

### **3.1.**

## **AMBIENT BIOLOGICAL MONITORING**

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As part of the SWAT program, the Biological Monitoring Unit evaluates benthic macroinvertebrate communities of Maine streams and rivers to determine if they are impaired by toxic contamination. For reasons of comparability, a small number of unimpaired reference sites is also evaluated. Benthic macroinvertebrates are animals without backbones that can be seen with the naked eye and live on the stream bottom, such as mayflies, stoneflies, caddisflies, crayfish, snails, and leeches. In 2006, we evaluated the condition of 39 sample locations, primarily in the Penobscot River and North Coastal Rivers basins.

The Biological Monitoring Unit uses a multivariate statistical model to analyze a benthic macroinvertebrate sample and predict if a waterbody is attaining the biological criteria associated with its statutory class. If a waterbody does not meet minimum state aquatic life criteria, Class C, then the model class is predicted as Non-Attainment (NA). Classes AA and A are treated the same in the model. Final decisions on aquatic life attainment of a waterbody are made accounting for factors that may allow adjustments to the model outcome. This is called the final determination.

Table 3.1.1 summarizes the results of biological monitoring activities for the 2006 SWAT Program, sorted by waterbody name. Column headings of Table 3.1.1 are described below:

- *Station* – Since waterbodies are sometimes sampled in more than one location, each sampling location is assigned a unique “Station” number.
- *Log* – Each sample event is assigned a unique “Log” number.
- *Map* – The “Map” number refers to Maps 1 through 29, which are located after the tables.
- *Location* – Some Stations are located upstream or downstream of potential sources of pollution, which are called “Issues”.
- *Issue* – Issues are potential sources of pollution.
- *Statutory Class* – The state legislature has assigned a statutory class, either AA, A, B, or C, to every Maine stream and river. Class AA and A waterbodies shall support a “natural” biological community. Class B waterbodies shall not display “detrimental changes in the resident biological community”. Class C waterbodies shall “maintain the structure and function of the resident biological community”.
- *Final determination* – The final decision on aquatic life attainment of a waterbody. Accounts for factors that may allow adjustments to the model outcome.
- *Attains Class* – “Y” is given if the final determination is equal to or exceeds the Statutory Class. A Class B stream, for example, would receive a “Y” if its Final determination was either A or B. “N” is given if a stream does not attain its Statutory Class. A Class B stream, for example, would receive an “N” if its final determination was either C or NA. A dash (“-”) is given if the sample was disturbed or provided insufficient information.
- *Probable Cause* – The probable cause column lists potential stressors to benthic macroinvertebrate communities, based on best professional judgement. In some cases, a probable cause may not be related to toxic pollution but instead to poor habitat conditions.

Data reports for each sampling event (Aquatic Life Classification Attainment Reports) are available in electronic format with the web version of this report. Supporting water chemistry data are given in Table 3.1.2. Water temperature data are given in Figure 3.1.1. For more

information about the Biological Monitoring Unit, please e-mail us at [biome@maine.gov](mailto:biome@maine.gov) or visit our web site: <http://www.state.me.us/dep/blwq/docmonitoring/biomonitoring/index.htm>.

### **Results Summary**

- Thirty-nine stations were assessed for the condition of the benthic macroinvertebrate community.
- Twelve of the thirty-nine stations (31 %) reported failed to attain the aquatic life standards of their assigned class.

### **Historical Notes**

(not all of the samples listed below were collected under the SWAT Program)

- Birch Stream (Station 312) failed to attain class in 1997, 1999, 2001, 2003, 2004, and 2005.
- Dennys River (Station 297) failed to attain class in 1997, 1999, and 2003.
- East Machias River (Station 494) failed to attain class in 2001.
- Great Falls Branch (Station 504) failed to attain class in 2001.
- Millinocket Stream (Station 287) attained class in 1996.
- Mopang Stream (Station 501) attained class in 2001.
- Narraguagus River (Station 81) failed to attain class in 1984 and 1993. It attained class in 2001.
- Narraguagus River (Station 111) attained class in 1987 and 2001. It failed to attain class in 1989 and 1996.
- Narraguagus River (Station 112) attained class in 1987.
- Penjajawoc Stream (Station 314) failed to attain class in 1997, 2001, 2002, and 2003.
- Penjajawoc Stream (Station 315) attained class in 1997 and 2001. It failed to attain class in 2002 and 2003.
- Penjajawoc Stream (Station 511) failed to attain class in 2001, 2002, and 2003 .
- Penobscot River (Station 62) attained class in 1984, 1993, 1994.
- Piscataquis River (Station 83) attained class in 1984, 1985, 1989, 1996. It failed to attain class in 1990.
- Piscataquis River (Station 135) attained class in 1989, 1990, and 1996.
- Piscataquis River (Station 152) attained class in 1991, 1993, and 1995.
- St. Croix River (Station 199) attained class in 1991 and 1997.
- Shaw Brook (Station 480) failed to attain class in 2001.
- Sheepscot River (Station 74) attained class in 1987, 1989, 1990, 1992, 1995, 1996, 1998, 1999, 2000, 2001, 2002, 2003, 2004, and 2005. It failed to attain class in 1984, 1985, 1986, 1988, 1991, 1993, 1994, and 1997.
- Souadabscook Stream (Station 290) attained class in 1996.
- Souadabscook Stream (Station 291) attained class in 1996.
- Unnamed Stream 2 (Station 633) failed to attain class in 2002.
- Unnamed Stream 4 (Station 634) attained class in 2002.
- West Branch Sheepscot River (Station 268) attained class in 1995, 1996, 1997, 1998, 1999, 2001, 2002, and 2005. It failed to attain class in 2000, 2003, and 2004.

**TABLE 3.1.1 - 2006 SWAT Benthic Macroinvertebrate Biomonitoring Results**

Name	Town	Map	Station	Log	Location	Issue <sup>1</sup>	Statutory Class/ Final Determination	Attains Class?	Probable Cause <sup>1</sup>
Birch Stream	Bangor	1	312	1549	Down-stream	Urban NPS; Airport	B / NA	N	NPS toxics; habitat
Card Brook	Ellsworth	2	814	1547		Urban NPS	B / NA	N	Habitat
Card Brook	Ellsworth	2	815	1548		Urban NPS	B / NA	N	NPS toxics; habitat
Dennys River	Meddybemps	3	297	1585		Haz Waste/ Liming	AA / A	Y	BPJ
Dennys River	Dennysville	4	741	1582			AA / A	Y	
E. Br. Penobscot River	T3R7 WELS	5	823	1589		Reference	AA / A	Y	
East Machias River	Crawford	6	494	1586			AA / A	Y	BPJ
Garland Pond Outlet	Sebec	7	817	1568			B / A	Y	
Great Falls Branch	Deblois	8	504	1579		Agric NPS	A / C	N	
Jepson Brook	Lewiston	9	824	1592		Urban	B / NA	N	NPS toxics; habitat
Kenduskeag Stream	Bangor	1	829	1550		Urban NPS	C / B	Y	
Little River	Columbia Falls	10	821	1581		Reference	A / A	Y	
Little Smith Brook	Millinocket	11	819	1572			A / C	N	Habitat
Millinocket Stream	Millinocket	11	287	1571		Urban NPS	B / A	Y	
Moose Brook	Auburn	12	816	1562			B / B	Y	
Mopang Stream	T30 MD BPP	13	501	1587			AA / A	Y	
Narraguagus River	Cherryfield	14	81	1576		Agric NPS	B / A	Y	
Narraguagus River	Deblois	8	111	1577		Agric NPS	AA / A	Y	
Narraguagus River	Beddington	15	112	1578		Reference	AA / A	Y	

<sup>1</sup> NPS = non-point source pollution; Haz waste = hazardous waste; Agric NPS = agricultural NPS; BPJ = Best Professional Judgment

**TABLE 3.1.1 - 2006 SWAT Benthic Macroinvertebrate Biomonitoring Results (cont.)**

Name	Town	Map	Station	Log	Location	Issue <sup>1</sup>	Statutory Class/ Final Determination	Attains Class?	Probable Cause <sup>1</sup>
Penjajawoc Stream	Bangor	16	314	1556		Urban NPS	B / C	N	NPS toxics; habitat
Penjajawoc Stream	Bangor	16	315	1557		Urban NPS	B / C	N	NPS toxics; habitat
Penjajawoc Stream	Bangor	16	511	1555		Urban NPS	B / C	N	NPS toxics; habitat
Penobscot River	Orono	17	62	1552		Munic/Ind	B / A	Y	
Piscataquis River	Abbot	18	83	1565		Reference	A / A	Y	
Piscataquis River	Sangerville	19	135	1566		Munic/Ind	B / A	Y	
Piscataquis River	Dover-Foxcroft	20	152	1567		Munic/Ind	B / A	Y	
St. Croix River	Baring	21	199	1584		Munic/Ind	C / A	Y	
Sebec River	Milo	22	827	1569		Municipal	B / A	Y	
Seboeis Stream	Howland	23	665	1575			A / A	Y	
Shaw Brook	Hermon	24	480	1551		Urban NPS	B / NA	N	NPS toxics; habitat
Sheepscot River	North Whitefield	25	74	1539		Reference	AA / A	Y	BPJ
Souadabscook Stream	Hampden	24	290	1553		Landfill	A / A	Y	BPJ
Souadabscook Stream	Hampden	24	291	1554		Landfill	A / A	Y	BPJ
Unnamed St. 2	Topsham	26	633	1564		Urban NPS	B / A	Y	
Unnamed St. 4	Topsham	26	634	1563		Urban NPS	B / A	Y	
W. Br. Sheepscot River	China	27	268	1540		Reference	AA / B	N	
Wassataquoik Stream	T3R7 WELS	28	812	1590		Reference	AA / A	Y	
West Seboeis Stream	T4 R9	29	818	1570			A / A	Y	
Western Little River	Columbia	10	820	1580			AA / C	N	

<sup>1</sup> NPS = non-point source pollution; Munic/Ind = municipal/industrial; BPJ = Best Professional Judgment

**TABLE 3.1.2 - 2006 SWAT Nutrients and Solids Data**

Log	Waterbody	Sampling Date	DOC	NH <sub>3</sub> -N	TKN	NO <sub>2</sub> -NO <sub>3</sub> -N	O-PO <sub>4</sub>	Total P	TSS	TDS
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
1549	Birch Stream	8/9/2006	4.2	0.03	0.3	0.32	0.006	0.022	~1.3	360
1548	Card Brook	8/8/2006	19	0.03	0.8	0.02	0.003	0.031	5	170
1550	Kenduskeag Stream	8/9/2006	11	0.01	0.5	0.07	0.008	0.032	2	100
1571	Millinocket Stream	8/16/2006	4.4	<0.01	0.2	0.01	0.002	0.008	~1.7	21
1576	Narraguagus River	8/21/2006	7.6	0.01	0.3	0.02	0.001	0.015	~1	32
1578	Narraguagus River	8/21/2006	7.7	<0.01	0.3	<0.01	0.001	0.012	0.8	32
1555	Penjajawoc Stream	8/10/2006	12	0.01	0.7	<0.01	0.003	0.029	4	90
1556	Penjajawoc Stream	8/10/2006	11	0.01	0.7	0.02	0.004	0.025	3	150
1557	Penjajawoc Stream	8/10/2006	12	0.01	0.6	0.02	0.003	0.021	~1.6	180
1552	Penobscot River	8/9/2006	11	<0.01	0.4	0.03	0.002	0.013	~0.7	45
1565	Piscataquis River	8/15/2006	5.5	<0.01	0.2	0.02	0.001	0.019	10	24
1566	Piscataquis River	8/15/2006	5.1	0.01	0.2	0.05	0.004	0.016	~1.4	27
1567	Piscataquis River	8/15/2006	5.7	0.01	0.3	0.03	0.002	0.013	~1.4	50
1575	Seboeis Stream	8/17/2006	7	<0.01	0.3	<0.01	0.001	0.009	~0.8	<20
1551	Shaw Brook	8/9/2006	6.7	0.02	0.4	0.18	0.002	0.032	10	230
1539	Sheepscot River	8/7/2006	11	0.01	0.5	0.02	0.003	0.014	~1	50
1553	Souadabscook Stream	8/10/2006	7.8	0.03	0.6	0.01	0.007	0.032	~1	70
1554	Souadabscook Stream	8/10/2006	18	0.01	0.5	0.02	0.008	0.030	2	70
1564	Unnamed Stream 2	8/14/2006	1.9	0.03	0.2	0.89	0.003	0.015	3	150
1563	Unnamed Stream 4	8/14/2006	2.2	0.08	0.2	0.45	0.002	0.015	8	370
1563	Unnamed Stream 4 DUPLICATE	8/14/2006	2.2	0.08	0.3	0.45	0.002	0.018	8	380
1540	W. Br. Sheepscot River	8/7/2006	9.6	0.01	0.5	0.03	0.002	0.013	~1	60
1540	W. Br. Sheepscot R. DUPLICATE	8/7/2006	9.3	0.01	0.5	0.03	0.002	0.015	~1.3	60

DOC = dissolved organic carbon, NH<sub>3</sub>-N = ammonia-nitrogen, TKN = total Kjeldahl-nitrogen, NO<sub>2</sub>-NO<sub>3</sub>-N = nitrite-nitrate-nitrogen, O-PO<sub>4</sub> = Ortho-phosphate, Total P = total phosphorus, TSS = total suspended solids, and TDS = total dissolved solids.