

## Researching the Effectiveness of Agricultural Programs in GLRI Priority Watersheds

REAP FINAL REPORT

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## Acknowledgements

This report was prepared by Dan Gold of the Great Lakes Commission (GLC) who also coordinated a significant portion of the REAP project work. The Principal Investigator for REAP was Victoria Pebbles; additional support was provided by Nicole Zacharda, also of the GLC staff. The findings in this report are drawn largely from individual reports prepared by project partners that were part of the REAP team as well as GLC analysis. Dr. Robyn Wilson of The Ohio State University led The Ohio State University's contributions to the REAP, with support from Adam Fix and Callia Tellez, including focus groups, interviews and surveys in priority watersheds. Sara Kruse and Tess Gardner of AMP Insights led the creation of priority watershed profiles as well as the analysis of economic and Great Lakes Restoration Initiative (GLRI) program data related to investments in priority watersheds. These team members also contributed with review of the finding and recommendations presented in this report. Editorial review and design support were provided by Beth Wanamaker and Laura Andrews of GLC staff. Finally, Jeremiah Asher and Laura Young from Michigan State University's Institute for Water Research led the assessment of GLRI-supported water quality tools and assisted in early analysis of GLRI program data.

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### **Executive Summary**

#### **Project Background**

Approximately \$96 million was invested between FY2010-2016 in agricultural incentives and other activities aimed at improving nearshore water quality in four priority watersheds (Maumee, Lower Fox, Saginaw, and Genesee) through Focus Area 3 of the Great Lakes Restoration Initiative (GLRI). While most other evaluations of agricultural conservation programs focus on environmental outcomes, Researching the Effectiveness of Agricultural Programs (REAP) investigated whether investments have resulted in long-term changes in voluntary on-farm decision-making that improve water quality outcomes. The REAP team included GLC staff, researchers from The Ohio State University (OSU), Michigan State University Institute

of Water Research (MSU IWR), AMP Insights, and a U.S. EPA Region 5 representative. From November 2017, through December 2019, the REAP team completed empirical analyses of primary<sup>1</sup> and secondary<sup>2</sup> data sources to investigate physical, social, and economic outcomes of GLRI Focus Area 3 investments. In addition, REAP included a review of GLRI-supported models and decisionsupport tools. Conclusions have been synthesized to better understand obstacles and opportunities for increased engagement with farmers that will lead to sustainable change in conservation-minded behaviors among farmers in the four priority watersheds and, ultimately, improved water guality within the Great Lakes Basin.



REAP study area including boundaries for the four GLRI Focus Area 3 Priority Watersheds, and the NRCS Phosphorus Priority sub watersheds

#### GLRI Programmatic Strengths and Opportunities to Improve Investment Outcomes

The REAP team used primary qualitative and quantitative data from surveys, interview, and focus groups to assess GLRI's key programmatic strengths and likely drivers of farmer behavior. GLRI has several unique qualities that stand apart from other traditional agricultural incentive programs such as the U.S. Department of Agriculture Natural Resource Conservation Service's (NRCS) Environmental Quality Incentive Program (EQIP) and leave it well-poised to make investments that result in sustainable, voluntary changes in on-farm behavior that contribute to improvements in water quality. However, the majority of Focus Area 3 funding between FY2010-2016 (between approximately 60-80%<sup>3</sup>) was allocated

<sup>&</sup>lt;sup>1</sup> "New" data from interviews, surveys, and focus groups completed by the REAP team.

<sup>&</sup>lt;sup>2</sup> "Previously existing" data (e.g. Census of Agriculture, U.S. Census Bureau, programmatic data for GLRI investments).

<sup>&</sup>lt;sup>3</sup> 83% of funding was allocated to projects with the primary purpose of implementing practices. At least 58% went directly to incentive payments. Specific information about how the remaining 25% was allocated within projects was not available, but it can be said with certainty that a portion was also allocated toward practice implementation.

directly toward support of traditional Farm Bill programming or other projects focused on conservation practice (practice) implementation that closely resembles EQIP. While EQIP is highly effective at implementing practices, and the REAP analysis builds from the premise that practice implementation improves water quality, this outcome in isolation does not speak to the goal of influencing on-farm decision-making in ways that are likely to be sustained if/when funding for agricultural incentives is no longer available. Findings suggest that some GLRI Focus Area 3 investments included in this investigation did capitalize on GLRI's unique strengths; however, GLRI's potential to make investments that will directly bolster the sustainability of changes in farmer behavior leading to improved environmental outcomes is underutilized.

GLRI's strengths include flexibility and support of innovative approaches, a reputation among farmers as having a personalized or grassroots feel, leeway to invest directly in outreach and education, relative simplicity and minimal paperwork for program enrollees, and its ability to expand local capacity for implementing conservation. Making an annual profit, managing soil health on individual farms, and cementing a personal legacy by passing a farm on to the next generation in better condition than when it was acquired ranked as the top concerns for priority watershed farmers. Messages related to nutrient loss (from personal farmland and the watershed in general) ranked as the lowest concerns. Through NRCS's Conservation Technical Assistance, GLRI funding has been used for demonstration farms and associated outreach events which facilitate peer-to-peer information exchange. This is important given REAP's finding that farmers prefer to receive information from peers or through personal interactions with local conservation district staff. However, based on available secondary data, only 2% of total funding was allocated toward projects with the direct goal of capacity building and outreach. Approximately 15% of GLRI Focus Area 3 funding was allocated toward monitoring, research, and decision-support tool development efforts that are potentially powerful tools for spreading awareness among farmers about the on-farm benefits of conservation.

These strengths contrast with traditional incentive programs that exclusively focus on practice installation and have strict requirements for what, how, and when practices can be implemented. Many farmers prefer not to engage with traditional federal programs due to an aversion to paperwork and contracts that include land management restrictions with a "regulatory" feel or the perception that practice standards are too generic to meet their farms' unique needs. Skepticism and lack of knowledge about practice efficacy and benefits in terms of financial and operational benefits were also identified as common barriers to voluntarily engaging in conservation. In general, farmers who own large farms, are more educated, and have greater belief in practice efficacy are more likely to engage in voluntary conservation than those working smaller farms or rented land, and who have less education and belief in practice efficacy. GLRI has the unique ability to invest in programs that are designed to overcome these barriers and engage with farmers who have been historically unwilling or unable to participate in more traditional conservation programs.

#### Assessment of Physical and Economic Outcomes<sup>4</sup>

Significant data gaps about how and/or where some GLRI Focus Area 3 funds were invested and associated outcomes limited the REAP team's ability to produce comprehensive empirical results. Data challenges included lack of access to federal interagency agreements, competing versions of priority watershed boundaries, and inconsistencies in the style and detail of project outcome reporting. Some GLRI-funded projects did not set explicit goals and therefore did not have clear criteria for evaluating success. Several basic questions could not be answered without significant caveats, including the total number of farmers

<sup>&</sup>lt;sup>4</sup> Summary one-pagers of priority watershed profiles, GLRI-specific data analysis, economic analysis, and focus group outcomes are included as Appendix A of the full REAP Final Report.

enrolled in GLRI Focus Area 3 programs, first time versus repeat enrollees, total acreage placed in conservation, number of jobs created, complete practice implementation tallies at the HUC12 scale, details about the types of activities (or project elements) and how funding was allocated to support those within individual projects, and the amount of funds leveraged through cost-share agreements. The data limitations encountered during this investigation point to substantial opportunities to improve the tracking of GLRI investment activities and associated outcomes so that a comprehensive and empirically based evaluation can be completed in the future.

The data that were collected for specific GLRI investments and made available to the REAP team point to a rubric for success that is focused on physical outcomes. This rubric understates the importance of social and economic indicators of success and inadvertently penalizes innovative projects whose short-term physical outcomes are unlikely to match those of traditional conservation practice investments utilizing well-established methods. Such innovative projects would be more appropriately judged based on outcomes such as their ability to enroll new farmers, sway the opinions of conservation detractors, transfer lessons learned to future investments, and demonstrate scalability of new ideas and methods that have been piloted on a small scale. In general, the focus on collection of physical outcome data misses an opportunity to lend empirical support to pervasive anecdotal accounts of GLRI Focus Area 3's greatest strengths and success stories.

Despite these limitations, a robust analysis of physical and economic outcomes was completed using available secondary and proxy economic data. An economic impact analysis using the U.S. Bureau of Economic Analysis' Regional Input-Output Modeling System concluded that \$96 million in GLRI Focus Area 3 investments had an estimated economic impact of nearly \$149 million, or an output multiplier of approximately 1.5 times the original investment. This analysis also estimated that between 135 and 210 jobs were created and retained as a result of these investments. Profiles highlighting key physical and demographic differences between the priority watersheds were constructed as a reference tool for future investment decisions. In terms of practice implementation, GLRI-supported EQIP was by far the leading program and the majority of contracts (52%) across all GLRI Focus Area 3 programs for practices were signed within NRCS's Phosphorus Priority Area HUC12 sub-watersheds. Based on Census of Agriculture data, the number of acres with cover crops increased and the reported usage of fertilizer have decreased in the priority watersheds (with the exception of in the Lower Fox) since the inception of GLRI in 2010. While these changes in on-farm behavior correlate with GLRI's focus (based on number of contracts signed) on cover crops and nutrient management, REAP was unable to determine a causal link between GLRI and these outcomes due to the unknown influence of non-GLRI incentive programs and voluntary conservation outside of government incentive programs.

#### **Recommendations**

Based on the conclusions of REAP's multi-faceted analysis, the following recommendations have been crafted in support of improving the effectiveness of future GLRI Focus Area 3 investments:

- 1. Increase federal interagency coordination to harmonize priority watershed boundaries and standardize data collection and tracking methods.
- Expand and standardize data tracking that includes project elements in addition to conservation practice implementation and that can support empirical analyses related to social and economic investment outcomes.

- **3.** Align reporting requirements with crop cycles and other time-bound elements while allowing greater flexibility within multi-year contracts with farmers to alleviate the risk of deviating from conservation plans due to weather or other unanticipated factors.
- 4. Increase multi-year investments supporting direct outreach (i.e., in-person public and private meetings and individual interactions) and traditional capacity building (i.e., additional personnel to increase implementation of traditional practices) at the state and local level in order to accommodate the timelines required for building both localized expertise in implementing conservation and personal relationships that drive program enrollment at the community and individual farm-scale.
- 5. Increase investments supporting *innovative* capacity building, such as new or emerging conservation technology and innovative approaches for expanding outreach to farmers, as well as continuing investment in the implementation of proven conservation methods and the bundling or stacking of proven practices to increase efficacy.
- 6. Refine outreach strategies to frame the benefits of conservation around primary farmer concerns including profits and soil health. Leverage personal relationships at the farm level between farmers and county conservation district staff to better understand individuals' viewpoints about the primary drivers of profitability on their farm.
- Invest in research that arms all stakeholders with data on the economic benefits of conservation practice adoption that can be used as an outreach and engagement tool to garner wider program participation and general support for voluntary conservation.
- 8. Increase outreach that targets landlords, farmers working rented land, and farm management companies who operate within the Great Lakes Basin. This could include offering financial incentives to landlords with lease agreements that include conservation requirements, augmenting incentives payments to increase financial benefits to farmers of implementing conservation practices on rented land, or allowing for the sale of cover crops to create an additional financial incentive for off-season conservation.
- 9. Invest in the purchase of conservation-oriented farming equipment for community use. Require equipment purchase grantees to devise outreach strategies that target large and midsized farms that may want to test out new equipment before purchasing it, as well as farmers working small farms that are open to using new conservation-oriented equipment but face barriers to purchasing it on their own.
- 10. Increase efforts to leverage information gleaned from multiple GLRI-funded tools, models, and monitoring efforts to bolster farmer confidence in conservation. This includes efforts to socialize GLRI-funded project managers and local technicians to existing resources, as well as strive to create tools that are more accessible/usable for farmers and specifically oriented towards helping them identify conservation practices that address their needs and align with their motivations.

## **Project Overview**

#### Background

Approximately \$96 million was invested between FY2010-2016 in agricultural incentives and other activities intended to influence on-farm decision-making and improve water quality in four priority watersheds (Maumee, Lower Fox, Saginaw, and Genesee) through Focus Area 3 of the Great Lakes Restoration Initiative (GLRI) (Figure 1). While many evaluations of agricultural conservation programs focus on environmental outcomes, this project, known as Researching the Effectiveness of Agricultural Programs (REAP), investigated whether investments result in long-term changes in voluntary on-farm decision-making that improve water quality outcomes. REAP began with the premise that implementing conservation practices (practice) yields water quality benefits and sought to better understand if and how investments can be tailored so that the resulting environmental benefits and conservation-oriented culture at the farm-scale will persist if/when incentive programs are no longer available.

From November 2017, through December 2019, the REAP team completed empirical analyses of primary<sup>5</sup> and secondary<sup>6</sup> data sources to investigate physical, social, and economic outcomes of GLRI Focus Area 3 investments. In addition, a review of GLRI-supported models and decision-support tools was carried out. Stand-alone reports were completed for each of these tasks<sup>7</sup>. Key findings from each of those sub-task reports have been synthesized herein to better understand obstacles and opportunities for enhanced engagement with farmers that will lead to sustainable changes in on-farm decision-making and water quality improvements.



**Figure 1:** REAP study area including boundaries for the four GLRI Focus Area 3 Priority Watersheds, and the NRCS Phosphorus Priority sub watersheds

<sup>&</sup>lt;sup>5</sup> "New" data from interviews, surveys, and focus groups completed by the REAP team.

<sup>&</sup>lt;sup>6</sup> "Previously existing" data (e.g. Census of Agriculture, U.S. Census Bureau, programmatic data for GLRI investments).

<sup>&</sup>lt;sup>7</sup> Each of the seven stand-alone sub-reports are included as Appendices D-J.

#### Organization of GLRI Focus Area 3 Investment Data

REAP identified 34 unique GLRI Focus Area 3-funded projects and programs (investments<sup>8</sup>) in priority watersheds between FY2010-2016 (Appendix C). Relevant data was culled from all available documents related to these 34 investments including proposals, progress reports, final reports, and other relevant supporting materials provided by participating federal agencies and PIs. Data was organized in a master database and further categorized based on eight "project elements" that were collaboratively identified and agreed upon by the Advisory Council. Collectively, these elements describe the spectrum of activities, features, and objectives within the 34 investments. Each investment was evaluated based on available documentation and marked as containing or not containing each of the eight elements. Every investment is associated with one or several elements.

	Project Element	Description
1	Conservation Practice Installation	Providing incentives to offset costs of practices to benefit water quality
2	Direct Outreach to Farmers	In-person public and private meetings and individual interactions
3	Indirect Outreach to Farmers	Mailers, press releases, fact sheets, newsletters, websites
4	Traditional Capacity Building	Helping existing agencies/programs increase implementation of widely- adopted traditional practices (e.g., through additional personnel)
5	Innovative Capacity Building	Help expand the use of innovative tools, methods, and practices that are not readily supported by other major agricultural programs
6	Edge of Field Monitoring & Research	Measuring nutrient runoff leaving fields before it enters waterways
7	Other Monitoring & Research	Measures nutrients in-stream and in open water
8	Decision Support Tool Development & Application	Includes the development and usage of models and databases created to improve on-farm decision making and assist with strategic water quality investments.

 Table 1: Eight "project elements" identified by the REAP Advisory Council and PMT to collectively describe the types of activities funded through GLRI Focus Area 3 investments

Investments were also placed into one of three categories based on how funding flows between the U.S. EPA and the PI (most commonly a state, federal, or local agency).

## **Table 2:** Three categories of investment pathways that describe the flowof money between U.S. EPA and principal investigator

	Type of Agreement	Description
1	Direct Grant	U.S. EPA awards a grant to the recipient(s) who directly implement the project as a grantee or through a cooperative agreement with U.S. EPA.
2	Indirect Grant	U.S. EPA awards a grant to a recipient (e.g., state agencies) who does not directly implement the project but distributes funding to sub-grantee implementer(s) (e.g., county conservation districts).
3	Interagency Agreement	U.S. EPA passes funding to a federal partner agency to support investments that are relevant to GLRI goals. The funds may be utilized directly by the federal agency or awarded to sub-grantees.

<sup>&</sup>lt;sup>8</sup> "Investment" is used throughout this report to capture GLRI funding in Focus Area 3 through a variety of mechanisms, including grants, cooperative agreements, and interagency agreements (Table 2).

#### **Project Team and Advisory Council**

The Great Lakes Commission (GLC) was the principal investigator (PI) for REAP under a GLRI cooperative agreement with the U.S. EPA. The REAP team included GLC staff, researchers from The Ohio State University (OSU), Michigan State University Institute of Water Research (MSU IWR), AMP Insights, and a U.S. EPA Region 5 representative (Appendix B). The creation of watershed profiles, economic analysis, and GLRI programmatic data analyses were led by AMP Insights; surveys, interviews, and focus groups were led by OSU researchers; and the review of GLRI-supported models and tools was led by MSU IWR. All tasks were coordinated and overseen by GLC staff via biweekly REAP team webinar meetings and approximately two inperson all-day meetings per year.

REAP was also informed by an Advisory Council (Appendix B) that included 42 professionals from federal, state, and local agencies, NGOs, the private sector, and academia, collectively representing all four priority watersheds. The Advisory Council convened five times during the project: three all-day in-person meetings in November 2017, 2018, and 2019, and two webinars in May 2018 and July 2019. The Advisory Council also provided iterative feedback and guidance on sub-tasks and deliverables through emails and phone conversations over the course of the project.

#### Distribution of GLRI Focus Area 3 Investments

The Maumee is the largest of the priority watersheds by area, has the most counties overlapping with its boundary (26), and received the largest p (\$44 million). The Genesee watershed, which ranks 3<sup>rd</sup> in both area and number of counties (10), received the smallest portion of funding (\$8 million). The Genesee was first designated as a GLRI "priority watershed" in approximately 2015<sup>9</sup>, so it has not been a GLRI Focus Area 3 target for investment as long as the other three watersheds.

GLRI Focus Area 3 Priority Watershed (State)	Total Investment FY2010-2016 (in millions)
Maumee (OH, IN, MI)	\$44
Lower Fox (WI)	\$24.3
Saginaw (MI)	\$19.5
Genesee (NY, PA)	\$8
All Priority Watersheds	\$95.8

#### Table 3: Distribution of GLRI Focus Area 3 investments by priority watershed

<sup>&</sup>lt;sup>9</sup> Genesee is first listed as a Focus Area 3 priority watershed in GLRI Action Plan III which describes GLRI activities, goals, and priorities for FY2020-2024. It is not listed as a priority watershed in GLRI Action Plans I or II, which cover FY2010-2019. Based on available information, U.S. EPA has regarded Genesee as the fourth priority watershed since sometime between late 2014 and mid-2016.

Most funding (\$65 million) was invested through interagency agreements with four other federal agencies, of which over \$54 million went to the U.S. Department of Agriculture's Natural Resource Conservation Service (NRCS). Remaining funds were distributed between 16 direct grants (\$17 million) and 14 indirect grants (\$14 million). Interagency agreements were not made available to the REAP team, so some details of how and where those funds were invested could not be evaluated.



**Figure 2:** Breakdown of money flow of GLRI Focus Area 3 investments in priority watersheds by type of grant or agreement (rounded to the nearest million dollars).

Recipient	Total Award FY2010-2016
USDA-NRCS	\$54,531,287
Ohio EPA	\$8,140,179
USGS	\$8,025,503
Ohio DNR	\$5,940,000
Fox-Wolf Watershed Al.	\$4,677,392
USACOE	\$1,962,700
EGLE (Formerly MDEQ)	\$1,845,740
MDARD	\$1,802,866
NEW Water (Green Bay)	\$1,686,699
16 Additional Recipients	\$7,196,405
Total Investment	\$95,808,771

Table 4: Distribution of GLRI Focus Area 3 investments by award recipier	<b>Fable 4:</b> Distribution	of GLRI Focus	Area 3 investments	by award recipie	ent
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The importance of this data gap came into focus when investigating GLRI expenditures using three standard NRCS investment categories: Financial Assistance (FA); Technical Assistance (TA); and Conservation Technical Assistance (CTA). FA and TA are used to promote agricultural production and environmental quality as compatible goals, optimize environmental benefits, and help farmers and ranchers meet federal, state, tribal, and local environmental regulations. The largest expenditures go to

FA, which are direct conservation incentive payments to farmers. Since this data was tracked based on the HUC12 watershed where the contract was signed, REAP was able to determine exactly how much FA funding was allocated to each priority watershed.

CTA program funds have been used to assist individuals and groups of decision-makers, communities, conservation districts and other units of state and local government, tribes, and other federal agencies, with voluntarily conservation, maintenance, and improvement of natural resources. This includes

cooperative agreements supporting enhanced program delivery, and many activities similar to those categorized as TA and FA. However, CTA investments have also included innovative projects such as demonstration farm networks that are specifically geared toward outreach and education and peer-to-peer interaction to promote the benefits of on-farm conservation. Specific data concerning how and where TA and CTA investments were distributed was not available. A pervasive challenge in completing this assessment was the lack of reporting about financial allocations and outcomes within specific investments related to project elements other than practice implementation.

A pervasive challenge in completing this assessment was the lack of reporting about financial allocations and outcomes within specific investments related to project elements other than practice implementation

NRCS's CTA investments are a prime example of how GLRI is used to invest directly in activities that can bring about the sustainable changes in farmer behavior that GLRI seeks. These include the support of innovative practices, capacity expansion at the state and local level leading to increased personal interactions, and outreach and education. However, information about the geographies, total dollar amounts, and project elements associated with specific CTA investments was not available for inclusion within the REAP analysis at the level of detail required.<sup>10</sup> The successful outcomes of CTA investments such as demonstration farms were supported by multiple investigative methods, but remain primarily anecdotal, as limited data availability concerning their social impacts prohibited a robust empirical analysis.<sup>11</sup>

Project Element	Funding Allocation (in millions)	% of Total Investments
Conservation Practice Implementation	\$79.3	83%
Monitoring, Research & Tool Development	\$14.4	15%
Capacity Building & Outreach	\$2.1	2%
Total	\$95.8	100%

## Table 5: Distribution of GLRI Focus Area 3 investments by project element(elements 2-5 & 6-8 from Table 1 have been condensed)

<sup>&</sup>lt;sup>10</sup> The REAP team would like to thank Martin Lowenfish, Edwin Martinez, Matt Otto, and other NRCS staff who expended significant effort gathering CTA-related data and helping the team understand the nuances of GLRI-NRCS investments in Focus Area 3 activities. <sup>11</sup> See Appendix F which includes a preliminary and limited evaluation of the impacts on farmers who attended field day events at the Blanchard

Data concerning how funding was distributed between multiple project elements within individual investments was limited<sup>12</sup>, but sufficient data was available to determine both the primary purpose of individual investments as well as the complete breakdown of which elements the 34 investments did or did not include. With this limited available data, REAP discerned that 83% of funding was allocated to projects with the primary purpose of implementing practices. This includes supplements to Farm Bill programs or funding other investments focused on practice implementation that closely resemble EQIP. Available data indicates that at least 58% of total GLRI Focus Area 3 investments went directly to conservation incentive payments for farmers. Information about how the remaining 25% was allocated between the eight project elements within specific investments was not available; however, most projects with this primary purpose also included other project elements including outreach and capacity expansion. With one exception,<sup>13</sup> investments were made in each of the eight project elements in all priority watersheds. Only 2% of total funding was allocated toward projects with the primary purpose of capacity building and outreach, and 15% was allocated directly for investments in monitoring, research, and tool development.

## Evaluation of GLRI Focus Area 3 Investment Outcomes and Efficacy Based on Multiple Measures of Success

Data gaps about how and/or where some GLRI Focus Area 3 funds were invested and associated outcomes limited the REAP team's ability to produce comprehensive empirical results. Despite these limitations, analyses of physical and economic investment outcomes were completed using the available GLRI-specific data, relevant public data sets, and proxy economic data.<sup>14</sup> Social outcomes were determined based on survey data<sup>15</sup>, focus groups with GLRI-project and program enrollees in priority watersheds, and interviews with PIs and managers of GLRI investments.<sup>16</sup>

#### **Physical Outcomes**

In total, 106 different types of practices were implemented using GLRI Focus Area 3 incentives. The number and type used vary by watershed; however, the REAP team worked with NRCS to ensure that all practices included in the analysis meet the threshold of improving water quality upon implementation. The greatest and least amount of different practice types were implemented in the Maumee and Genesee watersheds, respectively. The greatest and least amount of conservation incentive contracts were also signed in these two respective watersheds. The majority of practices were installed through GLRI-funded EQIP. Although outcome data (practice installation tallies and HUC12 locations) were not available for several direct and indirect sub-grantee projects, the number of contracts signed through EQIP topped all individual direct and indirect investments with available outcome data by several thousand. While EQIP is highly effective at implementing practices, and the REAP project builds from the premise that practice

<sup>&</sup>lt;sup>12</sup> For example, proposals, workplans, and outcome reports made available to the REAP PMT could be used to identify that an investment was primarily geared toward practice implementation and also included outreach and education components; however, there was no way to determine what percent of the funding went toward fulfilling those individual components of the overall work plan.

<sup>&</sup>lt;sup>13</sup> No investments categorized as "innovative capacity building" were made in the Genesee watershed.

<sup>&</sup>lt;sup>14</sup> See Appendix H and Appendix I for the full physical and economic investment outcome reports.

<sup>&</sup>lt;sup>15</sup> See Appendix E and Appendix F for full new survey report and previous survey report, respectively.

<sup>&</sup>lt;sup>16</sup> See Appendix D for full report on REAP interviews and focus groups.

implementation improves water quality, this outcome in isolation does not speak to the goal of influencing on-farm decision-making in ways that are likely to persist if/when funding for agricultural incentives are no longer available.

Conservation Practice	Implementation Details <sup>17</sup>
Cover Crops (NRCS Practice #340)	<ul> <li>2,138 contracts signed</li> <li>25% of all contracts</li> <li>345,000-acres</li> <li>\$11.5 million in payments or 12% of total GLRI Focus Area 3 investment</li> </ul>
Nutrient Management (NRCS Practice #590)	<ul> <li>1,176 contracts signed</li> <li>14% of all contracts</li> <li>308,000-acres</li> <li>\$7.5 million in payments or 8% of total GLRI Focus Area 3 investment</li> </ul>

#### Table 6: Implementation details of GLRI Focus Area 3's top conservation practices

Cover crops and nutrient management were the most popular practices across all priority watersheds in terms of the frequency of contracts signed. Based on Census of Agriculture data, the number of acres with cover crops increased and the reported usage of fertilizer decreased (with the exception of Lower Fox) in the priority watersheds since the inception of GLRI in 2010. While these changes in on-farm behavior correlate with GLRI Focus Area 3's goals for implementing cover crops and nutrient management, the unknown influence of non-GLRI incentive programs and voluntary conservation outside of programs precludes the determination of a causal link between GLRI Focus Area 3 investments and these outcomes.

Cover crops were also the number one practice in terms of dollars allocated to conservation payments, with nutrient management ranked third. The practice that was supported with the second highest level of funding was waste storage facilities (NRCS Practice #313). In terms of contracts, 124 (1.5% of all contracts) were signed for a total obligation of nearly \$9 million (~9.5% of total GLRI Focus Area 3 investment), with an average payment of \$72,350 per contract.

Most contracts for practices (at least 52%) were signed within one of the NRCS Phosphorus Priority Area sub-watersheds (PPAs). Since PPAs are defined by HUC12 watershed boundaries and some practice implementation data was not reported to this level of specificity, determinations could not be made for a portion of contracts in three priority watersheds (marked as blank in Figure 3 below). This gap did not exist for the Lower Fox watershed, where PPA and priority watershed boundaries are identical.

<sup>&</sup>lt;sup>17</sup> Metadata for contracts that distinguishes unique farmer participants or unique acres of land was not available. As a result, acreage that was improved with multiple practices in a single year, or acreage under contract across multiple years (returning participants) are double-counted in the dataset.



Figure 3: Percentage of contracts signed within NRCS PPAs by priority watershed

Contracts were signed in 52 out of 63 total counties whose boundaries partially overlap with one of the priority watersheds. Brown County, Wisconsin, (Lower Fox watershed), De Kalb County, Indiana, (Maumee watershed), and Defiance County, Ohio, (Maumee watershed), were the top counties for contracts signed, with Brown County significantly exceeding the number of contracts signed in other counties (Figure 4).



Figure 4: Distribution of practice implementation contracts signed by county and state, color-coded by priority watershed

#### **Economic Outcomes**

Due to data limitations concerning economic reporting and outcome data related to specific GLRI investments, a proxy method known as the Regional Input-Output Modeling System (RIMS II) was used to determine the economic impacts in priority watersheds. This method can be used to investigate the interrelationships between a specific industry (in this case the agricultural conservation "industry") and the multiplier effect of investments in one industry across a broader economy. Results of this type of analysis are typically expressed as multipliers that represent the additional economic impact above the direct contributions of the industry being considered. This analysis was also used to estimate the number of jobs created and retained as a result of GLRI Focus Area 3 investments.

For the REAP analysis, direct economic contributions of GLRI investments were total funds spent within each watershed. These investments then supported: a) indirect impacts - the purchase of supplies and services to support implementation of conservation practices (e.g., purchase of plants for a vegetative buffer or hedgerow planting); and b) induced impacts - personal spending by farmers receiving GLRI funding as well as any employees of industries providing supplies and services (e.g., purchase of groceries). Two data sources were used for this analysis – the Master Project Database compiled by the REAP PMT and RIMS II multipliers purchased from the U.S. Bureau of Economic Analysis. Impacts of practice

installation and the impacts of the other seven project elements (referred to as "Non-CP Funds and Impacts" in Figure 5 below) were parsed out as required by this analytical method, and the results were aggregated.

GLRI Focus Area 3 investments of \$95.8 million between FY2010-2016 had an estimated economic impact, measured in terms of total output, of between \$142 and \$149 million, or an overall output multiplier of 1.48 to 1.55 times the original investment. A conservative estimate for job creation ranges from 135 to 210 full and part-time jobs created and retained as a result of GLRI Focus Area 3 investments during that same period.

## Economic Impacts and Job Growth

\$95.8 million in GLRI investments leveraged nearly \$149 million in total economic impact, approximately 1.5 times the original investment

Up to 210 full and part time jobs created and retained



Figure 5: Estimated total economic impacts of GLRI Focus Area 3 investments by priority watershed

#### Social Outcomes

Farmers who participated in REAP focus groups were nearly unanimous in their support for the current structure of GLRI, suggesting that it is broadly perceived as an effective program as-is. Several people indicated that GLRI payments covered up-front costs which allowed them to integrate the practices into their operation. Once integrated, they reported many of the practices either paid for themselves or required very little cost to maintain. Many of these farmers stated that they have continued to implement practices initially installed through GLRI without incentive payments or intend to do so going forward. This contrasted with survey data where respondents indicated that for both buffer strips and cover crops, they were slightly unlikely to implement them in the future without incentive payments. While many PIs and managers who were interviewed believe that GLRI investments have resulted in lasting cultural changes, the response was not unanimous. Other program managers were optimistic, but expressed a "wait and see" approach, cautioning that cultural advances could be lost without continued GLRI investment. A third segment of interviewees indicated that they do not see evidence of lasting cultural change.

Information gleaned from farmers through both the survey and focus groups identified a low-awareness of the presence of GLRI in priority watersheds. Between 15-22% of survey respondents in each priority watershed indicated that they were "unsure" if they had participated in a GLRI-funded project or program. Focus group invitees specifically selected because they had received GLRI-backed incentive payments were asked if they had received GLRI funds. Nearly a third of farmers responded either "no" or "maybe", and when asked if they had ever heard of GLRI; several farmers responded "no". In addition, several of the barriers and other program structures or features that farmers spoke at length about not liking were tied to Farm Bill program restrictions that are not inherently connected to GLRI investments.

This lack of awareness is not surprising considering that the majority of GLRI-supported incentive payments were distributed through EQIP (a Farm Bill program, as opposed to investments uniquely associated with GLRI). The nuance of the specific funding stream that a local district uses to implement a program would be largely unimportant to an individual farmer primarily concerned with improving their operation. In addition, this may be a consequence of the widely-reported "grassroots" and "localized" perception of GLRI among farmers obscuring the fact that it is a federal program. While the lack of awareness of GLRI's presence could be inconsequential to overall programmatic goals, a widespread failure to recognize the difference between GLRI traditional and agricultural conservation programs means that GLRI's unique strengths and opportunities for innovation could be better marketed to potential program participants and members of Congress.

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## Obstacles that Must be Addressed by Current Voluntary Approaches to Improve Water Quality

#### **Policy-Level Obstacles**

Significant data gaps about how and/or where some GLRI Focus Area 3 funds were invested and associated outcomes currently limit possibilities for completing a comprehensive, empirical, socio-economic investigation of the efficacy of GLRI Focus Area 3 investments. In addition, some work plans and/or proposals for individual investments did not set explicit goals and therefore did not have clear criteria for evaluating their degree of success. Other specific obstacles for evaluating program-wide effectiveness include competing versions of priority watershed boundaries at different state and federal agencies, a convoluted naming system for unique investments in GLRI's public-facing master database, and inconsistencies in the style and details of outcome reporting. Several basic questions could not be answered without significant caveats, including the total number of farmers enrolled in GLRI Focus Area 3 programs, first time versus repeat enrollees, total new acreage placed in conservation and total acres on which existing conservation was perpetuated, number of jobs created, complete practice implementation tallies down to the HUC12 scale, details of how funding was allocated to various elements within individual projects, and the amount of funds leveraged through cost-share agreements, in-kind contributions, and synergies with other non-GLRI programs. The data limitations encountered during this investigation point to substantial opportunities to improve the tracking of investment activities and associated outcomes so that a comprehensive and empirically-based evaluation can be completed in the future.

The data that was collected for specific investments points to a rubric for success that is focused on physical outcomes. This aligns with the finding that the vast majority of funding (83%) went to investments

with the primary purpose of practice implementation. This investment focus and related outcome reporting understates the importance of social and economic impacts as indicators of success. It also inadvertently penalizes innovative projects whose short-term physical outcomes are unlikely to match those of traditional investments utilizing well-established methods. Such innovative projects would be more appropriately judged based on outcomes such as their ability to enroll new farmers, sway the opinions of conservation detractors, support sustainable long-term change in on-farm decision-making, and demonstrate scalability of new ideas and methods that have been piloted on a small scale. In general, the focus on collection of physical outcome data misses an opportunity to lend empirical support to pervasive anecdotal accounts of GLRI Focus Area 3's greatest strengths and success stories.

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#### Community and Farm-Level Obstacles

Survey data from priority watershed farmers indicates that many farmers prefer not to engage with traditional federal programs due to an aversion to paperwork and contracts that include land management restrictions, or the feeling that they are too generic to meet their farms' unique needs. Some

farmers indicated that current payment structures were insufficient to entice their participation. Skepticism and lack of knowledge about practice efficacy and financial benefits were also identified as common barriers to voluntarily engaging in conservation. In general farmers who operate relatively small farms, are older, less educated, more production-minded, and more concerned with their personal operation than the watershed as a whole are less likely to participate in voluntary conservation programs. Other major constraints included a belief that the government and not individual farmers are responsible for protecting water quality. Conversely, being younger, more educated and more conservation-minded, operating a larger farm, believing that the benefits of conservation are certain, that the practices are effective, that farmers are responsible for water quality, and being concerned about watershed-level issues increased the chances that a farmer will be motivated to engage in conservation.



Figure 6: Ranking of top barriers to program participation based on a survey of farmers in the four priority watersheds

In terms of cover crops specifically (GLRI Focus Area 3's top practices), challenges with access to equipment, the time it takes to manage, uncertainty in the weather, and the lack of an immediate economic return were consistently cited as the highest perceived obstacles across all priority watersheds. However, it should be noted that the majority of obstacles identified by farmers were also rated on average as not limiting their ability to use cover crops, or only limiting it a little bit.

Three additional noteworthy obstacles related to contract timing and land tenure were identified by priority watershed farmers during focus groups. One participant suggested that "having the resources [available] when you need them" was an obstacle, because "everything is so timely [in this business]." Other participants across multiple focus group agreed: when resources (e.g., machinery, supplies, personnel) are unavailable under shifting conditions (e.g. changes in weather or economic conditions), it presents an obstacle. Another participant suggested difficulties in "making the adjustment [from year-to-year] of where a particular cover crop may go and how soon it can get seeded," because economic factors drive crop rotations, and "you don't know three years out, or five years out, what it might be, and it might change." Allowing for seasonal adjustments within multi-year contracts with farmers could help overcome this obstacle. In addition, farmers noted that the current incentive structures do not provide sufficient

benefits to garner participation from landlords or farmers who work on rented land. This is significant considering Census of Agriculture data indicates that across the priority watersheds the percentage of operations utilizing some rented land ranges between 29-35%, and the acreage that is worked exclusively by tenant farmers ranges between 4-7%. Between 2007 and 2017, both of these percentages increased across all priority watersheds, pointing to a significant and growing population of farmers in GLRI Focus Area 3 priority watersheds who are unlikely to engage in the status quo of voluntary conservation programs.

By tailoring outreach to speak to the primary concerns of farmers, directly supporting local capacity expansion, innovative techniques, and education, and taking advantage of GLRI's flexibility compared to more rigid Farm Bill programs, GLRI has the unique potential to overcome these barriers and engage farmers who have been historically unwilling or unable to participate in voluntary conservation.

# Successful Approaches for Motivating Farmers to Engage in Voluntary Conservation and Improve Water Quality

GLRI has several unique qualities that stand apart from other traditional agricultural incentive programs and leave it well-poised to make investments resulting in sustainable changes in farmer behavior. Strengths of GLRI include its flexibility and support of innovative methods, a reputation among farmers as having a personalized or grassroots feel, leeway to invest directly in outreach and education, relative simplicity and minimal paperwork for program enrollees, and its ability to expand local capacity for implementing conservation. These strengths contrast with traditional programs that exclusively focus on practices and have strict requirements for what, how, and when they can be implemented.

Through NRCS's Conservation Technical Assistance, GLRI funding has been used for demonstration farms and associated outreach events that facilitate peer-topeer information exchange. This is important given REAP's finding that farmers prefer to receive information from peers or through personal interactions with local conservation district staff. This

#### GLRI's Unique Qualities and Key Strengths

Flexibility

Support of innovative methods

Reputation for personalized or "grassroots" programming

Leeway to invest directly in outreach and education

Minimal paperwork for program enrollees

Ability to expand local capacity for implementing conservation

conclusion, based on farmer focus groups and survey data, was also supported by information gleaned from interviews with GLRI Focus Area 3 PIs and managers who reported that GLRI investments create lasting cultural changes in cases where local staff are available to spend significant time with "boots on the ground" to assist individual farmers and the project timeframe is long enough that farmers begin to realize the economic benefits of conservation.



Figure 7: Ranking of preferred sources of information based on a survey of farmers in the four priority watersheds

Survey data about top concerns of farmers provides insight into how outreach and education can be tailored to achieve the widest possible engagement. Making an annual profit, managing soil health on individual farms, and cementing a personal legacy by passing a farm on to the next generation in better condition than when it was acquired ranked as the top concerns. Notably, messages related to nutrient loss (from personal farmland and the watershed in general) ranked as the lowest concerns for priority watershed farmers.



Figure 8: Ranking of top farmer concerns based on a survey of farmers in the four priority watersheds

Some GLRI Focus Area 3 investments included in this investigation did capitalize on GLRI's unique strengths; however, GLRI's potential to make investments that will directly bolster the sustainability of environmental outcomes is currently underutilized. The 15% of GLRI Focus Area 3 funding that was allocated toward monitoring, research, and tool development along with the 2% that was allocated directly toward capacity building and outreach has the potential to spread awareness among farmers about the on-farm benefits of conservation, and in turn solicit wider participation in voluntary conservation. By contrast, the 83% of funding invested for the primary purpose of practice implementation proved to be successful for achieving that outcome in isolation with no clear evidence that traditional program participants are likely to continue to implement conservation practices without incentives, or that these investments are likely to achieve wider engagement beyond the usual early adopters who are most likely to engage in voluntary conservation programs under any circumstances.

It should also be noted that the successful approaches summarized herein are based purely on survey data from farmers within the priority watersheds (but not necessarily participating in GLRI) and anecdotal accounts from GLRI participants obtained through focus groups and interviews. The lack of socioeconomic outcome data that could theoretically be used to discern connections between project and program design and social outcomes such as levels of participation and instances of continuing conservation by former GLRI-program participants does not allow for further empirical or quantitative support for these lessons learned. Improved data collection methods that help determine whether a small portion of farmers are engaging in multiple acts of conservation (e.g. 30% of the population is doing many things) or a larger portion of the population are taking fewer individual actions (e.g. 60% of the population is doing at least one thing) would support future analysis and recommendations for improved engagement and enrollment.

Recommendations for Adapting Current GLRI Focus Area 3 Investment Strategies to Increase Future Effectiveness

Based on the conclusions of REAP's multi-faceted analysis, the following recommendations have been crafted in support of improving the effectiveness of future GLRI Focus Area 3 investments:

- 1. Increase federal interagency coordination to harmonize priority watershed boundaries and standardize data collection and tracking methods.
- Expand and standardize data tracking that includes project elements in addition to conservation practice implementation and that can support empirical analyses related to social and economic investment outcomes.
- Align reporting requirements with crop cycles and other time-bound elements while allowing greater flexibility within multi-year contracts with farmers to alleviate the risk of deviating from conservation plans due to weather or other unanticipated factors.
- **4.** Increase multi-year investments supporting direct outreach (i.e., in-person public and private meetings and individual interactions) and traditional capacity building (i.e., additional

personnel to increase implementation of traditional conservation practices) at the state and local level in order to accommodate the timelines required for building both localized expertise in implementing conservation and personal relationships that drive program enrollment at the community and individual farm-scale.

- 5. Increase investments supporting *innovative* capacity building, such as new or emerging conservation technology and innovative approaches for expanding outreach to farmers, as well as continuing investment in the implementation of proven conservation methods and the bundling or stacking of proven practices to increase efficacy.
- 6. Refine outreach strategies to frame the benefits of conservation around primary farmer concerns including profits and soil health. Leverage personal relationships at the farm level between farmers and county conservation district staff to better understand individuals' viewpoints about the primary drivers of profitability on their farm.
- Invest in research that arms all stakeholders with data on the economic benefits of conservation practice adoption that can be used as an outreach and engagement tool to garner wider program participation and general support for voluntary conservation.
- 8. Increase outreach that targets landlords, farmers working rented land, and farm management companies who operate within the Great Lakes Basin. This could include offering financial incentives to landlords with lease agreements that include conservation requirements, augmenting incentives payments to increase financial benefits to farmers of implementing conservation practices on rented land or allowing for the sale of cover crops to create an additional financial incentive for off-season conservation.
- 9. Invest in the purchase of conservation-oriented farming equipment for community use. Require equipment purchase grantees to devise outreach strategies that target large and midsized farms that may want to test out new equipment before purchasing it, as well as farmers working small farms that are open to using new conservation-oriented equipment but face barriers to purchasing it on their own.
- 10. Increase efforts to leverage information gleaned from multiple GLRI-funded tools, models, and monitoring efforts to bolster farmer confidence in conservation. This includes efforts to socialize GLRI-funded project managers and local technicians to existing resources, as well as strive to create tools that are more accessible/usable for farmers and specifically oriented towards helping them identify conservation practices that address their needs and align with their motivations.