WIN:	22250.00	**Project Name:**	Macwahoc Plt Kingman Rd Br#5021
Town:	Macwahoc	**Stream Name:**	Macwahoc Stream
Route No.	Rt 170	**Bridge Name:**	Kingman Road
Asset ID:	5021	**Analysis by:**	DFB
Lat:	45.6243 **Long:** -68.25860	**Date:**	8/15/2017

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

Enter data in blue cells only!

	km^2	mi^2	ac	*Enter data in [mi^2]*
A	151.00	58.30	37312.0	Watershed Area *DRNAREA*
W	28.80	11.1	7115.4	Wetlands area (by NWI)
P_c	559000	5068926		watershed centroid (E, N; UTM 19N; meters)
County	Aroostook S			*choose county from drop-down menu*
pptA	39.0			mean annual precipitation (inches; by look-up)
SG	0.30			sand & gravel aquifer as decimal fraction of watershed A

A (km^2)	151.00	**Conf Lvl**	0.67
W (%)	19.07		NWI Wetlands % *STORNWI*

Ret Pd T (yr)	**Peak Flow Estimate Lower**	**Q_T (m^3/s)**	**Upper**	**Q_T (ft^3/s)**
1.1		13.21		466.6
2		23.55		831.4
5		33.73		1191.0
10		40.86		1442.8
25		50.03		1766.7
50		56.96		2011.4
100		64.38		2273.2
500		81.80		2888.3

Worksheet prepared by:
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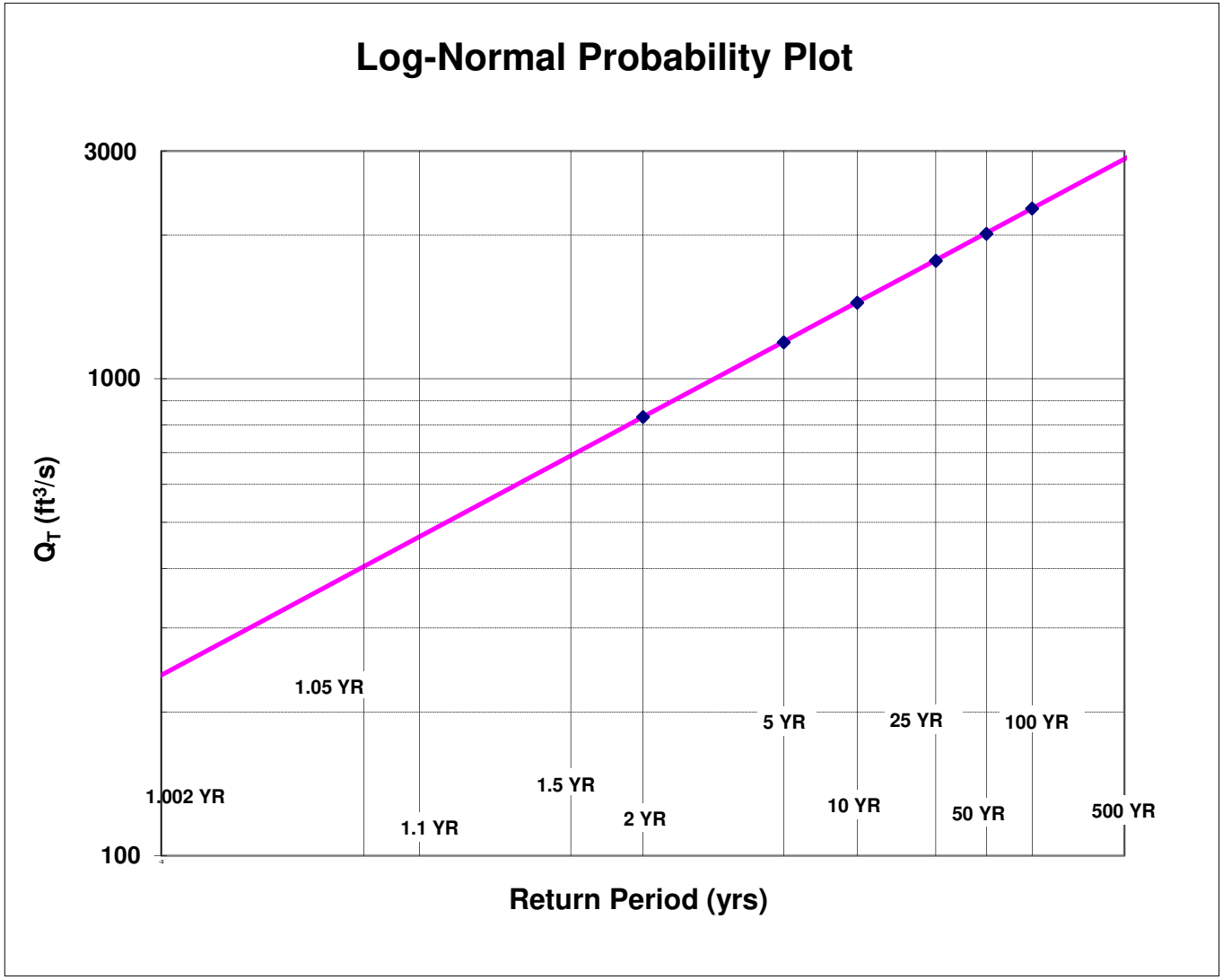
ver. 2017 Jun. 09

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

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


Log-Normal Probability Plot
3000
1000
100
Q_T (ft^3/s)
1.05 YR
5 YR
25 YR
100 YR
1.002 YR
1.5 YR
10 YR
1.1 YR
2 YR
50 YR
500 YR
Return Period (yrs)

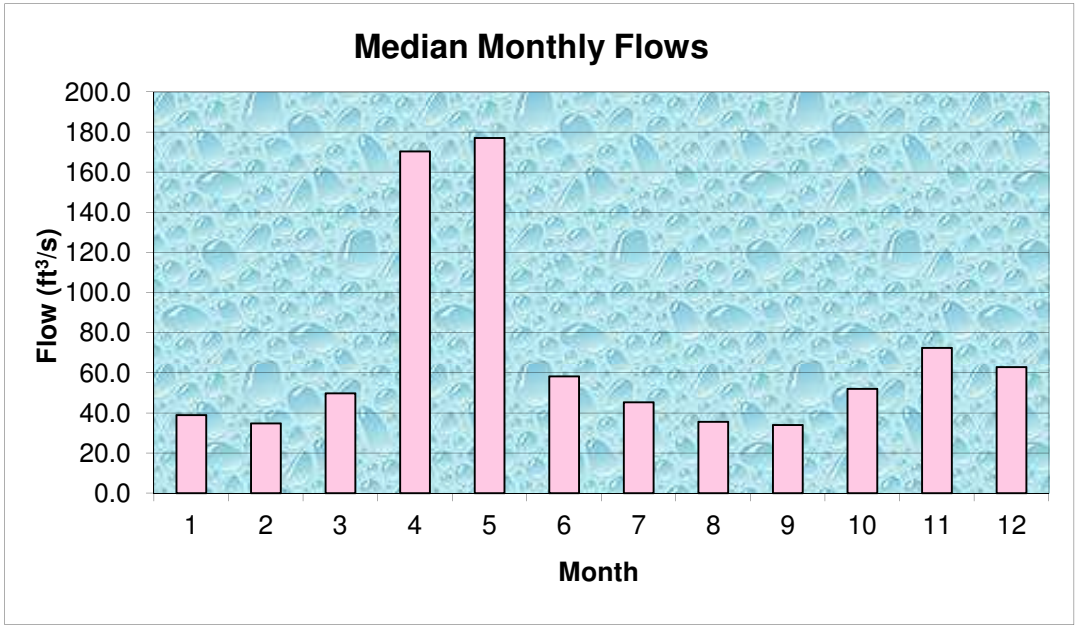
WIN:	22250.00	**Project Name:**	Macwahoc Plt Kingman Rd Br#5021
Town:	Macwahoc	**Stream Name:**	Macwahoc Stream
Route No.	Rt 170	**Bridge Name:**	Kingman Road
Asset ID:	5021	**Analysis by:**	DFB
Lat:	45.62430 **Long:** -68.25860	**Date:**	8/15/2017

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
	58.30	*A*	Area (mi^2)
559000.1	5068926	P_c	Watershed centroid (E,N; UTM; Zone 19; meters)
	109.73	*DIST*	Distance from Coastal reference line (mi)
	39.0	*pptA*	Mean Annual Precipitation (inches)
	0.30	*SG*	Sand & Gravel Aquifer (decimal fraction of watershed area)

Month	Q_{median} (ft3/s)	(m^3/s)
Jan	**38.97**	1.1043
Feb	**34.88**	0.9884
Mar	**49.88**	1.4137
Apr	**170.35**	4.8276
May	**177.07**	5.0180
Jun	**58.28**	1.6517
Jul	**45.39**	1.2863
Aug	**35.68**	1.0110
Sep	**34.10**	0.9664
Oct	**52.06**	1.4752
Nov	**72.41**	2.0520
Dec	**62.83**	1.7805



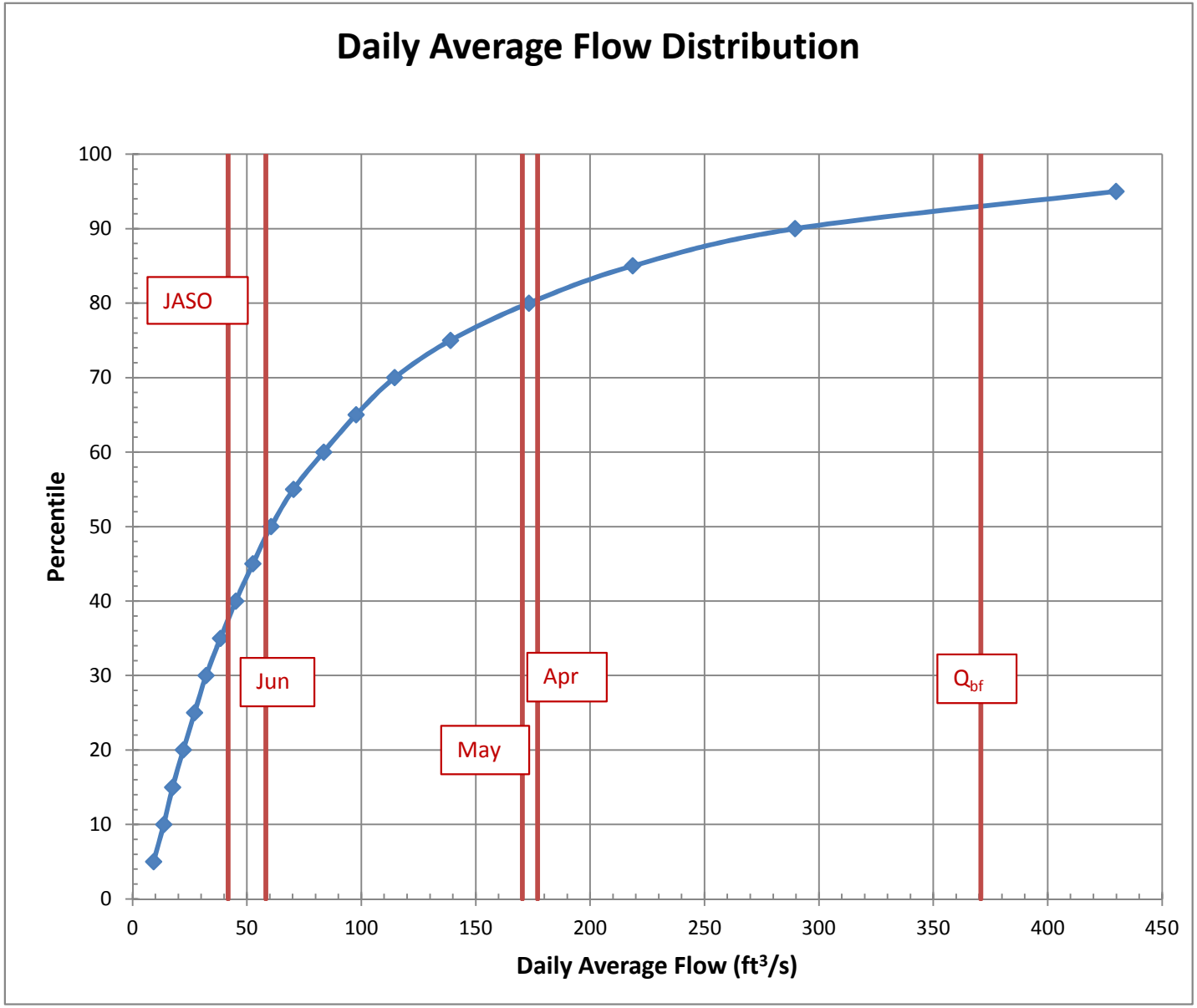
Q_{bf}	**370.8**	
ann avg	**108.4**	
ann med	**51.3**	
$Q_{1.002}$	**239.1**	
$Q_{1.01}$	**303.2**	
$Q_{1.05}$	**403.7**	
Q_{bf}	**575.3**	assume v = 4ft/s

W_{bf}	**60.8**	estimated bankfull width (ft)
d_{bf}	**2.4**	estimated bankfull depth (ft)
A_{bf}	**150.1**	estimated bankfull flow area (ft^2)

References

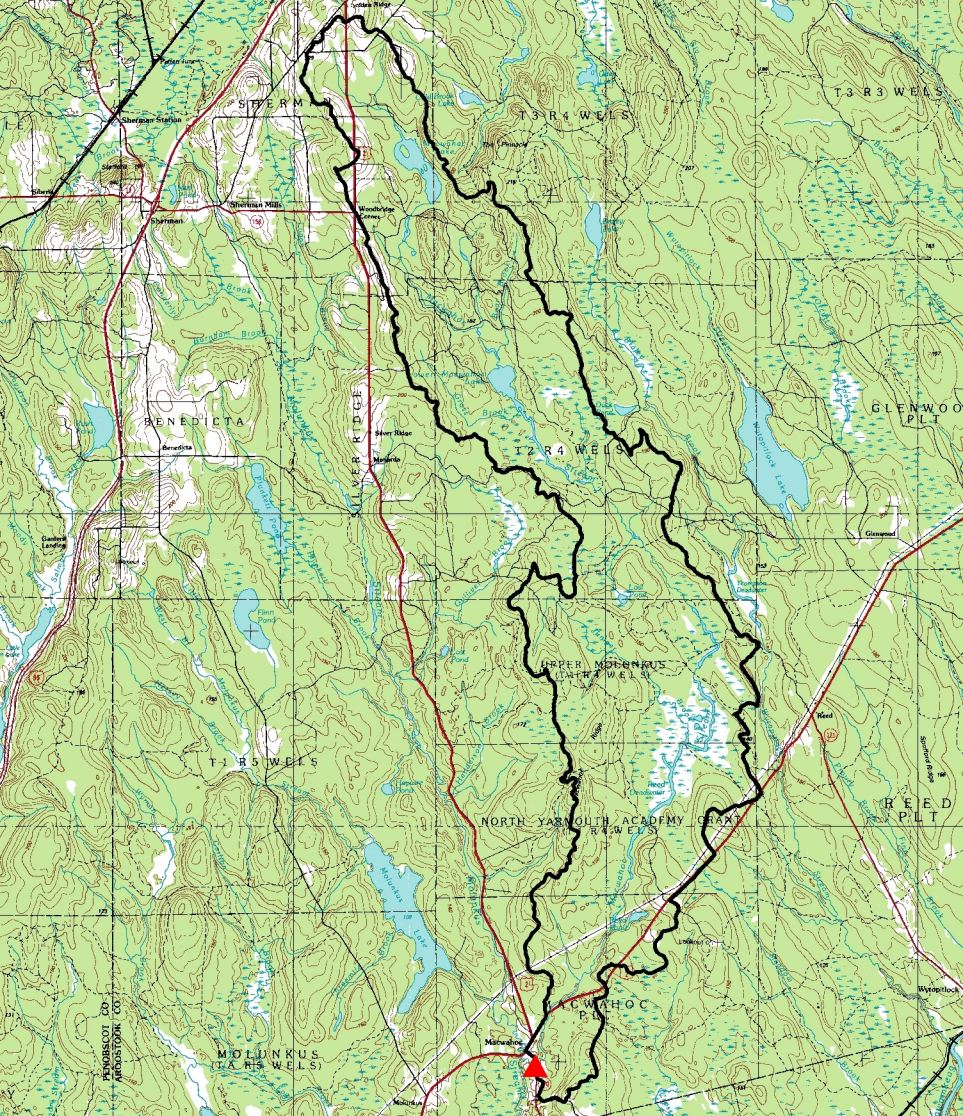
Dudley, R.W., 2013. FY2013 Progress Report - Phase 1 …, USFWS QRP Project

Dudley, R.W., 2004. Estimating Monthly Streamflows … , SIR 2004-5026



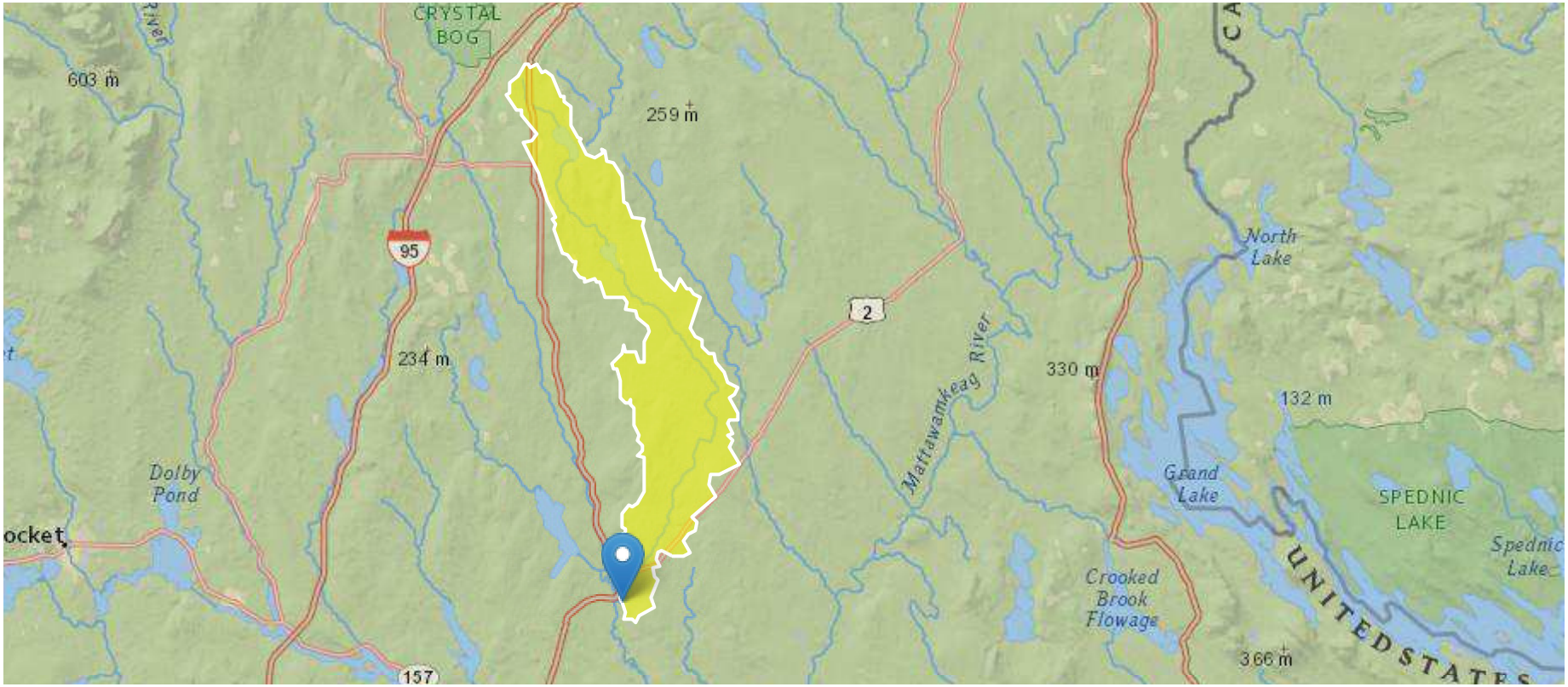
Daily Avg Flow Dist		
A_{ws} = (mi^2)		58.3
Q (ft^3/s)		
Pctl	**Median**	**84th pctl**
5	9.18	14.77
10	13.63	20.50
15	17.52	25.59
20	22.19	31.04
25	27.14	36.38
30	32.12	41.43
35	38.48	47.36
40	45.13	54.46
45	52.60	61.58
50	60.56	72.70
55	70.33	84.61
60	83.52	99.32
65	97.71	115.71
70	114.61	135.00
75	138.94	162.34
80	173.28	193.83
85	218.64	248.39
90	289.62	333.53
95	429.83	518.67

Q_{bf}	370.8
$Q_{1.002}$	239.1
$Q_{1.1}$	466.6
Q_2	831.4


SHERM
T3 R4 WELS
T3 R3 WELS
Sherman Station
Sherman Mills
Sherman
Woodbridge Corner
BENEDICTA
Silver Ridge
Mexico
SILVER RIDGE
T2 R4 WELS
GLENWOO
PLT
Glenwood
UPPER MOLUNKUS
(T4 R4 WELS)
T1 R5 WELS
NORTH YARMOUTH ACADEMY GRANT
(T4 R4 WELS)
REED
PLT
Reed
Lockwood Corner
Wytopitlock
MACHIAS
PLT
Machias
MOLUNKUS
(T4 R5 WELS)
PENOBSCOT CO
AROOSTOOK CO

Macwahoc Plt 22250 Br5021

Region ID: ME
Workspace ID: ME20170815132749523000
Clicked Point (Latitude, Longitude): 45.62420, -68.25894
Time: 2017-08-15 13:29:24 -0400



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	58.3	square miles
STORNWI	Percentage of strorage (combined water bodies and wetlands) from the Nationa Wetlands Inventory	19.07	percent

Parameter Code	Parameter Description	Value	Unit
ELEV	Mean Basin Elevation	551.6	feet
SANDGRAVAF	Fraction of land surface underlain by sand and gravel aquifers	0.003	dimensionless
BSLDEM10M	Mean basin slope computed from 10 m DEM	4.27	percent
COASTDIST	Shortest distance from the coastline to the basin centroid	111	miles
ELEVMAX	Maximum basin elevation	896.8	feet
LC06WATER	Percent of open water, class 11, from NLCD 2006	1.7	percent
LC11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	1.4	percent
LC11IMP	Average percentage of impervious area determined from NLCD 2011 impervious dataset	0.11	percent
PRECIP	Mean Annual Precipitation	42.6	inches
SANDGRAVAP	Percentage of land surface underlain by sand and gravel aquifers	0.3	percent
STATSGOA	Percentage of area of Hydrologic Soil Type A from STATSGO	1.04	percent

Peak-Flow Statistics Parameters [Statewide Peak Flow Full GT 12sqmi WRI 99 4008]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	58.3	square miles	0.93	1653
STORNWI	Percentage of Storage from NWI	19.07	percent	0.7	26.7

Peak-Flow Statistics Flow Report [Statewide Peak Flow Full GT 12sqmi WRI 99 4008]

PIl: Prediction Interval-Lower, Plu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PIl	Plu	SE	SEp	Equiv. Yrs.
2 Year Peak Flood	831	ft^3/s	465	1490	35.1	35.1	1.8
5 Year Peak Flood	1190	ft^3/s	660	2150	36.1	36.1	2.5
10 Year Peak Flood	1440	ft^3/s	787	2640	36.8	36.8	3.2
25 Year Peak Flood	1770	ft^3/s	941	3320	38.6	38.6	4.1
50 Year Peak Flood	2010	ft^3/s	1050	3860	39.9	39.9	4.8
100 Year Peak Flood	2270	ft^3/s	1160	4450	41.2	41.2	5.4

Statistic	Value	Unit	PIl	Plu	SE	SEp	Equiv. Yrs.
500 Year Peak Flood	2890	ft^3/s	1400	5980	44.9	44.9	6.4

Peak-Flow Statistics Citations

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

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

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	58.3	square miles	9.79	1418
SANDGRAVAF	Fraction of Sand and Gravel Aquifers	0.003	dimensionless	0	0.455

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

PIl: Prediction Interval-Lower, Plu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SE	SEp	Equiv. Yrs.
7 Day 10 Year Low Flow	2.76	ft^3/s	44.3	44.3	2.9

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	58.3	square miles	14.9	1419
SANDGRAVAF	Fraction of Sand and Gravel Aquifers	0.003	dimensionless	0	0.212
ELEV	Mean Basin Elevation	551.6	feet	239	2120

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

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SEp
1 Percent Duration	0.859	ft^3/s	144
5 Percent Duration	3.1	ft^3/s	62
10 Percent Duration	6.29	ft^3/s	41
25 Percent Duration	19.6	ft^3/s	22
50 Percent Duration	53.3	ft^3/s	20
75 Percent Duration	134	ft^3/s	17
90 Percent Duration	293	ft^3/s	17
95 Percent Duration	451	ft^3/s	18
99 Percent Duration	954	ft^3/s	29

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	58.3	square miles	14.9	1419
SANDGRAVAF	Fraction of Sand and Gravel Aquifers	0.003	dimensionless	0	0.212
ELEV	Mean Basin Elevation	551.6	feet	239	2120

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

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SEp
Mean Annual Flow	119	ft^3/s	16

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)