



2018 Final Report Summary Sheet

Grantee Information

Project Title: Dissolving uncertainty: A comprehensive evaluation of dissolved P in tile drainage

Institution: University of Illinois

Primary Investigator: Christianson

NREC Project # 2016-3-360498-549

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2014-3-8

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

If you answered "no" please explain: We thank you for approving our 6 month no-cost extension request which changes the project end date from 28 February 2019 to 31 August 2019. All objectives are on track for this modified timeline.

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:

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

If you answered "yes" please explain: We have a number of interesting findings that we're excited to move through peer-review. Stay tuned!

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: Please see section 3c and 3d.

Additional Notes: Thank you for your support and for granting an extension. It's exciting to see this project moving toward completion.

NREC February 2019 3.0 Year Report – *Project extended 0.5 y to August 2019*

Dissolving uncertainty: A comprehensive evaluation of dissolved P in tile drainage

PI: Dr. Laura Christianson, Assistant Professor of Water Quality, Department of Crop Sciences, University of Illinois, S322 Turner Hall, 1102 S Goodwin Ave., Urbana, IL 61801.

1. List of objectives

The specific assessable objectives are to:

1. Further develop the Measured Annual Nutrients for AGricultural Environments (MANAGE) database through addition of drainage nutrient concentration data, specifically dissolved reactive P but also including other forms of P and N.
2. Statistically analyze the newly assembled nutrient concentration database to determine the effect of controllable factors and uncontrollable factors (e.g., precipitation, soil drainage class) upon P concentrations in drainage water
3. Per the RFP, the final objective is “to include a final report at the conclusion of this project to address each of the objectives stated above.”

2. Length of project - number of years completed: 3.0 years (of 3.0 years)

3. Accomplishments

- a. The MANAGE database has been updated to include the new “Drain Concentration” table created during this project. This is publicly available: <https://www.ars.usda.gov/plains-area/temple-tx/grassland-soil-and-water-research-laboratory/docs/manage-nutrient-loss-database/>.
- b. Mr. Allan Hertzberger, the graduate student lead, successfully defended his MS thesis of this work on 06 February 2018 and graduated in May 2018.
- c. The work has been presented in 5 poster presentations at regional, national, and international conferences.
- d. This work was presented at the 2018 Department of Crop Sciences Agronomy Day, and an accompanying factsheet was distributed (**Figure 1**). The factsheet is also available at this link:
 - i. Hertzberger, A. and L. Christianson. 2018. Concentrating on nutrient loss: A review of tile drainage nutrient concentrations. University of Illinois Extension, Urbana, Illinois (2-pg factsheet). Available at: http://draindrop.cropsci.illinois.edu/wp-content/uploads/2016/06/Hertzberger-Christianson-UIUC_2018_Tile-Drainage-Concentration_Final.pdf.
- e. Two peer-reviewed manuscripts are under various stages of peer-review and revision:
 - i. Hertzberger, A., R.D. Harmel, and L. Christianson. (*Accepted 2019*). The MANAGE Drain Concentration database: A new tool compiling North American drainage nutrient concentrations. *Agricultural Water Management*.
 - ii. Hertzberger, A., R.D. Harmel, C.M. Pittelkow, and L. Christianson. (*In prep 2019*). Analysis of the MANAGE Drain Concentration database to evaluate agricultural management effects on drainage nutrient concentrations. *Under review at the Transactions of the ASABE*.

concentrations. Nitrogen application rates below 75 kg ha⁻¹ for corn did not significantly reduce annual NO₃-N concentrations compared to rates of 75-149 kg ha⁻¹ or 150-224 kg ha⁻¹, although the three largest application rate categories (75-149, 150-224, and >224 kg ha⁻¹, respectively) did result in significantly increasing NO₃-N concentrations. The MANAGE database will continue to evolve and remain a resource for new exploratory efforts to better understand and reduce nutrient losses from agricultural systems.

New questions created by this work:

Also from our manuscript: *The MANAGE Drain Concentration database is publicly available (<https://www.ars.usda.gov/plains-area/temple-tx/grassland-soil-and-water-research-laboratory/docs/manage-nutrient-loss-database/>) and should continue to be used by the science community, state and federal agencies, and conservation and agricultural organizations to better understand and mitigate nutrient-related water quality issues in agriculture.*

Table 2. Budget analysis showing expenditures aligned with budget categories.

	Budgeted	Spent through 01/2019
A. Personnel		
1 UIUC MS Graduate Student	\$34,603	\$30,697
2 PI Dr. L. Christianson	\$30,840	\$13,237
B. Fringe Benefits	\$11,383	\$7,056
C. Travel	\$7,200	\$1,413
D. Equipment	\$0	\$0
E. Supplies	\$4,400	\$564
F. Contractual Services	\$1,600	\$1,528
G. Other	\$0	\$0
H. Indirect Charges	\$10,873	\$6,055
	TOTAL COST (Year 3.0)	\$60,551
	BALANCE REMAINING	\$40,348