

Agency of Natural Resources
Department of Environmental Conservation
Watershed Management Division
Monitoring and Assessment Program
Biomonitoring and Aquatic Studies Section

MEMORANDUM

To: Kevin Burke, Environmental Analyst V, Stormwater Program
From: Richard Langdon, Environmental Scientist VI, Biomonitoring and Aquatic Studies Section
Date: February 9, 2012
Subject: Biological sampling results for Sheffield Wind Project site for 2006-2011

Construction on the Sheffield Wind Project site began on or shortly after 9/13/2010, with work being initiated on the main entrance road located in the Nation Brook tributary watershed. Pre-construction macroinvertebrate information includes consultant data from 2006 and 2009 and DEC- collected data from 2010. Preconstruction fish communities were first sampled in Clark Brook on 9/13/2010 while Nation Brook Tributary 3, and Annis Brook were sampled on 9/17/2010. The 2006, 2009 and 2010 biological samples then can be assumed to represent pre-construction data and therefore act as a control with which subsequent samples may be compared. DEC conducted the first year of post-construction biological sampling in streams draining the project area in 2011.

Macroinvertebrate Community Summary

Stream hydrology of 2011 was characterized by unusually intense precipitation events that triggered rapid snowmelt runoff in the spring and then TS Irene in August. Four of the five stream reaches sampled in the fall of 2011 maintained an *excellent* to *very good* level of biological integrity of the macroinvertebrate community (Table 1). These streams showed little to no change in most of the eight primary biometrics over the three to four years sampled. Pre-construction data showed total macroinvertebrate densities varied from moderate to low. This is typical of communities in high gradient coldwater streams that periodically experience naturally occurring scouring flows with low secondary productivity which is limited by low nutrient levels. The two Annis Brook sites showed very low total density in 2011 indicating that this stream was more affected by the 2011 higher flows than the other four streams. While the density did not meet Class B2-3 aquatic life support (ALS), all other metrics fell into the *excellent* range for both sites. Density is expected to rebound in 2012, absent any similarly dramatic runoff events.

Fish Community Summary

The fish assemblage data from the three streams sampled in both 2010 and 2011 generally indicate that there were no reductions in fish densities or other indicators of biological integrity during the first year of construction (Table 2). Differences in sample densities for these three species between the two years were well within what would be expected for unimpacted watersheds and can be considered within the range of annual natural variation. The Vermont coldwater IBI was scored for Clark Brook because the minimum two native species needed to apply the index were present. During both years the IBI score was 45 out of a possible 45 (*excellent* biological integrity) - fully meeting ALS.

Distribution of total lengths (implying age class) for brook trout was similar between years in Clark and Annis brooks, both showing a probable three year classes, including young of the year. The 2010 length data for Nation Brook tributary, stored in the VTDEC Laboratory Building in Waterbury, was lost during TS Irene. The 2011 length data from this site however, indicated a healthy distribution of as many as four year classes (range 50-205mm total length). Calendar Brook was first sampled for fish in 2011 when it scored a cold water IBI (CWIBI) value of 45 out of a possible 45 points for an *excellent* assessment.

DEC intends to continue biological sampling of these sites for at least another year. All sites that will be sampled for fish will consist of at least two electrofishing passes so that population estimates with confidence limits can be determined.

Table 1. Macroinvertebrate community metrics from six stream reaches immediately below the Sheffield Wind farm Project. The years 2006, 2009, and 2010 represent preconstruction baseline biological conditions.

Location	Site RM	Date	Score	Density	Richness	EPT	PMA-o	B.I.	Oligo%	Ept/EptC	PPCS-F
Annis Brook	0.1	Sep-11	Fair	159.0	42.5	26.0	83.5	2.08	2.9	0.97	0.73
	0.7	Oct-09	Fair-Good	268.5	32.0	22.0	85.1	1.58	2.6	0.95	0.64
	0.7	Sep-10	Excellent-V. Good	1093.7	32.0	20.0	74.0	1.99	0.9	0.98	0.60
	0.7	Sep-11	Fair	198.5	37.0	22.0	75.3	2.74	1.4	0.96	0.76
Nation Brook Tributary 3	0.8	Oct-09	Very Good	543.5	33.0	22.0	75.4	1.60	0.3	0.88	0.65
	0.8	Sep-10	Excellent	907.2	50.0	31.0	80.5	2.44	0.0	0.98	0.73
	0.8	Sep-11	Excellent	981.0	44.5	29.5	74.0	1.78	0.8	0.99	0.60
Calendar Brook	11.2	Oct-06	Very Good	417.5	37.5	22.5	77.4	2.27	1.0	0.96	0.60
	11.2	Oct-09	Good	321.0	42.0	29.5	81.1	1.76	1.2	0.93	0.75
	11.2	Sep-11	Excellent-V. Good	1258.0	38.5	26.5	56.0	2.53	0.7	0.98	0.46
Clark Brook	0.1	Oct-06	Good-Fair	248.5	32.5	20.5	75.0	2.62	6.1	0.94	0.59
	0.2	Oct-09	Very Good	452.0	31.0	23.0	65.9	2.07	3.4	0.96	0.51
	0.2	Sep-10	Very Good	1504.0	42.0	27.0	56.7	3.08	0.5	0.98	0.40
	0.2	Sep-11	Excellent-V. Good	688.0	41.0	25.5	58.5	3.15	1.4	0.99	0.49
Calendar Brook Tributary 22	0.4	Oct-06	Excellent	553.5	36.0	23.0	80.4	1.83	2.1	0.96	0.60
	0.4	Oct-09	Excellent	490.5	36.0	23.5	86.4	1.62	1.7	0.95	0.66
	0.4	Sep-10	Very Good	1280.0	40.0	21.0	60.8	2.69	1.3	0.97	0.45
	0.4	Sep-11	Excellent	878.2	43.0	28.0	69.0	2.64	1.4	0.98	0.61
<i>ANR Biocriteria for Small High Gradient Streams</i>			<i>Excellent</i>	>500	> 35	> 21	>65	<	< 2	> 0.65	> 0.50
			<i>Very Good</i>	>400	> 31	>19	> 55	<	< 5	> 0.55	> 0.45
			<i>Good</i>	>300	> 27	> 16	> 45	<	< 12	> 0.45	> 0.40

Table 2. Density for fish species in #s/ 100m² for one electrofishing run at four streams within Sheffield Wind farm drainages. Pre- construction is represented by 2010 data and post-construction- 2011. All data was collected in the month of September for both years.

Location	Brook trout		Slimy Sculpin		Rainbow trout		CWIBI	
	2010	2011	2010	2011	2010	2011	2010	2011
Annis Brook 0.1	6.5	7.0	0	0	8.4	18.1	-	-
Nation Brook Tributary 3	13.0	11.4	0	0	0	0	-	42 Excellent
Clark Brook	5.0	4.8	3.6	4.4	0	0	45 Excellent	45 Excellent
Calendar Brook Tributary 22	-	17.8	-	2.0	0	0	-	45 Excellent

c: Jeff Nelson

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