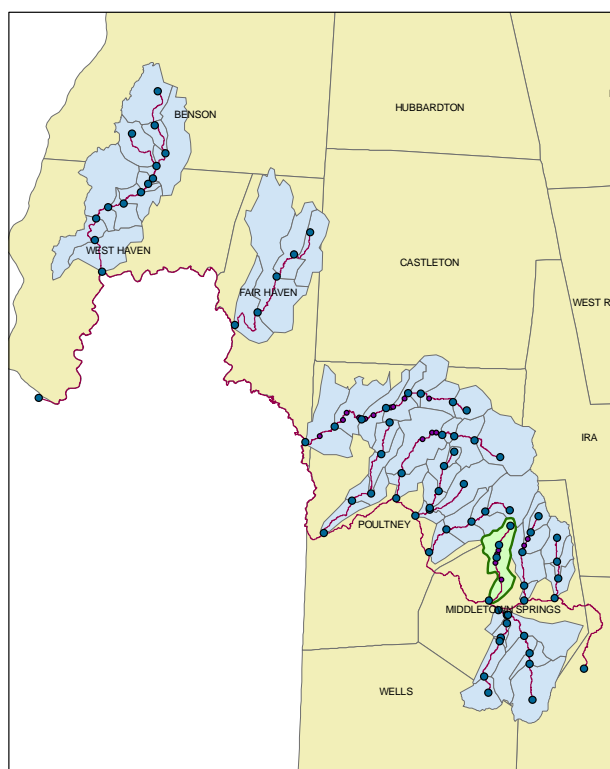


**VAIL BROOK STREAM GEOMORPHIC ASSESSMENT**  
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**POULTNEY METTOWEE WATERSHED PARTNERSHIP**  
**NOVEMBER 10, 2007**

**INTRODUCTION**

Phase 2 geomorphic assessments were conducted on Vail Brook, reaches M14-S1.01 and M14-S1.02. These reaches were each segmented into three sections; A, B, and C. Please refer to the map of the general location of the Vail Brook watershed and the map of the reaches assessed.

Map 1: Phase 1 Poultney River tributaries and subwatersheds with Vail Brook highlighted (in green).



Most of the length of Vail Brook had some floodplain access and a fairly steep slope, with stream-type “C4(b)” dominating. Many of the reaches were all or partially plane bed, with bed features that had either been filled in with sediment or eroded. Many of the reaches also had long stretches without water, or were “losing” reaches.

All of the geomorphic scores and most of the habitat scores were “fair”, due largely to recent degradation. The degradation is likely due to a new pond and dam constructed at the downstream end of segment M14-S1.02C. Due to the substrate type (gravel bottom) and “fair” scores, most of the segments showed *very high* sensitivity.

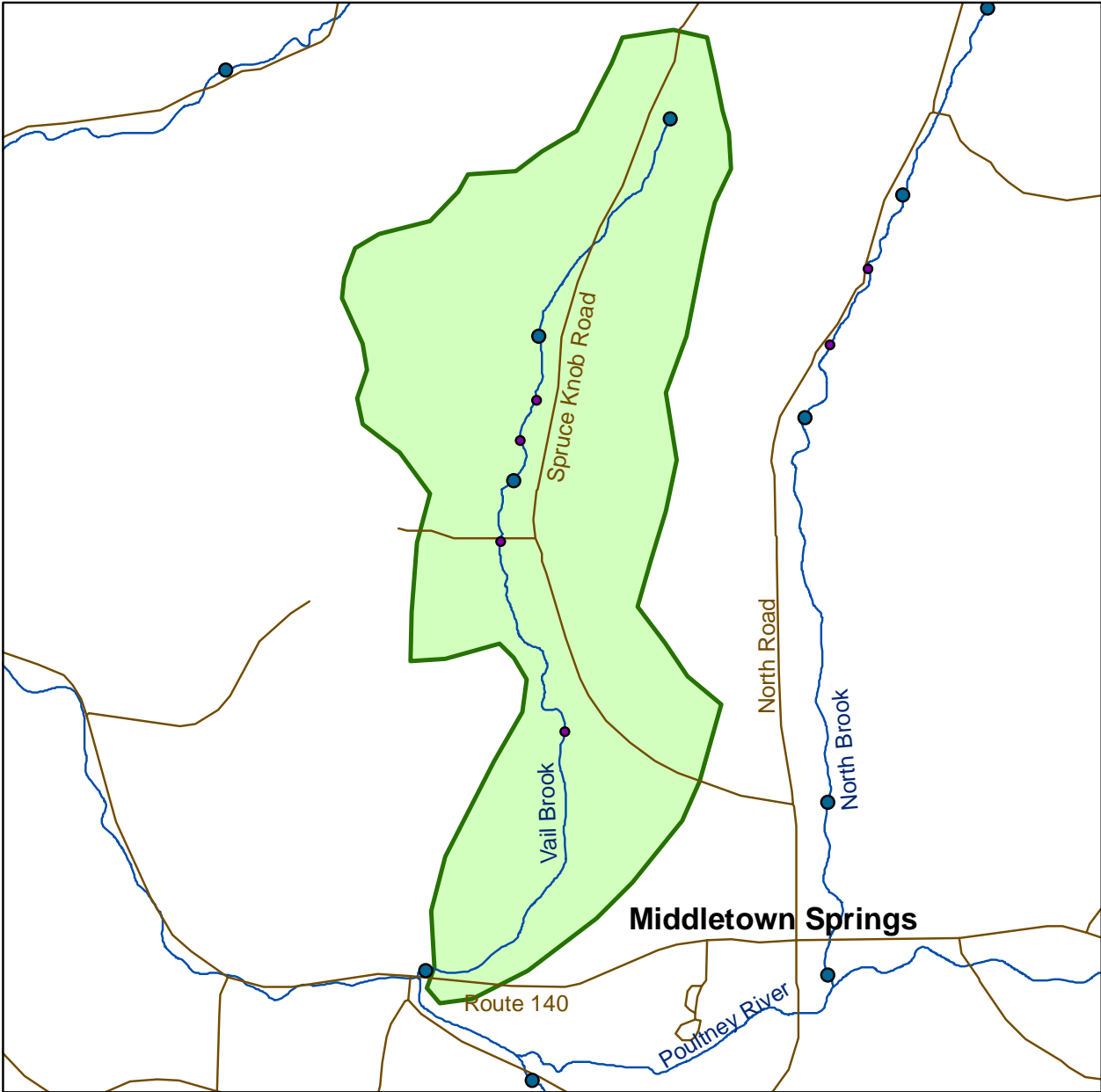
All of the segments most closely followed the F-stage channel evolution model (see protocol appendix C for more information about the channel evolution models). Most segments showed signs of degradation (step II). M14-S1.02C was difficult to characterize due to the effects of the impoundments at either end of the reach.

Table 1: Vail Brook segments

Segment ID	Stream Type	Bed Features	Slope	Habitat Score	Geomorph Score	Adjust Process	Sensitivity
M14-S1.01A	A,B,C4		5.5				
M14-S1.01B	C4(b)	S-P	2.7	Good*	Fair	F-II	High
M14-S1.01C	C4(b)	PB	2.7	Fair	Fair	F-II	Very high
M14-S1.02A	C6(b)	PB	3.99	Poor	Fair	F-II	Very high
M14-S1.02B	F4(a)	PB	4.7	Fair	Fair	F-II	Very high
M14-S1.02C	C4(b)	S-P	3.8	Fair	Fair	F-I	Very high
M14-S1.03							

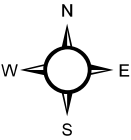
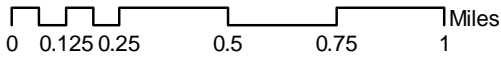
Map 2: Vail Brook subwatershed in Middletown Springs with reaches and segments delineated.

# Vail Brook Subwatershed



### Legend

- Reach Breaks
- Segment Breaks
- Roads
- Streams
- Vail Brook Watershed



Map created by Hilary Solomon,  
Poultney Mettowee Watershed Partnership, November 2007.  
Data sources include PMWP, Vermont Center for Geographic Information,  
and Vermont DEC River Management Program.

### **M14-S1.01A**

This segment was not assessed, due to lack of access to the stream. M14-S1.01A is most likely a mix of “A”, “B”, and “C” stream types and would be farther segmented if it were submitted for a phase 2 analysis. This segment flows through a narrow, steep valley as it leaves the plateau along Spruce Knob Road and heads toward the Poultney River. Once it leaves the steep section, it flows through a cow pasture (recently fenced out) and crosses Route 140 to join the Poultney River at Coy Hill Road. The upper sections of this segment are probably transport-dominated, carrying materials from the upstream reaches’ bed and banks, and the lower section may see some sediment deposition. A section of stream upstream of the confluence is channelized and cut off from its floodplain by Route 140.

Potential Projects: Monitor fenced-out section of stream for buffer re-growth and sediment capture patterns/potential. There are potential sites for plantings along lower section of stream, both in the cow pasture and downstream at the adjacent landowner’s property.

### **M14-S1.01B**

This segment flows through forest and was the most natural (least modified) of the segments assessed on Vail Brook. As with most of the brook in this area, this segment is a “C”-type stream with a slightly higher slope (most “C” streams have a slope of less than 2%). The bed features, as a result, were a mix of riffle-pool and step-pool, with step-pool dominating.

The geomorphic score was (a marginal) “good” and the habitat score was “fair”. The main stressor was deposition including islands, some braiding, and a long section of dry creek bed. This section of brook also had a relatively high level of erosion and was degrading slightly. The sediment deposition resulted from the bed and banks in this reach as well as upstream reaches S1.01C, S1.02A, and S1.02B, which are all degrading and widening.

Potential Projects: Notify landowners along this section of the assessment results and allow them to monitor the continued adjustment of the brook.

### **M14-S1.01C**

This segment flows through a fallow field and may have been channelized in the past. The stream type was “C4(b)” with bed features moderately plane bed. Most of this section did not have water at the time of the assessment. This section of stream is starting to migrate and showed poor channel development.

Both the geomorphic and habitat scores were “fair” for this segment due to poor channel flow (no water in the channel), lack of epifaunal cover, high sediment deposition, low bank stability, lack of trees in the riparian area, some degradation (one nickpoint), and poor channel development.

Potential Projects: Notify landowner of the assessment results and continue to monitor the migration and adjustment of this section. This section is located in a fallow field and should be allowed to adjust naturally until it achieves a stable planform.

### **M14-S1.02A**

This segment flows through a hayfield and may have been channelized in the past. The channel was narrow with wide benches on both sides. For this reason, the pebble count showed 50% silt (collected from the benches, which were within the bankfull width) and the stream type ended up being “C6(b)”. The bed of the narrow channel was gravel. The bed features were mostly plane bed and the channel overall functioned like a ditch. Most of the channel (from the ford downstream) was dry at the time of the survey. This section had good floodplain access, but no trees along the banks.

The geomorphic score for this section was “fair” due to signs of degradation, aggradation and widening. Pressures from the new dam and degradation upstream seem to be destabilizing this section of stream and planform changes were beginning to accelerate. The farmer who hays the field remarked that both this section and the upstream section were becoming deeper and more unstable in the last few years (personnal communication, Eric Tarbell, 8/30/2007). The habitat score for this segment was poor due to lack of cover, high embeddedness, poor channel flow (no water), lack of depth/velocity variety, lack of developed riffles or steps.

Potential Projects: Notify landowner of assessment results and apparent degradation. Continue to monitor this section of stream as it adjusts. Once it reaches a stable planform, plant the riparian buffer area with native trees and shrubs.

### **M14-S1.02B**

This segment originates downstream of a new pond and dam. The upper portion of this short reach flows over bedrock and appears to be a “B” channel with a high slope (4.8% slope). Once the stream depth is not controlled by bedrock, the channel has degraded significantly and departed from its reference stream type. This stream is now an “F4(a)”. The bed features are step-pool in the upper section of this reach and plainbed (though with some diversity of bed materials) in the lower section.

The geomorphic and habitat scores for this section were moderated by the upper step-pool section of this segment. The geomorphic score for this section is “fair”, due to degradation and widening. The habitat score was (a high) “fair” with lack of cover, velocity/depth variety, lack of developed riffles/steps and active channel alterations.

Potential Projects: Notify landowners of assessment results and apparent degradation. Potential to create grade controls to arrest degradation.

### **M14-S1.02C**

This segment originates downstream of a well-established stock pond and upstream of the new pond and dam. The stream type is “C4(b)” and the bed features are a mix of riffle-pool and step-pool. This segment is likely affected by the impoundments at both ends. The channel was wider and shallower than expected. The small floodplain was easily accessed and where the channel bumped against the valley walls, small mass failures formed. Sediment aggradation from this bank erosion was evident.

Both the geomorphic and habitat scores for this segment were “fair”, due to aggradation, embeddedness, and lack of depth/velocity variety. This segment showed signs of being part of a forested wetland system.

Potential Projects: Notify landowners of assessment results. There are several areas where the riparian buffer on the left bank could be widened with tree plantings.

### **M14-S1.03**

This reach was not assessed due to lack of access, however, during an interview the landowner expressed some concerns about sediment from road runoff entering this section of stream. The farmer generally digs a small pond, just upstream of the existing stock pond that helps to settle sediment from the road and protect his pond from infilling. A long stretch of Spruce Knob Road, without well-developed ditches, drains to this reach. This reach flows through a cow pasture. It is ephemeral and the channel is not well-developed. It lacks riparian buffers and is accessed by the cattle.

Potential Projects: Notify Town of Middletown Springs about the potential for Better Backroads Projects along this section of Spruce Knob Road. Contact the landowner about the potential for cattle exclusion fencing through the pastures and riparian plantings.

See below for photos:

**M14S1.01B**



Photo 1: Erosion and leaning trees along an outside bend in the upstream section of this reach.



Photo 2: Island with stream actively flowing on both sides and some gravel deposition in foreground.



Photo 3: Dry channel in middle section of segment. This section was largely plane bed, though up- and downstream sections had more riffle/pool development.



Photo 4: Dry section and erosion on sharp, outside bend upstream of a culvert. Again, note deposition upstream of bend.

**M14-S1.01C**



Photo 1: Gravel bottom and herbaceous banks along this segment. Note dry channel bed.

Photo 2: Downstream end of culvert under Norton Road. Deep pool sheltered many trout. Water actively flowing downstream of the culvert.



**M14-S1.02A**



Photo 1: Grassy channel with hay field in background. Channel is beginning to erode and regain some (limited) sinuosity. Tape measure is set at bankfull-note narrow channel with wide benches on each side.

**M14-SI.02B**



Photo 1: End of bedrock control. Note some floodplain access at upstream end (bottom of photo), but degradation past debris jam.

Photo 2: Degraded section. Notice tree roots protruding on left side of photo indicating recent degradation. Also note plane bed features in foreground.



**M14-SI.01C**



Photo 1: Erosion along valley wall. This section had lots of large woody debris.

Photo 2: Flat cross section and adjacent (wet) stream valley.



**M14-S1.03**



Photo 1: Stock pond at downstream end of this reach



Photo 2: Filled in area upstream of stock pond where farmer digs settling ponds for road settlement.



Photo 3: Erosion on both sides of Spruce Knob Road drains to Vail Brook.

Photo 4: Sediment draining to Vail Brook.

