

WIN: 26396.00  
 Town: Warren  
 Route No. ME90  
 Asset ID: 46641  
 Lat: 44.15713 Long: -68.18250

Project Name:  
 Stream Name: trib to Oyster Rvr  
 Bridge Name:  
 Analysis by: mrl / csh  
 Date: 10/14/2022

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

*Enter data in blue cells only!*

	km <sup>2</sup>	mi <sup>2</sup>	ac
A	3.78	1.46	934.4
W	0.24	0.1	58.6
P <sub>c</sub>	485066	4891055	
County	Knox		

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

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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 207-557-1052

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**Watershed Characteristics from StreamStats**

STORAGE	6.12	
STORNWI	6.27	NWI Wetlands %
SANDGRAVF	0.05	sand & gravel aquifer as decimal fraction of watershed A
ELEV	381.5	mean basin elevation (ft)
BSLDEM10M	10.1	mean basin slope (%)
COASTDIST	38.00	distance from the coast (mi)
ELEVMAX	1056	maximum basin elevation (ft)
LC06WATER	0.36	percent of drainage basin land cover as open water
PRECIP	48.8	mean annual precipitation
STATSGOA	0.78	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 T (yr)	I24	Q <sub>T</sub> (ft <sup>3</sup> /s)	
		1999 / 2015	2020
1.1			48
2	3.60	70	107
5	4.55	111	176
10	5.35	140	229
25	6.45	183	304
50	7.26	214	364
100	8.13	251	428
200	9.18	288	495
500	10.87	339	591

Q <sub>T</sub> (ft <sup>3</sup> /s) Design
50
105
175
230
305
365
430
495
590

Calculated Bankfull Width: 12.4 ft

**Instructions:**

*Enter values in blue cells only, watershed data from StreamStats*

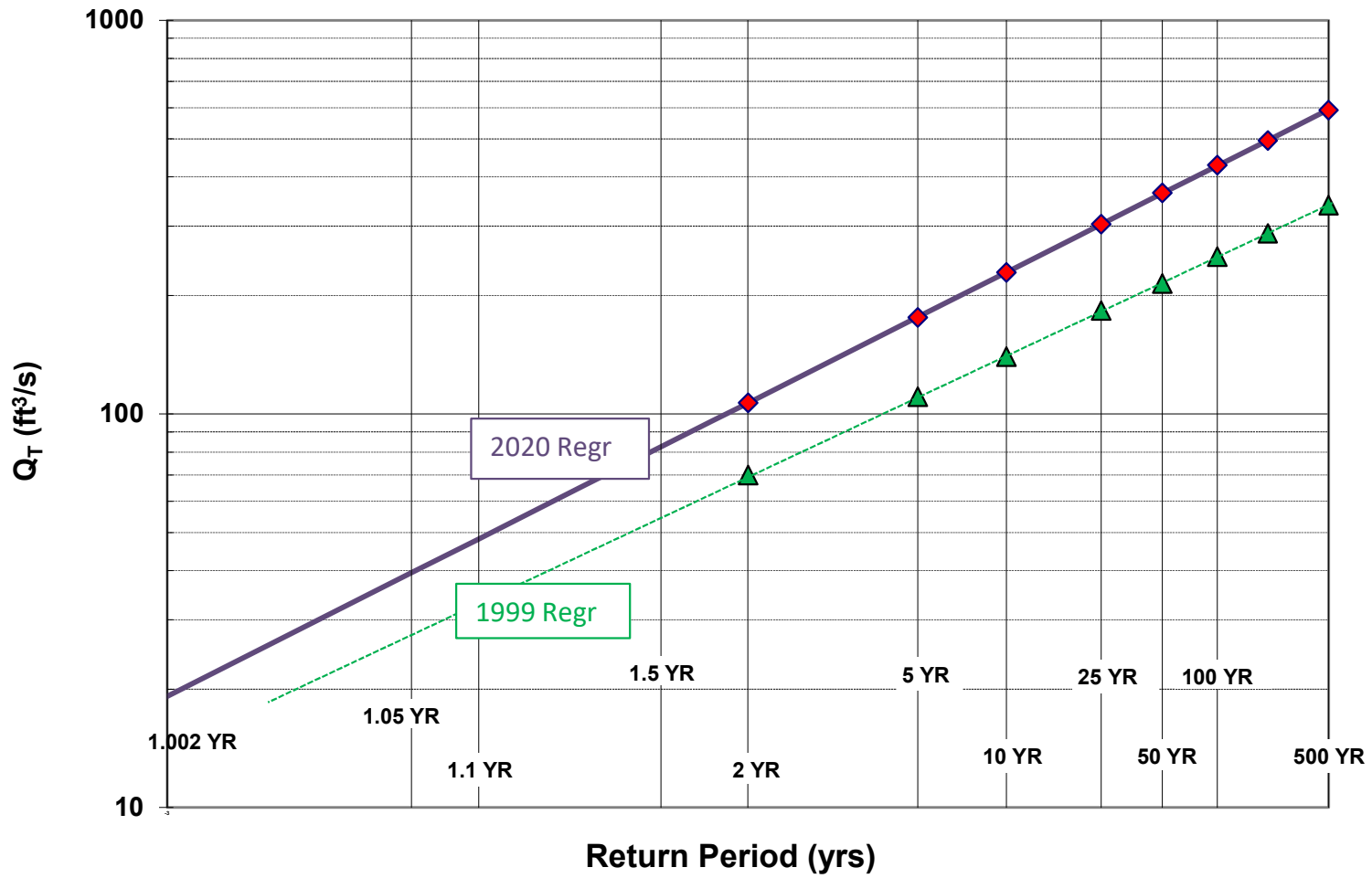
Copy I24 values from Stream Stats

Use results under "Design"

Check against gage data and FEMA studies if available

Questions? Check with ENV / Hydrology Section

# Log-Normal Probability Plot



WIN:	26396.00		
Town:	Warren		
Route No.:	ME90		
Asset ID:	46641		
Lat:	44.15713	Long:	-68.18250

Project Name:	0
Stream Name:	trib to Oyster Rvr
Bridge Name:	0
Analysis by:	mrl / csh
Date:	10/14/2022

**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)**

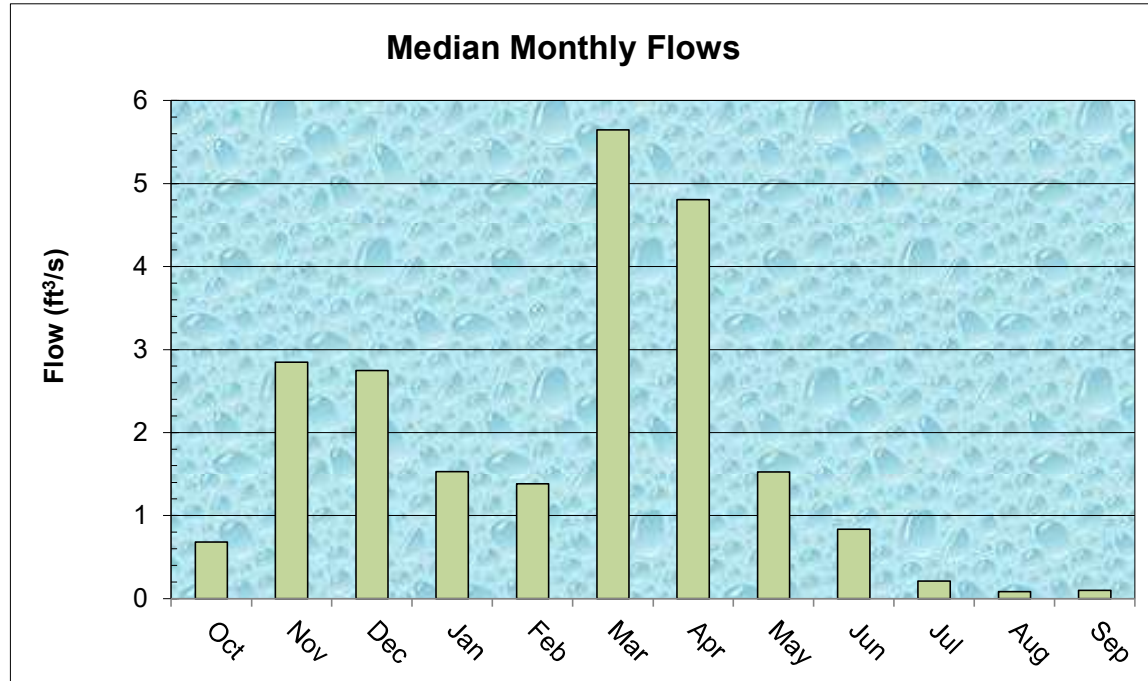
Value	Variable	Explanation
1.46	A	Area (mi <sup>2</sup> )
485066	4891055	$P_c$ Watershed centroid (E,N; UTM; Zone 19; meters)
37.49	DIST	Distance from Coastal reference line (mi)
48.8	pptA	Mean Annual Precipitation (inches)
0.00	SG	Sand & Gravel Aquifer (decimal fraction of watershed area)

Month	$Q_{median}$ (ft <sup>3</sup> /s)	(m <sup>3</sup> /s)
Jan	1.53	0.0434
Feb	1.38	0.0392
Mar	5.65	0.1600
Apr	4.81	0.1362
May	1.52	0.0432
Jun	0.84	0.0237
Jul	0.21	0.0060
Aug	0.08	0.0024
Sep	0.10	0.0028
Oct	0.68	0.0193
Nov	2.85	0.0808
Dec	2.75	0.0778

$Q_{bf}$	7.7
ann avg	3.4
ann med	1.4
$Q_{1.002}$	19.2
$Q_{1.01}$	26.6
$Q_{1.05}$	39.5
$Q_{bf}$	33.6

assume v = 4ft/s

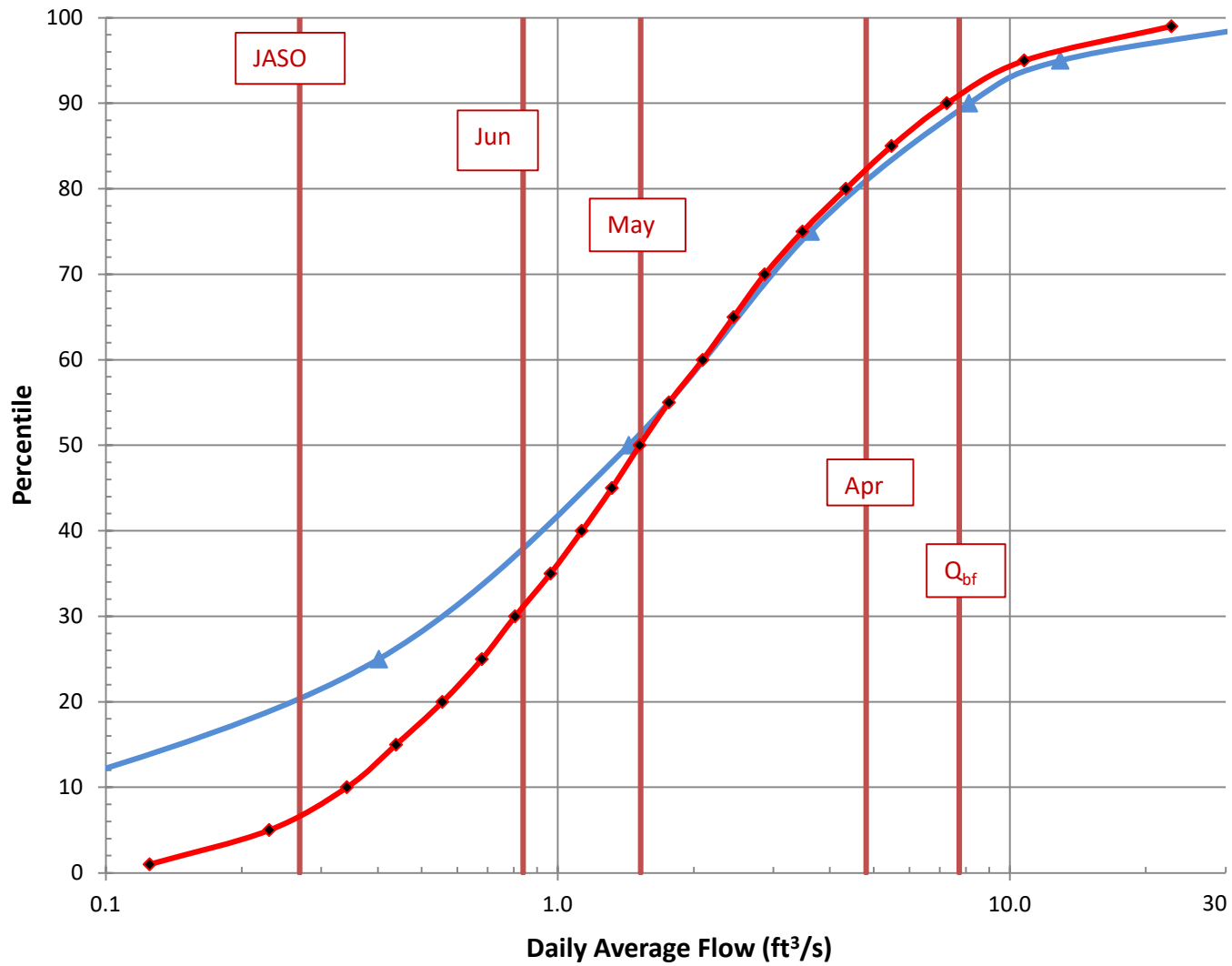
$W_{bf}$	12.4	estimated bankfull width (ft)
$d_{bf}$	0.7	estimated bankfull depth (ft)
$A_{bf}$	6.3	estimated bankfull flow area (ft <sup>2</sup> )



**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

# Daily Average Flow Distribution



## Daily Avg Flow Dist

$A_{ws} = (mi^2)$  1.5

$Q (ft^3/s)$

Pctl	Median	84 <sup>th</sup> pctl
1.00E-06	0.00	0.00
1	0.13	0.22
5	0.23	0.37
10	0.34	0.51
15	0.44	0.64
20	0.56	0.78
25	0.68	0.91
30	0.80	1.04
35	0.96	1.19
40	1.13	1.36
45	1.32	1.54
50	1.52	1.82
55	1.76	2.12
60	2.09	2.49
65	2.45	2.90
70	2.87	3.38
75	3.48	4.07
80	4.34	4.85
85	5.48	6.22
90	7.25	8.35
95	10.76	12.99
99	22.76	29.97

$Q_{bf}$	7.7
$Q_{1.002}$	19.2
$Q_{1.1}$	48.1
$Q_2$	106.7

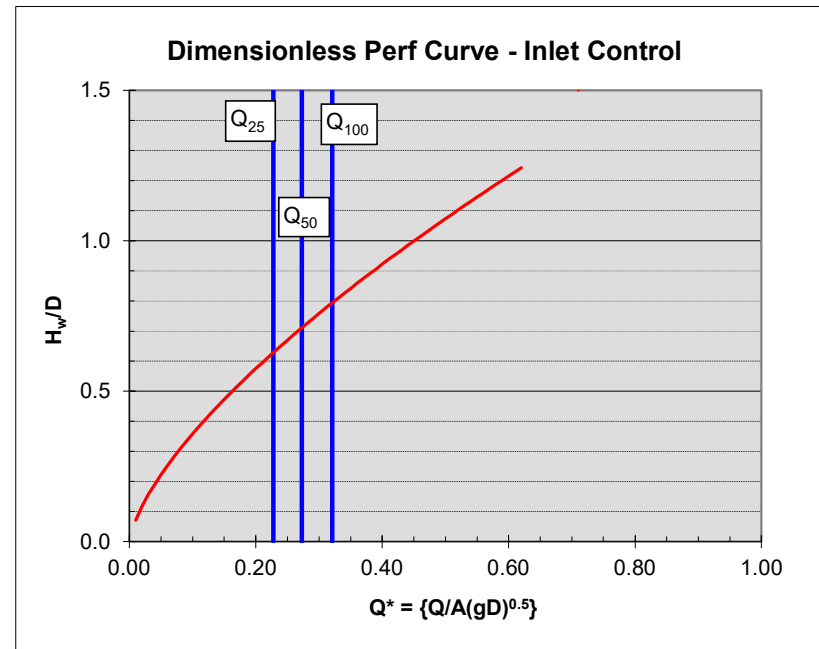
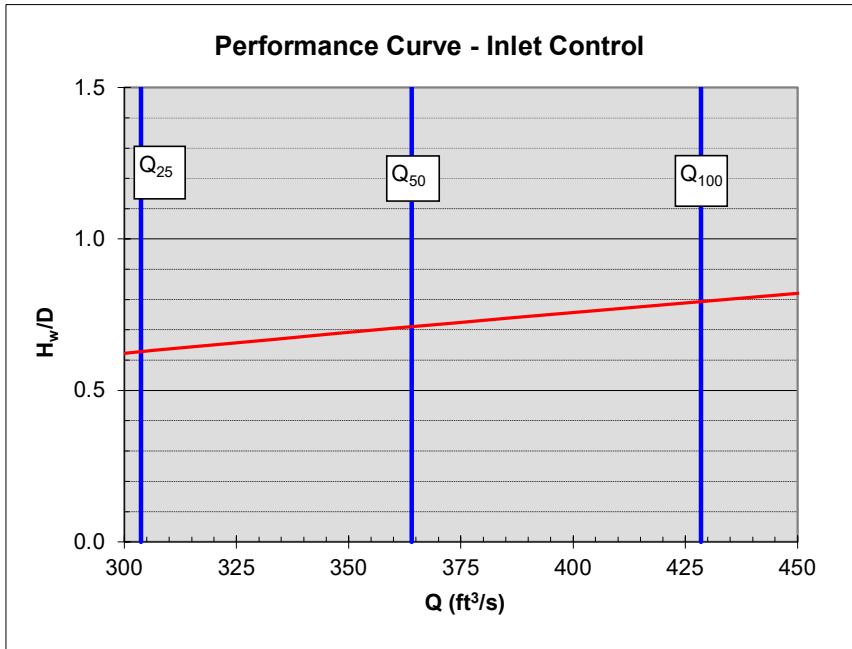
**NOTE:** This page is for preliminary sizing only.  
Final design should be done with HY8 or HDS-5

**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 <sub>25</sub>	303.7	trial D / R = 8.9
w (ft)	16 box span	Q <sub>50</sub>	364.0	
Slope (ft/ft)	0.01	Q <sub>100</sub>	428.5	trial w: BFW = 12.4
A (ft <sup>2</sup> )	96.00			
g (ft/s <sup>2</sup> )	32.2			

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





Pleasant Mtn

Meadow Mtn

Ruins

ain Preserve

Phil's Autobody

Cem

The Pitch

BM 219

90

90

333

385

280

300

300

400

200

260

X 375

700

7000

800

800

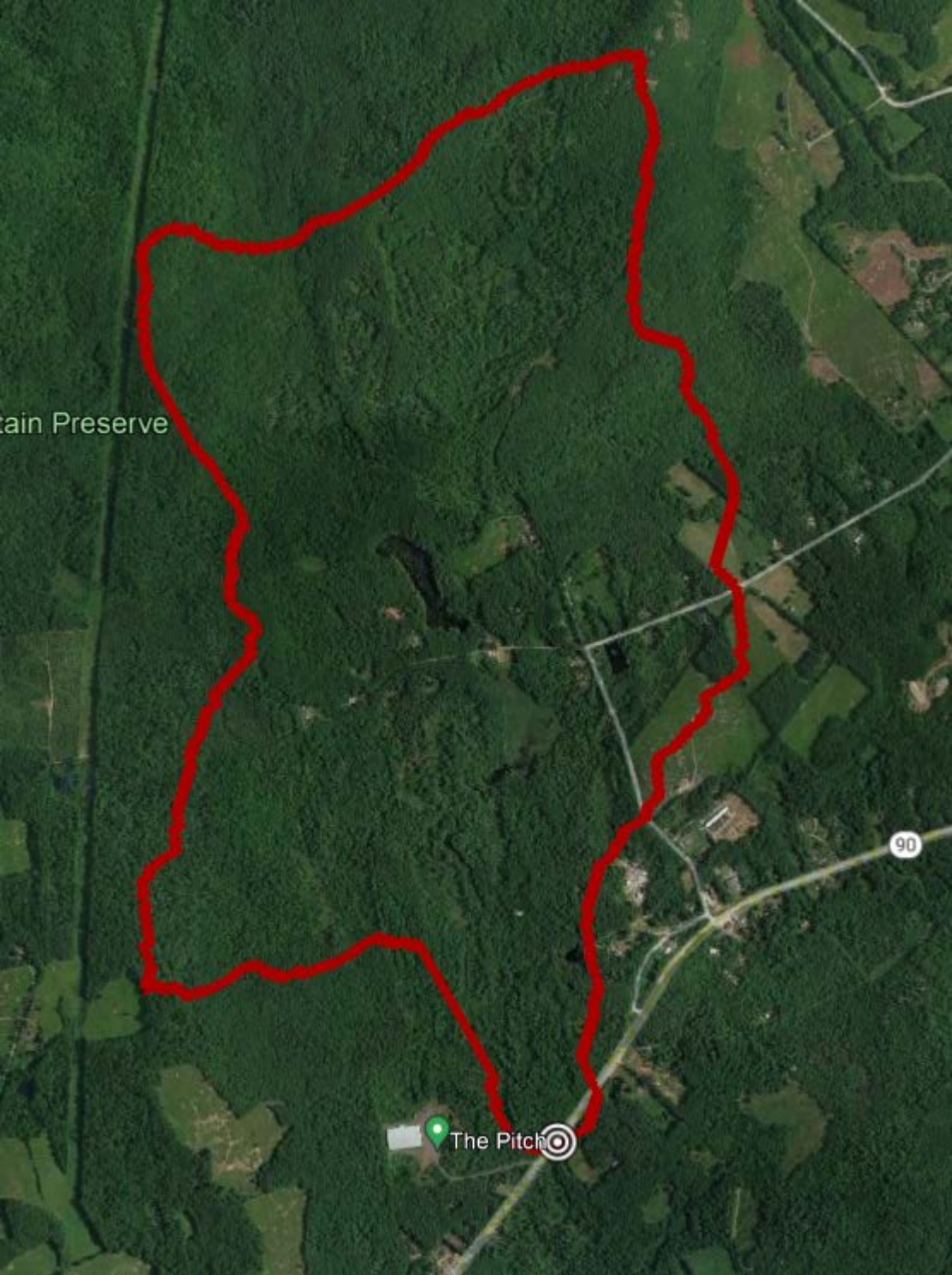
400

400

ain Preserve

90

The Pitch



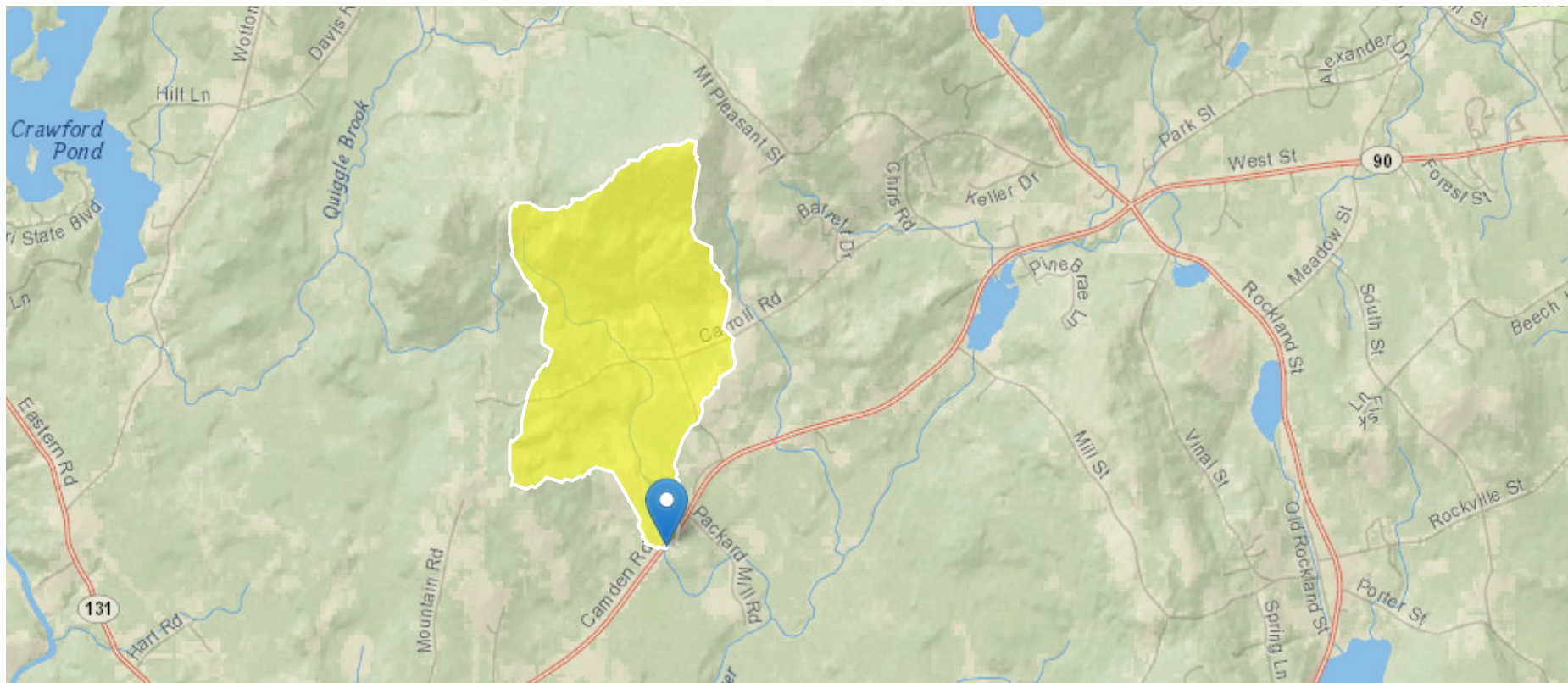
# Warren 26396 ME90 LC46641 trib to Oyster River

Region ID: ME

Workspace ID: ME20220222181453295000

Clicked Point (Latitude, Longitude): 44.15713, -69.18250

Time: 2022-02-22 13:15:16 -0500



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	1.46	square miles
I24H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	3.6	inches
STORAGE	Percentage of area of storage (lakes ponds reservoirs wetlands)	6.127	percent
I24H5Y	Maximum 24-hour precipitation that occurs on average once in 5 years	4.55	inches
I24H10Y	Maximum 24-hour precipitation that occurs on average once in 10 years	5.35	inches
I24H25Y	Maximum 24-hour precipitation that occurs on average once in 25 years	6.45	inches
I24H50Y	Maximum 24-hour precipitation that occurs on average once in 50 years	7.26	inches
I24H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	8.13	inches
I24H200Y	Maximum 24-hour precipitation that occurs on average once in 200 years	9.18	inches
I24H500Y	Maximum 24-hour precipitation that occurs on average once in 500 years	10.87	inches
SANDGRAVAF	Fraction of land surface underlain by sand and gravel aquifers	0.046	dimensionless
ELEV	Mean Basin Elevation	381.4	feet
BSLDEM10M	Mean basin slope computed from 10 m DEM	10.1	percent
CENTROIDX	Basin centroid horizontal (x) location in state plane coordinates	485065.84	meters
CENTROIDY	Basin centroid vertical (y) location in state plane units	4891054.36	meters
COASTDIST	Shortest distance from the coastline to the basin centroid	38	miles
ELEVMAX	Maximum basin elevation	1056.1	feet
LC06WATER	Percent of open water, class 11, from NLCD 2006	0.36	percent
LC11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	3.21	percent
LC11IMP	Average percentage of impervious area determined from NLCD 2011 impervious dataset	0.42	percent

Parameter Code	Parameter Description	Value	Unit
PRDECFEB90	Basin average mean precipitation for December to February from PRISM 1961-1990	13	inches
PRECIP	Mean Annual Precipitation	48.8	inches
SANDGRAVAP	Percentage of land surface underlain by sand and gravel aquifers	4.62	percent
STATSGOA	Percentage of area of Hydrologic Soil Type A from STATSGO	0.78	percent
STORNWI	Percentage of storage (combined water bodies and wetlands) from the National Wetlands Inventory	6.27	percent

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

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.46	square miles	0.26	5680
I24H2Y	24 Hour 2 Year Precipitation	3.6	inches	1.92	4.17
STORAGE	Percent Storage	6.127	percent	0	29.4
I24H5Y	24 Hour 5 Year Precipitation	4.55	inches	2.48	5.38
I24H10Y	24 Hour 10 Year Precipitation	5.35	inches	2.84	6.38
I24H25Y	24 Hour 25 Year Precipitation	6.45	inches	3.3	7.75
I24H50Y	24 Hour 50 Year Precipitation	7.26	inches	3.65	8.79
I24H100Y	24 Hour 100 Year Precipitation	8.13	inches	3.99	9.88
I24H200Y	24 Hour 200 Year Precipitation	9.18	inches	5.26	11.1
I24H500Y	24 Hour 500 Year Precipitation	10.87	inches	5.95	13.1

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

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

Statistic	Value	Unit	PII	Plu	ASEp
50-percent AEP flood	107	ft <sup>3</sup> /s	56.8	202	39.1
20-percent AEP flood	176	ft <sup>3</sup> /s	94.7	327	38.1
10-percent AEP flood	229	ft <sup>3</sup> /s	121	432	38.9
4-percent AEP flood	304	ft <sup>3</sup> /s	159	582	39.9
2-percent AEP flood	364	ft <sup>3</sup> /s	187	708	39.7
1-percent AEP flood	428	ft <sup>3</sup> /s	221	829	40.7
0.5-percent AEP flood	495	ft <sup>3</sup> /s	247	993	42.8
0.2-percent AEP flood	591	ft <sup>3</sup> /s	290	1210	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>)**

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

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.46	square miles	14.9	1419
SANDGRAVAF	Fraction of Sand and Gravel Aquifers	0.046	dimensionless	0	0.212
ELEV	Mean Basin Elevation	381.4	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	0.00414	ft <sup>3</sup> /s
5 Percent Duration	0.0258	ft <sup>3</sup> /s
10 Percent Duration	0.0734	ft <sup>3</sup> /s
25 Percent Duration	0.402	ft <sup>3</sup> /s
50 Percent Duration	1.43	ft <sup>3</sup> /s
75 Percent Duration	3.62	ft <sup>3</sup> /s
90 Percent Duration	8.12	ft <sup>3</sup> /s
95 Percent Duration	12.9	ft <sup>3</sup> /s
99 Percent Duration	35.6	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 [Statewide Annual SIR 2015 5151]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.46	square miles	14.9	1419
SANDGRAVAF	Fraction of Sand and Gravel Aquifers	0.046	dimensionless	0	0.212
ELEV	Mean Basin Elevation	381.4	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	3.44	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>)**

Bankfull Statistics Parameters [Central and Coastal Bankfull 2004 5042]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.46	square miles	2.92	298

Bankfull Statistics Parameters [Appalachian Highlands D Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.46	square miles	0.07722	940.1535

Bankfull Statistics Parameters [New England P Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.46	square miles	3.799224	138.999861

Bankfull Statistics Parameters [USA Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.46	square miles	0.07722	59927.7393

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	7.72	ft <sup>3</sup> /s
Bankfull Width	9.34	ft
Bankfull Depth	0.676	ft
Bankfull Area	6.3	ft <sup>2</sup>

Bankfull Statistics Flow Report [Appalachian Highlands D Bieger 2015]

Statistic	Value	Unit
Bieger_D_channel_width	17.8	ft
Bieger_D_channel_depth	1.25	ft
Bieger_D_channel_cross_sectional_area	22.5	ft <sup>2</sup>

Bankfull Statistics Disclaimers [New England P Bieger 2015]

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

Bankfull Statistics Flow Report [New England P Bieger 2015]

Statistic	Value	Unit
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<b>Statistic</b>	<b>Value</b>	<b>Unit</b>
Bieger_P_channel_width	28.1	ft
Bieger_P_channel_depth	1.49	ft
Bieger_P_channel_cross_sectional_area	42	ft <sup>2</sup>

## Bankfull Statistics Flow Report [USA Bieger 2015]

<b>Statistic</b>	<b>Value</b>	<b>Unit</b>
Bieger_USA_channel_width	14.1	ft
Bieger_USA_channel_depth	1.31	ft
Bieger_USA_channel_cross_sectional_area	21	ft <sup>2</sup>

## Bankfull Statistics Flow Report [Area-Averaged]

<b>Statistic</b>	<b>Value</b>	<b>Unit</b>
Bankfull Streamflow	7.72	ft <sup>3</sup> /s
Bankfull Width	9.34	ft
Bankfull Depth	0.676	ft
Bankfull Area	6.3	ft <sup>2</sup>
Bieger_D_channel_width	17.8	ft
Bieger_D_channel_depth	1.25	ft
Bieger_D_channel_cross_sectional_area	22.5	ft <sup>2</sup>
Bieger_P_channel_width	28.1	ft
Bieger_P_channel_depth	1.49	ft
Bieger_P_channel_cross_sectional_area	42	ft <sup>2</sup>
Bieger_USA_channel_width	14.1	ft

Statistic	Value	Unit
Bieger_USA_channel_depth	1.31	ft
Bieger_USA_channel_cross_sectional_area	21	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>)**

**Bieger, Katrin; Rathjens, Hendrik; Allen, Peter M.; and Arnold, Jeffrey G.,2015, Development and Evaluation of Bankfull Hydraulic Geometry Relationships for the Physiographic Regions of the United States, Publications from USDA-ARS / UNL Faculty, 17p. ([https://digitalcommons.unl.edu/usdaarsfacpub/1515?utm\\_source=digitalcommons.unl.edu%2Fusdaarsfacpub%2F1515&utm\\_medium=PDF&utm\\_campaign=PDFCoverPages](https://digitalcommons.unl.edu/usdaarsfacpub/1515?utm_source=digitalcommons.unl.edu%2Fusdaarsfacpub%2F1515&utm_medium=PDF&utm_campaign=PDFCoverPages))**

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Application Version: 4.7.0

StreamStats Services Version: 1.2.22

NSS Services Version: 2.1.2