

## The Missing Link to U.S. Water Quality Improvement: Connecting Agricultural Stewardship and Profit.

Despite decades of efforts to improve the nation’s water quality, more progress is needed. Efforts to improve water quality across agricultural landscapes have focused on programs offering payments to implement conservation practices (e.g., grassed waterways) or to change farming methods. Few farmers participate in these programs because they are highly bureaucratic and payments are insufficient to cover conservation practice maintenance costs. This situation has hindered timely and meaningful improvement to the nation’s water quality and increased pressure to regulate agriculture.

A new approach is needed to expand adoption of conservation practices by American farmers. The International Water Institute (IWI), a 501c3 non-profit organization (<https://iwinst.org>), is leading a public-private partnership to explore a new voluntary approach to address non-point source pollution issues. The “Stewardship Pilot Program” (SPP) is funded by The Mosaic Company (<http://www.mosaicco.com/>), an international fertilizer company, with guidance provided by SB&B Foods LLC (<https://sb-b.com/>), an agricultural company. The approach included a critical element for success – the shared vision and leadership of ten farmers in eastern North Dakota and western Minnesota.

***“Nothing about our efforts to voluntarily protect and improve the water quality of our streams, rivers and lakes within rural, agricultural landscapes in the U.S makes sense, unless you understand and involve the American Farmer.”***  
**Mark R. Deutschman, Ph.D., P.E., IWI Research Director**

SPP scientists and economists collaborated with farmers in January 2019 to explore how farming methods affect profit and “stewardship quality”. The SPP approach is novel because it defines stewardship quality using fourteen technical criteria reflecting the amount and quality of water leaving the field and potentially impacting received waters. Criteria included a measure of industry performance standards for managing and applying fertilizer, known as the “4Rs” (<https://nutrientstewardship.org/4rs/>). SPP scientists combined the fourteen criteria into a “Field Stewardship Rating” (FSR) describing the stewardship quality of the farm field. Stewardship quality is a function of the fourteen criteria and field’s farm management strategy (e.g., type of crops planted and tillage practices).

Each farmer provided 5-years of economic and yield data for 2 fields enrolled in the SPP. To understand the relationship between stewardship quality and profit, farmers considered two alternative farming method options on each field. The options focused on low-yield areas of each field due to poor drainage, shading from shelter belts, high slopes/soil movement, and saline soils.

***“The Stewardship Pilot Program influenced how I think about farming and provided me with critical information that linked my farming methods to profit, the effects on water leaving my field, and my level of stewardship quality.”***  
**A Participating North Dakota Farmer.**

Option development was facilitated using the farmers’ yield maps combined with soil types, elevation, slope, water flow paths, estimates of soil and nutrient loss, the amount of water retained by the soil, possible locations for conservation practices, and potential downstream water quality impacts. SPP data were derived from a computer application called the Prioritize, Target and Measure Application (<https://nd.ptmapp.iwinst.org/>).

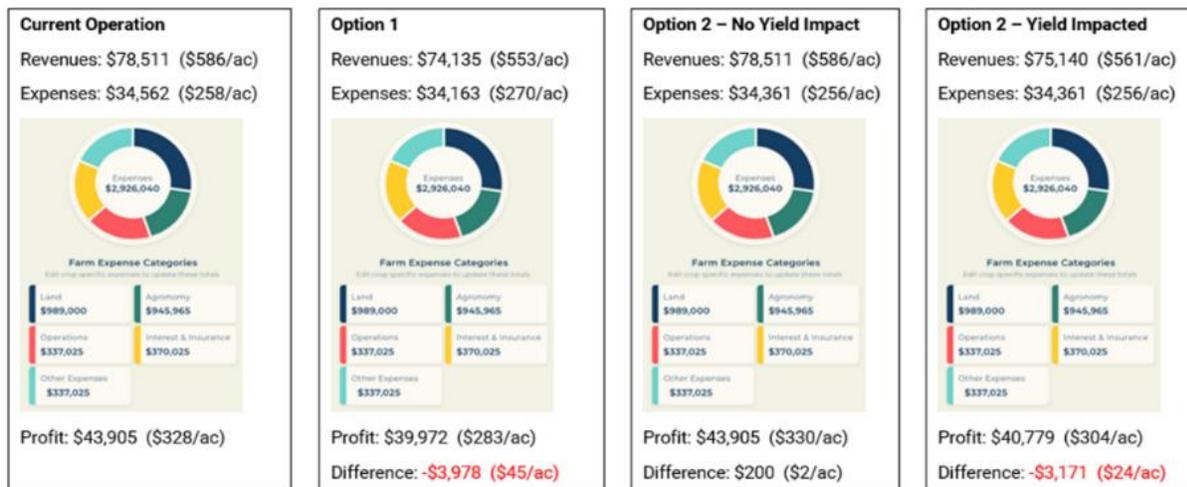
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The SPP concentrated on providing actionable information to farmers. Farmers could easily understand how profit and FSR change if they farm differently using a dashboard comprised of a “speedometer” and a series of colored charts to compare the stewardship quality (FSR) and profit for their current operation and the two options.

**Field Stewardship Rating (FSR) “speedometer” for the farm-field operation and two options.**



**Field profit information for the current operation and two options.**



Analysis of SPP data indicated a positive relationship between profit and stewardship quality (i.e., profit and stewardship quality values increase concurrently). As business owners, farmers acknowledge profit is necessary to continue farming. However, many on farm decision rarely focus solely on profit. Every SPP farmer expressed a deep desire to improve their operation, protect the land, and preserve their agricultural legacy for their children and grandchildren. Demonstrating the positive profit – FSR relationship was a key SPP outcome that can drive large-scale adoption of conservation practices necessary to improve the nation’s water quality.

Additional work is needed before the SPP approach can be adapted to larger areas. The criteria used to establish stewardship quality need more investigation. For instance; although the FSR was applied to farm fields with varying soil types and physical characteristics, the criteria may require modification (e.g.

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changing the number and type) in other agricultural regions. SPP partners also believe the profit - stewardship quality relationship will strengthen if revenue was provided to the farmer for increasing their FSR. Corporations and conservation organizations interested in supporting their sustainability claims are possible revenue sources the partnership will explore.

The partnership plans to continue refining the SPP approach and prepare for watershed-scale applications beginning in late 2020. The IWI's goal is to work with farmers in different U.S. watersheds to implement large-scale voluntary Stewardship Programs and improve our nation's water quality.

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