

WIN: 26630.10
 Town: Robbinston
 Route No. US1
 Asset ID: 47367
 Lat: 45.11260 Long: -67.13937

Project Name:
 Stream Name: Keene Lake Outlet
 Bridge Name: na
 Analysis by: csh
 Date: 6/10/2024

Peak Flow Calculations by USGS Regression Equations (Lombard/Hodgkins, 2021; Hodgkins, 1999 & Lombard/Hodgkins, 2015)

Enter data in blue cells only!

	km ²	mi ²	ac
A	7.02	2.71	1734.4
W	0.79	0.3	194.1
P _c	644005	4996556	
County	Washington		

Enter data in [mi²]

Watershed Area *DRNAREA*
 Wetlands area (by NWI)

watershed centroid (E, N; UTM 19N; meters)
 choose county from drop-down menu

ver. 2021 Jan 01

Worksheet prepared by:
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 Maine Dept. Transportation
 Augusta, ME 04333-0016
 207-557-1052
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Watershed Characteristics from StreamStats

STORAGE	11.30	
STORNWI	11.19	NWI Wetlands %
SANDGRAV	0.00	sand & gravel aquifer as decimal fraction of watershed A
ELEV	231.6	mean basin elevation (ft)
BSLDEM10M	9.25	mean basin slope (%)
COASTDIST	45.60	distance from the coast (mi)
ELEVMAX	512.2	maximum basin elevation (ft)
LC06WATER	6.77	percent of drainage basin land cover as open water
PRECIP	44.0	mean annual precipitation
STATSGOA	3.03	mean basin percentage of hydrological soil group A

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

Lombard, P.J. & G.A. Hodgkins, 2020.
 Estimating Flood Magnitude and Frequency on Gaged and
 Ungaged Streams in Maine
SIR 2020-5092, USGS, Augusta, ME.

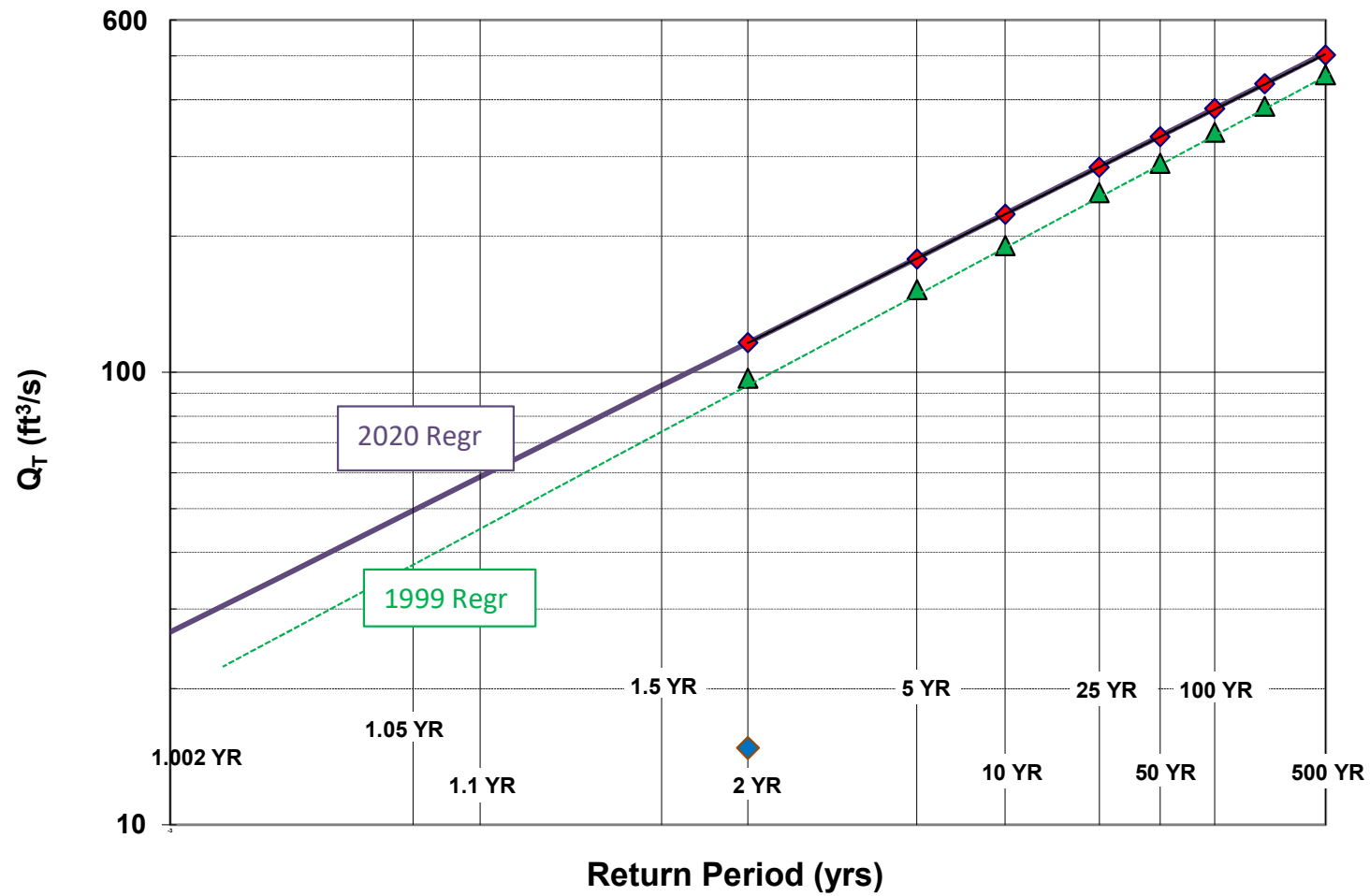
Ret Pd	I24	Q _T (ft ³ /s)		Q _T (ft ³ /s)
T (yr)		1999 / 2015	2020	Design
1.1			59	60
2	3.15	97	116	115
5	3.84	152	178	180
10	4.43	191	223	225
25	5.23	250	284	285
50	5.83	290	332	330
100	6.46	339	382	380
200	7.15	387	434	435
500	8.11	454	502	500

Calculated Bankfull Width: 16.2 ft

Instructions:

Enter values in blue cells only, watershed data from StreamStats
 Copy I24 values from Stream Stats
 Use results under "Design"
 Check against gage data and FEMA studies if available
 Questions? Check with ENV / Hydrology Section

Log-Normal Probability Plot



WIN:	26630.10	Project Name:	0
Town:	Robbinston	Stream Name:	n/n
Route No.	US1	Bridge Name:	na
Asset ID:	47367	Analysis by:	csh
Lat:	45.11260	Date:	6/10/2024
	Long: -67.13937		

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)

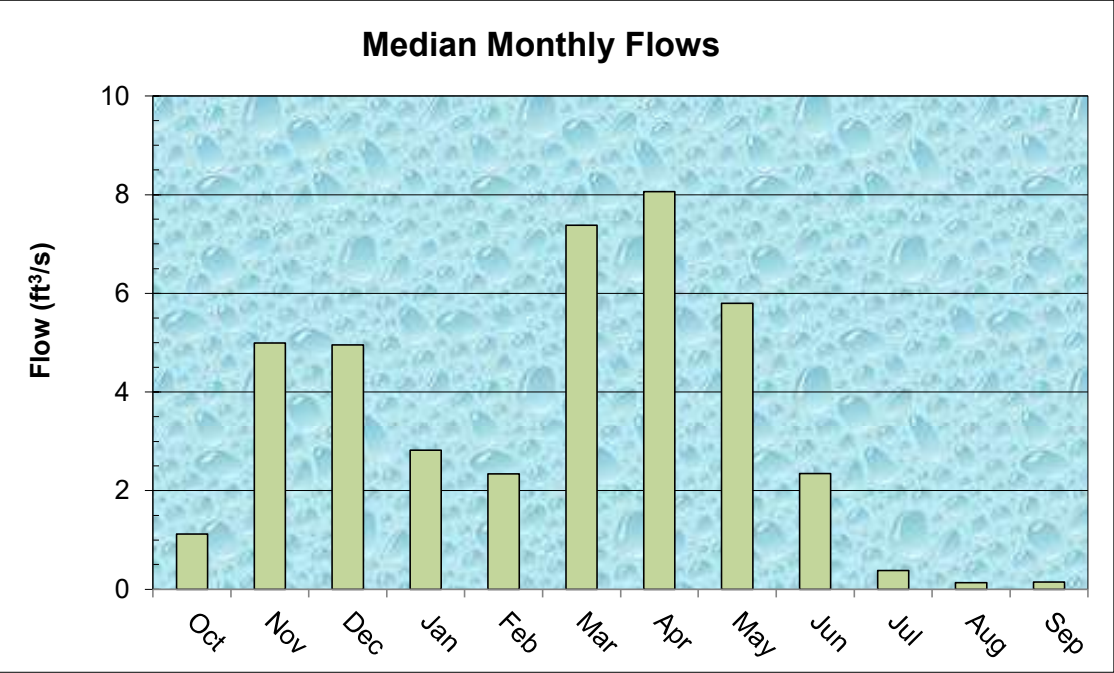
Value	Variable	Explanation
2.71	A	Area (mi ²)
644005	4996556	P _c Watershed centroid (E,N; UTM; Zone 19; meters)
45.60	DIST	Distance from Coastal reference line (mi)
44.0	pptA	Mean Annual Precipitation (inches)
0.00	SG	Sand & Gravel Aquifer (decimal fraction of watershed area)

Month	Q _{median} (ft ³ /s)	(m ³ /s)
Jan	2.82	0.0800
Feb	2.34	0.0662
Mar	7.38	0.2091
Apr	8.06	0.2285
May	5.80	0.1643
Jun	2.35	0.0666
Jul	0.38	0.0108
Aug	0.14	0.0039
Sep	0.15	0.0042
Oct	1.13	0.0319
Nov	4.99	0.1414
Dec	4.95	0.1404

Q _{bf}	14.8
ann avg	5.9
ann med	2.4
Q _{1.002}	26.6
Q _{1.01}	35.3
Q _{1.05}	49.5
Q _{1.1}	58.7
Q _{bf}	42.9

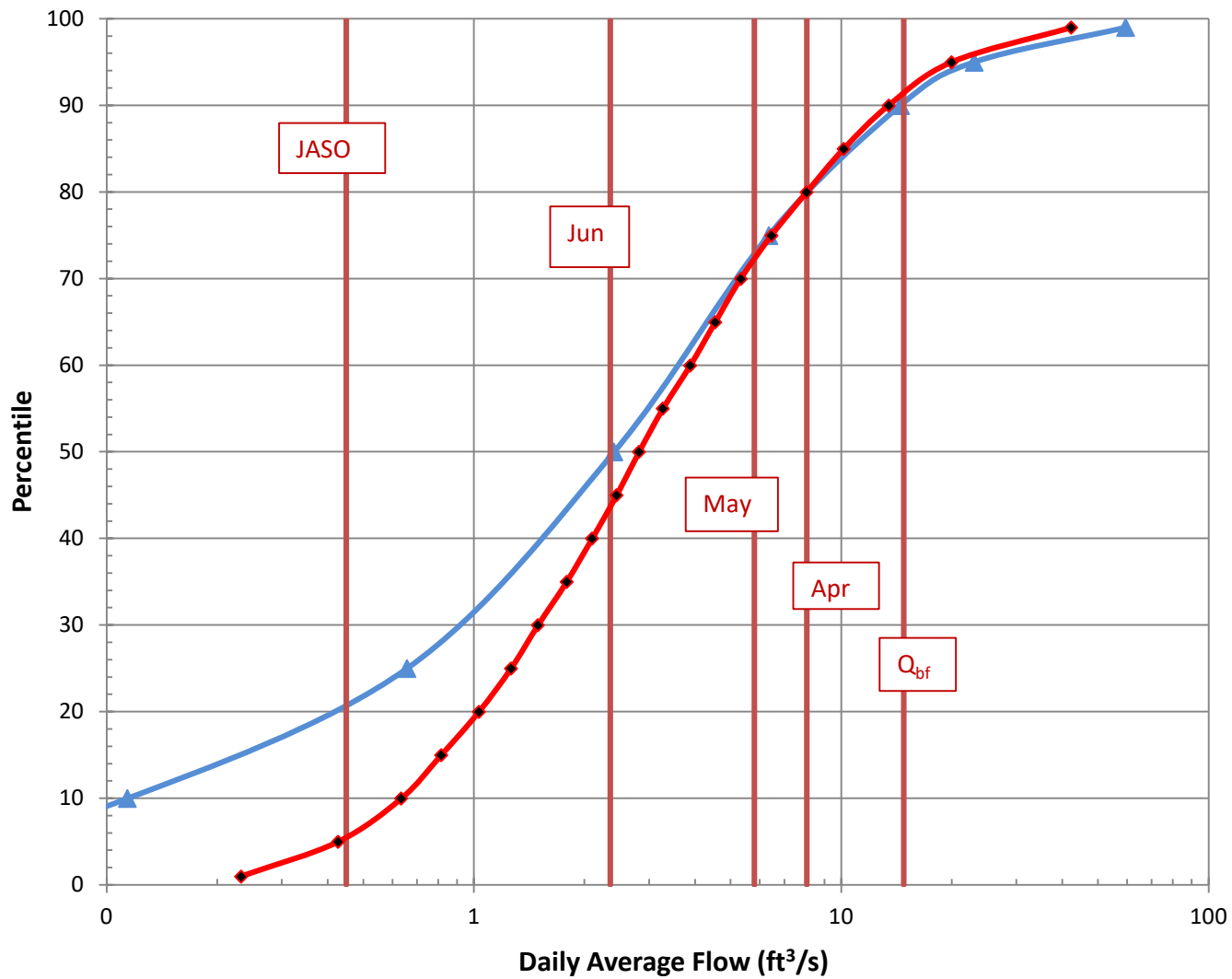
assume v = 4ft/s

W _{bf}	16.2	estimated bankfull width (ft)
d _{bf}	0.8	estimated bankfull depth (ft)
A _{bf}	10.7	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 Average Flow Distribution



Daily Avg Flow Dist

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

2.7

$Q (ft^3/s)$

Pctl	Median	84 th pctl
1.00E-06	0.00	0.00
1	0.23	0.41
5	0.43	0.69
10	0.63	0.95
15	0.81	1.19
20	1.03	1.44
25	1.26	1.69
30	1.49	1.93
35	1.79	2.20
40	2.10	2.53
45	2.45	2.86
50	2.82	3.38
55	3.27	3.93
60	3.88	4.62
65	4.54	5.38
70	5.33	6.28
75	6.46	7.55
80	8.05	9.01
85	10.16	11.55
90	13.46	15.50
95	19.98	24.11
99	42.25	55.62

Q_{bf} 14.8

$Q_{1.002}$ 26.6

$Q_{1.1}$ 58.7

Q_2 116.2

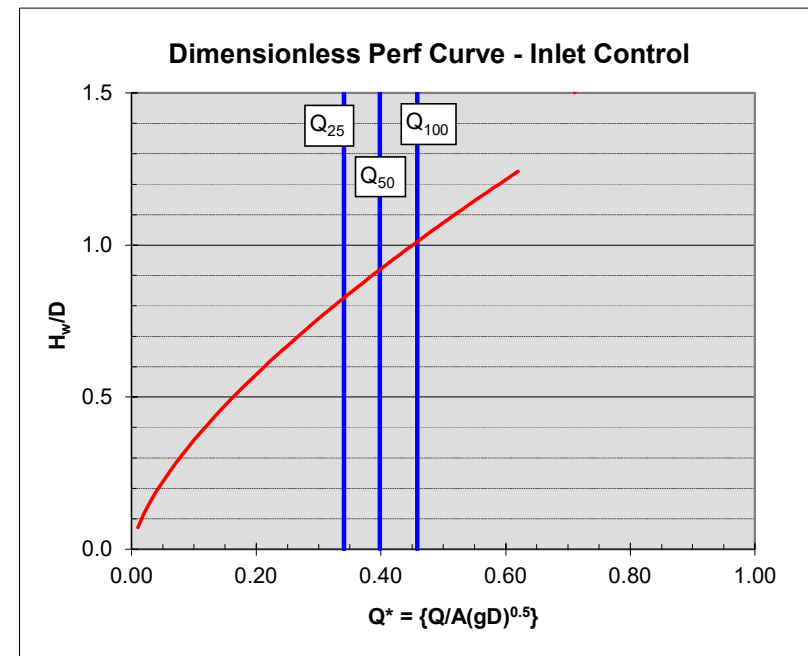
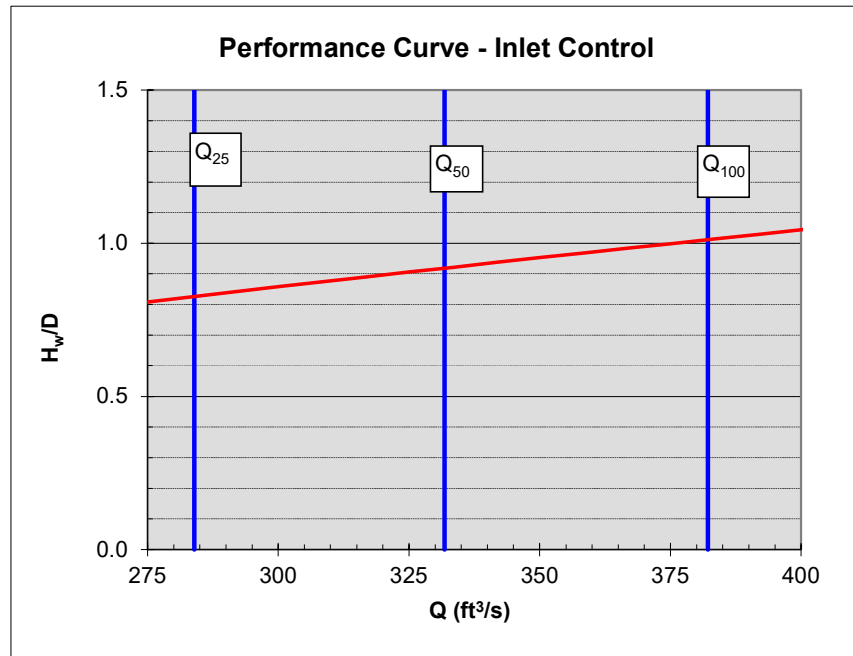
NOTE: This page is for preliminary sizing only.
Final design should be done with HY8 or HDS-5

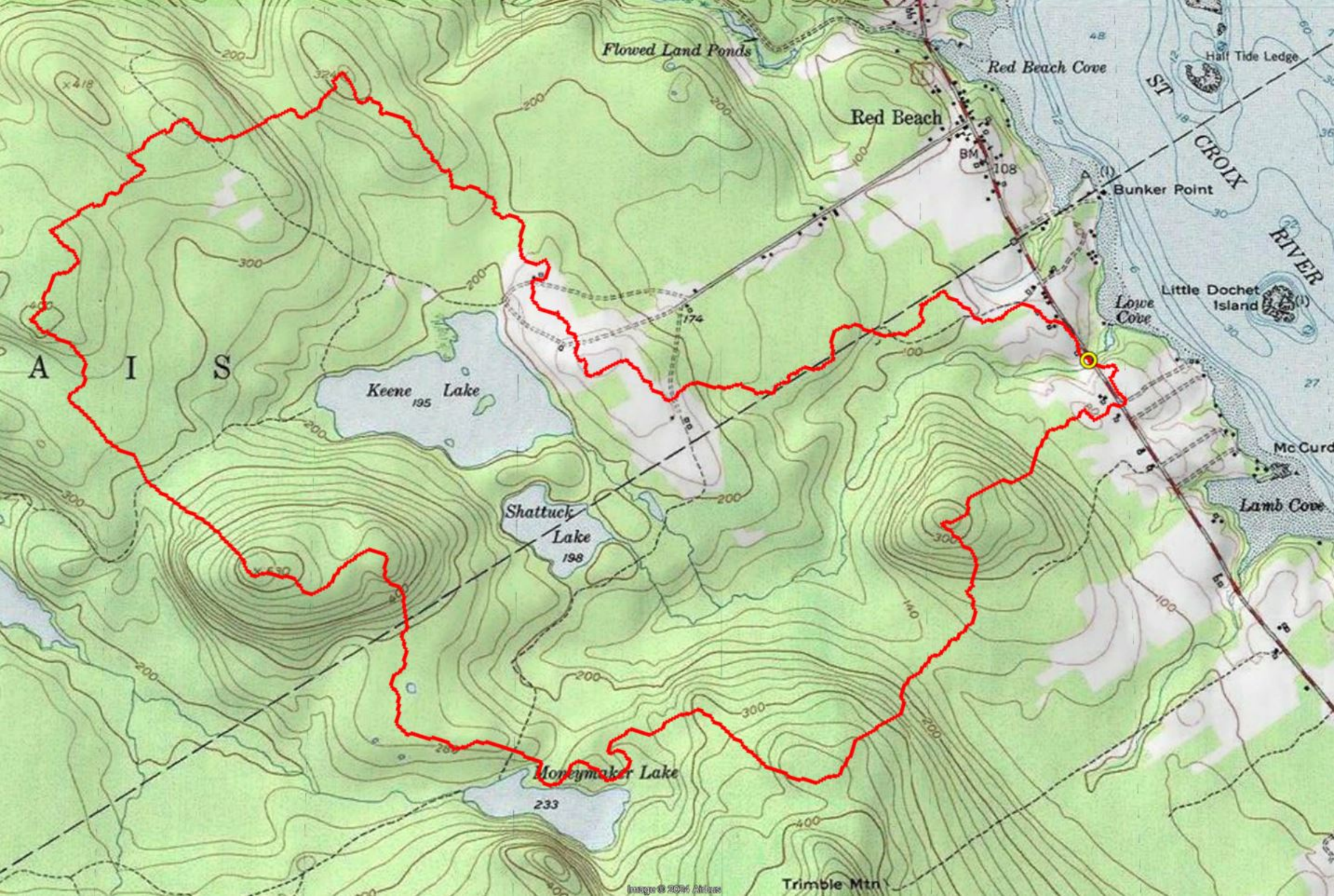
Note:
culvert dimensions are for open flow area; adjust for lost capacity
due to embedding / backfilling (min {2' / 25% rise} embedment)
Finish analysis with HY-8

Preliminary Culvert Sizing - Round & Box Culverts

Shape:	Box				
Inlet Type:	Box 0 ww				
D or R (ft)	6	diam / rise	Q ₂₅	283.9	
w (ft)	10	box span	Q ₅₀	331.8	trial D / R = 8.5
Slope (ft/ft)	0.01		Q ₁₀₀	382.2	trial w: BFW = 16.2
A (ft ²)	60.00				
g (ft/s ²)	32.2				

Choose shape and inlet type by pull-down menu in green cells





Flowed Land Ponds

Red Beach Cove

Red Beach

ST CROIX RIVER

Bunker Point

Little Docket Island

Lowe Cove

McCurd

Lamb Cove

Shattuck Lake

Keene Lake

Moneymaker Lake

Trimble Mtn

A I N S

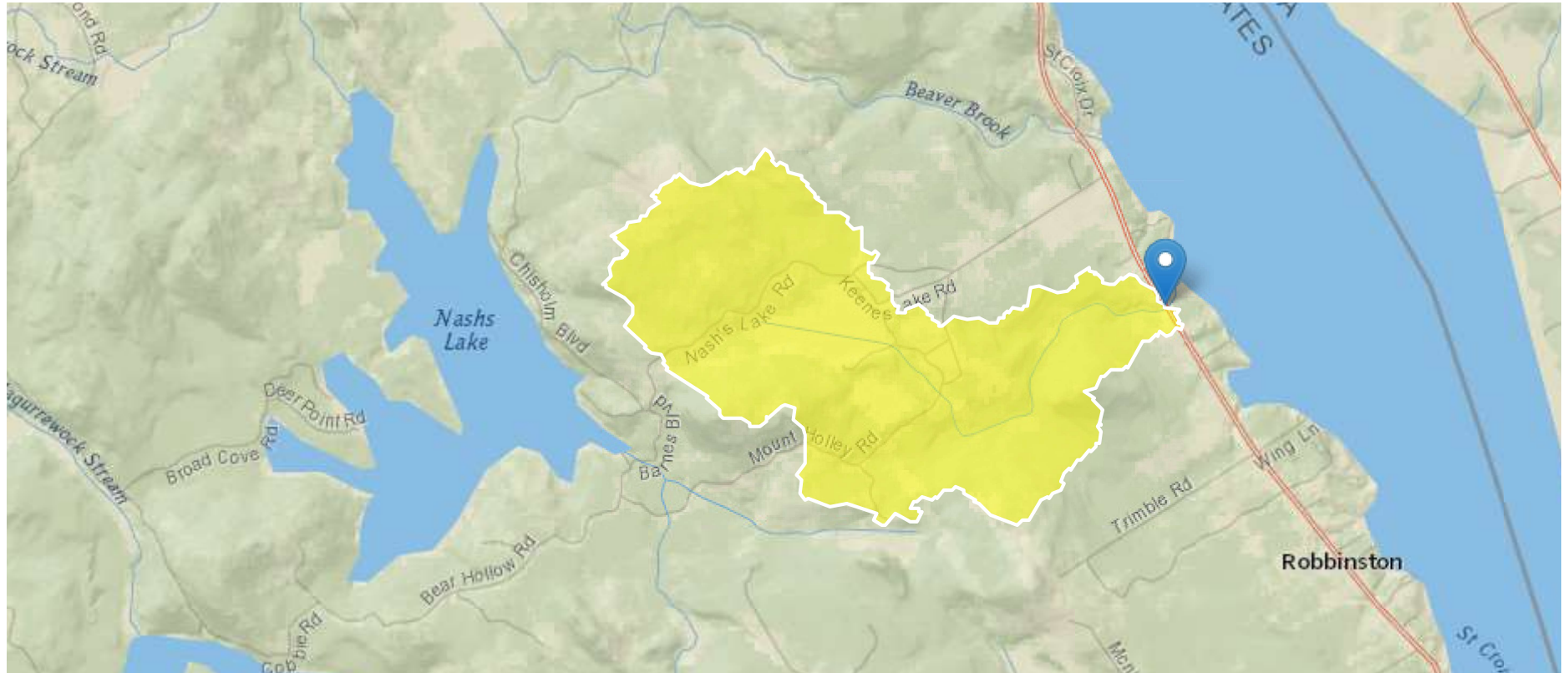
Robbinston 26630.10 LC-47367 US1

Region ID: ME

Workspace ID: ME20240610165459119000

Clicked Point (Latitude, Longitude): 45.11095, -67.13940

Time: 2024-06-10 12:55:23 -0400



96-in S x 108-in R CMP

➤ Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
BSLDEM10M	Mean basin slope computed from 10 m DEM	9.25	percent
CENTROIDX	Basin centroid horizontal (x) location in state plane coordinates	644004.64	meters
CENTROIDY	Basin centroid vertical (y) location in state plane units	4996555.85	meters
COASTDIST	Shortest distance from the coastline to the basin centroid	45.6	miles
DRNAREA	Area that drains to a point on a stream	2.71	square miles
ELEV	Mean Basin Elevation	231.6	feet
ELEVMAX	Maximum basin elevation	512.2	feet
I24H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	6.46	inches
I24H10Y	Maximum 24-hour precipitation that occurs on average once in 10 years	4.43	inches
I24H200Y	Maximum 24-hour precipitation that occurs on average once in 200 years	7.15	inches
I24H25Y	Maximum 24-hour precipitation that occurs on average once in 25 years	5.23	inches
I24H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	3.15	inches
I24H500Y	Maximum 24-hour precipitation that occurs on average once in 500 years	8.11	inches
I24H50Y	Maximum 24-hour precipitation that occurs on average once in 50 years	5.83	inches
I24H5Y	Maximum 24-hour precipitation that occurs on average once in 5 years	3.84	inches
JULAVPRE	Mean July Precipitation	2.99	inches
LC06WATER	Percent of open water, class 11, from NLCD 2006	6.77	percent
PCTSNDGRV	Percentage of land surface underlain by sand and gravel deposits	0	percent

Parameter Code	Parameter Description	Value	Unit
PRDECFEB90	Basin average mean precipitation for December to February from PRISM 1961-1990	11.5	inches
PRECIP	Mean Annual Precipitation	44	inches
SANDGRAVAF	Fraction of land surface underlain by sand and gravel aquifers	0	dimensionless
SANDGRAVAP	Percentage of land surface underlain by sand and gravel aquifers	0	percent
STATSGOA	Percentage of area of Hydrologic Soil Type A from STATSGO	3.03	percent
STORAGE	Percentage of area of storage (lakes ponds reservoirs wetlands)	11.304	percent
STORNWI	Percentage of storage (combined water bodies and wetlands) from the Nationa Wetlands Inventory	11.19	percent

➤ Peak-Flow Statistics

Peak-Flow Statistics Parameters [Statewide multiparameter peakflows SIR 2020 5092]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	2.71	square miles	0.26	5680
I24H2Y	24 Hour 2 Year Precipitation	3.15	inches	1.92	4.17
STORAGE	Percent Storage	11.304	percent	0	29.4
I24H5Y	24 Hour 5 Year Precipitation	3.84	inches	2.48	5.38
I24H10Y	24 Hour 10 Year Precipitation	4.43	inches	2.84	6.38
I24H25Y	24 Hour 25 Year Precipitation	5.23	inches	3.3	7.75
I24H50Y	24 Hour 50 Year Precipitation	5.83	inches	3.65	8.79

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
I24H100Y	24 Hour 100 Year Precipitation	6.46	inches	3.99	9.88
I24H200Y	24 Hour 200 Year Precipitation	7.15	inches	5.26	11.1
I24H500Y	24 Hour 500 Year Precipitation	8.11	inches	5.95	13.1

Peak-Flow Statistics Flow Report [Statewide multiparameter peakflows SIR 2020 5092]

PIL: Lower 90% Prediction Interval, PIU: Upper 90% Prediction Interval, ASEp: Average Standard Error of Prediction, SE: Standard Error, PC: Percent Correct (other -- see report)

Statistic	Value	Unit	PIL	PIU	ASEp
50-percent AEP flood	116	ft ³ /s	62.2	216	39.1
20-percent AEP flood	178	ft ³ /s	96.9	327	38.1
10-percent AEP flood	223	ft ³ /s	120	415	38.9
4-percent AEP flood	284	ft ³ /s	151	535	39.9
2-percent AEP flood	332	ft ³ /s	173	636	39.7
1-percent AEP flood	382	ft ³ /s	200	728	40.7
0.5-percent AEP flood	434	ft ³ /s	220	855	42.8
0.2-percent AEP flood	502	ft ³ /s	251	1000	43.8

Peak-Flow Statistics Citations

Lombard, P.J., and Hodgkins, G.A., 2020, Estimating flood magnitude and frequency on gaged and ungaged streams in Maine: U.S. Geological Survey Scientific Investigations Report 2020–5092, 56 p. (<https://doi.org/10.3133/sir20205092>)

➤ Annual Flow Statistics

Annual Flow Statistics Parameters [Statewide Annual SIR 2015 5151]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	2.71	square miles	14.9	1419
SANDGRAVAF	Fraction of Sand and Gravel Aquifers	0	dimensionless	0	0.212
ELEV	Mean Basin Elevation	231.6	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
Mean Annual Flow	5.93	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>)

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Application Version: 4.20.1

StreamStats Services Version: 1.2.22

NSS Services Version: 2.2.1