UPPER SUGAR CREEK WATERSHED MANAGEMENT PLAN
BOONE, CLINTON, MONTGOMERY, AND TIPPECANOE COUNTIES, INDIANA
EXECUTIVE SUMMARY

The Upper Sugar Creek Watershed starts downstream of the Browns Wonder-Sugar Creek Watershed receiving water from Prairie Creek, Walnut Fork-Sugar Creek and Lye Creek in addition to drainage from the Browns Wonder-Sugar Creek Watershed. The Upper Sugar Creek Watershed drains 508 square miles of which 319 square miles are addressed in this watershed management plan. The watershed includes drainage from Lebanon, Darlington, Colfax, and Thorntown. The Upper Sugar Creek Watershed is comprised of three major basins: Prairie Creek draining north and west from the City of Lebanon, Walnut Fork-Sugar Creek draining west along the southern portion of the watershed and Lye Creek draining the north and eastern portion of the watershed. Lye Creek, Prairie Creek and Walnut Fork-Sugar Creek and other tributaries join Sugar Creek upstream of Crawfordsville. Sugar Creek continues south and west through Montgomery, Fountain and Parke Counties where it meets the Wabash River north of Montezuma. The Wabash River flows south to join with the Ohio River.

The watershed covers approximately 204,500 acres and is covered by mixed land use consisting mainly of row crop agriculture and pasture. Small areas of developed open space and low, medium and high-density developed land and small forested pockets dot the watershed.

The Montgomery County Soil and Water Conservation District obtained funding from the Indiana Department of Environmental Management section 319 program for the development of a watershed management plan for the Upper Sugar Creek Watershed. A steering committee of regional partners, local producers and interested stakeholders was organized to work with the watershed coordinator to develop the watershed management plan.

The Upper Sugar Creek Watershed Management Plan is a comprehensive examination of the Upper Sugar Creek Watershed and is intended as a guide for the protection and improvement of the quality of Sugar Creek and its watershed. The plan was developed with the goal of balancing different uses within the watershed and the demands of the natural resource by the community. The scope of the management plan includes the following:

1. Describe and identify the watershed area, review historic studies, current community initiatives, and stakeholder involvement.
2. Assess watershed quality and complete water quality sampling, biological community and habitat quality assessments.
3. Receive community input via steering committee meetings, public meetings and a social indicator survey.
4. Identify watershed problems and causes.
5. Examine pollutant sources and calculate current load estimates and potential load reductions.
6. Determine critical and priority areas.
7. Create goal statements and select appropriate improvement measures to reduce specific loads.
8. Create an outreach plan for future strategies.
9. Outline future tracking and indicators of success.

The management plan included a review of historical studies, mapping exercises, a walking and driving tour of the watershed and subwatershed areas, an assessment of chemical and physical watershed health, water quality, water chemistry and habitat assessments. These efforts were completed with the goal of determining if stakeholder concerns were supported by watershed data and providing a

foundation upon which the watershed management plan could be built. Problem identification and primary resource concerns include residential septic systems, crop production, livestock production and channel stability and flooding. Ninety-eight percent of soils in the watershed are severely limited for septic system use. Septic systems also contribute to E. coli and phosphorous loading in the watershed area. Between 39 and 41% of corn and 37 to 39% of soybean production occur on conventionally tilled fields (2021 ISDA Tillage Transect study). Additionally, nearly 60% of watershed soils are highly erodible or erodes under wind or water. Livestock on regulated farms produce 354,000 tons of manure per year and more animals exist on unregulated farms. Reduced channel stability and increased flooding was observed throughout the watershed. In total, 84.8 miles of existing streambank erosion, 15.8 miles of livestock access and 22.3 miles of stream buffers which were narrower than ideal were identified during windshield surveys. Sugar Creek waterbodies are listed as impaired for E. coli (119 miles), nutrients (10.9 miles), impaired biotic communities (10.9 miles), pH (11 miles) and PCBs in fish tissue (92 miles).

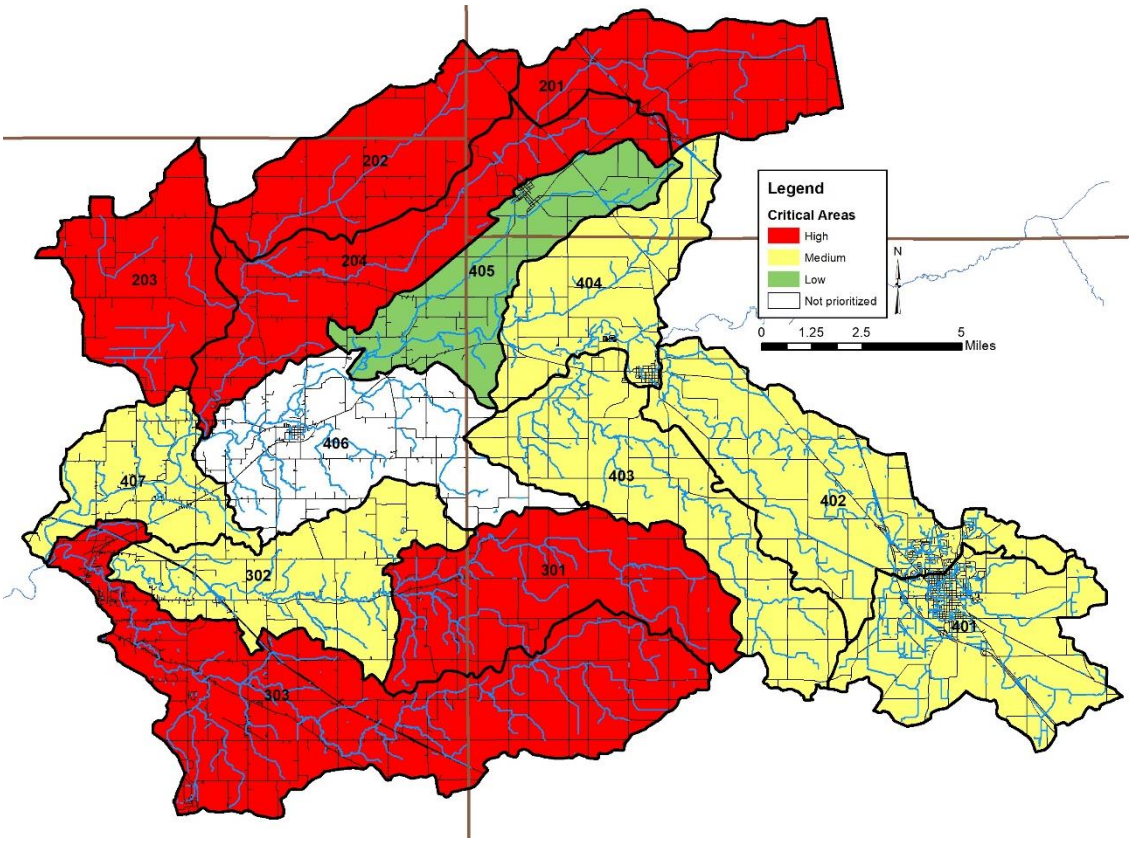
Several events occurred throughout the watershed with the goal of engaging the public and obtaining their opinion on the Upper Sugar Creek Watershed. These included two public meetings to launch and close the project as well as farmer and recreation-focused listening sessions. In addition to public meetings, educational outreach, workshops, field days, and educational events, a social indicator survey was conducted and mailed to 472 agricultural producers. The 13-page, five-wave mail survey yielded a 44% response rate. Most Upper Sugar Creek Watershed survey respondents, which were primarily agricultural landowners and producers, believe that good water quality is important for the community in which they live for both economic and quality-of-life reasons. Most individuals feel a degree of personal responsibility for the actions they take that affect local water resources, though they may be unwilling to pay for improvements. Upper Sugar Creek Watershed producers often feel that they must compromise between desired environmental outcomes and their financial concerns.

In general, survey respondents readily named visible water quality concerns such as littering and turbidity. Other problems, especially those related to nutrient loading and aquatic habitat alteration, garnered less awareness amongst respondents. Education and outreach efforts are needed across the board to effectively change management behaviors. Particularly successful campaigns may target those who have never heard of or are only slightly familiar with a given best management practice. Respondents often identified financial factors as the primary constraint to adopting conservation practices.

The steering committee evaluated inventory data, identified primary resource concerns identified by stakeholders and determined potential problems and sources of these concerns. Using available data, the steering committee identified critical and priority areas. To identify the highest priority subwatersheds, the steering committee decided to divide them into three tiers (high, medium and low priority), based on the number of parameters that were determined to be critical. The highest priority subwatersheds are those that were determined to be critical for three or more parameters of the four potential parameters (nutrients, sediment, E. coli, flooding). The medium-priority subwatersheds are those that were determined to be critical for two of four potential parameters. The lowest priority subwatersheds were critical for one of four potential parameters. Subwatersheds were prioritized as follows and are shown in the figure below:

- High priority: Headwaters Little Potatoe Creek (201), Bowers Creek (202), Lye Creek Drain (203), Little Potatoe Creek-Lye Creek (204), Little Creek-Little Sugar Creek (301), Town of Linnsburg-Walnut Fork Sugar Creek (303)

- Medium priority: Little Sugar Creek (302), Sanitary Ditch-Prairie Creek (401), Deer Creek-Prairie Creek (402), Wolf Creek (403), Goldsberry Creek-Sugar Creek (404), Town of Garfield-Sugar Creek (407)
- Low priority: With Creek-Sugar Creek (405)



Prioritized critical areas in the Upper Sugar Creek Watershed.

The Upper Sugar Creek steering committee reviewed historic and current water quality data, local habitat and recreation information, flooding area concerns and other available data. With this information, six goals were developed which the steering committee hopes to achieve through implementation of the Upper Sugar Creek watershed management plan. Large reductions are needed across the Upper Sugar Creek Watershed to meet watershed management plan goals. In total, an 84% reduction in nitrogen, 97% reduction in phosphorus, 95% reduction in sediment and 91% reduction in E. coli loading rates are needed to meet water quality goals or state standards. The goals are as follows:

- Reduce nitrate-nitrogen loading from 3,314,191 lb/year to 514,580 lb/year (84%) by 2053 and reduce total phosphorus loading from 1,214,352 lb/year to 41,166 lb/ year (97%) by 2053.
- Reduce total suspended solids loading from 160,733,493 lb/year to 7,718,695 lb/year (95%) by 2053.
- Reduce E. coli loading from 5.79E+15 to 5.49E+14 (90%) by 2053.
- Reduce flooding impacts by increasing storage and infiltration across the watershed by 2053.
- Natural habitat (grasslands, forest, wetlands) will increase by a total of 5% with a focus on improving habitat connectivity across the Upper Sugar Creek watershed by 2053.
- By 2053, 50% of property owners and producers will be informed about practices that can be implemented to positively impact Upper Sugar Creek and no less than 30% of individuals living

and farming in the watershed will be engaged in the project within 30 years. These efforts will be guided by a well-funded, robust, cohesive watershed group.

Based on what is practical for this watershed and the best management practices that will provide the most effective pollutant reductions, the steering committee prioritized 14 BMPs to help achieve watershed goals and objectives by decreasing nutrient, sediment and pathogen loading rates.
The selected BMP were nutrient/pest management, pollinator planting, fencing, prescribed grazing, cover crop planting, conservation cover, filter strips, forage and biomass plantings, tree/shrub establishment, grassed waterways, livestock restriction, streambank stabilization, and wetland creation/restoration.

The steering committee established an implementation plan and measurable milestones for the Upper Sugar Creek watershed management plan. The implementation plan identifies objectives and actions, assigns responsible parties and potential partners and outlines technical and financial assistance needs. Additionally, the 30-year goals were broken into 10-year, short-term goals as well as three-year, project-based goals. The 10-year goals address high-priority critical areas and target the following:

- Nitrate-nitrogen loading reduction from 3,314,191 pounds per year to 2,380,987 pounds per year will net a 28% reduction.
- Total phosphorus reduction from 1,214,352 pounds per year to 823,290 pounds per year is a 32% decrease.
- Total suspended solids reduction from 160,733,493 pounds per year to 109,728,561 pounds per year, a 32% reduction.
- E. coli input reduction by 30%, or from 5,79E +15 col/year to 4.04E +1 col/year.
- Increased storage and infiltration across the watershed will reduce flooding impacts in 10 years.
- Increased natural habitat by 2% by improving habitat connectivity across the watershed.
- A total of 30% of the public will be informed about practices that can be implemented to positively affect Upper Sugar Creek, and no less than 50% of individuals living and farming in the watershed will be engaged in the project within 10 years.

The three-year project goals outline four tasks:

- Goal 1: Identify and implement projects in high-priority critical areas only, by developing, promoting, and implementing a targeted cost-share program which will result in measurable changes in water quality.
- Goal 2: Develop and promote a cost-share program.
- Goal 3: Cultivate interest in BMP implementation.
- Goal 4: Continue targeted and watershed-wide education and outreach efforts aimed at increasing awareness about water quality issues and the adoption rate of BMPs in high-priority critical areas.

Public engagement is necessary for any of the above goals to be successful. The outreach plan for future strategies includes five primary components. 1) Information about the cost-share program will be mailed to landowners and producers in the high-priority critical areas during the first year of the program highlighting opportunities for on-the-ground cost-share. 2) Quarterly newsletter articles or press releases, and monthly website or social media updates will be released. 3) Promotion of project goals, the cost-share program, available funds, education/outreach activities, and cost-share application details will be released. 4) Quarterly steering committee meetings will guide the development and implementation of the cost-share program, provide education and outreach event updates, and review

progress on all Upper Sugar Creek watershed-based projects. 5) Lastly, public events including river clean-ups, float trips, and county fairs will help connect the community to Sugar Creek, and educate them about the river, its watershed, and potential impacts on the local community.

The Montgomery County SWCD and project steering committee will implement a four-step adaptive management strategy to improve the project's success. The Upper Sugar Creek Project coordinated by the Montgomery County SWCD, will be responsible for maintaining records for the project including tracking plan successes and failures and any necessary watershed management plan revisions. The plan will be re-evaluated at the end of Year 5 and every 5 years after that.

The first step is planning and following the IDEM 2009 Watershed Management Checklist. The project coordinator worked in concert with and was guided by the Upper Sugar Creek Project Steering Committee to develop the WMP using knowledge of the watershed, inputs from stakeholders, new data from water monitoring and windshield surveys, and historical data. This plan includes goals, an action register, and a schedule outlining how and when to achieve the defined goals.

The second step is implementation. The action register and schedule will be implemented to achieve the goals of the Upper Sugar Creek Watershed Project objectives and goals. implementation will include a cost-share program and education events targeting both youth and adults. Practices implemented through the cost-share program will follow the NRCS Field Office Technical Guide (FOTG) Practice Standards or other technical standards as detailed in the cost-share program, once developed.

The third step is to evaluate and learn. Evaluations of indicators will occur often to check the progress made toward the project goals. Factors evaluated will include but will not be limited to number of BMPs installed, calculated/estimated load reductions of installed BMPs, number of individuals reached through outreach, etc. The Upper Sugar Creek Project Steering Committee will conduct the evaluations. The group will then provide recommendations that will improve project success. Progress against the watershed management plan will be reviewed no less than every two years (i.e. 2024, 2026, etc).

The last step is to alter the strategy. The project's implementation and management strategy will be adjusted to improve the project's success. If progress is not made proportionate to the time into the project (i.e., at the end of year 3, approximately 30% (3/10) of 10-year goals should be met), the steering committee will have the opportunity to alter their strategy to meet the goals of the project. Adjustments will be based on recommendations from the Evaluate and Learn step. Once the adjustments are agreed upon by the steering committee, the project will revert to Implementation (Step 2) to continue with the Adaptive Management strategy (steps 2-4) until all goals have been met or all conservation opportunities have been exhausted.