

Illinois State University

ISU ReD: Research and eData

---

Faculty Publications - Agriculture

Agriculture

---

5-2019

## A Farming Community's Perspective on Nutrient Loss Reduction

Benjamin Marks

Maria A. Boerngen

*Illinois State University*, [maboern@ilstu.edu](mailto:maboern@ilstu.edu)

Follow this and additional works at: <https://ir.library.illinoisstate.edu/fpag>



Part of the [Agriculture Commons](#)

---

### Recommended Citation

Marks, Benjamin and Boerngen, Maria A., "A Farming Community's Perspective on Nutrient Loss Reduction" (2019). *Faculty Publications - Agriculture*. 3.

<https://ir.library.illinoisstate.edu/fpag/3>

This Article is brought to you for free and open access by the Agriculture at ISU ReD: Research and eData. It has been accepted for inclusion in Faculty Publications - Agriculture by an authorized administrator of ISU ReD: Research and eData. For more information, please contact [ISUReD@ilstu.edu](mailto:ISUReD@ilstu.edu).

# A Farming Community's Perspective on Nutrient Loss Reduction

Benjamin Marks and Maria A. Boerngen\*

### Core Ideas

- Interviews with Illinois farmers revealed they are concerned about nutrient loss.
- Illinois farmers may not know specifics of the IL Nutrient Loss Reduction Strategy.
- However, they are changing their practices in response to nutrient loss concerns.
- Opportunities exist to further encourage adoption of BMPs to meet IL NLRs goals.

**Abstract:** The Illinois Nutrient Loss Reduction Strategy (NLRs) is a voluntary framework to achieve ambitious reductions in nitrate-nitrogen and phosphorus runoff to the Mississippi River. In interviews, a group of “conservation-minded” Illinois farmers revealed that while they are not necessarily familiar with the Illinois NLRs, they are concerned with nutrient loss and are taking steps to address those concerns. However, the strategy’s “Phase 1 Milestones” of 15 and 25% reduction in nitrate-nitrogen and phosphorus loss, respectively, by 2025 may require additional efforts to encourage adoption of the best management practices (BMPs) recommended by the strategy. This study identifies the information sources farmers trust in making management decisions, suggesting avenues to encourage achieving the goals of the Illinois NLRs. It also serves as the pilot study for a large-scale farmer survey that will provide a more thorough understanding of Illinois farmers’ awareness of, and responses to, nutrient loss issues.

INTENDED TO “direct efforts to reduce nutrients from point and nonpoint sources in a coordinated, primarily voluntary, and cost effective manner” (Illinois EPA et al., 2015, p. 2), the Illinois Nutrient Loss Reduction Strategy (NLRs) was written by a policy working group consisting of representatives from industry and academia, in accordance with the federal Gulf Hypoxia Action Plan 2008 (USEPA, 2008). Point sources (such as industrial facilities) contribute 18% of Illinois’s nitrate-nitrogen ( $\text{NO}_3\text{-N}$ ) runoff and 48% of phosphorus (P) runoff to the Mississippi River, with surface and tile-system runoff from agricultural fields contributing 80 and 48% of Illinois’s  $\text{NO}_3\text{-N}$  and P loss, respectively. The state’s remaining  $\text{NO}_3\text{-N}$  and P loss is attributed to urban stormwater runoff. The goals of the Illinois NLRs include 15 and 25% reductions in total  $\text{NO}_3\text{-N}$  and P loss, respectively, to the Mississippi River by 2025. Ultimately, the Illinois NLRs aims for a 45% reduction in both total  $\text{NO}_3\text{-N}$  and P loss (measured against the average yearly loss of these nutrients between 1980 and 1996), and while this larger reduction goal has no deadline for completion, these 45% targets are subdivided into specific reduction levels for point sources, and agricultural and urban nonpoint sources, proportional to each category’s contribution to total runoff.

For the farming community, the reduction of nutrient loss from nonpoint agricultural sources entails a delicate balance between protecting farmer income and protecting the environment. Efforts are currently underway in Illinois to encourage the adoption of best management practices (BMPs) for reducing runoff and maintaining economic viability. For example, the “4R4U” partnership between the Illinois Farm Bureau, county farm bureau chapters, FS companies, and GROWMARK, Inc. (4R4U, 2019) is a cooperative effort to increase the awareness and application of 4R nutrient stewardship principles and practices on Illinois farms (“Right fertilizer source at the Right rate,

Dep. of Agriculture, Illinois State Univ., Campus Box 5020, Normal, IL 61790-5020.

© 2019 The Authors. This is an open access article distributed under the terms of the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>). Agric. Environ. Lett. 4:190004 (2019) doi:10.2134/aerl2019.02.0004

Received 11 Feb. 2019.

Accepted 12 Apr. 2019.

\*Corresponding author (maboern@ilstu.edu).

**Abbreviations:** BMP, best management practice; NLRs, Nutrient Loss Reduction Strategy; SWCD, Soil and Water Conservation District.

at the Right time and in the Right place”) (The Fertilizer Institute, 2017). The Illinois Council on Best Management Practices, composed of producer groups such as the Illinois Corn Growers, Soybean, Pork Producers, and Fertilizer and Chemical Associations; the Illinois Farm Bureau; and companies such as Syngenta promotes farmers’ voluntary adoption of BMPs (Illinois CBMP, 2019). However, the success of these voluntary efforts relies on buy-in from the farming community.

We applied the concept of “customer discovery” (Blank, 2013) to study farmers’ perspectives on nutrient loss reduction. This innovative entrepreneurial approach is typically applied to business start-ups focusing on customers’ perception of a problem and their need to solve it. Applying this approach within the nutrient loss context can inform future efforts to encourage the adoption of production practices that will enable farmers to voluntarily comply with the goals of the Illinois NLRs. This commentary provides a valuable first look at how farmers in one of the United States’ top corn (*Zea mays* L.)-producing counties view and are responding to these issues and also suggests ways that information about nutrient loss and the Illinois NLRs can be conveyed more effectively to the farming population.

## Farmer Interviews

Using the methods for conducting telephone interviews outlined by Dillman et al. (2014), we interviewed farmers in McLean County, IL, in the fall of 2016 and early winter of 2017 to (i) discover their level of familiarity with the Illinois NLRs, (ii) identify how they make input use decisions, (iii) determine their level of concern about nutrient loss, and (iv) identify steps that they are taking in response to those concerns. Following approval from the Illinois State University Institutional Review Board (IRBNet ID 884056-5), 81 farmers in McLean County received letters inviting their participation in the study (Fig. 1). These potential participants were selected with the assistance of a retired University of Illinois extension educator and the McLean County Soil and Water Conservation District (SWCD) office, and their contact information was obtained from the SWCD office’s database. With these interviews serving as a pilot study for a larger-scale survey, we used “purposeful sampling” (Cresswell and Poth, 2018, p. 148) to identify our potential participants. Compared with a probability sampling technique that allows generalizations to be made to a population, purposeful sampling is a nonprobability method that deliberately samples individuals who are best positioned to help the researcher understand the issue being studied (Cresswell and Poth, 2018). Each farmer in our pool received a phone call within 2 wk of the mailing, with



ILLINOIS STATE  
UNIVERSITY  
*Illinois' first public university.*



10/28/2016

(Participant name)

(Participant address)

(Participant address)

Dear (Participant),

You will soon receive a phone call from Benjamin Marks, a senior agribusiness major in the Department of Agriculture at Illinois State University, inviting your participation in a research study on nutrient loss. Specifically, he will invite you to complete an interview during which you will be asked your opinion on issues related to nutrient loss. As a member of the population most directly affected by efforts to reduce nutrient loss, this study provides you a unique opportunity to share your first-hand perspective on this timely issue, and gives the farming community an important voice in the process of meeting the goals of the Illinois Nutrient Loss Reduction Strategy.

Please know that your participation in this study is completely voluntary, and that any information you provide will remain confidential. The McLean County SWCD Office will not be informed of your decision to participate in this study, and refusal to participate in this research study involves no loss of benefits.

Thank you for considering contributing to this research effort. If you have any questions, please feel free to contact us using the information provided below.

Sincerely,

Maria Boerngen, Ph.D.  
Assistant Professor of Agribusiness  
Dept. of Agriculture, Illinois State University  
maboern@ilstu.edu/309-438-8097

Mike Kelley, Chair  
McLean County SWCD Board  
mcleancountyswcd@gmail.com  
309-452-3848 EXT. 3

Fig. 1. Initial contact letter.

additional follow-up calls placed as needed. We followed a seven-question interview script (Fig. 2) with the 30 farmers who consented to participate in the study, addressing how they make fertilizer use decisions, the information sources they trust, their level of concern about nutrient loss, their familiarity with the Illinois NLRs, changes they have made to their production practices in response to nutrient loss concerns, the nature of their farm enterprises, and the challenges they face in their farming operations.

## What We Learned

Twenty-two participants indicated that their farms were predominantly corn-soybean [*Glycine max* (L.) Merr.] operations, with eight reporting both crop and livestock enterprises on their farms. The majority of our participants ( $n = 23$ ) identified economic pressures as the greatest challenge they faced in their farming operation. While 25 farmers acknowledged that they were concerned about the economic and environmental impacts of nutrient loss, fewer than half ( $n = 14$ ) of our participants indicated that they were familiar with the Illinois NLRs. However, 19 farmers reported making changes in their production practices due to nutrient

1. What type of farming do you do? (grain, livestock, both?)
2. How do you make decisions on input use?  
For grain farmers: How do you decide what type of fertilizer to apply, and how much?  
For all farmers: Where do you get the information that you use to make those decisions?
3. In general, what types of information sources about agriculture do you trust?
4. Is nutrient loss a concern for you in your operation?  
If it is, how big of an issue is it for you?
5. Have you made any changes in your farming practices because of nutrient loss? Could you please explain what you have done?
6. Are you familiar with the Illinois Nutrient Loss Reduction Strategy?  
What is your opinion of it?
7. What are the biggest challenges facing you in your farming operation?  
Is nutrient loss one of those challenges?

**Fig. 2. Farmer interview script.**

loss concerns, including the use of nitrification inhibitors, changing the timing of their N application, the use of vegetative buffer strips, and the adoption of cover crops. A slight majority ( $n = 16$ ) identified university research as their most trusted source for general information about agriculture. However, when asked specifically about fertilizer application decisions, most participants mentioned relying on soil test results and retail sales staff at local input suppliers as primary sources of information.

## Implications and Future Direction

The Illinois NLRs is a framework to direct the voluntary reduction of nutrient runoff to the Mississippi River. What we learned from our interviews implies that while farmers may not be specifically familiar with the Illinois NLRs, they are concerned about nutrient loss and are already taking steps to address those concerns. In 2016, a USDA National Agricultural Statistics Service survey addressed Illinois farmers' knowledge and adoption of BMPs such as those recommended by the Illinois NLRs (USDA National Agricultural Statistics Service, 2016). While the survey did not specifically address farmers' familiarity with the Illinois NLRs and its goals, its findings can help put our interviews into a broader context. For example, 53.3% of survey respondents were knowledgeable or very knowledgeable about the 4R strategy, and in 2015 there were 453,248 ha (1.12 million acres) of corn and soybean in Illinois planted to cover crops (representing approximately 5% of total planted corn and soybean acres that year) (USDA National Agricultural Statistics Service, 2016, 2017). Additionally, in 2015, there were 64,750 tiled ha (160,000 tiled acres) draining into wetlands constructed at the ends of the tile lines and 93,078 ha (230,000 acres) planted in perennial crops (USDA National Agricultural Statistics Service, 2016), both included in the BMPs recommended by the Illinois NLRs (Illinois EPA et al., 2015).

The Illinois NLRs recommends adoption of cover crops on 100% of tile-drained corn and soybean acres (Illinois EPA et al., 2015). In focus groups conducted with Iowa farmers,

Roesch-McNally et al. (2018) found that landowners are more likely than tenant farmers to adopt and maintain cover crops. This may be attributed, at least in part, to tenant operators' fears that they would not receive long-term benefits from the investments required to establish this practice. This presents a challenge for Illinois in particular, where 60% of the state's farmland is operated by renters (Bigelow et al., 2016). While current opportunities such as Illinois Environmental Protection Agency Section 319 Program grants and the Illinois Department of Agriculture Partners for Conservation cost-share program can help farmers with the cost of establishing cover cropping practices (Illinois EPA et al., 2017), furthering the adoption of cover crops to levels approaching the Illinois NLRs recommendation may

require additional incentives. For example, cover cropping is defined as a "good farming practice" in the 2018 Farm Bill (Coppess et al., 2018, p. 4), which includes changes related to protecting the insurability of cash crops planted following the chemical termination of cover crops. These program revisions are predicted to assuage farmers' reluctance to adopt cover cropping practices (Coppess et al., 2018), which is a step toward the additional policy initiatives, beyond direct financial interventions, suggested by Roesch-McNally et al. (2018) as possible ways to encourage more widespread adoption of cover cropping practices.

The USDA National Agricultural Statistics Service survey did not address the information sources farmers use in making management decisions such as fertilizer type, timing, and application rates. However, the high value that our participants place on agriculture retail professionals such as local input suppliers and on soil testing laboratories suggests that those entities may be an effective way to connect farmers with the Illinois NLRs and promote the common goal of reducing nutrient runoff. Additionally, the trust farmers place in university research indicates that there is an opportunity for the academic community to participate in these types of targeted outreach opportunities by partnering with retail input and service suppliers to host workshops and provide information and training on available cost-share programs or funding opportunities. By hosting field days at their research farms, universities can display cover crop plots and demonstrate edge-of-field practices such as constructed wetlands. Finally, university research measuring the cost of establishing BMPs on Illinois farmland, the economic benefits of these practices, the financial incentives farmers would be willing to accept in exchange for establishing BMPs, and the impact of nonfinancial policy interventions on BMP adoption can help inform further efforts to encourage more widespread adoption of the practices recommended by the Illinois NLRs and move the agricultural community closer to achieving the strategy's goals.

The farmers we interviewed were actively engaged with their local SWCD office, indicating that they may already be conservation-minded. Whether the sentiments they

expressed are reflective of the general farming population is yet to be determined. These interviews are a first step in capturing the Illinois farming community's perspective on the Illinois NLRs, and the measures farmers are taking to meet its goals. An extension of this work includes a large-scale survey to gain a deeper understanding of farmers' knowledge of the Illinois NLRs, their concerns for and responses to nutrient loss, and their adoption of BMPs in response to those concerns.

## Conflict of Interest

The authors declare no conflict of interest.

## Acknowledgments

Funding for this project was provided by USDA-NIFA-AFRI Food Security Program Grant 2016-68004-24769. The authors appreciate the assistance of Donald E. Meyer, retired McLean County (IL) Extension Advisor; Jackie Kraft, McLean County (IL) Soil and Water Conservation District Watershed Coordinator; and Mike Kelley, Chair of the McLean County (IL) Soil and Water Conservation District Board of Directors. The authors also thank the reviewers for their constructive feedback on this manuscript.

## References

4R4U. 2019. 4R4U nutrient stewardship project. <http://www.4r4u.com/> (accessed 15 Jan. 2019).

Bigelow, D., A. Borchers, and T. Hubbs. 2016. US farmland ownership, tenure, and transfer. EIB-161. USDA Economic Research Service, Washington, DC.

Blank, S. 2013. The four steps to the epiphany: Successful strategies for products that win. 5th ed. K & S Ranch Press, Pescadero, CA.

Coppess, J., G. Schnitkey, C. Zulauf, N. Paulson, B. Gramig, and K. Swanson. 2018. The Agricultural Improvement Act of 2018: Initial review. *Farmdoc Daily* (8):227. <https://farmdocdaily.illinois.edu/2018/12/the-agriculture-improvement-act-of-2018-initial-review.html> (accessed 6 Apr. 2019).

Cresswell, J.W., and C. N. Poth. 2018. *Qualitative inquiry and research design*. 4th ed. Sage, Thousand Oaks, CA.

Dillman, D.A., J.D. Smyth, and L.M. Christian. 2014. *Internet, phone, mail, and mixed mode surveys: The tailored design method*. 4th ed. John Wiley & Sons, Hoboken, NJ.

The Fertilizer Institute. 2017. What are the 4Rs. <https://www.nutrientstewardship.com/4rs/> (accessed 4 Apr. 2019).

Illinois CBMP. 2019. Illinois Council on Best Management Practices. <http://illinoiscbmp.org/> (accessed 11 Jan. 2019).

Illinois EPA, Illinois DOA, and University of Illinois Extension. 2015. Illinois nutrient loss reduction strategy. <https://www2.illinois.gov/epa/Documents/iepa/water-quality/watershed-management/nlrs/nlrs-final-revised-083115.pdf>.

Illinois EPA, Illinois DOA, and University of Illinois Extension. 2017. Illinois nutrient loss reduction strategy: Biennial report 2015–2017. <https://www2.illinois.gov/epa/Documents/iepa/water-quality/watershed-management/excess-nutrients/nlrs-biennial-report/NLRS%20Biennial%20Report.pdf#search=biennial%20report>.

Roesch-McNally, G.E., A.D. Basche, J.G. Arbuckle, J.C. Tyndall, R.E. Miguez, T. Bowman, and R. Clay. 2018. The trouble with cover crops: Farmers' experiences with overcoming barriers to adoption. *Renew. Agric. Food Syst.* 33(4):322–333. doi:10.1017/S1742170517000096

USDA National Agricultural Statistics Service. 2016. Nutrient loss survey results. USDA. [https://www.nass.usda.gov/Statistics\\_by\\_State/Illinois/Publications/Current\\_News\\_Release/2016/Nutrient\\_Loss\\_Survey\\_Results.pdf](https://www.nass.usda.gov/Statistics_by_State/Illinois/Publications/Current_News_Release/2016/Nutrient_Loss_Survey_Results.pdf) (accessed 3 Apr. 2019).

USDA National Agricultural Statistics Service. 2017. Illinois crop production 2016 summary. USDA. [https://www.nass.usda.gov/Statistics\\_by\\_State/Illinois/Publications/Current\\_News\\_Release/2017/20170112-IL\\_Annual\\_Crop\\_Production.pdf](https://www.nass.usda.gov/Statistics_by_State/Illinois/Publications/Current_News_Release/2017/20170112-IL_Annual_Crop_Production.pdf) (accessed 3 Apr. 2019).

USEPA. 2008. Gulf hypoxia action plan 2008. <https://www.epa.gov/ms-htf/gulf-hypoxia-action-plan-2008>.