

CRUSER BROOK (CR1) WATER QUALITY:

The Crusser Brook sampling site is located downstream of the the 3M Quarry where the Brook flows under Route 601.

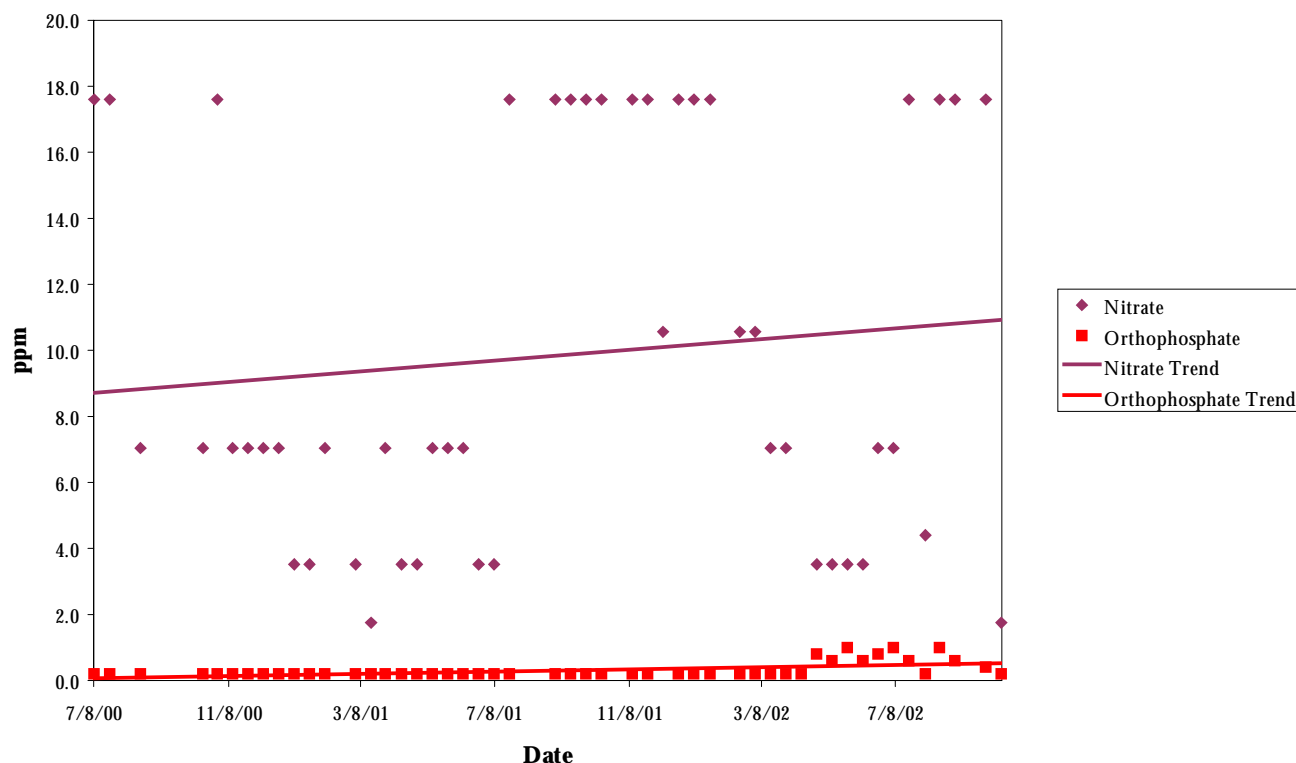
Data on the chemical water quality of Crusser Brook has been collected by trained volunteers since July 2000 and continues every other weekend until the present time. Parameters collected at the site include: dissolved oxygen, water temperature, nitrate, orthophosphate, turbidity, and pH. Observation are also made on stream flow, wildlife, water color, and weather conditions.

Some of the results of this testing are outlined below:

NITRATE:

- Nitrates at CR1 from 2000 – 2002 show a significant trend towards increasing nutrients in the water (see attached graph).
- At CR1, 40.8% of the samples taken from 2000 – 2002 (20 out of 49) exceed the State Water Quality Standard of 10.0 parts per million (ppm).
- For the rest of the Beden Brook Watershed, the nitrate standard is exceeded in 39.0% of the samples taken from July 2000 - 2002.

Nutrients (Nitrate & Orthophosphate) for Crusser Brook (CR1) 2000 - 2002



Nitrogen makes up about 80 percent of the air we breathe. It's an essential component of proteins and is found in the cells of all living things. Inorganic nitrogen may exist in the "free" state as a gas, or as nitrites, nitrates or ammonia. Organic nitrogen is found in proteins and other compounds. Acceptable nitrate levels for drinking water have been established as less than 10 parts of nitrate in one million part of water (ppm). Unpolluted water generally has a nitrate reading of less than 1.0 ppm.

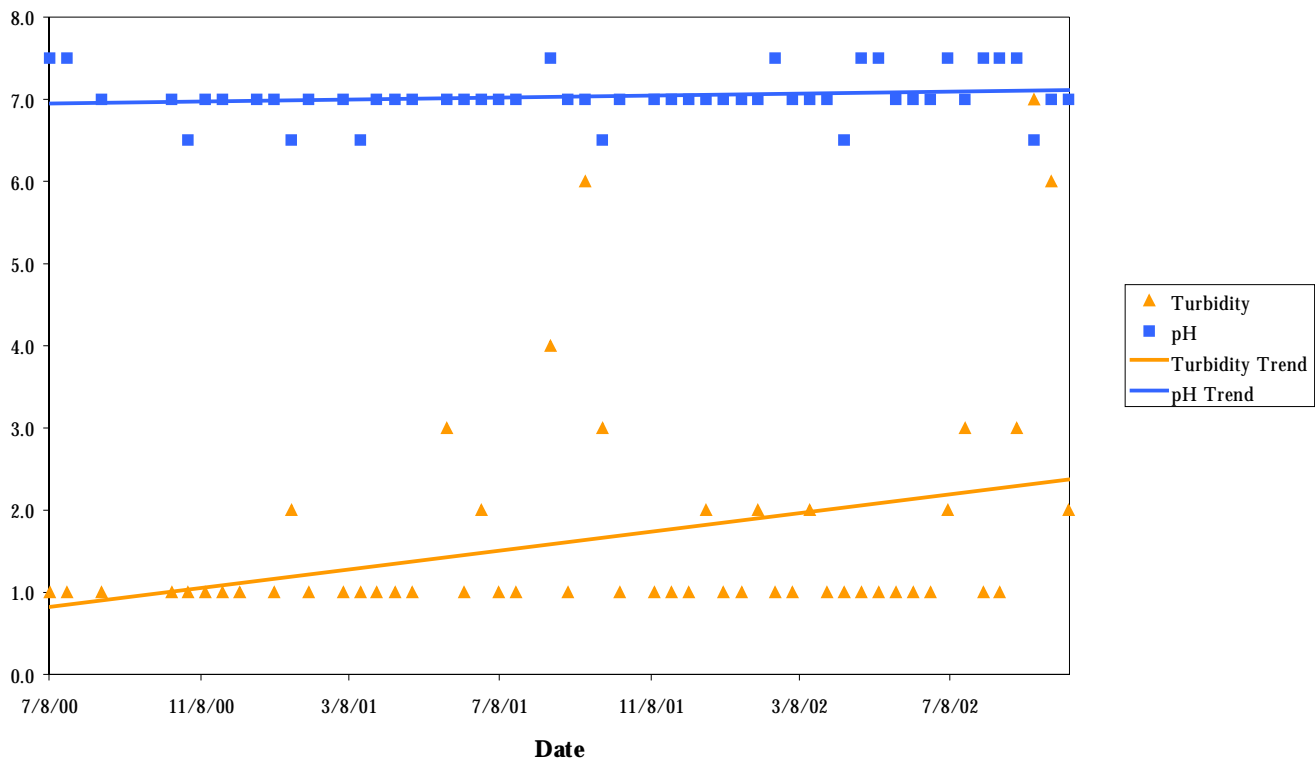
Nitrates represent the most completely oxidized states of nitrogen commonly found in water. Nitrates in water come from soil, fertilizer runoff, leaky cesspools, sewage treatment plants, manure from livestock animal wastes and from car exhausts. These nitrates, along with phosphates, become detrimental when they over-fertilize aquatic plants and cause excessive eutrophication.

Eutrophication is the natural aging process of a body of water. However, an excess of nutrients such as nitrates and phosphates can greatly accelerate this natural process by stimulating excessive plant growth. These plants die more quickly than they can be decomposed, and the dead plant matter builds up. Together with the sediment entering the water, the plant matter results in a filling of the bed of the waterbody making it progressively shallower. Although the process of eutrophication may take hundreds or even thousands of years naturally, human impacts may reduce this time period to tens of years.

TURBIDITY:

- Turbidity from CR1 from 2000 – 2002 shows an increasing trend in the Brook (see attached graph).
- At CR1, 29.4% of the samples taken from 2000 – 2002 (15 out of 51) record turbidity as greater than 1.0 (i.e., showing some turbidity in the water).
- For the remainder of the Beden Brook Watershed, the turbidity samples are greater than 1.0 in only 3.9% of the samples (6 out of 152) in that same time period.

Turbidity & pH for Crusier Brook (CR1) 2000 - 2002



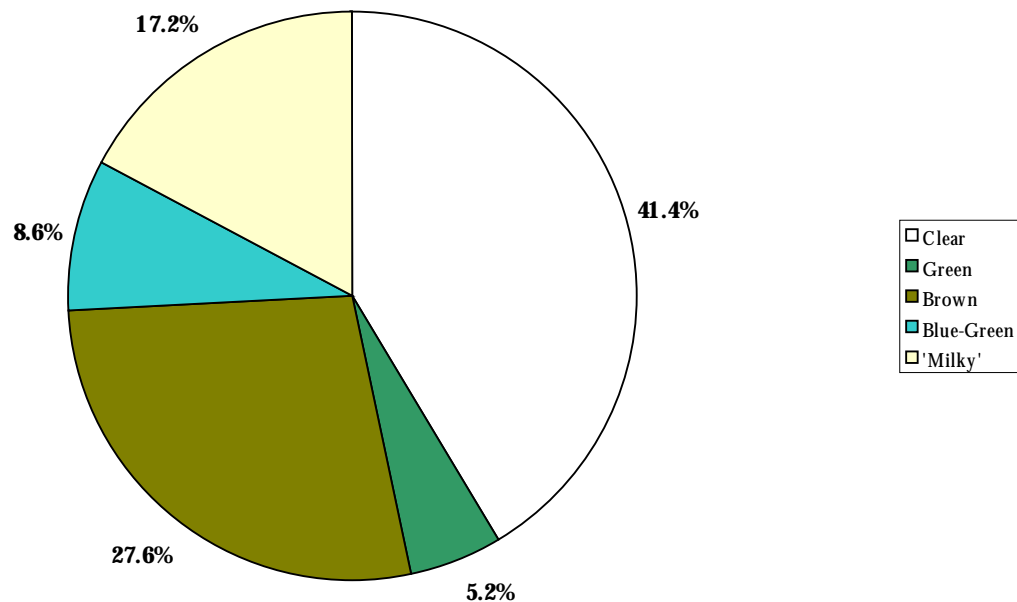
Sediment material from the watershed tends to fertilize algae and aquatic plants because essential nutrients are attached to incoming particles. Further, sedimentation can ruin the lake bottom for aquatic insects and bottom dwelling creatures, and negatively affects fish spawning beds.

Turbidity is a measurement of the amount of sediment particles suspended in the water. The presence of suspended sediment may cause the water to be turbid and brownish in appearance. They block light from penetrating into the water and may interfere with the gills of fish and the breathing mechanisms of other creatures.

WATER COLOR:

- Volunteers observe the color of the water and either circle one of the available choices (clear, green, brown, yellow, gray or blue-green) or fill in a different color under the 'other' category and circle that choice.
- In 58.6% of the sampling events (34 out of 58) from 2000 – 2002 at CR1, water color was noted. The remaining 41.4% of the sampling events (24 out of 58) had clear water (see attached pie chart).
- Of the times that colored water was observed, 27.6% of the time (16 out of 58) it was Brown, 17.2% of the time it was 'Milky' (10 out of 58, as written in by the volunteers), 8.6% was recorded as Blue-Green (5 out of 58) and another 5.2% of the time (3 out of 58) it was Green (see attached pie chart).

Water Color for Crusier Brook (CR1) 2000 - 2002



The proliferation of algae and aquatic plants is a significant water quality problem in our watershed. Such conditions are signs of man-induced eutrophication. The extremely slow stream velocities present particularly in the Upper Millstone further accelerate the rate of eutrophication.

Algae are photosynthetic plants that contain chlorophyll and have a simple reproductive structure but do not have tissues that differentiate into true roots, stems or leaves. Some species are microscopic single cells,

and others grow as mass aggregates of cells (colonies) or in strands (filaments). Some even resemble plants growing on the lake bottom.

Excessive growth of one or more species of algae is termed a "bloom". Algal blooms, usually occurring in response to an increased supply of nutrients, may give the water an unpleasant taste or odor, reduce clarity and color a stream or lake a vivid green, brown, yellow or even red depending on the species. Filamentous and colonial algae are especially troublesome because they can mass together to form scums or mats on the water surface.

Also, the water color can be impacted by chemical pollution or from sedimentation. Chemical pollutants can react with water to produce a variety of colors. Varying-colored sediments can affect the color of water (for example, many of the area's red shale can create rust colored waterways).

NOTES ON READING THE GRAPHS:

1. The State water quality standard for dissolved oxygen (DO) is 4.0 parts per million (ppm) at any time. Anything below this level has violated the State guideline and is indicative of potential problems.
2. The State water quality standard for nitrate-nitrogen (NO₃-N) is 10.0 ppm. NO₃-N is the final nitrate value measured in the field multiplied by 4.4 during data analysis. Hence, the large NO₃-N values presented on the graphs.
3. The trend lines on the graphs show the direction of the trend in parameter measured. If the trend line points upward over time, that parameter (DO or NO₃-N) is increasing over time, and vice versa. Also, how steep the trend line is shows how rapidly or slowly that parameter is increasing or decreasing. In other words, the steeper the line the larger the difference in the values over time.