Integration of Precision Prairie Applications with Business and Conservation Planning
Submitted by: Bill Kuckuck, Executive Vice President and Chief Operating Officer, CropLife America
Partners: CropLife Foundation, Iowa Agriculture Water Alliance, Iowa State University, Iowa Soybean Association’s Environmental Programs and Services, EFC Systems, Pheasants Forever, Heartland Co-op, Natural Resources Conservation Service (NRCS)
Presenter: Jim Jordahl, Iowa Agriculture Water Alliance

This case study describes two closely aligned efforts on the integration of precision prairie application with business and conservation planning in Iowa. The CropLife Foundation ‘Precision Prairie’ (CPP) Project pairs prairie strips with subfield scale profitability analysis. Key activities include technology development and outreach to farmers to help them understand the economic and environmental benefits of prairie strips. The Iowa Agriculture Water Alliance (IAWA) project, ‘Accelerating Habitat-Water Quality Conservation and Enhancing Agricultural Return on Investment’ (Ag-ROI), integrates business planning and conservation planning by building on subfield profitability analysis and helping farmers complete conservation plans and identify locations to implement conservation practices using the EFC Systems (AgSolver) Profit Zone Management platform (PZM). Many of the project partners are involved on both projects. Together, the projects promote the use of prairie strips to improve environmental benefits (such as reducing water run-off, nitrogen and phosphorus loss and increasing wildlife habitat) while also incorporating business planning and improving economic efficiency for farmers.

The Importance of Local Agricultural Retailers on Improving Micro- and Macronutrient Management and Efficiency
Submitted by: Hunter Carpenter, Director of Public Policy, Agricultural Retailers Association
Partners: Gary Farrell-President and CEO of Ag Enterprise Supply, local Soil and Water Conservation Districts, Agricultural Retailers Association, NRCS
Presenter: Gary Farrell, President and CEO of Ag Enterprise Supply

Local conservation districts, innovative growers, the Direct Seed Association and NRCS partnered together in Spokane, Washington to address a lack of information on local cover crops, lack of research on micro- and macronutrient efficiencies, and lack of reliable data to determine yield potential; unreliable base lines to interpret soil health tests; and limited markets for alternative crops that would improve diversity and soil health. To help address these problems, Gary Farrell, the President and CEO of Ag Enterprise Supply, Inc., worked with local growers who adopted yield monitor technology to help them implement variable rates of fertilizer, micronutrients and crop seed to fine tune fertility recommendations and determine different nutrient efficiencies. Due to this assistance, producers were able to save money on nitrogen fertilizers and instead invest in micronutrients that had been previously unaffordable, resulting in environmental benefits and financial gain for both the producer and agricultural retailer. This case study demonstrates how the localized expertise of small independent agribusiness retailers can help producers improve nutrient management and efficiency.
The PA 4R Alliance: Accelerating Farm Adoption of Nutrient Stewardship in Pennsylvania
Submitted by: Dan Dostie, State Resource Conservationist, Pennsylvania NRCS and Eric Rosenbaum, Executive Director, PA 4R Alliance
Partners: PennAg Industries Association, USDA NRCS, The Fertilizer Institute, The Nature Conservancy
Presenter: Dean Collamer, Chair, PA 4R Alliance Steering Committee

The PA 4R Alliance was created in July 2012 as a volunteer organization and affiliate of the PennAg Industries Association in response to an NRCS subcommittee review of the PA 590 Nutrient Management conservation practice standard. The subcommittee identified a need for agribusinesses to work with farmers through a unified research and education strategy to expand the adoption of 4Rs Nutrient Stewardship Practices in Pennsylvania. The Alliance was selected for a Conservation Innovations Grant (CIG) in 2013 to accelerate adoption of nutrient stewardship practices by Pennsylvania farmers by establishing a common language and facilitating dialogue among agricultural stakeholders throughout the state. Since then, the PA 4R Alliance has continued to build trusting partnerships with a wide group of stakeholders around nutrient management and improved water quality. They have also developed numerous publications on 4R nutrient stewardship and conducted extensive educational outreach programs to address misinformation about the cost of nutrient management, educate legislators on future regulatory impacts, and share 4R success stories. Since concluding their CIG project in 2015, they have collaborated with new partners including The Nature Conservancy and the Mid-Atlantic 4R Nutrient Stewardship Association to continue expanding their reach. In October of 2017, a new grant from the National Fish & Wildlife Foundation was received that will be used to support the agricultural community’s efforts to improve water quality in Delaware, Maryland, and Pennsylvania through an increase of 335,000 acres of practice implementation.

Strengthening Relationships between Agricultural Service Providers to Enhance Irrigation Management
Submitted by: Britt Aasmundstad, Associate Director, Public Policy, National Association of State Departments of Agriculture
Partners: National Association of State Departments of Agriculture, Coca-Cola North America-Environment and Sustainability Group, Jackson Soil and Water Conservation District, The Nature Conservancy, Larry Ford with Ford Farms, Florida Department of Agriculture and Consumer Services-Office of Agricultural Water Policy (FDACS-OAWP)
Presenter: David Cambron, Environmental Manager, FDACS-OAWP

Five partners came together with the common objective of reducing groundwater withdrawal as a direct result of increased irrigation efficiencies. The major goal of this partnership was to identify and initiate an innovative project that could serve as a flagship program to local producers who wish to enhance their irrigation management and conservation stewardship while also improving significant water savings. The Florida Depart of Agriculture and Consumer Services – Office of Agricultural Water Policy, the Coca-Cola North America Environment and Sustainability Group, The Nature Conservancy, the Jackson Soil and Water Conservation District and Larry Ford with Ford Farms all played a critical part in the success of this project from funding, producer selection and project facilitation. This case study provides best practices for ensuring project advancement and close collaboration despite facing numerous unforeseen circumstances during project implementation.
Partnering to Increase Precision Agriculture Nutrient Management Adoption in Eastern South Carolina
Submitted by: Karl Anderson, Director of Government Relations, American Society of Agronomy
Partners: Russell Duncan-Owner of CRD Agronomics LLC, USDA NRCS, Carolina Eastern Company
Presenter: Russell Duncan, Owner of CRD Agronomics LLC

Recognizing the need to increase the rate of precision agriculture nutrient management adoption in eastern South Carolina, specifically the Big Swamp Watershed, Mr. Russell Duncan, CRD Agronomics LLC, partnered with the Natural Resources Conservation Service (NRCS) office and the Carolina Eastern Company. Mr. Duncan and NRCS held joint workshops to educate producers on comprehensive nutrient management plans (CNMPs) and to introduce eligible producers to sign up for NRCS Environmental Quality Incentive Program (EQIP) grants to help them attain financial assistance for cover crops and advanced precision farming practices. Mr. Duncan’s status as a Certified Crop Advisor was important in his ability to engage farmers and promote EQIP. Despite facing initial resistance from some producers on deviating from standard nutrient management practices, the initial adopters of precision agriculture nutrient management practices experienced successful results and helped to recruit additional EQIP participants through their success stories.
**Project Description**

This case study describes two closely aligned efforts on the integration of precision prairie application with business and conservation planning. Many of the project partners are involved in both projects.

The projects are intended to assist private landowners meet their production and conservation goals while improving profitability and demonstrate the importance and effectiveness of voluntary conservation efforts.

In the CropLife Precision Prairie (CPP) Project, the Crop Life Foundation is partnering with the Iowa Soybean Association, Iowa State University, Iowa Agriculture Water Alliance (IAWA) and others to scale up pairing prairie strips with subfield scale profitability analysis.

Key activities include technology development and outreach to farmers with an added focus on the design and management of prairie strips for integration with crop protection strategies to optimize production, while continuing to evaluate the effectiveness of this method in improving water quality and pollinator habitat.

The IAWA project, ‘Accelerating Habitat-Water Quality Conservation and Enhancing Agricultural Return on Investment’ (Ag-ROI), works with EFC Systems and their Profit Zone Manager platform (PZM) to determine which acres are consistently unprofitable and better suited for conservation practices such as prairie strips. Conservation planning and application of practices are then focused on these unprofitable areas. The project will include an evaluation of different methods of delivering these services.

** Problems and Opportunities **

While extensive agricultural production is an essential component of the Midwestern region’s economy, an important contributor to the world’s food supply, there are recognized environmental concerns including soil erosion, water quality, and habitat loss for pollinators, other insects, and bird species associated with this scale of row crop production. Moreover, farmers are squeezed by ever higher input prices and periods where commodity prices fall below the cost of production. Emerging opportunities to address many of these concerns simultaneously include precision business planning to improve their return on investment (ROI) and strategic placement of zones of native prairie species.

Iowa State University has led development of Prairie strips technology as a practical, low-cost means of providing substantial reductions in soil erosion, improvements in water quality, and an expansion of pollinator and wildlife habitat. In this approach, narrow strips of native grasses and wildflowers are planted within row crops.

Subfield-scale profitability analysis enables farmers to determine the profitability of every acre in their fields to optimize their ROI. Taking unprofitable acres out of production and putting them into prairie strips releases capital that can be invested in the remaining parts of the field that more consistently generate revenue.

The CropLife Foundation and IAWA are coordinating efforts on the CPP and Ag-ROI projects to advance these approaches.

** Project Partners **

CropLife Foundation
USDA-Natural Resources Conservation Service
Iowa Agriculture Water Alliance (IAWA)
Iowa State University
Iowa Soybean Association/Environmental Programs & Services (ISA/EPS)
EFC Systems
Pheasants Forever
Heartland Co-op

** Partnership Dates **

2015 to 2020
Croplife Precision Prairie (CPP)
2016 to 2018
Agriculture Return on Investment (Ag-ROI)

** Project Goals **

Overarching goals of both the CPP and Ag-ROI projects include improved water quality, pollinator habitat, and soil conservation while intensifying yields and increasing capacity for voluntary conservation in the Corn Belt.

The CPP project seeks to advance sustainable intensification on working landscapes by focusing on the most productive and profitable acres coupled with strategic placement of prairie strips in areas of lower profit potential. Displacing lower profit potential cropland with prairie may free-up resources helping farmers to optimize crop production on remaining cropland and maintain or improve soil quality such that agricultural yield goals can continue to be met.
The Ag-ROI project looks to change the paradigm for conservation discussions with producers by improving farm economics. This includes evaluating alternative methods of project delivery and supporting and developing the capabilities of private sector conservation planning resources.

**Measures of Success**

**CPP**
- Prairie STRIPS program now has 40 sites in Iowa and additional sites in Missouri, Michigan, and Wisconsin.
- Approximately $5M in prairie strips research funded at ISU.
- 32 peer-reviewed journal papers supporting prairie strips and a summary paper in top-tier scientific journal, PNAS.
- Conducted 5 CCA/TSP training sessions in Iowa in 2017 with a total of 62 attendees.

**Ag-ROI**
- Combined, ISA-EPS and Heartland Co-op reached 42 producers and conducted 18 PZM scenarios.
- ISA-EPS CCAs now able to conduct PZM analysis independently of EFC Systems.
- Reached approximately 850 farmers/landowners about project.
- Collaboration and financial support of two ISU CCA/TSP training sessions.

**Best Practices**

**CPP**
- Provocative and rock-solid data have been key to farmer/farmland owner interests in prairie strips.
- Farmer champions provide another kind of essential credibility.
- Soil conservation message particularly resonates with farmer audiences. Multiple, disproportionate benefits of prairie strips are also very appealing.

**Ag-ROI**
- Plan for a significant challenge in helping producers understand the economic opportunity associated with subfield profitability analysis such that they are motivated to fully engage and invest in the approach.
- Multiple contacts and strong relationships based on trust are required to conduct subfield profitability analysis and to link this with conservation planning and practice implementation.
- Private sector business models and structure change often, and potentially multiple times during project development and delivery. Projects including public-private partnerships need to be flexible and adaptable to these changes.
- Incorporate prairie strips as a distinct practice in EQIP based on the design standards established by the Prairie strips program at ISU (i.e., distinct from contour buffer strips and filter strips).
- Integrate economic tools including subfield economic analysis in conservation planning.
- Develop and conduct training for staff on subfield profitability analysis (awareness, not necessarily proficiency) and prairie strips as tools in conservation planning.

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**Example Profitability Data**

![Profitability Data Chart](chart.png)

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The PA 4R Alliance
Accelerating Adoption of Nutrient Stewardship Principles in PA

**Partnership Summary**
The PA 4R Alliance was created in July 2012 as a volunteer organization and affiliate of the PennAg Industries Association in response to a Natural Resources Conservation Service (NRCS) subcommittee review of the PA 590 Nutrient Management conservation practice standard. The subcommittee identified a need for agribusinesses to work with farmers through a unified research and education strategy to expand the adoption of 4R Nutrient Stewardship principles in Pennsylvania to have a positive impact with respect to economic, social and environmental outcomes.

The Alliance was selected for a Pennsylvania NRCS Conservation Innovations Grant (CIG) in 2013 to accelerate adoption of nutrient stewardship practices by Pennsylvania farmers by establishing a common language and facilitating dialogue among agricultural stakeholders throughout the state. Since then, the PA 4R Alliance has continued to build trusting partnerships with a wide group of stakeholders, including government agencies, non-profit environmental groups, agribusinesses and farmers around nutrient management and improved water quality.

The Alliance has also developed numerous publications on 4R nutrient stewardship and has conducted extensive educational and outreach programs. Since concluding their CIG project in 2015, they have collaborated with new partners including The Nature Conservancy (TNC) and the Mid-Atlantic 4R Nutrient Stewardship Association to continue expanding their reach. In October of 2017, a new grant from the National Fish & Wildlife Foundation was received that will be used to support the agricultural community’s efforts to improve water quality in Delaware, Maryland, and Pennsylvania through an increase of 335,000 acres of practice implementation.

A Memorandum of Understanding was drafted in September of 2017 between the PA 4R Alliance and the NRCS to establish their mutual interests and agreement to cooperate in accelerating the adoption of nutrient stewardship principles.

**Location: Pennsylvania**

**Problems and Opportunities**
The mutual interest of the PA 4R Alliance and PA NRCS partnership is to improve crop productivity, reduce loss of nutrients to the environment and maintain a positive return on producers’ and taxpayers’ investments. This mission fostered an initial project to establish a common language to express sustainable crop management and nutrient stewardship across industry, government agencies, environmental stakeholders, consultants and farmers. Additionally, the initial project sought out opportunities to collectively deliver science-based systems that increase nutrient use efficiency as a means to achieve mutual interests.

**Partnership Priorities**
The PA 4R Alliance completed a discovery process in 2013 and formulated an action plan and set priorities around:

**Research** – Test in-season field specific nutrient use efficiency systems; research soil health and resilience; develop strategies to minimize stress; increase manure nutrient conservation including precision feeding,

**Private-Public Partners**
PA 4R Alliance
USDA-NRCS Pennsylvania

**Key Stakeholders**
The Fertilizer Institute
PennAg Industries Association
Mid-Atlantic 4R Nutrient Stewardship Association
GROWMARK FS
PA Farm Bureau
Timac USA
Chemgro
Syngenta
The Nature Conservancy

**Partnership Dates**
March 2012 PA NRCS 590 subcommittee recommendation
July 2012 PA 4R Alliance created
September 2013 PA NRCS CIG awarded
January 2014 Rosetree Consulting brought on as Executive Directors
September 2015 PA NRCS CIG completed
March 2017 Mid-Atlantic Association formed
October 2017 NFWF Grant awarded
November 2017 TNC hires PA Ag Program Manager to support 4R initiatives
bedding, solid liquid manure separation, storage and land application technology improvements, export, and manure to energy conversion.

**Education and Outreach** – Work with farmers, ag retailers, crop consultants, extension agents, industry representatives, non-profits and agency staff to establish a dialogue and further the adoption and understanding of 4R Nutrient Stewardship.

**Data Collection and Quality** – Develop a shared database for 4R and nutrient use efficiency research and demonstration, address misinformation and fill data gaps.

**Communication** – Address misinformation about the true cost and value of nutrients, especially manure nutrient sources. Share success stories, educate legislators about future regulatory impacts and need for certainty. Target conversations to each market segment from early adopters/champions (20% of the farming operations), to the basic and mid-level adoption operators (60% of the farming operations) and those with no adoption of 4R practices (20% of farming operations).

**Initial Project Measures of Success**

The purpose of the initial project was to translate The Fertilizer Institute’s 4R Nutrient Stewardship concepts into plain language familiar to Pennsylvania landscapes and farmers and to demonstrate 4R concepts in action. The two primary outreach products developed include a practical pocket guide for local farmers to implement 4R practices year-round called the “4waRd Thinking” brochure and a “How Do You do 4R on Your Farm?” fact sheet. This two-year project resulted in reaching 2,080 farmers, 238 NGO members, and 790 industry representatives through 35 outreach events supported by PennAg Industries, agribusiness, Penn State Extension, PA regulatory agencies and industry associations. As a result of this successful project, new partners, including The Nature Conservancy, have expressed interest in building on this project.

**Best Practices**

**Actively listen**
Keep an open mind. Listen to understand and seek to find common ground you can build on.

**Begin at the beginning**
Before selling advanced practices to a new customer, establish that they have mastered the basic ones. Do you test the soil? Calibrate application equipment? Keep records? Sample manure sources? Stabilize nitrogen?

**Use plain language**
While the 4R practices are science-based, use plain language to achieve buy-in and sell new ideas.

**Make it relevant**
Site and customer-specific information is key to earning trust and transforming a one-time encounter into a life-long relationship.

**Contact Information**

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January 2018
Project Description

Multiple agencies working to improve irrigation practices in Northwest Florida partnered with the Replenish Project of the Coca-Cola Corporation to work with farmers to improve efficiency of irrigation water use and reduce costs, by demonstrating advanced irrigation technologies at a farm in Greenwood, Florida. The existing irrigation type was an electric fixed center pivot overhead irrigation system with a 288 wettable acre footprint. This system is 1,948 feet long with an end gun.

During the project, the system was fully automated with 6 zone controller kits, allowing the pivot to operate 42 zones of irrigation independently. The entire system is fully automated and wireless, allowing the farmer to determine the status of the pivot and to control the pivot remotely and the farmer to match irrigation precisely to a soils map of available water capacity. Using maps provided by a Mobile Irrigation Lab, the farmer can modify the irrigation prescription to more accurately apply water where needed, minimize runoff, and avoid irrigating non-production areas.

Problems and Opportunities

Conventional center pivot irrigation systems typically operate at high pressure with impact sprinklers spraying water from the top of the pivot mainline. Retrofitting these traditional systems with spray-type sprinklers on drop hoses can generate considerable water and energy savings by applying water at a lower pressure more directly to the soil surface to reduce evaporation and wind drift losses and produce a uniform application of water droplets over the field.

The area of the project is a karst terrain with increasing demand on the Floridian Aquifer. Soils are highly permeable resulting in the potential water quality impacts as a result of over-irrigation.

Project Goals

The goal was to reduce groundwater withdrawal as a direct result of increased irrigation efficiencies. The project aimed to utilize an innovative irrigation system retrofit to demonstrate the feasibility of irrigation efficiency enhancements and conduct a field day to encourage similar projects to surrounding producers. Groundwater withdrawal reductions were calculated as the volume of water that is not withdrawn for irrigation, as a result of implementing irrigation improvements. The water savings associated with irrigation improvements were estimated though field evaluations conducted by the Mobile Irrigation Laboratory (MIL), which is a partnership between the Florida Department of Agriculture and Consumer Services, the Natural Resources Conservation Service and Northwest Florida Water Management District.

Project Partners

- Replenish Project
- Coca-Cola Corporation
- The Nature Conservancy
- Jackson Soil and Water Conservation District
- Florida Department of Agriculture and Consumer Services
- NW Florida Mobile Irrigation Laboratory
- Limno Tech

Partnership Dates

October 2015 to October 2016
Measures of Success
The MIL evaluated the performance of the irrigation system at the project farm before and after the upgrades were completed on the center pivot system. The water savings are calculated separately for implementation of the irrigation emitter retrofits and Variable Rate Irrigation.

Irrigation emitter retrofits:
- Net irrigation requirement (for cotton crop)
  \[1 = 9.46 \text{ inches}\]
- Area under irrigation = 288 acres
- Pre-project (before emitter retrofits)
  - Distribution efficiency before emitter retrofits = 0.68
  - Total irrigation application before emitter retrofits = 14 inches = 333.9 acre-ft/yr
- Post-project (after emitter retrofits)
  - Distribution efficiency after emitter retrofits = 0.93
  - Total irrigation application after emitter retrofits: 10 inches = 244.1 acre-ft/yr
- Water Savings = pre-project irrigation volume – post-project irrigation volume
  \[= 333.9 \text{ acre-ft/yr} - 244.1 \text{ acre-ft/yr} = 89.8 \text{ acre-ft/yr} = 29.24 \text{ million gals/yr}\]

Variable Rate Irrigation (VRI):
The water savings associated with VRI are calculated as the volume of water that was not applied, as a result of using the VRI technology. This calculation considers the total water volume applied after implementing irrigation retrofit, which equals 10 inches per growing season. Areas affected by VRI and associated water savings are presented in Table 1 below.

Best Practices
- Utilize existing agency relationships to expedite new projects
- Incorporate time for development of contractual arrangements between participating partners
- Anticipate complications that may arise from undertaking irrigation projects on an operating farm.
- In this case, the success of the project was jeopardized by complications from the installations of a variable frequency drive motor on the irrigation well. Project timelines need to include flexibility for similar complications.
- Use field days with the participation of the cooperating grower to demonstrate the success of the project and viability for other area producers.

### Table 1. Irrigation water savings associated with VRI

<table>
<thead>
<tr>
<th>Area</th>
<th>VRI Impact</th>
<th>Irrigation Avoided</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Acre-inch</td>
</tr>
<tr>
<td>6 acres</td>
<td>Non-Crop Area</td>
<td>60</td>
</tr>
<tr>
<td>16 acres</td>
<td>50% reduction</td>
<td>80</td>
</tr>
<tr>
<td>17 acres</td>
<td>30 reduction</td>
<td>51</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>191</td>
</tr>
</tbody>
</table>

Water savings due to VRI = 5,186,462 gallons/year

Total water savings = water savings due to emitter retrofits + water savings due to VRI
\[= 29.24 \text{ million gals/yr} + 5.19 \text{ million gals/yr} = 34.43 \text{ million gals/yr} \]

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Natural Resources Conservation Service

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