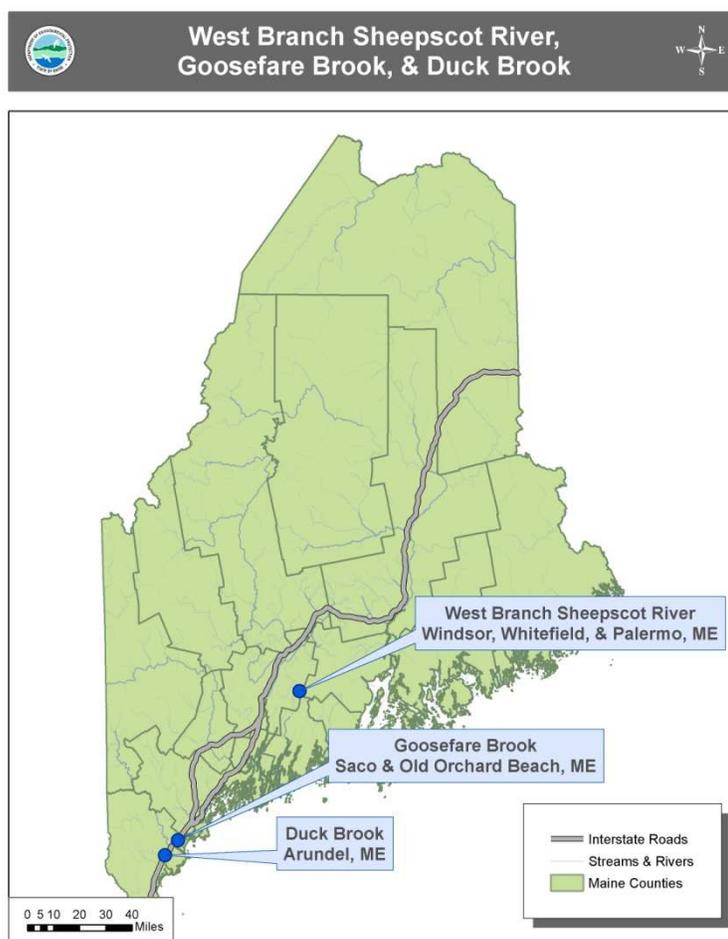


Maine Statewide Bacteria TMDL:2013 Freshwater Addendum

Appendix C: West Branch of the Sheepscot River, SVCA Water Quality Monitoring Program, 2012 Season Report

Report #: DEPLW-1254
August, 2014

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Maine Department of Environmental Protection - Created by: KNemmer, August 2013 - Data Sources: MEGIS, MDEP



Prepared for:

US EPA New England, Region 1



MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION

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Sheepscot Valley Conservation Association Water Quality Monitoring Program 2012 Season

By David Miller, WQM Technical Advisor

EXECUTIVE SUMMARY

This report is a summary of the 19th sampling season of the Sheepscot Valley Conservation Association's Water Quality Monitoring Program. This year SVCA monitored the same 9 sites as last year. The sites sampled were:

- DY001-E** (Dyer River, Sheepscot)
- S007-E** (Sheepscot River, Head Tide)
- CHABK001-F** (Chamberlain Brook, Kings Mills)
- S013-F** (Sheepscot River, Whitefield)
- CHBK001-F** (Choate Brook, Windsor)
- MEBK001-F** (Meadow Brook, China)
- WB001-F** (West Branch, Whitefield)
- WB002-F** (West Branch, Windsor)
- WB005-F** (West Branch, China)

Water samples were tested for bacteria and dissolved oxygen. Water temperature at all sites and salinity at one estuarine site were measured. The data are provided to the Maine DEP and they continue to be used by the MDEP for water quality assessment.

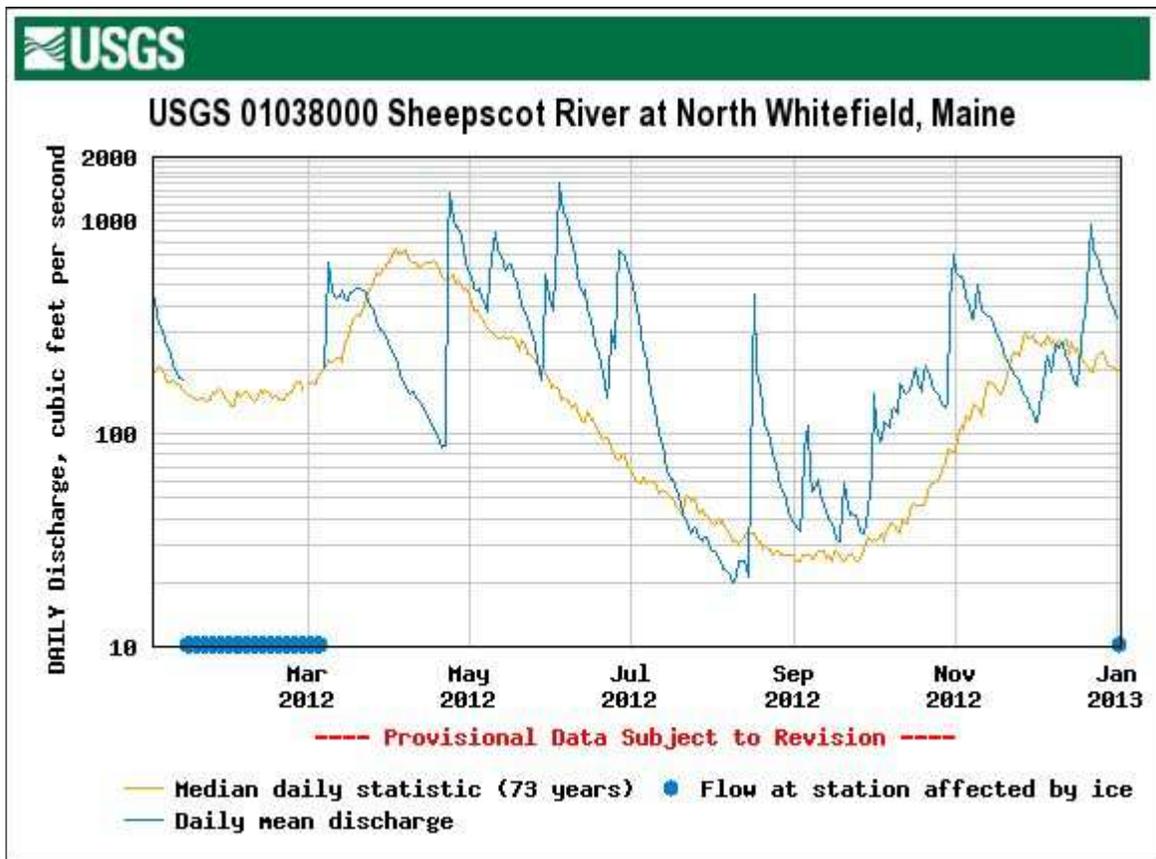
Weather

The year 2012 tied for the warmest year on record at Portland Jetport with 2010. The average temperature for 2012 was 49.2 degrees F, 2.7 degrees above normal. Spring 2012 was the second warmest on record, 4.5 degrees F above normal. Summer 2012 was the 4th warmest in 72 years with an average temperature of 68.5 degrees F, 1.6 degrees above normal. The highest temperature at Portland was 93 degrees on June 20th. There were four days with temperatures of 90 degrees F or greater.

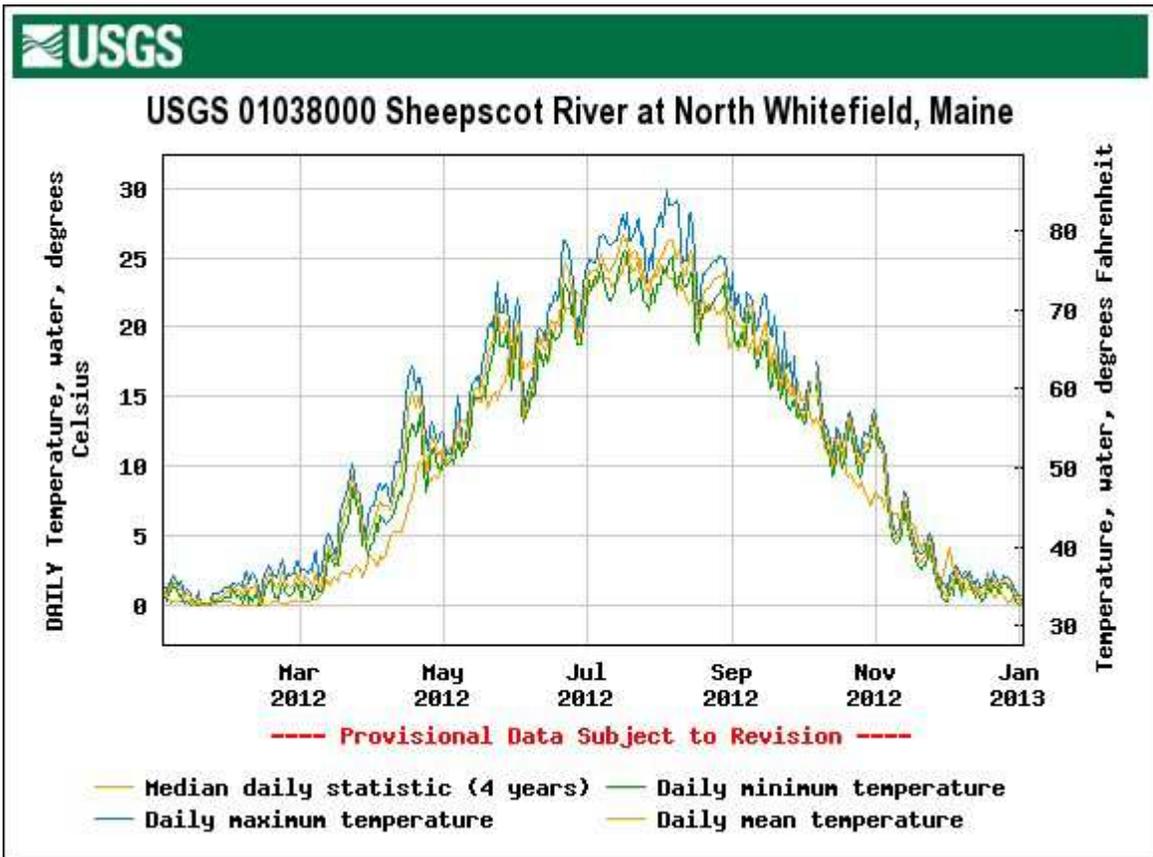
Precipitation during 2012 was an above normal 54.47 inches in Portland, the 17th wettest year in 142 years and 7.22 inches above normal. June was the wettest month of 2012 with 8.63 inches of rain, the 5th wettest June on record, 4.84 inches above normal. Every month except February, March, October and November had above normal precipitation. 5.31 inches of rain fell on June 2-3, the most in a 24 hour period during 2012. During the sampling season, rain events near sampling dates occurred (in Portland) as follows:

May 8 (0.81 in.)	June 2-4 (6.97 in.)	July 1-2 (0.29 in.)	Aug 10 (2.50 in.)	Sept 8 (0.25 in.)
May 22 (0.12 in.)		July 16 (0.35 in.)	Aug 12 (0.29 in.)	Sept 19 (0.71 in.)
		July 26-27 (1.54 in.)	Aug 28 (0.08 in.)	
		July 29 (0.34 in.)		

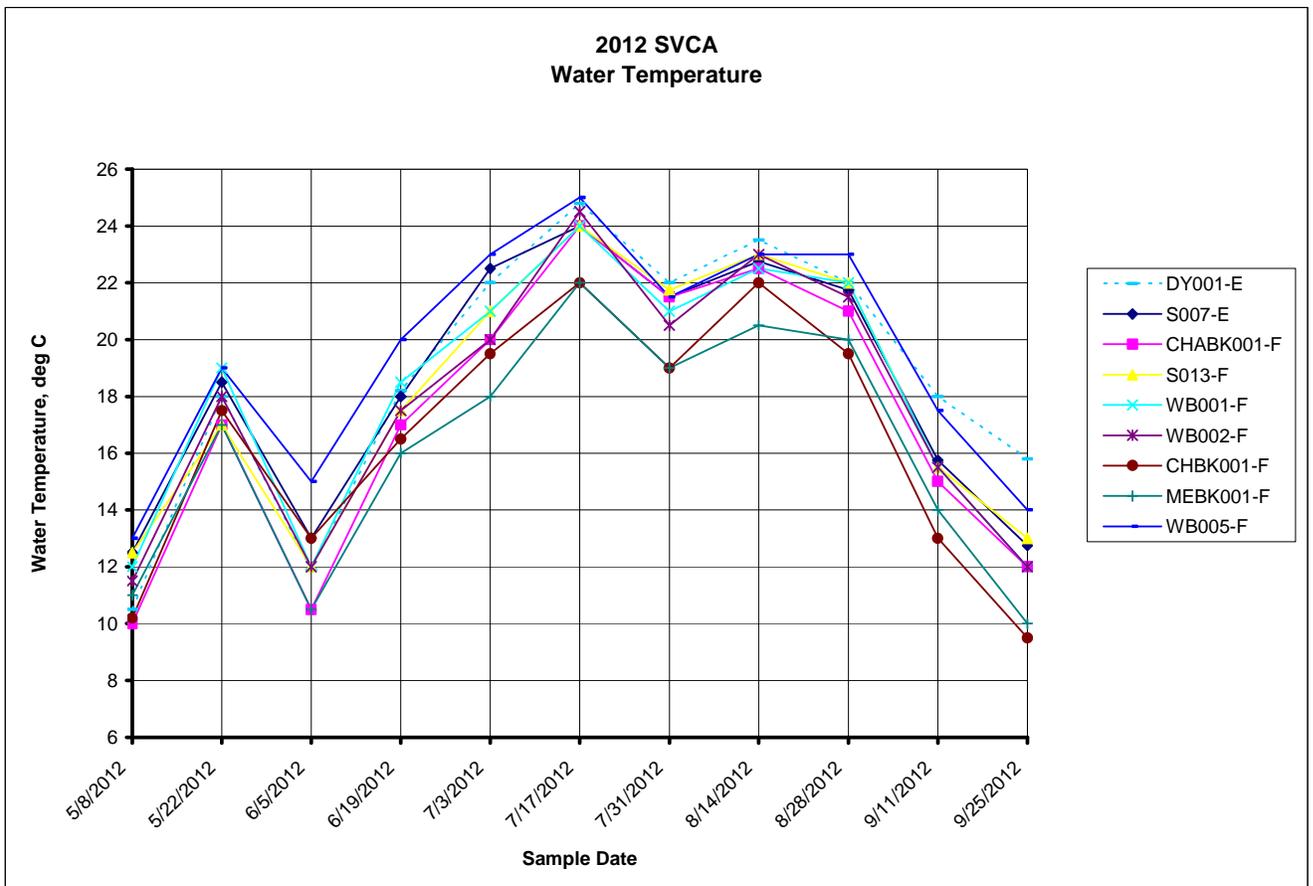
River flow data at the USGS gage station on the Sheepscot River at Whitefield is shown in Graph #1. In general, during the SVCA sampling season, river flow was at or above median daily flow (73 years of record) except for being below median flow during mid April and the last half of July and first part of August. Graph #2 shows the water temperature recorded at the Whitefield gage station during 2012. The water temperatures recorded at the SVCA sampling sites are shown in Graph #3. SVCA peak water temperatures were reached during mid July, decreased at the end of July and then increased again at mid August before trending down the remainder of the year. This behavior agrees with the gage station data.



Graph #1: Mean 2012 discharge at the Whitefield Gage station near site S013



Graph #2: Recorded 2012 daily water temperature at Whitefield gage station near site S013



Graph #3: 2012 Summer Water temperature (in degrees Celsius) at SVCA Sample Sites
Water Quality Overview

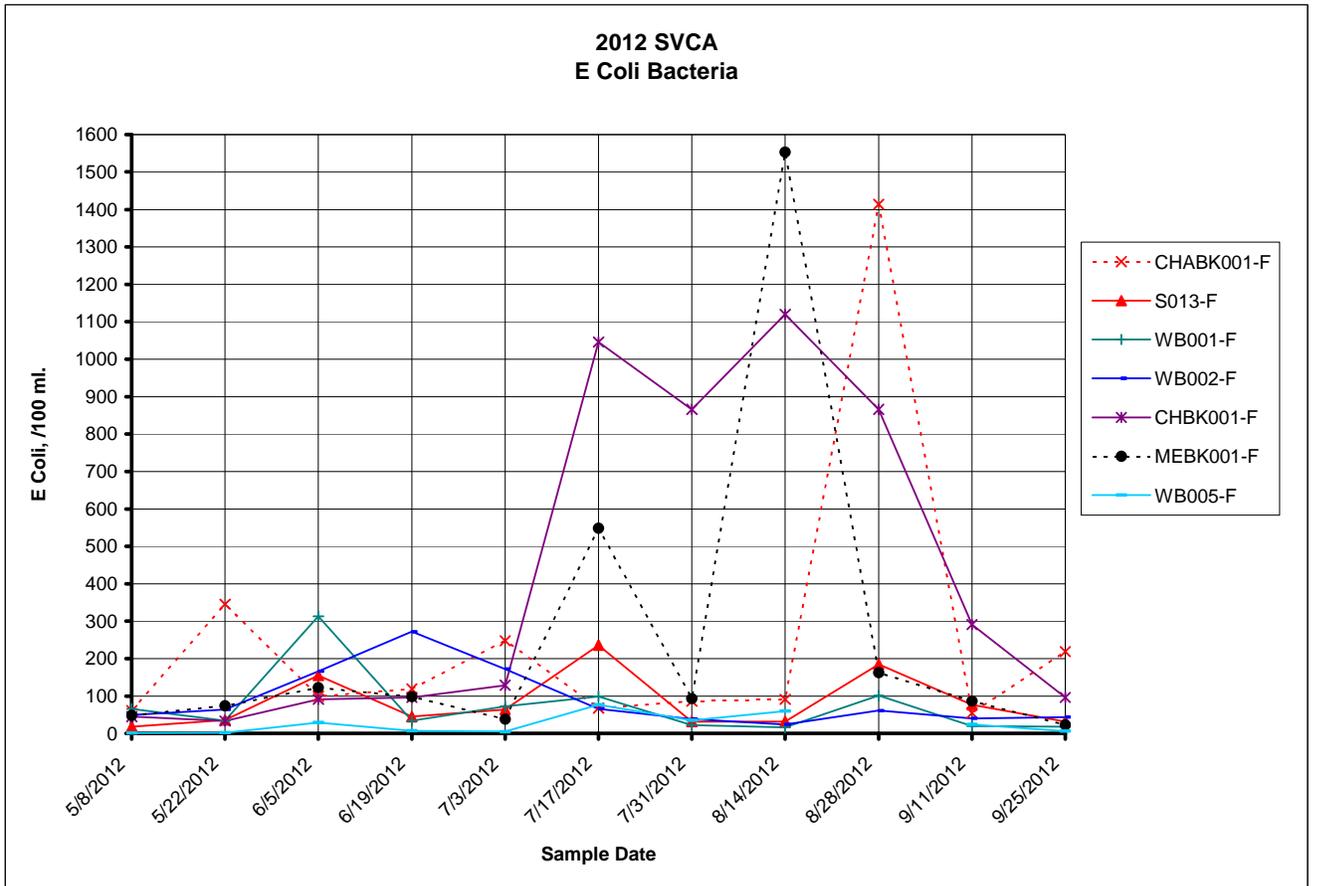
Bacteria

The SVCA bacteria data are presented in the following two graphs. E. coli was sampled at freshwater sites while Enterococcus and Fecal Coliform were sampled at estuary sites.

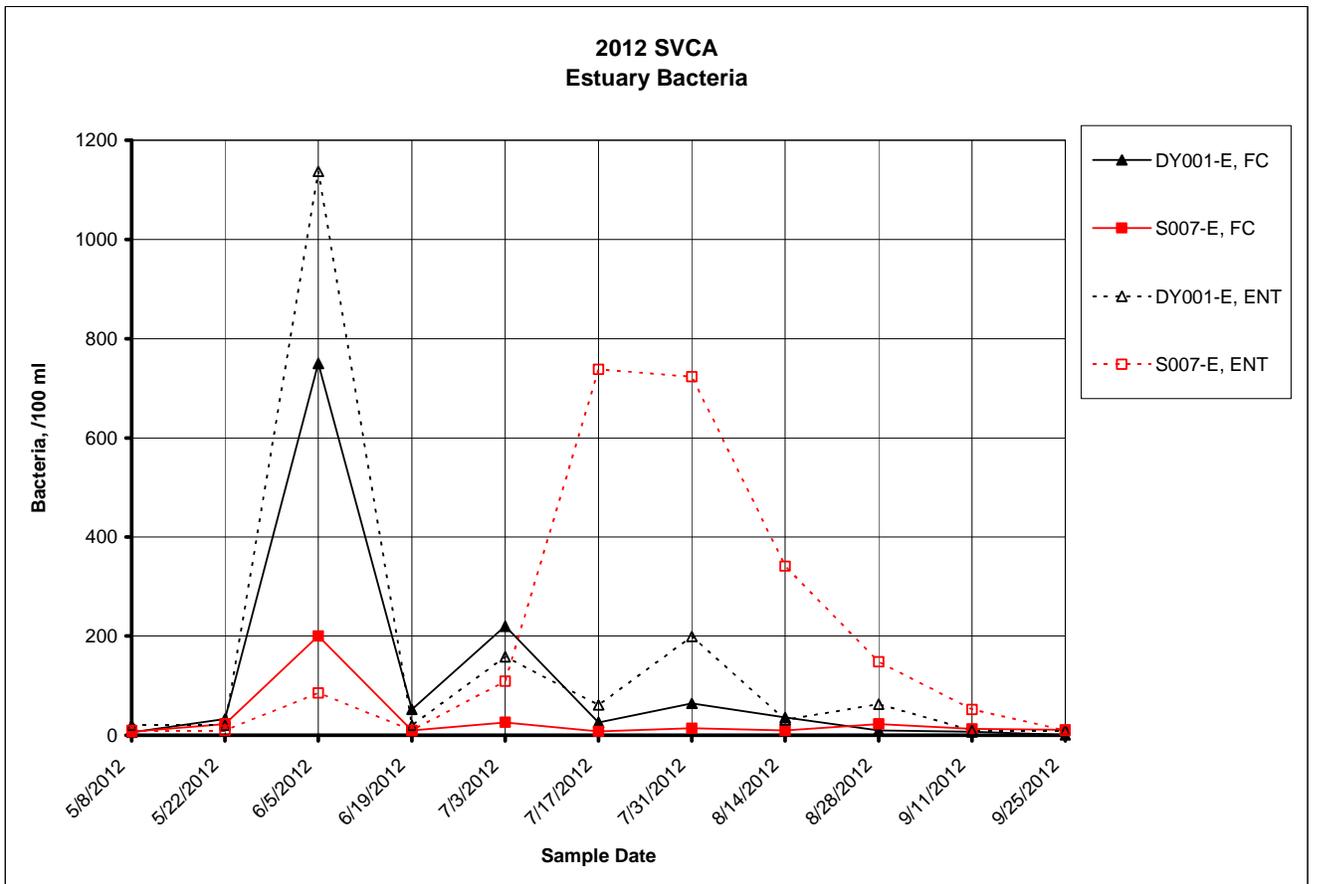
Several freshwater sampling sites showed large spikes in E. Coli bacteria during the season (most notably MEBK001 and CHABK001). Other sites showed smaller but still significant spikes throughout the season. Some of these spikes could be explained by the occurrence of rain events (May 22, June 5, July 3, July 17, July 31 and August 14 sample dates), but not all sites showed spikes on the same days. CHBK001 showed elevated E Coli bacteria during July and August.

There was a spike in estuary site bacteria levels on June 5 consistent with a large rain event on the 2nd-3rd. There were smaller but still significant spikes in estuary bacteria at site DY001 on July 3rd and July 31st which could be related to rain events. There were elevated Enterococcus levels at site S007 during July and August. In general the estuary sites of DY001 and S007 did not meet bacteria standards for more than half of the season with the exception of site S007 Fecal levels. Site S007 came close to meeting the Fecal coliform bacteria standards throughout the season, the exception being June 5 (which can be associated with a significant rain event).

Only site WB005 met bacteria standards throughout the sampling season. Non-attainment events for bacteria standards for each site are summarized in the 1994-2012 summary tables at the end of this report.



Graph #4: 2012 E Coli Bacteria



Graph #5: 2012 Estuary Bacteria

Dissolved Oxygen

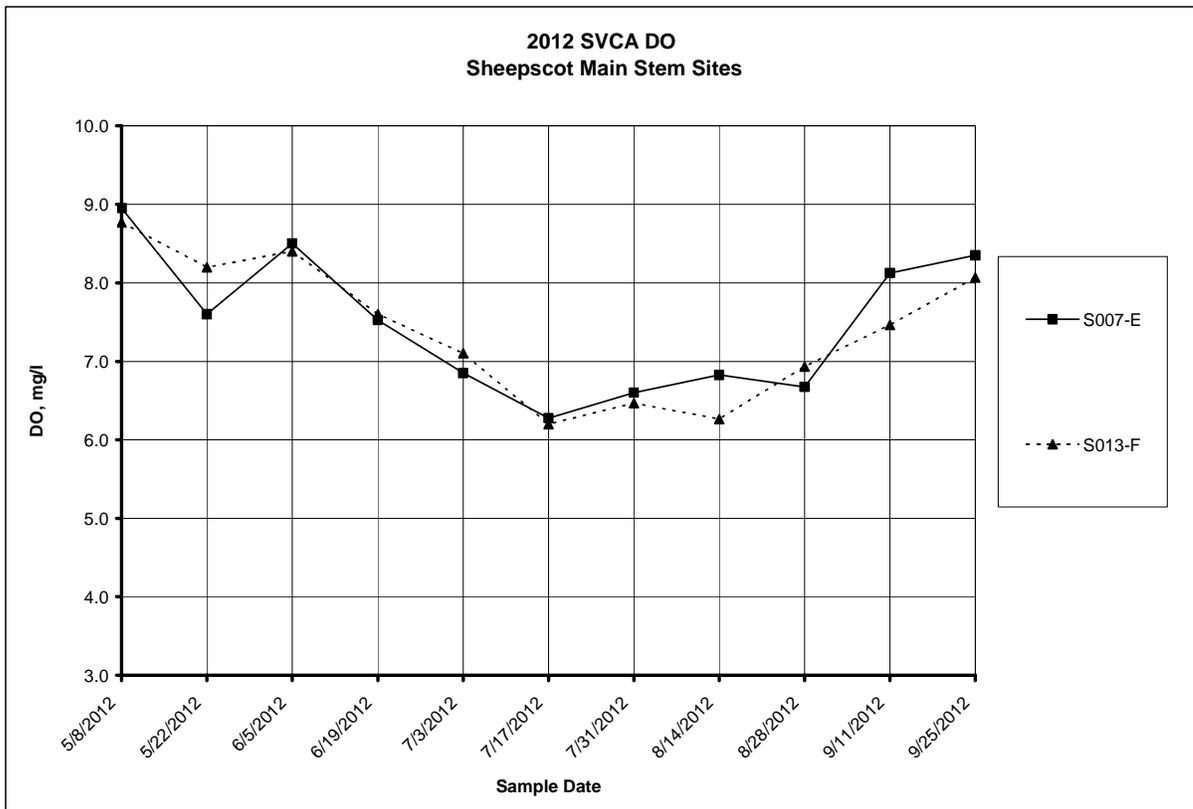
The SVCA dissolved oxygen (DO) data are presented in the following three graphs and two tables.

The 2012 SVCA data showed DO values above 7 mg/l (the class AA, A and B standard) for site WB001 for all except the July 17 sampling date. The remaining mainstem sites (S013, S007, WB002 and WB005) had DO values above 7 mg/l for all days except during July and August. In general, minimum DO levels occurred on July 17 with site WB002 falling below 5 mg/l. This date coincided with the lowest river flow of the year and the highest water temperature. DO concentrations recovered steadily after this date.

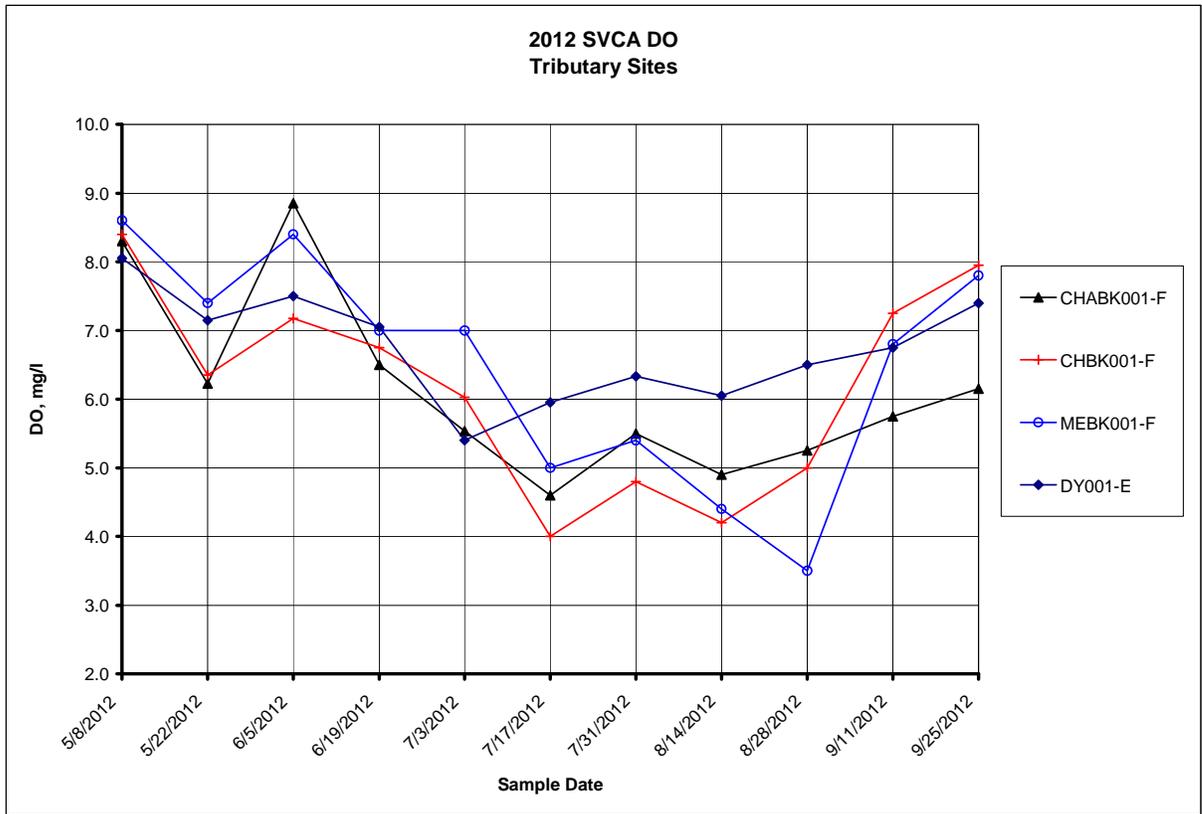
The freshwater tributary sites showed DO concentrations below 7 mg/l for most of the season (21 of 33 samples). One of the exceptions was the June 5 sampling day, which corresponded with a high flow rain event.

The tables present the percent DO saturation values for the estuarine sites. These two sites are class SB which has a DO standard of a minimum of 85% saturation. Both estuary sites (Site S007 and DY001) were below the DO standard for all of the sampling dates (although levels were above 7.0 mg/l about half the dates).

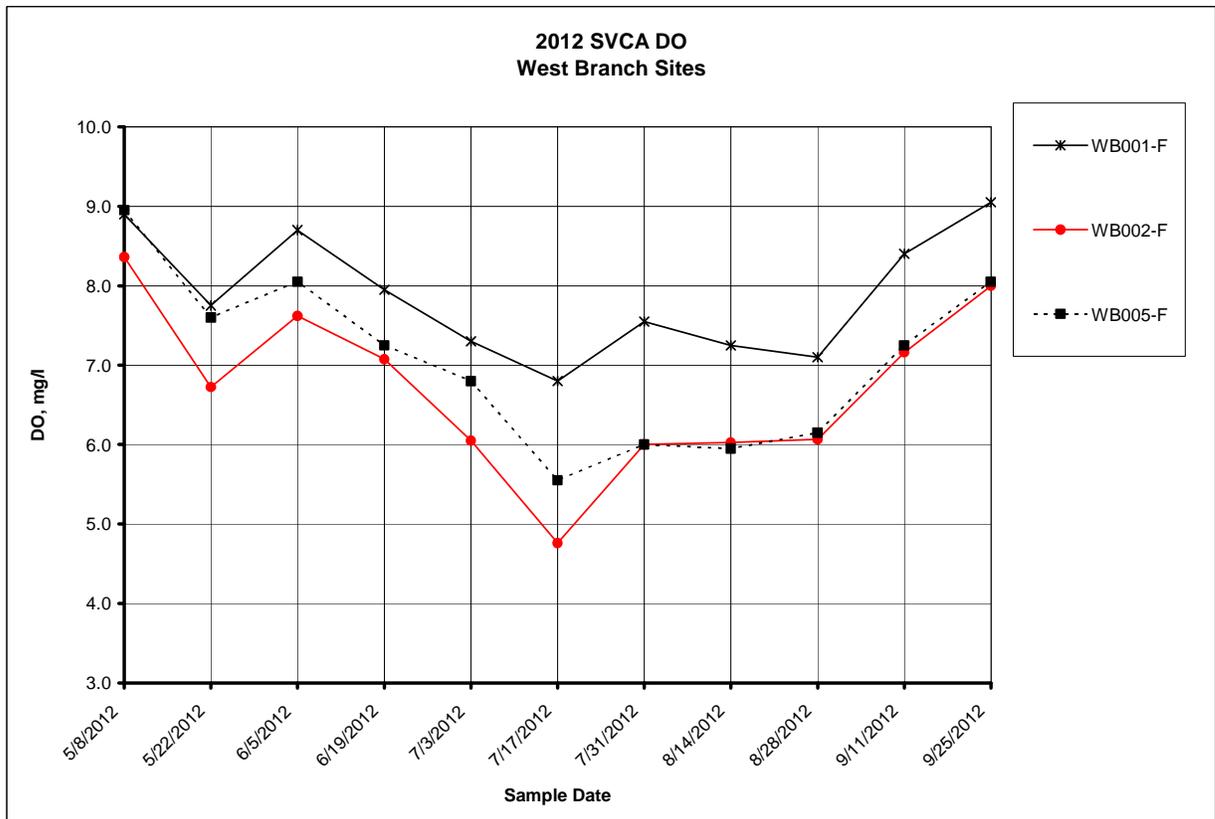
Descriptions of the DO standards and a table of non-attainment are given in the 1994-2012 summary at the end of this report.



Graph #6: 2012 Main Stem DO



Graph #7: 2012 Tributary DO



Graph #8: 2012 West Branch DO

DY001-E

Sample Date	Temp C	Salinity ppt	ave. DO ppm	DO Sat %
5/8/2012	10.5	7.6	8.05	76%
5/22/2012	18	0.0	7.15	76%
6/5/2012	11.9	0.0	7.50	69%
6/19/2012	18.2	0.0	7.05	75%
7/3/2012	22.0	0.0	5.40	62%
7/17/2012	24.8	8.5	5.95	75%
7/31/2012	22	12.4	6.33	78%
8/14/2012	23.5	12.0	6.05	76%
8/28/2012	22.0	14.4	6.50	81%
9/11/2012	18.0	19.6	6.75	80%
9/25/2012	15.8	19.8	7.40	84%

S007-E

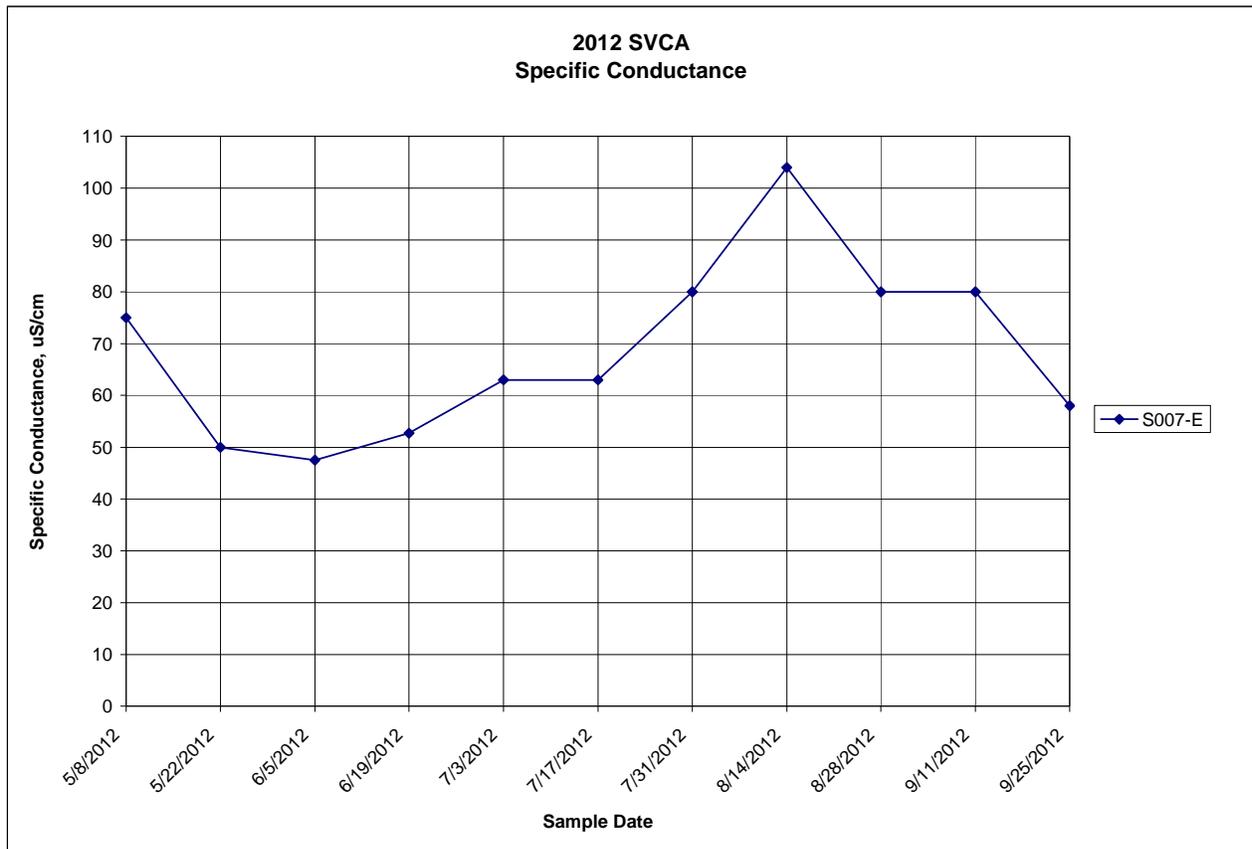
Sample Date	Temp C	Salinity ppt	DO ppm	DO Sat %
5/8/2012	12.5	0	8.95	84%
5/22/2012	18.5	0	7.60	81%
6/5/2012	13.0	0	8.50	81%
6/19/2012	18.0	0	7.53	79%
7/3/2012	22.5	0	6.85	79%
7/17/2012	24.0	0	6.28	75%
7/31/2012	21.5	0	6.60	75%
8/14/2012	22.8	0	6.83	79%
8/28/2012	21.8	0	6.68	76%
9/11/2012	15.8	0	8.13	82%
9/25/2012	12.8	0	8.35	79%

Specific Conductance

The monitor for site S007-E was able to collect conductance measurements in addition to the temperature, DO and bacteria sampling. The results are shown in Graph #9.

Specific Conductance is measured in micro siemens per centimeter ($\mu\text{S}/\text{cm}$). Generally, there aren't regulatory levels for SC. Instead, the concentration of total dissolved solids (TDS) is often regulated. However, SC is an easily-obtained parameter that is a good indicator of the amount of dissolved solids in a water and thus can be used to detect contaminants in water.

Pure water would theoretically have an SC value of zero $\mu\text{S}/\text{cm}$ at 25° C. Distilled or deionized water has an SC of at least 1 $\mu\text{S}/\text{cm}$. Rain water can have an SC value higher than distilled water, because it dissolves gases from the air and also particles of dust or other airborne material. Sea water has an SC of approximately 50,000 $\mu\text{S}/\text{cm}$, because of the large amount of dissolved salts it contains. The specific conductance of rivers in the United States generally ranges from 50 to 1500 $\mu\text{S}/\text{cm}$. Studies of inland fresh waters indicate that streams supporting good mixed fisheries have a range between 150 and 500 $\mu\text{S}/\text{cm}$. Industrial waters can range as high as 10,000 $\mu\text{S}/\text{cm}$.



Graph #9: 2012 Specific Conductance

QAQC/Duplicates

As a part of its monitoring program, SVCA includes, in addition to a preseason training session, at least one duplicate sampling per site and one QAQC check of each monitor during a sampling season. The following graphs show the comparison of duplicate sampling for dissolved oxygen and bacteria.

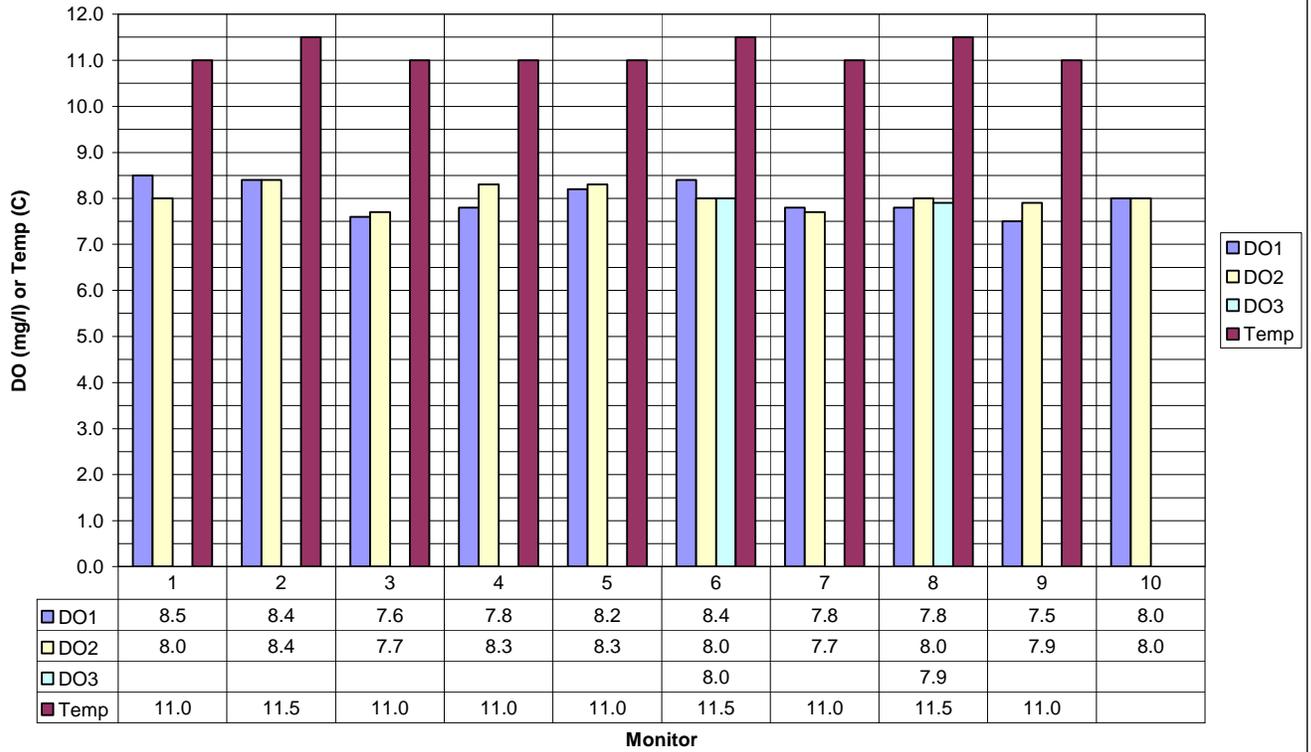
Graph 10 shows a comparison of DO and temperature readings of the participants of the pre-season training session. All temperature readings agreed well within the required 2 degree C precision. All individual DO readings were within the required 0.5 mg/l range of the group average, although the range of all values (lowest to highest) was 1.0 mg/l. The range of monitor average values was 0.75 mg/l.

Graph 11 shows a comparison of DO reading site duplicates made during the field sampling season using the titration method. The black values are the basic readings acquired by the regular samplers. The red values are the duplicates performed by the regular samplers and the gray values are the readings acquired by the QAQC team.

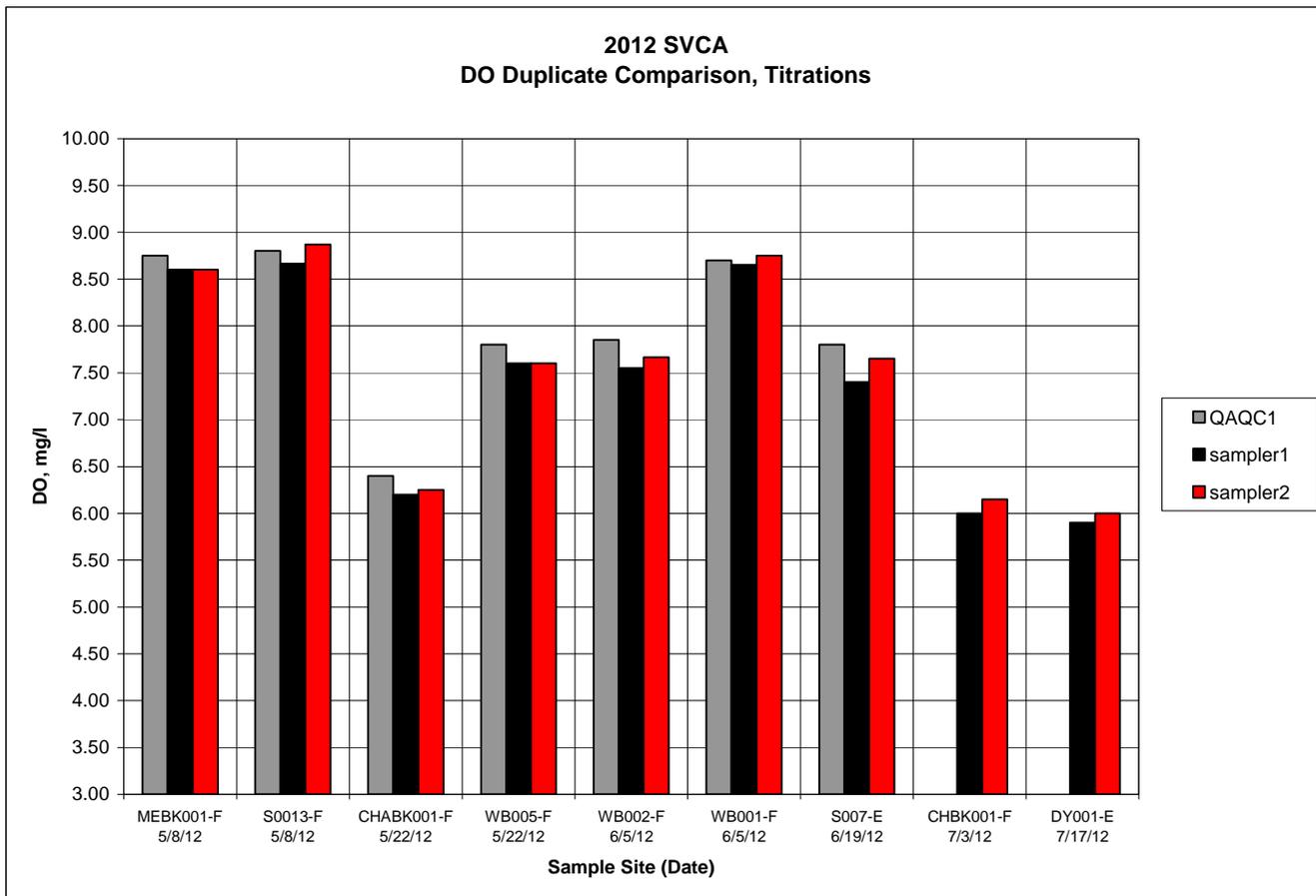
All QAQC and duplicate checks passed (within the 0.5 mg/l target). Note that two sites show no QAQC values because the monitors were checked at an alternate site. Due to the improvement in QAQC results it is suggested that the monitor continue to collect all the samples (regular and QAQC) at the same time and position in the stream.

2012 Training QAQC
4/29/12

Ave DO = 8.0 mg/l
Ave Temp = 11.2 C

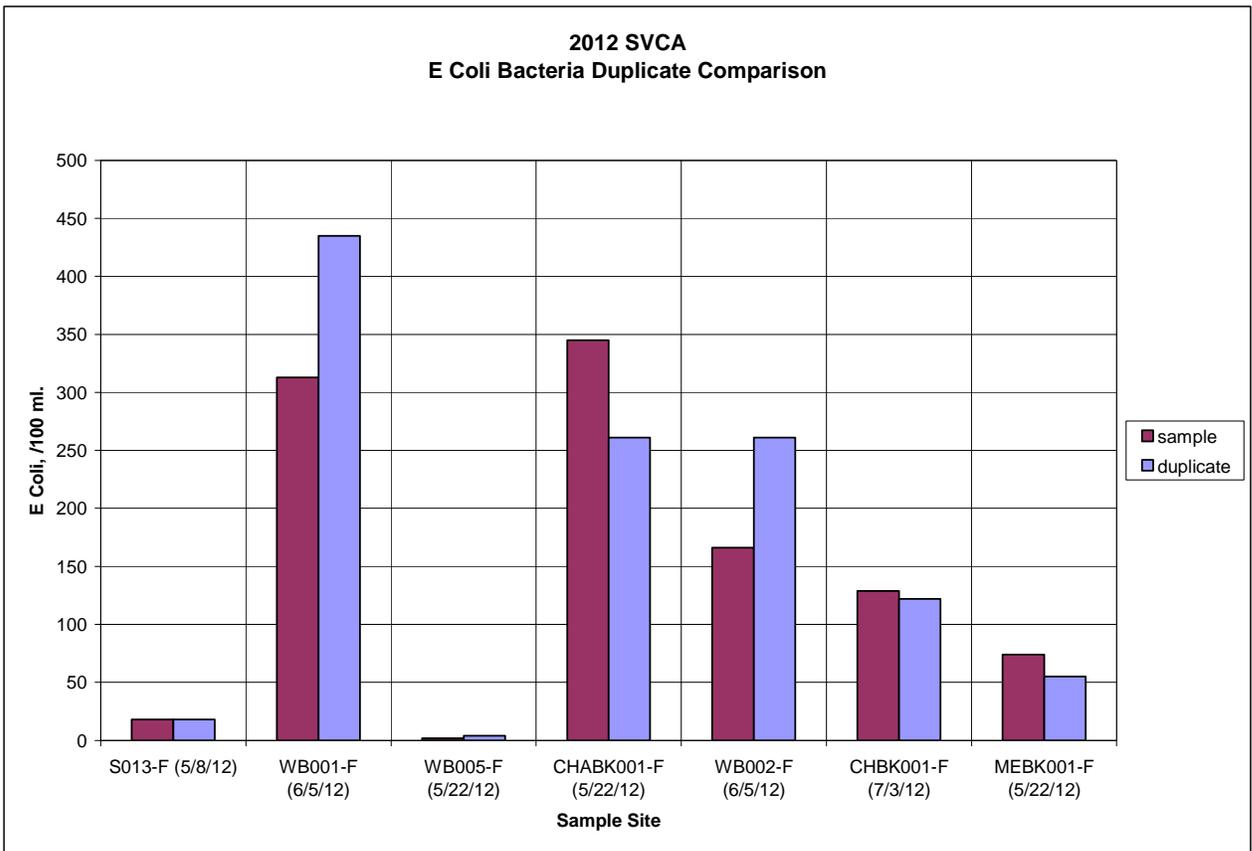


Graph #10: 2012 DO/Temp Duplicate Comparisons (Training Day)

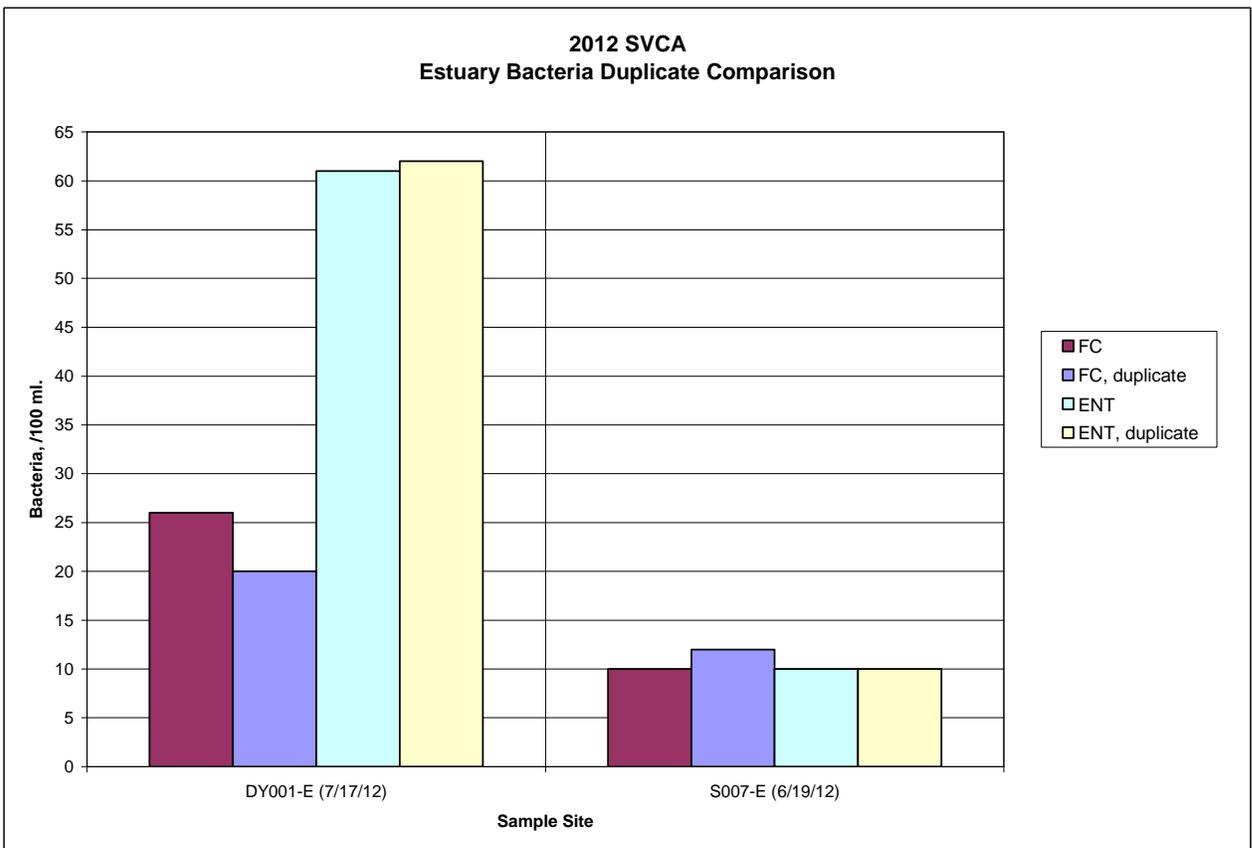


Graph #11: 2012 DO Duplicate Comparisons

Graphs 12 and 13 show comparisons of the bacteria duplicates. In general there was good agreement for the estuary bacteria duplicates. Four of the seven freshwater bacteria duplicates were good with poorer agreement on three occasions.



Graph #12: 2012 E Coli Duplicate Comparisons



Graph #13: 2012 Estuary Bacteria Duplicate Comparisons

Conclusion

During 2012 only one site (WB005) achieved bacteria standards throughout the sampling season. Only one site (WB001) nearly achieved DO standards throughout the season, the exception being July 17 when it achieved the % saturation standard but failed the concentration standard. Field QAQC compliance was perfect, we just need to tighten up on the training day results. It is planned to continue with the nine 2012 sites for the 2013 season.

All 2012 salinity measurements were made using the hydrometer method (only one site has measurable salinity).

The web site for MDEP Bureau of Land and Water Quality also has many interesting links, including documents using our data. You can find them at: <http://www.maine.gov/dep/blwq>

Thank you

To all of the dedicated volunteers who have made the past 19 years of sampling possible. During 2012, with 9 of the 14 active volunteers reporting, the estimated total time involved was over 153 hours and the estimated total mileage traveled was 2914 miles. We thank Kristin Pennock for office and organizational help.

Special thanks to outgoing Executive Director Maureen Hoffman for her guidance and enthusiasm.

Thanks also to Lee Murch for his years of dedicated courier service.

Water Quality Monitoring Committee

Maureen Hoffman, Executive Director
David Miller, Co-coordinator/Technical Advisor/Data Coordinator
Sharon Miller, Co-coordinator
Kristin Pennock
Alex Pugh, Technical Advisor

QAQC Team

David Miller
Alex Pugh

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Mary Atticks	Tom Atticks
Jim Crowley	Dede Heath
Jay LaGore	Susanne Meidel
David Miller	Sharon Miller
Alex Pugh	Fred Quivey
Karin Swanson	

Couriers

Lee Murch
Alex Pugh

Back up monitors

Maureen Hoffman
Kristin Pennock
Lili Pugh
Merry Fossel

Drop Off Sites

Alna Store
Tobey's Store

Appendix

Sheepscot River Water Quality Data 1994-2012

The following data has been summarized but not yet thoroughly analyzed. It should be considered as preliminary results until further analysis has been completed. Only the sites sampled in 2009 - 2012 are shown. The number of sampling dates for a particular year for each site is listed in parentheses.

All **violations** of State of Maine Water Quality Standards for the Sheepscot Drainage in the data collected are in **BOLD**. *Violations are based on standards (or surrogates) in effect during the specific sample year and may not reflect current standards (see water quality classifications of the Sheepscot below).*

The Sheepscot Main Stem from Route 17 to tidewater and the West Branch are Class AA:

There are no specified numerical standards for AA waters. Class AA is the highest classification and sections of river that have this designation are "...outstanding natural resources and which should be preserved because of their ecological, social, scenic or recreational importance." For comparison purposes the following standards had been created (Note: with change in B standards, AA surrogate standards had been changed for 2007-2008). Maine's Statewide Bacteria TMDL was approved in 2009. The TMDL specifies the use of GPA standards for 'as naturally occurs' (table 4.1, pg 25 <http://www.maine.gov/dep/blwq/docmonitoring/TMDL/2009/report.pdf>).

Dissolved Oxygen:	7.0 mg/l or 75% saturation (class A standard)	
E Coli (1994-2006):	64 geometric mean	214 instantaneous
E Coli (2007-08, B standard):	64 geometric mean	236 instantaneous
E Coli (2007-08, 1/2 B standard):	32 geometric mean	118 instantaneous
E Coli (2009-12, GPA)	29 geometric mean	194 instantaneous

The Mainstem of the Sheepscot River from its headwaters to Sheepscot Lake and the tributaries Trout Brook, Choate Brook, Weaver Brook, Ben Brook, Finn Brook, Hewitt Brook, Dearborn Brook, and Culvert Pond Brook were upgraded in 2003 to Class A:

There are no specified numerical bacterial standards for A waters. Bacterial levels are to be as naturally occurs. For comparison purposes standards for these waters are the same as those used for Class AA waters above.

The Mainstem of the Sheepscot River from Sheepscot Lake to the Route 17 bridge in Whitefield and all tributaries not otherwise designated are Class B. The standards for Class B changed in 2005 (implemented in 2006). The standards are as follows:

Dissolved Oxygen:	7.0 mg/l or 75% O ₂ Sat., whichever is higher.	
E Coli (1994-2005):	64 geometric mean	427 instantaneous
E Coli (2006-2012):	64 geometric mean	236 instantaneous

Estuarine waters of the Sheepscot are Class SB. The standards for SB waters are as follows:

Dissolved Oxygen (1994-2008): 7.0 mg/l or 85% O₂ Sat., whichever is higher*
 Enterococci: 8 geometric mean 54 instantaneous
 Dissolved Oxygen 2009-2012: 85% O₂ Sat.
 Fecal coliform** 2009-2012: 14 geometric mean 31 90th percentile

*standard was/is actually 85% saturation, 7.0 mg/l was used for comparative purposes

**for approved shellfish harvesting waters

Estuary and Tributaries

DY001-E

Dyer River. At mouth, below bridge in Sheepscot Village. Class SB

<i>YEAR</i>	<i>FECAL COLIFORM GEO MEAN</i>	<i>FECAL COLIFORM 90th %</i>	<i>ENTEROCOCCI GEO MEAN</i>	<i>ENTEROCOCCI DAYS IN VIOLATION</i>	<i>D.O. DAYS IN VIOLATION</i>	<i>AVERAGE WATER TEMP (°C)</i>
1994					9 (9)	
1995	18.4				4 (8)	
1996	48.3		36.0	4 (11)	8 (11)	
1997	9.9		3.5	0 (10)	5 (12)	
1998	22.3		20.6	4 (11)	4 (11)	
1999	20.6		19.2	2 (12)	4 (12)	
2000	42.0		115.5	8 (10)	0 (10)	
2001	14.9		27.4	3 (11)	3 (12)	
2002	19.0		25.4	4 (11)	1 (11)	16.1
2003	34.2		32.6	5 (11)	6 (11)	16.7
2004	56.6		22.7	2 (11)	3 (11)	17.6
2005	20.5		42.6	2 (12)	3 (12)	14.2
2006	96.0		118.1	8 (12)	6 (11)	18.3
2007	11.6		12.3	2 (11)	2 (10)	16.7
2008	54.6		28.8	3 (10)	3 (11)	17.8
2009	24.6		25.2	3 (11)	8 (11)*	16.2
2010	17.2	75	53.2	6(11)	9(11)*	18.0
2011	38.9	126	82.1	5(11)	8(11)*	17.5
2012	27.6	220	48.4	5(11)	11(11)*	18.8

*85% standard

S007-E

Sheepscot River. Downriver from Head Tide Road Bridge; behind SVCA Office; river left. Class SB

<i>YEAR</i>	<i>FECAL COLIFORM GEO MEAN</i>	<i>FECAL COLIFORM 90th %</i>	<i>ENTEROCOCCI GEO MEAN</i>	<i>ENTEROCOCCI DAYS IN VIOLATION</i>	<i>E Coli Geo mean</i>	<i>D.O. DAYS IN VIOLATION</i>	<i>AVERAGE WATER TEMP (°C)</i>
1994	80.1					1 (10)	
1995	32.3					2 (12)	
1996	21.5		88.7	7 (12)		0 (12)	
1997	26.0		138.8	9 (12)		0 (12)	
1998	58.2		337.1	9 (12)		1 (12)	
1999	111		359	8 (11)	59 (6)	0 (7)	
2000	113.8		564	8 (9)		0 (12)	
2001	406.2		82.5	1 (2)	86.2 (10)	1 (12)	
2002	68.2		241.6	9 (11)	--	0 (12)	13.8
2003	201.4		19.1	1 (11)	--	0 (11)	17.0
2004	75.8		237.9	7 (10)	--	0 (10)	17.1
2005	22.1		45.6	4(12)		0(10)	18.0
2006	44.1		222.4	8 (12)		0 (9)	17.5
2007	35.7		17.0	2 (11)		0 (11)	14.8
2008	71.7		82.8	6 (11)		0 (11)	17.0
2009	88.2		127.8	8 (11)		5 (11)*	16.5
2010	12.0	30	181.7	9(11)		3(11)*	17.8
2011	26.1	77	90.8	7(11)		7(11)*	17.7
2012	16.8	26	67.4	6(11)		11(11)*	18.5

*85% standard

Sheepscot Main Stem and Tributaries

CHABK001-F

Chamberlain Brook, King's Mills. Below route 194 Bridge. Class B

<i>YEAR</i>	<i>E COLI GEOMEAN</i>	<i>E COLI DAYS IN VIOLATION</i>	<i>D.O. DAYS IN VIOLATION</i>	<i>AVERAGE WATER TEMP (°C)</i>
1997	85.3	2 (8)		
1998	157.5	3 (12)	11 (12)	
1999	165	5 (12)	10 (12)	
2000	113.2	1 (9)	6 (8)	
2001	84.6	1 (12)	11(12)	
2002	49.1	1 (12)	9 (12)	16.5
2003	40.2	1 (9)	6 (9)	17.0
2004	96.6	1(11)	0 (11)	
2005	80.5	0 (12)	6 (10)	15.4
2006	133.3	0 (11)	8 (11)	17.0
2007	70.8	2 (11)	8 (11)	14.8
2008	63.0	3 (11)	4 (11)	16.6
2009	103.5	2 (11)	8 (10)	15.1
2010	155.6	6(11)	11(11)*	18.7
2011	144.8	4(11)	10(11)*	17.3
2012	144.1	3(11)	10(11)*	17.3

*1(11) non-attainment of 75% standard only

S013-F

Sheepscot River. North Whitefield. Below Route 126. River right. Class AA

<i>YEAR</i>	<i>E COLI GEOMEAN</i>	<i>E COLI DAYS IN VIOLATION (1/2 B STD)</i>	<i>E COLI DAYS IN VIOLATION (B STANDARD)</i>	<i>E COLI DAYS IN VIOLATION (GPA)</i>	<i>D.O. DAYS IN VIOLATION</i>	<i>AVERAGE WATER TEMP (°C)</i>
1994	28.5	0 (9)			3 (9)	
1995	33.5	1 (11)			0 (12)	
1996	49.5	1 (5)				
1997	41.9	1 (10)			2 (8)	
1998	29.5	0 (8)			3 (8)	
1999	85.1	1 (11)			0 (5)	
2000	54.5	1 (12)				
2001	33.0	0 (11)			4 (11)	
2002	44.0	0 (11)			2 (12)	17.8
2003	34.5	0 (11)			2 (11)	18.4
2004	94.0	1 (9)			1 (9)	18.6
2005	55.3	1 (11)			1 (1)	18.1
2006	95.7	2 (12)			2 (11)	18.0
2007	42.9	1 (11)	1 (11)		2 (11)	16.3
2008	55.0	2 (11)	0 (11)		2 (11)	16.8
2009	70.7	-	-	1(11)	2 (11)	16.5
2010	63.3	-	-	1(11)	5(11)	18.8
2011	85.1	-	-	1(11)	1(11)*	18.2
2012	59.3	-	-	1(11)	4(11)**	18.1

*1(11) non-attainment of 75% standard only

**1(11) non-attainment of 7 mg/l concentration standard only

West Branch and Tributaries

WB001-F

West Branch Sheepscoot River. Below Howe Road Bridge, Whitefield. Class AA

<i>YEAR</i>	<i>E COLI GEOMEAN</i>	<i>E COLI DAYS IN VIOLATION (1/2B STD)</i>	<i>E COLI DAYS IN VIOLATION (B STANDARD)</i>	<i>E COLI DAYS IN VIOLATION (GPA)</i>	<i>D.O. DAYS IN VIOLATION</i>	<i>AVERAGE WATER TEMP (°C)</i>
1994	19.9	0 (7)			0 (7)	
1995	17.7	0 (12)			1 (12)	
1996	36.2	0 (12)			4 (12)	
1997	23.0	0 (10)			0 (10)	
1998	50.3	1 (10)			0 (10)	
1999	30.3	1 (12)			0 (12)	
2000	28.9	1 (12)			0 (12)	
2001	16.2	0 (10)			0 (10)	
2002	23.2	0 (12)			0 (12)	15.5
2003	17.6	0 (10)			0 (10)	16.4
2004	43.6	1 (10)			0 (5)	17.6
2005	27.6	1 (11)			0 (10)	18.1
2006	76.6	1 (8)			3 (10)	17.9
2007	43.0	1 (8)	1 (8)		0 (10)	17.3
2008	63.5	2 (9)	1 (9)		1 (10)	16.1
2009	48.5	-	-	1 (10)	2 (10)	15.5
2010	46.1	-	-	1(11)	0(11)	18.2
2011	36.2	-	-	2(11)	0(11)	17.8
2012	46.5	-	-	1(11)	1(11)*	18.1

*1(11) non-attainment of 7 mg/l concentration standard only

WB002-F

West Branch Sheepscot River. Above Route 105 Bridge, Whitefield. Class AA

<i>YEAR</i>	<i>E COLI GEOMEAN</i>	<i>E COLI DAYS IN VIOLATION (1/2B STD)</i>	<i>E COLI DAYS IN VIOLATION (B STANDARD)</i>	<i>E COLI DAYS IN VIOLATION (GPA)</i>	<i>D.O. DAYS IN VIOLATION</i>	<i>AVERAGE WATER TEMP (°C)</i>
1994	48.9	0 (8)			8 (10)	
1995	30.8	1 (11)			5 (10)	
1996	40.4	1 (12)			5 (12)	
1997	19.9	0 (12)			No data	
1998	40.3	1 (12)			7 (12)	
1999	49.9	1 (12)			8 (12)	
2000	64.8	0 (12)			4 (12)	
2001	51.7	1 (12)			5 (12)	
2002	33.0	0 (12)			7 (12)	17.2
2003	32.3	0 (12)			7 (11)	18.1
2004	79.3	1 (11)			3 (11)	17.8
2005	42.7	1 (13)			4(11)	20.3
2006	94.6	1 (12)			5 (9)	16.3
2007	36.6	1 (11)	1 (11)		2 (11)	16.7
2008	52.5	2 (11)	0 (11)		6 (11)	17.3
2009	55.2	-	-	0 (11)	4 (11)	16.2
2010	24.2	-	-	0(10)	6(9)	18.0
2011	101.7	-	-	2(11)	9(11)	17.7
2012	68.7	-	-	1(11)	10(11)*	17.8

*4(11) non-attainment of 75% standard only

CHBK001-F

Choate Brook. Above Sampson Road bridge just north of Route 105, Windsor. Class A (1997-2003)
Class AA (2004+)

<i>YEAR</i>	<i>E COLI GEOMEAN</i>	<i>E COLI DAYS IN VIOLATION (1/2B STD)</i>	<i>E COLI DAYS IN VIOLATION (B STANDARD)</i>	<i>E COLI DAYS IN VIOLATION (GPA)</i>	<i>D.O. DAYS IN VIOLATION</i>	<i>AVERAGE WATER TEMP (°C)</i>
1997	42.1		0 (12)		7 (12)	
1998	131.6		0 (11)		2 (4)	
1999	108.9		1 (9)		4 (8)	
2000	63.3		1 (12)		7 (12)	
2001	104.2		1 (12)		11 (12)	
2002	91.0		2 (11)		8 (12)	15.0
2003	192.9		6 (11)		8 (11)	15.9
2004	135.7	1 (11)			7 (11)	16.3
2005	32.2	1 (12)			7 (12)	16.5
2006	103.5	1 (11)			6 (11)	17.1
2007	96.1	4 (11)	3 (11)		4 (11)	14.8
2008	73.0	3 (11)	3 (11)		5 (11)	15.6
2009	35.2	-	-	0 (11)	4 (11)	15.8
2010	147.2	-	-	4(11)	8(11)*	16.1
2011	65.8	-	-	1(11)	11(11)**	17.6
2012	213.1	-	-	5(11)	10(11)***	16.5

*1(11) non-attainment of 75% standard only

**2(11) non-attainment of 75% standard only

***3(11) non-attainment of 75% standard only

MEBK001-F

Meadow Brook, below old railroad grade on Oliver Dairy Farm, Weeks Mills. Class B

<i>YEAR</i>	<i>E COLI GEOMEAN</i>	<i>E COLI DAYS IN VIOLATION</i>	<i>D.O. DAYS IN VIOLATION</i>	<i>AVERAGE WATER TEMP (°C)</i>
1997	104.2	3 (12)	6 (12)	
1998	279.0	2 (9)	2 (2)	
1999	64.8	1 (12)	7 (10)	
2000	147.3	3 (12)	0 (12)	
2001	173.0	3 (11)	7 (10)	
2002	61.0	2 (12)	6 (11)	15.5
2003	63.4	0 (11)	7 (11)	14.9
2004	623.5	6 (9)	6 (9)	15.0
2005	86.3	0 (13)	5 (12)	16.4
2006	160.9	2 (13)	4 (10)	15.8
2007	179.5	4 (9)	3 (9)	12.7
2008	129.0	3 (11)	3 (11)	14.6
2009	94.6	1 (11)	2 (11)	14.9
2010	155.3	3(10)	9(10)*	15.4
2011	194.3	2(10)	8(10)**	15.8
2012	113.7	2(11)	8(11)**	16.2

*4(11) non-attainment of 75% standard only

**3(11) non-attainment of 75% standard only

WB005-F

West Branch Sheepsfoot River. Below Foot Bridge off of Water Street, Palermo. Class AA

<i>YEAR</i>	<i>E COLI GEOMEAN</i>	<i>E COLI DAYS IN VIOLATION (1/2B STD)</i>	<i>E COLI DAYS IN VIOLATION (B STANDARD)</i>	<i>E COLI DAYS IN VIOLATION (GPA)</i>	<i>D.O. DAYS IN VIOLATION</i>	<i>AVERAGE WATER TEMP (°C)</i>
1995	23.4	0 (10)			8 (12)	
1996	7.7	0 (12)			2 (12)	
1997	21.5	0 (10)			8 (12)	
1998	71.1	1 (11)			4 (11)	
1999	55.6	1 (12)			2 (12)	
2000	51.7	1 (11)			5 (11)	
2001	71.7	0 (12)			7 (12)	
2002	32.0	0 (12)			6 (12)	17.3
2003	12.5	0 (11)			4 (11)	17.9
2004	13.2	0 (8)			3 (8)	18.8
2005	8.2	0 (11)			0 (11)	19.4
2006	8.7	0 (12)			1 (7)	20.3
2007	13.3	0 (11)	0 (11)		5 (10)	18.6
2008	14.1	0 (11)	0 (11)		2 (10)	18.8
2009	5.8	-	-	0 (9)	3 (11)	18.2
2010	14.7	-	-	0(11)	4(11)*	19.2
2011	10.2	-	-	0(10)	4(11)**	19.5
2012	11.7	-	-	0(10)	5(11)*	19.5

*1(11) non-attainment of 7.0 mg/l standard only

**2(11) non-attainment of 7.0 mg/l standard only