Stony Creek (South Branch River Raisin) Watershed Conservation Plan

University of Michigan School for Environment and Sustainability
&
Michigan Department of Agriculture and Rural Development

Project Partners:

Lenawee County Conservation District
River Raisin Watershed Council
Farmer-Led Watershed Conservation
Michigan Department of Agriculture and Rural Development

With special thanks to the invaluable contributions of the
Stony Creek Community Conservation Steering Committee.

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Watershed Conservation Plan for Stony Creek (South Branch River Raisin)

Executive Summary

Stony Creek (South Branch River Raisin) (Stony Creek) is a HUC-12 subwatershed located primarily in Dover Township, Lenawee County, Michigan, and lies within the River Raisin Watershed. The River Raisin watershed is Michigan's primary direct drainage into the Western Lake Erie Basin (WLEB), and Stony Creek has been highlighted by the State of Michigan as a priority subwatershed for agricultural conservation efforts to reduce phosphorus loading into the lake. Agricultural Best Management Practices (BMPs) are designed to reduce the environmental impacts of farming while improving the sustainability and profitability of agricultural production. However, approaches to reducing agricultural runoff through voluntary cost-share programming and outreach efforts have not resulted in significant increases in adoption of BMPs primarily due to economic and social/cultural factors. Therefore, conservation challenges must be presented in a way that demonstrates the historical and systemic nature of current barriers and does not diminish the humanity or dignity of farmers and the choices they make to support themselves and their communities.

The overall goal of this plan is to lay a path to building conservation program participation in Stony Creek with a focus on the needs, priorities, and perspectives of the local community and agricultural stakeholders. The inputs into this plan come from interview research with local producers, field-level GIS and agricultural inventories within the subwatershed, and discussions with the Plan's steering committee of local stakeholders. This research was conducted by graduate students from the University of Michigan School for Environment and Sustainability in partnership with the Michigan Department of Agriculture and Rural Development. This plan may serve as a template for other priority subwatersheds in their community-based conservation efforts.

This plan offers recommendations for specific BMPs applicable to Stony Creek, as well as programmatic recommendations for broader engagement and progress monitoring. Precision agriculture is recommended regardless of any conditions on the land, whereas other practices are recommended based on a more- or less-sloped field binary. For fields with 75% or more in 3% grade or higher, we recommend annually successive uptake of grassed waterways, water and sediment control basins (WASCOBs), and no-till farming. For fields with less than 75% in 3% or higher, we recommend annually successive uptake

of cover crops and filter strips. In addition to improving local water quality, BMPs such as precision agriculture and low/no-till contribute positively to soil health while minimizing costs associated with nutrient inputs and equipment wear and tear. All recommended practices are supported by subsidy programs through federal, state, land grant extension, and Conservation District programming. Additionally, conservation organizations should provide consolidated conservation information in a central webpage and conduct more and smaller/less formal outreach events in the Stony Creek region. Finally, we suggest that monitoring for progress in reducing field runoff would require considerable edge-of-field water quality monitor installation, a task which is not feasible in the short term. Instead, the following metrics should be considered as surrogates for granular water quality monitoring data within the boundaries of Stony Creek: Cropland acres enrolled in MAEAP, CREP, and other conservation programs; number of farms enrolled in MAEAP, CREP, and other conservation programs; miles of grassed waterways installed; acres of cover crops; acres of no-till and low-till; acres managed via WASCOB; miles of vegetated riparian buffers (buffer strips); number of community outreach events quarterly and annually; community outreach attendance; farm conservation organizations active in Stony Creek, and; number of conservation champions active in Stony Creek.

Introduction

River Raisin Watershed & Stony Creek (South Branch River Raisin) Subwatershed

The River Raisin watershed is situated in Southeast Michigan and drains over 1,000 square miles of land into the Western Lake Erie Basin (WLEB). The watershed touches Lenawee, Monroe, Washtenaw, Jackson, and Hillsdale counties in Michigan and Fulton County in Northeastern Ohio. (See Figure 1.) Over 75% of the watershed land area is in agricultural production, a fact which underlies a number of social, economic, and ecological considerations for conservation efforts (River Raisin Watershed Council, 2009). The primary agricultural products are grain corn and soybeans, with occasional crops of wheat, hay, and corn silage (USDA, 2017a). Lenawee County, at the heart of the watershed, ranks in the top 6% of counties nationally in terms of grain sales including corn and soy (USDA, 2017b). According to the USDA, 96% of farms across the watershed's Michigan counties are family owned and operated, providing some insight into the social and cultural importance of agriculture in this area (USDA, 2017a).

As Michigan's primary direct drainage basin into the Westen Laker Erie Basin (WLEB), the River Raisin watershed has been a focus of conservation efforts over the years (State of Michigan, 2018). Due to the significant re-emergence of cyanobacterial harmful algal blooms (HABs) in the WLEB over the past three decades, a renewed interest in the source and role of phosphorus has arisen within the governments of states and provinces

bordering the lake, as well as within environmental conservation NGOs and community organizations in the region. In 2015, the states of Michigan and Ohio, along with the Canadian province of Ontario, agreed to reduce their phosphorus loading into the WLEB by 40% in 2025, from a 2008 loading baseline year. In 2018, the Michigan Domestic Action Plan (DAP) team identified the Stony Creek subwatershed as a state priority for addressing nonpoint source nutrient pollution into the WLEB, along with several other subwatersheds in the River Raisin watershed. The Michigan DAP team consists of state government employees from conservation-focused departments, and it develops state-level plans to address HABs according to requirements in Annex 4 of the 2012 Great Lakes Water Quality Agreement (IJC, 2023).

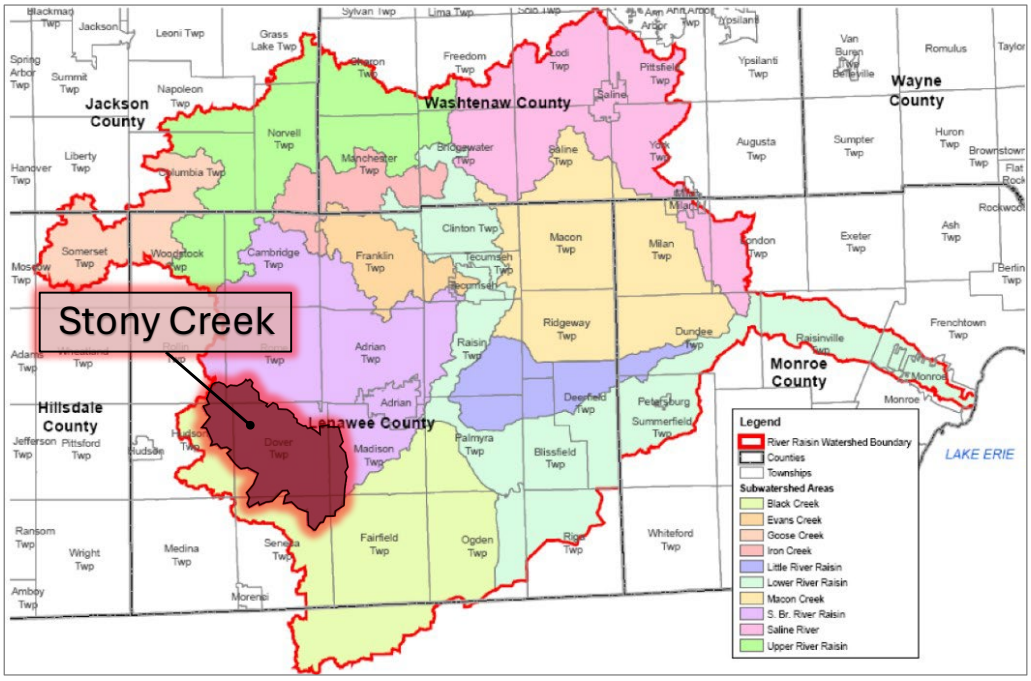

Figure 1: Major subwatersheds and jurisdictional boundaries of the River Raisin (River Raisin Watershed Council, 2009), 10, fig. 1-1. Stony Creek shown (added).

The Stony Creek (South Branch River Raisin) subwatershed (Stony Creek) is classified as a HUC-12 subwatershed (041000020202) and is located in the southwestern portion of Lenawee County, Michigan. (See *Figure 4*.) Stony Creek covers nearly 46 square miles centered over Dover Township (population 1,662) with portions of the subwatershed

extending into neighboring Rome, Rollin, Hudson, Madison, Fairfield, and Seneca townships (see *Figure 2*). Stony Creek is made up mostly of rural cropland with a few towns and villages throughout. The largest of these is the village of Clayton, with a population of 311 people in 2020 (US Census Bureau, 2021). There are 674 farm fields in the subwatershed ranging from 2.5 to 392 acres, constituting 20,734.9 total acres or 70.65% of the total land area in the subwatershed.

Hydrologic Unit Codes (HUCs) are used by US Geological Survey (USGS) to identify watersheds throughout the US. A two-digit HUC-2 code indicates a large region, whereas a twelve-digit HUC-12 code indicates a subwatershed of approximately 30 square miles, on average. See Figure 3 for a graphical depiction of the HUC system.

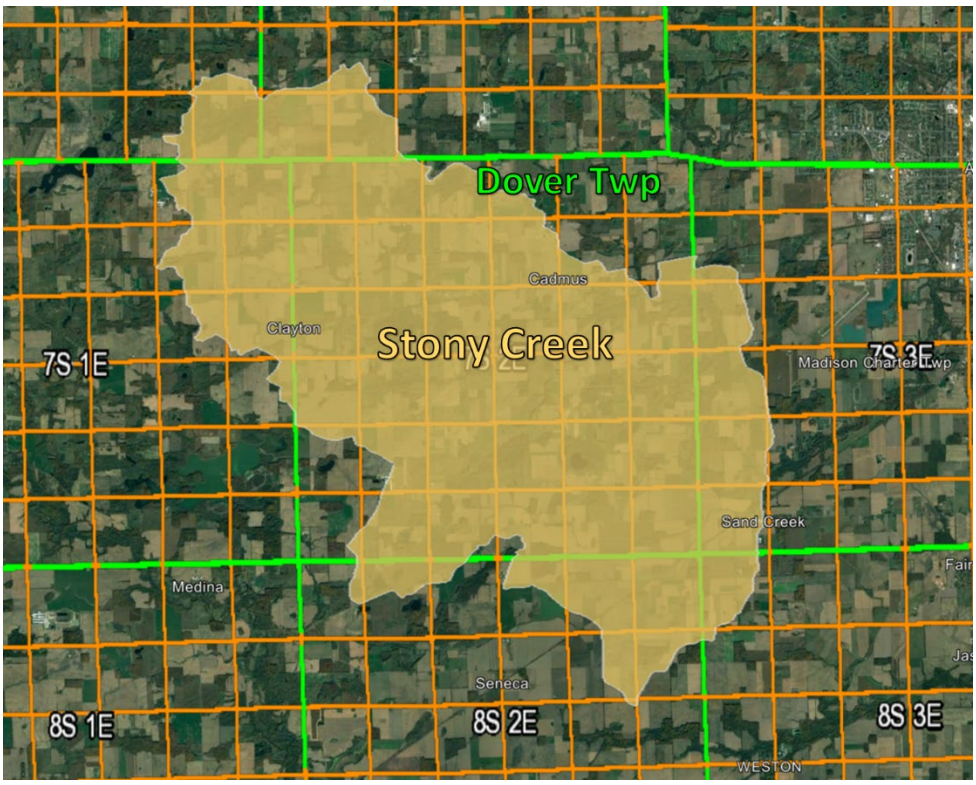

Figure 2: Stony Creek (South Branch River Raisin) sits primarily in Dover Township, MI.

Figure 3: Hydrologic Unit Codes (HUCs) Explained (USGS, 2023) https://nas.er.usgs.gov/hucs.aspx

As a component of the greater River Raisin watershed, Stony Creek and its agricultural land use has been identified by the state of Michigan as one of 13 priority subwatersheds for Lake Erie. Subwatershed prioritization has been completed according to the state's agricultural inventory process, which identifies potential nonpoint source pollution risk via field surveys and topographical analysis (EGLE et al., 2021).This plan outlines the agricultural context and barriers to conservation, and then recommended solutions specific to Stony Creek and its immediate surroundings, utilizing inputs from research, residents, farm operators, and a local steering committee. The plan focuses on those conservation methods determined to be the most worthwhile and feasible to the local population, and which are backed by scientific research. The goal of this plan is to get to the heart of community conservation in Stony Creek, and to provide a potential roadmap for other communities to act in their own best interests while striving for a more sustainable future.

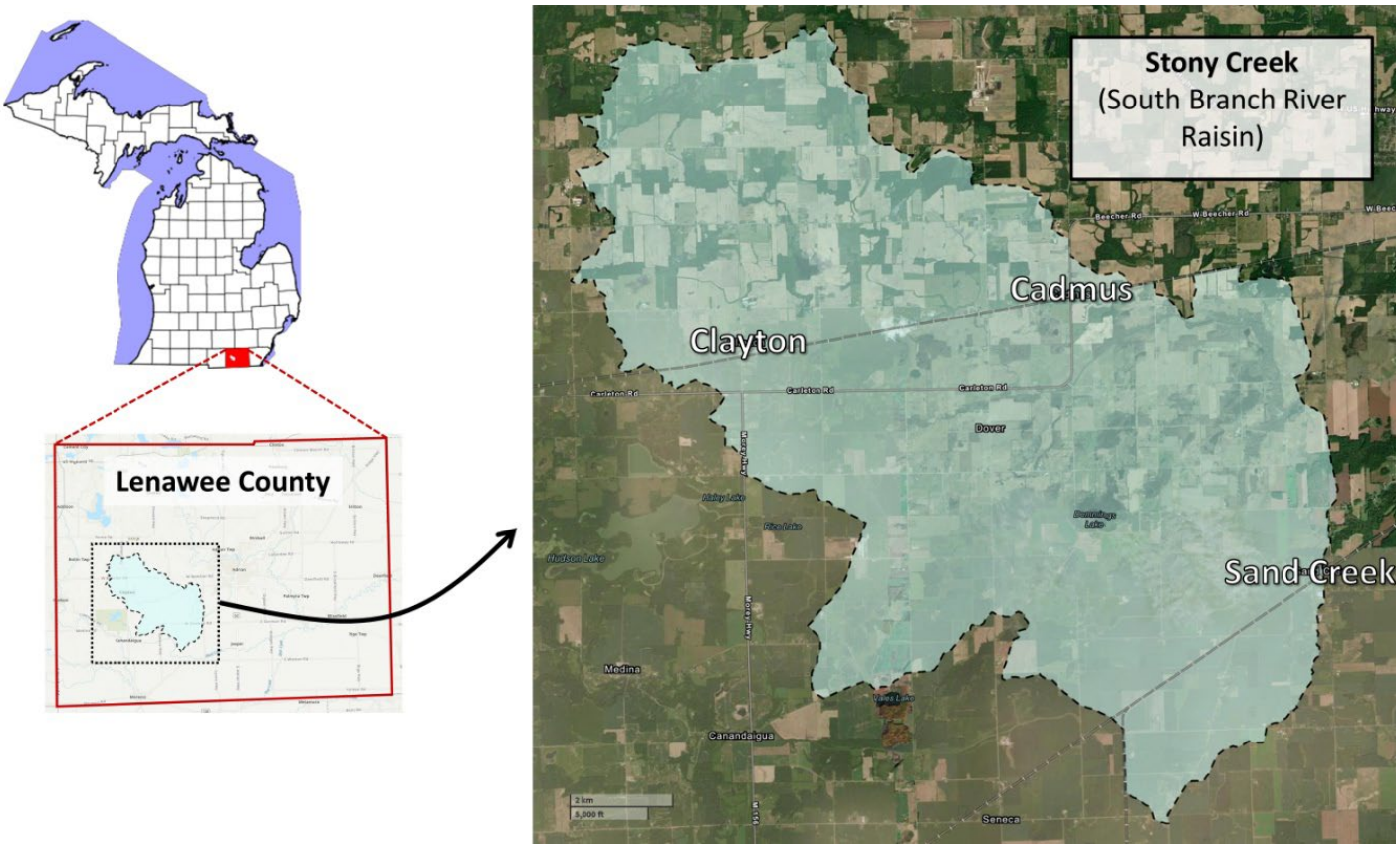

Figure 4: Stony Creek (South Branch River Raisin) is located in Lenawee County, Michigan.

Challenges to Conservation

The challenges to agricultural conservation in this subwatershed are significant and are mirrored in much of the American corn belt. These issues can be categorized primarily as economic and/or social/cultural in nature. It is critical that conservation challenges are presented in a way that recognizes the historical and systemic nature of current barriers and does not diminish the humanity or dignity of farmers and the choices they make to support themselves and their communities.

Economic Challenges

From an economic perspective, national trends of farm consolidation, increased efficiency, and yield prioritization have spurred soil and water quality degradation across the US. These trends are reinforced by federal subsidies under the Farm Bill, propping up national and global markets for corn and soy commodities. Economic incentives for maximizing soy and corn yields are deeply engrained in the US agricultural setting.

Additionally, farming technology continues to develop towards higher levels of efficiency and productivity in terms of yielded bushels per acre. GPS-enabled precision tilling, planting, fertilizing, and harvesting equipment improves yields through detailed monitoring and data logging of inputs and outputs, often shown in near-real-time (NRT) to producers operating the equipment. These technological advancements allow farmers to maximize their profits through yield increases and have increasingly become the operational standard for profitability. For those who can afford these new technologies, either outright or on credit, this trend towards high-tech equipment feeds into economic pressures to maximize yields. However, it also presents an opportunity for producers to utilize their precision equipment with a focus on sustainable practices – a necessary component of agricultural conservation discussed later in this plan. Still, the cost of advanced equipment is prohibitively high for many small-scale farmers.

The context of federal and state subsidy and yield maximization is a significant barrier to conservation due to the economic and financial realities of producers in this and other watersheds. Many farmers compete in the commodities market along such thin margins that they are unable to support the costs of conservation measures, regardless of whether they would like to be more sustainable. The general economic argument for increasing the use of agricultural best management practices (BMPs) is that, in a span of years or decades, a participating farmer will see increased profits from reductions in input costs of fuel, equipment wear-and-tear, fertilizers, and soil organic matter. These factors also contribute to soil heath improvements, bolstering long-term productivity in a more sustainable manner. While this logic is sound, the length of time needed to see the benefits of BMPs is beyond the scope of farmers who struggle to operate on a yearly or even seasonal basis.

To counter the considerable economic and financial barriers to conservation in the absence of mandates and regulation, state and federal government programs offer significant financial support to producers for improving their conservation activities. Federal grants and cost-share programs under US Department of Agriculture (USDA) National Resource Conservation Service (NRCS) number in the hundreds, and the 2024 funding cycle offers over $3 billion to producers nationwide (USDA NRCS, 2023). There are also federal funding opportunities through the US Fish and Wildlife Service (USFWS) and US Forest Service (USFS), among others. At the state level, Michigan Department of Rural Development (MDARD) set aside $13 million in their budget to support soil health and regenerative practices, and other state agencies offer several more funding avenues. However, even at these levels of national and state funding, cost-share programs are competitive, and financial resources quickly become limited or unavailable to producers.

Bureaucratic Issues

Bureaucracy is a necessary aspect of government administration, and conservation programs are no exception. Too often, the prospect of navigating a dense bureaucracy is too much for producers to take on, especially when they do not have a strong desire to adopt conservation practices. Nearly every producer who has participated in conservation subsidy programs through the state or federal government experienced the bureaucratic hassle of seeking and receiving funding. While a level of processing and accountability is required of government entities in the distribution of funds, producers can be especially sensitive to the complexity of these funding systems due to the time and energy costs to access them.

There are conservation champions in and near Stony Creek who have successfully navigated the application systems, and who make good use of subsidy funding on their operations. And yet, they are also quick to point out examples of bureaucratic hurdles that would almost certainly deter less motivated producers. There are even examples of these champions dropping out of funding application processes due to bureaucratic hangups, showing that efforts of even the most driven producers can be thwarted by the administrative structure of the state and federal government. In one case, a fatal administrative stalemate grew from a simple issue with printing compatibility regarding a project proposal map.

To make things more complicated, bureaucratic processes change according to the administrative agency which is providing the funding. Funding from federal and state sources leverages different eligibility requirements than funding from Conservation District programming. Funding programs with the most available resources often present the highest barriers to access in the form of prerequisite farm conditions or preexisting conservation practices. For example, FSA programs often set on-farm infrastructural standards, such as storage container condition, electrical standards, and proximity to buildings, which must be met for cost-share eligibility. Conservation Districts and local government units are the preferred conservation funding institutions for many producers in Stony Creek, even as they retain low levels of funding and offer relatively less conservation programming support. This preference speaks to the value that farmers place on their time and energy and is not fully represented in federal cost-share programs. Additionally, while CD programming isn't without prerequisites, they are typically not as stringent as USDA requirements, contributing to ease of adoption among producers.

Stony Creek producers often prefer to work with funding programs through the Lenawee County Conservation District (LCD). As members of affected rural communities, CD

practitioners are trusted to have their friends' and neighbors' best interests at heart in pursuit of improved environmental quality. (See the last section, *Metrics and Evaluation*.)

Social/Cultural Challenges

Farming is more than a job or profession. Farmers and farm operators identify deeply with their work, and often derive their purpose and self-worth from their critical ability to raise crops and livestock. More broadly, rural Americans are proud of their history of community values, pragmatism, and self-sufficiency. Michigan is 94% rural by land mass, and yet only 18% of its population lives in rural areas – reduced from 39% in 1920 (Gardner, 2022). These factors provide important context to many of the social and cultural barriers to conservation practices here in Stony Creek, including age and family dynamics, reliance on hired farm labor, and cultural divisions between rural communities and urban centers.

Nearly 1/3 of farmers in Michigan are over the age of 65, and it's likely that this holds true within Stony Creek (Gardner, 2022). Older producers are less likely to take on new, voluntary conservation practices for several reasons. It is easy to see how a farmer using conventional methods for decades might reject a new practice. Beyond this, conservation farming is not without risks, especially in the first few years. Older farmers may be less risk tolerant due to their decades-long experience in successful conventional farming methods. Additionally, older farmers have little incentive to "buy in" to conservation practices when they do not plan to be farming long enough to see the long-term benefits.

In addition, farm patriarchs tend to hold onto their decision-making power into old age. Often, by the time the "old dad" hands off his authority to an heir, the heir has already been farming conventionally for decades themself. In other industries or businesses, transitions of power or ownership usually occur sooner, and there is more opportunity for "the next generation" to be younger and more interested in or capable of making fundamental changes in the operation. In this way, changes to producer behavior without intervention occur more slowly than is generally acknowledged.

Aspects of farm labor practices also contribute to the slow uptake of BMPs in Stony Creek and elsewhere. Farm owners will often hire out work to be done on the farm, as has been done throughout history the world over. Due to both the shrinking rural population and age of many farm owner-operators, this labor is increasingly sourced from non-local individuals or businesses without strong ties to the local community. Whereas conservation practices serve to benefit both the ecosystem and local environmental quality, nonlocal hired help is less likely to value local water and soil conditions to the same extent as residents of the area. Considerations for runoff mitigation and the 4 Rs of farm conservation (right source, right rate, right time, right place) are not likely to factor into operational decisions by hired laborers without landowner intervention.

Goals and Implementation Activities

Stony Creek Management Goals

The goal of this plan is to provide a roadmap toward improved soil health and water quality in Stony Creek by focusing on the following objectives:

1. Acknowledge and utilize the experiences and needs of the local community;
2. Educate and inform community members of what can and should be done to improve soil health and water quality in the subwatershed;
3. Foster a sense of stewardship among producers and community members in and around the subwatershed; and
4. Provide actionable recommendations to local producers, community members, and government entities for the improvement of soil health and water quality.

To meet these objectives, this plan was written with input from local community members through a steering committee convened for this purpose. The steering committee for this plan comprised one local producer and conservation champion, one local agricultural education expert, and one watershed planning expert with extensive experience working in the Stony Creek region. The committee convened to establish on the purpose and scope of the plan, set the plan objectives and topic outline, and review draft iterations between October 2023 and April 2024, making recommendations based on each member's varied and considerable experience.

In contrast to some watershed management plans, the objectives of this plan do not include a waterway measurement or monitoring element for three reasons. First, the high number of monitoring stations needed to measure nutrient runoff from individual fields is not feasible in the short term primarily due to high cost, but also disinterest among producers in voluntary runoff monitoring and reporting. Second, edge-of-field monitoring is limited to specific metrics but can be viewed as a comprehensive indicator of soil health and water quality. Third, due to variations in nutrient and sediment runoff from fields across months and years, monitoring data would mean very little without several years of data collection. Compounding this issue is the time delay in field-level responses to BMPs, which may take 5-10 years to develop. In the current climate of voluntary action among producers, widespread field monitoring is not a reasonable goal in the short term.

However, monitoring plays an important role in producer behavior in the long term and is critical for developing a full understanding of what is working, what is not, and what systems might be altered to improve soil health and water quality. Important work is being done within Lenawee County to understand and improve conservation behaviors, and that

work hinges on the availability of robust monitoring data. In the field of farm conservation research, there is a strong consensus around the importance of monitoring for informing behavior as well as for providing system-wide data, particularly for funding requirements. As such, this plan includes recommendations to participate in water monitoring efforts for long-term improvement and program effectiveness.

Additionally, "monitoring" in the general sense is necessary to understand the effectiveness of the plan in meeting its goals. In this plan, we include a list of metrics for monitoring progress of BMP adoption in Stony Creek which do not strictly depend on high-intensity water quality measurements. (See the final section, *Metrics and Evaluation*.)

Local Community Needs

Above all, local watershed conservation activities should contribute to the local community, not burden it. While there may be aspects of watershed conservation that seem costly, stewardship of the soil and water contributes to the sustainability of the largest economic driver in Stony Creek: agriculture. Agricultural BMPs contribute to the long-term sustainability of farming activity in the watershed, and therefore help to ensure the continued existence of the small towns and villages throughout Stony Creek.

Self-sufficiency, local knowledge, and pragmatism are key aspects of rural communities which are often overshadowed by policies and organizations operating from urban centers, sometimes prioritizing the knowledge and opinions of individuals without deep connections to rural America. Local communities should be embraced for their ability to contribute to practical solutions. As such, communities should be provided with a forum to participate in local planning activities, and their inputs should be weighed heavily in the final planning product. This will result in a plan which is prepared with the best insights into its specific, localized context, and plan implementation will be made more durable with the community participating throughout the process. In the context of voluntary conservation measures, deeply engaging with communities in this way is an ideal alternative to large-scale, top-down planning, which has failed to accelerate watershed stewardship where it is needed most.

Additionally, as part of the River Raisin watershed, Stony Creek is part of a long history of conservation and environmental stewardship. Since the River Raisin's official acknowledgement in the Great Lakes Water Quality Agreement (GLWQA) of 1987, producers and community members have been consistently improving the condition of the watershed's agricultural lands and waters (US EPA, 2019). Although recent events have focused attention on the area due to its nutrient contributions to Lake Erie, marked improvements have been made within the subwatershed, and this sentiment should preface any information and education (I&E) efforts here. Engagement practitioners should

acknowledge the historical progress and the legacy of watershed stewardship within the River Raisin watershed and convey their gratitude for the continued efforts of Stony Creek's producers and community members.

Recommendations

On-Farm Practices

Improving soil health and water quality in Stony Creek requires on-farm practices which reduce erosion, increase soil organic content, and minimize the potential for nutrient runoff. The topography varies throughout the subwatershed and is generally flatter in the southeast and hillier in the central and northwestern portions. Soil types and slopes throughout the subwatershed provide varying levels of erosion risk due to the natural landscape. In this sense, different fields will require different interventions for soil health and water quality, with one notable exception: Precision agriculture.

Precision agriculture is a system of farming which utilizes on-farm data to ensure crop yields are realized with the least amount of resource use. Primarily, the system involves closely tracking nutrient application so that fertilizers are not used where they aren't necessary, and so they're applied with the least product waste. This approach relies on regular soil testing to determine what areas in each field are saturated with legacy nutrients, and what areas require regular or increased application. Additionally, equipment is required to precisely apply nutrients below the soil surface for each plant. Recent experiments in Lenawee County have successfully shown that accounting for legacy nutrients in the field and precisely applying less nutrient has no appreciable impact on yields with significant cost savings to the producer (Graham Sustainability Institute, 2024). These and other findings were presented at the first-annual 2023 Western Lake Erie Basin Conference, held in Adrian, Michigan, where producer collaboration was highlighted as a key method toward increasing adoption of BMPs. However, producer attendance at the event was extremely low, exemplifying the engagement barrier between conservation practitioners and agricultural producers – a barrier this plan attempts to bridge.

Aside from the generalized recommendation for precision agriculture, this plan proposes a simplified three-phase BMP adoption strategy for use in Stony Creek. The strategy encourages producers and landowners to take on one practice per year for three years, and to maintain the combination of practices for a minimum of ten years to see marked improvements in soil health, water quality, and financial surplus from reduced inputs. Each practice is subsidized by a state or federal program, as shown in Table 1, with more support and information available through the Lenawee Conservation District staff. The two categories of field are generally more sloped (greater than 75% of the field in 3% grade

or higher) and less sloped (less than 75% of the field in 3% grade or higher). Developed with models using satellite topography measurements and soil type data, Figure 5 shows the relative erosion risk within Stony Creek at a 30 square meter resolution. Figure 6 highlights farm fields which encompass high erosion risk areas, and which are not known to be actively using BMPs to control erosion.

Table 1: Conservation programming information for producers in Stony Creek.

	STRAND	**Soil Erosion 101, Back to Basics**
Program Administration	MSU Extension, Lenawee Conservation District	Lenawee CD
Program Website	https://www.canr.msu.edu/news/strand-cost-share-signup-is-live	https://www.lenaweeconservationdistrict.org/
Program Phone Number	517-263-7400 Ext. 5 (LCD) or 888-678-3464 (MSU Ext.)	517-263-7400 Ext. 5
Program Offerings	Cost-share for new or enhanced precision nutrient management strategies for acreage in Michigan WLEB drainage	Flat rate payments for grass waterways, erosion control structures, and WASCOBs
Program Application	See the Lenawee Conservation District at 1100 Sutton Rd, Adrian, MI 49221	See the Lenawee Conservation District at 1100 Sutton Rd, Adrian, MI 49221

	Taking Nutrient Management to Another Level	USDA NRCS Support & FSA Grants
Program Administration	Lenawee CD	USDA
Program Website	https://www.lenaweeconservationdistrict.org/	https://www.nrcs.usda.gov/getting-assistance/how-to-apply
Program Phone Number	517-263-7400 Ext. 5	517-263-7400
Program Offerings	Funding for yield monitors, hydraulic down pressure, electric drives, variable rate, GPS, nitrogen applicators, strip-till equipment, cover crops, no-till combo, and more	CRP, CSP, EQIP, RCPP (Funding for most/all conservation programs - contact your USDA service provider)
Program Application	https://uploads.documents.cimpress.io/v1/uploads/1446845d-c321-44e3-aca2-1ed2be75627a~110/original?tenant=vbu-digital	See the USDA Field Office at 1100 Sutton Rd, Adrian, MI 49221

	Michigan CREP
Program Administration	MDARD
Program Website	https://www.michigan.gov/mdard/environment/crep
Program Phone Number	800-292-3939
Program Offerings	Additional cost-share for establishment of grasses, legumes, windbreaks, filter strips, riparian buffers, and more
Program Application	See the USDA Field Office at 1100 Sutton Rd, Adrian, MI 49221

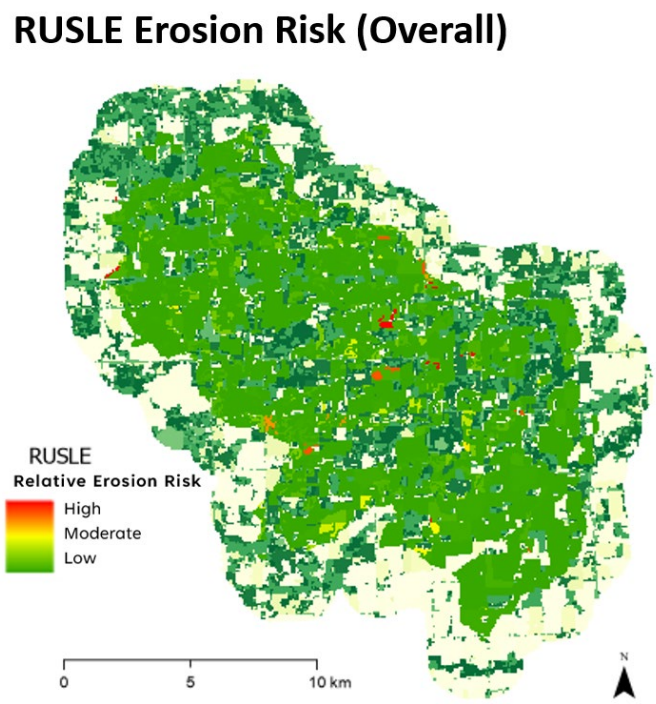

Figure 5: Stony Creek Relative Erosion Risk, factoring in soil type, rainfall data, and topography

For fields with moderate to high erosion risk according to Figures 5 and 6, three annually successive BMPs are recommended: Grassed waterways, WASCOBs, and no-till farming. Grassy waterways should be installed where natural gullies form in the landscape to trap suspended solids and prevent continued and repetitive erosion of soil. WASCOBs should be installed to impound water in a controlled manner and allow sediments to settle out either via elevated drainage or filtered drainage. No-till farming leaves maximum residue on farm fields and anchors the soil in place with the year's crop root systems, providing erosion resistance over the surface of the field.

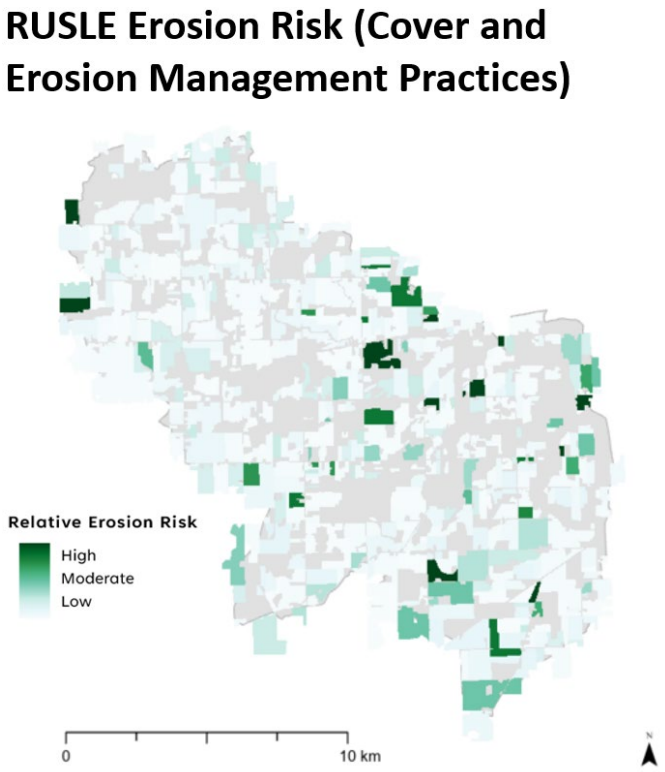

Figure 6: Stony Creek Relative Erosion Risk by Field and Observed BMP Use

For fields which fall in the low erosion risk categories in Figures 5 and 6, two alternative BMPs are recommended: Cover crops and filter strips. Like the benefits of no-till, cover crops anchor the soil and prevent erosion outside of the main growing season. Some cover crops can also be harvested and sold for a profit, but most are terminated and mulched to reincorporate biomass into the soil. See Table 1 for a comprehensive selection of cover crops applicable in Michigan and their individual pros and cons. Filter strips provide a riparian vegetation buffer between farmed row crops and drainage ditches, encouraging runoff nutrient uptake by buffer plants and improving local water quality.

Refer to Figure 7 for an agricultural BMP recommendations visual aid for Stony Creek producers.

Table 2: Selected Michigan cover crops for prevented planting with ratings for goals, advantages, and potential problems. Key: P – POOR, F FAIR, G – GOOD, VG – VERY GOOD, E – EXCELLENT, VH – VERY HIGH, H – HIGH, M – MODERATE, L – LOW, N – NONE. From Cover Crops for Prevented Planting, by D. Baas et al., 2019, MSU Extension.

			Goals						Potential Advantages								Potential Problems		
Species *	Summer Annual or Cool Season **	Winter Kill	N Scavenger	Soil Builder	Erosion Fighter	Weed Fighter	Good Grazing	Quick Growth	Subsoiler	Free P&K	Loosen Topsoil	Suppresses Nematodes	Suppresses Soil Diseases	Allelopathic	Attract Beneficials	Bears Traffic	Becomes a Weed	Attracts Harmful Insect/Nematodes	Contributes to Crop Diseases
Annual Ryegrass	SA	No	VG	VG	VG	VG	VG	VG	G	G	E	G	G	G	F	E	VH	N	L
Barley	CS	No	VG	VG	E	VG	VG	VG	G	G	VG	F	G	VG	G	G	L	M	M
Oats	SA	Yes	VG	G	VG	E	G	E	P	F	VG	P	G	VG	P	G	N	L	L
Rye	CS	No	E	E	E	E	G	E	F	VG	E	VG	VG	E	F	VG	M	L	L
Wheat	CS	No	VG	VG	VG	VG	VG	VG	G	VG	VG	F	F	F	F	G	L	M	M
Sorghum-Sudan	SA	Yes	E	E	E	VG	VG	E	E	G	G	VG	VG	E	G	G	L	L	N
Buckwheat	SA	Yes	P	G	F	E	P	E	P	E	VG	F	P	VG	E	P	VH	L	N
Radish	SA	Yes	E	VG	VG	E	G	VG	E	VG	G	VG	G	VG	F	F	L	L	N
Rapeseed	CS	No	VG	G	VG	VG	G	VG	G	F	G	VG	G	VG	G	F	M	M	N
Berseem Clover	SA	Yes	G	VG	VG	VG	E	E	VG	VG	G	F	F	G	VG	G	L	M	L
Crimson Clover	SA	Maybe	G	VG	VG	VG	G	E	F	G	G	F	G	F	VG	F	L	H	L
Red Clover	CS	No	G	VG	G	VG	E	F	VG	VG	G	F	F	G	VG	G	L	M	L
Sweetclovers	CS	No	F	E	VG	VG	F	G	E	E	E	F	F	F	VG	G	M	M	N
Winter Pea	CS	No	F	G	VG	G	VG	VG	F	F	VG	G	VG	F	VG	F	N	L	M
Hairy Vetch	CS	No	F	VG	G	G	G	F	G	G	VG	F	G	G	E	P	H	L	N

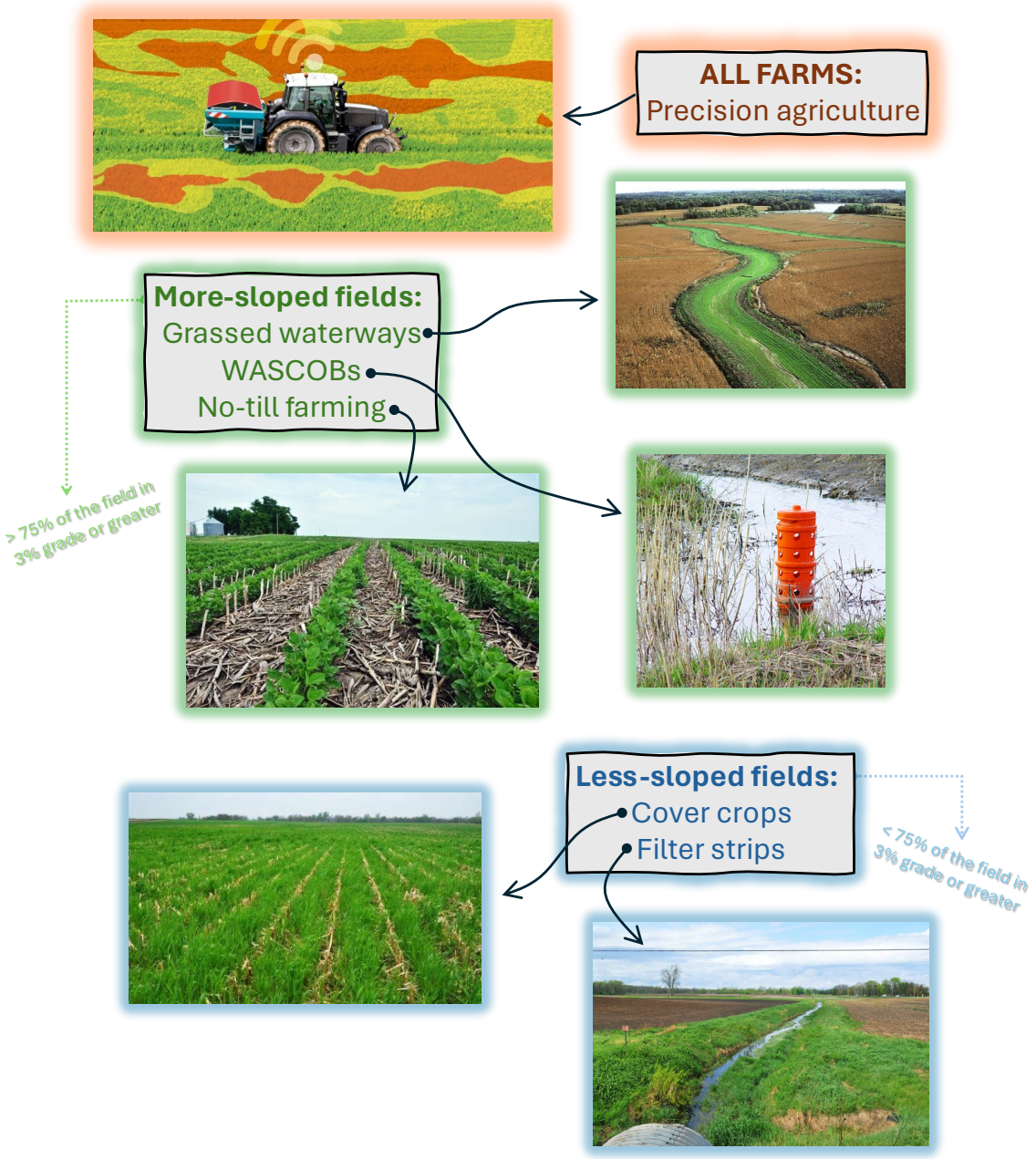

Figure 7: Stony Creek BMP Recommendations Visual Aid, showing the primary recommendations for Stony Creek farmers. Recommendations are differentiated between more- and less-sloped fields, defined by EGLE standards (greater/less than 75% of the field in 3% grade).

Information and Education (I&E)

Agricultural BMPs are familiar to producers, and yet BMP uptake lags in Stony Creek. This points to a need for more and better opportunities to bring farmers together to discuss and demonstrate the positive impacts of BMPs and the significant financial support available for conservation. Part of the information gap comes from the lack of edge-of-field monitoring, which some local producers indicate would make a difference in their conservation practice decision-making. In the absence of field-level monitoring data, there is still plenty of information which can be communicated and utilized for improved BMP uptake.

There are educational opportunities for Stony Creek producers interested in conservation farming in the form of the Center for Excellence field day and events put on by the Farmer-Led Conservation group and the Michigan Association of Conservation Districts (MACD). These events are annual or bi-annual and consist of informational sessions and updates from producers and researchers working in agricultural conservation. One approach to increasing I&E in Stony Creek is to attract more producers to these events. Event organizers should interface with local communities to develop a communication strategy to reach producers and landowners in the watershed with effective messaging and delivery methods.

A different approach is to increase engagement opportunities within Stony Creek on a more frequent and less formal basis. Quarterly events could be organized for producers, landowners, and watershed residents with informal conservation messaging to encourage community discussions around soil health and water quality. These sessions could be accompanied by pamphlets of up-to-date contact, program, and website information for conservation subsidy programs at all levels of government. This type of outreach effort could also be made at existing community events such as fairs, festivals, markets, etc. More frequent interactions embedded within the community may provide better engagement outcomes than less frequent special events.

A key aspect of both approaches is cooperation between conservation organizations' activities in Stony Creek. To maximize outreach, pool resources, and provide the most comprehensive set of information and recommendations to producers and community members, conservation organizations should coordinate their efforts as much as possible. For coordination purposes, a lead organization should be appointed to synchronize information and outreach activities on a central webpage for ease of access. Participating organizations (see Table 2) should agree to a coordination scheme, in which each organization procedurally updates the others on planned activities in and near Stony Creek.

Implementation Activities

There is no single path toward implementation of the recommendations in this plan. However, in the realm of voluntary farm conservation practices, careful outreach and engagement with producers may be the most important effort at the subwatershed level.

Active outreach is critical, whether at the individual or organizational level, and there are opportunities to bridge both levels on a more frequent basis. Table 2 lists organizations that are active in the local conservation space, and that may have an interest in coordinating outreach for sustainable farming practices. Organizing with these entities to provide quarterly or monthly opportunities for gatherings within Stony Creek would allow for more engagement with local producers. However, there is the issue of attracting producers to such events. Local advertising of events through geographically targeted social media ads, local radio station placements, notices placed in the Adrian Telegraph newspaper, and mailing notifications are all underutilized, with the latter having an outsized impact in recent Farmer-Led Conservation meeting attendance for new attendees.

These organizational outreach efforts should be paired with town halls in Clayton and Dover Township, local festivals, and other community events. Rather than catering to farmers at farmer-specific events, outreach should include engagement with the local community more broadly to normalize agricultural conservation concepts and raise the general awareness of their benefits for soil, water, and long-term sustainability. Changing community expectations about what healthy farm fields look like plays a role in the choices that farmers make within their communities, indicated by Stony Creek locals discussing the perceived “properness” of fields tilled bare after harvest.

In addition to active outreach, there is a need for locally specific conservation recommendations and information to be easily accessible and understandable in an online format. This should take the form of a single webpage, simple and easily navigable, which provides all the relevant information for Stony Creek producers and community members to become more informed and active in the conservation space. Utilizing an existing organization such as the River Raisin Watershed Council or the Farmer-Led Conservation group offers the most efficient pathway to establishment and maintenance of a one-stop-shop for local information outside of a government offering through MDARD or the Lenawee Conservation District.

The webpage should host links to recommended BMPs for Stony Creek farmers, as well as to the relevant cost-share programming at the Federal, State, and Conservation District levels, with instructions for application, “frequently asked questions” (FAQs), and other information designed to provide a first-time visitor with all the information they would need

to get started on a program application. The webpage would not attempt to be a replacement for resources provided by the Lenawee Conservation District, but rather a complement to the office and an additional resource to utilize when the District is task-saturated or unable to quickly respond to inquiries.

Importantly, this plan does not call for implementation or adoption of novel technologies for phosphorus capture or runoff prevention. Rather, community engagement and educational efforts should focus on the primary BMP recommendations included in this plan, which are well known and present a lower barrier in terms of aversion to change or perceptions of risk.

Table 3 Local Agricultural Conservation Organizations and Contact Information

Organization	Role	Location	Email	Phone
Lenawee Conservation District	Local government agricultural and natural resource conservation assistance, programs hub	Adrian, MI	brooke.bollwahn@macd.org	517-263-7400 (Ext. 5)
River Raisin Watershed Council	Watershed conservation non-profit, planning and implementation grant partner	Tecumseh, MI	rrwc@lenawee.mi.us	517-264-4754
Legacy Land Conservancy	Land trust and conservation non-profit	Ann Arbor, MI	info@legacylandconservancy.org	734-302-5263
MI Farm Link	Farm succession assistance, new farmer assistance, farmland conservation organization	Washtenaw County, MI	hello@mifarmlink.org	734-302-8715
Future Farmers of America	Youth and student organization for agriculture and leadership	Lenawee County, MI	region2ffa@gmail.com	517-849-9934
Farmer-Led Watershed Conservation	Conservation farming networking and education organization (administered by RRWC)	Lenawee County, MI	rrwc@lenawee.mi.us	517-264-4754
LISD Tech Center	Career technical education, natural resources and agriscience	Adrian, MI	carley.kratz@lisd.us	517-263-2108
Michigan Association of Conservation Districts	Advocacy organization for Michigan Conservation Districts	Flint, MI	dan.moilanen@macd.org	517-331-4391
Village of Clayton	Local government body & gathering space	Clayton, MI	villageofclayton@gmail.com	
Dover Township	Local government body & gathering space	Clayton, MI		517-445-2412 517-445-2267

Metrics and Evaluation

Metrics and monitoring continue to be a crucial element of watershed planning at the state and federal levels. Metrics typically come in the form of water quality monitoring data within key waterways and, in some cases, at the edge-of-field. However, for a nuanced understanding of all conditions contributing to nutrient and sediment losses from fields, and to offer recommendations for field-level BMPs backed by sampling and measurement, much more edge-of-field monitoring would be needed in Stony Creek. However, in Stony Creek (and perhaps at the HUC-12 scale in general), resources and social will would not support a local effort to install and maintain monitoring equipment at the field edge. This arduous and expensive task can only be left to State and Federal agencies, and implementation of such a program is not guaranteed even with their resources.

Rather than emphasizing a focus on metrics related to soil and water samples for Stony Creek, this plan recommends gathering and analyzing metrics related to the quantity of the following variables:

- Cropland acres enrolled in MAEAP, CREP, and other conservation programs,
- Number of farms enrolled in MAEAP, CREP, and other conservation programs,
- Miles of grassed waterways installed,
- Acres of cover crops,
- Acres of no-till and low-till,
- Acres managed via WASCOB,
- Miles of vegetated riparian buffers (buffer strips),
- Community outreach events quarterly and annually,
- Community outreach attendance,
- Farm conservation organizations active in Stony Creek, and
- Conservation champions active in Stony Creek.

Each of the variables on the list is measurable either through data collected by government entities via conservation programming enrollment, desktop analysis of satellite imagery, or by organizational network mapping and records from community engagement events. In terms of monitoring progress and setting goals for BMP uptake, these categories of data are either more readily available and feasible for collection, or they are already available. Additionally, they represent viable proxies for strict monitoring of water quality within Stony Creek. However, while several of these metrics are easily available at the state- and national-level through the USDA Agriculture Census, there are no products which identify their values at the county or subwatershed level. For example, there are 167,800 acres of cropland enrolled in MAEAP (MDARD, 2023), constituting 2.2% of the total 7,515,740 acres

of cropland in the state (USDA, 2022). Whether or not this is representative of the situation in Stony Creek is unclear, and developing subwatershed-level statistics would set up the necessary foundation for goal setting and progress evaluation. The context of this example can be extended across the following recommended metrics: Number of farms enrolled in conservation programs, miles of grassed waterways, acres of cover crops, acres of no-till and low-till, acres managed via WASCOB, and miles of vegetated riparian buffers. Submitting a Freedom of Information Act request from USDA Agricultural Research Service, National Agricultural Statistics Service (NASS) for this data in the specific Stony Creek geographic area may be required to develop these localized statistics.

The additional metrics are not likely to be housed in one central location, may not exist in a standard format, and may need to be developed from scratch in partnership with local conservation agencies and NGOs (see Table 3). Researching, maintenance, and publishing of these metrics would likely be a central role of a Stony Creek agricultural conservation entity, whether at the Conservation District, another local entity, or a new organization focused on agricultural conservation in Stony Creek.

Conclusion

Agricultural conservation for environmental improvement and long-term sustainability is a critical task facing producers in the Stony Creek (South Branch River Raisin) subwatershed. While producers here have opportunities to take up agricultural best management practices through a wide range of government-subsidized cost-share programs, the adoption rates of these practices are hindered by several factors. Economic, bureaucratic, and socio-cultural aspects of BMP adoption all present challenges to producers and weigh heavily in their choices regarding the uptake of conservation practices. These challenges can be mitigated, in part, through building more and better community-based engagement and educational efforts. Opportunities for community-centric conservation networking exist within the various organizations currently operating in and near Stony Creek (see Table 3). These organizations can be leveraged as a holistic resource for developing community conservation events at higher than annual or bi-annual frequency throughout the region. By centering the lived experiences of local producers, information and education efforts can boost perceptions and attitudes around BMPs, which are a critical marker of whether producers will overcome barriers and pursue conservation practices.

Additionally, the barriers described can be mitigated with simple and specific conservation programming, most accessed through Lenawee Conservation District but also available through USDA FSA and NRCS efforts. We recommend all producers take up precision agriculture in order to utilize their operational inputs most efficiently for cost savings and

improvements to soil health and water quality. Additionally, for producers who are new to conservation practices, we recommend one of two suites of BMPs depending on whether farm fields are more- or less-sloped, with practices including cover crops, reduced tillage, WASCOBs, and others. These practices are all covered by cost-share programming, with program details listed in Table 1.

While our recommendations are specific to Stony Creek, they are simplified and by no means exhaustive. We believe the recommendations provided here are the most direct route to increasing the adoption of BMPs in this region, but there is certainly a need for creative approaches to increasing BMP adoption in the future. Conservation competitions, local conservation newsletters, conservation champions, increased involvement with local town halls – these and more could bring a fresh perspective to community conservation planning within the Stony Creek community for improved local and downstream conditions.

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