

TCSWCD,s Nutrient Reduction Report - Keppers Farm

This is a summary of the nutrient reduction into Van Heel Creek.

Biological Oxygen Demand (BOD). Amount of Dissolved oxygen needed to break down (oxidize) organic materials to Carbon Dioxide, water and minerals in a given volume of water at a certain temperature over a specified time period.

BOD5 is what the MNfarm looks at and this is the time period of 5 days and is measured in pounds/year.

P is phosphorous and is in pounds/year.

Tom's project is collecting all feedlot runoff, therefore no feedlot runoff is entering the creek. Tom has reduced the amount of BOD5 (232 pounds) and Phosphorous (20 pounds).

MPCA limits on Tom's farm (this is what MPCA would allow to discharge) BOD5 125 pounds, Phosphorous 5 pounds. Tom has eliminated all runoff.

Phosphorous Facts from MPCA:

One pound of phosphorous can produce 500 pounds of aquatic vegetation.

Phosphorous is recognized as the limiting nutrient in most lakes.

Biological Oxygen Demand (BOD) – Overview

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Biochemical Oxygen Demand (BOD) refers to the amount of oxygen that would be consumed if all the organics in one liter of water were oxidized by bacteria and protozoa (ReVelle and ReVelle, 1988).

The first step in measuring BOD is to obtain equal volumes of water from the area to be tested and dilute each specimen with a known volume of distilled water which has been thoroughly shaken to insure oxygen saturation.

After this, an oxygen meter is used to determine the concentration of oxygen within one of the vials. The remaining vial is then sealed and placed in darkness and tested five days later. BOD is then determined by subtracting the second meter reading from the first.

The range of possible readings can vary considerably: water from an exceptionally clear lake might show a BOD of less than 2 ml/L of water. Raw sewage may give readings in the hundreds and food processing wastes may be in the thousands.

Background Information

Microorganisms such as bacteria are responsible for decomposing organic waste. When organic matter such as dead plants, leaves, grass clippings, manure, sewage, or even food waste is present in a water supply, the bacteria will begin the process of breaking down this waste. When this happens, much of the available dissolved oxygen is consumed by aerobic bacteria, robbing other aquatic organisms of the oxygen they need to live. Biological Oxygen Demand (BOD) is a measure of the oxygen used by microorganisms to decompose this waste. If there is a large quantity of organic waste in the water supply, there will also be a lot of bacteria present working to decompose this waste. In this case, the demand for oxygen will be high (due to all the bacteria) so the BOD level will be high. As the waste is consumed or dispersed through the water, BOD levels will begin to decline.

Nitrates and phosphates in a body of water can contribute to high BOD levels. Nitrates and phosphates are plant nutrients and can cause plant life and algae to grow quickly. When plants grow quickly, they also die quickly. This contributes to the organic waste in the water, which is then decomposed by bacteria. This results in a high BOD level.

When BOD levels are high, dissolved oxygen (DO) levels decrease because the oxygen that is available in the water is being consumed by the bacteria. Since less dissolved oxygen is available in the water, fish and other aquatic organisms may not survive.