

WIN: 22292.00
 Town: Canton
 Route No. 108
 Asset ID: 5242
 Lat: 44.4509 Long: -70.31737

Project Name: Canton 22292 Childs Brook #4
 Stream Name: Child Brook
 Bridge Name: Childs Brook #4
 Analysis by: DFB
 Date: 10/13/2017

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

Enter data in blue cells only!

	km ²	mi ²	ac
A	5.70	2.20	1408.0
W	0.00	0.0	0.0

P _c	393482	4923824
County	Oxford E	
pptA	43.0	
SG	0.00	

A (km ²)	5.70
W (%)	0.00

Conf Lvl 0.67

Enter data in [mi²]

Watershed Area *DRNAREA*
 Wetlands area (by NWI)

watershed centroid (E, N; UTM 19N; meters)
 choose county from drop-down menu
 mean annual precipitation (inches; by look-up)
 sand & gravel aquifer as decimal fraction of watershed A

NWI Wetlands % *STORNWI*

Worksheet prepared by:

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 ver. 2017 Jun. 09

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

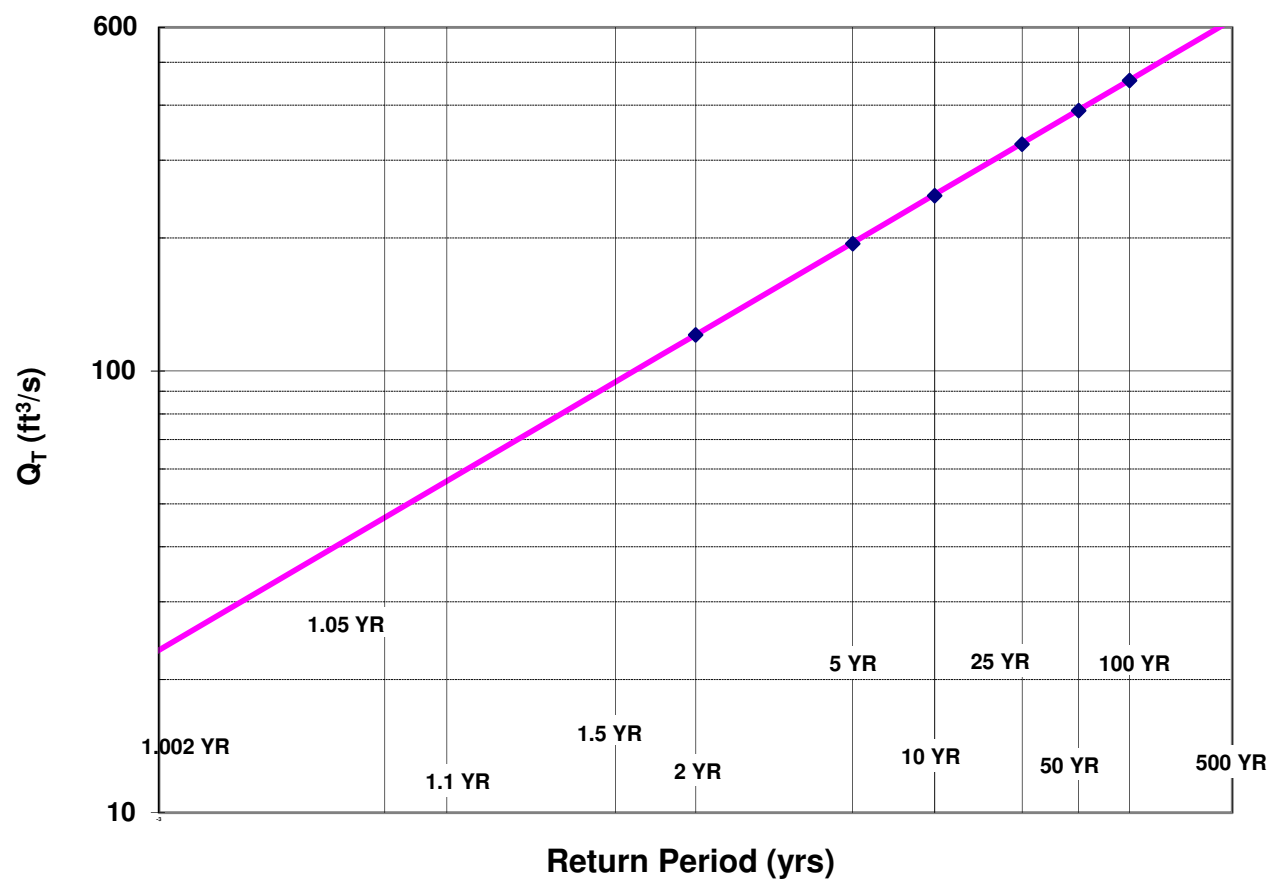
Lombard, P.J. & G.A. Hodgkins, 2015.
 Peak flow regression equations for small, ungaged streams in
 Maine - Comparing map-based to field-based variables
SIR 2015-4059, USGS, Augusta, ME

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

Ret Pd	Peak Flow Estimate		
T (yr)	Lower	Q _T (m ³ /s)	Upper
1.1		1.60	
2		3.42	
5		5.50	
10		7.06	
25		9.25	
50		11.01	
100		12.89	
500		17.71	

Q _T (ft ³ /s)
56.4
120.8
194.2
249.4
326.6
388.8
455.0
625.3

Log-Normal Probability Plot



WIN: 22292.00
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 Date: 10/13/2017

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

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

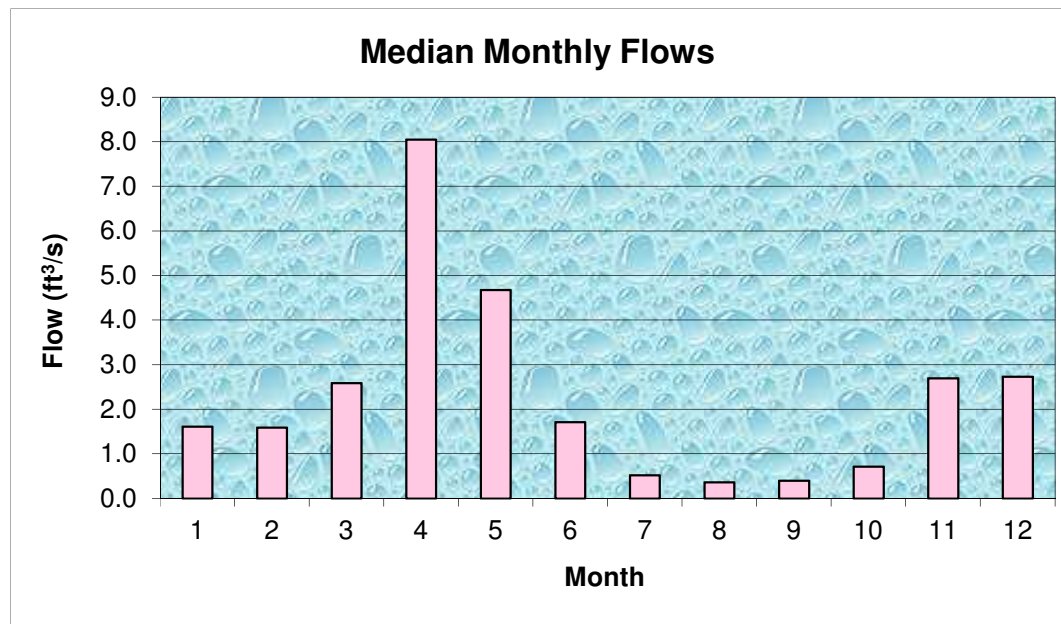
	Value	Variable	Explanation
	2.20	A	Area (mi ²)
393481.5	4923824	P_c	Watershed centroid (E,N; UTM; Zone 19; meters)
	83.28	$DIST$	Distance from Coastal reference line (mi)
	43.0	$pptA$	Mean Annual Precipitation (inches)
	0.00	SG	Sand & Gravel Aquifer (decimal fraction of watershed area)

Month	Q_{median} (ft ³ /s)	(m ³ /s)
Jan	1.61	0.0457
Feb	1.59	0.0451
Mar	2.59	0.0733
Apr	8.05	0.2282
May	4.68	0.1326
Jun	1.71	0.0486
Jul	0.52	0.0147
Aug	0.37	0.0104
Sep	0.40	0.0113
Oct	0.72	0.0203
Nov	2.70	0.0764
Dec	2.73	0.0774

Q_{bf}	11.9
ann avg	4.4
ann med	2.2
$Q_{1.002}$	23.3
$Q_{1.01}$	31.9
$Q_{1.05}$	46.6
Q_{bf}	46.1

assume $v = 4\text{ft/s}$

W_{bf}	14.9	estimated bankfull width (ft)
d_{bf}	0.8	estimated bankfull depth (ft)
A_{bf}	9.0	estimated bankfull flow area (ft ²)



References

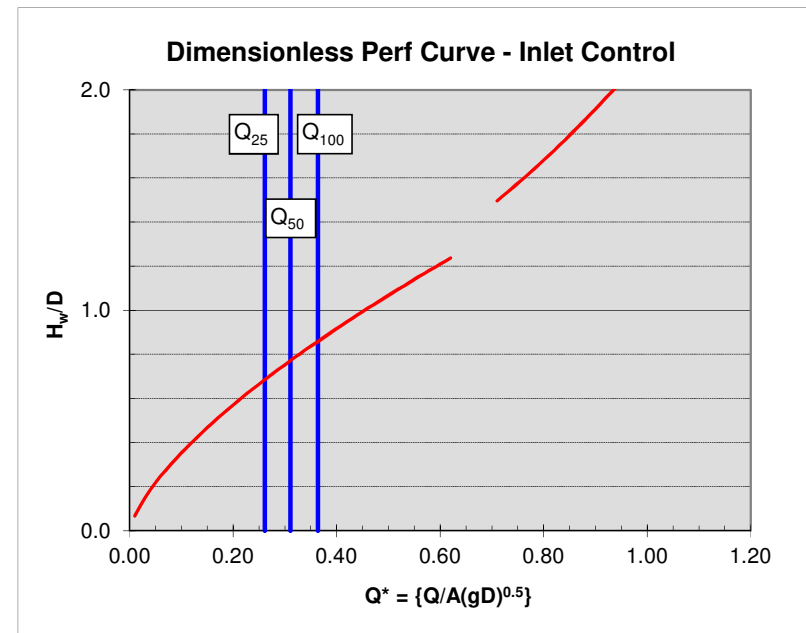
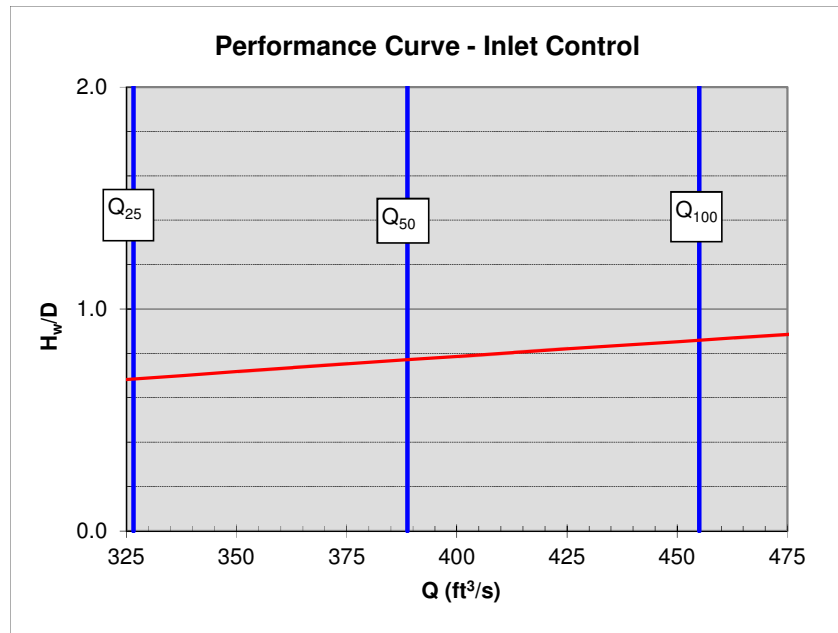
Dudley, R.W., 2013. FY2013 Progress Report - Phase 1 ..., USFWS QRP Project
 Dudley, R.W., 2004. Estimating Monthly Streamflows ..., SIR 2004-5026

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

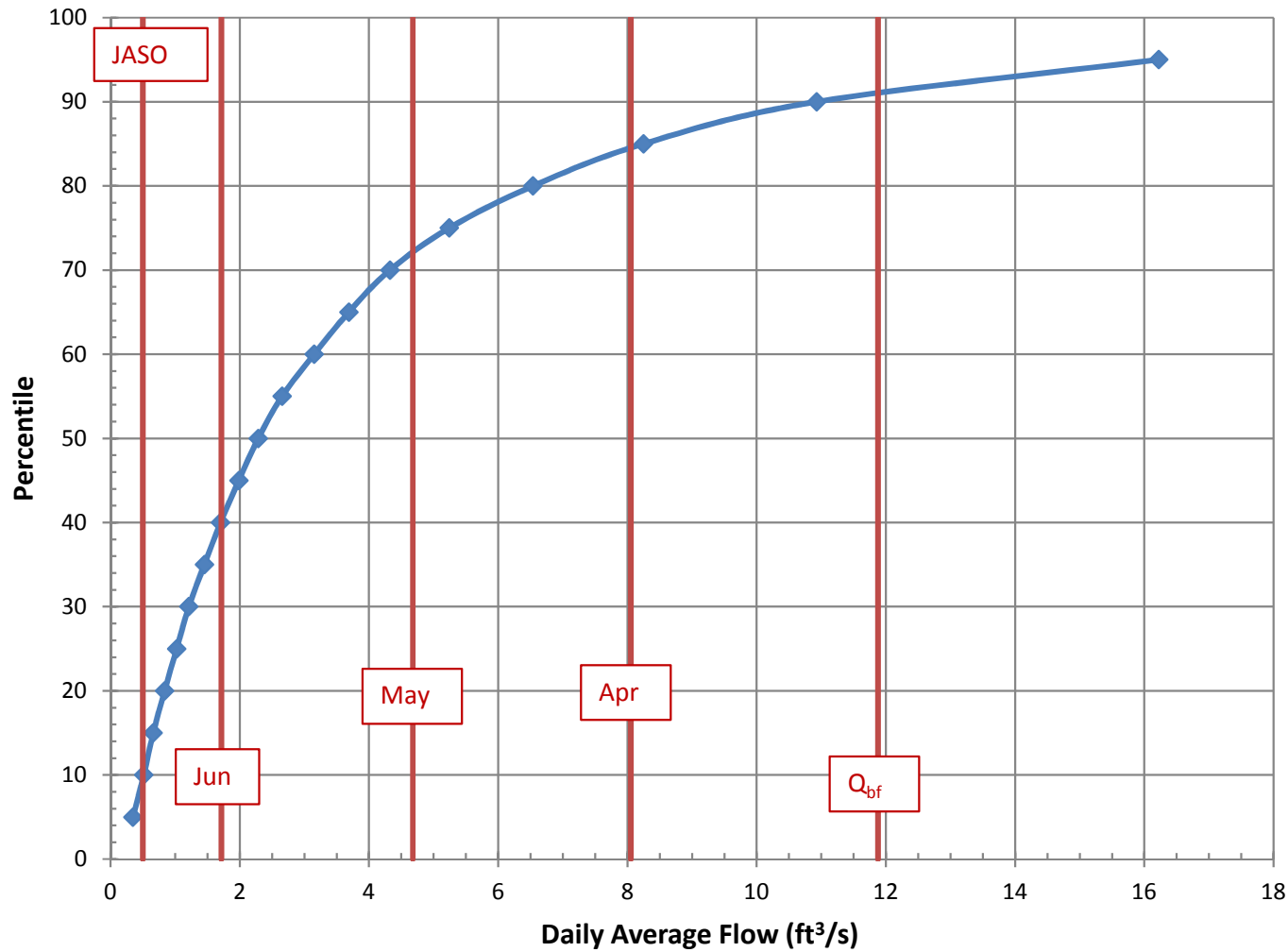
Preliminary Culvert Sizing - Round & Box Culverts

Shape:	Box			
Type:	Box 0 ww			
D or R (ft)	6	Q_{25}	326.6	trial D / R = 9.0
w (ft)	15 box width	Q_{50}	388.8	
Slope (ft/ft)	0.02	Q_{100}	455.0	trial w: BFW = 14.9
A (ft ²)	90.00			
g (ft/s ²)	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

$A_{ws} = (mi^2)$ 2.2

$Q (ft^3/s)$

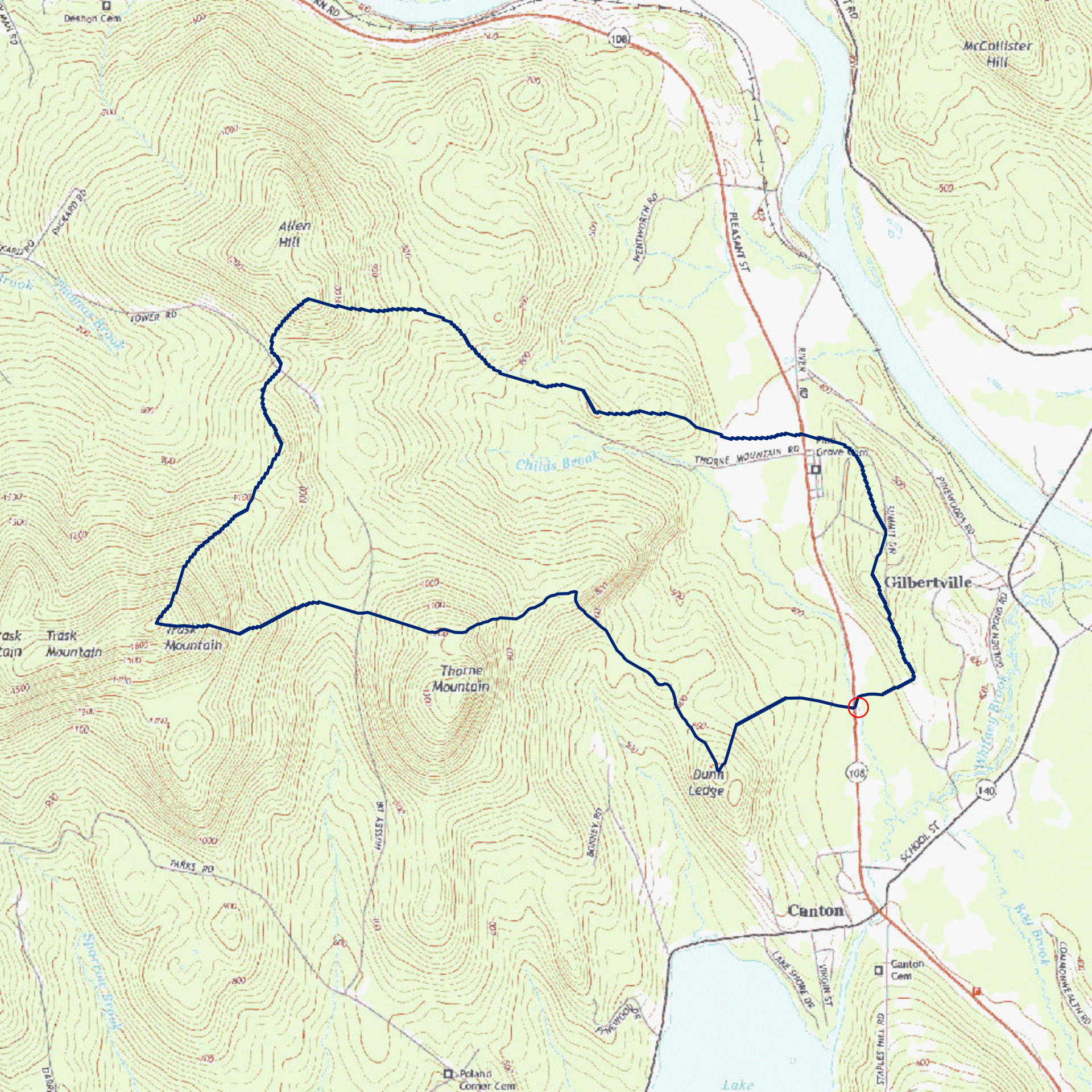
Pctl	Median	84 th pctl
5	0.35	0.56
10	0.51	0.77
15	0.66	0.97
20	0.84	1.17
25	1.02	1.37
30	1.21	1.56
35	1.45	1.79
40	1.70	2.06
45	1.98	2.32
50	2.29	2.74
55	2.65	3.19
60	3.15	3.75
65	3.69	4.37
70	4.33	5.09
75	5.24	6.13
80	6.54	7.31
85	8.25	9.37
90	10.93	12.59
95	16.22	19.57

Q_{bf} 11.9

$Q_{1.002}$ 23.3

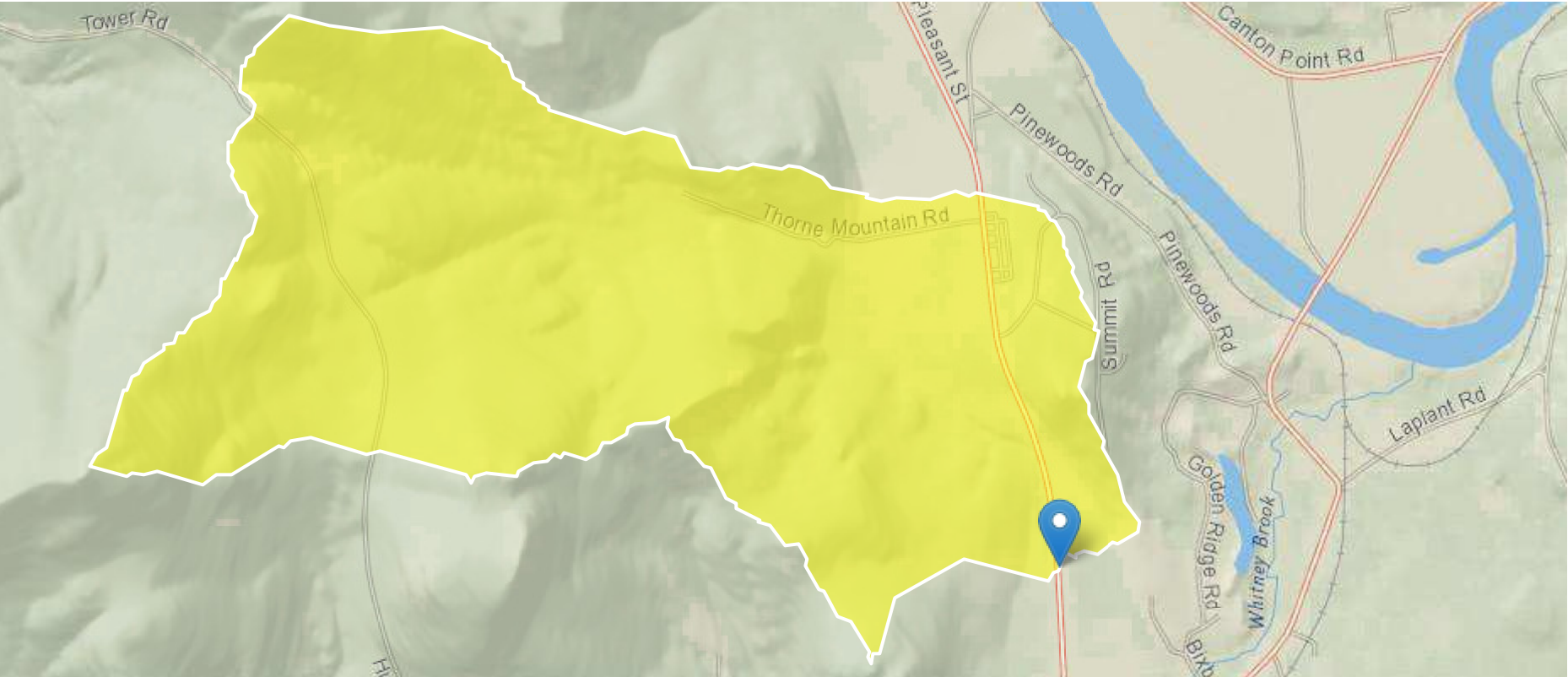
$Q_{1.1}$ 56.4

Q_2 120.8



Canton 22292 Childs Brook

Region ID: ME
Workspace ID: ME20171013162217951000
Clicked Point (Latitude, Longitude): 44.45094, -70.31731
Time: 2017-10-13 12:22:36 -0400



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	2.2	square miles
STORNWI	Percentage of storage (combined water bodies and wetlands) from the Nationa Wetlands Inventory	2.81	percent



StreamStats

	Parameter Description	Value	Unit
SANDGRAVAP	Fraction of land surface underlain by sand and gravel aquifers	0.073	dimensionless
ELEV	Mean Basin Elevation	701.7	feet
BSLDEM10M	Mean basin slope computed from 10 m DEM	15.1	percent
CENTROIDX	Basin centroid horizontal (x) location in state plane coordinates	393481.54	
CENTROIDY	Basin centroid vertical (y) location in state plane units	4923824.26	
COASTDIST	Shortest distance from the coastline to the basin centroid	84	miles
ELEVMAX	Maximum basin elevation	1713.5	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	3.3	percent
LC11IMP	Average percentage of impervious area determined from NLCD 2011 impervious dataset	0.91	percent
PRECIP	Mean Annual Precipitation	44.4	inches
SANDGRAVAP	Percentage of land surface underlain by sand and gravel aquifers	7.32	percent
STATSGOA	Percentage of area of Hydrologic Soil Type A from STATSGO	18.9	percent

Bankfull Statistics Parameters [Central and Coastal Bankfull 2004 5042]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	2.2	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 errors

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

Statistic	Value	Unit
Bankfull Streamflow	11.9	ft ³ /s
Bankfull Width	11.6	ft

Statistic	Value	Unit
Bankfull Depth	0.777	ft
Bankfull Area	8.96	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>)

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	2.2	square miles	0.31	12
STORNWI	Percentage of Storage from NWI	2.81	percent	0	22.2

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

PII: 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	31.8	ft^3/s	38
2 Year Peak Flood	110	ft^3/s	34
5 Year Peak Flood	175	ft^3/s	35
10 Year Peak Flood	223	ft^3/s	37
25 Year Peak Flood	292	ft^3/s	39
50 Year Peak Flood	346	ft^3/s	41
100 Year Peak Flood	405	ft^3/s	42
250 Year Peak Flood	464	ft^3/s	44
500 Year Peak Flood	553	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>)

Low-Flow Statistics Parameters [Statewide LowFlow SIR 2004 5026]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	2.2	square miles	9.79	1418
SANDGRAVAF	Fraction of Sand and Gravel Aquifers	0.073	dimensionless	0	0.455

Low-Flow Statistics Disclaimers [Statewide LowFlow SIR 2004 5026]

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

Low-Flow Statistics Flow Report [Statewide LowFlow SIR 2004 5026]

Statistic	Value	Unit
7 Day 10 Year Low Flow	0.0889	ft ³ /s

Low-Flow Statistics Citations

Dudley, R.W., 2004, Estimating Monthly, Annual, and Low 7-Day, 10-Year Streamflows for Ungaged Rivers in Maine: U.S. Geological Survey Scientific Investigations Report 2004-5026, 22 p. (<http://water.usgs.gov/pubs/sir/2004/5026/pdf/sir2004-5026.pdf>)

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

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	2.2	square miles	14.9	1419
SANDGRAVAF	Fraction of Sand and Gravel Aquifers	0.073	dimensionless	0	0.212
ELEV	Mean Basin Elevation	701.7	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	0.0148	ft^3/s
5 Percent Duration	0.0697	ft^3/s
10 Percent Duration	0.17	ft^3/s
25 Percent Duration	0.741	ft^3/s
50 Percent Duration	2.36	ft^3/s
75 Percent Duration	5.68	ft^3/s
90 Percent Duration	12.5	ft^3/s
95 Percent Duration	19.9	ft^3/s
99 Percent Duration	55.1	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	2.2	square miles	14.9	1419
SANDGRAVAF	Fraction of Sand and Gravel Aquifers	0.073	dimensionless	0	0.212
ELEV	Mean Basin Elevation	701.7	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 errors

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

Statistic	Value	Unit
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Statistic	Value	Unit
Mean Annual Flow	5.45	ft^3/s
<i>Annual Flow Statistics Citations</i>		
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)		