M.L. 2017, Chp. 96, Sec. 2, Subd. 08j Project Abstract
For the Period Ending June 30, 2022

PROJECT TITLE: Economic Assessment of Precision Conservation and Agriculture
PROJECT MANAGER: Tanner Bruse
AFFILIATION: Pheasants Forever
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FUNDING SOURCE: Environment and Natural Resources Trust Fund
LEGAL CITATION: M.L. 2017, Chp. 96, Sec. 2, Subd. 08j

APPROPRIATION AMOUNT: $400,000
AMOUNT SPENT: $290,464
AMOUNT REMAINING: $109,536

Sound bite of Project Outcomes and Results
This project showcased opportunities available for farmers and landowners to implement profitable conservation practices on lands otherwise providing a negative return. Through this new approach to conservation delivery, we were able to put 1,216 acres of conservation on the landscape, providing multiple benefits to Minnesota's natural resources and economy.

Overall Project Outcome and Results
With recent advancements of real-time yield monitoring, it has been demonstrated that, on many farms, 3-15% of cropped acres cost money to farm (revenue negative acres). By applying the current cutting-edge precision technology and focusing on return on investment (ROI) to deliver conservation, we worked with farmers to identify areas that make sense for them to apply conservation practices in a practical and profitable way. This new approach to conservation delivery, focused on revenue negative acres, provided insight to the consideration of profitable conservation practices, reasons for conservation adoption, and the delivery of conservation acres that otherwise would've continued to be in traditional crop production. In addition, this project demonstrated a high level of cooperation and coordination between agriculture and conservation.

By looking at the entire operation, at the enterprise level, current technology allows for acre-by-acre analysis to develop conservation solutions on acres that otherwise yield a negative return. This project worked directly with 72 farmers to analyze 45,214 acres and look for conservation solutions on 5,382 acres that are low yielding in comparison to the rest of the field or operation. Our findings show that of the analyzed acres, 12% of the acres fell below break-even yield, which is in the range of 3-15% revenue negative acres demonstrated by previous research (E Brand *et al* 2016). With the analysis and available program opportunities this project was able to meet farmer objectives while increasing profitability through conservation on 1,216 acres. These are acres that otherwise didn't receive consideration for conservation practices. While not all identified acres received immediate change, the overall conversation and influence of this project, opened the door for continued conservation consideration and future conservation adoption. The practices implemented provide direct benefit to Minnesotans through increased soil health, water quality, carbon sequestration, wildlife habitat, and other natural resources.

Project Results Use and Dissemination
This project resulted in the hiring of a precision ag & conservation specialist to work with farmers, landowners, trusted advisors and demonstrate the use of precision agriculture technology to deliver conservation on the landscape. This project helped launch the addition of multiple staff in additional states to both implement and

influence conservation on the landscape. This project hosted or was a part of 66 different outreach event impacting 3,608 attendees. Outreach consisted of online webinars, attendance at tradeshows (such as the MN Ag Expo and FarmFest) along with varying presentations and meetings geared towards ag professionals, conservation professionals, and farmers/landowners.

Environment and Natural Resources Trust Fund (ENRTF)
M.L. 2017 LCCMR Work Plan Final Report

Date of Submission: August 2022

Final Report

Date of Work Plan Approval: 06/07/2017

Project Completion Date: June 30, 2022

PROJECT TITLE: Economic Assessment of Precision Conservation and Agriculture

Project Manager: Tanner Bruse

Organization: Pheasants Forever

Mailing Address: 1783 Buerkle Circle

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Location: Ag matrix of MN (NW, W, WC, C, SW, S and SE)

Total ENRTF Project Budget:	**ENRTF Appropriation:**	**$400,000**
	Amount Spent:	**$290,437**
	Balance:	**$109,563**

Legal Citation: M.L. 2017, Chp. 96, Sec. 2, Subd. 08j

Appropriation Language:
$400,000 the first year is from the trust fund to the commissioner of natural resources for an agreement with Pheasants Forever to demonstrate a new approach to promote conservation practices utilizing return-on-investment analysis and identifying revenue-negative acres on agricultural land to assist farmers in implementing conservation practices that will provide environmental and economic benefits. This appropriation is available until June 30, 2020, by which time the project must be completed and final products delivered.

I. PROJECT TITLE: Economic Assessment of Precision Conservation and Agriculture

II. PROJECT STATEMENT:

With recent advancements of real-time yield monitoring combined with substantial declines in commodity prices it has been demonstrated that, on many farms, 3-15% of cropped acres cost money to farm (revenue negative acres). This proposal will foster an unprecedented level of cooperation between agriculture and conservation. It will accelerate conservation delivery, by applying cutting-edge precision technology and ag-business planning principles, to identify areas that make sense for farmers to apply conservation practices. By utilizing technology and return on investment (ROI) precision agriculture software, such as but not limited to; AgSolver's Profit Zone Manager (PZM), we are able to look at subfield planning (acre by acre) to identify areas in a field that consistently cost money to farm, year after year, no matter the uncontrollable variables. Traditional views have been based on whole farm or whole enterprise levels which doesn't take into consideration that every single acre performs differently. Previous perceptions are that profitability and environmental performance are competitive. By using technology and data already being collected, analyzing every single acre independently, we find that by increasing profitability we also gain positive environmental performance.

By using this technology and business planning concept we will demonstrate a new return-on-investment (ROI) approach to precision conservation by sourcing approximately 5,000-8,000 acres for conservation implementation to guide new and additive opportunities to maximize water and land stewardship decisions. Using this innovative approach, we will work in the agricultural matrix of Minnesota to provide conservation acres on the landscape that are beneficial to water quality and wildlife while maintaining individual farm profitability. This project will work with approximately 160 Minnesota farmers, analyze approximately 80,000 acres, identifying revenue negative acres to show how implementing conservation may actually increase profitability for the farmer while providing soil, water, and wildlife benefits. While working with Minnesota farmers, analyzing their entire operations acre by acre, opportunities for State, Federal, local, and individual working lands programs can be used to increase on farm profitability. Using Federal programs such as the conservation reserve program (CRP), environmental quality incentive program (EQIP) and conservation stewardship program (CSP) can be used to best place grassland practices and utilize working lands (cost share) initiatives that are mutually beneficial for sustainability and economic performance.

It has become increasingly apparent that meeting our State's water quality and habitat goals will require adoption of thousands of acres of perennial vegetation combined with innovative conservation practices. With that in mind we will test a pilot that provides cost share on seed, seeding recommendations and maintenance information to provide an alternative option to traditional programs such as CRP. This program will have a shorter contract duration and be less restrictive while still providing environmental and wildlife benefits. While state and federal programs, such as CRP and RIM are important, we believe it's equally important to provide working lands opportunities to the producer. Working lands, such as pasture restoration, can benefit profitability by diversifying working capital and provide tremendous wildlife habitat along with water quality benefits when done correctly. This pilot is based on sustainability and generating additional acres, beyond the traditional program enrollment, to benefit water quality, soil health, wildlife habitat and producers bottom lines.

We will contract out the work to create an online profitability map. This map will be based on both soil types and economic performance to provide an interactive tool for conservation professionals and others to determine areas that best suits the farmer to install conservation based on profitability. This web-based map will be available to the public. By using this map in conjunction with previous tools such as the environmental benefits index (EBI), we can find common places to implement conservation that provide the greatest benefit for conservation and take into consideration the potential willingness of the farmer to install on identified acres.

Working with the farmer to implement conservation on acres that will increase his or her bottom line will set a new standard for conservation and agriculture working together in MN. This innovative process, mapping and

working lands program will have the ability to work with new farmers, new partners and showcase mutually beneficial scenarios. This project will give guidance to the incentives necessary for installation of conservation practices, a need for alternative working lands programs and source acres not previously considered for conservation.

III. OVERALL PROJECT STATUS UPDATES:

Project Status as of July 1, 2018**:**

As of June 2018, Pheasants Forever has hired one Precision Ag and Conservation Specialist (PACS) in Minnesota to work directly with farmers to provide services to analyze operations and zone-based conservation scenarios based on profitability of each individual acre. This PACS has worked directly with 42 farmers to analyze 21,651 acres looking for acres of opportunity to implement conservation on these revenue negative acres. Of the acres analyzed 4,565.09 acres were identified as revenue negative and deemed as acres of conservation opportunity. Alternative scenarios have been created for all 4,565.09 acres that would result in a conservation outcome. To date 278.8 acres have been implemented into conservation practices/programs. This doesn't count the number of acres that are scheduled to be implemented after harvest or the number of acres waiting on acceptance from State and Federal agency conservation programs.

As with any new concept the beginning phases were focused on outreach and education through collaborating on workshops, hosting workshops and booths at agriculture events such as MN Farmfest. Through the first year Pheasants Forever has either hosted or participated in 29 outreach events that included 1,403 attendees. While success has been obtained it didn't come without hurdles. Some of the largest hurdles have included; number of precision ag platforms already being utilized by farmers, available Federal Farm Bill programs open for enrollment (example: CRP being shutdown) and short windows of available time to work with farmers, agronomists, consultants, and folks in retail agriculture.

Number of Farmers worked with	42
Number of Profit Zone Manager Subscriptions	15
Number of MN Counties working in	11
Number of financial partnerships	8
Total number of partners collaborated with	36
Number of outreach events involved in	29
Number of people attending outreach events	1403
Acres analyzed using Profit Zone Manager	21,651 acres
Of analyzed acres, number of acres of opportunity based on being revenue negative	4,565.09 acres
Acres offered for submission into a conservation program	212 acres
Acres waiting acceptance from submission into conservation	152.6 acres
Acres implemented by farmer into conservation	278.8 acres

Project Status as of January 1, 2019**:**

As of the end of December 2018, Pheasants Forever now has a new Precision Ag & Conservation Specialist (PACS), BJ Werk. On September 5th, 2018, Pheasants Forever hired BJ Werk to be the second PACS. The departure of the original specialist, Jennifer Hahn, on September 28th, 2018, now has Pheasants Forever down to one PACS in Minnesota. With the departure of Jennifer, we are back to the learning curve of a new employee but are confident in the talent and experience the new hire has in the agriculture and conservation world. Since June of 2018 there has been a total of 13 outreach events or workshops either hosted or presented at. The total number of attendees between these event totaled 483 individuals. In addition, we have made 15 new professional contacts to add to the partners collaborated with. This includes retail agriculture and local conservation groups such as Soil and Water Conservation Districts. Since the last report there were another

176.5 acres implemented into conservation practices/programs. This includes cover crop implementation, alfalfa plantings and CRP enrollment acceptance. Some of the offers and waiting for acceptance acres are still on hold until we hear further from the producer and a new Farm Bill comes into place.

We have entered into a partnership with an agriculture consulting company to work with their clients to collect Electrical Conductivity (EC) soil data with five farmers covering 1,000 acres. Involvement from five consultants and coordination with the PF PACS will allow us to take into consideration soil characteristics, historical yield data and profitability. After coordination and data analysis it will allow the PF PACS to sit down and make recommendations to the farmer regarding conservation and on farm profitability that match the farmers objectives. We are excited for this new ability and collaboration with retail ag and could set the stage for added results. So far the biggest hurdle is still the availability of Farm Bill programs. That will hopefully change as the new Farm Bill takes effect. In addition, staff turnover is always a hurdle to overcome.

Number of Farmers worked with	42
Number of Profit Zone Manager Subscriptions	15
Number of MN Counties working in	16
Number of financial partnerships	8
Total number of partners collaborated with	51
Number of outreach events involved in	42
Number of people attending outreach events	1886
Acres analyzed using Profit Zone Manager	21,651 acres
Of analyzed acres, number of acres of opportunity based on being revenue negative	4,565.09 acres
Acres offered for submission into a conservation program	212 acres
Acres waiting acceptance from submission into conservation	131 acres
Acres implemented by farmer into conservation	418.8 acres

Project Status as of July 1, 2019**:**

As of the end of June 2019 Pheasants Forever currently has one Precision Ag & Conservation Specialist (PACS), BJ Werk. On September 5th, 2018, Pheasants Forever hired BJ Werk to be the second PACS. During the last six months, one highlight was a precision ag workshop titled “How to Make Precision Ag Pay”. This workshop was held in Glenwood MN and was sponsored by the local Pheasants Forever chapter with support from other funding sources such as LCCMR and MDA. The event had a broad range of topics covered and speakers involved. Speakers included Cody Nelson with RX soil talking about profitable soil health practices, NRCS professionals and PF Farm Bill Biologists talking about Federal Farm Bill conservation opportunities and landowners discussion on their perspective of precision ag and working with data for conservation opportunity. It was a successful workshop that included 24 attendees with a mix of farmers and industry professionals.

Since the last project status update, we have some results in working with CENTROL crop consulting in working with their clients to collect Electrical Conductivity (EC) soil data with five farmers covering ~1,000 acres. These considerations of soil characteristics, historical yield data and profitability have led to changes made on every acre analyzed. This ranges from cover crops, no-till, wildlife habitat, conservation cover to reduced fertilizer through variable rate technology. PF’s role in this was the identification of and recommendations on revenue negative acres as well as conservation opportunity (vegetative) over all acres. The breakdown of acres included 23 acres into wildlife habitat with an additional ~20+ acres applied for EQIP and CSP monarch butterfly RCPP. Above and beyond, now that CRP has opened, there are additional acres being considered for enrollment. With it being in the early stages of this sign-up period we don’t have enough details to report the number of acres offered for CRP.

With a new employee being on now for 10 months we are seeing an increase in accomplishments now that the learning curve is mostly behind him. With the Farm Bill work picking up and sign ups available again this should alleviate some of the previous hurdles we have seen since the program started.

Number of Farmers worked with	50
Number of Profit Zone Manager Subscriptions	18
Number of MN Counties working in	17
Number of financial partnerships	8
Total number of partners collaborated with	59
Number of outreach events involved in	46
Number of people attending outreach events	2410
Acres analyzed using Profit Zone Manager	25,341 acres
Of analyzed acres, number of acres of opportunity based on being revenue negative	4,896 acres
Acres offered for submission into a conservation program	232+ acres
Acres waiting acceptance from submission into conservation	20+ acres
Acres implemented by farmer into conservation	437 acres

Amendment Request January 2020:
We are requesting an amendment in coordination with a USDA, NRCS grant that will extend the life of this project to June of 2022. This will extend the completion deadlines for Activity 1 Outcomes 1-5. This was discussed with LCCMR staff member Megan Lennon in October. Also attached is the NRCS agreement for a Precision Ag and Conservation Specialist. This is a great opportunity to extend the life of this project and bring in Federal dollars to MN for voluntary conservation delivery through precision ag analysis.
Amendment approved by LCCMR 4/29/2020

Project Status as of January 2020**:**

From a farmer perspective the fall of 2019 was one to forget. A tough harvest led to time restraints and availability to meet with growers. This had an overall impact in the program from farmers worked with; all the way to even consideration of implementing something different on revenue negative acres. We still made pushes to meet with growers, partners and working through farmer unavailability. In a situation such as this most of the conversations were over the phone rather than in person and collecting data for analyzation. Throughout the winter we will continue to ramp up our meetings and getting in front of farmers.

Between August and December, we also had a booth at FarmFest thanks to this grant opportunity. This event was held over a 3-day period in the Redwood Falls MN area. Several thousand people attended the event daily, which consisted mostly of farmers. If you are basing success on involved, in depth, conversations you cannot count all attendees as it's a very large event and likely that not all attendees even walked by the booth. Of that number we had conversation with hundreds of growers and would classify 60 of those conversations as a success and engaged dialogue around precision ag, profitability, conservation, and habitat. From that list we signed up two out of the three growers that waned an on-the-farm visit and full data analysis. This equated to 1,900 acres analyzed. With the tough spring we are still working with these growers on alternative options and considering the 2019 harvest data. We are looking forward to seeing what comes of these connections and other connections made over the course of FarmFest.

In addition to Farm Fest, we also had a booth at the MN Ag Expo in Mankato MN. This event was held in January 2020 and was a great opportunity to talk to corn and soybean farmers from all over Minnesota. We are still working numbers and performing follow ups so they will be on the next work plan update, but we wanted to at least provide an initial success. The biggest success was the commitment of one of the attendees to run his entire farms data for return on investment, profitability, and conservation/habitat alternatives.

Number of Farmers worked with	55
Number of Profit Zone Manager Subscriptions	20
Number of MN Counties working in	18
Number of financial partnerships	9
Total number of partners collaborated with	62
Number of outreach events involved in	56
Number of people attending outreach events	2638
Acres analyzed using Profit Zone Manager	27,542 acres
Of analyzed acres, number of acres of opportunity based on being revenue negative	5,059 acres
Acres offered for submission into a conservation program	212+ acres
Acres waiting acceptance from submission into conservation	43+ acres
Acres implemented by farmer into conservation	448 acres

Project Status as of July 2020**:**

Since the last report we tallied up the number of farmers we talked to at the MN Ag Expo in Mankato MN. At this event we interacted with around 150 individuals to showcase how precision ag data coupled with conservation adoption increases bottom lines by implementing conservation practices on poor producing acres. This was a great opportunity to get directly in front of Minnesota growers and we generated some fantastic contacts. We are looking at working with individuals who we talked with that attended the event. Pheasants Forever also hosted a precision ag workshop: Farm Forward in conjunction with Pheasant Fest in Minneapolis this February. At this event we had over 200 attendees and were able to demonstrate to MN Farmers and Ag professionals the value of data combined with conservation. It was a great turnout and successful event. After that event COVID-19 struck and we have had to adapt to a new way of doing business. Getting creative on reaching out to growers, gathering data and information about their operation and being able to ground truth via site visits. Things seem to be progressing and we are looking forward to the upcoming harvest and getting back to a new kind of normal.

The biggest workload is currently coming from a partnership with Purina and the launch of the Soil Health and Habitat Program. Through this generous funding opportunity, our goal is to work with 60 farmers to analyze 30,000 acres of precision ag data and implementing 7,200 acres of conservation practices in the prairie pothole region. This is split between perennial habitat and cover crops. Through our first application period we have selected 5 growers in MN to work with. The 5 growers selected farm a total of over 10,000 acres and initially have shown interest in 300 acres of habitat and 2,350 acres of cover crops. Our Precision Ag and Conservation Specialist, BJ Werk, is leading the efforts in working with these farmers and the precision ag analysis and finding alternatives on low producing acres. Looking forward to adding these to the list below.

From the initial proposal to today we are no longer just working with the Profit Zone Manager tool. We have created new partnerships in precision ag and are working with any platform that a grower is currently using. This includes, but not limited to; Truterra, Climate Fieldview, Granular Insights, John Deere Operations Center, among others. We are also growing Precision Ag positions in other states and gaining momentum around precision conservation. We currently have positions in MN, ND, SD, IA, WI, GA, NE and more coming online yet this year. This shows the growth of the positions and because of this funding opportunity MN was one of the leaders. Some of the metrics below may change some because of the different platforms being used to perform the precision ag analysis.

Number of Farmers worked with	57
Number of Profit Zone Manager Subscriptions	20
Number of MN Counties working in	18
Number of financial partnerships	10
Total number of partners collaborated with	62
Number of outreach events involved in	57
Number of people attending outreach events	2788
Acres analyzed	27,542 acres
Of analyzed acres, number of acres of opportunity based on being revenue negative	5,059 acres
Acres offered for submission into a conservation program	
Acres waiting acceptance from submission into conservation	
Acres implemented by farmer into conservation	703 acres

Project Status as of January 2021:

Since the last update BJ Werk was part of an outreach event for Pheasants Forever representing the Precision Ag and Conservation Specialists at the American Society of Agronomy (ASA) sustainability virtual conference. At this event we had a virtual booth that approximately 100 people "stopped by" to view how Pheasants Forever utilizes precision agriculture technology and the impact to farmers' bottom line in addition to sustainability outcomes and goals. The booth consisted of a short video introducing Pheasants Forever, materials available for download and a chat feature to connect directly to BJ. The audience consisted of certified crop advisors who play a major role as a trusted advisor for the farmer. As COVID continues to impact how everyone goes about business, getting creative in outreach strategies is important. This virtual event helped provide awareness and education around how precision ag helps drive solutions through profitable decision making.

Currently we are working with farmers from the Soil Health and Habitat Program from Purina and Pheasants Forever. Two new growers have signed on and the data collection, analyzation and planning is underway. From this program 200 new acres of conservation have gone in the ground. These 200 acres were planted into cover crops this fall and will be providing soil health and water quality benefits into the spring. These operations also have livestock that will utilize these conservation acres to benefit the resource and the farmers' bottom line. More acres of cover crops were planted above and beyond the limitations of the program. In addition, planning is occurring on another 57 acres of perennial vegetation that will get planted this spring. Outside of the Soil Health and Habitat Program there are additional acres submitted and waiting acceptance for Farm Bill Programs. A farmer that we work with recently notified us that through the precision ag analysis and identification of acres of opportunity they were accepted into a program to convert 5 acres into pollinator habitat.

Number of Farmers worked with	59
Number of Profit Zone Manager Subscriptions	20
Number of MN Counties working in	20
Number of financial partnerships	10
Total number of partners collaborated with	62
Number of outreach events involved in	58
Number of people attending outreach events	2888
Acres analyzed	30342 acres
Of analyzed acres, number of acres of opportunity based on being revenue negative	5,059 acres
Acres offered for submission into a conservation program	17
Acres waiting acceptance from submission into conservation	73
Acres implemented by farmer into conservation	903 acres

Project Status as of July 2021:

We are working on a project with Sustainable Environmental Consultants (SEC) and their platform EcoPractices to identify the environmental outcomes and beneficial practices through working with precision data, our Precision Ag & Conservation Specialist BJ Werk and the impact of implementing conservation on revenue negative acres on one farm enterprise in Minnesota. SEC is able to take on farm data, soil samples and other necessary metrics to look at environmental outcomes to create comprehensive and customized assessments and reports for sustainability. Through EcoPractices platform, they design a custom plan that focuses first on farm progress. It includes aggregated results with visual representations to provide environmental performance results in a format that is easy to understand. In collaboration they also develop short- and long-term goals based on the environmental impact analysis to address specific needs at the operational level. We are excited to share these results in the next report and start to quantify environmental impacts of this project.

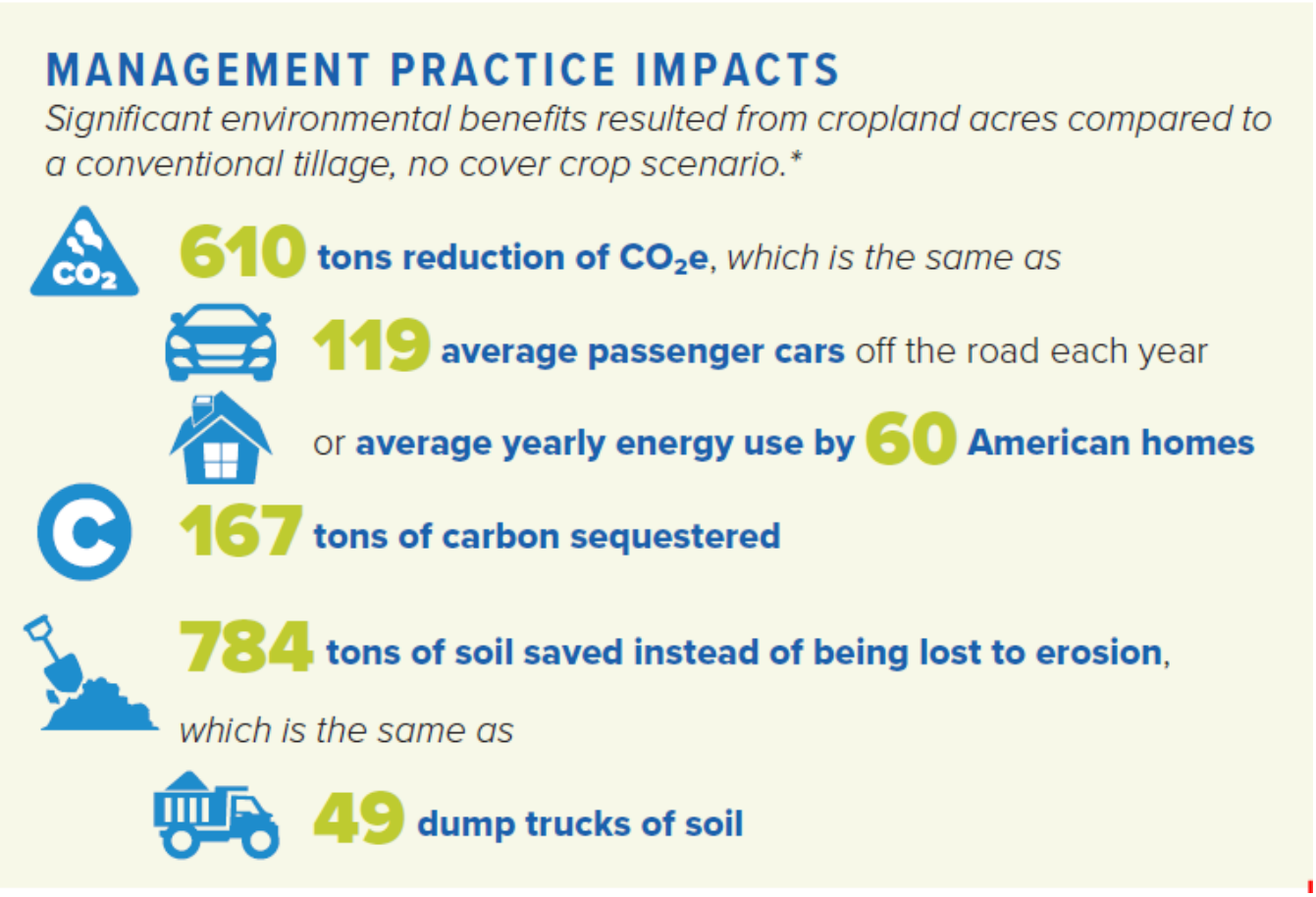
This spring an additional 57 acres of perennial vegetation were planted through the Soil Health and Habitat Program presented by Purina and Pheasants Forever. In total, the 57 acres consisted of, one 39-acre field and the balance of the 16 acres were planted on two different fields. These were planted to diverse mixes that will benefit wildlife and pollinators while also providing additional environmental outcomes. The additional acres submitted from the last report were accepted and will be getting planted either as a dormant planting this fall/winter or this coming spring. We are also in the stages of working with a farmer in Central Minnesota collecting field data and analyzing acres on nearly 1,000 acres. Opportunities will be presented this summer and looking for alternative conservation practices on revenue negative acres. We have a booth at FarmFest now that it is back in person and we are looking forward to connecting with farmers across Minnesota.

Number of Farmers worked with	63
Number of Profit Zone Manager Subscriptions	20
Number of MN Counties working in	24
Number of financial partnerships	10
Total number of partners collaborated with	62
Number of outreach events involved in	59
Number of people attending outreach events	2913
Acres analyzed	30841 acres
Of analyzed acres, number of acres of opportunity based on being revenue negative	5,059 acres
Acres offered for submission into a conservation program	32
Acres waiting acceptance from submission into conservation	64
Acres implemented by farmer into conservation	1048 acres

Project Status as of January 2022:

Through the project with Sustainable Environmental Consultants (SEC) and their platform EcoPractices we identified the environmental outcomes and beneficial practices through working with precision data, our Precision Ag & Conservation Specialist, BJ Werk, and the impact of implementing conservation on revenue negative acres on one farm enterprise in Minnesota. SEC utilized farm data, soil samples and other necessary metrics to look at environmental outcomes to create a comprehensive and customized assessments and reports for sustainability. Through EcoPractices platform, we created a custom plan that focuses first on farm progress. It included aggregated results with visual representations to provide environmental performance results in a format that is easy to understand. The results over the 857 acres on the operation, 17 of the acres are in perennial vegetation and pollinator habitat, that on average this operation is sequestering .2 tons per acre of carbon. In addition, the metrics provided results on erosion that showed that soil erosion on the row crop acres was 6.5 tons per acre and the perennial vegetation was .4 tons per acre. During the period in which this study was performed, 95% of the cropped acres implemented cover crops, 68% of the acres implemented no-till and

32% of the acres used reduce till practices. Below are the management practice impacts over the entire 857-acre operation:



In the past 6 months we had a booth at the two main agriculture events in Minnesota. This summer we had a booth at Farmfest. While attendance was slightly down from previous years, we engaged with over 200 farmers on our precision ag and conservation initiative and conservation conversations. This winter we had a booth at the MN Ag Expo in Mankato MN. Again, attendance was down compared to previous years. We were able to engage with over 50 farmers to showcase how precision ag data coupled with conservation adoption increases bottom lines by implementing conservation practices on poor producing acres. BJ Werk, precision ag and conservation specialist, presented online in two different events. One was related to the Minnesota Ag Water Quality Certification Program (MAWQCP) by showcasing how utilizing data and implementing conservation on revenue negative acres helps the enrollment into MAWQCP and increases the bottom line making producers more profitable. BJ also did an on-line presentation in conjunction with BWSR and NRCS's training program. This was a recorded webinar that was attended virtually and available online for conservation staff to view and learn how technology and data can help them while working with farmers. In January we were able to hire a 2nd precision ag and conservation specialist, Jan Payne. Jan comes from a farming background and recently retired from his operation. His conservation mind and direct farming history will be instrumental to helping this initiative over the next 6 months and beyond.

Number of Farmers worked with	68
Number of Profit Zone Manager Subscriptions	20
Number of MN Counties working in	28
Number of financial partnerships	10
Total number of partners collaborated with	63
Number of outreach events involved in	62
Number of people attending outreach events	3153
Acres analyzed	37,639 acres
Of analyzed acres, number of acres of opportunity based on being revenue negative	5,359 acres
Acres offered for submission into a conservation program	16
Acres waiting acceptance from submission into conservation	16
Acres implemented by farmer into conservation	1144 acres

Overall Project Outcomes and Results:

With recent advancements of real-time yield monitoring, it has been demonstrated that, on many farms, 3-15% of cropped acres cost money to farm (revenue negative acres). By applying the current cutting-edge precision technology and focusing on return on investment (ROI) to deliver conservation, we worked with farmers to identify areas that make sense for them to apply conservation practices in a practical and profitable way. This new approach to conservation delivery, focused on revenue negative acres, provided insight to the consideration of profitable conservation practices, reasons for conservation adoption, and the delivery of conservation acres that otherwise would've continued to be in traditional crop production. In addition, this project demonstrated a high level of cooperation and coordination between agriculture and conservation.

By looking at the entire operation, at the enterprise level, current technology allows for acre-by-acre analysis to develop conservation solutions on acres that otherwise yield a negative return. This project worked directly with 72 farmers to analyze 45,214 acres and look for conservation solutions on 5,382 acres that are low yielding in comparison to the rest of the field or operation. Our findings show that of the analyzed acres, 12% of the acres fell below break-even yield, which is in the range of 3-15% revenue negative acres demonstrated by previous research (E Brand *et al* 2016). With the analysis and available program opportunities this project was able to meet farmer objectives while increasing profitability through conservation on 1,216 acres. These are acres that otherwise didn't receive consideration for conservation practices. While not all identified acres received immediate change, the overall conversation and influence of this project opened the door for continued conservation consideration and future conservation adoption. The practices implemented provide direct benefit to Minnesotans through increased soil health, water quality, carbon sequestration, wildlife habitat, and other natural resources.

Number of Farmers worked with	72
Number of Profit Zone Manager Subscriptions	20
Number of MN Counties working in	29
Number of financial partnerships	10
Total number of partners collaborated with	63
Number of outreach events involved in	66
Number of people attending outreach events	3608
Acres analyzed	45,214 acres
Of analyzed acres, number of acres of opportunity based on being revenue negative	5,382 acres
Acres offered for submission into a conservation program	0 (end of grant)
Acres waiting acceptance from submission into conservation	0 (end of grant)
Acres implemented by farmer into conservation	1,216 acres

IV. PROJECT ACTIVITIES AND OUTCOMES:

ACTIVITY 1:
Description:

Two precision planning specialists, with an education in agriculture (ag business, precision ag, agronomy), will be hired and trained to work directly with approximately 160 Minnesota farmers along with retail ag businesses. The goal is to source approximately 5,000-8,000 acres for conservation implementation while still maintaining farm profitability. This new economic approach will test the viability of identifying new acres for conservation to achieve water, soil, and wildlife outcomes. By working with ag-business, getting this concept into other offices, such as co-ops, consultant offices and ag-retail space it will create a paradigm shift of collaboration between agriculture and conservation by focusing on technology and concentrating on the dollars and cents of conservation delivery. Spreading this message, collaboration with conservation and agriculture entities and promoting this concept will be a very important component to help amplify results. Once acres have been analyzed by the specialist, they will work with the grower to identify land use goals and bring the farmer to conservation professionals to explore program options (See attached graphic: Precision Ag Business Planning Cycle). This ability to walk them through the entire process, bringing customer service full circle, provides the best opportunity to see conservation delivered on the landscape along with generating an increase in working capital for the farmer.

We will conduct 14 outreach, demonstration and workshops to showcase successes, provide educational experiences and display this innovative approach showcasing opportunities for producers to be sustainable both environmentally and economically. These ROI planning workshops will involve a wide audience to include growers, conservation professionals, ag business, and other individuals/groups, such as ag lenders, to demonstrate how universal this program and process is and how it is mutually beneficial. Creating discussion amongst growers is crucial to generating coffee shop talk and creating the domino effect within local communities to expand the use of this innovative approach. Over the course of this project, we will attend farm fest annually to engage agriculture communities and showcase successful results to both promote and implement this concept, in turn, amplifying results.

We will test a working lands program with interested producers providing cost share on seed. This working lands program will be less restrictive than current state and federal programs and also provide a shorter contract duration. By making it less restrictive and a shorter contract duration it should provide an intriguing option for producers and source acres that traditionally had no consideration for a conservation practice. The reality is that while state and federal programs are extremely important, we feel it's equally important to create a program that pays less but in turn is favorable to operations interested in working lands alternatives. By implementing a working lands pilot, it will help determine incentives necessary to implement conservation on revenue negative acres that traditionally drew no previous attention.

We will contract out the creation of an online profitability map. This map of Minnesota will be an interactive tool for conservation professionals and others to determine areas that best suits the farmer to install conservation based on profitability. This web-based map will be available to the public. This map will show estimates of profitability of fields in corn or soybean. This map will be meant to provide insight into alternative land management to improve farm profitability using publicly available data. While useful for insight into relative performance of areas within fields this map will not contain individual economic or management data, and actual profitability will depend on actual expenses,

revenue, and management. Local variations of yields, management and marketing practices, land tenure, and underlying spatial data result in deviations from the estimates that will be produced by the map. By using this map in conjunction with previous tools such as the environmental benefits index (EBI), we can find common places to implement conservation that provide the greatest benefit for conservation and take into consideration the potential willingness of the farmer to install on identified acres.

Summary Budget Information for Activity 1:

ENRTF Budget: $ 400,000
Amount Spent: $ 290,437
Balance: $ 109,563

Outcome	***Completion Date***
1. 2 Precision Specialists to conduct planning with ~160 farmers on ~80,000 acres to source ~5,000-8,000 acres to implement conservation practices that increase ROI and have a positive environmental impact.	June 30, 2022
2. Engage the retail sector of agri-business including agronomists, independent crop advisers, seed dealers, absentee land managers, ag lending, co-ops, and other key partners. Gain support from different ag based businesses and groups to show the connection between ag and conservation.	June 30, 2022
3. Conduct demonstration events/workshops and host a booth at Farm Fest to demonstrate how bottom lines can be increased by utilizing the precision planning process as well as promote, implement, and amplify results of conservation implementation on revenue negative acres.	June 30, 2022
4. Test the viability of a pilot working lands conservation program that provides additional opportunities for conservation by offering a shorter term (3-6 years) and less restrictive program that offers cost share assistance.	June 30, 2022
5. Create a publicly accessible, web-based, statewide profitability map based on soil types and economics to identify acres that are currently generating a negative return to identify acres that make sense to a farmer for conservation practices.	June 30, 2022

Activity 1 Status as of July 1, 2018:

1.) To date Pheasants Forever has hired one precision specialist. We found that competing in the agriculture workforce requires higher salaries than what we are used to in the conservation workforce. Through the National Fish and Wildlife Foundation (NFWF) we were able to contribute $38,696 to cover 50% of LCCMR project costs. These funds are available from July 2017 through July 2018. The addition of these funds will allow for Pheasants Forever to be able to explore the addition of a second precision specialist for the remaining 2 years of the project. With just one specialist over the first year, we were able to work with 42 farmers to analyze 21,651 acres resulting in 278.8 acres implemented into conservation. This doesn't count the acres that are pending acceptance into State or Federal programs or acres planned for implementation following harvest or spring of 2018. While we have a ways to go for hitting our approximant goal of 160 farmers, analyzing 80,000 acres for 5,000-8,000 acres of conservation, we believe the potential addition of a second specialist and program momentum will help reach this goal over the remaining 2 years of the project.

2.) Since the program began, we have invested time in updating and informing different commodity groups, companies in the retail sector of agri-business and other key partners. To date we have met with over a dozen different organizations and companies in the ag sector which in turn has received good reviews as to the approach of using precision agriculture and various conservation scenarios to promote conservation use on revenue negative acres. Some of the different groups met with include MN Soybean Growers, MN Corn Growers and MN Farmers Union among others. In addition to the ag sector,

we have met with various conservation organizations ranging from local Soil and Water Conservation Districts (SWCD's) to other nonprofit organizations such as Great River Greening.

3.) Independently and in collaboration with other partners we have presented or hosted 29 separate events. The total number of attendees at these events is over 1,400 people. The largest event we have been a part of is MN FarmFest in which we had a booth at in 2017. At FarmFest we interacted with over 200 farmers and demonstrated our approach to precision agriculture and how a focus on profitability can lead to conservation outcomes. Outreach events have been a large part of the success we have had to date as it allows time to explain and interact one on one with growers and other partners. We have exceeded our goal of 14 outreach events but will continue hosting and partnering because of the value they produce.

4.) To date we have not had anyone enroll in a separate working lands program. There has been a lot of excitement and interest in implementing a working lands type of program from farmers that is shorter in contract duration and less restrictive. The final consideration, and reason for not implementing, comes down to the fact that cropping history will be lost in the duration of the working lands pilot making some Federal programs ineligible in the future due to no cropping history (example: CRP). We will continue to work with farmers on the availability of this program and continue to vet their opinion on what would make something like this successful.

5.) Currently we have the groundwork laid and have sourced the data necessary to create a statewide profitability map. We are currently working on finding the best website/partner to host this information to create the most visibility and IT support to make sure it functions at a high-level.

Activity 1 Status as of January 1, 2019:

1.) On September 5th, 2018, we hired the second Precision Ag & Conservation Specialist (PACS) because of the tremendous momentum we had gained from the current PACS. Unfortunately, only weeks later, on September 28th, 2018, the current PACS left Pheasants Forever to pursue another position. Now down to one position on the ground and the learning curve that comes with it the primary focus has been on introducing the new PACS to prior farmers, partners and networking with both conservation and ag retail groups. We are still investigating the potential of a second PACS but knowing the grant timeline is ticking limits the ability to offer job stability. Over the coming months and the new PACS getting more comfortable we expect the number of farmers worked with, analyzed acres and implemented acres to increase.

2.) While we are still staying current with past key partners and updating them on progress we are also venturing to new collaborators. This includes John Deere dealerships and other precision agriculture platforms. The biggest success to date is the partnership in working with clients of an ag consulting group to work with 5 new farmers and their respective consultant to compare soil data, historical yield data and correlate to profitability analysis to make sound on farm decisions and provide conservation opportunity on revenue negative acres. In addition, the new PACS is working with local conservation districts and groups in a different part of the state than the previous PACS because of the logistics of being local to WC MN compared to the precious employee being in SC MN. We are excited about the momentum and the future results.

3.) Independently and in collaboration with other partners we have presented or hosted 42 separate events. The total number of attendees at these events is over 1,800 people. Over the last 6 months the

two largest events we have been a part of is a 7-mile creek field tour hosted by Great River Greening and a Rock County field day that totaled 150 attendees. Outreach events have been a large part of the success we have had to date as it allows time to explain and interact one on one with growers and other partners. We have exceeded our goal of 14 outreach events but will continue hosting and partnering because of the value they produce.

4.) To date we have not had anyone enroll in a separate working lands program. There has been a lot of excitement and interest in implementing a working lands type of program from farmers that is shorter in contract duration and less restrictive. The final consideration, and reason for not implementing, comes down to the fact that cropping history will be lost in the duration of the working lands pilot making some Federal programs ineligible in the future due to no cropping history (example: CRP). We will continue to work with farmers on the availability of this program and continue to vet their opinion on what would make something like this successful.

5.) Currently we have the groundwork laid and have sourced the data necessary to create a statewide profitability map. We are currently working on finding the best website/partner to host this information to create the most visibility and IT support to make sure it functions at a high-level.

Activity 1 Status as of July 1, 2019:

1.) Within the last month or two our Precision Ag & Conservation Specialist has signed up 3 separate growers to evaluate their entire operation. This equates to 3,690 acres for analysis of return on investment and profitability through conservation opportunities. This recent success shows promising increases as the new employee gains momentum and gets more comfortable in the position. With a wet spring it has made getting in front of farmers difficult. They have had a long, busy, and stressful planting season. As we continue into summer the opportunity should increase and we are optimistic that the momentum will continue.

2.) The example of working with ag retailers has led to results and showcased in working with CENTROL crop consulting. In working with CENTROL and their clients to collect Electrical Conductivity (EC) soil data with five farmers covering ~1,000 acres. These considerations of soil characteristics, historical yield data and profitability have led to changes made on every acre analyzed. This ranges from cover crops, no-till, wildlife habitat, conservation cover to reduced fertilizer through variable rate technology. PF's role in this was the identification of and recommendations on revenue negative acres as well as conservation opportunity (vegetative) over all acres. The breakdown of acres included 23 acres into wildlife habitat with an additional ~20+ acres applied for EQIP and CSP monarch butterfly RCPP. Above and beyond, now that CRP has opened, there are additional acres being considered for enrollment. With it being in the early stages of this sign-up period we don't have enough details to report the number of acres offered for CRP.

3.) We continue with outreach, as with any new initiative, informing people is key. Two of the biggest success included putting on a lone workshop "How to Make Precision Ag Pay" and having a booth at the West Ottertail Crop and Forage Show. The Crop and Forage Show had approximately 400 individuals walk through the show. This provided great visibility and informative discussion with show attendees. We are looking forward to having a booth at FarmFest coming up in August and the ability to meet with more Minnesota farmers.

4.) To date we have not had anyone enroll in a separate working lands program. There has been a lot of excitement and interest in implementing a working lands type of program from farmers that is shorter in contract duration and less restrictive. The final consideration, and reason for not implementing, comes down to the fact that cropping history will be lost in the duration of the working lands pilot making

some Federal programs ineligible in the future due to no cropping history (example: CRP). We are working with an individual that may be interested in enrolling ~20 acres into this program. This farmer has not been accepted into previous EQIP opportunities because of the competitive nature. We will continue working with this grower and have an update on the next status report.

5.) Currently we have the groundwork laid and have sourced the data necessary to create a statewide profitability map. Because of different challenges it doesn't appear as though we will accomplish this goal. Finding a host site was the biggest struggle in making this profitability map accessible. With AgSolver being bought out by EFC systems and previous staff turn over our connections are now limited for the data acquisition and implementation. More to come.

Activity 1 Status as of January 2020:

1.) Our Precision Ag & Conservation Specialist has signed up 2 separate growers to evaluate their entire operation. This equates to 1,900 acres for analysis of return on investment and profitability through conservation opportunities. In addition, another 301.2 acres were analyzed of individual fields. This led to 28.8 acres being put into conservation. An additional amount of acres are being applied for within Farm Bill programs. These acres are additional acres that may not have been implemented without the precision ag analysis being completed and the dollars and cents being applied to these acres.

2.) We continue to engage the retail sector of ag business. This is done by one-on-one meetings set up with co-op's, retail businesses, dealerships, crop consultants, agronomists, commodity groups and additional organizations working directly with farmers. In addition, we continue to work with conservation organizations to spread the word and opportunity of agriculture and conservation working together.

3.) As we continue with outreach, as with any new initiative, informing people is key. The largest outreach event included FarmFest. At FarmFest we interacted with hundreds of individuals to showcase how precision data can create farm profitability with conservation opportunity. Over the 3 days we had in-depth conversations with 55 individuals about their personal operation and their precision ag data. To take it further BJ Werk, Precision Ag and Conservation Specialist, met directly with 3 of these growers on their farm to discuss the opportunity.

4.) To date we have not had anyone enroll in a separate working lands program. We are working on creating a separate program for Pheasants Forever called the Soil Health and Habitat Program. This is anticipated to launch in 2020 and will cover the prairie pothole region. We are excited about providing this opportunity and to incorporate it into our LCCMR project. The program will focus on perennial vegetation by utilizing precision ag data and implementing perennial vegetation on revenue negative acres. In addition, this will allow opportunity to implement cover crops in addition to the perennial vegetation. We are looking forward to the success of this opportunity offered by Purina and include it in our LCCMR project.

5.) Currently we have the groundwork laid and have sourced the data necessary to create a statewide profitability map. Because of different challenges it doesn't appear as though we will accomplish this goal. Finding a host site was the biggest struggle in making this profitability map accessible. With AgSolver being bought out by EFC systems and previous staff turn over our connections are now limited for the data acquisition and implementation. More to come.

Activity 1 Status as of July 2020**:**

1.) Two more additional farmers have been identified and began working with BJ with precision ag data and conservation solutions. With the Covid-19 pandemic it impacted the ability to work with farmers, do

outreach and meet with partners. Finding new ways of doing business via conference calls, video calls and more work over emails/telephone was a change to the normal. Generally speaking, the best results come from meeting directly with farmers on their property to see firsthand the operation and fields for ground truthing and gathering ideas. As of the end of June, 2020 we have currently worked with 57 farmers, analyzing over 27,000 acres and implementing over 700 acres of conservation.

2.) We continue to engage the retail sector of ag business. This is done by one-on-one meetings set up with co-op's, retail businesses, dealerships, crop consultants, agronomists, commodity groups and additional organizations working directly with farmers. In addition, we continue to work with conservation organizations to spread the word and opportunity of agriculture and conservation working together. Our biggest success in the last 6 months for building partnerships is with Granular and their precision ag platform Granular Insights. This provides tremendous opportunity to work together for farmer profitability and conservation implementation.

3.) The two biggest outreach events in the last 6 months includes our Precision Ag Workshop that was held in conjunction with Pheasant Fest in Minneapolis along with the MN Ag Expo in Mankato, MN. These two outreach events provided a large stage to demonstrate the work being done through this project and continued to highlight the innovative approach to precision ag and conservation solutions.

4.) Pheasants Forever with generous funding from Purina launched the Soil Health and Habitat Program. This program is offered to farmers in the prairie pothole region. In Minnesota this will equate to analyzing data for 15+ growers on over 7,500 acres for 1,800 acres of conservation implementation. The two different conservation options will be a 5-year perennial habitat program and a 1-year cover crop option. We are excited to join this with the LCCMR/ENRTF project and report results after analyzation and implementation.

5.) Because of different challenges it doesn't appear as though we will accomplish this goal.

Activity 1 Status as of January 2021:

1.) Two more additional farmers have been identified and began working with BJ with precision ag data and conservation solutions. The Covid-19 pandemic has impacted our ability to work with farmers, do outreach and meet with partners. Finding new ways of doing business via conference calls, video calls and more work over emails/telephone was a change to the normal. Generally speaking, the best results come from meeting directly with farmers on their property to see firsthand the operation and fields for ground truthing and gathering ideas. As of the end of January 2021 we have currently worked with 59 farmers, analyzing over 30,000 acres and implementing over 900 acres of conservation.

2.) We continue to engage the retail sector of ag business. This is done by one-on-one meetings set up with co-op's, retail businesses, dealerships, crop consultants, agronomists, commodity groups and additional organizations working directly with farmers. In addition, we continue to work with conservation organizations to spread the word and opportunity of agriculture and conservation working together. Our biggest success in the last 6 months for building partnerships was working with Granular and their precision ag platform Insights, meeting with individuals from John Deere dealerships, coordination with Truterra, seed dealers, certified crop consultants and local conservation offices through NRCS and SWCD's in Minnesota.

3.) The biggest outreach event in the last 6 months includes our attendance and presence at the Sustainability Conference put on by the American Society of Agronomy. This event allowed a stage to showcase our work to certified crop advisors and highlight the innovative approach to precision ag and conservation solutions.

4.) Pheasants Forever with generous funding from Purina launched the Soil Health and Habitat Program. This program is offered to farmers in the prairie pothole region. In the last six months we are working with 2 new growers that have implemented 200 acres of conservation and the planning process is under way to implement another 57 acres of perennial habitat.

5.) Because of different challenges it doesn't appear as though we will accomplish this goal.

Activity 1 Status as of July 2021:

1.) The Covid-19 pandemic has impacted our ability to work with farmers, do outreach and meet with partners. Finding new ways of doing business via conference calls, video calls and more work over emails/telephone was a change to the normal. In person events are becoming more relevant as we are getting past the Covid-19 pandemic allowing us to get in front of more people and we are excited to get back to workshops and outreach events. As of the end of July 2021 we have currently worked with 63 farmers, analyzing over 30,000 acres, and implementing over 1,000 acres of conservation.

2.) We continue to engage the retail sector of ag business. This is done by one-on-one meetings set up with co-op's, retail businesses, dealerships, crop consultants, agronomists, commodity groups and additional organizations working directly with farmers. In addition, we continue to work with conservation organizations to spread the word and opportunity of agriculture and conservation working together. In the last six months we are working with the Minnesota Department of Agriculture (MDA) and the Minnesota Ag Water Quality Certification Program (MAWQCP) to identify ways to work together. In addition to the certification program, they also have endorsements. This will be beneficial in identifying farmers and landowners and utilizing precision data to place practices to complete the MAWQCP process.

3.) We are excited to have our first in-person large outreach event next week with a booth at FarmFest. This will allow us to engage with ag partners, farmers, and landowners to discuss precision conservation and showcase the work we do and work with more farmers through precision ag and analyze data for profitability and conservation outcomes.

4.) Pheasants Forever with generous funding from Purina launched the Soil Health and Habitat Program. This program is offered to farmers in the prairie pothole region. Over 250 acres have been implemented through this program and we are excited to launch another sign-up this summer or late fall after harvest.

5.) Because of different challenges it doesn't appear as though we will accomplish this goal.

Activity 1 Status as of January 2022:

1.) The Covid-19 pandemic continues to impact our ability to work with farmers, do outreach and meet with partners. We continue to dedicate ourselves to finding new ways of doing business via conference calls, video calls and more work over emails/telephone that is a change to what we consider normal. In the last six months we have been able to be at two events, Farmfest and the MN Ag Expo. It was awesome to be back in front of farmers and ag professionals and has allowed us to make new connections that we will be working with moving forward. As of the end of January 2022 we have currently worked with 68 farmers, analyzing over 37,000 acres, and implementing nearly 1,200 acres of conservation.

2.) We continue to engage the retail sector of ag business. This is done by working with co-op's, retail businesses, dealerships, crop consultants, agronomists, commodity groups and additional organizations working directly with farmers. In addition, we continue to work with conservation organizations to spread the word and opportunity of agriculture and conservation working together. In the last six months we continue working with the Minnesota Department of Agriculture (MDA) and the Minnesota Ag Water Quality Certification Program (MAWQCP) to identify ways to work together. We are currently working with them to get a story out about a farmer who worked with us and is certified plus has the endorsements for his farm. Looking forward to getting that out in the coming months. We also had a booth at the MN Ag Expo that connected us with 100's of farmers, ag industry partners and ag business partners.

3.) We had our first in-person large outreach event this summer with a booth at FarmFest. We were able to engage with ag partners, farmers, and landowners to discuss precision conservation and showcase the work we do and work with more farmers through precision ag and analyze data for profitability and conservation outcomes. At this event we connected with over 200 farmers and landowners to impact how they view precision ag data, profitability, and conservation. We are currently working with several growers since this event.

4.) Pheasants Forever with generous funding from Purina launched the Soil Health and Habitat Program. This program is offered to farmers in the prairie pothole region. Over 250 acres have been implemented through this program and we are excited to be working with an additional grower this spring and potentially more after the results of the most recent sign-up ending at the beginning of February.

5.) Different hurdles have made this challenging. First the company that we were working with, AgSolver, was bought out by EFC systems. With this they didn't retain the employees from AgSolver which were our contacts to create a statewide profitability map. In addition, we tried numerous different avenues for hosting the map on organizations websites without success do to capacity and ongoing maintenance. We will continue working on ways to complete this during and after the completion of this project. In the coming weeks we have discussions with other potential partners related around this outcome.

Final Report Summary

1.) Through the entirety of this project, we were able to have a varying number of precision ag and conservation specialists. At times there were two specialists at the same time and at times there was one position on the ground. In total we had three different individuals filling these positions. We found that the cost to employ agriculture professionals, and positions in general, has changed significantly since submitting this grant in 2016. In all we maintained at least one position, and at times two positions, through the entirety of this project. We have continued to employ one precision ag & conservation specialist after this project's completion.

This project allowed us to work with a total of 72 farmers from 29 different counties within Minnesota. By working with these farmers, we analyzed a total of 45,214 acres for acre-by-acre analysis to identify revenue negative zones and offer conservation solutions that increase the farmers return on investment (ROI) and have a positive environmental impact. Conservation solutions consisted of various local, State and Federal programs such as, but not limited to; the Conservation Reserve Program (CRP), the Environmental Quality Incentive Program (EQIP), the Conservation Stewardship Program (CSP), the Conservation Reserve Enhancement Program (CREP), and the Soil Health and Habitat Program through Pheasants Forever and Purina, among others. In total this project implemented 1,216 acres of conservation solutions through the collaboration with the precision ag & conservation specialist and the farmers. These acres were all vegetated practices and consisted mostly of perennial vegetation through pollinator/monarch plots, CRP, CREP and other practices as stated above.

In total we identified 5,382 acres as revenue negative. Reasons for not implementing conservation practices on all acres included, but not limited to; programmatic availability, programmatic compensation, and the location of identified acres making it difficult to farm if implemented. Farmers goals and objectives along with increasing ROI and delivering conservation were the main priorities of this proposal. Different challenges presented itself through the life of this project including employee turnover, AgSolver being bought out, recruiting farmers through the Covid-19 pandemic, and the general busy schedules of farmers and landowners throughout all months of the year.

2.) This project allowed us to not only implement conservation solutions but also influence conservation decision making by working with a wide variety of partners within both conservation and agriculture professionals. Influencing the perception of conservation and making it profitable is not a measurable result but will have a lasting impact beyond the completion of this project. In total we worked with 63 different partners ranging from agronomists and crop consultants to local service centers including both SWCD's and NRCS. Engaging with various stakeholders led to conversation and projects with Truterra, John Deere dealerships, CENTROL Crop Consulting, Granular, the Minnesota Department of Ag (MDA), the Minnesota Ag Water Quality Certification Program (MAWQCP), Minnesota commodity groups such as the Minnesota Soybean Growers Association (MSGA) and Minnesota Farmers Union (MFU) among other groups and organizations at the local, state, and federal level located within Minnesota. The biggest challenge we found was coordination and available time to work across various stakeholder groups as at times you are working with up to four or five different individuals to deliver the conservation solutions.

3.) This was another area that allowed for both implementation and influencing of conservation solutions. In total we hosted or presented at 66 different outreach events. This included a booth annually at MN FarmFest and the MN Ag Expo. These events were great at interacting with not only partners and engaging new people but working directly with farmers and landowners. These events had a significant impact on working with the 72 different farmers through this project. In addition, we were able to have a presence through the virtual sustainability conference hosted by the American Society of Agronomy. This event allowed us to tell the story and showcase how the use of precision ag data and technology can identify acres for conservation while increasing the farmers ROI. This project allowed us to tell the story across Minnesota, and we will continue to do so beyond the completion of this project.

4.) Pheasants Forever, with generous funding from Purina, implemented the Soil Health and Habitat Program (SHHP). This program is offered to farmers in the prairie pothole region. This program offered two different options for farmers: perennial vegetation and cover crops. The perennial vegetation portion of the program was limited to 20 acres per farmer and offered a five-year contract with a $250/acre one-time incentive payment and a $150/acre seed and establishment incentive. This opportunity allowed us to test the viability of a shorter duration and more flexible program with an incentive that was less restrictive and shorter duration than traditional programs. The cover crops portion was limited to 100 acres per farmer and offered a one-year contract with a $20/acre incentive. In total, for Minnesota, this program was able to deliver over 400 acres of conservation and allowed us to gain insights into working lands programs. From this pilot we were able to identify a couple of considerations for future reference. A sliding payment scale may be necessary to create interest across the entire state of Minnesota. All the acres delivered through the SHHP program were in central/northwest Minnesota as the payment rate wasn't competitive in the southern portion of the state. Getting the word out about program opportunities was challenging. The most success we had was through local service centers and ag media. We will continue working towards future working lands programs with the knowledge we gained from the SHHP program.

5.) Different hurdles made this challenging. First the company that we were working with, AgSolver, was bought out by EFC systems. With this they didn't retain the employees from AgSolver, who were our contacts to create a statewide profitability map. In addition, we tried numerous different avenues for hosting the map on organizations websites without success due to capacity and ongoing maintenance. We were unable to implement this part of the project, as various things changed since submitting this proposal in 2016. We have had discussions with other organizations and individuals about the potential of delivering this profitability map for Minnesota outside of this project's completion.

V. DISSEMINATION:
Description:

Status as of July 1, 2018:

Status as of January 1, 2019:

https://pheasantsforever.org/Newsroom/2018-October/New-MN-Precision-Ag-Conservation-Specialist-Helps.aspx

https://www.mda.state.mn.us/minnesota-ag-water-quality-certification-program-honored-pheasants-forever

Status as of July 1, 2019:
No additional

Status as of January 1, 2020:
No additional

Status as of July 1, 2020**:**
We have a new website for our precision ag initiative. Notice LCCMR/ENRTF partner logo.
https://pheasantsforever.org/Conservation/Precision-Agriculture.aspx

Status as of January 2021:
No additional

Status as of July 2021:
No additional

Status as of January 2022:
Outreach attendance at two in-person agriculture events to promote this project and overall precision ag initiative. Events included FarmFest and the MN Ag Expo. In total we interacted and talked about this project with several hundred Minnesota farmers.

Digital outreach through a webinar available to conservation professionals in Minnesota. This was done through BWSR, MASWCD and NRCS's Technical Training and Certification Program. In this training BJ Werk talked about the work of this project and overall precision ag components of conservation planning.

http://bwsr.state.mn.us/technical-training-and-certification-program

Final Report Summary

This project resulted in the hiring of a precision ag & conservation specialist to work with farmers, landowners, trusted advisors and demonstrate the use of precision agriculture technology to deliver conservation on the

landscape. This project helped launch the addition of multiple staff in additional states to both implement and influence conservation on the landscape. This project hosted or was a part of 66 different outreach events impacting 3,608 attendees. Outreach consisted of online webinars, attendance at tradeshows (such as the MN Ag Expo and FarmFest annually) along with varying presentations and meetings geared towards ag professionals, conservation professionals, and farmers/landowners.

VI. PROJECT BUDGET SUMMARY:

A. Preliminary ENRTF Budget Overview:
***This section represents an overview of the preliminary budget at the start of the project. It will be reconciled with actual expenditures at the time of the final report.**

Total Number of Full-time Equivalents (FTE) Directly Funded with this ENRTF Appropriation: 6 FTE

Total Number of Full-time Equivalents (FTE) Funded through Contracts with this ENRTF Appropriation: 0 FTE

B. Other Funds:

Source of Funds	$ Amount Proposed	$ Amount Spent	Use of Other Funds
Non-state			
AgSolver	$3,600 (cash)	N/A	2 Wi-Fi Hot Spots at $50 per month, per Specialist over 3 years = $3,600
Landowner's	$160,000 (cash)	$5,040	50% contribution for subscription "program" use ($1,000 per landowner) which generally costs $2,000 per landowner
AgSolver	$160,000 (in-kind)	$5,040	50% in-kind contribution via reduced subscription contribution for "program" use.
Pheasants Forever	$54,189 (in-kind)	$54,189	Indirect on salary for 2 specialists ($45,000 x .2007 x 2 specialist's x 3 years) for overhead costs.
Pheasants Forever (Purina)	$15,000 (Cash)	$27,437.93	Chapter contribution (when project is in that particular County) towards cost share for working lands program. Also, PF-Purina Soil Health and Habitat Program for working lands program.
National Fish and Wildlife Foundation (NFWF)		$38,696	50% of expenses for 1 year (July 2017-July 2018)
NRCS		$49,943.38	Contribution for Precision Ag position
State			
N/A	N/A	N/A	
TOTAL OTHER FUNDS:	**$392,789**	**$180,346.31**	

We are no longer able to utilize the $3,600 dollars from AgSolver for Wi-Fi hotspot services. This feature is no longer available to employees and instead cell phones are now functioning as hot spots.

We are no longer able to utilize program use and source of funds from AgSolver and Landowners as the company (AgSolver) was sold to EFC Systems and no longer available. We continued to use precision services

and precision data to implement conservation solutions through other sources that didn't require subscriptions or that cost money to us, this grant, or landowners.

Pheasants Forever was able to obtain $38,696 through the National Fish and Wildlife Foundation (NFWF) to contribute towards 50% of the Precision Ag and Conservation Specialists expenses through the first year of the LCCMR project.

VII. PROJECT STRATEGY:

A. Project Partners:

Partners receiving ENRTF funding

- None

Partners NOT receiving ENRTF funding

- Through the use of the analysis program and precission planning process it may provide conservation program options and/or tehcnical assistance from organizations such as, but not limited to; BWSR, SWCD's, DNR, NRCS, FSA and/or USFWS.

B. Project Impact and Long-term Strategy:

By showcasing the substantial benefits of working together with Minnesota farmers to implement voluntary conservation practices, we will achieve greater water quality, soil health, and wildlife (including pollinators) outcomes. By working side by side with both agriculture and conservation professionals it enables all parties to work together with a high level of collaboration providing sustainable opportunities to increase bottom lines, provide water quality benefits and wildlife benefits on acres that make sense for the farmer. By creating a working lands program it provides additional opportunities for farmers to implement beneficial practices on acres not previously considered for conservation. Working lands alternatives also provides opportunity to explore new and innovative crops, increase livestock production and the ability to diversify operations. The key question is whether we can shape this future by harnessing the technology to also include the economics of conservation practices at a sub-field planning scale. Once we demonstrate the value of using economics and environmental performance at a sub-field scale, we believe this technology and approach will be sustaining into the future.

After the completion of this project we are maintaining this position and will continue this important work into future years.

B. Funding History:

Funding Source and Use of Funds	Funding Timeframe	$ Amount
National Fish and Wildlife Foundation (NFWF) grant used to hire/employ precision specialist/s. These funds will expire on 6/30/17 and will be used to get employees up to speed allowing them to be fully prepared to utilize this opportunity from LCCMR and ENRTF funds to execute work at an efficient/accelerated speed.	FY16-FY17 Funds expire on 6/30/17	~$66,000 from October 2016 through September 30, 2017.

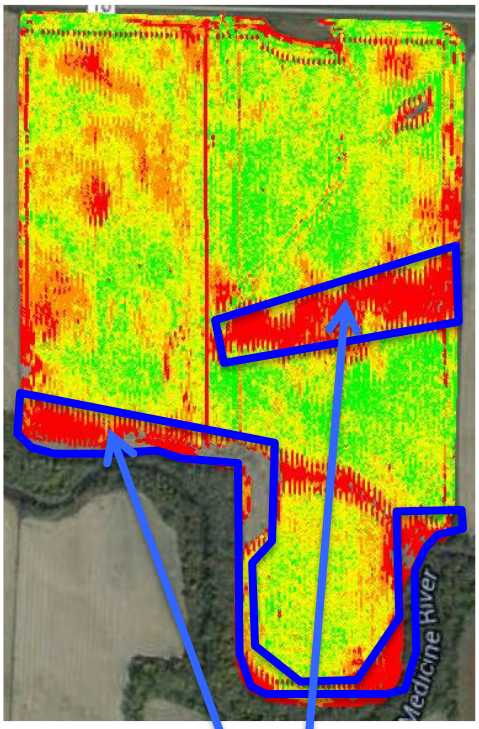
VIII. REPORTING REQUIREMENTS:

- **The project is for 5 years, will begin on 07/01/17, and end on 06/30/22.**
- **Periodic project status update reports will be submitted** *January 1* **and** *July 1* **of each year.**
- **A final report and associated products will be submitted between June 30 and August 15, 2022**.

IX. VISUAL COMPONENT or MAP(S):

See attached

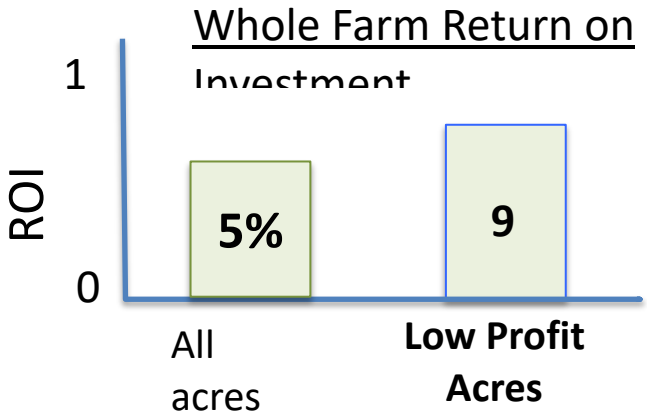
A WIN for Water, Wildlife and Farmers

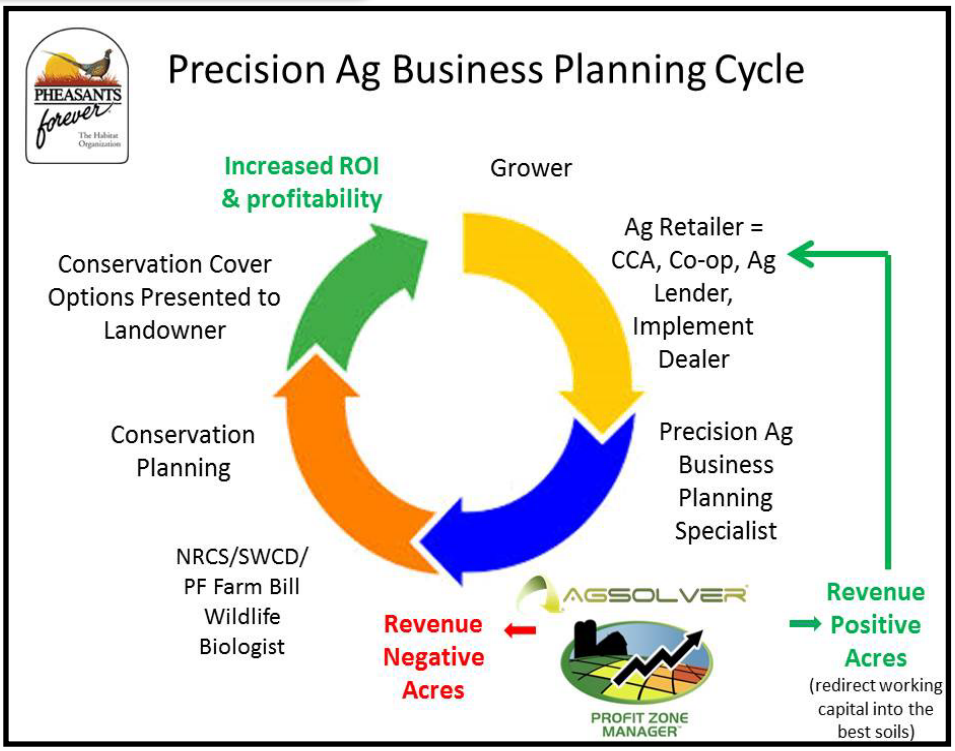


Revenue Negative Acres Identified for Conservation

LEGEND: Profit:

- + $100 to $200/acre
- + $0 to $100/acre
- -$0 to ($200)/acre (revenue negative)





Precision Ag And Conservation

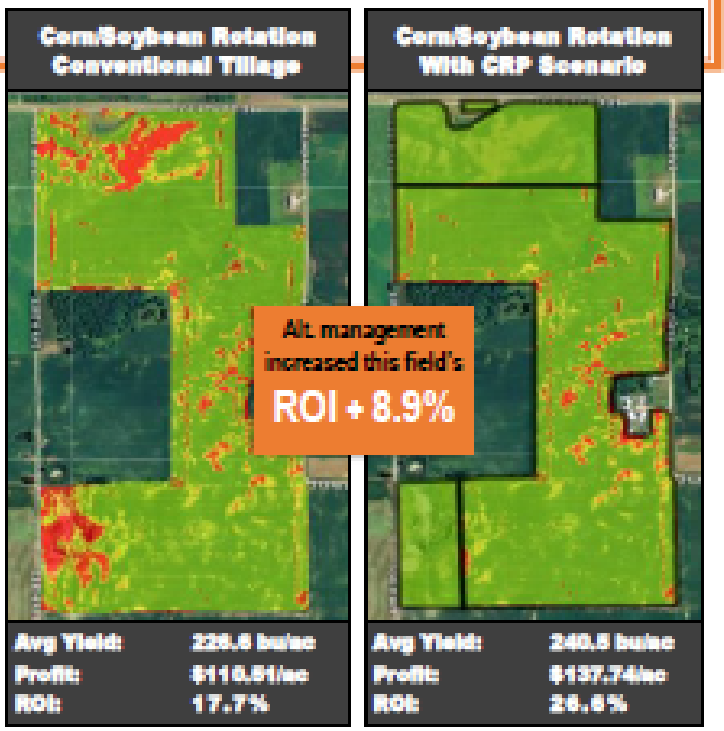
Turning Red Acres Green

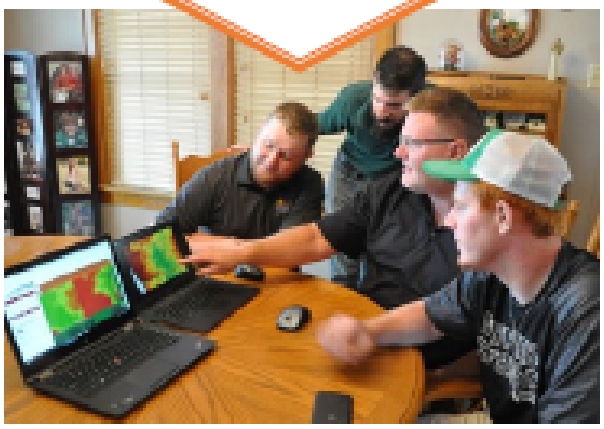
As stewards of the land and business owners, producers should have access to economical options when analyzing ROI negative acres. Pheasants Forever is your resource when making those decisions.

Private, on-farm consultations with our specialists will provide:

- Unlimited technical support in processing and analyzing data.
- Full suite of profit & ROI maps, alternative management scenario comparisons, and financial reports.
- Direct connections to alternative solutions tailored specifically to your land.

No Cost to Producers



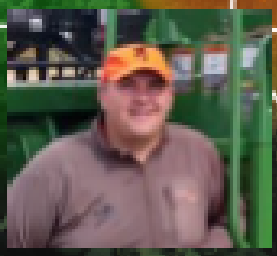


For more Information, contact your local Precision Ag & Conservation Specialist;

Minnesota: BJ Werk

bwerk@pheasantsforever.org

(701) 238-6504



Below is an example from acres implemented through this project. The orange line indicates the boundary of the acres that were converted to prairie that will now increase water and soil quality and provide additional natural resource benefits through the creation of pollinator and wildlife habitat among the other various benefits that prairie provide.

Project Highlights:

Number of Farmers worked with	72
Number of MN Counties working in	29
Number of financial partnerships	10
Total number of partners collaborated with	63
Number of outreach events involved in	66
Number of people attending outreach events	3608
Acres analyzed	45,214 acres
Of analyzed acres, number of acres of opportunity based on being revenue negative	5,382 acres
Acres implemented by farmer into conservation	1,216 acres

Environment and Natural Resources Trust Fund
M.L. 2017 Project Budget - Final

Project Title: Economic Assessment of Precision Conservation and Agriculture
Legal Citation: M.L. 2017, Chp. 96, Sec. 2, Subd. 08j
Project Manager: Tanner Bruse
Organization: Pheasants Forever
M.L. 2017 ENRTF Appropriation: **$**400,000
Project Length and Completion Date: 5 Years, June 30, 2022
Date of Report: August 2022

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Activity 1 Budget	Amount Spent	Activity 1 Balance	TOTAL BUDGET	TOTAL BALANCE
BUDGET ITEM	***Precision Conservation and ROI: Sourcing New Acres for Conservation***				
Personnel (Wages and Benefits)					
PF Precision Planning Specialist: $170,000 (70% salary, 30%benefits): 100% FTE each year for 3 years	$170,000	$170,000	$0	$170,000	$0
PF Precision Planning Specialist: $170,000 (70% salary, 30%benefits): 100% FTE each year for 3 years	$170,000	$100,951	$69,049	$170,000	$69,049
Professional/Technical/Service Contracts					
Contract work with, TBD (through bidding process), to produce an interactive statewide profitability map that uses data to predict past and present profitability by commodity price and soil type. This interactive map will be an online tool that is available to the public and will assist in promoting conservation on acres that may make sense to the farmer.	$5,000		$5,000	$5,000	$5,000
Equipment/Tools/Supplies					
Laptop. Necessary to perform daily duties along with working in numerous locations to provide planning to farmers. Needed because when traveling there will be no true "office".	$1,500	$1,194	$306	$1,500	$306
Laptop. Necessary to perform daily duties along with working in numerous locations to provide planning to farmers. Needed because when traveling there will be no true "office".	$1,500	$891	$609	$1,500	$609
Travel expenses in Minnesota					

Mileage. Travel to meet on site with farmers to run analysis/precision planning. Approximate mileage will be 10,000 miles per specialist, per year, at .54 per mile for 3 years	$32,400	$10,904	$21,496	$32,400	$21,496
Lodging and Meals. While traveling to meet on site with farmers to run analysis/precision planning. Per commissioners plan lodging and meals will consist of approximately 15 nights lodging per specialist, per year, at $100 per stay over 3 years ($9,000) and approximately 70 meals per specialist, per year, over 3 years ($4,330).	$13,330	$1,926	$11,404	$13,330	$11,404
Other					
Booth at MN Farmfest to promote, implement and amplify results of precision business planning. $1,090 per year for 3 years	$3,270	$2,151	$1,119	$3,270	$1,119
Implement workshops, field days and/or events to promote, implement and amplify results of precision business planning. 15 events @ $200 each. Associated costs may include, but not limited to; postage, posters, printing materials (brochure, handouts, etc.) and event notifications (press, radio, etc.).	$3,000	$2,420	$580	$3,000	$580
COLUMN TOTAL	**$400,000**	**$290,437**	**$109,563**	**$400,000**	**$109,563**
			$109,563		