# Pilot Milkshed Sustainability Project

## Year Two Report on Environmental Sustainability, Local Resources, and Financial Benchmarcking

**Project Partners:**

https://farmersforsustainablefood.com/SustainabilityFramework

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# 1 EXECUTIVE SUMMARY

Farmers for Sustainable Food (FSF), the Lafayette Ag Stewardship Alliance (LASA) and key stakeholders in the dairy supply chain continue to partner with one another to work on replicable frameworks in farmer-led sustainability projects. The project group has grown during the first three years, with three additional farms joining to the project between 2020 and 2021. As of January 2022, there are 15 farms enrolled and which have entered over 15,000 acres of cropland into the FieldPrint Platform. Project benchmarks were created for alfalfa, corn grain and corn silage.

In 2020, FSF and LASA worked with Field to Market (FTM) and Houston Engineering, Inc. (HEI) to create a project within FTM's Fieldprint Platform sustainability tracking system. A report was published in early 2020 outlining Year 1 (2019 crop year) of the LASA FTM report card on sustainability goals and baseline values of where LASA currently is in regards to seven key sustainability metrics: land use, biodiversity, greenhouse gas equivalent emissions, energy use, water quality, soil carbon and soil conservation scores.

This report provides information on the seven key on-farm sustainability metrics (Field to Market, Fieldprint Platform) for years 2 and 3 (crop years 2020 and 2021) and outlines the new water quality metric that has been incorporated into the platform. This report contains a section on impact to local water resources that outlines the benefits of using the Prioritize, Target, and Measure Application (PTMApp) that was used in the Year 1 report.

**Greenhouse Gas Equivalent Score**

**15% decrease between 2019-2021**

A decreased score is preferred

As described in the Year 1 report, FSF and LASA outlined their commitment to show continued progress toward on-farm sustainability outcomes through these reports and present their findings to the community. Based on the on-farm Best Management Practices (BMPs) that were analyzed for the Year 1 report, and assuming equal adoption of practices across all LASA farms and fields, reduced and no-till practices alone are currently reducing sediment loss from the watershed by an estimated 56,700 tons per year. That is the equivalent of 4,200 dump truck loads of sediment per year, or 11.5 per day.


In addition to providing estimated load reductions of current and feasible future BMPs, additional applications of PTMApp are presented to highlight the utility and flexibility of the available data. This includes combining Field to Market's Fieldprint Platform data and PTMApp data to target and prioritize potential future BMPs on the landscape more precisely.

Southwest Tech Farm Business and Production Management (FBPM) program continued work with FSF and LASA to complete farm financial analysis for the 2020 fiscal year. Financial analyses completed in 2019 created a baseline of data for each participating farm. Three financial metrics have been calculated for each year and for the three crops monitored in this project: yields per acre, direct cost of production per acre, and gross return per acre. In year two of this project, data is beginning to support implementing various environmentally friendly practices into cropping systems results in similar yields and greater gross return per acre. This preliminary conclusion allows farmers to gain confidence in implementing conservation practices on-farm while still maintaining a positive financial return on their investment. Work in year three has begun and farm financial data is continually refined to provide more accuracy in results.

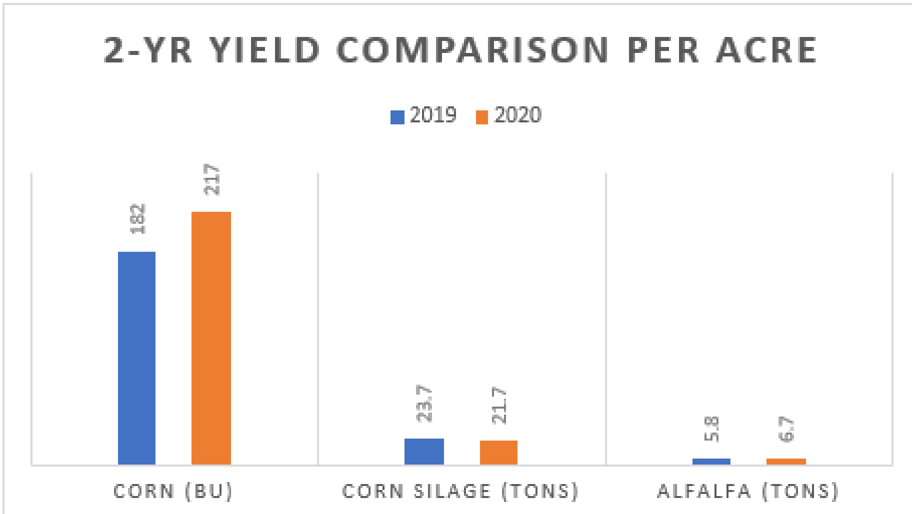



**Figure 1:** Two Year Comparison Showing Change in Yield by Crop Type

## 2 NEW FIELDPRINT PLATFORM WATER QUALITY METRIC

Field to Market has updated the water quality metric within the FieldPrint Platform. This update took place in the summer of 2021 with the release of version 4.0 of the platform. The old water quality metric used to be scored between 0 and 10, showing a scale of poor to good water quality. This metric was based on the Water Quality Index for Agricultural Runoff (WQIag). The new water quality metric is based on the Natural Resources Conservation Service (NRCS) Stewardship Tool for Environmental Performance (STEP) model. The new metric has four components and is now scored between 0 and 4 of the pathways being mitigated.

The updated metric identifies pathways for surface runoff and subsurface flow for both nitrogen and phosphorus. Each field is given a Field Sensitivity Score (FSS), which is based on the potential estimated nutrient loss from either runoff (surface) or leaching (subsurface). FSS scores factor in soil properties, tile drainage, irrigation, and local climate. An FSS score is created for each pathway (surface nitrogen loss, subsurface nitrogen loss, surface phosphorus loss and subsurface phosphorus loss).

| Loss Pathway | Field Sensitivity Category | Pathway Ratio (RMS / FSS) | Pathway Mitigation |
|---|---|---|---|
| Surface Phosphorus | Moderately high | 0.95 (28.5 / 30) | Improve |
| Subsurface Phosphorus | Moderate | -0.07 (-3.75 / 55) | Improve |
| Surface Nitrogen | Moderately high | 1.21 (78.5 / 65) | Mitigated |
| Subsurface Nitrogen | Moderate | 1.13 (45 / 40) | Mitigated |

Example Water Quality Matrix

After inputting field data for each year, a risk mitigation score (RMS) is calculated for each field. To gain a water quality score point, a risk must be mitigated. Each of the four pathways can be mitigated and if all four pathways are mitigated, you would obtain a water quality metric of 4/4.

The RMS is comprised of several factors including any nitrification inhibitors or precision application, use of cover crop and type of tillage practices, nutrient management techniques such as 4R, and what types of NRCS practices are on the landscape.

To obtain the "mitigation" status for any of the four pathways, the RMS score must be equal or greater than the FSS score. If the RMS score is below the FSS score, the pathway is not considered mitigated. Based on the inputs listed above for calculating both the FSS and RMS, it is important to have accurate data inputted into the platform to get the best and most accurate results from the platform.

***Accurate data entry into Fieldprint Platform is essential for accurate scores.***

In the report to follow, given the updated metric, it is now possible to break down water quality scores between these four metrics in addition to providing the aggregate water quality score, providing a greater depth of knowledge and interpretation ability for this metric.

## 2.1 LASA PILOT PROJECT WATER QUALITY METRICS

The LASA group has now completed data entry for 2019-2021, providing insights into three years of field data for project participants. The water quality pathway breakdowns are shown in **Table 1** and **Figure 1**, along with a cumulative score for the water quality metric. The graph shows the percentage of fields within the project that are mitigating each pathway. As an example, the surface phosphorus pathway is being mitigated by 50 percent of fields in 2019. The cumulative water quality metric, the bar to the far right, shows the aggregated score of all four pathways. For the aggregated score, 50 percent equates to a score of 2/4 for the project. The project score went from 1.9/4 to 2.3/4 between 2019-2021, an improvement of 18 percent.

**Table 1:** Pathway Variables and Mitigation

| | Pathway | |
|---|---|---|
| | **Phosphorus** | **Nitrogen** |
| Variables | ▪ Amount of inorganic P fertilizer applied<br>▪ Amount of organic N fertilizer applied (P in organic fertilizer when applying at a rate to meet N needs)<br>▪ Length of time P application is intended to be used for (how many years)<br>▪ P application intended for cover crops (and how many years)<br>▪ P application timing<br>  ○ Split application<br>  ○ Is first application <25 lb/ac?<br>▪ P application method | ▪ Amount of N credit carried over from a cover crop or prior year applications<br>▪ Amount of inorganic N fertilizer applied<br>▪ Amount of organic N fertilizer applied<br>▪ Timing of first N application<br>  ○ Is the first N application a split application?<br>  ○ Is the first N application <40 lb/ac?<br>▪ Split applications – are they split into three or more applications?<br>▪ N application method<br>▪ Crop type – determines the N ratio of how much N was removed during crop harvest |
| Surface Pathway Mitigation | The surface phosphorus pathway in 2019 was mitigated by half of the fields in the project. In 2020, 54% of the fields were mitigating this pathway, and in 2021, 52% of the fields mitigated surface phosphorus. | The surface nitrogen pathway in 2019 was being mitigated by 61% of the fields in the project. In 2020, 65% of the fields were mitigating this pathway, and in 2021, 58% of the fields mitigated surface nitrogen. |

| | Pathway | |
|---|---|---|
| | **Phosphorus** | **Nitrogen** |
| Subsurface Pathway Mitigation | The subsurface phosphorus pathway in 2019 was being mitigated by 3% of the fields in the project. In 2020, 3% of the fields were mitigating this pathway, and in 2021, 13% of the fields mitigated subsurface phosphorus. | The subsurface nitrogen pathway in 2019 was being mitigated by 75% of the fields in the project. In 2020, 82% of the fields were mitigating this pathway, and in 2021, 88% of the fields mitigated subsurface nitrogen. |

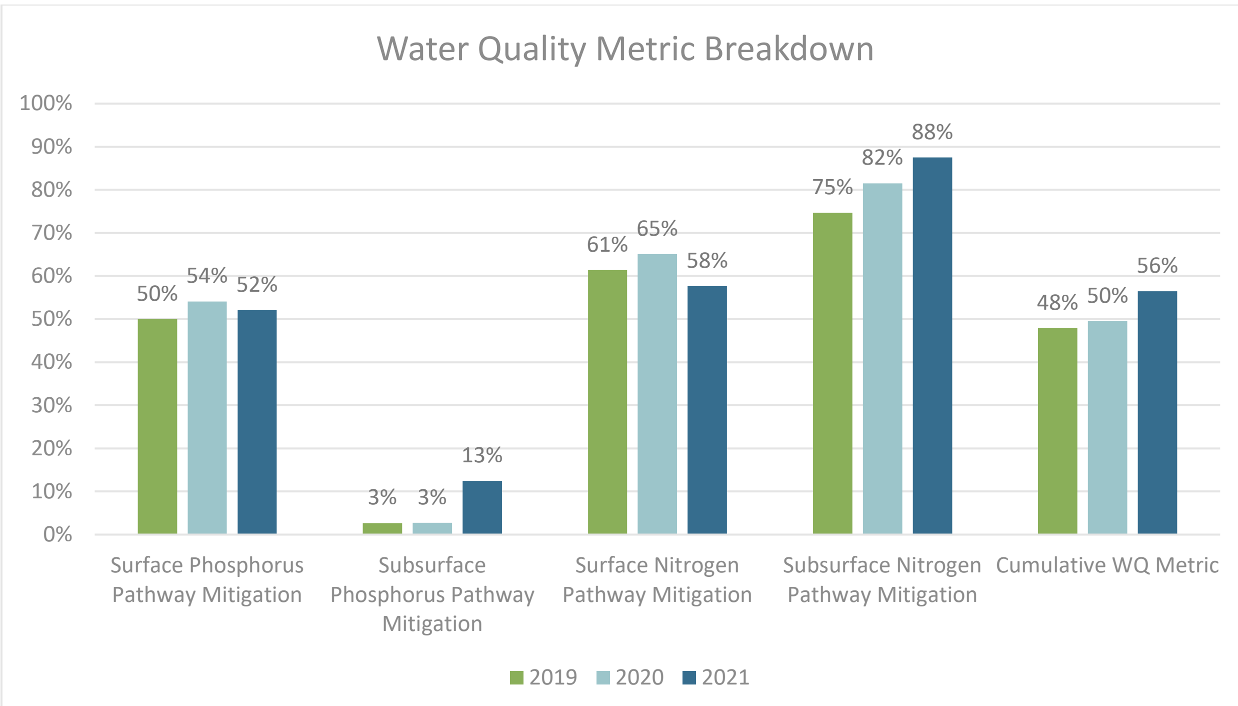



**Figure 2:** Water Quality Metric Breakdown

# 3 ON-FARM SUSTAINABILITY

To compare metrics at a project level, it was necessary to weight each field against the total acreage within the project (i.e.: a field that is 200 acres in size has a greater impact on the score than a field that is 10 acres in size). A description of each metric and the metric trend are shown below. The percentages are showing change between 2019 and 2021. The values are not associated to any one farm or field and provide a project-wide overview of the sustainability metrics.  Comparisons are not being made at a crop-specific level except for the land use score, where crop use is broken out by acres/ton and acres/bushel.

LASA outlined four important metrics they would focus on: Land Use, Soil Carbon, Soil Conservation, and Water Quality. As described in the previous section, the water quality metric was updated in 2021 and contains four sub-metrics providing a more detailed understanding of surface and subsurface water quality pathways.

## Soil Conservation

**22% increase in soil loss between 2019-2021**

A decreased score is preferred

**unit of measure:** tons of soil lost per acre per year (tons/ac/yr)

**numeric score in crop year 2021:** 2.7 tons/ac/yr

Soil erosion is calculated from the USDA NRCS erosion models (WEPP and WEPS). A smaller value is better because that means less soil is leaving the fields each year. For the LASA project, there was a 22% increase between 2019 and 2021 for soil erosion. The average loss of soil per year is 2.7 tons per acre.

## Soil Carbon

**18% decrease in likelihood that project is gaining carbon in soil between 2019-2021**

An increased score is preferred

**unit of measure:** Unitless; scored between -1 and 1. A value greater that 0 suggests soil carbon is increasing while a value less than 0 suggests soil carbon is being lost.

**numeric score in crop year 2021:** 0.43 unitless

Soil carbon is calculated using the Soil Conditioning Index developed by the NRCS. The value of the soil carbon score shows the likelihood that carbon is either getting stored or is being lost. A larger or smaller score does not suggest how quickly soil carbon is being gained or lost. The change in soil carbon from 2019-2021 was 18%. The actual score at the project level is 0.43, suggesting that on average, fields within the project are likely gaining soil carbon.

## Water Quality Score

**18% increase between 2019-2021**

An increased score is preferred

**unit of measure:** Scored between 1 to 4. Score breakdown is described in previous section.

**numeric score in crop year 2021:** 2.26 unitless

The water quality metric is comprised of four pathway mitigation processes: surface phosphorus pathway, subsurface phosphorus pathway, surface nitrogen pathway, and subsurface nitrogen pathway. A larger value is preferred as it shows that more pathways were mitigated (i.e., fewer nutrients were able to leave the field from the surface and/or subsurface). The cumulative score for the project increased 18% between 2019 and 2021. A more detailed breakdown of each score is in the previous section.

## Greenhouse Gas Equivalent Score

**15% decrease between 2019-2021**

A decreased score is preferred

**unit of measure:** Pounds of carbon dioxide and carbon dioxide equivalents produced per acre

**numeric score in crop year 2021:** 2206 lbs./CO2e/ac

Greenhouse gas equivalents include carbon dioxide (CO2), and nitrous oxide (N2O) emissions. This equivalent simply converts nitrous oxide emissions into carbon dioxide emissions so that the values can be compared with one another. LASA project participants decreased their greenhouse gas emissions by 15% between 2019 and 2021.

## Energy Use

**15% decrease between 2019-2021**

A decreased score is preferred

**unit of measure:** British thermal units per acre (BTU/ac)

**numeric score in crop year 2021:** 4,234,009 BTU/ac

Energy use is calculated from the point of pre-planting all the way to the first point of sale. This metric tries to consider all energy that went into creating the product. Energy use touches all parts of the platform from field location, soil type, crop rotation, management, and drying. An example of how to interpret BTU consumption: A house in the United States in 2020, on average, consumed nearly 11,000 kilowatt hours of energy, or approximately 37.5 million BTUs of energy. For perspective, that means that, on average, 9 acres of land in production within the LASA program is equivalent to the average home energy consumption in the United States per year.

## Land Use

**8-20% increase between 2019-2021**

A decreased score is preferred

**unit of measure:** acres per ton or acres per bushel of production

**numeric score in crop year 2021:** 0.25 ac/ton and 0.005 ac/bushel

The land use metric shows how much land is needed to produce one ton or bushel of product. A smaller value is preferred as it shows that more product is being created per acre of land in production. The data from the platform indicates that at the project level, the efficiency of production for crops measured in ton/ac has decreased by 20% and crops that are measured in bushels/ac decreased by 8% when comparing 2019 and 2021 values.

**Biodiversity Score**

**2% decrease between 2019-2021**

An increased score is preferred

**unit of measure:** Habitat Potential Index (HPI) expressed as a percent. A value provided to each field of the potential of a given farm to provide wildlife habitat on land or in water within the field boundary.

**numeric score in crop year 2021:** 72 HPI

Biodiversity metric has two parts to it. The HPI score is a value, and the biodiversity score is a percent which shows the amount of habitat the field provides based on the field's potential biodiversity estimate. Across the LASA project, biodiversity decreased 2%. This means that fields decreased their realized potential for habitat.

# 4 LOCAL WATER RESOURCES

Data from PTMApp was used as a resource for a wide variety of investigations, analyses and reporting needs. It has the power to locate areas of high sediment and nutrient runoff, find best management practice (BMP) and conservation practice (CP) opportunities, estimate the water quality benefit of existing or potential BMPs and CPs, among many other utilities. PTMApp data can be used to prioritize BMP placement, determine the cost-effectiveness of potential BMPs, develop BMP implementation scenarios to work toward achieving water quality goals, and can serve as the foundation for grant applications for large-scale projects.

The data from PTMApp can be utilized in many different ways and at many different spatial scales, depending on the specific information needs. **Figure 3** shows three common scales at which to analyze data from PTMApp. Individual fields, like the UW-Platteville Pioneer Farm fields (**Figure 3** – left) can be analyzed to determine where background yields (sediment, phosphorus, and nitrogen) are highest. Subwatersheds can be reviewed (**Figure 3** – middle) for suitable locations for BMPs and CPs. And estimated load reduction benefits for those practices can be ranked to allow BMP prioritization. The watershed as a whole can also be analyzed (**Figure 3** – right) to determine the collected water quality benefit of existing and/or future BMPs.

These analyses and other uses of PTMApp data are presented in **Appendix A**.

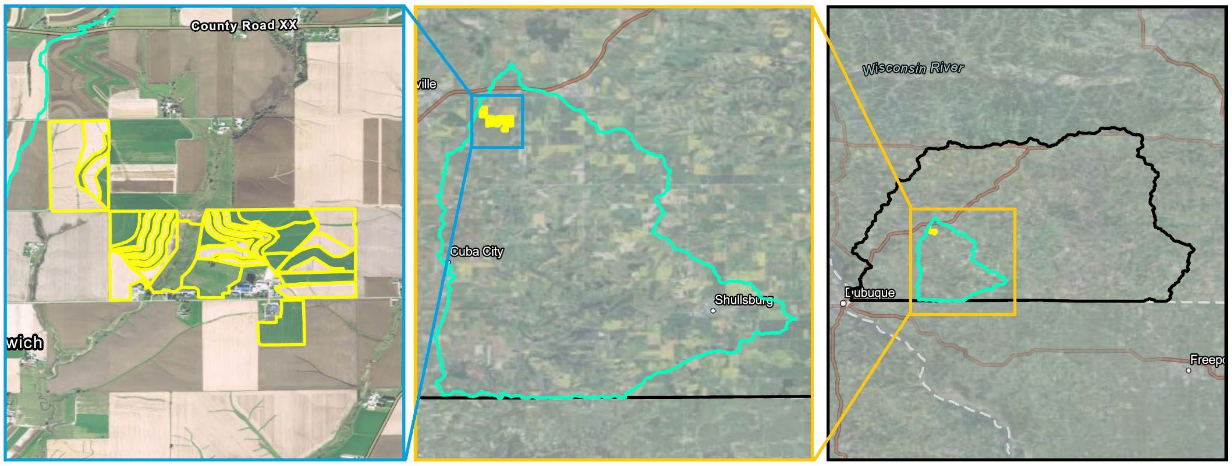



**Figure 3:** Spatial scales of PTMApp analysis. Field/farm-scale (left), subwatershed-scale (middle), and watershed-scale (right).

To summarize the collective benefit of LASA water quality stewardship efforts, existing practices were reviewed at the three spatial scales presented in **Figure 3**. The fields of the UW Platteville-Pioneer Farm were used as example fields to show the fine resolution of possible analysis within PTMApp. Reviewing these fields also highlights the effect of measuring estimated load reduction at different locations within the watershed, in this case at the edge-of-field and at a downstream location such as the watershed outlet.

The difference in load reduction estimates between edge-of-field and a downstream location is due to natural in-stream losses of the measured parameter. In-stream loss is due to the physical, chemical, and biological processes that naturally reduce the load of sediment, phosphorus, and nitrogen in streams. For example, the settling of sediment in the stream channel or uptake of phosphorus and nitrogen by bacteria, plants, algae, etc., as the water travels downstream in the channel. This leads to depressed or muted reduction estimates at further downstream locations.

Sediment load reduction of the BMPs currently implemented on UW-Platteville Pioneer Farm fields is presented in **Figure 4** at the edge-of-field (field-scale) and at the watershed outlet (sub-watershed scale).

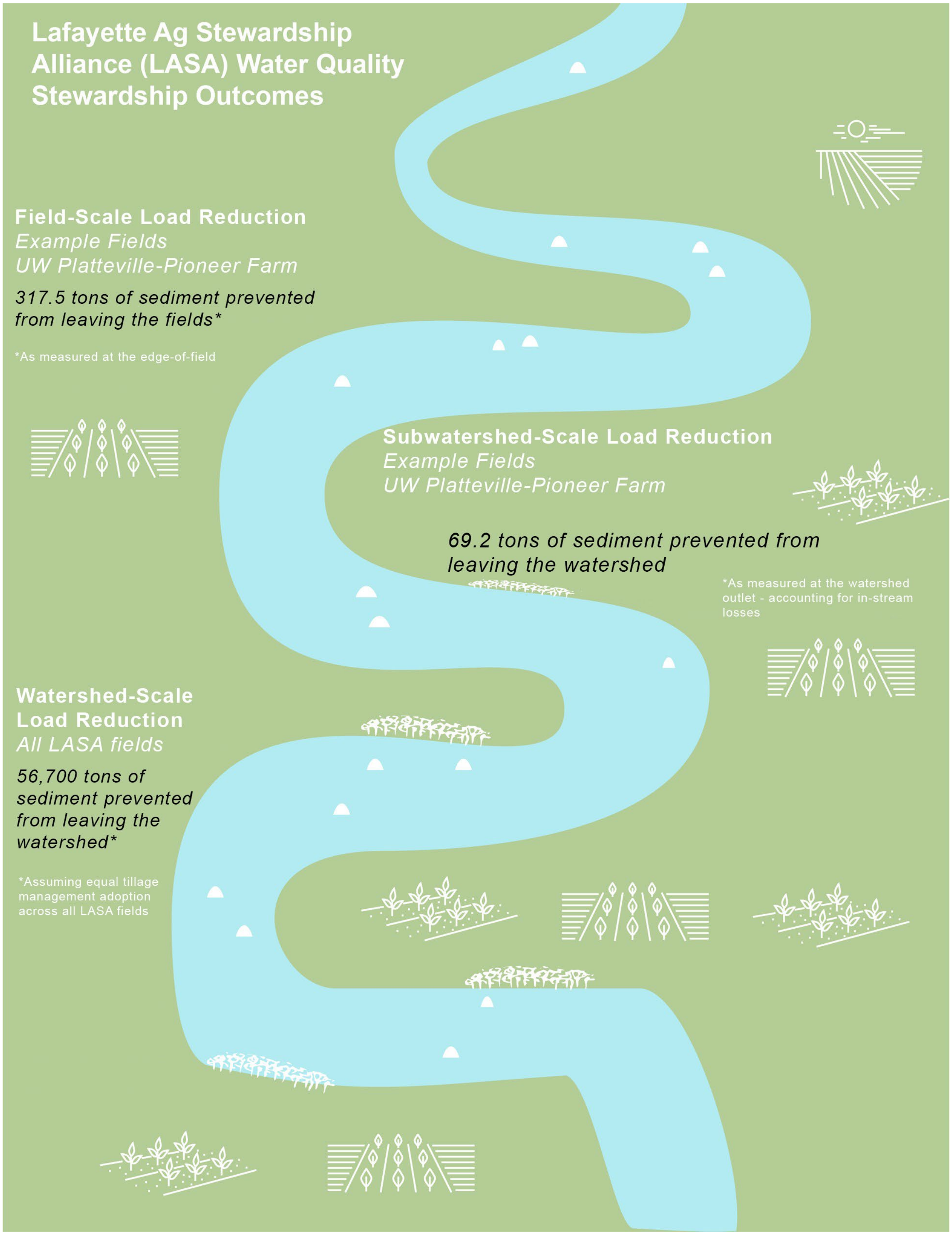



**Figure 4:** Sediment load reduction estimate of LASA participating fields as measured at different spatial scales

Similarly to how load reduction of BMPs from a single farm can be estimated, reduction estimates can be aggregated among all fields or farms to calculate the total reduction in load leaving the watershed.

Field to Market Fieldprint Platform data for 2021 shows 152 registered fields covering a total of 3,908 acres. This represents approximately 8.2percent of all LASA fields but can serve as a baseline for LASA participant fields. **Table 2** shows the estimated load reductions for the existing tillage management BMPs that were digitized and run through the PTMApp toolbar.

**Table 2:** PTMApp Estimated load reductions for FPP BMPs digitized for the Year 1 report

| Practice Type | Acreage Implemented | Load Reduction | | |
|---|---|---|---|---|
| | | Sediment (tons/yr) | Total Phosphorus (lbs/yr) | Total Nitrogen (lbs/yr) |
| Reduced tillage | 533 | 1,111 | 74 | 1,397 |
| No Till | 1,540 | 3,538 | 300 | 5,307 |

In total, LASA includes 47,660 acres; however, not all BMPs across all LASA farms and fields have been digitized and processed through the PTMApp toolbar to produce estimated load reduction benefits. **Table 3** presents the potential estimated load reduction benefits of tillage management BMPs across all LASA farms and fields, assuming the same BMP adoption rate as for the digitized fields and BMPs.

**Table 3:** Load reductions of FPP BMPs extrapolated to all LASA farms/fields (assuming equivalent practice adoption rates)

| Practice Type | Acreage Implemented | Load Reduction | | |
|---|---|---|---|---|
| | | Sediment (tons/yr) | Total Phosphorus (lbs/yr) | Total Nitrogen (lbs/yr) |
| Reduced tillage | 6,496 | 13,550 | 908 | 17,033 |
| No Till | 18,786 | 43,147 | 3,658 | 64,717 |

Assuming an equivalent adoption rate of BMPs across all LASA fields, reduced tillage and no tillage being implemented across LASA fields could be reducing sediment loss from the watershed by 56,700 tons/yr (**Figure 4, Table 3**). To put that in terms of dump trucks loaded with sediment, that's equivalent to preventing 4,200 dump truck loads of sediment per year from leaving the watershed, or 11.5 per day.

With the addition of other BMP types (e.g., grassed waterways, stripcropping, etc.), the load reduction could be significantly greater.


## 4.1 TARGETING AND CREATING IMPLEMENTATION PROFILES FOR GOAL PLANNING

One of the many benefits of PTMApp is the ability to create implementation scenarios to work toward achieving a water quality or load reduction goal. PTMApp data provides opportunities to explore and prioritize alternative practices and to show the benefits and impacts of those practices on water resources. This ability can be of great benefit for achieving specific water quality goals within the watershed. For example, Silver Spring Creek is impaired by sediment and therefore has an assigned total maximum daily load (TMDL). The TMDL report for Silver Spring Creek suggests that reducing average sediment yield within the drainage area of Silver Spring Creek to 0.9 tons/acre/year would allow Silver Spring Creek to meet the water quality standards for sediment. The Silver Spring Creek watershed is

3,476.3 acres, which would mean that to meet water quality standards, the total annual load of sediment leaving the Silver Spring Creek Watershed would need to be less than 3,128.7 tons per year. As estimated by PTMApp, the natural background sediment load to the outlet of the watershed is 17,861.3 tons/yr, which aligns with the estimated annual load of 14,056 tons/yr presented in the TMDL report. Also included in the TMDL report is the current measured sediment load leaving the watershed and factors in the effect of current load reductions resulting from existing BMPs, CPs, and Conservation Reserve Program (CRP). This current load leaving the Silver Spring Creek watershed is 4,870 tons/yr, or 1.4 tons/ac/yr. To meet the water quality goal for this watershed, a BMP implementation scenario could be created in which PTMApp BMPs are prioritized to reduce the Silver Spring Creek Watershed sediment load by an additional 1,741 tons/yr (0.5 tons/ac/yr) to allow the watershed to meet the maximum load defined by the TMDL report. Estimated additional load reduction could be calculated alongside the necessary investment to reach the load reduction goal to determine if achieving the load reduction goal is financially feasible. PTMApp BMPs can be prioritized based on a number of options including estimated load reduction or cost-effectiveness (load reduced per invested dollar).

Cost-effectiveness curves like the example presented in **Figure 5** can be created to show the expected load reduction for a given level of financial investment. It can be used to determine if the load reduction goal is attainable or if there is a point of diminishing returns at which additional investment is not economically favorable.

Because PTMApp does not have an inventory of existing BMPs, there may be feasible BMPs that are presented by PTMApp that are already implemented on the landscape. If it's determined that there are few on-field management practices remaining to be implemented within the watershed, this type of analysis can also be used as part of a grant application if it is decided that a large-scale project desired.

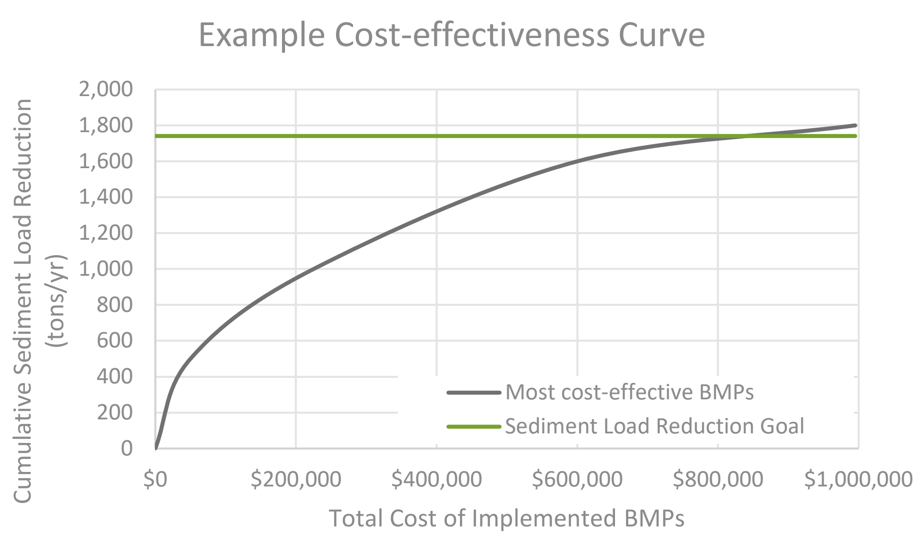



**Figure 5:** Example cost-effectiveness curve

# 5 CROP PRODUCTION FINANCIAL BENCHMARKING

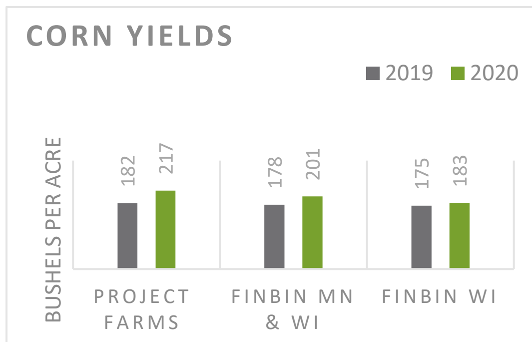
Financial analyses were completed for 2020 and included a breakdown by enterprises of corn for grain, corn silage and alfalfa. This second year of the project was focused on building data from the 2019 established baseline of each participating farm to aid in developing trendlines and conclusions of the farms' return on investment with conservation practices implemented.

Financial data collected in this report is recorded from the actual financial records kept on each farm. Benchmark numbers used are from the FINBIN database managed by the Center for Farm Financial Management. Limits to benchmark data exist due to low database farms of special sorts, such as use of cover crops, grown with cover crop, no-till and non-organic.

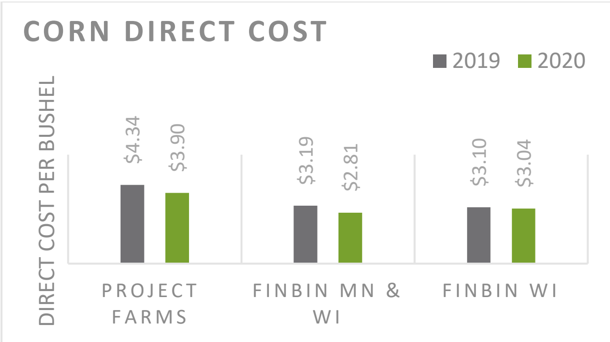
The standardized value used for gross return per acre is determined annually by averaging the commodity value over the previous year as determined by each individual summary group. This value is used for feed inventories on the balance sheet to create consistency. Direct expenses include seed, fertilizer, chemical, crop insurance, custom hire, land rent, fuel and oil, repairs and operating interest. Manure hauling expense is split 50/50 between livestock custom hire and crop fertilizer expenses. This shared allocation lowers purchased fertilizer costs and shares the manure expense to both enterprises.

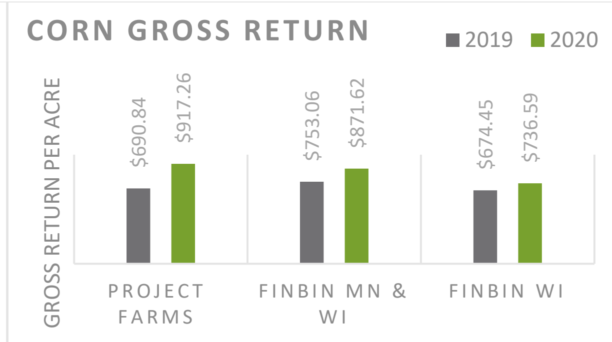
## 5.1 CORN GRAIN PRODUCTION ANALYSIS

The average corn for grain acres for project farms was 811 acres. Minnesota/Wisconsin combined database averaged 553.3 acres (738 farms) while the average acres for Wisconsin database was 837.9 acres (7 farms) for corn for grain. The database farms were sorted to include farms that produced 251-1,500 acres of corn for grain.



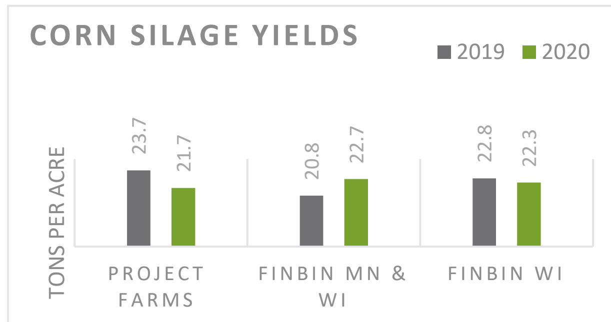

The average yield of the four project farms was 216.8 dry bushels of grain per acre. When comparing the project farms to the Minnesota/Wisconsin combined database, yields were greater by 15.5 bushels per acre. Direct cost of production for project farms was $3.90 which is $1.09 higher. The average gross return per acre on project farms was $917.26, which is $45.60 greater than the database. When comparing the project farms to the Wisconsin-only database, yields were greater by 34.3 bushels per acre, direct cost was higher by $0.86 and gross return per acre was $180.67 greater. Gross return per acre includes bushels per acre times a standard value of $4.00 unless grain is contracted; if so then the priced value is used. Minnesota/Wisconsin combined standard value is $4.05, indicating more grain was priced. Wisconsin-only grain is $3.69 per bushel, signifying that most grain will be fed to livestock. The gross return also includes the value of corn fodder, government payments and crop insurance revenue if applicable.



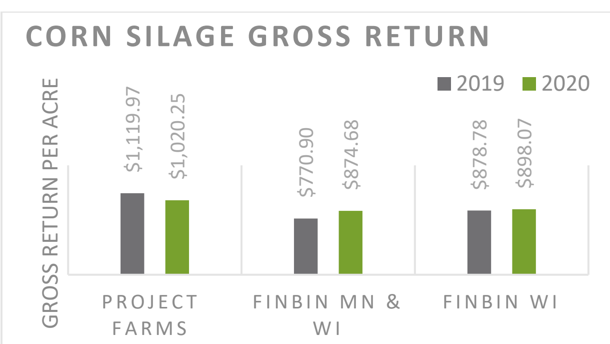



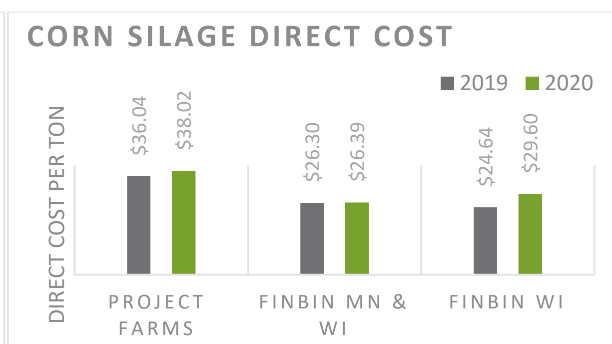

## 5.2 CORN SILAGE PRODUCTION ANALYSIS

The average corn silage acres for three project farms was 963 acres. Minnesota/Wisconsin combined database averaged 470.2 acres (43 farms) while the average acres for Wisconsin data base was 180.2 acres (39 farms) for corn silage. The database farms were sorted to include farms that produced 251-1,500 acres of corn silage for Minnesota/Wisconsin combined and all farms were included in the Wisconsin data cohort.




The average yield for project farms was 21.7 tons per acre. When comparing the project farms to the Minnesota/Wisconsin combined database, yields were lower by 1 ton per acre. Direct cost of production for project farms was $38.02 which is $11.63 higher. The average gross return per acre on project farms was $1,020.25 which is $145.57 greater than the database. When comparing the project farms to the Wisconsin only database, yields were lower by 0.6 tons per acre, direct cost was higher by $8.42 and gross return per acre was $122.18 greater. Gross return per acre includes tons per acre times a standard value of $45 per ton, WI and MN was $36.71, and WI $37.02 per ton. The value per ton of corn silage on the three project farms is higher due to the farms all harvesting brown midrib corn silage. All three project farms utilize cover crops following corn silage harvest. This cover crop is terminated prior to planting the following year's crop and the corn silage crop absorbs the cover crop expense.

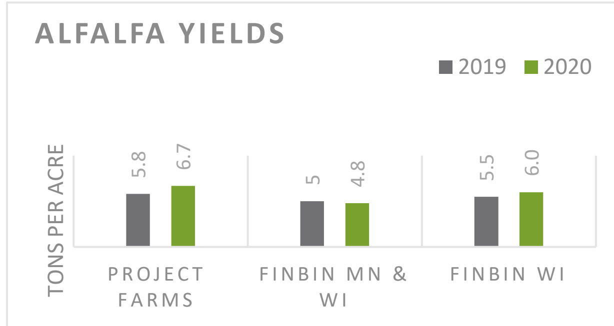


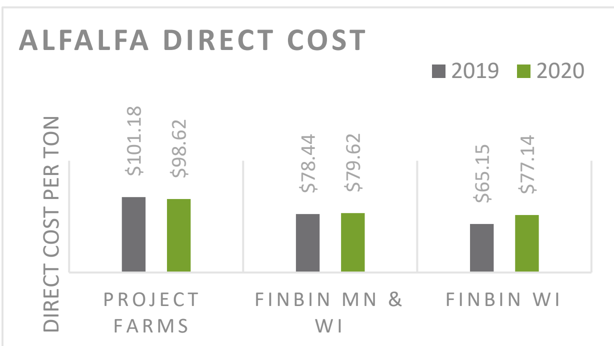

## 5.3 ALFALFA PRODUCTION ANALYSIS

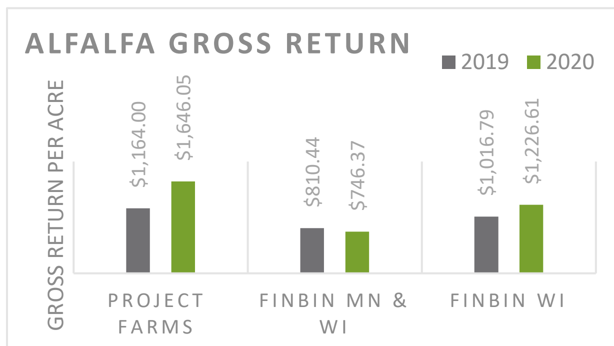
The average alfalfa acres for three project farms was 825.7 acres. Minnesota/Wisconsin combined database averaged 392.9 acres (30 farms) while the average acres for Wisconsin database was 260.5

acres (17 farms) for alfalfa. The database farms were sorted to include farms that produced 251-1,500 acres of alfalfa for Minnesota/Wisconsin combined, and farms with 100-1,500 acres of alfalfa were included in the Wisconsin data cohort.




The average yield for project farms was 6.7 tons per acre. When comparing the project farms to the Minnesota/Wisconsin combined database, yields were greater by 1.9 tons per acre. Direct cost of production for project farms was $98.62 which is $19 higher. The average gross return per acre on project farms was $1,646.05 which is $899.68 greater than the database. When comparing the project farms to the Wisconsin only database, yields were higher by 0.7 tons per acre, direct cost was higher by $21.48 and gross return per acre was $419.44 greater. Gross return per acre includes tons per acre times a standard value of $240 per ton, Minnesota/Wisconsin combined farms were $150.97, and Wisconsin only was $196.32 per ton. The value per ton of alfalfa hay on the three project farms is higher due to all farms harvesting high quality dairy hay. All project farms apply manure after the third year of production.




## 5.4 CONCLUSION AND SUMMARY

Implementing many environmentally friendly practices into cropping systems results in similar yields and greater gross return per acre. The two-year trend is beginning to support a positive return over direct expenses for all three commodities: corn for grain, corn silage and alfalfa. Yields in year two proved to be higher for all three crops, indicating that implementing conservation practices does not always result in lower yields. Finally, direct cost of production was the highest for project farms compared to the benchmarks yet did not negatively impact the gross return per acre for all three crops.

Higher direct costs can be attributed to custom hire of manure hauling and harvesting, along with land rent.

Three of the four project farms grow their crops to feed their livestock. Knowing corn grain cost of production is higher than the standardized value may allow the project farms to make management decisions of producing corn grain or purchasing it from another source. A true on-farm cost of production was reviewed with each producer due to the overhead expenses being unique to each farm. Having data to benchmark your farm against a group of other farms with similar size allows management decisions to be made moving forward with much greater confidence. Benchmarking makes it possible to examine your farming business to find opportunities to improve your financial position, efficiency and profitability in each enterprise.

As the FINBIN database continues to refine how cover crop and environmental practice data is collected, the project data will become more complete and detailed. Currently, there are challenges with finding benchmark reports that relate well to the number of acres represented in our project farms. As the project continues, additional years of data will focus on specific practices and how they relate to environmental stewardship and economic benefit.

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Southwest Wisconsin TECHNICAL COLLEGE

*Southwest Wisconsin Technical College is one of 16 institutions that comprise the Wisconsin Technical College System. Southwest Tech offers more than 60 programs in a wide variety of disciplines. The Farm Business & Production Management Program helps farm families reach their goals! This program gives current farm owners/operators opportunities to develop and fine tune their skills with production agriculture. Knowledge presented and skills demonstrated are provided through classroom settings and individual on-farm instruction. Individual instruction includes, but not limited to: farm financial analysis, cash flows, recordkeeping, nutrient management planning and farm succession. To learn more, visit www.swtc.edu/fbpm.*

# 6 APPENDIX

## 6.1 FIELD OR FARM-SCALE ANALYSIS

The data from PTMApp can be utilized at many different spatial scales, depending on the specific information needs. For instance, the fields of the University of Wisconsin – Platteville, Pioneer Farm can be reviewed on a field-by-field basis.

Pioneer Farm covers a contiguous 430 acres (330 tillable acres) in the western portion of the study watershed (**Figure 6**). Although the fields that comprise the Pioneer Farm are spatially connected, no two fields are the same. At a field-scale, individual fields within a farm can be analyzed for a wide variety of factors.

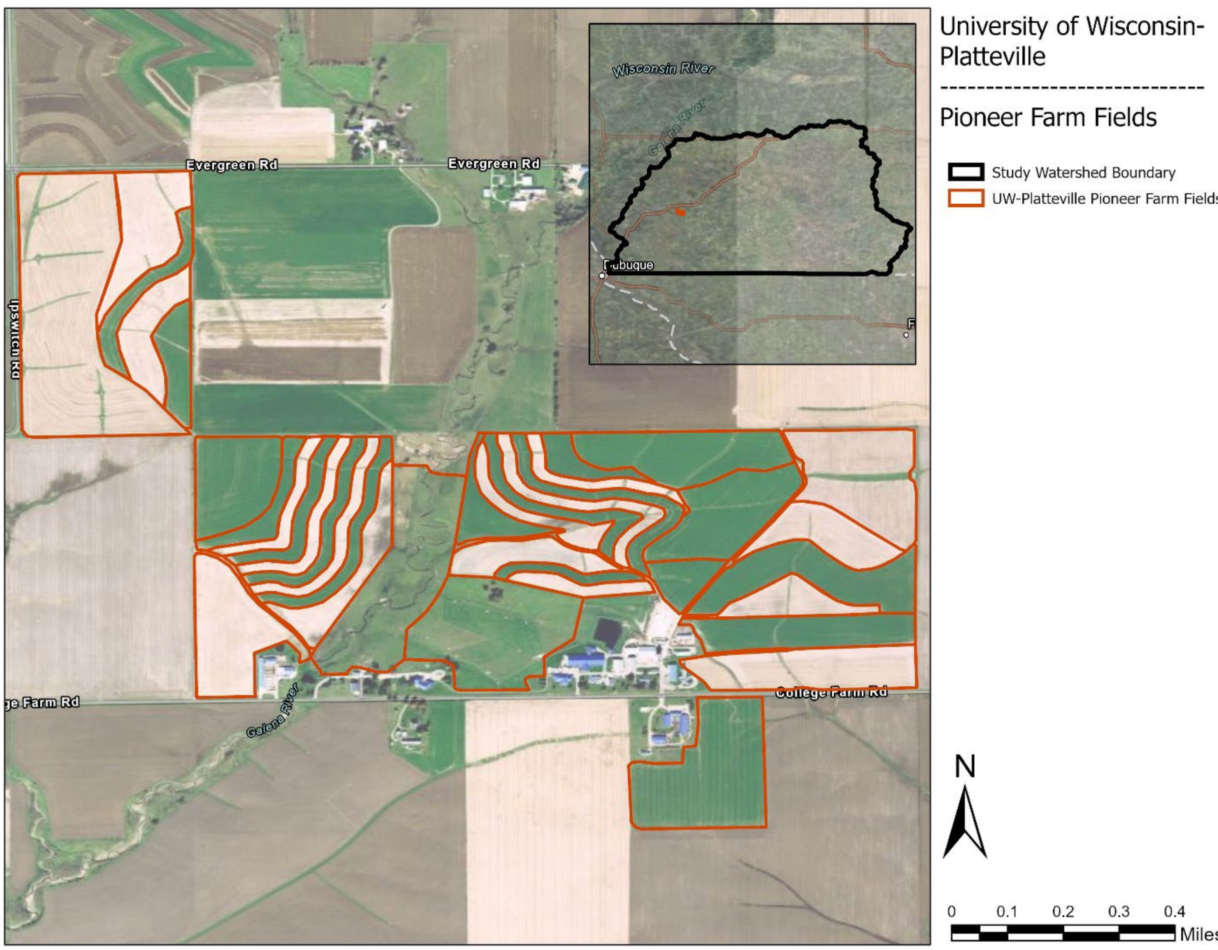



**Figure 6:** UW-Platteville Pioneer Farm fields.

### 6.1.1 SOURCE ASSESSMENT

A sediment source assessment (**Figure 7**) can be used to estimate the overall sediment yield (tons/ac/yr) from a farm or individual field and highlight fields or even areas within individual fields that may have a higher likelihood of erosion and soil loss. Lighter colored areas on the figure have low annual sediment loss whereas darker areas have higher annual sediment loss. At this level of analysis, the land area represented in **Figure 7** is segmented within PTMApp into a grid of 3-meter by 3-meter squares.

Sediment runoff is estimated for every individual square and is presented in the map. Although this level of detail is extremely useful, it is recommended to step back from that level of detail and consider the overall picture of loading at a slightly broader scale.

On average, the fields within Pioneer Farm have the potential to deliver 2.67 tons/ac/yr of sediment to downstream waterbodies. Across all tillable fields, that's nearly 900 tons of sediment per year, but does not account for the sediment retained on the fields due to management or structural BMPs and CPs. A similar analysis can also be conducted for total phosphorus and total nitrogen.


**Figure 7:** Sediment source assessment for the area in and around UW-Platteville Pioneer Farm

### 6.1.2 ANALYSIS OF EXISTING PRACTICES

Through use of the PTMApp toolbar, the load reduction of existing practices can be estimated to determine the expected water quality benefit of the management and structural practices that are already being implemented on the landscape. For the Year 1 report, a number of these practices were digitized (converted to a spatial data type that can be used within PTMApp) and run through the PTMApp toolbar (**Figure 8**). Practices were only digitized for fields that have data within the Field to Market Fieldprint Platform (shown in blue on **Figure 8**) and only if spatial data were readily available or were able to be digitized from aerial photos.

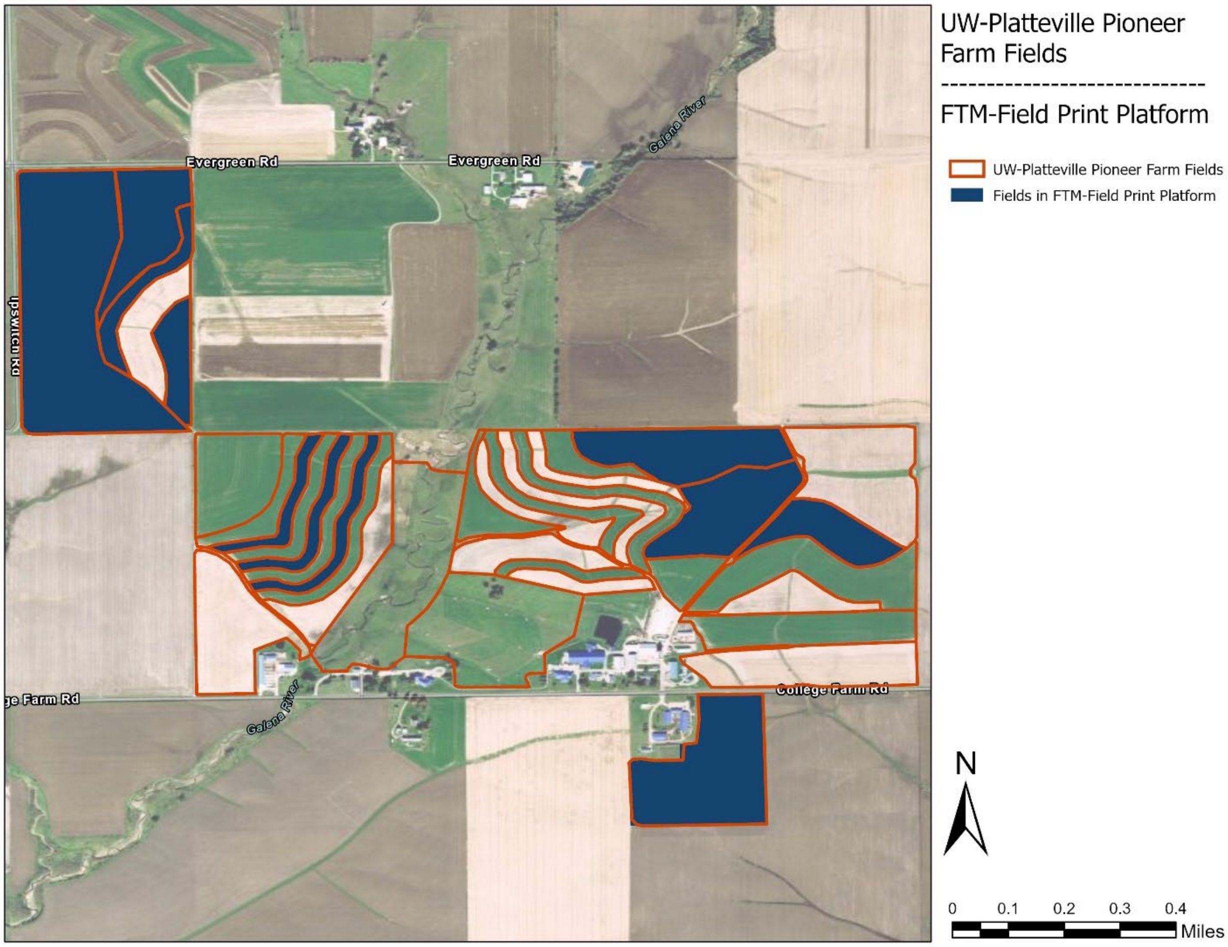



**Figure 8:** Locations of fields where BMPs were digitized on the UW-Platteville Pioneer Farm.

*Collectively, 317.5 tons of sediment per year are maintained on the fields as a result of the BMPs that were analyzed using PTMApp.*

The practices that were able to be digitized serve as a demonstration of one type of analysis that can be performed when using PTMApp data and the PTMApp toolbar. **Table 4** summarizes the estimated load reduction of the practices that were digitized within the Pioneer Farm and run through the PTMApp toolbar. Collectively 317.5 tons of sediment per year are maintained on the fields due to the BMPs that were analyzed using PTMApp. It should be noted that estimated load reductions for overlapping or adjacent BMPs cannot always be simply added together to get an estimated of overall load reduction. In certain circumstances, the load reduction provided by one BMP reduces the amount of load that an overlapping or downstream BMP can reduce, and thus reduces the overall estimated load reduction of the second BMP. This “treatment train” effect is typically not calculated within PTMApp for a large number of BMPs but can be calculated for a subset of BMPs if desired.

**Table 4:** Estimated load reduction of digitized existing practices on Pioneer Farm fields, as measured at the edge-of-field.

| BMP Type | Number of Digitized BMPs | Sediment (tons/yr) | | TP (lbs/yr) | | TN (lbs/yr) | |
|---|---|---|---|---|---|---|---|
| | | Sum | Average* | Sum | Average* | Sum | Average* |
| Reduced Tillage | 27 | 231.5 | 8.6 | 22.3 | 0.8 | 432.7 | 16 |
| Grassed Waterways | 14 | 76.6 | 5.5 | 1.8 | 0.1 | 29.6 | 2.1 |
| Stripcropping# | 13 | 9.4 | 0.7 | 1.8 | 0.1 | 31.4 | 2.4 |

* Average load reduction per individual BMP
# Although not a BMP type available within PTMApp by default, load reduction efficiency values specific to stripcropping can be input into PTMApp to estimate equivalent load reduction benefits.

### 6.1.3 TARGETING FUTURE BMPS

Opportunities for future BMPs and CPs can also be reviewed at the field scale, as can the probable water quality benefit of implementing those practices. This can be a tremendous asset when determining how to most effectively utilize and allocate resources and money on a farm.

Again, using the Pioneer Farm as an example, the sediment source assessment map presented in **Figure 7** and modified in **Figure 9** demonstrates how BMP targeting can be done using PTMApp data. Locations with higher sediment runoff are shown as darker brown on **Figure 9** and present opportunities to implement management or structural BMPs or CPs to have the greatest sediment load reduction.

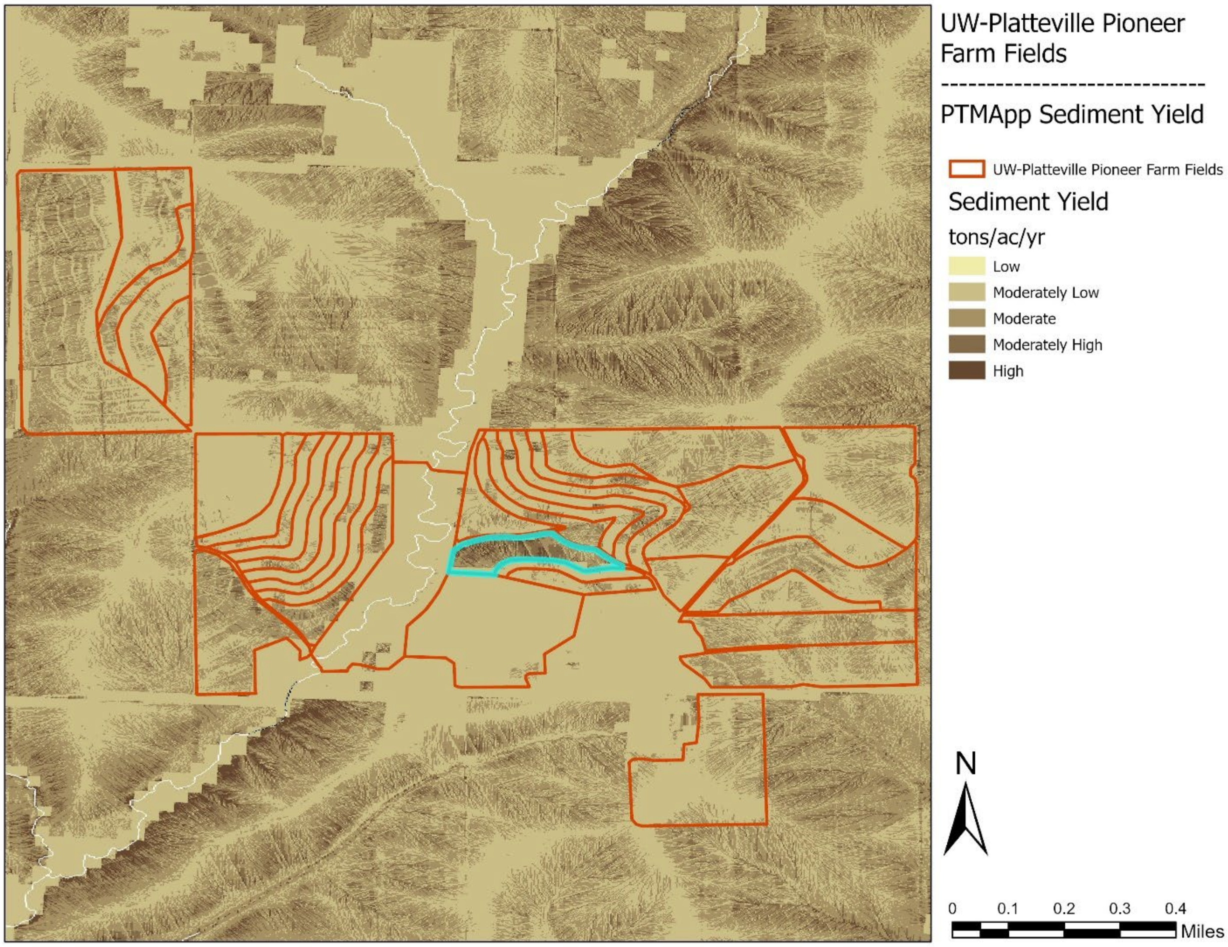



**Figure 9:** Field 20 (highlighted) within the UW-Platteville Pioneer Farm, with sediment source assessment.

Field 20 is highlighted on **Figure 9** as an area that has potential for significant sediment movement from the landscape to a downstream waterbody. Standard PTMApp output suggests several feasible BMPs that could be implemented on or around that field to reduce the sediment being washed away. Some of these optional BMPs are presented in **Table 5** as an example of how BMPs can be analyzed and reviewed.

**Table 5:** A selection of feasible BMPs for implementation on Field 20 at UW-Platteville Pioneer Farm, highlighted on **Figure 9**.

| PTMApp BMP ID | BMP Type | Estimated Load Reduction | | |
|---|---|---|---|---|
| | | Sediment (tons/yr) | Total Phosphorus (lbs/yr) | Total Nitrogen (lbs/yr) |
| 280198391_547575_6_345 | Reduced Tillage | 38 | 1.25 | 26 |
| 230021344_547575_5_412 | Grassed Waterway | 11.5 | 0.67 | 13 |
| 290307026_547575_6_512 | Forage/ Biomass Planting | 28 | 0.57 | 5 |

| PTMApp BMP ID | BMP Type | Estimated Load Reduction | | |
|---|---|---|---|---|
| | | Sediment (tons/yr) | Total Phosphorus (lbs/yr) | Total Nitrogen (lbs/yr) |
| 210022601_547575_5_342 | Critical Area Planting | 7.5 | 0.42 | 8.4 |
| 270198391_547575_6_340 | Cover Crop | 43.7 | 1.6 | 32 |

It should be noted that PTMApp BMPs do not necessarily align with field boundaries and may extend beyond the field boundary. This is because PTMApp evaluates the landscape based on hydrologic boundaries (how/where water flows), not based on ownership or political boundaries. And, PTMApp does not account for existing practices, so some of the potential practices presented in **Table 5** may already be implemented but are merely presented to demonstrate the utility of PTMApp.

This type of analysis is not limited to review of sediment load and can be also used to find additional areas on the farm that could be prioritized for reducing nitrate infiltration or nitrogen or phosphorus runoff. **Figure 10** shows the results of the nitrogen infiltration risk analysis presented in the Year 1 report. Three fields with high nitrogen infiltration risk are highlighted and could be prioritized for BMPs that reduce nitrogen infiltration or treat nitrogen in subsurface flowpaths. A selection of optional BMPs for these three fields are presented in **Table 6**.

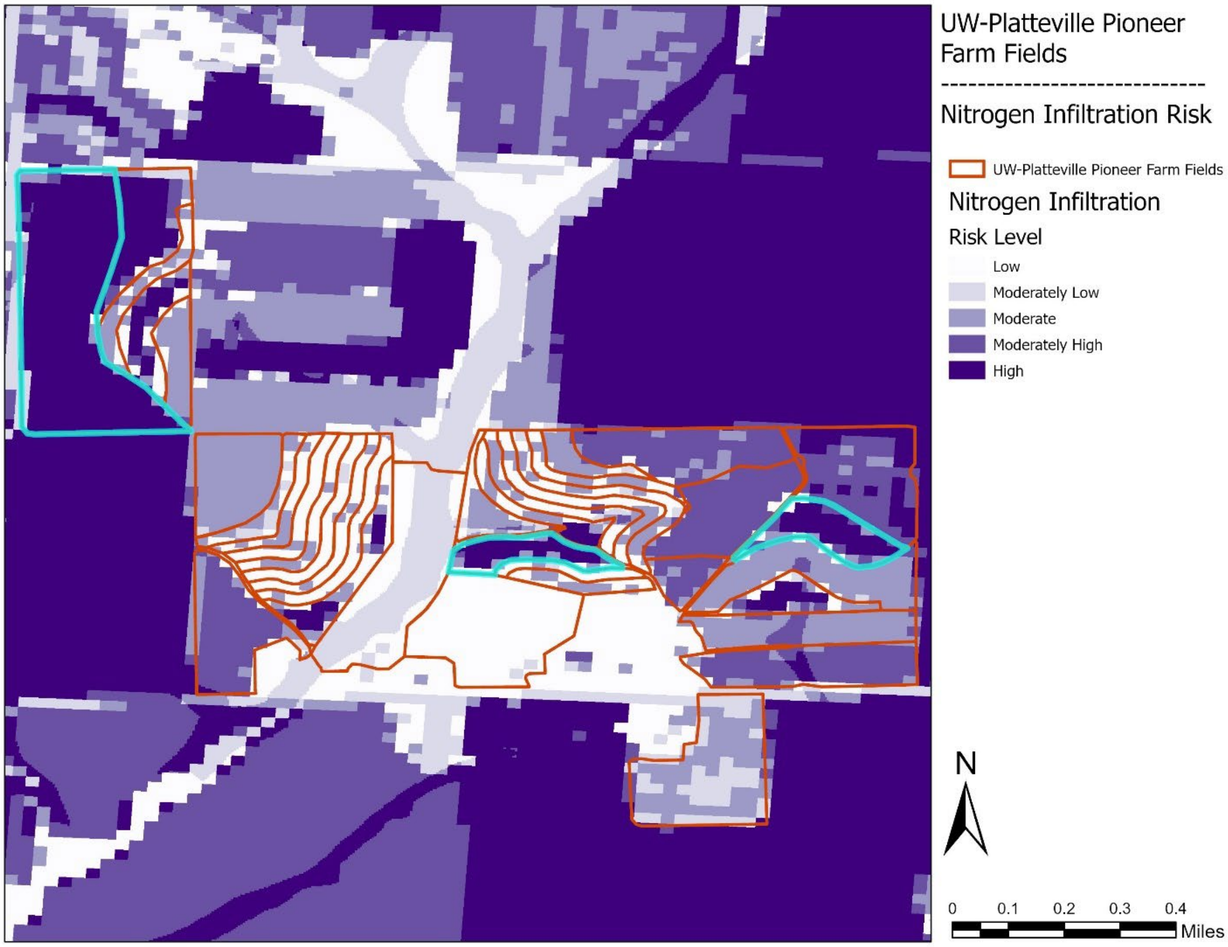



**Figure 10:** Fields 1, 20, and 24.2 (left to right, highlighted) within the UW-Platteville Pioneer Farm, with nitrogen infiltration risk assessment.

**Table 6:** Potential nutrient management BMPs to reduce nitrogen infiltration within the highlighted fields in **Figure 9**.

| PTMApp FULL_BMP_ID | BMP Type | Estimated Load Reduction | | |
|---|---|---|---|---|
| | | Sediment (tons/yr) | Total Phosphorus (lbs/yr) | Total Nitrogen (lbs/yr) |
| 310189009_547375_6_590_1 (Field 1) | Nutrient Management for GW Nitrogen Reduction | 128 | 4 | 51.6 |
| 310198417_547575_6_590_1 (Field 20) | | 24.4 | 0.6 | 7.2 |
| 310196386_548873_6_590_1 (Field 24.2) | | 56.7 | 3.8 | 49 |

### 6.1.4 FIELD VERIFICATION OF PTMAPP SUITABLE LOCATIONS FOR BMPS

Not only can PTMApp provide information about where to place BMPs on the landscape, but existing BMPs can be used to verify the validity of PTMApp output. Field verification of model output is a beneficial check of the data that is being produced by any model. Grassed waterways are shown in **Figure 11** in the fields of the UW-Platteville Pioneer Farm that are also present in the Field to Market Fieldprint Platform. Existing grassed waterways are shown superimposed on the PTMApp output of suitable locations for grassed waterways. General locations of existing grassed waterways align well with PTMApp output, although not perfectly due to the strict suitability criteria within the PTMApp model.

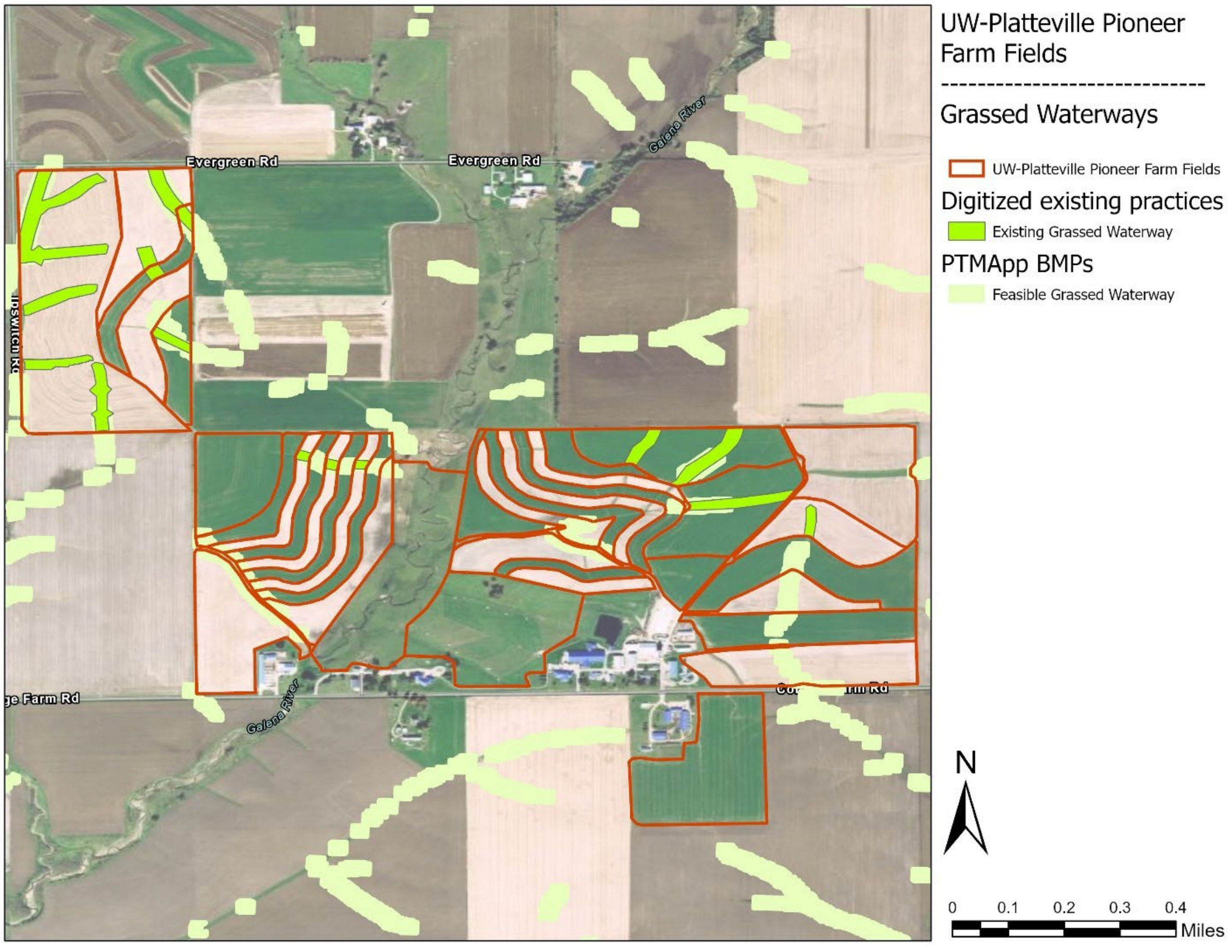



**Figure 11:** PTMApp grassed waterway suitability vs. digitized existing grassed waterways. Note, not all existing grassed waterways are represented.

## 6.2 SUBWATERSHED-SCALE ANALYSIS

Larger areas of the landscape can be reviewed in a similar manner as presented earlier, but other types of analysis can also be performed to get a better idea of overall water quality benefit of many fields/farms within a defined subwatershed. **Figure 12** presents the small drainage area containing the UW-Platteville Pioneer Farm (highlighted in yellow), as it sits in a headwater area of a larger subwatershed (highlighted in light blue).

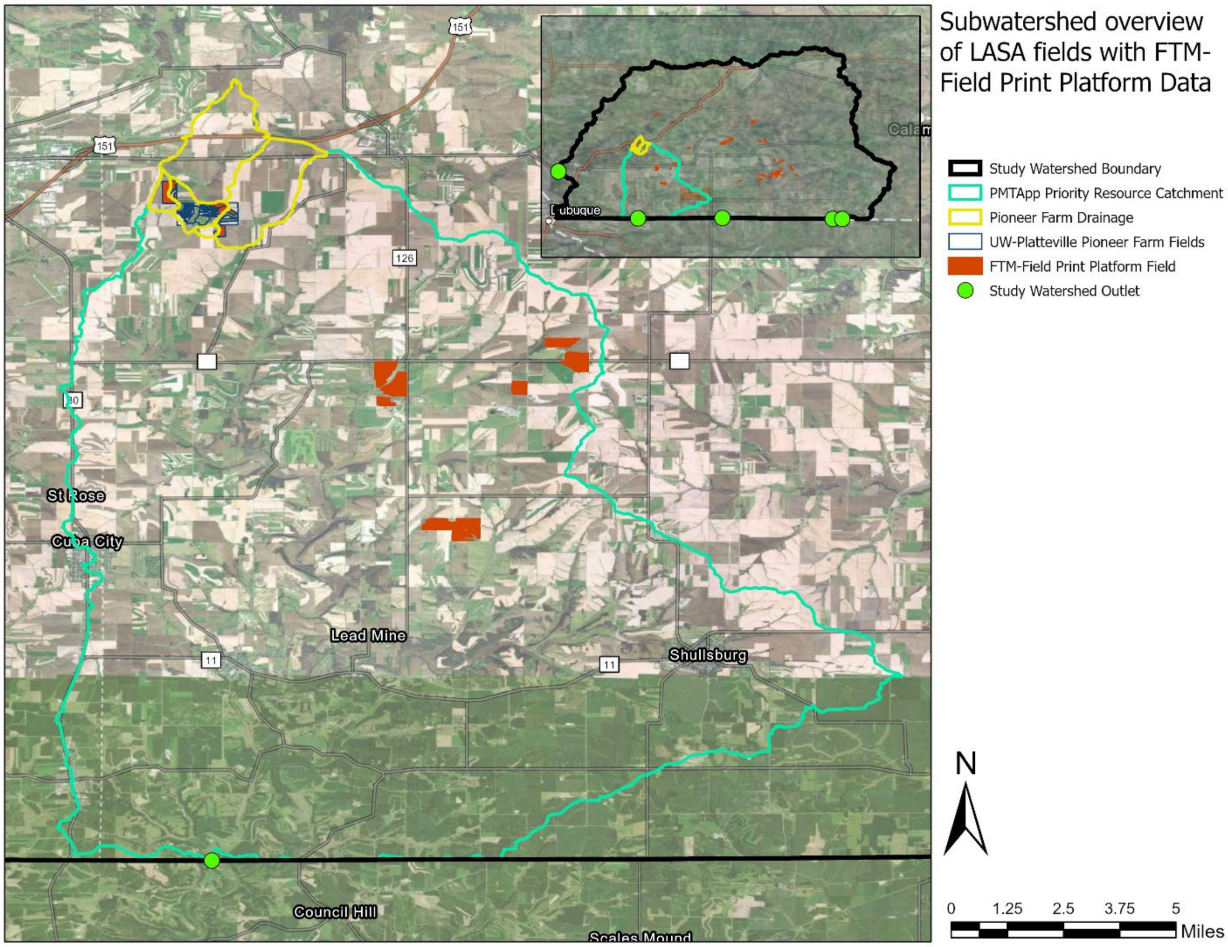



**Figure 12:** LASA participating fields within PTMApp priority resource catchment 1 that have data in the Field to Market – Fieldprint Platform

### 6.2.1 EXISTING LOADS TO A SUBWATERSHED OR PLANNING REGION OUTLET

At this scale, a source assessment can be conducted that presents the load of sediment (or total phosphorus or total nitrogen) delivered to each PTMApp catchment outlet, not factoring in any load reduction from any existing BMPs on the landscape. As a reminder, a PTMApp catchment is an approximately 40-acre area that is delineated based upon the hydrology of the area and serves as the finest scale of data aggregation within PTMApp. **Figure 13** shows the sediment loading to each PTMApp catchment outlet within the subwatershed.

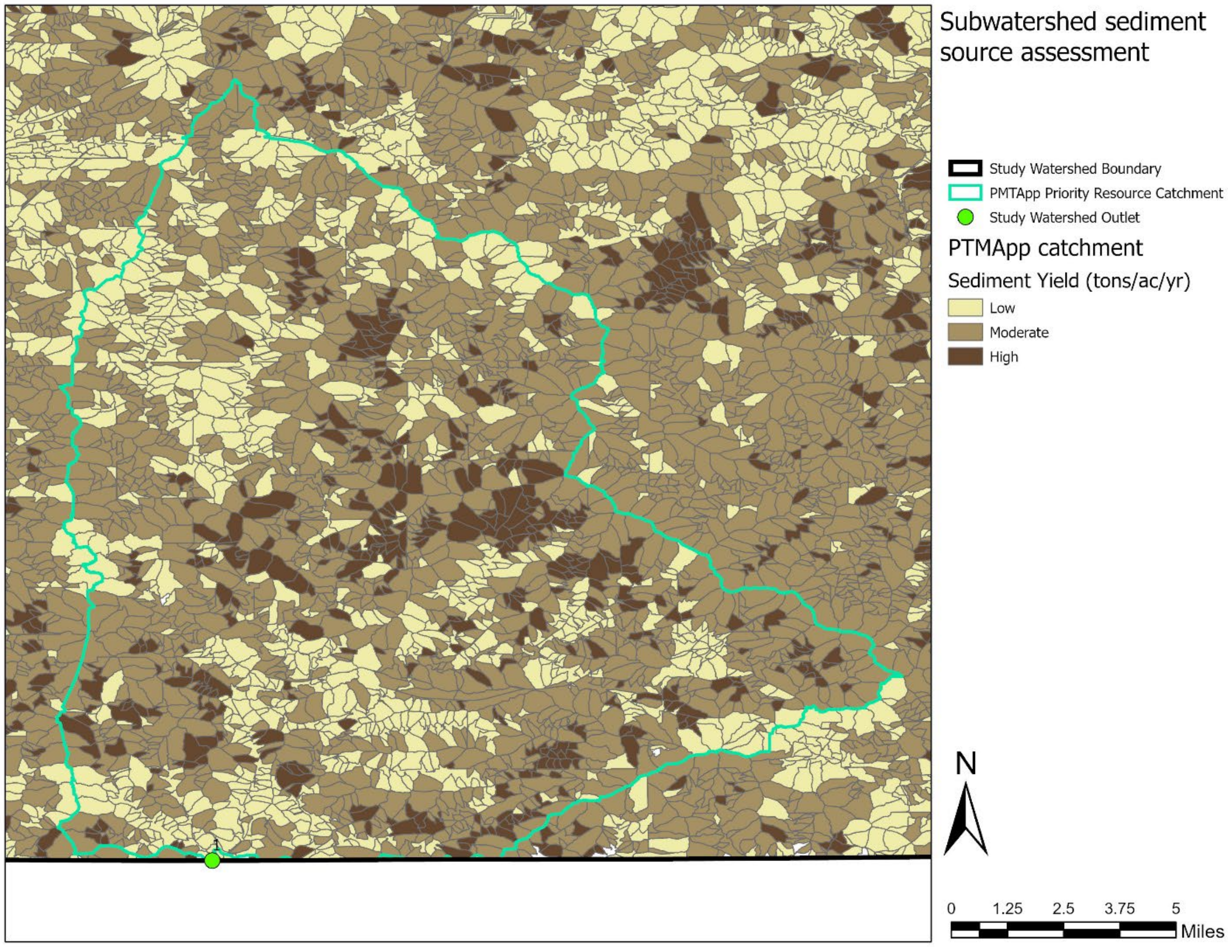



**Figure 13:** PTMApp catchment-level source assessment for Priority Resource Catchment 1

Source maps like this can highlight general locations within a larger area that may be contributing more sediment or pollutant runoff downstream and may aid in prioritizing BMP efforts or selection of certain practices to reduce specific types of runoff pollutant(s). From this level of analysis, PTMApp also provides information not only about the annual loading of sediment, phosphorus, and nitrogen to each catchment outlet, but also the aggregated load to any defined downstream point, called a priority resource point. This aggregation of loads also accounts for in-stream losses, or the reduction from physical, chemical and biological processes that naturally reduce the load of sediment, phosphorus and nitrogen in streams. For example, the settling of sediment in the stream channel or uptake of phosphorus and nitrogen by bacteria, plants, algae, etc., as the water travels downstream in the channel.

Annual load of sediment, phosphorus, and nitrogen as measurable at priority resource point 1 (**Figure 14**) are presented in **Table 7:** Total load delivered to priority resource point 1.

***Source maps can highlight locations that may be contributing more sediment or pollutant runoff downstream. This can aid in prioritizing BMP efforts or selecting certain practices to reduce specific types of runoff pollutant(s).***

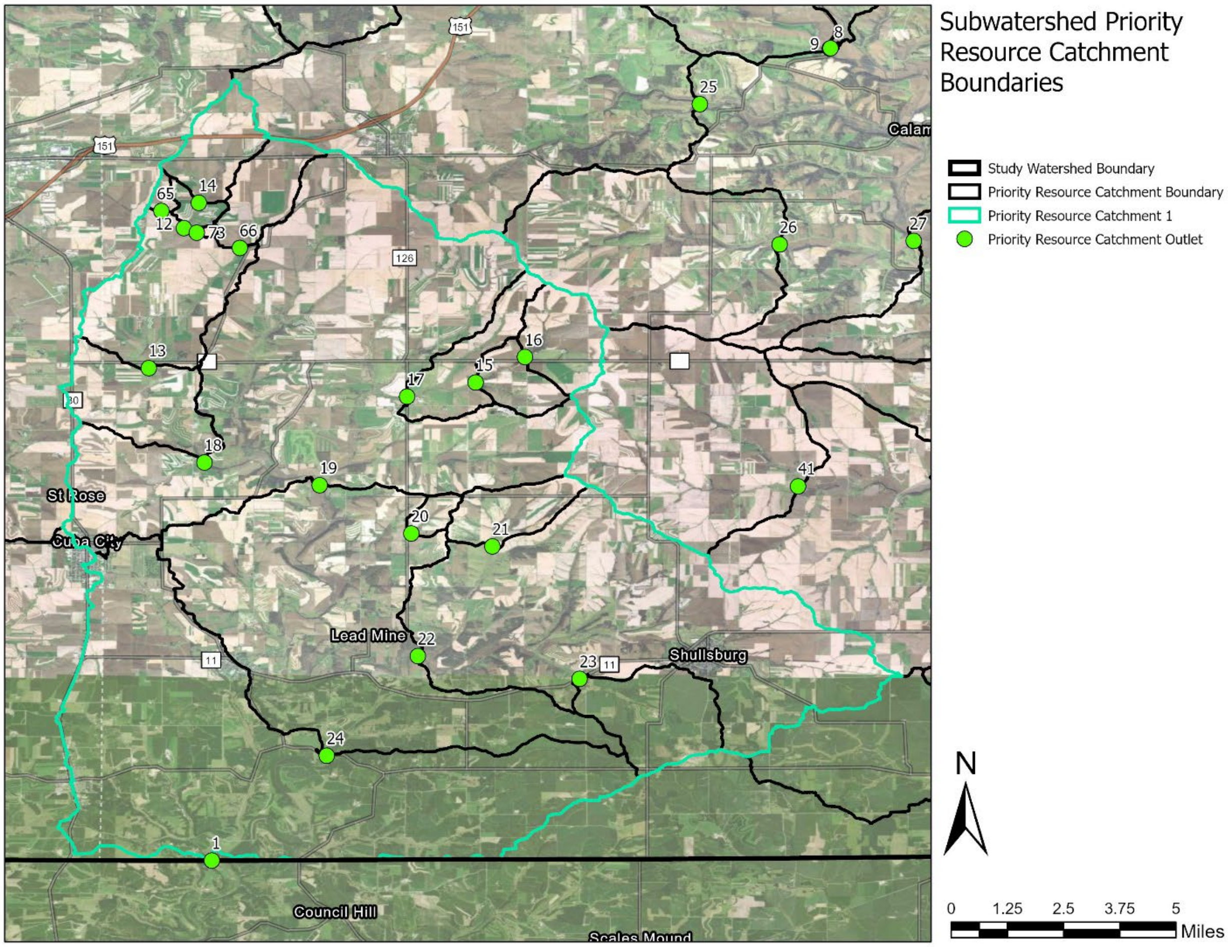



**Figure 14:** Priority resource catchment boundaries in and around the highlighted subwatershed

**Table 7:** Total load delivered to priority resource point 1

| Priority Resource Point | Sediment Load (tons/yr) | Total Phosphorus Load (lbs/yr) | Total Nitrogen Load (lbs/yr) |
|---|---|---|---|
| 1 | 259,325 | 22,441 | 395,101 |

### 6.2.2 LOAD REDUCTION OF EXISTING PRACTICES

The measurable load reduction resulting from BMPs implemented within the entire subwatershed can also be aggregated and estimated at the downstream priority resource point, in this case priority resource point 1 – the subwatershed outlet (**Table 8:** Estimated load reduction of digitized existing practices on Pioneer Farm fields, as measured at priority resource point 1). This would be equivalent to measuring the change in load at priority resource point 1 due to all upstream BMPs and considers the natural in-channel load reduction discussed previously. Therefore, load reduction values for a single BMP will be lower when measured at a downstream priority resource point when compared to the load reduction at the field-edge, for example as presented in **Table 4**.

**Table 8:** Estimated load reduction of digitized existing practices on Pioneer Farm fields, as measured at priority resource point 1

| BMP Type | Number of Digitized BMPs | Sediment (tons/yr) | | TP (lbs/yr) | | TN (lbs/yr) | |
|---|---|---|---|---|---|---|---|
| | | Sum | Average* | Sum | Average* | Sum | Average* |
| Reduced Tillage | 27 | 50.4 | 1.9 | 14.9 | 0.6 | 288.6 | 10.7 |
| Grassed Waterways | 14 | 16.8 | 1.2 | 1.2 | 0.1 | 19.8 | 1.4 |
| Stripcropping# | 13 | 2.0 | 0.2 | 1.2 | 0.1 | 20.9 | 1.6 |

* Average load reduction per individual BMP

# Although not a BMP type available within PTMApp by default, load reduction efficiency values specific to stripcropping can be input into PTMApp to estimate equivalent load reduction benefits.

Choosing the outlet of the watershed is one example of a location where loading can be estimated. However, loads and load reductions can be calculated at any priority resource point within the watershed. For example, if reducing sediment load to a specific section of a stream within the watershed is desired, the estimated load reduction of possible upstream BMPs can be estimated if there is a priority resource point at that stream segment.

### 6.2.3 BMP TARGETING AT A SUBWATERSHED SCALE

As water quality or soil management priorities are analyzed in the watershed, whether they be the reduction of sediment, phosphorus or nitrogen in surface waters; reduction of nitrogen in groundwater; or increasing in soil carbon on cultivated fields, a wide range of BMPs are presented by PTMApp in areas on the landscape that they will have the greatest impact. This information, used in combination with the source assessment maps or nitrogen infiltration risk maps, can lead to the implementation of BMPs that will have the greatest effect on water or soil quality.

The following maps (**Figure 15 - Figure 17**) represent a selection of the 24 BMP and CP types provided by PTMApp that could feasibly and reasonably be implemented on the landscape to provide water quality or soil quality benefits. Each BMP type has different criteria for determining suitable locations on the landscape. Some BMPs are best suited for implementation as management strategies on the fields (**Figure 15**), others may be installed or constructed in the field or at the edge of the field (**Figure 16**), while others are installed along streams and channels (**Figure 17**). Many of the available BMPs are not presented on **Figure 15 - Figure 17** because they may overlap other feasible BMPs and would not be visible in the figure. This is particularly true of field management BMPs such as cover crops, reduced tillage, no tillage, or nutrient management for phosphorus or nitrogen, any of which could be implemented on any cultivated land.

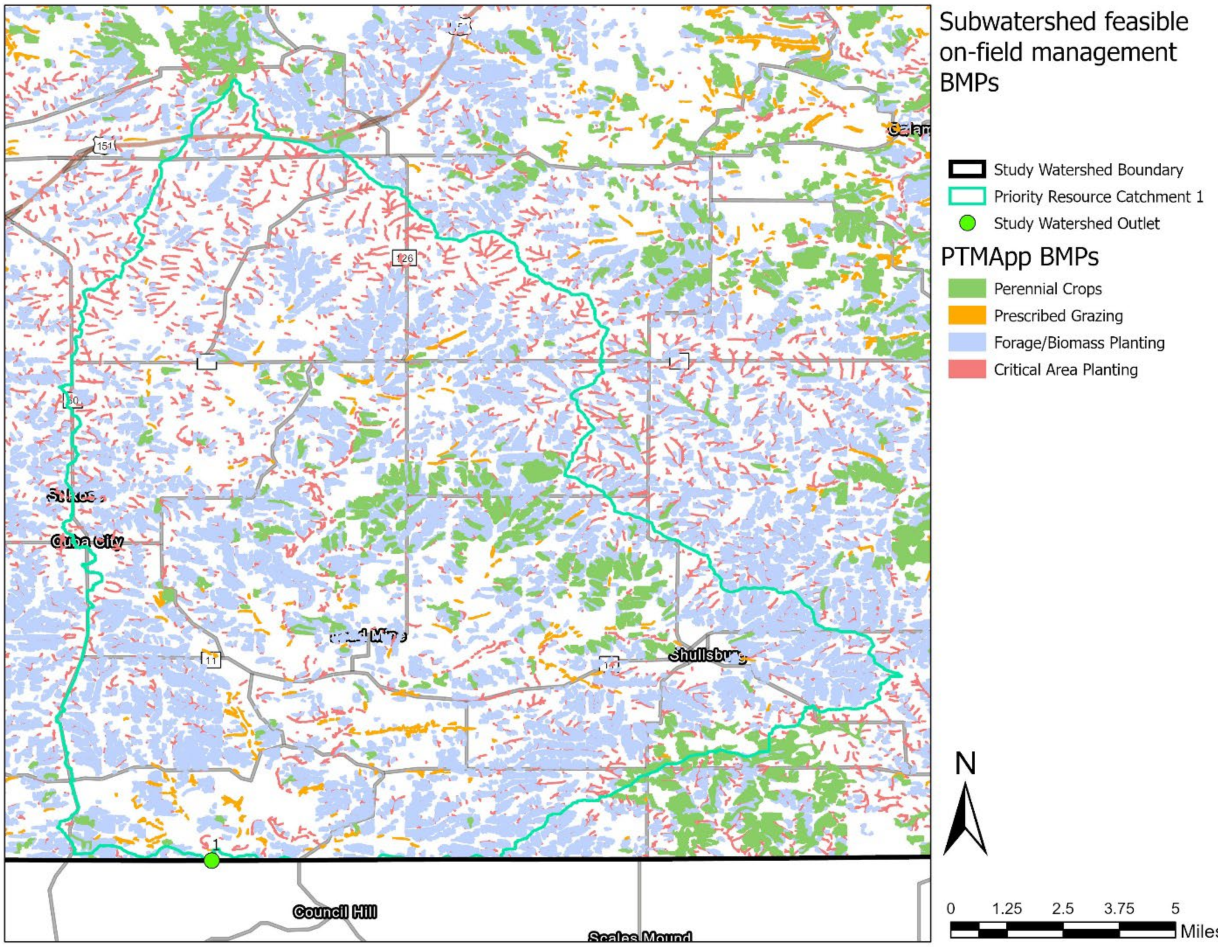



**Figure 15:** On-field management practices that can be implemented within the subwatershed

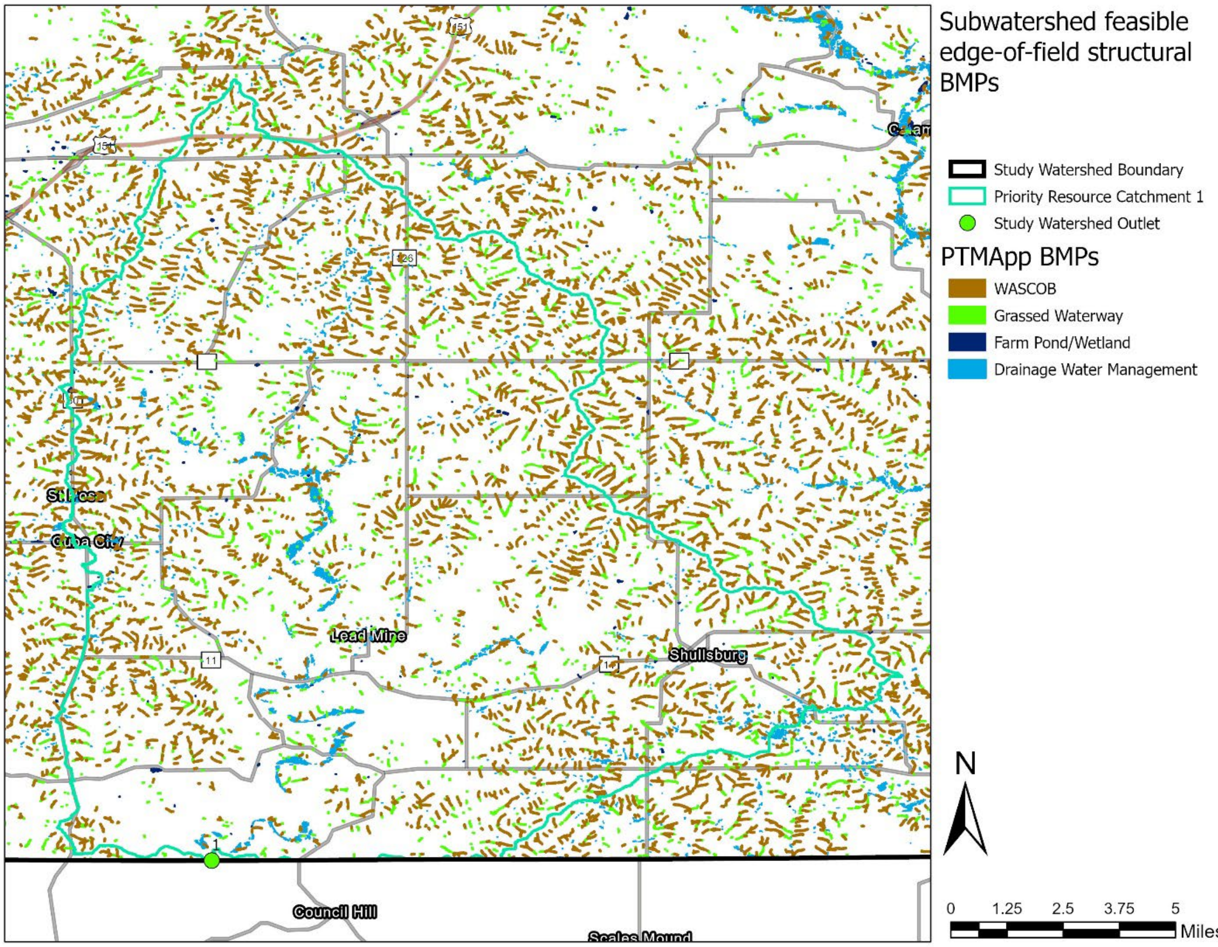



**Figure 16:** Edge-of-field structural practices that can be implemented within the subwatershed

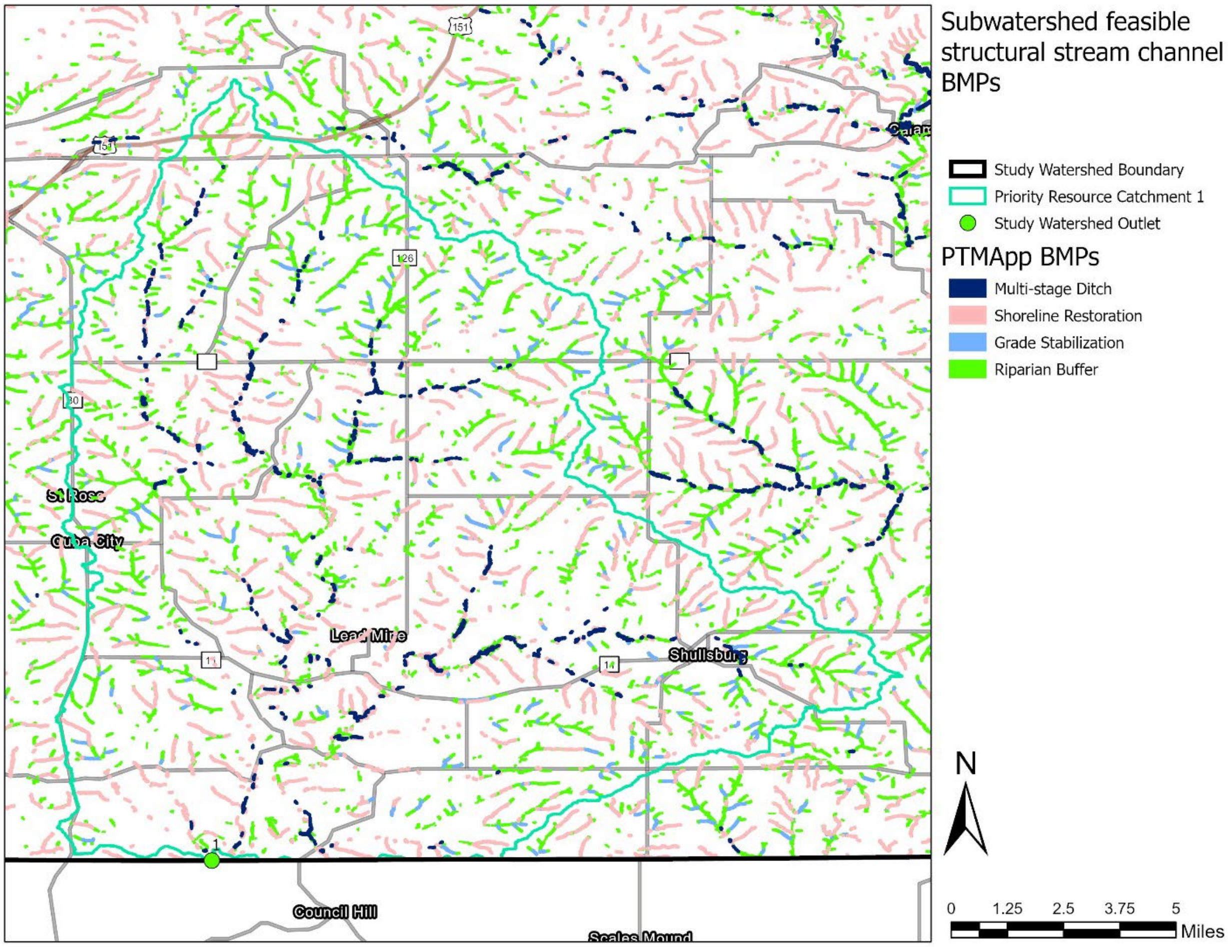



**Figure 17:** Structural channel practices that can be implemented within the subwatershed

Any of the practices presented in **Figure 15 - Figure 17** could feasibly be implemented on the landscape and could have load reduction benefits and expected costs estimated through PTMApp.

## 6.3 WATERSHED-SCALE ANALYSIS

The largest scale of analysis by PTMApp is an entire study watershed (**Figure 18**). At this scale the sediment, phosphorus and nitrogen loads from all watershed outlets can be aggregated to produce an estimate of total annual load leaving the watershed. For this study watershed there are a total of five priority resource points that act as outlets for the study watershed. Background loads to those priority resource point locations are presented in **Table 9**. Using sediment as an example, the total annual load leaving the watershed is approximately 1.9 million tons per year (**Table 9**). In more tangible terms, a standard 10 cubic yard dump truck can hold approximately 13.5 tons of sediment. So, the equivalent of 140,634 dump truck loads of sediment leave the watershed per year, or about 385 dump truck loads per day.

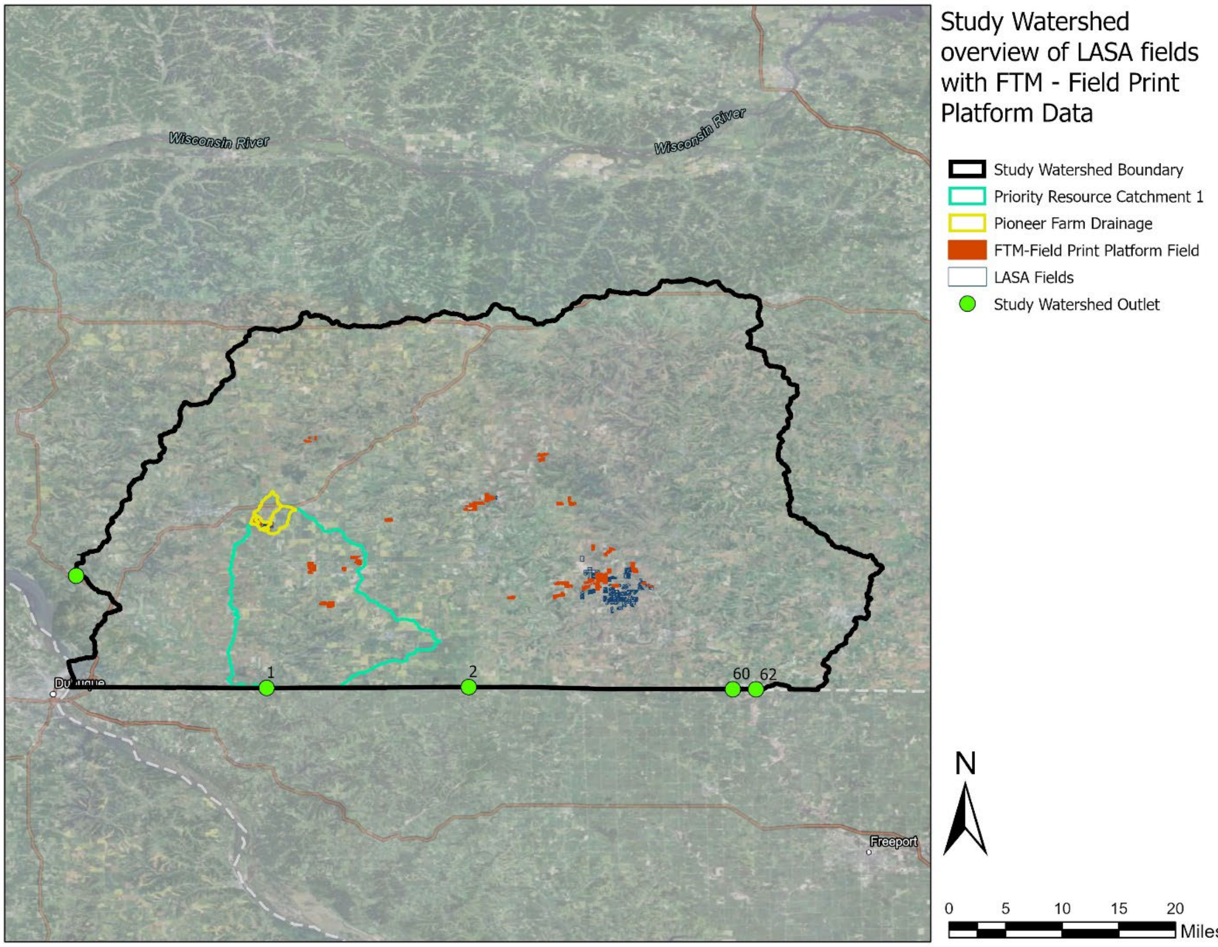



**Figure 18:** The LASA study watershed, subwatershed, and individual farm drainage areas highlighted. All LASA fields and those fields with Field to Market Fieldprint Platform data are shown

**Table 9:** Loading to major study watershed outlets and cumulate study watershed load

| Priority Resource Point | Sediment Load (tons/yr) | Total Phosphorus Load (lbs/yr) | Total Nitrogen Load (lbs/yr) |
|---|---|---|---|
| 1 | 259,325 | 22,441 | 395,101 |
| 2 | 24,088 | 2,038 | 38,158 |
| 7 | 210,328 | 22,305 | 357,955 |
| 60 | 1,336,345 | 123,404 | 2,080,393 |
| 62 | 68,466 | 7,064 | 105,782 |
| **Total** | **1,898,552** | **177,252** | **2,977,389** |

### 6.3.1 LOAD REDUCTION OF EXISTING PRACTICES

Similarly to how loads can be aggregated among the subwatersheds to calculate the total load leaving the watershed, estimated load reduction of existing or potential BMPs for the total study watershed can be calculated. Subwatershed load reduction estimates can be aggregated to get an overall picture of existing or potential load reductions of BMPs within the entire study watershed.

Field to Market Fieldprint Platform data for 2021 shows 152 registered fields covering a total of 3,908 acres. This represents approximately 8.2 percent of all LASA fields but can serve as a baseline for LASA participant fields. **Table 10** shows the estimated load reductions for the existing BMPs that were digitized and run through the PTMApp toolbar.

**Table 10:** PTMApp Estimated load reductions for FPP BMPs digitized for the Year 1 report

| Practice Type | Acreage Implemented | Load Reduction | | |
|---|---|---|---|---|
| | | Sediment (tons/yr) | Total Phosphorus (lbs/yr) | Total Nitrogen (lbs/yr) |
| Grassed waterway | 142 | 475 | 11 | 171 |
| Reduced tillage | 533 | 1,111 | 74 | 1,397 |
| No Till | 1,540 | 3,538 | 300 | 5,307 |
| Stripcropping | 1,826 | 3,124 | 207 | 3,326 |
| Perennial Crops | 1,427 | 1,714 | 160 | 1,219 |

In total, LASA includes 47,660 acres; however, not all BMPs across all LASA farms and fields have been digitized and processed through the PTMApp toolbar to produce estimated load reduction benefits. **Table 11** presents the potential estimated load reduction benefits of BMPs across all LASA farms and fields, assuming the same BMP adoption rate as for the digitized fields and BMPs.

**Table 11:** Load reductions of FPP BMPs extrapolated to all LASA farms/fields (assuming equivalent practice adoption rates)

| Practice Type | Acreage Implemented | Load Reduction | | |
|---|---|---|---|---|
| | | Sediment (tons/yr) | Total Phosphorus (lbs/yr) | Total Nitrogen (lbs/yr) |
| Grassed waterway | 1,726 | 5,794 | 131 | 2,091 |
| Reduced tillage | 6,496 | 13,550 | 908 | 17,033 |
| No Till | 18,786 | 43,147 | 3,658 | 64,717 |
| Stripcropping | 22,266 | 38,097 | 2,521 | 40,564 |
| Perennial Crops | 17,405 | 20,907 | 1,947 | 14,861 |

Assuming an equivalent adoption rate of BMPs across all LASA fields, reduced tillage and no tillage being implemented across LASA fields could be reducing sediment loss from the watershed by 56,700 tons/yr. To put that in terms of dump trucks loaded with sediment, that's equivalent to preventing 4,200 dump truck loads of sediment per year from leaving the watershed, or 11.5 per day.


With the addition of other BMP types (e.g., grassed waterways, stripcropping, etc.), the load reduction could be significantly greater. But load reductions presented in **Table 11** cannot simply be added together, particularly if BMPs overlap one another or are downstream of one another, due to the treatment trains effect described earlier. And the acreage of BMPs presented in **Table**

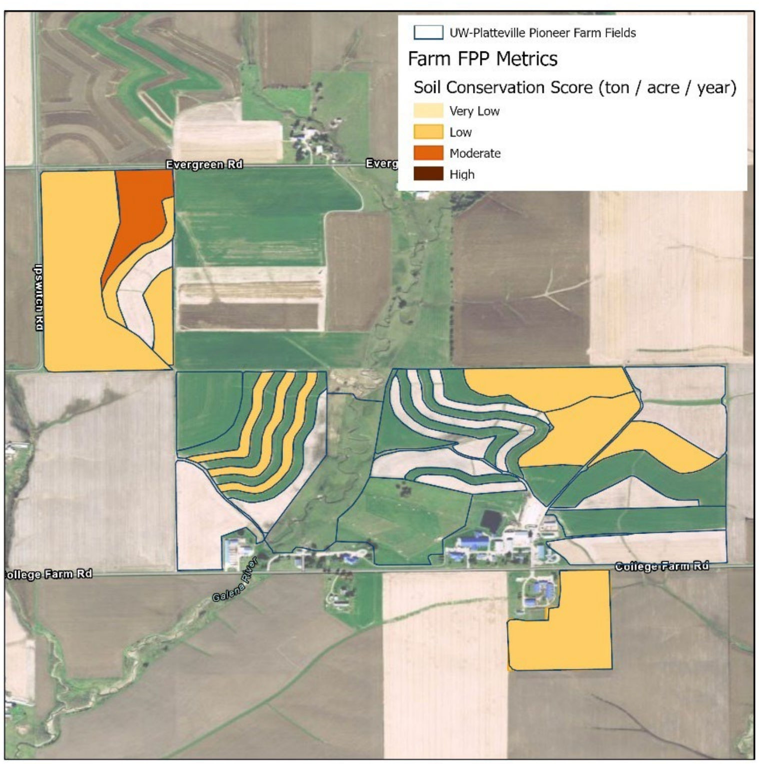
**11** is greater than the total acreage of LASA farms due to potential overlap of multiple BMPs on a single field.

## 6.4 PTMAPP DATA USED IN COMBINATION WITH FIELD TO MARKET FIELDPRINT PLATFORM

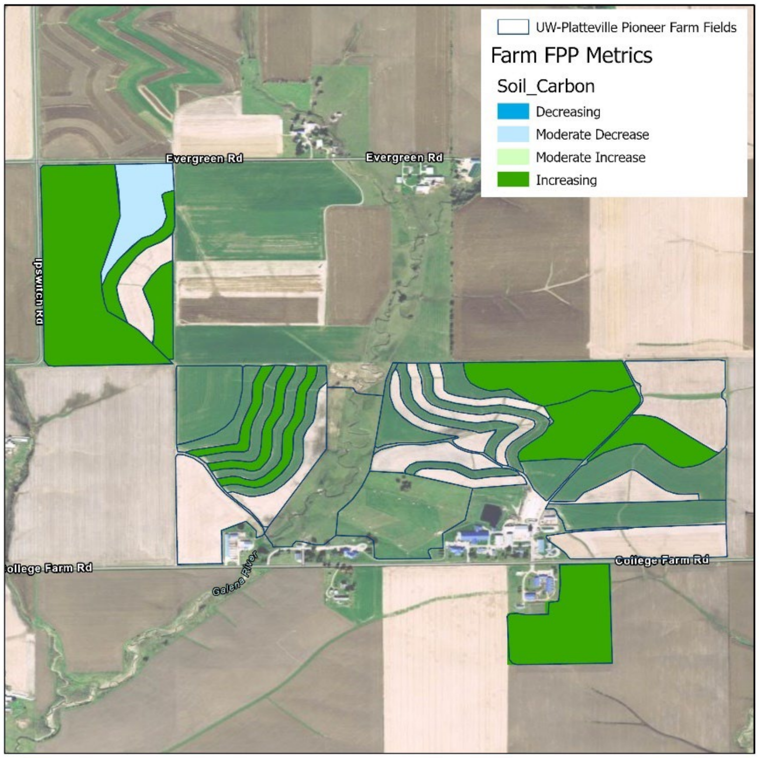
In combination with the Field to Market Fieldprint Platform data, PTMApp data can be used to enhance the usefulness of the data already gathered for Field to Market and allow farmers to have the necessary information available to make appropriate management and environmental decisions. Fieldprint Platform and PTMApp data can be used in unison to refine the method of targeting areas within the watershed that may benefit from additional BMPs. From there, PTMApp data can be used to show the types of BMPs that are feasible or practical for implementation in a specific location to best mitigate sediment and nutrient loss.

For instance, UW-Platteville Pioneer Farm fields that have a high soil conservation score (higher score indicates more soil loss potential), negative soil carbon score, or low water quality score can be prioritized for review (**Figure 19:** Field to Market Fieldprint Platform soil conservation score (A), soil carbon score (B), and water quality score (C) for UW-Platteville Pioneer Farm fields within the Fieldprint Platform., for example). From there, PTMApp data can be used to help verify areas on the landscape that have the highest potential for sediment, phosphorus, or nitrogen loss; determine feasible BMP types to reduce losses within those locations (**Figure 20:** Feasible BMPs locations on UW-Platteville Pioneer Farm fields for improving water quality and soil conservation based on PTMApp data. Note: not all of the 24 feasible BMP types are presented in this figure); and estimate the sediment load reduction from implementing the feasible BMP(s).

A.



B.


UW-Platteville Pioneer Farm Fields
Farm FPP Metrics
Soil_Carbon
Decreasing
Moderate Decrease
Moderate Increase
Increasing
Evergreen Rd
Evergreen Rd
Ipswich Rd
College Farm Rd
College Farm Rd
Galena River

C.

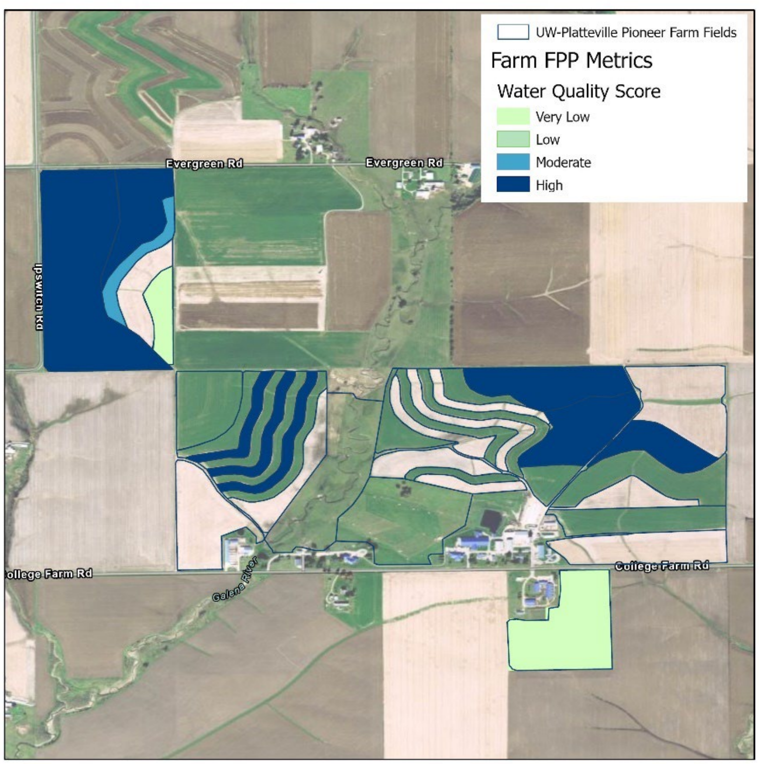

UW-Platteville Pioneer Farm Fields
Farm FPP Metrics
Water Quality Score
Very Low
Low
Moderate
High
Evergreen Rd
Evergreen Rd
Ipswich Rd
College Farm Rd
College Farm Rd
Galena River

**Figure 19:** Field to Market Fieldprint Platform soil conservation score (A), soil carbon score (B), and water quality score (C) for UW-Platteville Pioneer Farm fields within the Fieldprint Platform.

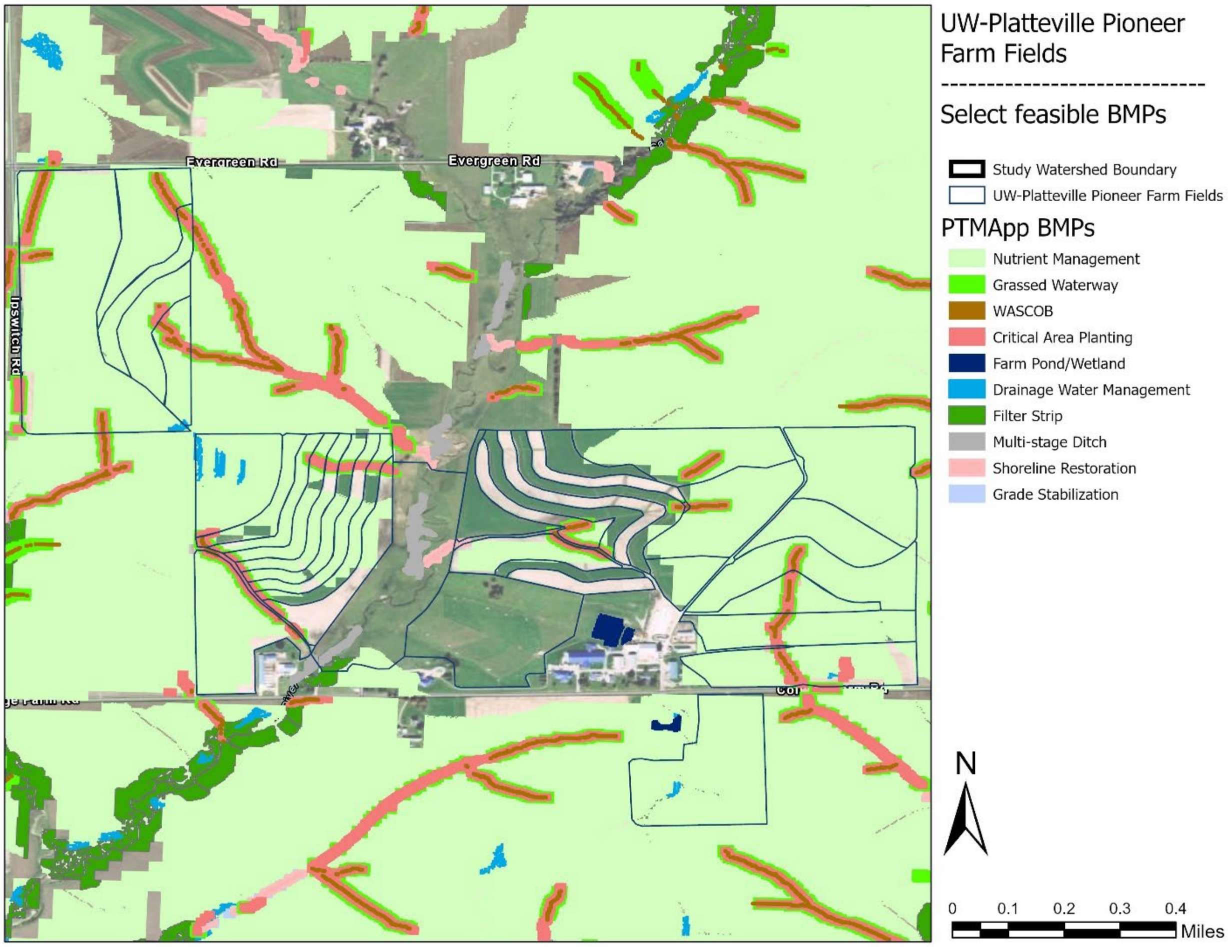



**Figure 20:** Feasible BMPs locations on UW-Platteville Pioneer Farm fields for improving water quality and soil conservation based on PTMApp data. Note: not all of the 24 feasible BMP types are presented in this figure

A similar review of the Fieldprint Platform Subsurface Nitrogen Sensitivity score, in combination with the nitrogen infiltration risk assessment presented in the Year 1 report, could be used to find locations that could benefit from BMPs or CPs targeted at reducing nitrogen infiltration (**Figure 21**), at which time a review of the PTMApp data could be done to determine feasible BMPs to implement on the landscape and the expected water quality benefit. Based on Fieldprint Platform data, the field in the northwest corner of the Pioneer Farm is listed as having the potential to further reduce nitrogen infiltration into the subsurface, as well as showing a high risk for nitrogen infiltration as seen on **Figure 21**. BMPs could be specifically targeted to that field to lead to the highest benefit to reducing nitrogen movement to groundwater.

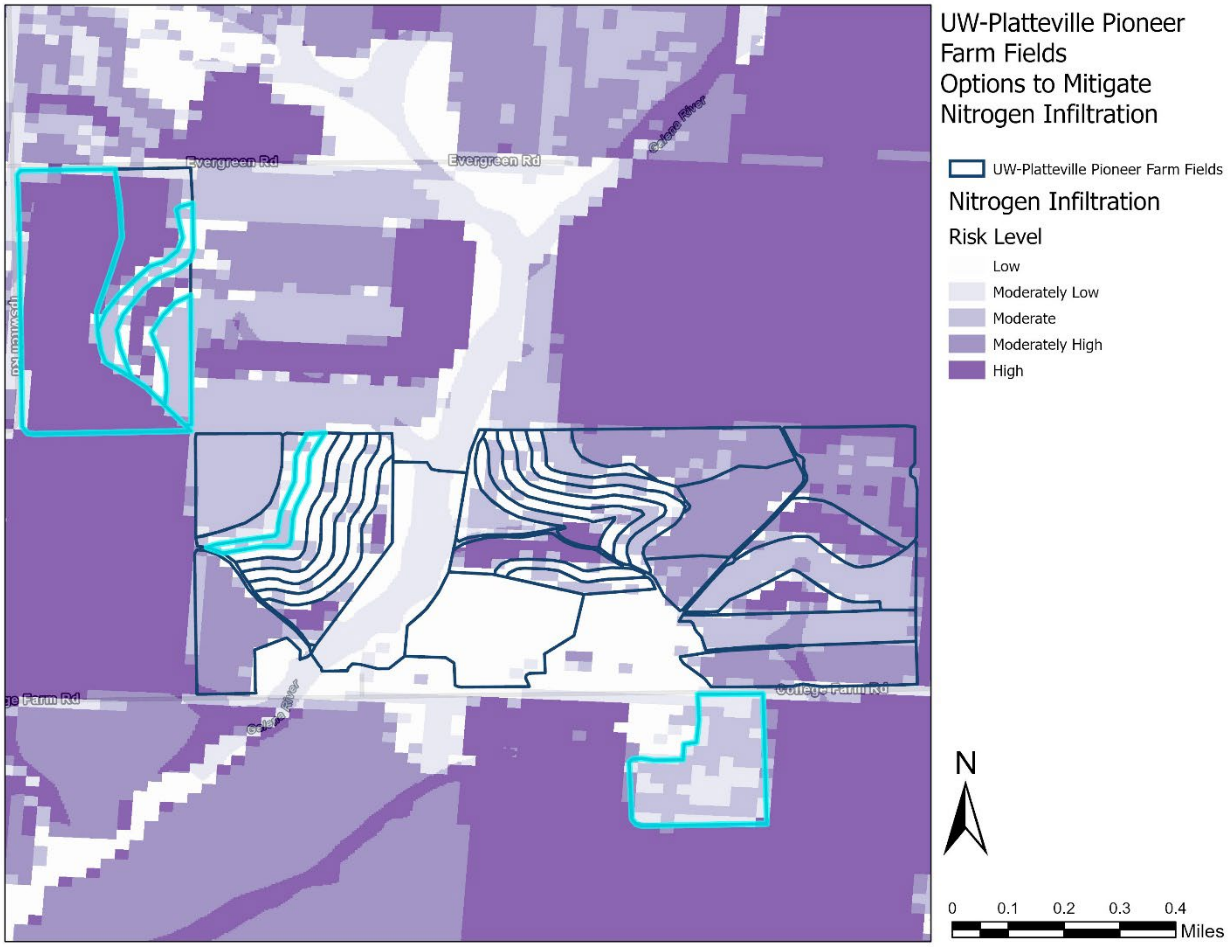



**Figure 21:** Nitrogen infiltration risk map on UW-Platteville Pioneer Farm fields. Highlighted areas represent fields that could improve nitrogen infiltration mitigation efforts, based on Fieldprint Platform metrics