2019 Final Report Summary Sheet

Grantee Information

Project Title: Watershed scale response of agricultural systems to drainage water management in Central Illinois

Institution: University of Illinois

Primary Investigator: Rabin Bhattarai (PI), Richard Cooke (Co-PI)

NREC Project # 2019-4-360624-286

Is your project on target from an IMPLEMENTATION standpoint? ☐ **Yes** ☒ **No**

If you answered "no" please explain:

We are slightly behind the project timeline due to issues encountered with identifying a project location and landowner willing to cooperate in the project. However, we were able to find a suitable project site and cooperating landowner in Summer of 2019 in Shelby County, IL. Because of the delay in finding a project site, we are also slightly behind schedule on baseline data collection.

Is your project on target from a BUDGET standpoint? ☒ **Yes** ☐ **No**

If you answered "no" please explain:

Based on what you know today, will you meet the objectives of your project on-time and on-budget? ☒ **Yes** ☐ **No**

If you answered "no" please explain:

Have you encountered any issues related to this project? ☒ **Yes** ☐ **No**

If you answered "yes" please explain:

We encountered initial issues with locating a suitable project site and cooperating landowner. After we established a project location, we have also encountered some slight timing issues with implementation, as we are waiting on the completion of subsurface drainage designs for the control watershed. We are continually working with the landowner to begin implementation of all data collection and observation equipment as soon as possible.

Have you reached any conclusions related to this project that you would like to highlight? ☐ **Yes** ☒ **No**

If you answered "yes" please explain:

Have you completed any outreach activities related this project? Or do you have any activities planned? ☒ **Yes** ☐ **No**

If you answered "yes" please explain and provide details for any upcoming outreach:

We are planning an extension field day for the Summer of 2020 in coordination with IL Farm Bureau. This activity will include a visit to the project site in Shelby County. Attendees of the outreach activity will get the opportunity to tour the fields selected for the project. The activity will detail the data collection technology and structures implemented in Fall of 2019 and Spring of 2020. Attendees will witness a demonstration of how the technology works, and how data has been and will be collected throughout the project duration. Attendees will also receive information pertaining to farming practices for the project fields, with the possibility of a face-to-face meeting with the farm manager.

Objectives and progress made

Objectives for the project remain the same as the initial proposal and mid-year report. The overall goal of this project is to observe and communicate new information about the watershed scale effects of drainage water management (DWM) on water and nitrogen (N) losses, and crop production in Central Illinois. The specific project objectives and our progress towards them are as follows:

1. Monitor the watershed-scale effects of DWM on nutrient reductions, water and N balances, and crop production through a paired watershed experiment. (*Expected completion date: December 2022*)

   We were able to make significant progress towards this objective by securing a project location suitable for the paired watershed experiment with a cooperative landowner in Shelby County, IL. The project site was analyzed to determine the locations for required data monitoring including streamflow, weather-related variable, and tile flow. A detailed map showing the site location along with watershed boundaries and monitoring locations is shown in Figures and 2.

   We purchased and installed an Onset automatic weather monitoring station in a central location between the two watersheds in Fall/Winter of 2019. Six (6) Agri-Drain control structures, two (2) water gate valves, and six (6) Onset HOBO water level loggers were ordered to monitor tile flow in accordance with the proposed drainage water management plan at the treatment watershed. We have prepared plans and an order schedule for control structures for the control watershed, pending finalization of the subsurface drainage system.

2. Estimate the long-term environmental and agricultural benefits of DWM through a watershed-scale modeling. (*Expected completion date: December 2022*)

   We will progress towards this objective by obtaining relevant modelling parameters related to crop yields and subsurface drainage system data in subsequent years.

3. Communicate results to agricultural community stakeholders through field days and extension events. (*Expected completion date: December 2022*)

   We have planned an extension field day for the summer of 2020 to allow stakeholders to view the project location and

4. To include a final report at the conclusion of this project to address each of the objectives stated above. (*Expected completion date: December 2022*)

Planned activities

For the 2020 year, we plan to finish implementing all data collection and observation equipment. We will begin baseline data collection in 2020.

Major accomplishment

- Selection of a suitable project site with a cooperating landowner – completed
- Analysis of the site to determine necessary data collection and observation locations - completed
- Installation of the Onset automatic weather station – completed
- Purchase of Six (6) Agri-Drain control structures, two (2) water gate valves, and six (6) Onset HOBO water level loggers to monitor tile flow at the treatment watershed - completed

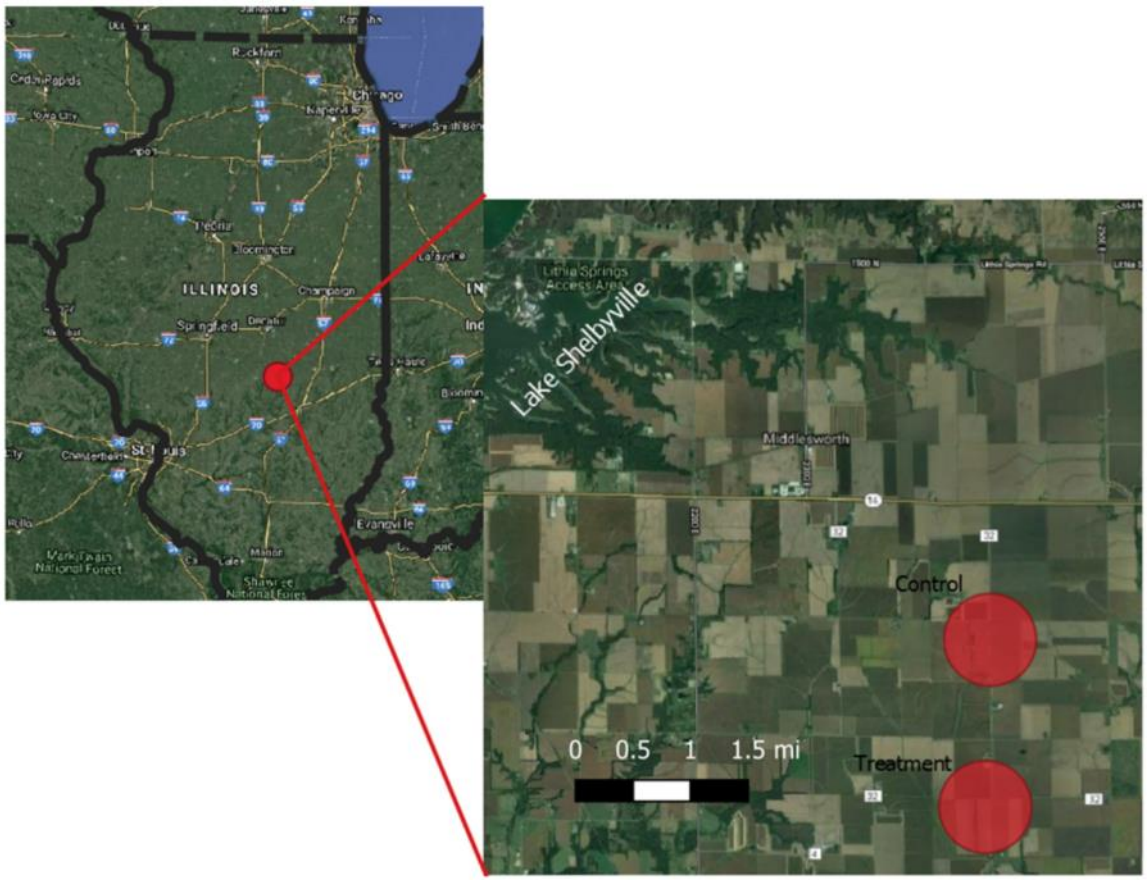
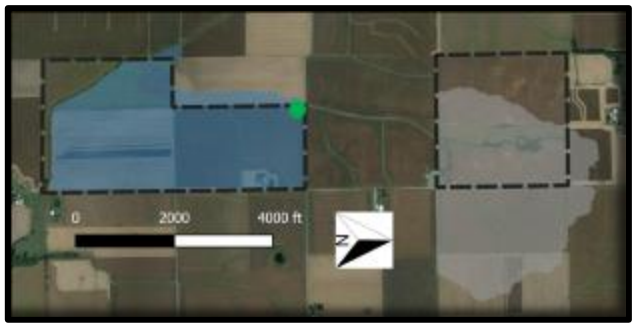


Figure 1: Location map for project site in Shelby County, IL.



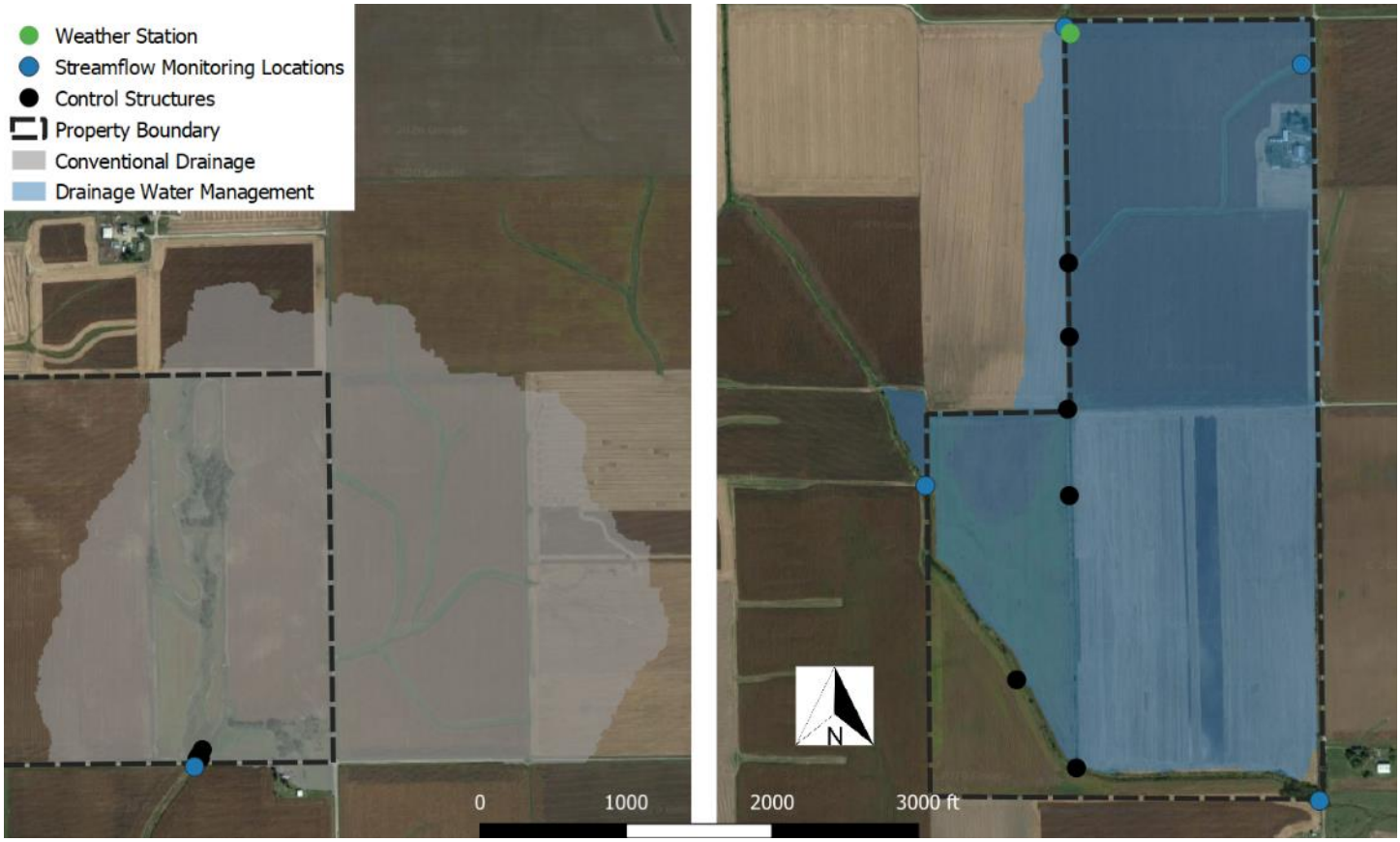


Figure 2: Data collection and observation locations for control and treatment watersheds.

Any publications or outreach accomplished from the research:

We conducted the following outreach activities to disseminate the project findings in 2019:

- A poster was presented at Public Field Day at Al Boyd's DWM Field (Argenta, IL) on August 7, 2019 as a part of ILICA Drainage Workshop.

Relevant budgeting:

The project is under the budget as proposed. The table below provides an overview of project expenses for 2019. Since we did not hire a 0.5 FTE technician to work on the project in 2019, we have some left over in terms of salary. For year 2020, we have hired a field technician to help in instrumenting the research site.

Item	Amount requested	Amount spent
Salary and wages	64,251.00	29,372.11
Fringe benefits	16,390.00	4,484.42
Travel	2,000.00	181.20
Materials and Supplies	34,119.00	16,352.95
Services	24,000.00	0.00
Indirect cost	15,638.00	5,277.22

Summary

This is a new project started in 2019. It took a while for the research team to identify a project cooperator (landowner) to implement the project. Initially, we had selected Champaign County as a potential project site. But we were not able to find a research site in Champaign County. After identifying a potential landowner in Shelby County, we have selected Strasburg as the project site. Although we are slightly behind the project milestone compared to the original plan, we believe that we will meet the project objectives from implementation, time, or budget standpoint.

Since selection of the project site in Strasburg, we have made several site visits to coordinated project details with the landowner, review key elements of the site related to data collection and observation locations, and implement data monitoring equipment. Using a drainage water management plan provided by the landowner, we have purchased control structures for the treatment watershed and have plans to purchase the control structures for the control watershed as soon as the landowner finalizes subsurface drainage plans. We have also analyzed the watersheds for necessary locations to implement streamflow monitoring equipment and perform nutrient sampling. Construction of the streamflow monitoring equipment and initiation of baseline data collection is scheduled to begin in the spring of 2020, weather permitting.