

# MaineDOT Culvert Hydrology Summary Sheet

Town: Owls Head WIN (or Region): 21808.00

Route: Route 73 Local Road Name:

Stream: No Name

Lat: 44.077065 Long: 69.1056

Asset ID: LC 46010 Also Known As:

Existing Structure: 98" x 72" - two bands unhooked and unzipped and the banks have severe erosio

\*\*\*\*\*

Watershed Area: 1.1 sq. mi. NWI Wetlands: 8.65 %

Wbf - calculated: 8.1 feet Wbf - measured (if known): 8.5 feet

Q50: 154.3 cfs

Q100: 180.5 cfs

Preliminary Pipe Size\*:

8' D emb 24"

\* Note: this size may NOT meet fish passage regulatory requirements. Consult with ENV staff for guidance.

Comments:

By: LPO

Date: 6/7/2016

Revised:

ver: 5/12/2016

Project Name: Owls Head  
 Stream Name: No name  
 Bridge Name: No name  
 Route No. Route 73  
 Analysis by: LPO

PIN: 21808  
 Town: Owls Head  
 Bridge No. LC #4 6010  
 USGS Quad:  
 Date: 6/7/2016

### 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	2.85	1.10	704.0
W	0.25	0.1	60.9

P <sub>c</sub>	490847	4879950
County	Knox	
pptA	46.1	
SG	0.00	

A (km <sup>2</sup> )	2.85
W (%)	8.65

Conf Lvl 0.67

*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

mean annual precipitation (inches; by look-up)

sand & gravel aquifer as decimal fraction of watershed A

NWI Wetlands % STORNWI

**Worksheet prepared by:**

Charles S. Hebson, PE

Environmental Office

Maine Dept. Transportation

Augusta, ME 04333-0016

207-557-1052

[Charles.Hebson@maine.gov](mailto:Charles.Hebson@maine.gov)

ver. 2016 Feb 05

**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

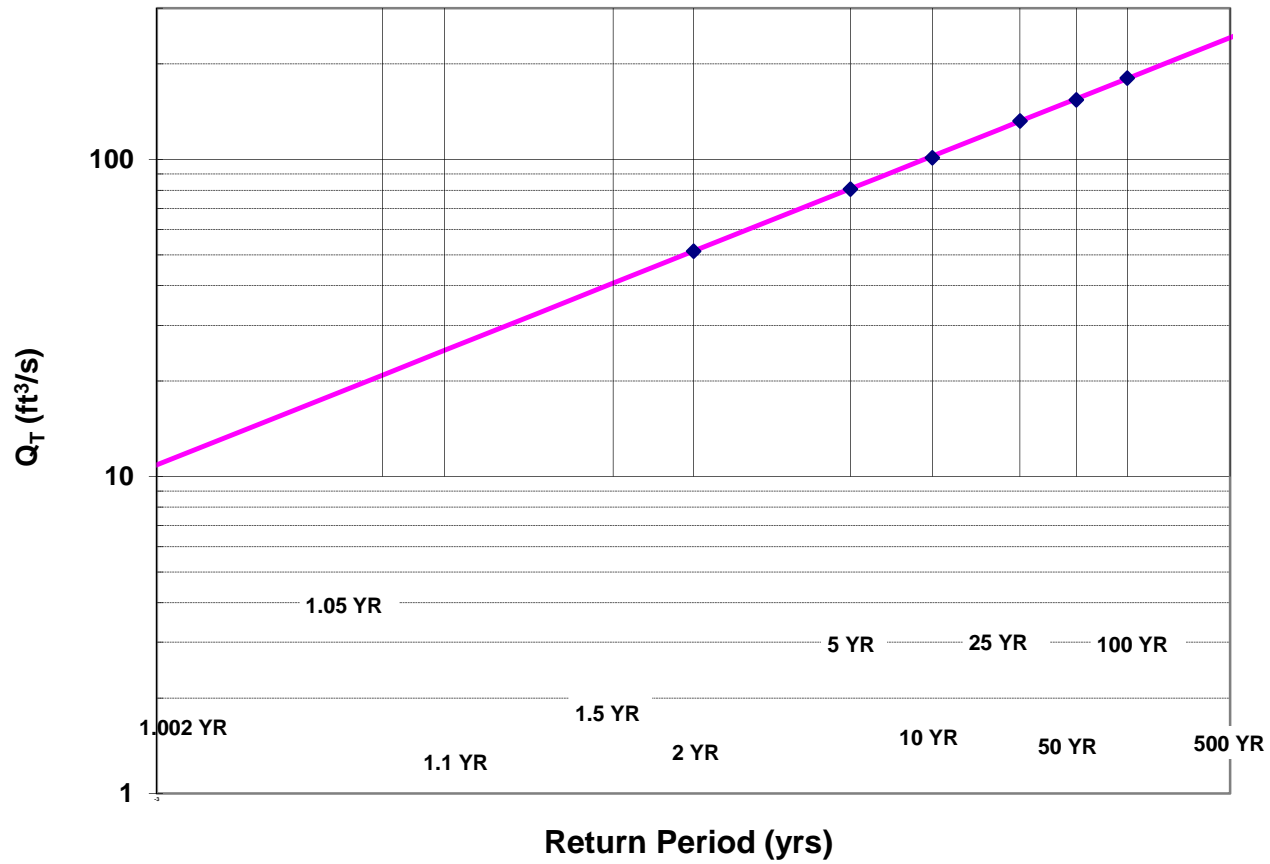
SIR 2015-4059, USGS, Augusta, ME

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

Ret Pd T (yr)	Peak Flow Estimate		Upper
	Lower	Q <sub>T</sub> (m <sup>3</sup> /s)	
1.1		0.71	
2		1.46	
5		2.28	
10		2.87	
25		3.75	
50		4.37	
100		5.11	
500		6.87	

Q <sub>T</sub> (ft <sup>3</sup> /s)
25.0
51.4
80.6
101.3
132.4
154.3
180.5
242.6

# Log-Normal Probability Plot



Project Name: Owls Head  
 Stream Name: No name  
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 USGS Quad:  
 Date: 6/7/2016

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

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

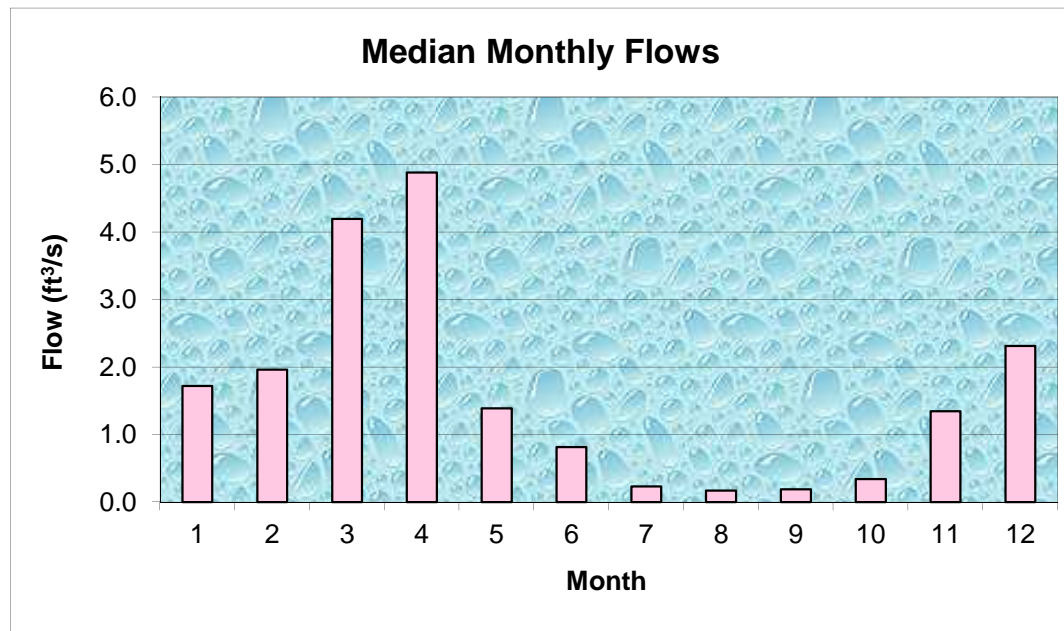
	Value	Variable	Explanation
	1.10	A	Area (mi <sup>2</sup> )
490847	4879950	$P_c$	Watershed centroid (E,N; UTM; Zone 19; meters)
	29.76	DIST	Distance from Coastal reference line (mi)
	46.1	pptA	Mean Annual Precipitation (inches)
	0.00	SG	Sand & Gravel Aquifer (decimal fraction of watershed area)

Month	$Q_{median}$ (ft <sup>3</sup> /s)	(m <sup>3</sup> /s)
Jan	1.72	0.0488
Feb	1.96	0.0557
Mar	4.19	0.1188
Apr	4.88	0.1384
May	1.39	0.0393
Jun	0.81	0.0230
Jul	0.23	0.0066
Aug	0.17	0.0048
Sep	0.19	0.0053
Oct	0.34	0.0096
Nov	1.34	0.0381
Dec	2.32	0.0656

$Q_{bf}$	5.7
ann avg	2.3
ann med	1.2
$Q_{1.002}$	10.9
$Q_{1.01}$	14.6
$Q_{1.05}$	20.9
$Q_{bf}$	19.8

assume v = 4ft/s

$W_{bf}$	8.1	estimated bankfull width (ft)
$d_{bf}$	0.6	estimated bankfull depth (ft)
$A_{bf}$	4.9	estimated bankfull flow area (ft <sup>2</sup> )



**References**

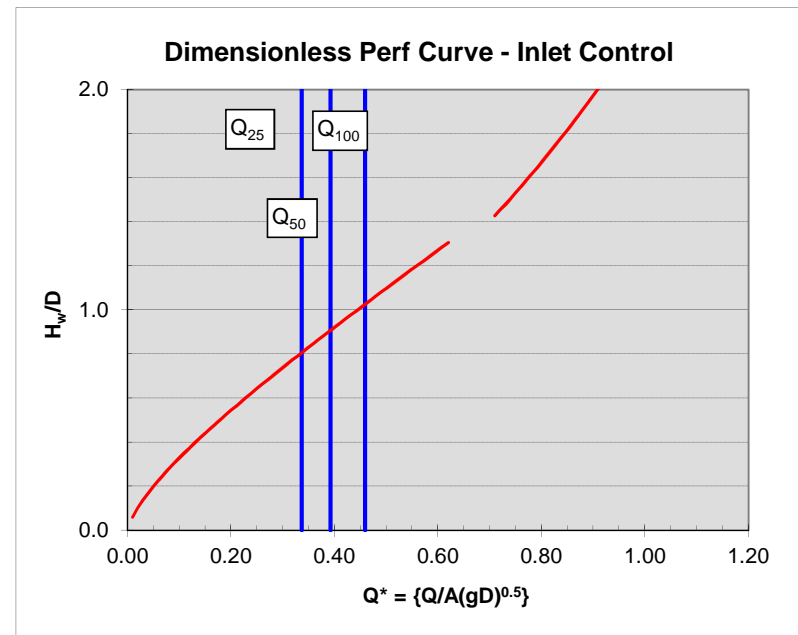
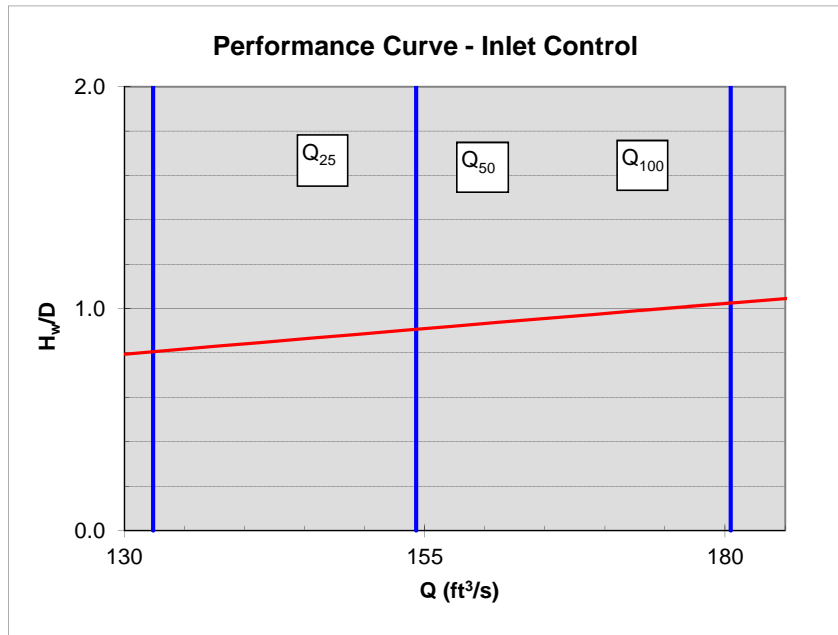
Dudley, R.W., 2004. Hydraulic Geometry Relations ..., SIR 2004-5042  
 Dudley, R.W., 2004. Estimating Monthly Streamflows ... , SIR 2004-5026

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

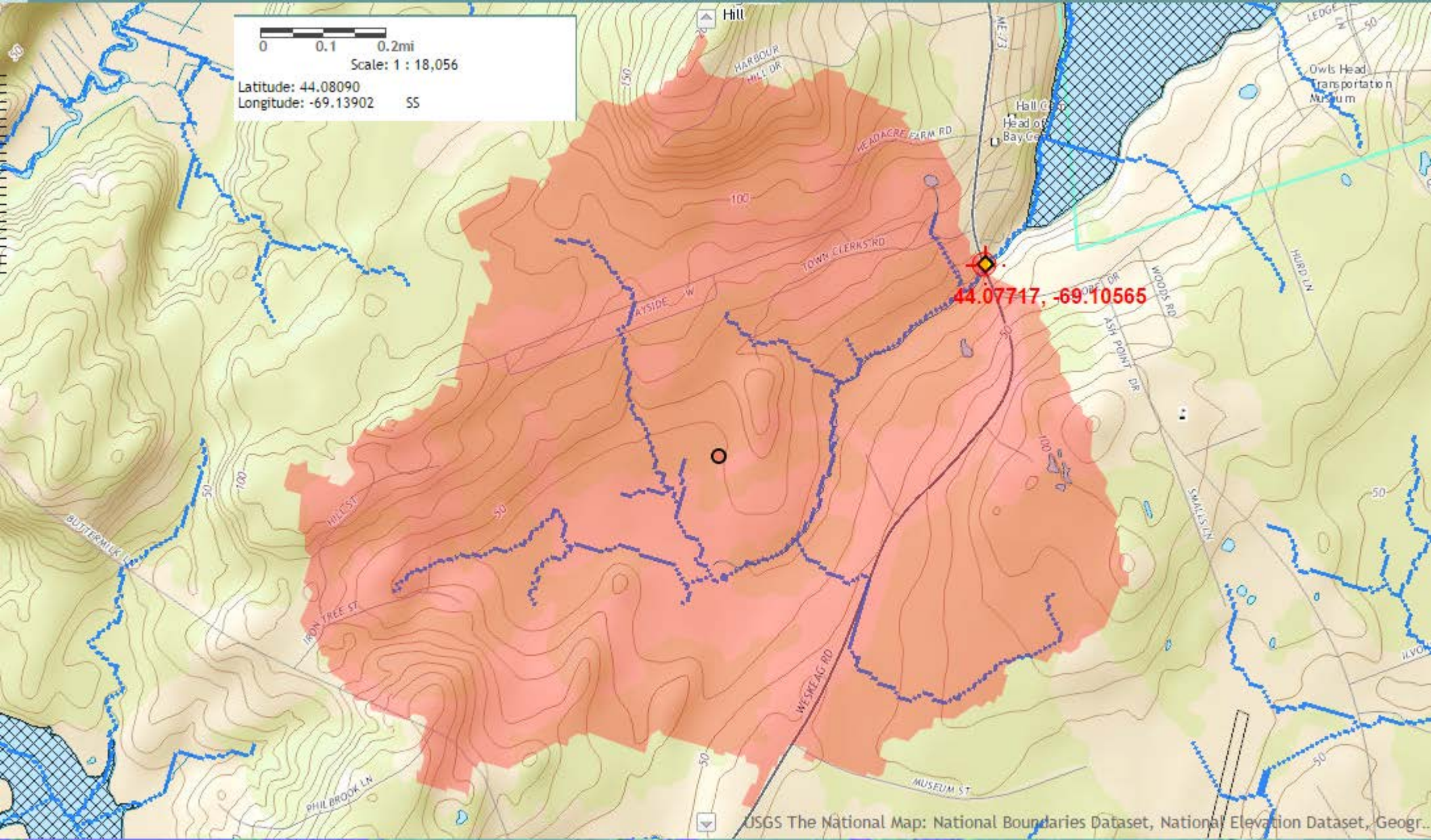
**Preliminary Culvert Sizing - Round & Box Culverts**

Shape:	Round			
Type:	Circ CMP Proj	Q <sub>25</sub>	132.4	
D or R (ft)	6	Q <sub>50</sub>	154.3	trial D / R = 6.3
w (ft)	box width	Q <sub>100</sub>	180.5	trial w: BFW = 8.1
Slope (ft/ft)	0.02			
A (ft <sup>2</sup> )	28.27			
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)



0 0.1 0.2mi  
Scale: 1 : 18,056  
Latitude: 44.08090  
Longitude: -69.13902 SS



44.07717, -69.10565

# StreamStats Version 3.0

## Basin Characteristics Ungaged Site Report

Date: Tues June 7, 2016 9:28:37 AM GMT-4  
 Study Area: Maine  
 NAD 1983 Latitude: 44.0772 ( 44 04 38)  
 NAD 1983 Longitude: -69.1055 (-69 06 20)

Label	Value	Units	Definition
DRNAREA	1.1	square miles	Area that drains to a point on a stream
STORNWI	8.65	percent	Percentage of storage (combined water bodies and wetlands) from the National Wetlands Inventory
ELEV	68	feet	Mean Basin Elevation
PRECIP	47.6	inches	Mean Annual Precipitation
PRDECFEB90	13.1	inches	Basin average mean precipitation for December to February from PRISM 1961-1990
SANDGRAVAP	0	percent	Percentage of land surface underlain by sand and gravel aquifers
COASTDIST	30.5	miles	Shortest distance from the coastline to the basin centroid
CENTROIDX	490847.04	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	4879949.57	State plane coordinates	Basin centroid vertical (y) location in state plane units
SANDGRAVAF	0	dimensionless	Fraction of land surface underlain by sand and gravel aquifers
LC11IMP	3.55	percent	Average percentage of impervious area determined from NLCD 2011 impervious dataset
LC11DEV	19.3	percent	Percentage of land-use from NLCD 2011 classes 21-24

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U.S. Department of the Interior | U.S. Geological Survey  
 URL: [http://streamstats.cr.usgs.gov/v3\\_beta/BCreport.htm](http://streamstats.cr.usgs.gov/v3_beta/BCreport.htm)  
 Page Contact Information: [StreamStats Help](#)  
 Page Last Modified: 01/26/2016 11:44:09 (Web2)

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# StreamStats Version 3.0

## Flow Statistics Ungaged Site Report

Date: Tues June 7, 2016 9:30:20 AM GMT-4

Study Area: Maine

NAD 1983 Latitude: 44.0772 ( 44 04 38)

NAD 1983 Longitude: -69.1055 (-69 06 20)

Drainage Area: 1.1 mi<sup>2</sup>

Regional Hydraulic Geometry Basin Characteristics			
100% Central and Coastal Bankfull 2004 5042 (1.1 mi <sup>2</sup> )			
Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	1.1 (below min value 2.92)	2.92	298

*Warning: Some parameters are outside the suggested range. Estimates will be extrapolations with unknown errors.*

Regional Median Flows Basin Characteristics	
100% Undefined Region (1.1 mi <sup>2</sup> )	
The selected watershed is entirely in an area for which flow equations were not defined.	

Monthly Mean Flows Basin Characteristics			
100% Statewide Mean Monthly SIR 2004 5026 (1.1 mi <sup>2</sup> )			
Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	1.1 (below min value 9.79)	9.79	1418
Fraction of Sand and Gravel Aquifers (dimensionless)	0.00	0	0.455
Mean Annual Precipitation (inches)	47.6	37.8	47.9
Distance From Coast To Basin Centroid (miles)	30.5 (below min value 42.7)	42.7	193

*Warning: Some parameters are outside the suggested range. Estimates will be extrapolations with unknown errors.*

Monthly Median Flows Basin Characteristics			
100% Statewide Median Monthly SIR 2004 5026 (1.1 mi <sup>2</sup> )			
Parameter	Value	Regression Equation Valid Range	
		Min	Max

Drainage Area (square miles)	1.1 (below min value 9.79)	9.79	1418
Fraction of Sand and Gravel Aquifers (dimensionless)	0.00	0	0.455
Mean Annual Precipitation (inches)	47.6	37.8	47.9
Distance From Coast To Basin Centroid (miles)	30.5 (below min value 42.7)	42.7	193

*Warning: Some parameters are outside the suggested range. Estimates will be extrapolations with unknown errors.*

Peak Flow Basin Characteristics			
100% Statewide Peak Flow Full WRI 99 4008 (1.1 mi2)			
Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	1.1	0.93	1653
Percentage of Storage from NWI (percent)	8.65	0.7	26.7

Annual Flows Basin Characteristics			
100% Statewide Annual SIR 2004 5026 (1.1 mi2)			
Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	1.1 (below min value 9.79)	9.79	1418
Fraction of Sand and Gravel Aquifers (dimensionless)	0.00	0	0.455
Basin Ave Precip Dec Feb PRISM 1990 (inches)	13.1 (above max value 12.6)	7.71	12.6

*Warning: Some parameters are outside the suggested range. Estimates will be extrapolations with unknown errors.*

Regional Hydraulic Geometry Statistics						
Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
BFFLOW	5.74	ft3/s				
BFWDTH	8.06	ft				
BFDPTH	0.61	ft				
BFAREA	4.94	ft2				

<http://pubs.usgs.gov/sir/2004/5042/pdf/sir2004-5042.pdf> (<http://pubs.usgs.gov/sir/2004/5042/pdf/sir2004-5042.pdf>)  
 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

Monthly Mean Flows Statistics				
90-Percent Prediction Interval				

Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	Min	Max
Q1	2.87	ft3/s				
Q2	3.02	ft3/s				
Q3	7.56	ft3/s				
Q4	6.23	ft3/s				
Q5	2.03	ft3/s				
Q6	1.51	ft3/s				
Q7	0.53	ft3/s				
Q8	0.39	ft3/s				
Q9	0.48	ft3/s				
Q10	1.19	ft3/s				
Q11	2.73	ft3/s				
Q12	3.65	ft3/s				

<http://water.usgs.gov/pubs/sir/2004/5026/pdf/sir2004-5026.pdf> (<http://water.usgs.gov/pubs/sir/2004/5026/pdf/sir2004-5026.pdf>)  
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.

Monthly Median Flows Statistics						
Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
JAND50	1.69	ft3/s				
FEBD50	1.92	ft3/s				
MARD50	4.08	ft3/s				
APRD50	5.38	ft3/s				
MAYD50	1.4	ft3/s				
JUND50	0.81	ft3/s				
JULD50	0.23	ft3/s				
AUGD50	0.17	ft3/s				
SEPD50	0.19	ft3/s				
OCTD50	0.34	ft3/s				
NOVD50	1.34	ft3/s				
DECD50	2.29	ft3/s				

<http://water.usgs.gov/pubs/sir/2004/5026/pdf/sir2004-5026.pdf> (<http://water.usgs.gov/pubs/sir/2004/5026/pdf/sir2004-5026.pdf>)  
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.

**Peak Flow Statistics**

Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
PK2	54.3	ft3/s	35	1.8	29.5	100
PK5	91.6	ft3/s	36	2.5	49.1	171
PK10	121	ft3/s	37	3.2	63.5	230
PK25	162	ft3/s	39	4.1	82.7	318
PK50	196	ft3/s	40	4.8	97.4	394
PK100	233	ft3/s	41	5.4	113	480
PK500	327	ft3/s	45	6.4	149	719

<http://me.water.usgs.gov/99-4008.pdf> (<http://me.water.usgs.gov/99-4008.pdf>)

Hodgkins, G. A., 1999, Estimating the Magnitude of Peak Flows for Streams in Maine for Selected Recurrence Intervals: U.S. Geological Survey Water-Resources Investigations Report 99-4008, 45 p.

**Annual Flows Statistics**

Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
QA	2.53	ft3/s				
MEDAN	1.47	ft3/s				
M7D10Y	0.0257	ft3/s				

<http://water.usgs.gov/pubs/sir/2004/5026/pdf/sir2004-5026.pdf> (<http://water.usgs.gov/pubs/sir/2004/5026/pdf/sir2004-5026.pdf>)

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.

