POULTNEY RIVER
2004 SUMMER WATER QUALITY MONITORING PROGRAM

Submitted to Vermont Department of Environmental Conservation

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Submitted by

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Poultney River 2004 Water Quality Monitoring Summary

Sampling Locations

The Poultney-Mettowee watershed encompasses an area of 373 square miles in portions of Addison, Rutland and Bennington Counties. The Poultney River (VT02-01) drains 236 square miles in Vermont and is 40 miles long. It originates in the town of Tinmouth and flows generally northwest until flowing into Lake Champlain at South Bay. The Mettowee River (VT02-05) originates in the town of Dorset and flows northeasterly into New York. The section of the Mettowee River located in Vermont is approximately 23 miles long and its drainage area encompasses 137 square miles.

During the 2004 sampling season, the PMWP sampled eight sites along the Poultney River. Details about site locations can be found in the table to the right. Of the eight sites sample, four sites are duplicates of sites sampled in 2003. These include, Dairy Hollow, Barker Bridge, Parker Water Well and the D&H Rail Trail.

Site	Location
PR01	Dairy Hollow
PR02	Buxton Hollow
PR03	Barker Bridge
PR04	Parker Water Well
PR05	Morse Hollow
PR06	Blue Heaven
PR07	D&H Rail Trail
PR08	Green Road

Methodology

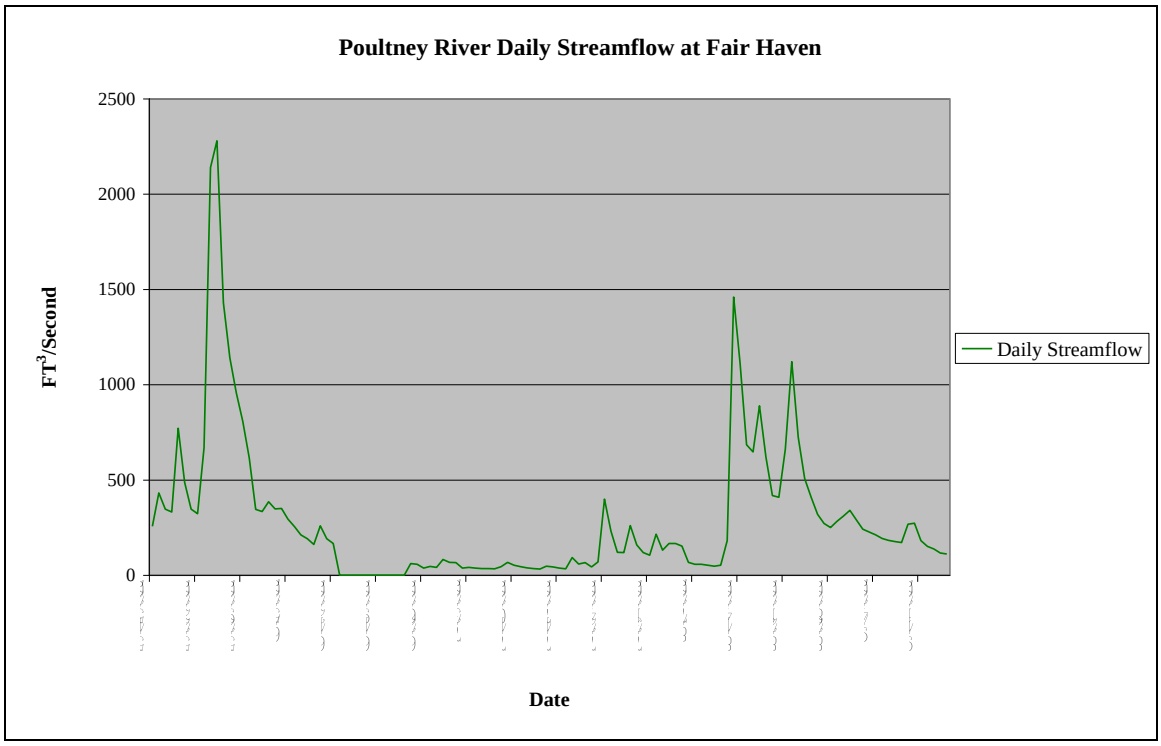
The PMWP proposal for summer 2004 sampling included two sampling dates (spring and fall) to include four sets of samples analyzed for E. coli, total phosphorus, total nitrogen, chlorophyll a and turbidity. It also included approximately seven sample dates between June and August, the peak recreation period. Sue Sutheimer with Green Mountain College (GMC) and her students collected the spring samples, but due to unforeseen logistical problems could not collect the fall samples. Summer samples were collected every two weeks at the eight locations listed above. These sites were tested for E. coli, turbidity and total phosphorus in the lab, while field measurements for conductivity, air temperature, water temperature, water color, water odor and algal growth were recorded in the field.

Prior to sampling, members of the PMWP attended the recommended training session at the VTDEC offices in Waterbury to learn about quality assurance project plan preparation, sample collection and submission and data delivery procedures. Collection methods recommended by the DEC Lab, or other appropriate protocols, were followed in the field. The QAPP submitted by the Partnership outlines all protocols and methods used during sample collection and delivery. Sample analysis was conducted in accordance with US EPA test methods and Vermont State protocols at the LaRosa Environmental Laboratory in Waterbury, Vermont.

Results

Streamflow Data

Chart 1: Streamflow data for the Poultney River at the USGS gauging station in Fair Haven, VT.



This data, from the US Geologic Service (USGS) website (http://vt.water.usgs.gov), shows streamflow measured at their gauge located on the Poultney River near Fair Haven. Flow data was not collected between June 21 and 24 due to an equipment malfunction. The highest streamflow was recorded between the week of May 22 and May 29. High streamflow from storm events often shows increased levels of nonpoint source (NPS) pollution in streams. No samples were collected on the Poultney River for this period, unfortunately. Relatively low streamflow is recorded for the period between the beginning of June and the middle of August. Streamflow increases toward the end of August, which was marked by frequent showers and thunder storms.

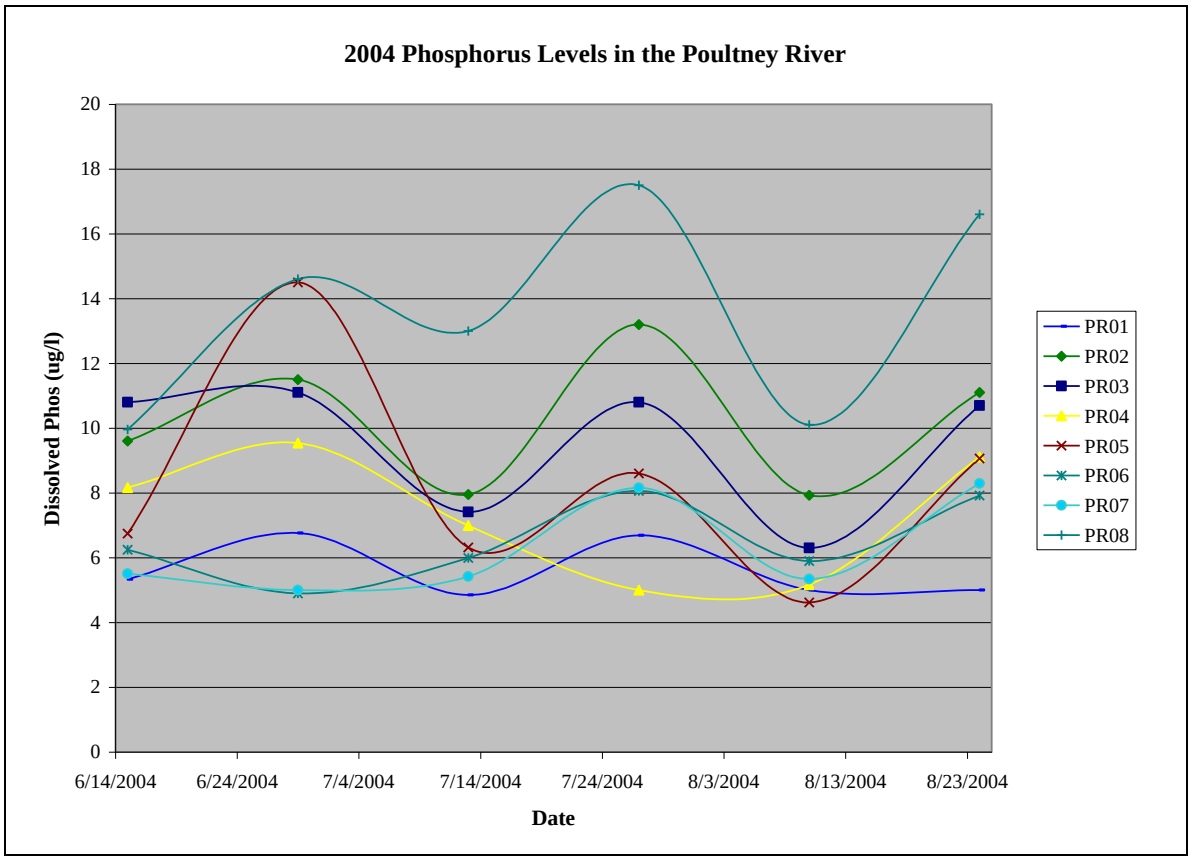
Rainfall data collected at the Rutland airport (wunderground.com) showed that it rained just over 0.5 inches in Rutland on June 1 and again on June 12, potentially causing contaminants to be carried in runoff on these dates. On June 29, when we correspondingly see some of our highest contaminant peaks, it rained almost 1.3 inches. On July 27, it rained over an inch and on August 21 it rained over 2 inches, though there

was no more rain in the days preceding the August 24 sampling date. There was very little precipitation preceding the July 13 or August 10 sampling dates.

Total Phosphorus

Phosphorus is often the nutrient that limits the amount of aquatic plant growth in our waterbodies. Excess phosphorus in water, thus, often contributes to the growth of algae and other plants. This accelerated plant growth may eventually damage stream ecosystems by changing the balance of plants growing, causing algal blooms and by draining the oxygen levels in the water when the plants decompose. Phosphorus is often introduced into the environment through human activities such as improper waste management, over-application of fertilizers, certain industrial wastes and human disturbance of the land and its vegetation. Phosphorus binds with soil and is often carried into streams during storms when suspended sediment levels are high. This phosphorus may under certain conditions disassociate from the soil and become biologically available in the water column, where it may remain for many seasons.

Chart 2: Total Phosphorus results for the Poultney River.



The phosphorus levels on the Poultney River are relatively low. The Lake Champlain phosphorus target for South Lake B is 25 mg/L (LCBP atlas: phosphorus concentrations, 2004). The phosphorus levels reported here are much lower than these targets (<0.18 mg/L), indicating that the sections of the Poultney River sampled in 2004 may not be significant contributors to the eutrophication of the Lake (given that the target is appropriate for the Lake ecosystem). It is possible that there are phosphorus sources closer to the lake than measured in this study, which contribute to Champlain nutrient levels.

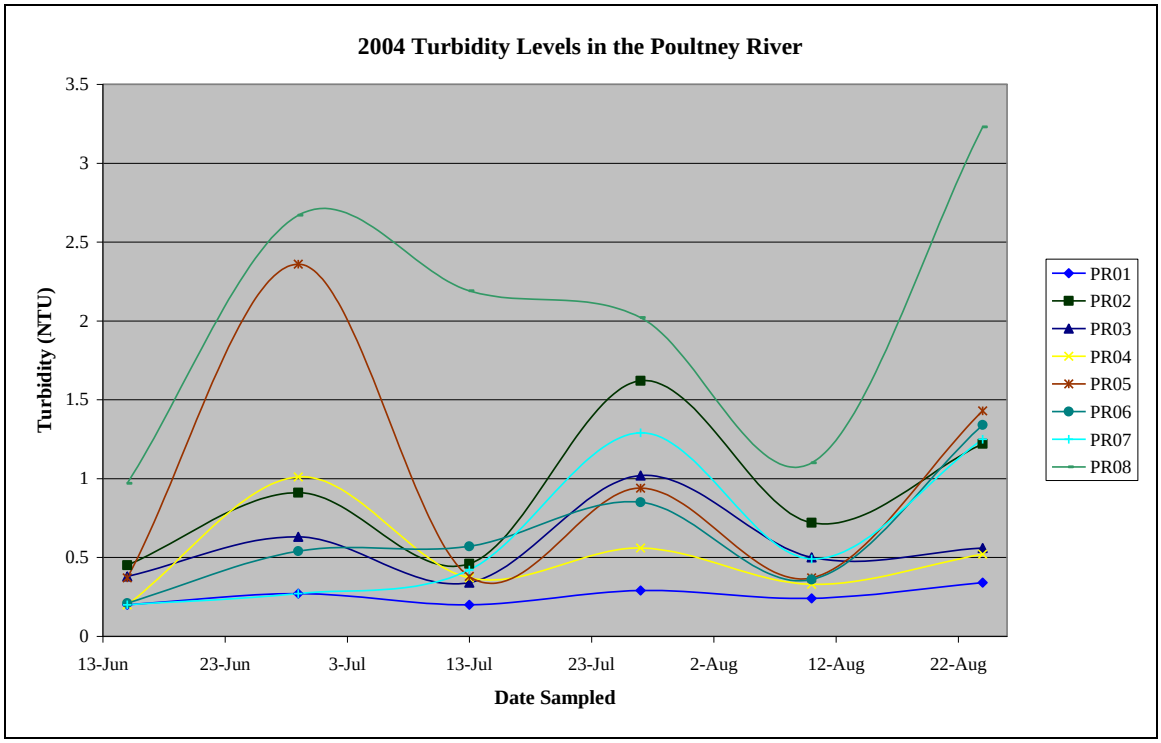
Turbidity

The amount of turbidity and/or total suspended solids (TSS) found in water serves to determine its relative clarity. Suspended solids in the water create turbid (murky) conditions and reduce the transmission of light. Suspended solids are varied, ranging from clay, silt and plankton, to industrial wastes and sewage.

Water containing high levels of sediment, loses its ability to support a diversity of aquatic organisms, becoming warmer as suspended particles absorb heat from the sunlight and cause oxygen levels to fall. Photosynthesis decreases because less light penetrates the water, resulting in even further drops in oxygen levels. The combination of warmer water, less light and oxygen depletion may make it impossible for some forms of aquatic life to survive.

Suspended solids affect aquatic life in other ways as well. Suspended solids can clog fish gills, reduce growth rates, decrease resistance to disease and prevent egg and larval development. Particles of silt, clay and organic materials settle to the bottom, especially in areas of a river or stream that are slow moving. These settled particles could smother the eggs of fish and aquatic insects, as well as suffocate newly hatched insect larvae. Material that settles into the spaces between rocks makes these microhabitats unsuitable for mayfly and stonefly nymphs, caddisfly larvae and other aquatic insects living there (Above information from Richards, West River Report, 2004).

Chart 3: Turbidity results for the Poultney River.

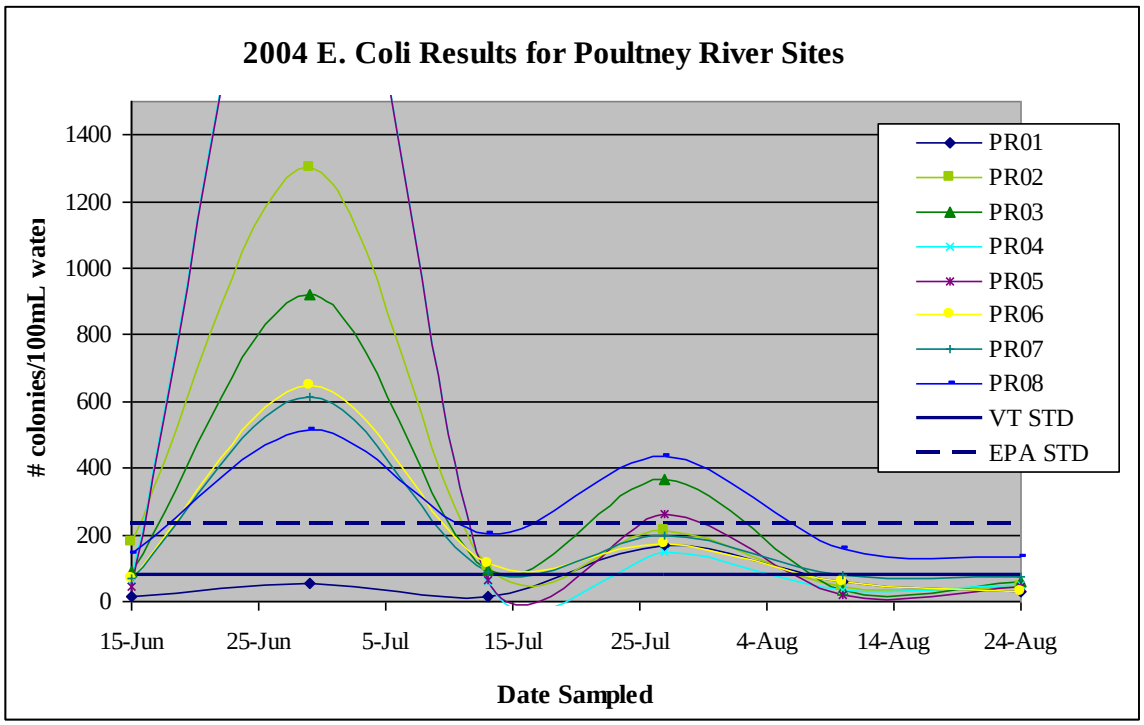


Turbidity levels in the Poultney River are relatively low, compared to other streams in the vicinity (the Otter, for example). However, the Poultney River's substrate appears to be made up largely of gravel and bedrock, which would decrease sediment created from erosion of the channel itself. *The Partnership has not yet made a study of reference conditions in this basin, or potential causes for sedimentation*. The Castleton River contributes sediments and manure, as witnessed at the Gully Brook site. Hopefully, the work carried out in 2004 to reintroduce the Gully Brook to its floodplain and minimize flooding of the Castleton directly upstream of the confluence will help alleviate some of those contributions.

E. coli

E. coli counts measure one type of fecal coliform bacteria found in the digestive tracts of human and other warm-blooded animals. High *E. coli* levels indicate that fecal waste is being carried over land or through groundwater into streams. People exposed to fecal wastes of sick individuals can develop serious diseases or other health consequences. US EPA sets its recommended limits for *E. coli* levels in waters where swimming may occur at 235 colonies per 100mL of water, while the Vermont DEC sets their recommended limit for class B waters (current classification for most of the sites monitored) at 77 colonies per 100 mL of water.

Table 4: E. coli results for Poultney River.

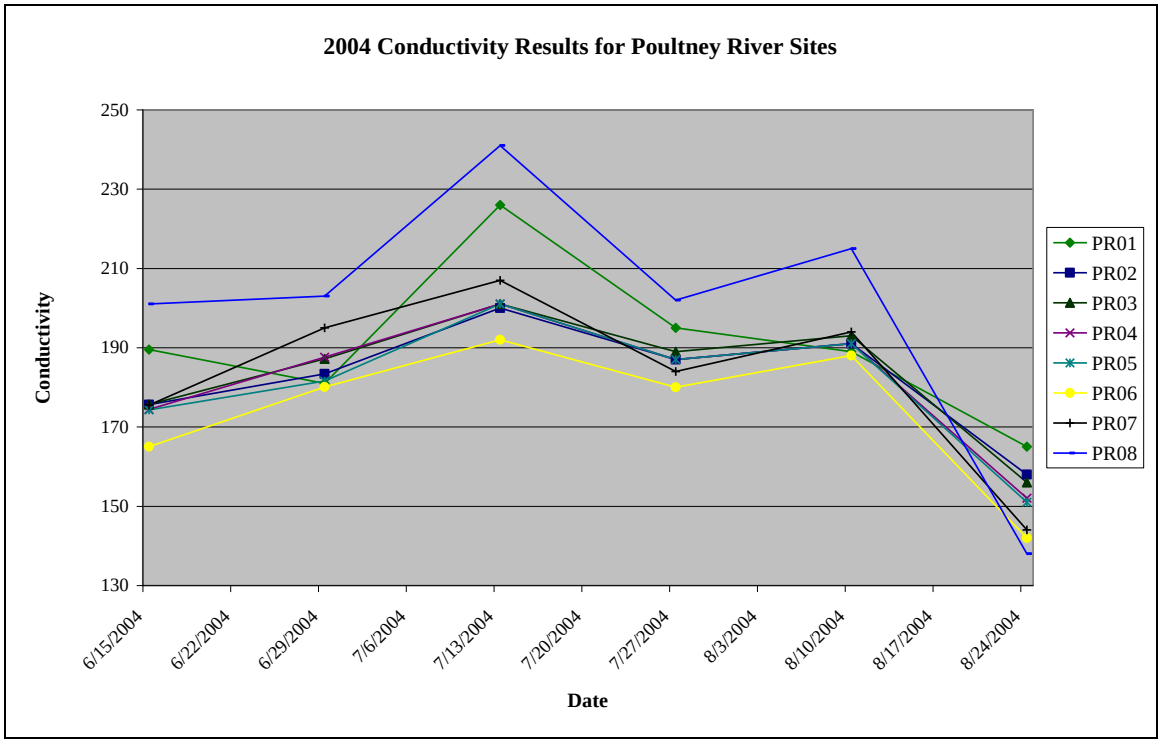


Many of the sample results in the Poultney River were over the state regulatory limits for *E. coli* measurements. Sites PR04 and PR05 surpassed the lab's reporting limits (2419 colonies per 100 mL) after a rain event, measured June 29, 2004. During June and July, most of the measurements were above Vermont's water quality standards for contact recreation. On June 29, only one site, PR01, was below the standards. On July 27, none of the sites were below the Vermont standard, though five of the sites were below the EPA standard. The exceedances of the water quality standards for *E. coli* appear to be correlated to heavy rainfall in the early summer months. Though August was rainy, perhaps the consistency of the rain prevented the flushing of bacteria seen at the beginning of summer. Relatively high levels of bacteria seen at site PR08 may indicate that failing septic systems in the area are a source of contamination.

Conductivity

Conductivity is a measure of electrical conductance. High conductivity usually indicates that high levels of ionic salts are present in solution in measured waters.

Chart 5: Conductivity results for the Poultney River.



Conductivity is a measure of electrical conductance. High conductivity usually indicates that high levels of ionic salts are present in solution in measured waters. Measured conductivity values on the Poultney River ranged between 138 and 241 (units??). The highest values corresponded with the lowest streamflow levels, while the lower values corresponded with higher flow levels. Sites PR08, along the NY border, and PR01, the headwaters, showed the highest conductivity measurements. These measurements could indicate that while more salts may be present in the lower reaches of the watershed (more, larger roads are present for example), the headwaters with lower volumes of water are also sensitive.

Algal growth

During collection, algae growth was noted (qualitatively) at each of the sample sites. The sites that consistently scored the highest for algae presence were PR03, PR04 and PR05. The headwaters, PR01, consistently had the lowest (<25%) algae cover score. Algae growth is often a sign of warm, nutrient rich waters. There are several farms in the vicinity of the algae growth that may be contributing to this problem.

Temperature

The highest water temperature measured in the Poultney River during summer sample collection was 66 ^{o}F at PR08. Water temperatures at this site were consistently the highest along the river; however, this site was consistently the last site in the morning to be sampled. The temperatures measured at this site, were lower than those measured in the Mettowee, which has a documented problem with overly warm waters causing fish kills. Measurements on the Poultney River indicate that throughout the summer, water temperatures routinely dipped below 68 ^{o}F at night.

Color

Most sites had consistently clear water color, though the last site, PR08, was occasionally tea-colored.

Odor

As with color, most sites consistently had no odor. Several sewage-type smells were recorded during the low flow period in July and early August.

Conclusions

In conclusion, sample sites along the Poultney River showed relatively low levels of total phosphorus and turbidity. While the site located closest to the headwaters showed relatively low levels of E. coli as well, sites farther downstream showed measureable E. coli contamination, often exceeding state and federal guidelines. The PMWP plans to resample the same locations as were sampled in 2004. Future sites include 5 in the Mettowee subwatershed that are also temperature monitoring sites (5/14 temp monitoring sites).

The PMWP is currently working to reduce E. coli levels in the Poultney River. Unfortunately, one of the main (measured) contributors is not willing to establish buffers or other mitigating projects at this time.