**Agency of Natural Resources**
**Department of Environmental Conservation**

**Water Quality Division**
**Building 10 North**
**802-241-3777**

# MEMORANDUM

**To:** **Doug Burnham BASS , Chief**

**From:** **Steve Fiske BASS**
**Rich Langdon BASS**

**C:** **Brian Kookier**

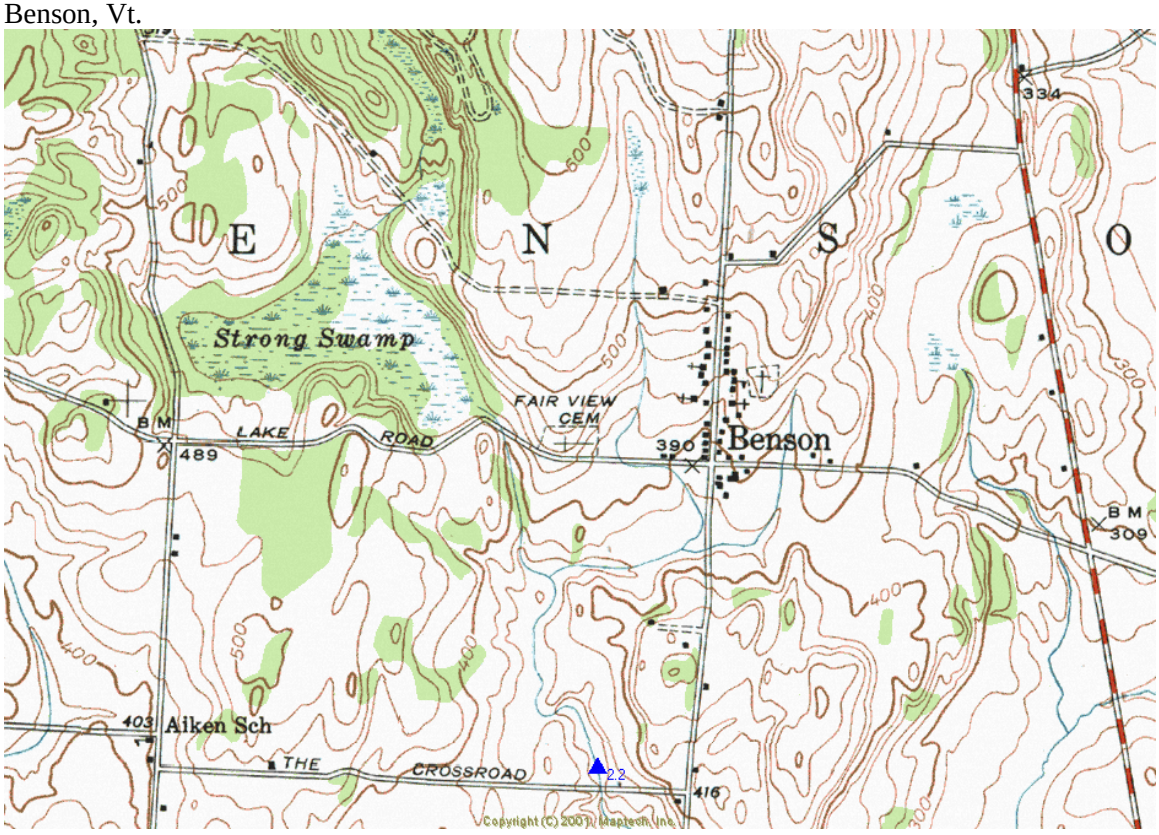
**Date:** **Feb 10,2002**

**Subject:** **Biological Condition of Trib to Hubbarton River 1997**

---

The fish and macroinvertebrate communities from a tributary to the Hubbardton River were sampled in October 1997. The sampled reach of stream is located above the Goodrich Crossroad Bridge as the stream runs through a pasture is about 2.2 miles above the confluence with the Hubbardton River (**Figure 1**). The reach is located a little less then a mile below Benson Village. The main branch of the tributary originates in the Strong Swamp, which is a little less then a mile above the sampled reach.

**Figure 1**. The location of Fish and macroinvertebrate collections on Trib to Hubbardton River in Benson, Vt.



The macroinvertebrate community from the Hubbardton Tributary is considered in poor biological condition. It is dominated by a very tolerant midge and is low in species richness, sensitive taxa and diversity. **Table 1** below presents selected biometrics which describe the biological integrity of the macroinvertebrate community from the Hubbardton Tributary. The table also presents these metrics from other similar low gradient silt sand bottom streams to illustrate the poor condition compared to streams in better biological condition. A list of all the macroinvertebrate taxa and their percent composition from the Hubbardton Tributary is attached.

**Table 1:** Macroinvertebrate community metrics from the Trib to Hubbardton in Benson, and several other streams in VT of similar type (low gradient silt/sand bottom).

| Stream Site<br>year | Trib Hubbardton<br>2.2<br>1997 | Kelly Brook<br>1.4<br>1998 | Trout Brook<br>1.2<br>1991-92 | Beaver Branch<br>2.6<br>1996 |
|---|---|---|---|---|
| Density | 924 | 510 | 1351-2702 | 749 |
| Richness | 24 | 34 | 45-49 | 40 |
| EPT | 0 | 7 | 7-10 | 6 |
| Diversity | 2.55 | 3.89 | 4.19-4.69 | 3.42 |
| Bio Index | 8.77 | 4.62 | 4.71-4.80 | 6.71 |
| %Dom Taxa | 60<br>Chironomus | 25<br>Paraleptophlebia | 18-30<br>Simulium - Baetis | 29<br>Caenis |
| %3Dom Taxa | 76 | 52 | 34-43 | 62 |
| %Diptera | 79 | 35 | 57-75 | 8 |
| %Trichoptera | 0 | 7 | 2.3-2.5 | 6 |
| %Ephemeroptera | 0 | 34 | 10-30 | 30 |
| %Coleoptera | 9 | 3 | 1-4 | 31 |
| %Odonata | <1 | 2 | 1-2 | <1 |

The tributary to the Hubbardton is shown to be low in species richness, and contain no sensitive species from the orders Ephemeroptera, Plecoptera, or Ephemeroptera (EPT). The community is also low in diversity dominated by a midge *Chironomidae Chironomus* sp. (60 % composition). The *Chironomus* larvae are also known as "blood worms" which refers to their red appearance due to the hemoglobin in their blood. The hemoglobin allows these animals to survive in aquatic environments which periodically become very low in dissolved oxygen. As a result they are often found to dominate macroinvertebrate communities from organically rich environments. The high Bio Index value at the site is also an indication that the community as a whole is dominated by taxa which are tolerant of organic enrichment.

## FISH COMMUNITY

No biological index currently exists that assesses fish assemblage health for soft-bottom, low gradient Vermont streams. The assemblage sampled in this tributary consisted of four species: Fathead minnow, brown bullhead, creek chub and blacknose dace (**Table 2**). All four are tolerant of water and physical habitat degradation. The population density was within the expected range of un-impacted sites. Based on this data it is impossible to say with any confidence whether or not this site met Class B standards. A detailed above-below sampling would need to be conducted to determine compliance. All that can be safely said is that the impact (if any) is not severe, since there are fish present in close to expected numbers.

**Table 2** . Numbers of each species collected at the Goodrich Crossing Bridge from a single electrofishing run in a 75 meter-long section.

| Species | Numbers collected |
|---|---|
| Fathead minnow | 28 |
| Brown bullhead | 10 |
| Creek chub | 7 |
| Blacknose dace | 5 |

## CONCLUSIONS

The reason for the poor condition of the macroinvertebrate community has not been identified nor has the source or sources been isolated by the above biological monitoring. Based on the community composition, possible causes of the poor environmental conditions in the tributary may be:

Nutrient, or organic loading, from one or several sources - The Benson WWTF, Strong Swamp, agricultural practices.

Ammonia – The Benson WWTF, agricultural practices.

Temperature – Exposed stream from agricultural practices or Strong Swamp.

Attachment: A list of the macroinvertebrate taxa from the Trib to Hubbardton in Benson Vt. Sample collected in 0ct 1997.

| Order | Genera | Species | Density | % Comp |
|---|---|---|---|---|
| COLEOPTERA | DUBIRAPHIA | sp | 63 | 6.8 |
| COLEOPTERA | DUBIRAPHIA | quadrinotata | 3 | 0.3 |
| COLEOPTERA | ECTOPRIA | leechi | 3 | 0.3 |
| COLEOPTERA | HALIPLUS | sp | 15 | 1.6 |
| COLEOPTERA | TROPISTERNUS | natator | 3 | 0.3 |
| DIPTERA | CHIRONOMUS | sp | 555 | 60.1 |
| DIPTERA | CRICOTOPUS | bisinctus | 30 | 3.2 |
| DIPTERA | DICROTENDIPES | sp | 42 | 4.5 |
| DIPTERA | MICROTENDIPES | sp | 21 | 2.3 |
| DIPTERA | PARAMERINA | sp | 3 | 0.3 |
| DIPTERA | STICTOCHIRONOMUS | sp | 9 | 1.0 |
| DIPTERA | TANYTARSUS | sp | 30 | 3.2 |
| DIPTERA | THIENEMANNIELLA | sp | 24 | 2.6 |
| DIPTERA | THIENEMANNEMYIA | sp | 6 | 0.6 |
| DIPTERA | CHRYSOPS | sp | 6 | 0.6 |
| DIPTERA | STRATIOMYIDAE | unid | 6 | 0.6 |
| ODONATA | BASIAESCHNA | janta | 6 | 0.6 |
| ODONATA | ISCHNURA | sp | 18 | 1.9 |
| ODONATA | LIBELLULIDAE | unid | 3 | 0.3 |
| GASTROPODA | FOSSARIA | obrussa grp | 3 | 0.3 |
| BIVALVIA | PISIDIUM | casertanum | 12 | 1.3 |
| BIVALVIA | SPHAERIUM | simule | 42 | 4.5 |
| OLIGOCHAETA | TUBIFICIDAE | unid | 12 | 1.3 |
| OLIGOCHAETA | ENCHYTRAEIDAE | unid | 3 | 0.3 |
| HEMIPTERA | BELOSTOMA | sp | 6 | 0.6 |