

### Presumpscot Watershed Initiative Task 7E – Stream Crossing Monitoring

In conjunction with Task 3 (Stream Crossing Erosion Control) of the PWI Workplan, PRW collected water quality samples and measured stream discharge at several sites throughout the Presumpscot River watershed (Figure 1). These sites were selected in consultation with the Cumberland County Soil and Water Conservation District (CCSWCD) and the Casco Bay Estuary Partnership (CBEP).

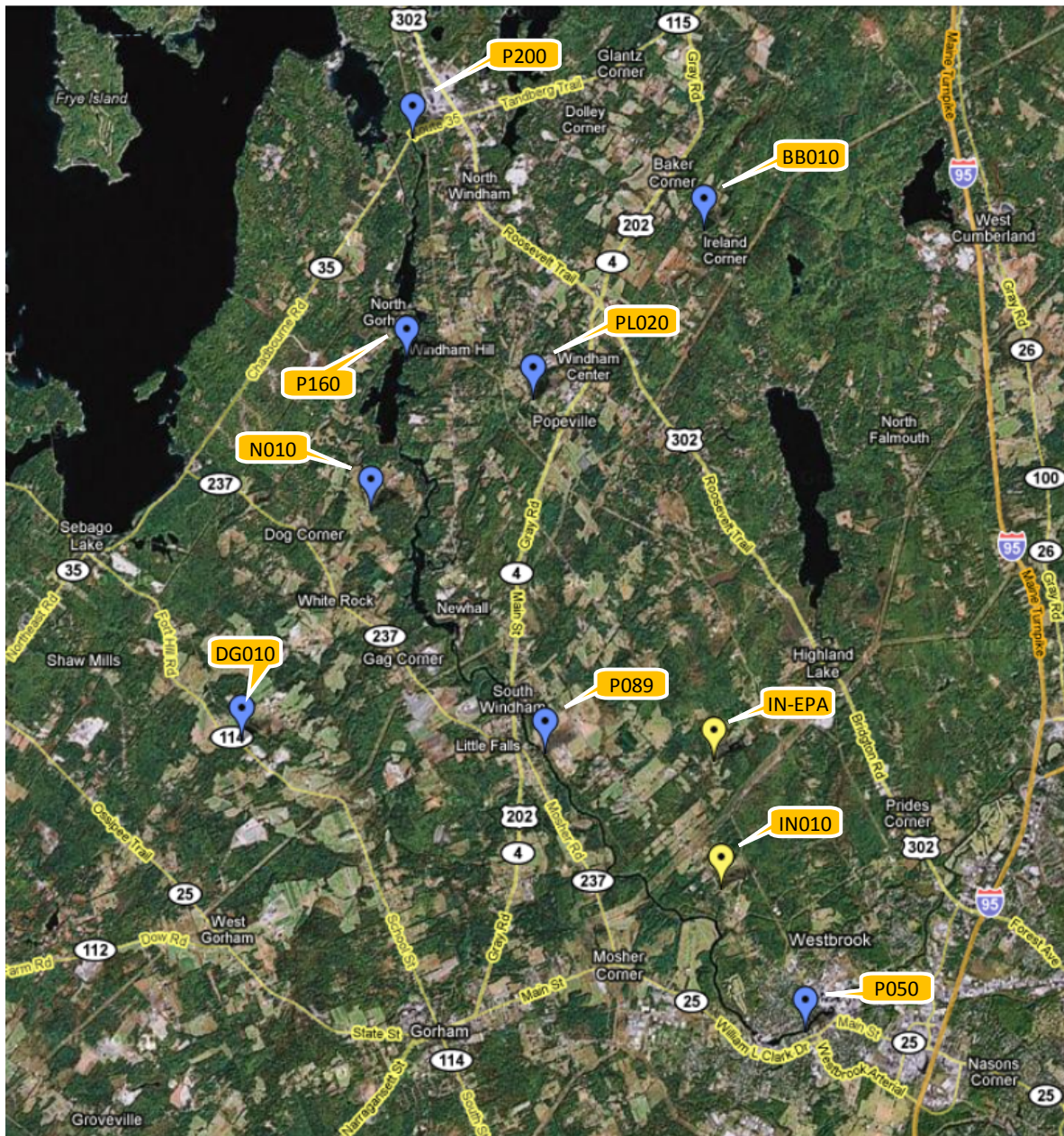


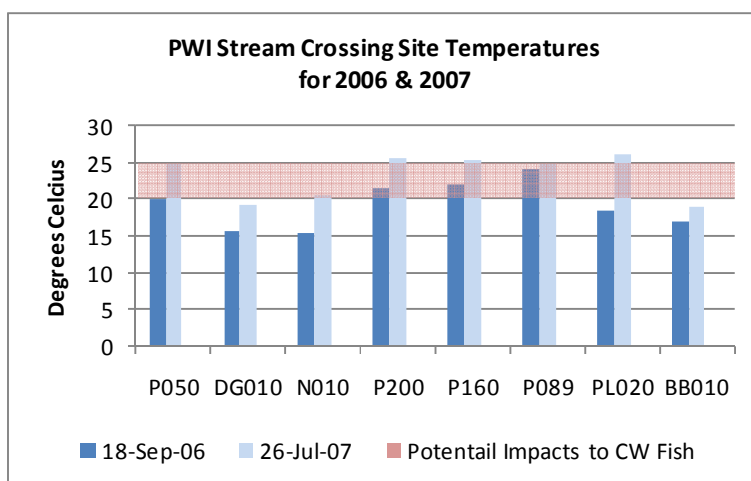
Figure 1: Stream crossing sample locations for PWI water quality monitoring and flow measurement

## Water Quality Monitoring

PRW staff measured water quality at eight established PRW sites indicated with blue symbols in Figure 1 (P200, BB010, P160, PL020, N010, DG010, P089 and P050) on September 18, 2006 and July 26, 2007. Monitoring parameters included temperature, dissolved oxygen (concentration and percent saturation), turbidity, specific conductance and pH. The results from these measurements were fairly consistent from 2006 to 2007. Water temperatures for both years were between 20 - 25°C – the range generally considered as potentially detrimental to cold water fish species – at three of the eight stream crossing sites (P200, P160 and P089). Three other sites had water temperatures in this range for 2007: P050, N010 and PL020 (Table 1 and Figure 1). Dissolved oxygen levels failed to comply with Maine DEP Class B Water Quality Classification standards on only one occasion over the course of the monitoring period. In July 2007, site N010 had a D.O. concentration of 6.4 parts per million and a saturation level of 73.1% (Table 1 and Figure 2). The minimum standard for each of these parameters is 7 ppm and 75%, respectively.

**Table 1: Eight primary stream crossing locations sampled for PWI Project in 2006 and 2007.**

Samplers: T. Bennett & F. Dillon		Meters: DO: YSI DO200; Turb: LaMotte 2020; pH/Cond: YSI pH100						Samplers: T. Bennett & F. Dillon		Meters: DO, pH, cond: YSI 85; Turb: LaMotte 2020					
Sept. 18, 2006 Sample Field Measurement		Temp	Dissolved Oxygen		Turbidity	Spec. Conductance		July 26, 2007 Sample Field Measurement		Temp	Dissolved Oxygen		Turbidity	Spec. Conductance	
Site Number / Location	Sample Collection Time	(°C)	PPM	% Sat	(NTUs)	(µS)	pH	Site Number / Location	Sample Collection Time	(°C)	PPM	% Sat	(NTUs)	(µS)	pH
P050	10:15	20	9	99.6	1.42	64	6.9	P050	15:26	24.99	9.3	114.8	2.77	69	6.9
DG010	11:30	15.8	7.5	75.4	1.95	134.5	7	DG010	9:20	19.2	7.2	78.5	1.34	130	6.9
N010	11:55	15.4	9.2	90.6	8.49	98.1	7.2	N010	16:44	20.5	6.4	73.1	4.99	99	7
P200	12:30	21.7	8.6	98.4	0.4	48.1	7.5	P200	13:10	25.63	9.67	121	0.14	53	7.05
P160	12:55	22.2	8.6	98.3	0.48	47.7	7.1	P160	15:20	25.5	7.4	92.9	1.15	54	7.3
P089	14:10	24.2	7.8	93.9	0.6	59.1	7.61	P089	15:51	25.01	7.8	96.1	0.65	55	7.8
PL020	14:45	18.6	9.9	106.2	1.62	185.5	7.97	PL020	16:13	26.2	7.8	98.4	3.17	193	6.9
BB010	15:15	17	8.4	87.1	2.4	50.6	6.78	BB010	12:05	19.01	8.9	97.6	1.32	46	6.4



**Figure 1: Water temperature monitoring results for eight primary stream crossing locations for PWI Project.**

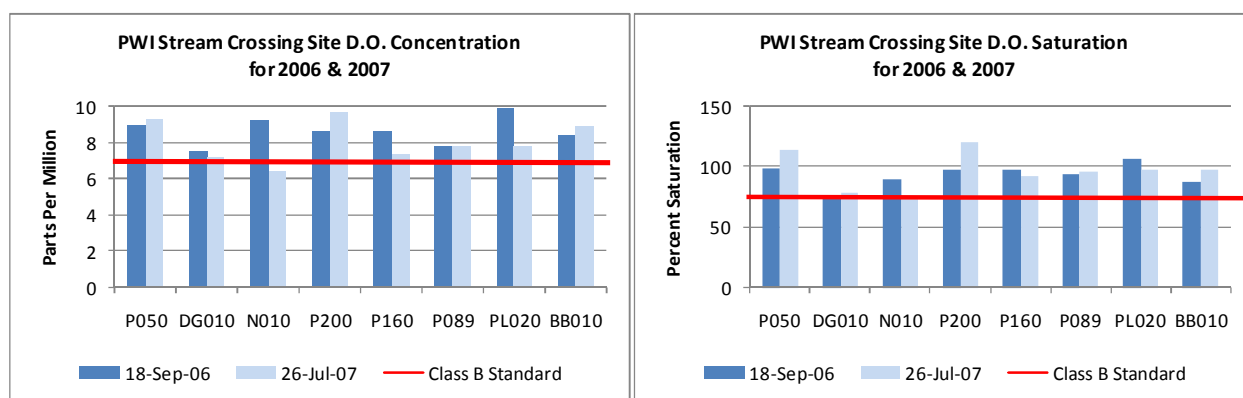


Figure 2: Dissolved oxygen monitoring results for eight primary stream crossing locations for PWI Project.

Turbidity results for nearly all of the eight primary stream crossing sites were below 3 NTUs. The only exception was site N010, which had readings of 8.49 and 4.99 NTUs in 2006 and 2007, respectively (Table 1 and Figure 3). Conductivity and pH results were fairly consistent at each site from year to year (with a couple of notable exceptions) but varied considerably between particular sites (Table 1 and Figure 4).

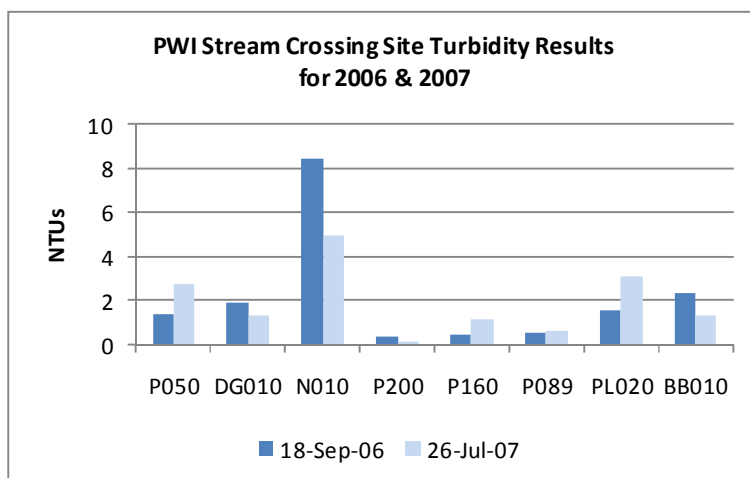


Figure 3: Turbidity monitoring results for eight primary stream crossing locations for PWI Project.

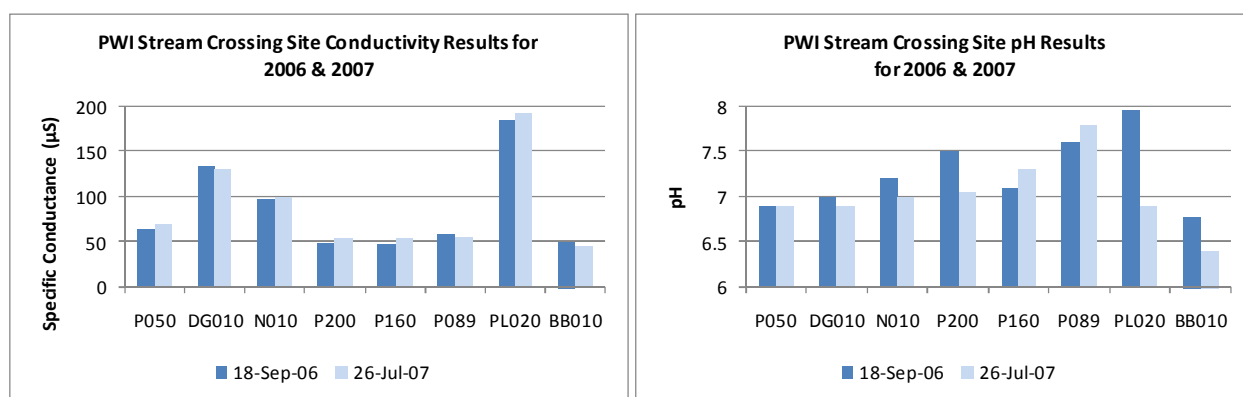


Figure 4: Conductivity and pH monitoring results for eighty primary stream crossing locations for PWI Project.

Water quality was also measured and samples were collected on September 26, 2007 from two additional sites (indicated with yellow symbols in Figure 1). One of these, IN010, is an established PRW site whereas site “IN-EPA” further upstream on Inkhorn Brook was sampled as part of a separate EPA study. Sampling parameters for these two sites included total phosphorus, Chlorophyll-a, nitrite-nitrate nitrogen, total suspended solids, temperature, dissolved oxygen (concentration and percent saturation), turbidity and specific conductance. Results for all sampling sites are summarized in Tables 1 and 2 below and graphs of these results are provided in Appendix 1. Field data sheets and laboratory results for all monitoring activities are on file at the Presumpscot River Watch’s office in Portland, ME.

**Table 2: Two additional stream crossing locations sampled for PWI project in 2007.**

Sampler: F. Dillon		Meters: DO, pH, cond: YSI 85												
Sept. 26, 2007 Sample Collection & Measurement		Sample Collection for Analysis Later							Sample Field Measurement					
		Sample Container Type			Parameter				Temp	Dissolved Oxygen		Turbidity	Spec. Conductance	
		Site Number / Location	Sample Collection Time	Plastic	Glass	Whirl Pak	TP (ppm)	Chl-a (ppm)	NO <sub>2</sub> -NO <sub>3</sub> (ppm)	TSS (ppm)	(°C)	PPM	% Sat	(NTUs)
IN010		11:35	x	-	-	0.036	0.0032	-	-	17.7	3.8	37.7	12	174.5
IN-EPA		12:10	x	-	-	0.052	0.016	0.06	12	18.2	8.22	87.3	20	85.3

### Stream Discharge Measurements

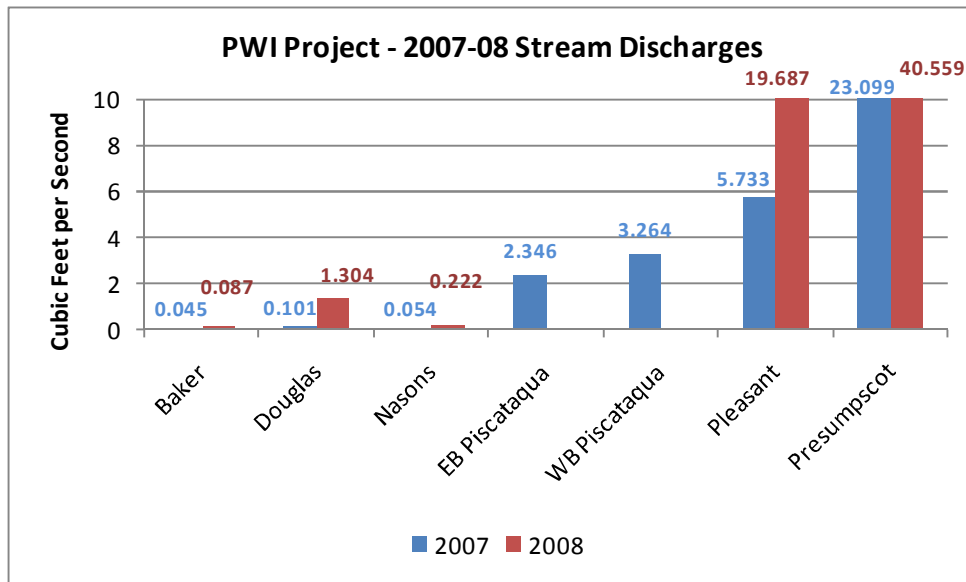
Stream discharges were measured in 2007 and 2008 using USGS Type AA and mini (“Pygmy”) current meters and methodology. This equipment was obtained through EPA’s Equipment Loan Program for volunteer monitoring groups. PRW and CBEP staff measured stream discharges at five of the eight primary stream crossing sites that were monitored for water quality in 2006 and 2007 (P200, BB010, PL020, N010, and DG010). Stream discharges for sites P089 and P050 could not be measured using the EPA’s equipment because they are located on the main stem of the Presumpscot (this equipment can only be used on wadeable streams). As such, additional sites were established for stream discharge measurements at PI010 and PI020 – the locations for datasonde deployments under Task 7C (Continuous Instream Monitoring) of the PWI Workplan.

Stream discharges were measured during drier weather conditions in 2007 and wetter weather conditions in 2008 (which was one of the wettest years on record according to the National Weather Service). Consequently, there was considerable variation from year to year at each site. Stream discharges could not be measured at PI010 and PI020 in 2008 due to back flow from the main stem of the Presumpscot. (At the time that PRW and CBEP staff were measuring stream discharges, water was being released from Sebago Lake in preparation for a Maine DEP dye study that required lower flow conditions). Stream discharge results are indicated in Table 3 and Figure 5. All field data sheets for these activities are on file at PRW’s office in Portland, ME.



**Table 3: Stream discharge measurements for PWI Project**

<b>Stream Site</b>	<u>2007</u> <u>Flow (cfs)</u>	<u>2008</u> <u>Flow (cfs)</u>	<u>2007 Avg</u> <u>Vel (fps)</u>	<u>2008 Avg</u> <u>Vel (fps)</u>	<u>2007 Area</u> <u>(ft<sup>2</sup>)</u>	<u>2008 Area</u> <u>(ft<sup>2</sup>)</u>	<u>Comments</u>
Baker	0.045	0.087	0.006	0.007	6.985	11.638	
Douglas	0.101	1.304	0.013	0.058	7.758	22.291	
Nasons	0.054	0.222	0.004	0.019	12.788	11.568	Avg. of 2 measurements for July & Sept. 2007
EB Piscataqua	2.346	-	0.067	-	34.925	-	Sep08: SAPPI dam release to increase main stem flow for DEP study created back flow to EBP so unable to measure discharge.
WB Piscataqua	3.264	-	0.085	-	38.300	-	Sep08: SAPPI dam release to increase main stem flow for DEP study created "back flow" to WBP so unable to measure discharge.
Pleasant	5.733	19.687	0.139	0.251	41.205	78.326	
Presumpscot	23.099	40.559	0.213	0.286	107.815	142.013	Avg. of 2 measurements for July & Sept. 2007



**Figure 5: Stream discharge measurements for PWI Project.**