

Aquatic Life Use Attainment Assessment of Big Spruce January 2010

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Description of water body and sampling sites:

Big Spruce Brook is located in the town of Stowe, Vermont. It is a tributary to the West Branch of the Little River, and is a small cold water Class B management type stream (see **Table 1 and Figure 1**). Based on the drainage area, elevation and stream gradient Big Spruce is assessed for Aquatic Life Support (ALS) using the Small High Gradient (SHG) macroinvertebrate stream type Biocriteria guidelines. The percentage of land use categories within these watersheds shows (Table 2). These watersheds have been monitored since 2000 as part of an Act 250 SMR Community 2000 Master Development Plan (MDP) known as the “settlement agreement”. The SMR 2000 Community Plan - Water Quality Monitoring Plan (submitted to and approved by ANR) is to provide information and guidance for water quality protection during construction and development at Spruce Peak.

Table 1 Macroinvertebrate reach locations from Big Spruce Brook, and a local “reference control” Pinnacle Brook in Stowe Vt.

Location	Site	Latitude	Longitude	Elev ft	DA KM ²	Description
Pinnacle Brook	0.2	44.52055556	72.76611111	1300	5.7	Located about hundred meters above confluence with the W.Brch Little River.
	1.3	44.52694444	72.76527778	1500	4.2	Located above upper golf course, above upper falls/gorge.
Big Spruce Brook	0.2	44.52666667	72.77750000	1417	2.1	Located below Little Spruce trib, about 100m above confluence with W.BrLittle River.
	0.3	44.52803600	72.77686900	1470	1.9	Located about 50m above confluence with Little Spruce trib.Below golf cart bridge 50m.

Biological Assessment:

The initial year of monitoring, in the year 2000, documented predevelopment conditions in Big Spruce tributary and Pinnacle Brook (identified as a local reference stream). This pre development year established that Big Spruce Brook was in “fair” condition very low in density, and Pinnacle Brook was in “excellent” condition based on the SHG biocriteria **Table 2**. Development monitoring began in the year 2003. Since 2003 Pinnacle Brook has been assessed as Very Good – Good on all sampling occasions. Most of the fair assessments at RM 0.2 were due to very low density in the reach, on two occasions very low EPT richness was also found. In two of the last three years Big Spruce 0.2 has met ALS with densities above the minimum threshold.

Big Spruce at RM 0.2 was assessed as “Good-fair” in 2003, “Fair” from 2004-2006, “Good” in 2007, “Fair” in 2008, and “Good” in 2009 on two separate sampling dates. In 2006 a second reach was added on Big Spruce Brook at RM 0.3, just above the most developed subwatershed within Big Spruce. Big Spruce at RM 0.2 was assessed as “fair” in 2006, “Good-fair” in 2007, “fair-poor” in 2008, and “Fair” in 2009.

The above assessments on Big Spruce 0.3 show no improvement in biological condition in the last two years 2008, and 2009. Both years were low in both Richness and EPT taxa, and 2008 was very low in density.

Table 2 Macroinvertebrate community assessments from two locations on Big Spruce Brook, and an adjacent “reference” control stream Pinnacle Brook. Bolded metrics are below Class B Aquatic Life Support (ALS) thresholds.

Location	Site RM	Date	Assessment	Density	Richness	Ept	PMA-O	BI	Oligo%	Ept/EptC	PPCS-F
Pinnacle Brook	0.2	S-00	Exc	714.0	35.0	21.0	72.5	2.02	0.0	0.68	0.55
		O-03	Good	1098.0	27.5	16.5	65.9	1.20	0.4	0.91	0.40
		N-04	Vg-Good	499.0	32.5	17.5	57.9	2.17	3.1	0.76	0.53
		S-05	Vg-Good	600.5	52.5	21.5	67.0	2.44	14.0	0.64	0.48
		O-06	Vg-Good	499.0	30.0	18.0	69.8	1.61	0.0	0.90	0.65
		S-07	Good	791.5	28.0	18.0	79.1	2.00	0.0	0.79	0.58
		S-08	Good	411.5	33.0	17.0	61.1	2.58	1.5	0.64	0.39
		S-09	Vg-Good	649.5	30.0	18.0	74.6	3.17	0.2	0.68	0.68
	1.3	S-05	Good	511.5	43.0	20.0	69.3	1.93	3.5	0.78	0.41
Big Spruce Brook	0.2	S-00	Fair	207.0	38.5	19.5	71.7	3.45	2.7	0.66	0.62
		S-03	G-Fair	310.0	37.0	17.0	58.4	3.75	4.2	0.45	0.50
		O-03	G-Fair	261.0	35.0	20.0	59.8	1.76	1.5	0.76	0.45
		N-04	Fair	1224.0	25.0	14.0	44.5	4.24	2.0	0.26	0.48
		S-05	Fair	209.0	43.0	19.0	67.4	2.54	12.6	0.70	0.56
		O-06	Fair	181.5	24.0	14.5	69.4	2.74	0.3	0.84	0.45
		S-07	Good	500.5	29.5	18.0	77.5	2.37	0.0	0.67	0.48
		S-08	Fair	225.0	29.0	16.5	83.4	2.27	0.2	0.87	0.56
		S-09	Good	474.5	29.0	17.5	83.6	2.93	0.8	0.71	0.52
		S-09	Good	322.5	35.5	22.0	80.8	1.87	0.5	0.88	0.63
	0.3	O-06	Fair	207.0	29.5	17.5	71.9	2.77	0.5	0.89	0.46
		S-07	G-Fair	314.5	36.5	20.5	84.5	2.04	0.1	0.78	0.64
		S-08	F-Poor	125.0	25.5	12.0	72.5	1.59	1.5	0.87	0.44
		S-09	Fair	358.5	25.5	13.0	79.2	2.38	0.3	0.68	0.50

Summary of Stressors and Recommendations:

The stressors identified during the course of the WQ monitoring in Big Spruce have been sediment, iron, and Hydrologic modification. Here is where we need to look at assessment reports, most current not out yet. It appears by looking at the substrate evaluations that sediment issues that were prevalent in early and mid years 2003-2006 or 7 have been reduced. At Big Spruce RM 0.3 sediment issues may still be present; additionally an iron seep is periodically more prevalent at this upper location.

Figure 1. Map of Big Spruce Brook and local “reference control stream Pinnacle Brook and surrounding areas.

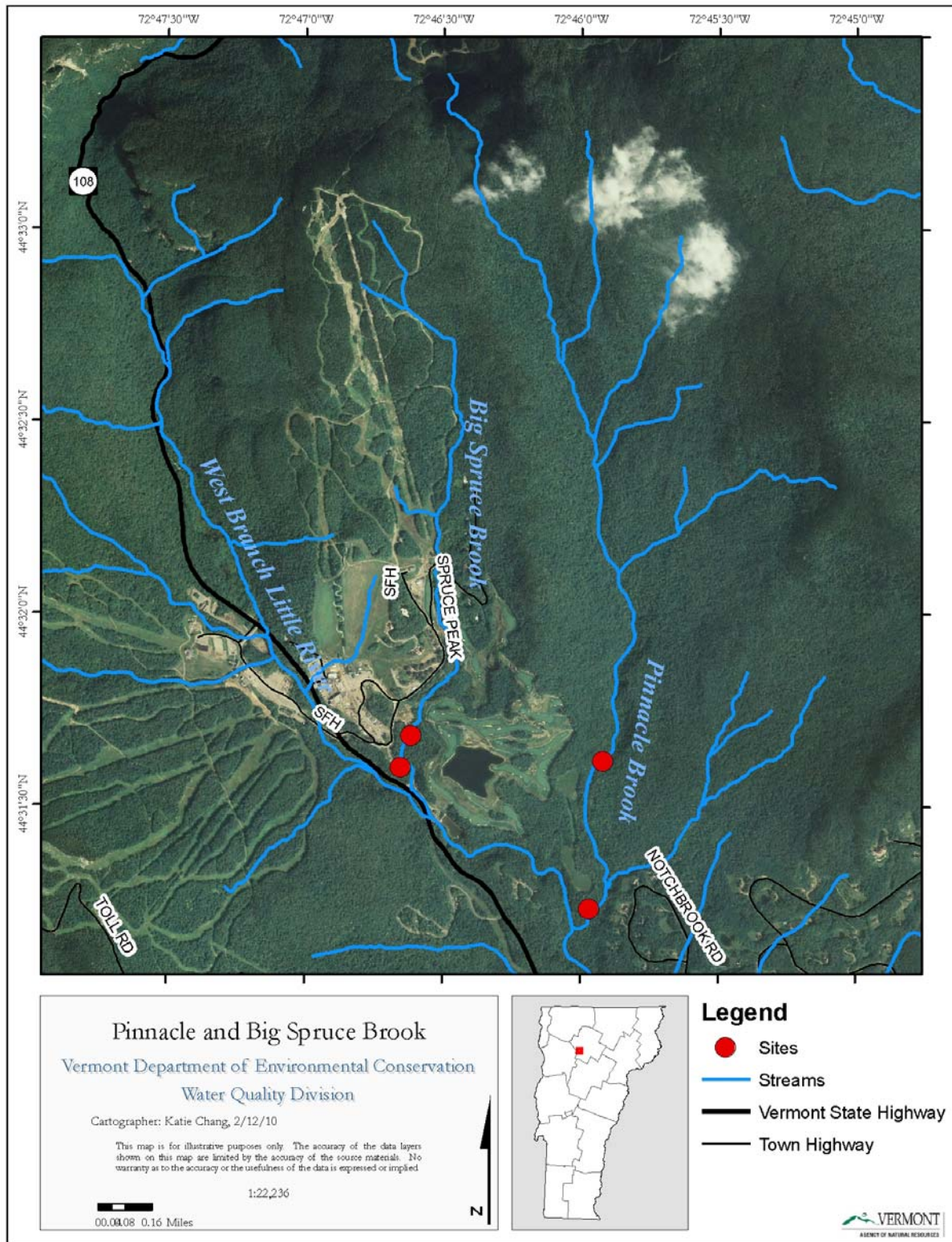


Figure 2: Big Spruce Brook

