3/s)	(m^3/s)
Jan	**1.98**	0.0560
Feb	**1.73**	0.0489
Mar	**6.56**	0.1859
Apr	**6.58**	0.1865
May	**2.17**	0.0614
Jun	**1.18**	0.0333
Jul	**0.26**	0.0073
Aug	**0.09**	0.0026
Sep	**0.10**	0.0029
Oct	**0.81**	0.0229
Nov	**3.59**	0.1018
Dec	**3.52**	0.0998



Q_{bf}	**10.2**	
ann avg	**4.3**	
ann med	**1.7**	
$Q_{1.002}$	**17.6**	
$Q_{1.01}$	**23.8**	
$Q_{1.05}$	**34.3**	
Q_{bf}	**41.2**	assume v = 4ft/s

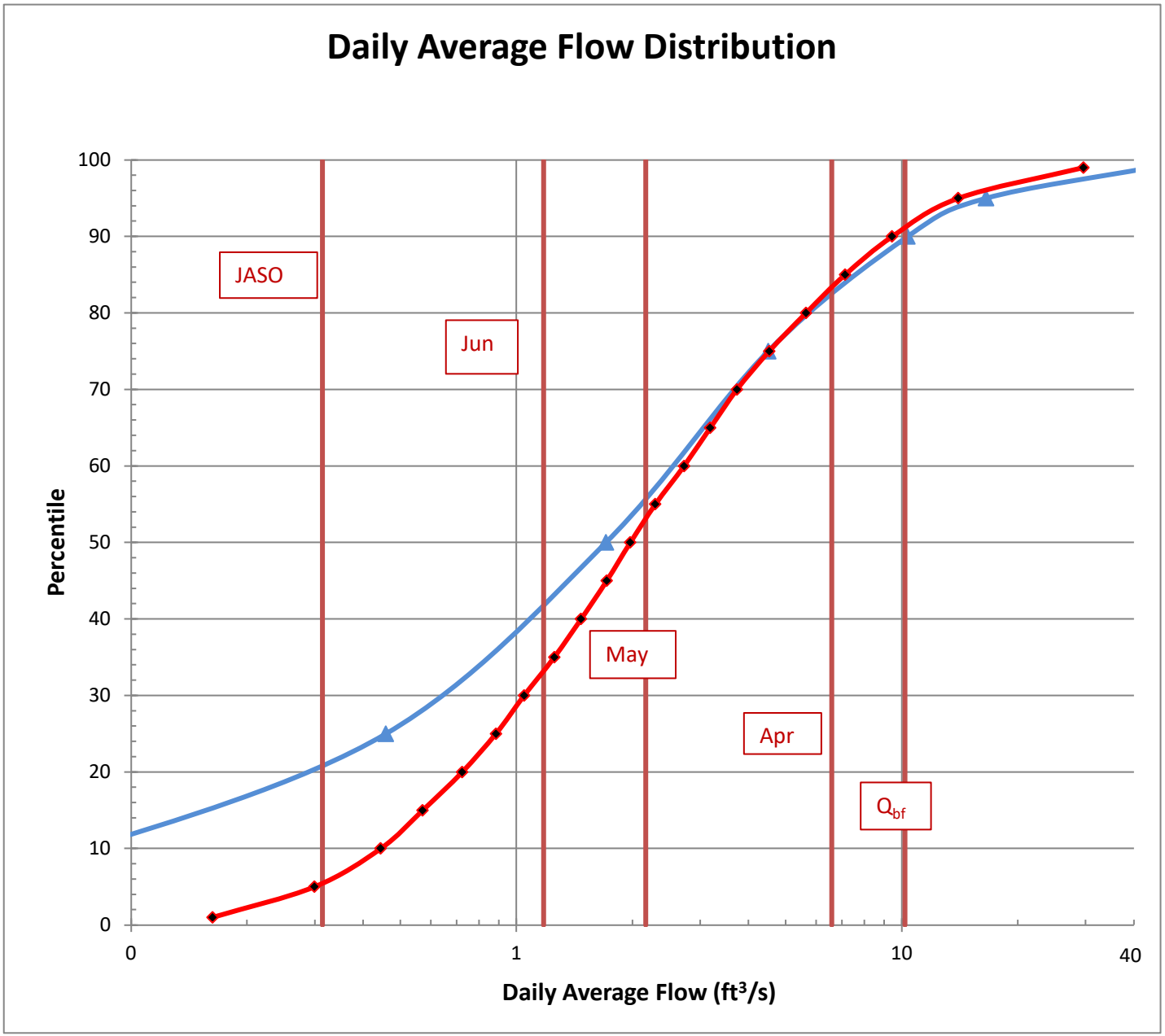
W_{bf}	**13.9**	estimated bankfull width (ft)
d_{bf}	**0.7**	estimated bankfull depth (ft)
A_{bf}	**7.9**	estimated bankfull flow area (ft^2)

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



Daily Avg Flow Dist	
A_{ws} = (mi^2)	1.9

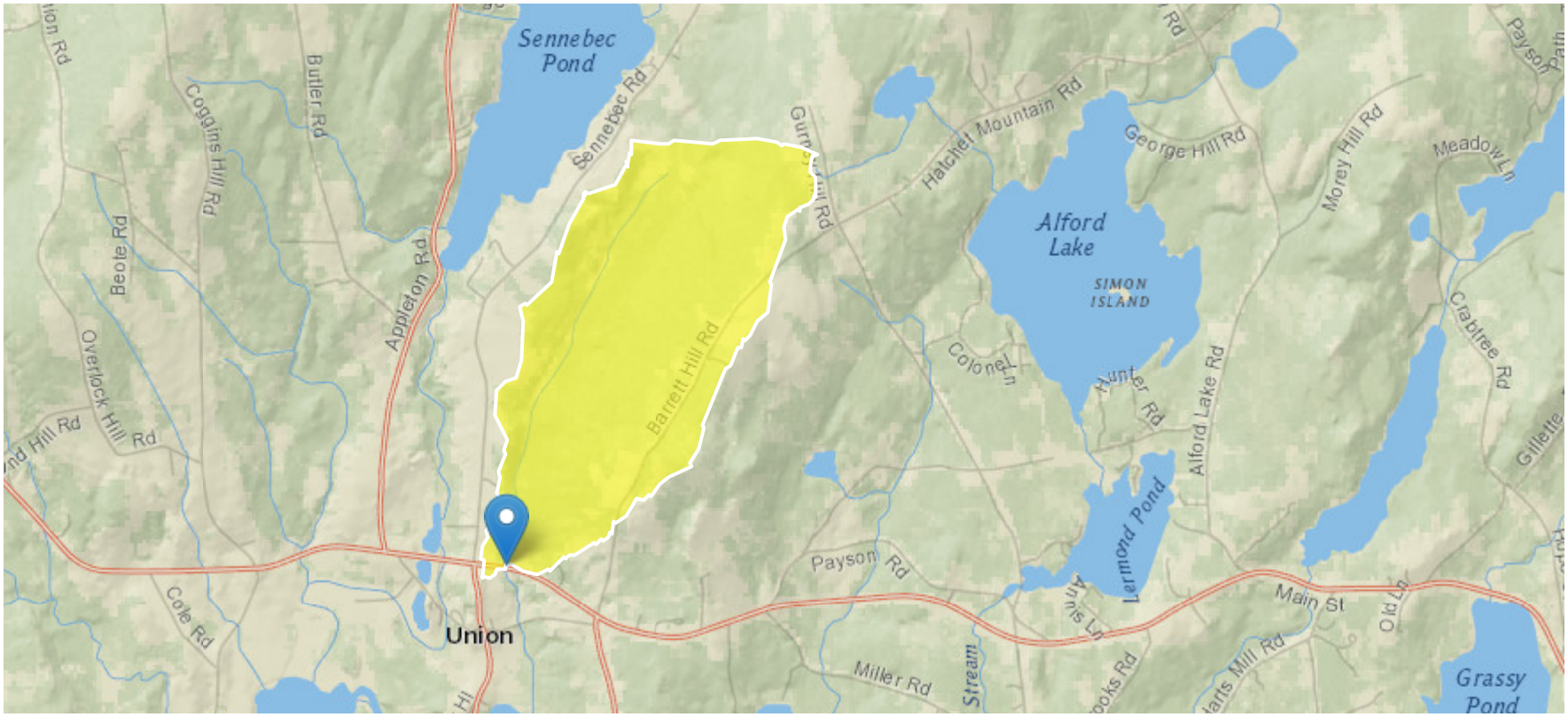
Q (ft^3/s)

Pctl	Median	84th pctl
1	0.16	0.29
5	0.30	0.48
10	0.44	0.67
15	0.57	0.83
20	0.72	1.01
25	0.88	1.19
30	1.05	1.35
35	1.25	1.54
40	1.47	1.77
45	1.71	2.01
50	1.97	2.37
55	2.29	2.76
60	2.72	3.24
65	3.18	3.77
70	3.74	4.40
75	4.53	5.29
80	5.65	6.32
85	7.13	8.10
90	9.44	10.87
95	14.01	16.90
99	29.62	39.00

Q_{bf}	10.2
$Q_{1.002}$	17.6
$Q_{1.1}$	41.2
Q_2	85.8

24237 Union ME131

Region ID: ME
Workspace ID: ME20200427204620688000
Clicked Point (Latitude, Longitude): 44.21636, -69.27245
Time: 2020-04-27 16:46:39 -0400



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	1.9	square miles
STORNWI	Percentage of storage (combined water bodies and wetlands) from the National Wetlands Inventory	6.5	percent
SANDGRAVAF	Fraction of land surface underlain by sand and gravel aquifers	0	dimensionless
ELEV	Mean Basin Elevation	293.8	feet
BSLDEM10M	Mean basin slope computed from 10 m DEM	12.2	percent
CENTROIDX	Basin centroid horizontal (x) location in state plane coordinates	479259.12	meters
CENTROIDY	Basin centroid vertical (y) location in state plane units	4897699.24	meters
COASTDIST	Shortest distance from the coastline to the basin centroid	43	miles
ELEVMAX	Maximum basin elevation	699	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	2.56	percent
LC11IMP	Average percentage of impervious area determined from NLCD 2011 impervious dataset	0.3	percent
PRECIP	Mean Annual Precipitation	46.7	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	1.27	percent

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

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.9	square miles	0.31	12

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
STORNWI	Percentage of Storage from NWI	6.5	percent	0	22.2

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

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

Statistic	Value	Unit	SEp
1.01 Year Peak Flood	25.4	ft^3/s	38
2 Year Peak Flood	85.7	ft^3/s	34
5 Year Peak Flood	136	ft^3/s	35
10 Year Peak Flood	172	ft^3/s	37
25 Year Peak Flood	225	ft^3/s	39
50 Year Peak Flood	263	ft^3/s	41
100 Year Peak Flood	308	ft^3/s	42
250 Year Peak Flood	350	ft^3/s	44
500 Year Peak Flood	417	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)

Bankfull Statistics Parameters[Central and Coastal Bankfull 2004 5042]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.9	square miles	2.92	298

Bankfull Statistics Disclaimers[Central and Coastal Bankfull 2004 5042]

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

Bankfull Statistics Flow Report[Central and Coastal Bankfull 2004 5042]

Statistic	Value	Unit
Bankfull Streamflow	10.2	ft^3/s
Bankfull Width	10.7	ft
Bankfull Depth	0.739	ft
Bankfull Area	7.9	ft^2

Bankfull Statistics Citations

Dudley, R.W.,2004, Hydraulic-Geometry Relations for Rivers in Coastal and Central Maine: U.S. Geological Survey Scientific Investigations Report 2004-5042, 30 p (http://pubs.usgs.gov/sir/2004/5042/pdf/sir2004-5042.pdf)

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

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.9	square miles	14.9	1419
SANDGRAVAF	Fraction of Sand and Gravel Aquifers	0	dimensionless	0	0.212
ELEV	Mean Basin Elevation	293.8	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 errorsOne 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	0.00329	ft^3/s
5 Percent Duration	0.0246	ft^3/s
10 Percent Duration	0.0761	ft^3/s
25 Percent Duration	0.458	ft^3/s
50 Percent Duration	1.71	ft^3/s
75 Percent Duration	4.5	ft^3/s
90 Percent Duration	10.3	ft^3/s
95 Percent Duration	16.5	ft^3/s
99 Percent Duration	44.2	ft^3/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[Statewide Annual SIR 2015 5151]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.9	square miles	14.9	1419
SANDGRAVAF	Fraction of Sand and Gravel Aquifers	0	dimensionless	0	0.212
ELEV	Mean Basin Elevation	293.8	feet	239	2120

Annual Flow Statistics Disclaimers[Statewide Annual SIR 2015 5151]

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

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

Statistic	Value	Unit
Mean Annual Flow	4.26	ft^3/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)

Application Version: 4.3.11