

above the last bridge before the State park gate and drains approximately 6.1 km² of forested watershed. Physical characteristics of the two sites are very similar: stream substrate composition is similar with 35% boulder, 30% cobble, 20% coarse gravel, 10% gravel, and 5% sand; canopy cover (shading) is approximately 80% at both sites; sampling depth averages 0.2 m at both sites.

METHODS

Table 1: Range of macroinvertebrate measurements at the two study sites and at a number of similar undisturbed sites statewide.

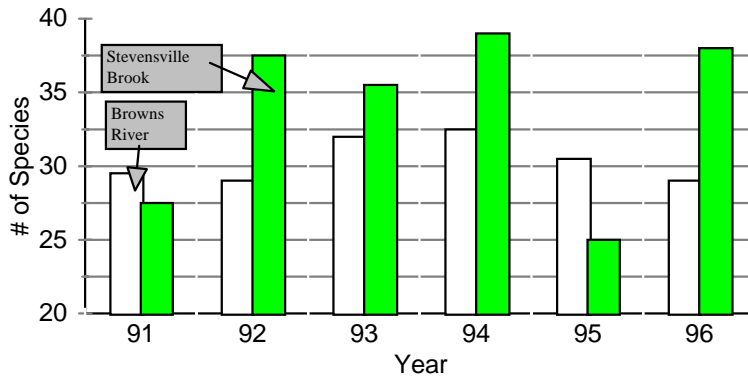
Attribute	Statewide Range	Stevensville 1991-1996	Relative Standard Deviation	Brown's 1991-1996	Relative Standard Deviation
Relative Density	100-2400	151-945	65%	208-2262	72%
Mean Taxa Richness	21-48	25-39	18%	29-32.5	6%
% Stoneflies	13-79	38-76	36%	13-55	36%
% Mayflies	0-45	1-40	123%	11-29	41%
% Shredders	3-55	20-70	45%	7-40	46%

This is a clear example of a highly successful recruitment year for a couple of species. Because

one year. Two taxa have appeared at the greater than three percent level in all six years.

Figure 2: Mean Taxa Richness

of "species" in sample

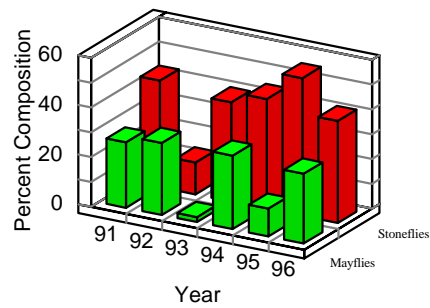


Similarly in Stevensville Brook, eighteen taxa have appeared at the three percent level, with five appearing only once at that level and three taxa at the greater than three percent level in all six years.

These two streams are dominated by mayflies and stoneflies. Recent evaluations conducted by DEC of similar streams throughout Vermont show this to be a very typical scenario for small, high elevation cold turbulent streams (**Table 1**). **Figures 3 and 4** show the percent composition of mayflies and stoneflies at the two streams.

Figure 4: % Mayflies and Stoneflies

Browns River



The **detrital shredder functional group** makes up a significant portion of both stream macroinvertebrate communities, although some variability between years is indicated. **Figure 7** shows the percent composition of detrital shredders in the two streams from 1991 to 1996. A dominance by

detrital shredders
is a general
indication of the
extent to which
heterotrophic,
rather than
autotrophic
energy sources
dominate the
aquatic food
chain.
Heterotrophic
aquatic food

shredder component than the Brown's River. Stevensville is consistently dominated by the shredding *Leuctridae* and *Peltoperlidae* stoneflies and less by the algal-grazing mayflies (*Baetis spp* and *Epeorus sp*) and caddisflies (*Lepidostoma spp*) of the Brown's River. As with other measurements evaluated at these sites, the percent shredders indicate that 1992 was an unusual year, with a low percentage of shredders in both streams.

Observations of six years of macroinvertebrate monitoring data from these two streams can lead to a number of inferential conclusions regarding the character of these two streams:

- The macroinvertebrate communities of these two streams appear to be typical of similar streams throughout the state, although some of the community characteristics border on the extreme range for their stream type.
- The measured characteristics of the macroinvertebrate communities show considerable variability from year to year. Individual species show high variability in relative abundance from year to year. Because these streams are relatively unimpacted by human activity, this variability can be assumed to be due to natural causes.
- The data indicate some differences between the two streams. Stevensville appears to have a more hydraulically rigorous environment than the Brown's River. This is indicated by wider ranges in most measurements and an apparent lower level of primary production as indicated by relatively greater dominance by detrital shredders. In addition, the dominant species are those able to resist hydraulic scouring to a greater extent some of those common to the Brown's River.

The Vermont Forest Ecosystem Monitoring Research Area offers a unique opportunity to investigate the factors that influence variability in these streams and to validate the inferences that can be made from the biological data. Additional data being gathered by cooperating researchers on the site, including streamflow, stream chemistry, precipitation quantity and chemistry, the timing of leaf litter inputs to the streams, and land typing and use mapping will be integrated into further investigations regarding the forces which shape natural variability in the biological components of aquatic systems.

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