

MaineDOT Culvert Hydrology Summary Sheet

Town: Warren WIN (or Region): 21835.00

Route: Route 235 Local Road Name: Alfond St

Stream: No Name

Lat: 44.161182 Long: -69.3150

Asset ID: LC 46645 Also Known As:

Existing Structure: 72" x 64" - 72"PIPE 64'LONG, 48"PIPE 60'LONG - 72 inch pipe is unzipped all t

Watershed Area: 3.6 sq. mi. NWI Wetlands: 12.28 %

Wbf - calculated: 14.9 feet Wbf - measured (if known): 14.5 feet

Q50: 349.3 cfs

Q100: 409.0 cfs

Preliminary Pipe Size*:

9'D emb 36"

* 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: Warren
 Stream Name: No Name
 Bridge Name:
 Route No. Route 235
 Analysis by: LPO

PIN: 21835
 Town: Warren
 Bridge No. LC 466
 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 ²	mi ²	ac
A	9.32	3.60	2304.0
W	1.14	0.4	282.9

P _c	473713.8	4891498
County	Knox	
pptA	46.1	
SG	0.01	

A (km ²)	9.32
W (%)	12.28

Conf Lvl

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:

Charles S. Hebson, PE

Environmental Office

Maine Dept. Transportation

Augusta, ME 04333-0016

207-557-1052

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

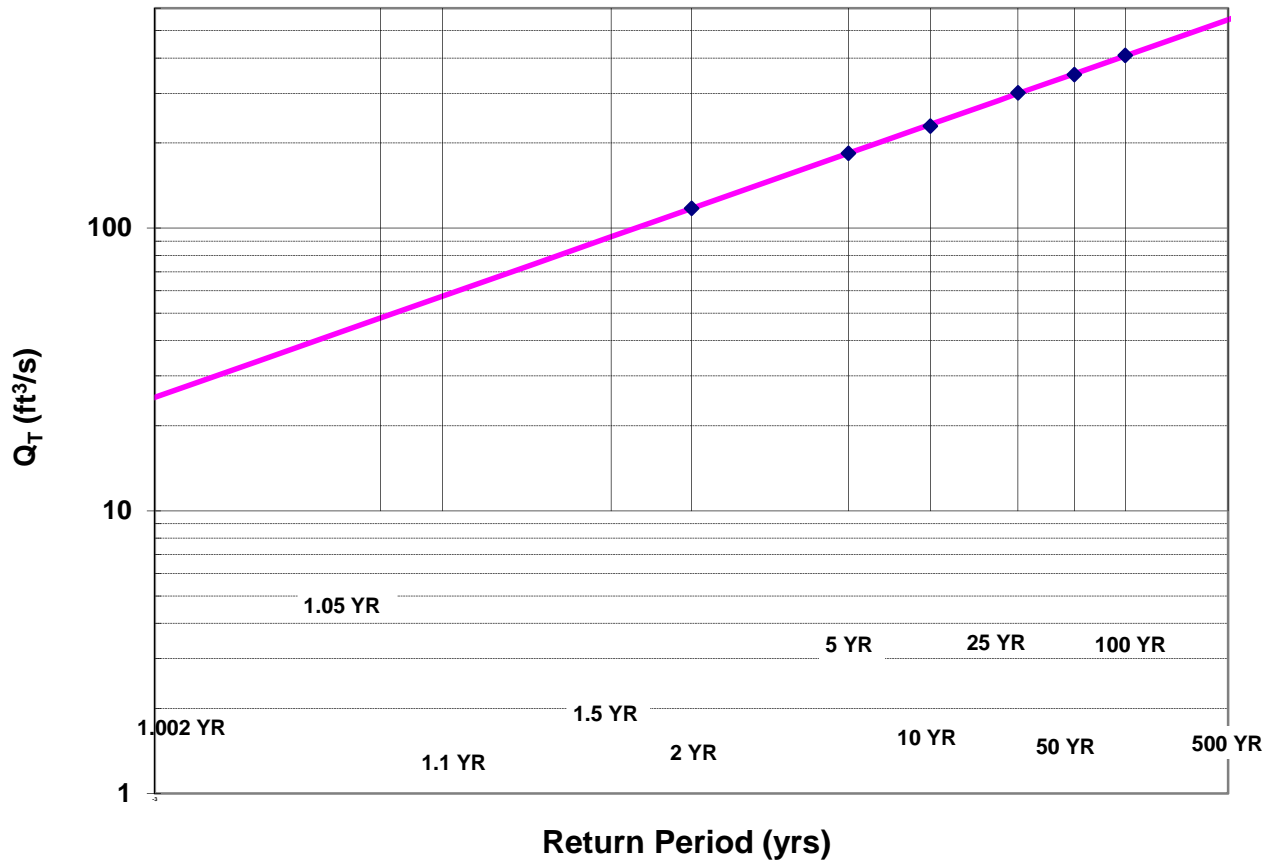
SIR 2015-4059, USGS, Augusta, ME

Ret Pd T (yr)	Peak Flow Estimate	
	Lower	Upper
1.1	Q _T (m ³ /s)	1.63
2		3.33
5		5.21
10		6.51
25		8.54
50		9.89
100		11.58
500		15.50

Q _T (ft ³ /s)
57.5
117.4
184.0
230.0
301.5
349.3
409.0
547.2

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

Log-Normal Probability Plot



Project Name: Warren
 Stream Name: No Name
 Bridge Name: 0
 Route No. Route 235
 Analysis by: LPO

PIN: 21835
 Town: Warren
 Bridge No. LC 466
 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)

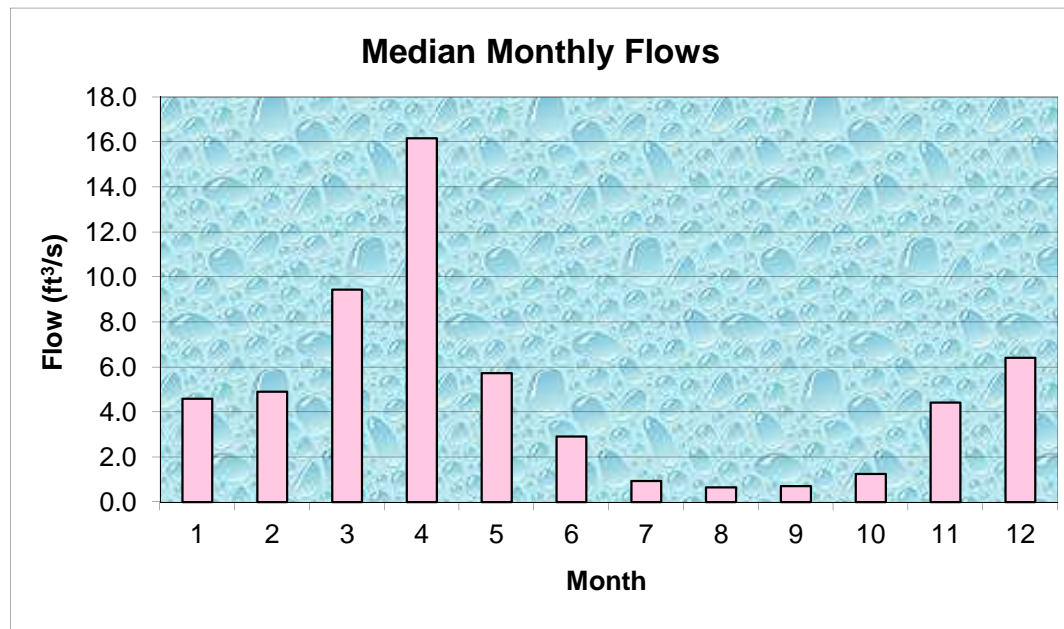
Value	Variable	Explanation
3.60	A	Area (mi ²)
473713.8	P _c	Watershed centroid (E,N; UTM; Zone 19; meters)
41.23	DIST	Distance from Coastal reference line (mi)
46.1	pptA	Mean Annual Precipitation (inches)
0.01	SG	Sand & Gravel Aquifer (decimal fraction of watershed area)

Month	Q _{median} (ft ³ /s)	(m ³ /s)
Jan	4.59	0.1301
Feb	4.91	0.1391
Mar	9.45	0.2677
Apr	16.17	0.4582
May	5.73	0.1624
Jun	2.91	0.0825
Jul	0.94	0.0265
Aug	0.66	0.0186
Sep	0.71	0.0200
Oct	1.25	0.0353
Nov	4.42	0.1253
Dec	6.41	0.1817

Q _{bf}	19.9
ann avg	7.5
ann med	3.9
Q _{1.002}	25.2
Q _{1.01}	33.8
Q _{1.05}	48.1
Q _{bf}	54.8

assume v = 4ft/s

W _{bf}	14.9	estimated bankfull width (ft)
d _{bf}	0.9	estimated bankfull depth (ft)
A _{bf}	13.7	estimated bankfull flow area (ft ²)



References

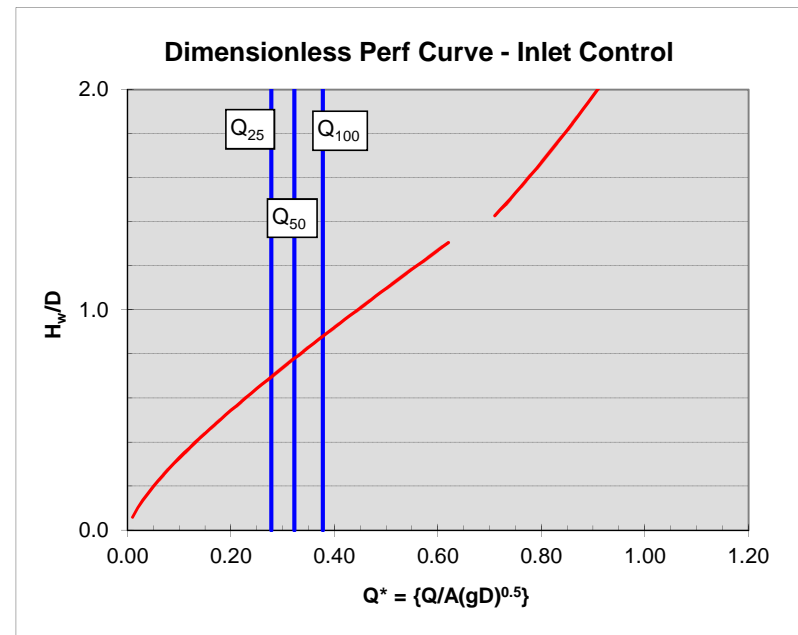
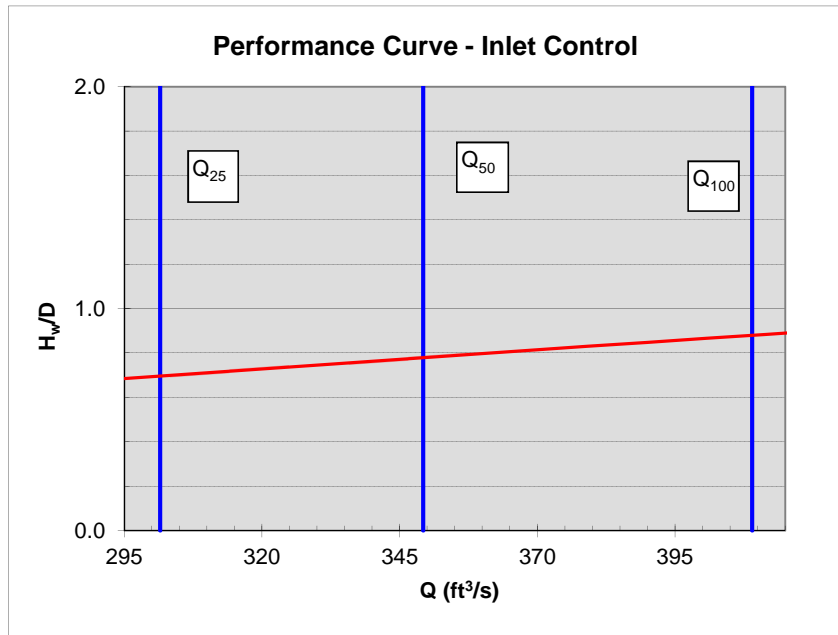
Dudley, R.W., 2004. Hydraulic Geometry Relations ..., SIR 2004-5042
 Dudley, R.W., 2004. Estimating Monthly Streamflows ... , SIR 2004-5026

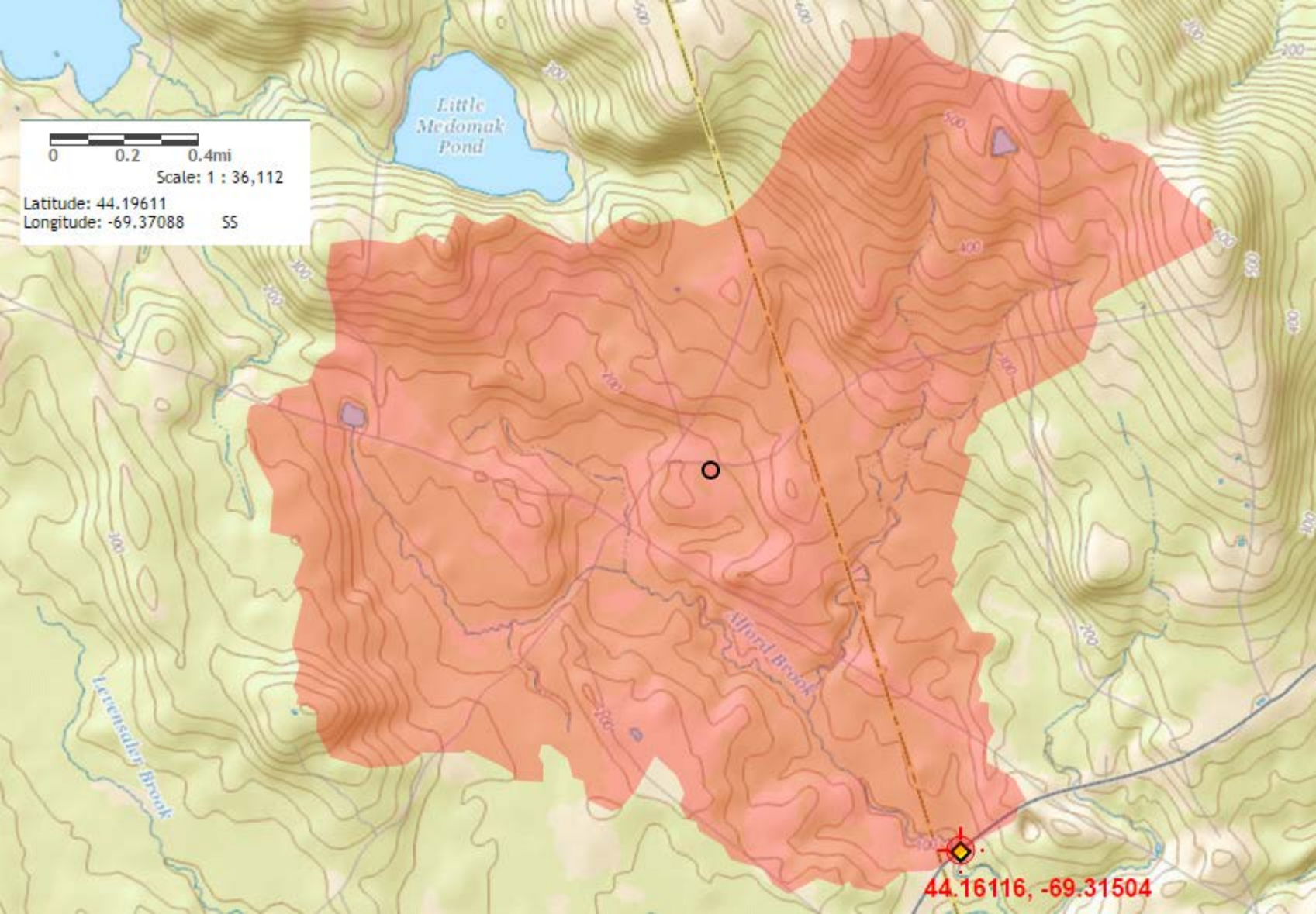
NOTE: This page is for preliminary sizing only.
Final design should be done with HY8 or HDS-5

Preliminary Culvert Sizing - Round & Box Culverts

Shape:	Round			
Type:	Circ CMP Proj	Q ₂₅	301.5	
D or R (ft)	9	Q ₅₀	349.3	trial D / R = 8.7
w (ft)	box width	Q ₁₀₀	409.0	trial w: BFW = 14.9
Slope (ft/ft)	0.02			
A (ft ²)	63.62			
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)





0 0.2 0.4mi
Scale: 1 : 36,112
Latitude: 44.19611
Longitude: -69.37088 SS

44.16116, -69.31504

StreamStats Version 3.0

Basin Characteristics Ungaged Site Report

Date: Tues June 7, 2016 1:07:35 PM GMT-4
 Study Area: Maine
 NAD 1983 Latitude: 44.1611 (44 09 40)
 NAD 1983 Longitude: -69.3149 (-69 18 54)

Label	Value	Units	Definition
DRNAREA	3.6	square miles	Area that drains to a point on a stream
STORNWI	12.28	percent	Percentage of storage (combined water bodies and wetlands) from the National Wetlands Inventory
ELEV	242.9	feet	Mean Basin Elevation
PRECIP	45.8	inches	Mean Annual Precipitation
PRDECFEB90	11.9	inches	Basin average mean precipitation for December to February from PRISM 1961-1990
SANDGRAVAP	1.02	percent	Percentage of land surface underlain by sand and gravel aquifers
COASTDIST	42.1	miles	Shortest distance from the coastline to the basin centroid
CENTROIDX	473713.79	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	4891497.58	State plane coordinates	Basin centroid vertical (y) location in state plane units
SANDGRAVAF	0.01	dimensionless	Fraction of land surface underlain by sand and gravel aquifers
LC11IMP	1.7	percent	Average percentage of impervious area determined from NLCD 2011 impervious dataset
LC11DEV	9.12	percent	Percentage of land-use from NLCD 2011 classes 21-24

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 URL: http://streamstats.cr.usgs.gov/v3_beta/BCreport.htm
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StreamStats Version 3.0

Flow Statistics Ungaged Site Report

Date: Tues June 7, 2016 1:09:00 PM GMT-4
 Study Area: Maine
 NAD 1983 Latitude: 44.1611 (44 09 40)
 NAD 1983 Longitude: -69.3149 (-69 18 54)
 Drainage Area: 3.6 mi²

Regional Hydraulic Geometry Basin Characteristics			
100% Central and Coastal Bankfull 2004 5042 (3.6 mi ²)			
Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	3.6	2.92	298

Regional Median Flows Basin Characteristics	
100% Undefined Region (3.6 mi²)	

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 (3.6 mi ²)			
Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area	3.6		
Fraction of Sand and Gravel Aquifers			
Mean Annual Precipitation			
Distance From Coast To Basin Centroid	42.1		

Monthly Median Flows Basin Characteristics			
100% Statewide Median Monthly SIR 2004 5026 (3.6 mi ²)			
Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area	3.6		
Fraction of Sand and Gravel Aquifers			

Mean Annual Precipitation	
Distance From Coast To Basin Centroid	42.1

Peak Flow Basin Characteristics		
100% Statewide Peak Flow Full WRI 99 4008 (3.6 mi2)		
Parameter	Value	Regression Equation Valid Range
Drainage Area	3.6	Min
Percentage of Storage from NWI		Max

Annual Flows Basin Characteristics		
100% Statewide Annual SIR 2004 5026 (3.6 mi2)		
Parameter	Value	Regression Equation Valid Range
Drainage Area	3.6	Min
Fraction of Sand and Gravel Aquifers		Max
Basin Ave Precip Dec Feb PRISM 1990	11.9	

Regional Hydraulic Geometry Statistics						
Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
BFFLOW	19.9	ft3/s	54			
BFWDTH	14.9	ft	33			
BFDPTH	0.92	ft	26			
BFAREA	13.7	ft2	57			

<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

