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SUGAR CREEK SCOOP

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Identifying Sources of Priority Resource Concerns

As discussed in previous Sugar Creek Scoop articles, stakeholder groups compiled a list of priority resource concerns for the Sugar Creek Watershed. The next step in the development of the watershed management plan is to determine the sources of the priority resource concerns identified.

A source may be:

- An activity without a specific location, like car washing or dog walking,
- Associated with a material or structure, such as impervious surfaces, or
- Actions associated with a business or enterprise, such as construction or livestock production.

As part of the Sugar Creek Watershed Management Plan development process, several methods to identify the sources were utilized. Stakeholders were interviewed during steering committee and public input meetings to gather local knowledge of watershed conditions; water quality data was collected from various sources to pinpoint specific locations of concern; and physical and chemical analysis of the watershed was conducted through a monitoring and analysis process (See Sugar Creek Water Quality Monitoring and Analysis on page 2).

Once the sources of the priority concerns are identified, the areas where the sources are causing the greatest damage will be prioritized and treatment methods will be identified.

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Back to Basics- What is a TMDL?

The Total Maximum Daily Load (TMDL) is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards. It is the sum of allowable loads of a single pollutant from all contributing point and non-point sources. A margin of safety is included in the calculation to account for scientific uncertainty and future conditions of the watershed.

Section 303(d) of the 1972 Federal Clean Water Act requires each state to identify those waters that do not meet the state's water quality standards for designated uses. These streams are then listed on the State's list of impaired waters. For such waters, the State is required to establish TMDLs to meet the water quality standards.

Several waterbodies have been found to be impaired in the Sugar Creek Watershed and are listed on Indiana's 303(d) list. The Sugar Creek Watershed Management Plan will address the impaired waterbodies and discuss best management practices to protect and enhance the quality of water within the Sugar Creek watershed.

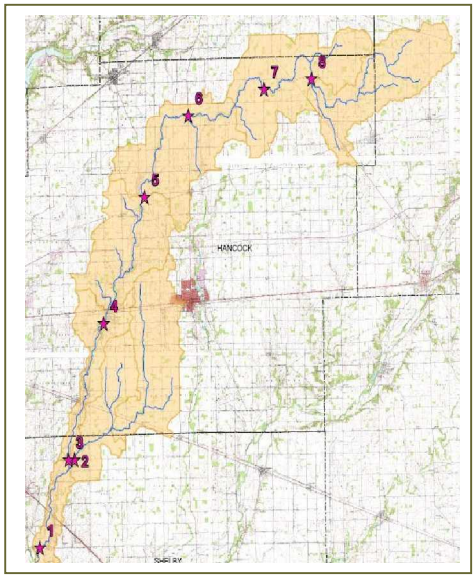
A draft E.coli TMDL has been developed by IDEM for the Sugar Creek watershed and is available for review at on their website. A link to this report is available on the Sugar Creek website.

Sugar Creek Water Quality Monitoring and Analysis

Sugar Creek water quality monitoring is conducted on a monthly basis at eight sampling stations for a period of one year. Water quality conditions fluctuate periodically so monthly analysis will include trends within the watershed. Water quality measurements for temperature, conductivity, specific conductance, salinity, pH, dissolved oxygen, flow and turbidity were taken in the field. Water samples were also collected for water chemistry analysis in a laboratory for total phosphorous, biological oxygen demand and E. coli.

Phosphorus is one of the key elements necessary for growth of plants and animals. Phosphate will stimulate the growth of aquatic plants which provide food for fish. However, if an excess of phosphate enters the water, algae and plant growth will increase and use large amounts of oxygen. Phosphorus originates from a variety of sources, many of which are related to human activities. Major sources include human and animal wastes, soil erosion, septic systems and runoff from farmland or lawns. Total phosphorous greater than .3mg/L indicates increased nutrients in the water which can lead to degraded conditions over time.

Sculpin found at Station 7. Sculpins use their front fins to stabilize themselves on the bottom of creeks and rivers.



Sugar Creek sampling station locations.

Biochemical oxygen demand (BOD) is a chemical procedure for determining how fast organisms use up oxygen in the water during the decomposition of organic matter. BOD is used to measure pollutant organic matter in the water. Natural sources of organic matter include plant decay and leaf fall. However, plant growth and decay may be unnaturally accelerated when nutrients and sunlight are overly abundant due to human influence. Therefore, a low BOD is an indicator of good quality water, while a high BOD indicates polluted water. The BOD test serves an important function in stream pollution-control activities.

E. coli is a type of fecal coliform bacteria that comes from human and animal waste. The Environmental Protection Agency (EPA) uses E. coli measurements to determine whether water is safe for recreation. Disease-causing bacteria may be present in water that has elevated levels of E. coli. Levels of E. coli can increase during flooding. The EPA water quality standard for E. coli bacteria is 394 colony forming units per 100 mL. Measuring E. coli can be an important tool for determining the overall health of the watershed.

Field instruments used to measure water quality parameters.

Water quality measurements are taken in the field using the YSI 63 for parameters such as pH, salinity, conductance and temperature. The YSI 55 meter is used to measure dissolved oxygen. All measurements obtained using the YSI meters are calculated by inserting the probe into the stream. Once the reading is stable, a value is recorded for the desired parameter. The instrument used for measuring turbidity is called a turbidimeter, which measures the intensity of light scattered at 90 degrees as a beam of light passes through a water sample.

Turbidity is a measure of the degree to which the water looses it's transparency due to the presence of suspended solids. The more total suspended solids in the water, the murkier it seems and the higher the turbidity. High concentrations of particulate matter can cause increased sedimentation and siltation in a stream, which in turn can ruin important habitat areas for fish and other aquatic life. Suspended particles also provide attachment places for other pollutants, such as metals and bacteria. High suspended solids or turbidity readings can be used as "indicators" of other potential pollutants. Regular monitoring of turbidity can help detect trends that might indicate increasing erosion in developing watersheds.

Stream flow is the volume of water flowing past a point in a unit of time. Spring flow measurements were taken in June and Fall flow in October using Flo-Mate. This instrument uses an electromagnetic sensor to measure the velocity (speed) of water. The velocity is in one direction and displayed as feet per second (ft/s). The wading rod has increments of 1 foot which is also divided by .1 foot sections to precisely measure water depth.

In order to accurately determine stream flow, measurements must be made of the stream's width, depth, and speed (velocity) of the water at many points across the stream. Measuring tape is placed above the width of the stream and divided into equal segments. Water depth is measured using the wading rod and velocity is calculated and recorded for each segment. Flow is calculated by the following equation:

Segment Length x Water Depth x Velocity= Flow

Total flow for the stream can be calculated by adding the flow values at each station together. Flow fluctuates naturally by heavy rain events and seasonal changes. Increased urbanization can directly alter flow rates which can lead to erosion and increased sedimentation. It is important to monitor flow because of its impact on water quality and on the living organisms and habitats in the stream.

Flow measurements taken during June 2007 sampling.

Water Quality Evaluation Results

In an effort to summarize the problems within the watershed and evaluate their results, water quality standards were used as benchmarks. If water quality results were below lower limit thresholds, or results were greater than higher limit thresholds, an exceedance was recorded. This method of condensing water quality results was the method in which the eight 14-digit HUC subwatershed were compared and prioritized.

V3 is performing monthly sampling at eight stations, which is on-going and will continue through May of 2008. To date, water quality parameter results which demonstrated an impairment or degradation included infractions on limits for phosphorus, nitrate/nitrite and arsenic at only one of the eight 14-digit HUC subwatersheds each. Four of these eight subwatersheds demonstrated an impairment or degradation with respect to DO levels and E. coli concentrations.

In the Next Issue...

More Bugs = Better Water Quality?

Back to Basics – What is a Habitat?

Upcoming Sugar Creek Meeting Dates

Upcoming meetings for the watershed planning groups are listed below.

July 9, 2008: Steering Committee Meeting 4:00-6:30pm, Public Meeting 7:00-9:00pm – Greenfield Public Library, 900 West McKenzie, Greenfield, IN 46140, Phone: 317-462-5141

August 5, 2008: Steering Committee Meeting 4:00-6:00pm – Hancock County SWCD, 1101 W Main St, Greenfield, IN 46140

September 9, 2008: Steering Committee Meeting 6:00-8:30pm – Mohawk United Methodist Church, 2045 W 400 N, Greenfield, IN 46140

October 9, 2008: Steering Committee Meeting 6:00-8:30pm, New Palestine Town Hall, 42 E Main St, New Palestine, IN 46163, Phone: 317-861-4727

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