



Advancing 4R Nutrient Stewardship in Minnesota

A Review of Incentive-Based 4R Models for Agricultural Retailers

MN Session Law 2025, Chapter 34, Sec. 2, Subd. 2(r)

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Legislative Language

The Minnesota Legislature authorized this study and report, administered by the Minnesota Department of Agriculture, in the 2025 Minnesota Session Laws, Chapter 34, Section 2, Subdivision 2, paragraph (r).

(r) \$50,000 the first year is to conduct a study and develop recommendations for establishing an incentive-based program to support and encourage agricultural retailers in promoting 4R nutrient management practices. The 4R nutrient management practices include: the right source of nutrients, at the right rate and right time, in the right place.

(1) As part of the study, the department must evaluate strategies for leveraging cost-share programs, including the feasibility of coordinating with the Agricultural Water Quality Certification Program and other efforts related to the state's Nutrient Reduction Strategy.

(2) The commissioner must submit a report detailing its findings, including potential funding sources and proposal outlines for funding requests where appropriate. The commissioner must submit the report to the chairs and ranking minority members of the legislative committees with jurisdiction over agriculture and environment by March 15, 2026.

Executive Summary

The objective of this report is to fulfill MDA's statutory requirement to study and make recommendations on developing an incentive-based strategy that engages agricultural retailers as key partners in the state's nutrient stewardship and water quality efforts. Agricultural retailers, agronomists, and crop advisers are trusted sources of information for Minnesota farmers, and an incentive-based strategy can build on these trusted-advisor relationships to accelerate adoption of best management practices (BMPs), reduce barriers to cost share participation, and support improved water quality outcomes across agricultural landscapes.

This report evaluates how Minnesota can close the implementation gap by engaging agricultural retailers as verified conservation partners, using evidence from peer-reviewed literature and four program models implemented across the United States and Canada. While each model provides useful insights, none offers a fully tested administrative blueprint, and each has been implemented only in limited geographies with varying funding structures. These findings underscore the importance of careful program design, shared agency roles, and realistic consideration of long-term administrative needs.

- **Direct Contractor Model:** Public funds directly compensate retailers for delivering verified nutrient management plans, verification, and implementation at scale using their existing agronomic expertise, client relationships, and digital infrastructure.
- **Incentive Eligibility Model:** Farmer eligibility for cost-share is tied to working with a certified or approved retailer.
- **Pay-for-Performance Model:** Payments are based on state-verified nutrient reductions rather than practice adoption.

- **Regulatory Certainty Model:** Producers receive non-monetary incentives—such as liability protection or presumption of compliance with regulatory requirements—to producers who adopt approved practices and complete verification protocols.

Take home message: To translate these findings into a Minnesota approach, the MDA recommends a mixed delivery model—centered on a direct contractor approach through agricultural retailers and supported by geographically targeted, pay-for-performance and incentive-based funding.

By credentialing advisors and improving the systems that support verification, Minnesota can leverage the existing retail infrastructure to provide scalable, accountable, and cost-effective nutrient stewardship. Strengthening retailer engagement offers a pathway to more consistent nutrient recommendations, improved documentation, and better coordination with existing state programs. Working through agricultural retailers complements other efforts including working with soil and water conservation districts (SWCDs) and the University of Minnesota while supporting research, water quality monitoring, and on-farm demonstrations. The goal is to build and enhance partnerships between agricultural retail facilities and the current conservation delivery system to create efficiency and expansion of current nutrient management work.

Funding is not currently available to support an incentive-based program for agricultural retailers. The Minnesota Department of Agriculture (MDA) cannot support the proposed program(s) without dedicated funding provided by the legislature. New funding for an ag retailer program can leverage existing cost share funding for conservation practice planning and adoption such as: Board of Soil and Water Resources (BWSR) One Watershed One Plan and Watershed Based Implementation Funding, USDA Natural Resource Conservation Service (NRCS) EQIP Funding, Minnesota Ag Water Quality Certification Program, and local funding, such as County or SWCD conservation practice incentives.

Key Findings

- Minnesota’s biggest barrier to 4R adoption is delivery capacity, not scientific uncertainty about effective practices.
- In-field nutrient management is among the most cost-effective water-quality interventions and can complement broader conservation systems.
- Agricultural retailers play a central role in shaping nutrient decisions on Minnesota cropland, and their existing infrastructure offers a practical and efficient pathway to expand verified nutrient management when paired with clear standards, credentialing, and efficient verification processes.
- Expanding Minnesota’s nutrient management capacity requires empowering agricultural retailers to shift from a traditional, product-driven model to one that emphasizes service-oriented agronomy and a business model for providing data management, reporting, and environmental services.
- Any future retailer-integrated approach would require clear standards, data-sharing expectations, and coordination across multiple state agencies – not solely MDA.
- Minnesota can achieve improved nutrient stewardship outcomes by adopting an approach centered on a direct contractor approach through agricultural retailers and supported by geographically targeted, pay-for-performance and incentive-based funding.
- Because no model has yet produced a fully durable technical-service business model in the agricultural retail sector, incremental, pilot-based testing may be the most appropriate next step.

High-Level Recommendations

Based on these findings, the MDA has identified several potential strategies for further development and internal review. A complete list of recommendations, based on the research and literature reviews, begins on page 12.

- **Establish a 4R Retailer Readiness and Innovation Fund:** Create a 5-year fund to reimburse Minnesota 4R Nutrient Stewardship Certification Program certification fees, audit costs, and staff time, supporting the uniformity of conservation delivery within retail businesses.
- **Implement Verification-as-a-Service:** Compensate 4R certified retailers for the technical labor of generating high quality, auditable data and documentation that support existing state programs.
- **Harmonize Programs to Improve Efficiency and Regulatory Certainty:** Recognize retailer 4R Certification as a pre-verified module for the Minnesota Agricultural Water Quality Certification Program (MAWQCP) to streamline enrollment and reduce administrative redundancy.
- **Build Technical Assistance and Verification Capacity Across the Delivery System:** Expand technical assistance capacity through training, partnerships, and professional development.

These recommendations are exploratory and are intended to inform future decision-making. Next steps would depend on legislative direction, interagency coordination, additional stakeholder engagement, and the availability of dedicated funding.

Introduction/Background

Minnesota farmland is among the most productive in the world, supporting a strong agricultural sector that generates significant economic value and sustains hundreds of thousands of jobs. The state's agricultural systems encompass a wide range of soil types, management approaches, and hydrologic conditions—from the coarse-textured soils of the Central Sands to the tile-drained landscapes of southern Minnesota and the karst geology of the southeast. Within these diverse production environments, nutrient loss—particularly nitrogen leaching and phosphorus runoff—remains a documented challenge for water quality and agronomic efficiency.

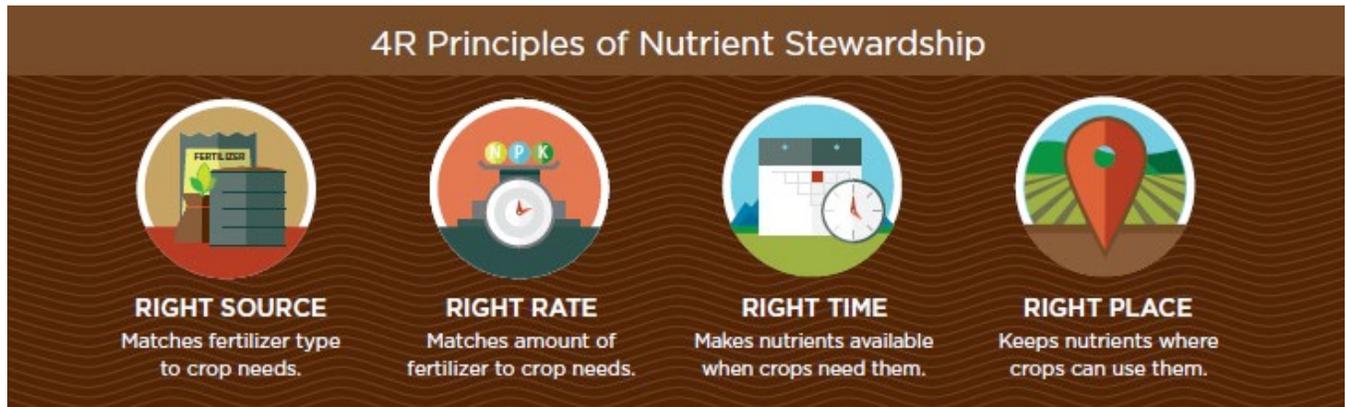
Adoption of advanced nutrient management practices is inconsistent across the state. Common barriers include the cost of precision equipment, uncertainty about yield and economic impacts, limited staff capacity among public conservation agencies and private retail, inconsistent industry buy-in, and the complexity of managing agronomic data. Because agricultural retailers already guide most fertilizer-related decisions and have the technical infrastructure to support precision management, they represent Minnesota's most immediate pathway to scaling nutrient stewardship within existing agricultural advisory networks. Retail advisers are increasingly equipped to provide site-specific recommendations, and research consistently shows they are among the most trusted and influential information sources on nitrogen management decisions, often surpassing public agencies and extension services (Houser et al., 2019; Upadhaya et al., 2023).

Taken together, these challenges and opportunities provide the rationale for evaluating how retailer-centered nutrient stewardship—supported by credentialing, verified documentation, and incentive alignment—can help Minnesota close its implementation gap and advance statewide water quality and soil health goals. Crop advisers, crop consultants, and crop retailers are essential partners to adoption of best management practices (BMPs) and conservation delivery in Minnesota.

Goals of an incentive-based strategy that activates agricultural retailers:

- Accelerated adoption of best management practices, especially practices related to nutrient management including nitrogen management related to nitrogen rate, timing, source, and placement.
- Consistent messaging about agronomic, economic, and environmental information related to farming practices.
- Expanded technical and financial capacity for conservation planning and certification.
- Direct assistance applying for funding for farmers to implement nutrient management strategies and coordination with conservation professionals.
- Enhanced customer service to farmer clients and improved water quality outcomes on agricultural lands.

The 4R principles provides a structured approach for improving nutrient management decisions across agricultural landscapes. Its core objective is to ensure that fertilizer applications support agronomic performance while minimizing environmental risk. The framework is built around four complementary principles and based on University of Minnesota fertilizer research and guidance:



These principles establish the technical foundation for evaluating nutrient management strategies throughout this report and serve as the basis for aligning public incentives with verified stewardship actions across Minnesota’s agricultural landscapes.

Literature Review and Research Results

This study evaluated 4R Nutrient Stewardship and nutrient management incentive programs across four dominant implementation models used in the United States and Canada. These models represent distinct theories of change, funding structures, evaluation mechanisms and roles for agricultural retailers and producers.

Program Model Types

Research highlighted four major categories of program delivery used by existing 4R and nutrient stewardship programs. Each model is identified below, along with a brief explanation and examples. Case studies from different states are included in the appendix with more details

Direct Contractor Model

The Direct Contractor Model describes programs in which public appropriations directly fund both farmer adoption and retailer delivery. Retailers are contracted to provide nutrient management planning, verification, and implementation at scale using their existing agronomic expertise and digital infrastructure, while producers receive a financial incentive payment. Ohio's Western Lake Erie Basin program, delivered through H2Ohio, is the most developed example. Governance is shared between the state's Nutrient Stewardship Council and the Ohio Agribusiness Association, which coordinate audits, certification standards, and retailer verification processes (Vollmer-Sanders et al., 2016; Walpole et al., 2023). The program requires significant annual legislative appropriations – approximately \$69 million per year for agriculture – supporting both farmer payments and retailer contracts, with reported enrollment of more than 1.85 million acres. Producer payments average \$10–\$15 per acre, and retailers receive an additional \$5–\$10 per acre for developing nutrient management plans and submitting verified as-applied data. Legislative appropriations support retailer payments, producer incentives, and statewide program administration, which requires significant recurring legislative appropriations.

Incentive Eligibility Model

The Incentive Eligibility Model is defined by programs where producers' eligibility to incentive payments depends on working with a certified or approved retailer. The governance of these programs is anchored in the certification protocols. Rather than paying retailers directly, this approach influences retailer behavior by tying access to state or federal funding to the use of credentialed advisers. Missouri's 4R/Center for Regenerative Agriculture framework exemplifies this approach. Retailer certification becomes the determinant of farmer eligibility for federal funding, with USDA program documentation identifying certified advisers as gatekeepers for program access. The program is supported by a five-year, \$25 million USDA grant that provides approximately \$5 million per year for producer cost-share payments, with farmers receiving about \$20 per acre (up to 500 acres per farmer). Initial funding for the Missouri model is in the form of federal grant dollars, which may limit the longevity of the model. Because the program is early in its implementation, publicly reported acreage estimates are not yet available, and performance measures focus on practice adoption (such as split N application or variable-rate technology) rather than quantified nutrient load reductions.

Pay-for-Performance Model

Pay-for-Performance programs compensate producers for a documented reduction in nutrients, rather than for adopting specific practices or adhering to standards. Verification requirements are higher than in other models, relying on retailer-generated agronomic data, modeled reductions, or measured field-level outcomes. Nebraska's NiRIA pilot illustrates this model. The Nebraska Corn Board is funding this pilot with a \$1 million cap for the 2026 program year, in which producers are paid solely for verified nitrogen reduction outcomes rather than practice adoption. Payments to producers range from \$10 to \$15 per acre, with higher incentive rates in priority wellhead protection zones. The governance of Nebraska's program is shared between the department of natural resources and local natural resources districts, which are regional units of local government with longstanding authority over groundwater quality. A three-year historical baseline is required for each field, and producers must verify a 40-pound-per-acre reduction in nitrogen use to qualify for payment. This outcome-based model offers high environmental accountability because payment is tied directly to verified reductions, but its verification requirements are more complex than other models because they require field-

level baselines and documented nutrient reductions rather than practice-based checks. The governance of Nebraska’s program is split across public and private sector entities to ensure defensible verification and integrity.

Regulatory Certainty Model

Regulatory Certainty programs provide non-monetary incentives—such as liability protection or presumption of compliance—to producers who adopt approved practices and complete verification protocols. Michigan’s Agricultural Environmental Assurance Program (MAEAP) and Florida’s Agricultural Best Management Practices (BMP) Program are key examples. These programs are typically governed by state agricultural agencies and funded through a combination of legislative appropriations and, in some states, fertilizer fee revenue, and provide producers with regulatory assurance once a series of best management standards, recordkeeping requirements and verification steps are met. Many of these models also convey compliance publicly with signage or other visual indicators of participation on the farm. MAEAP invests approximately \$11–\$12 million per year, supported by both general fund dollars and fertilizer fees, and has verified over 144,000 acres annually in recent years.

Operational Comparison Matrix

This matrix provides a side-by-side evaluation of four state-level program models, comparing their administrative structure, verification approach, staffing burden, and estimated annual costs. It serves as a quick reference for decision-makers to understand trade-offs between scalability, cost-efficiency, and verification rigor. This comparison is supported by case studies included in Appendix A.

By consolidating key attributes — such as who administers the program, verification method, administrative burden, and cost estimates — the matrix highlights how different models balance resource intensity with environmental accountability. For example, tech-enabled systems like Ohio’s Direct Contractor Model minimize administrative overhead, while site-visit-based programs like Michigan’s Regulatory Certainty Model offer strong compliance assurance but face scalability challenges.

This comparative view aligns with the four models described in the preceding section and provides the foundation for the analysis that follows.

Program	Model type	Who Administers?	Verification Method	Admin. Burden	Est. Annual Cost
Ohio (H2Ohio)	Direct Contractor	ODA + SWCD	Software (MyFarms)	Low (Automated checks)	~\$69M (Ag only)
Missouri (CRCL)	Gatekeeper (Incentive Eligibility)	MFCB + Univ.	3rd Party Audit	Medium (Auditor cost)	~\$5M (Grant)

Program	Model type	Who Administers?	Verification Method	Admin. Burden	Est. Annual Cost
Michigan (MAEAP)	Regulatory Certainty	MDARD	Site Visits	High (Technician time)	~\$11M
Nebraska (NiRIA)	Pay-for- Performance	NRDs	Baseline Audit	High (Baselines)	~\$1M (Pilot)

Review of Scientific Evidence Across Programs

Analysis across regional scientific assessments, national retailer studies, and multiple state nutrient management programs indicate that farmers are utilizing multiple sources of information for nutrient management decisions, but that the most common source of N application information are fertilizer suppliers. Ensuring these suppliers provide recommendations based on scientific efficacy, a viable service-based business model, and an enabling regulatory structure is critical to producer and supplier success. When these elements align, adoption and verification accelerate; when they do not, implementation stalls (Houser, 2019; Fixen, 2020; Vollmer-Sanders et al., 2016; Upadhaya et al., 2023).

Scientific Consensus: Effectiveness, Stackability, and Operational Fit

Upper Midwest synthesis work shows that the practices retailers already deliver—especially nutrient rate, timing, source and placement aligned with the 4Rs—consistently reduce nutrient losses and, importantly, are highly stackable (Christianson et al., 2018; Christianson, Souza, and Rosen, 2025; MPCA, 2026). They also may be the most readily integrated into current production systems. Cover crops and reduced tillage (services already offered by some ag retailers) provide additional benefits but require more operational change; perennial systems, while highly effective, are the least scalable.

Cost-Effectiveness: Maximizing Nutrient Reduction Per Dollar

Looking solely at the cost-benefit of practices capacity for nutrient reduction, in-field nutrient management is among the most cost-effective interventions, often producing net savings when baseline nitrogen rates exceed agronomic need (Christianson et al., 2018). Other conservation practices may provide multiple benefits, and are ideal when stacked with other practices, but cover crop incentives can cost \$70– \$130 per acre per year, bioreactors and drainage water management can be cost-effective per pound of nutrient reduced but are limited by siting needs, and perennial systems yield large reductions but are among the least cost-effective annually and most difficult to scale (Christianson et al., 2018).

Take home message: Minnesota can maximize water quality return on investment by anchoring program design in retailer-delivered 4R practices as the first tier, then layering additional practices where site conditions warrant. This further achieves direct coordination with the Minnesota Agricultural Water Quality Certification Program (MAWQCP), as cited in the legislative language, where MAWQCP requires 4R BMP adoption, but

additionally risk assesses the entire farming operation for site-specific mitigations to address any other resource concerns.

Participation, Awareness, and Behavioral Drivers

Studies consistently show fertilizer suppliers and agricultural retailers are the primary information source for nutrient decisions across the Midwest—more influential than extension or government sources (Houser et al., 2019; Upadhaya et al., 2023).

Adoption is strongly driven by:

- Locally relevant return on investment (ROI) evidence
- Peer examples
- Perception of self-efficacy in reducing nutrient losses
- Confidence in adviser recommendations (Moody, 2018; Upadhaya et al., 2023)

Retailer Business Model and Capacity

Two national studies—*Ag Retail in Transition* and *Growing for the Future*—document a shift toward service-based, data-driven agronomy. Traditional product margin models are declining due to consolidation and trends of increased costs and market volatility; retailers increasingly rely on:

- Nutrient modeling and planning services
- Data stewardship
- Digital recordkeeping
- Verification support
- Technical assistance for certification and cost-share

This work is time-intensive, involving nearly continuous contact, detailed documentation, and additional administrative support which leads to advisors serving fewer growers per full-time equivalent. These capacity constraints help explain why advisory labor often becomes a limiting factor in delivering additional nutrient management support.

Overall, the evolving retailer business model and increasing reliance on service-based agronomy highlight both the opportunity and the constraints facing Minnesota’s nutrient stewardship efforts. Retailer capacity – rather than scientific uncertainty – remains a key limiting factor in scaling verified nutrient management.

Discussion

Applicability of Findings to Minnesota’s Context

Minnesota has a strong foundation in the funding pools and guiding frameworks – including: the Nutrient Reduction Strategy, Minnesota Agricultural Water Quality Certification Program and the One Watershed, One Plan program – that collectively shape statewide nutrient management expectations. While these efforts

provide essential oversight and direction, they rely on advisory and implementation capacity that is uneven across the state.

Agricultural retailers already influence the majority of fertilizer-related decisions and maintain the digital infrastructure, field-level documentation, and operational presence required to deliver verified nutrient management at scale. As a result, aligning program design with the point where nutrient decisions are actually made allows Minnesota to maintain rigorous standards while shifting routine plan preparation, data collection, and first-line verification to credentialed private advisors.

A retailer-centered approach does not replace public roles. Agencies continue to set standards, accredit providers, target priority areas, support structural practices, and maintain compliance authority. Local governments, particularly SWCDs, remain the backbone of conservation practice delivery. Integrating retailers complements existing public capacity by expanding the state’s ability to reach more acres with consistent, technically sound nutrient management guidance. This division of labor reflects a “Minnesota fit”: public oversight for public outcomes, and private delivery for annual agronomy at scale.

Strategic Goals for Retailer Integration

Expanding Minnesota’s nutrient management capacity requires empowering agricultural retailers to shift from a traditional, product-driven model to one that emphasizes service-oriented agronomy. The following strategic goals provide direction for how the state can integrate retailers into its long-term nutrient stewardship architecture:

- Strengthening advisory capacity by leveraging existing retail infrastructure and technology to deliver field-specific nutrient management across more acres than public agencies can reach independently.
- Establishing consistent standards so nutrient management plans are developed and verified according to transparent, technically sound, Minnesota-specific criteria, including alignment with University of Minnesota fertilizer guidance and regulatory expectations.
- Supporting economically viable service models that allow retailers to deliver planning, data stewardship, verification, and conservation services as part of a sustainable business model.
- Improving verification efficiency by streamlining documentation and data submission, reducing administrative burden for producers while improving accuracy and consistency of reported information.
- Aligning implementation with state goals, ensuring that retailer-delivered nutrient stewardship supports groundwater protection, nutrient reduction milestones, and long-term regulatory certainty for Minnesota producers.

Collectively, these goals provide the architecture for a scalable and durable conservation delivery system that uses retailer expertise to expand the reach and effectiveness of Minnesota’s existing programs.

Navigating Trade-Offs Between Scale and Rigor

The program models reviewed demonstrate that no single approach optimally balances scalability, verification rigor, administrative efficiency, and cost-effectiveness. Instead, each model offers distinct strengths relevant to Minnesota:

- The Direct Contractor model enables the state to compensate retailers directly for delivering verified nutrient-management services, aligning support with where annual agronomic decisions occur and ensuring high documentation quality.
- The Pay-for-Performance model delivers the highest accountability by paying only for measured or verified nutrient reductions but requires significantly more data, modeling, and verification labor and is harder to implement statewide.
- The Incentive Eligibility model scales rapidly because it ties access to state or federal funding to the use of certified advisors. Its verification is process-based, allowing broad adoption with relatively low administrative demand.

In practice, Minnesota will need to balance these trade-offs based on geography, groundwater vulnerability, and program goals. For example, Incentive Eligibility may be most effective for scaling nutrient management across general acreage, while Direct Contractor or Pay-for-Performance approaches may be better suited for vulnerable groundwater areas or critical hotspots where precision verification is essential.

Taken together, these trade-offs indicate that Minnesota is best served by a mixed-model strategy that leverages the strengths of each approach—broad participation through certification-based eligibility, targeted service payments where documented verification is needed, and outcome-based payments in select geographies where precision matters most. This synthesis establishes the rationale for the recommendations that follow and reflects the state’s diverse agricultural landscapes and program architecture.

Before turning to the specific recommendations, it is important to highlight the role of the Minnesota 4R Nutrient Stewardship Certification Program, which provides the standards, audit structure, and documentation framework that underpin several of the proposed delivery approaches. The certification program offers a ready mechanism for consistent nutrient recommendations, verified recordkeeping, and alignment with Minnesota-specific agronomic guidance and regulatory expectations. As such, it serves as a foundational platform for implementing the mixed-model strategy described in the preceding discussion.

Program Administration Considerations

Designing an incentive-based approach that integrates agricultural retailers into Minnesota’s nutrient stewardship system requires careful planning and consideration of program administration, long-term oversight, and the roles of state agencies, local partners, and private providers. While the program models reviewed in this report offer useful reference points, none provide a fully transferable or proven administrative structure for Minnesota’s long-term needs. Each model has been tested only in limited contexts and outside Minnesota, often with substantial external funding, and none has yet demonstrated a durable, scalable business model for ongoing technical service delivery.

Shared Responsibility Across State Agencies

Any future retailer-integrated program would require coordination among multiple state agencies—not solely the Minnesota Department of Agriculture. Depending on legislative direction, administrative roles could be distributed across agencies such as the MDA and the Board of Water and Soil Resources (BWSR) with additional support from the University of Minnesota Extension and soil and water conservation districts (SWCDs). This

approach aligns with Minnesota’s existing conservation delivery system and reduces the likelihood that a single agency would need to establish new administrative capacity independently.

Potential Administrative Pathways

Several administrative pathways could be considered, depending on program scope and legislative intent:

- State-administered oversight, in which agencies set standards, approve verifiers, and manage data systems, while retailers and third-party auditors provide technical services.
- Hybrid administration, in which roles are shared among agencies and watershed partnerships (e.g., One Watershed, One Plan) for geographically targeted implementation.
- Third-party administration, in which independent certifying bodies or contracted service providers manage verification, audits, and data collection under state-defined standards.

Each pathway carries different implications for staffing, oversight, data management, and regulatory alignment. No existing model reviewed in this study fully resolves these questions for long-term implementation in Minnesota.

Regulatory and Program Oversight Considerations

Expanding retailer roles raises important questions about how the state maintains program consistency, data integrity, accountability, and compliance with existing water quality frameworks. Agencies would need to determine:

- How verification roles are assigned and monitored,
- What data elements must be shared by retailers and in what format,
- Which state entities oversee data privacy and reporting,
- How to ensure equivalency with existing programs such as MAWQCP and the Nitrogen Fertilizer Management Plan,
- How to prevent duplication of effort for both producers and retailers.

These considerations underscore the need for clear expectations and defined governance prior to any program launch. They also highlight that additional funding—for state agencies collectively, rather than the MDA alone—would likely be needed to support data systems, standards development, training, and oversight functions.

Managing Scale and Uncertainty

Because retailer-integrated conservation delivery is still an emerging approach nationally, Minnesota may need to proceed incrementally. Early-stage pilots, targeted geographies, or phased implementation could help test feasibility, administrative frameworks, and long-term costs before scaling statewide. This stepwise approach also helps ensure the state maintains appropriate oversight and avoids creating systems that grow more quickly than their administrative backbone.

Overall, program administration will be a determining factor in whether any retailer-integrated nutrient stewardship effort achieves long-term durability, technical rigor, and public accountability. Future decisions will

need to consider shared agency roles, data management expectations, long-term funding stability, and mechanisms to ensure that verification and conservation outcomes remain credible as the program evolves.

Minnesota 4R Nutrient Stewardship Certification Program

The Minnesota 4R Nutrient Stewardship Certification Program provides the standards and verification structure that underpins several of the recommendations that follow. In 2020, the Minnesota Crop Production Retailers Association (MCPR) launched a 4R Nutrient Stewardship Certification Program for agricultural retailers. This approach provides a science-based framework for plant nutrition, sustained crop production, and reduced risk to the environment, while considering specific individual farms' needs. This program is overseen by a 4R Stewardship Council including representatives from ag industry, crop retailers, University of Minnesota, SWCDs, commodity groups, and a state agency.

The Minnesota 4R Nutrient Stewardship Certification Program operationalizes the 4R framework by providing a detailed set of Minnesota-specific, voluntary, third-party-audited standards for agricultural retailers, crop advisers and nutrient service providers. It ensures nutrient recommendations and fertilizer applications following the 4R principles using Minnesota-specific agronomic and regulatory guidance. The program aligns retailer practices with University of Minnesota fertilizer recommendations, NRCS 590 criteria, Minnesota fertilizer and manure rules, and state expectations related to nitrogen timing, phosphorus placement, and frozen-ground application. This program follows a two-year audit cycle, combining onsite and remote verification of 19 standards, and provides a foundation of the 4R principals that can be built upon.

Recommendations for an Incentive-Based Program for Agricultural Retailers in Minnesota

The following recommendations are based on a literature review, study of programs in the United States and Canada, and professional conversations and experience. They operationalize a mixed-model framework for Minnesota by applying certification-based eligibility, targeted service payments, and outcome-based incentives in ways that align with state programs, advisory capacity, and geographic priorities.

Recommendation 1: Establish a 4R Retailer Readiness and Innovation Fund

Minnesota should establish a Retailer Readiness and Innovation Fund to support the integration of 4R standards and conservation services within retail businesses. This fund would build the advisory and verification capacity necessary for retailers to support consistent, Minnesota-specific 4R nutrient stewardship at scale. The fund should operate as a 5-year initiative designed to reimburse Minnesota 4R Nutrient Stewardship Certification Program fees, audit costs, and staff time, ensuring uniformity and consistency in conservation delivery across retail businesses.

Using the existing Minnesota 4R Nutrient Stewardship Certification framework – established in 2020 and revised in 2024 – ensures that retailers adopt and maintain a consistent set of best management practices and nutrient standards audited by trained third-party verifiers.

The fund would support two core functions:

Reduce barriers to participation

- Reimburse retailers' certification fees
- Cover third-party audit costs
- Offset staff time required for annual verification
- Support uniform adoption of certified nutrient standards across participating retail locations

Expand nutrient management and verification capacity

- Technical assistance grants for hiring or training conservation-focused nutrient management personnel.
- Support retail-based recordkeeping and documentation for MAWQCP and other voluntary state programs.
- Strengthen internal retailer systems that contribute to consistent implementation of 4R standards and verified nutrient management plans.

This investment enhances the current delivery system by aligning private expertise with public goals and leverages existing infrastructure and agronomic expertise within agricultural retail, effectively expanding technical assistance capacity without expanding government staffing.

The fund could be supported through a combined approach in which:

- Legislative appropriations support verification and administrative functions.
- AFREC resources support education, research, and standards-related activities.
- Retailers pay only a nominal processing fee, ensuring accessibility while preserving the program's core public-benefit functions.

Recommendation 2: Implement Verification-as-a-Service to Monetize Data Stewardship

Minnesota should implement a Verification-as-a-Service model that compensates 4R certified agricultural retailers for the technical labor required to generate auditable nutrient management documentation. This model allows the state to rely on trained partners for high-quality record keeping and verification that supports existing programs—such as 4R Certification and the Minnesota Agricultural Water Quality Certification Program (MAWQCP)—ensuring accountability and documenting environmental benefits, rather than focusing solely on practice implementation. Verification may include field-specific records as-applied fertilizer maps, yield data, soil tests, and timing and placement documentation.

A tiered service structure is recommended to reflect increasing levels of verification rigor and technical expertise:

Basic services

- Assist producers with recordkeeping and program applications

- Generate as-applied maps and field-level inventories
- Support on-farm trials and provide nutrient rate, source, timing, and placement summaries aligned with University of Minnesota guidance

Mid-level services

- All basic services, plus facility assessments that verify current practices and identify recommended nutrient management improvements
- Collection of soil, irrigation water, or manure samples, when applicable
- Provide technical assistance to support improved nutrient management planning

Advanced services

- Offer services as a Technical Service Provider (TSP) including full nutrient, manure, and irrigation water management planning
- Provide comprehensive verification deliverables required under state programs

Payment Structure

A blended payment model should be used, recognizing both fixed and variable costs:

- A one-time onboarding fee (e.g., \$10 per acre) for digitizing historical records and establishing a verified baseline
- A maintenance fee (e.g., \$5 per acre) for ongoing documentation, updated prescriptions, and audit support

While a tiered fee structure offers a transparent mechanism for compensating retailers, it is not intended as a universal statewide payment model. Applied broadly across Minnesota cropland, costs would escalate rapidly. For this reason, per-acre payments should be targeted to priority geographies or early-stage pilots where verified documentation provides the greatest public benefit.

Funding Considerations

This recommendation could be supported through a combination of legislative appropriations and Clean Water Fund proposals to support verification and administrative oversight, and AFREC resources for training, research, field trials, and standards-related activities.

Long-Term Scalability

A durable funding model will require diversified support beyond per-acre payments. Public-private cost-sharing with agricultural retailers, supply chain partners, federal programs, and non-governmental organizations (NGOs) can sustain training, verification, and data management functions. Over time, Verification-as-a-Service will help retailers transition from a traditional product-driven business model to a service-oriented agronomic model, with revenue balanced between cost-share subsidies and client payments.

Retailer-Delivered Verification: Alignment with MAWQCP and Minnesota’s Existing Program Architecture

Minnesota’s experience with retailer-supported verification under the Minnesota Agricultural Water Quality Certification Program (MAWQCP) demonstrates that agricultural retailers are already capable of providing the types of services envisioned in both the Retailer Readiness & Innovation Fund and the Verification-as-a-Service model.

Through MAWQCP, several crop retailers have piloted agreements to assist producers with application support, documentation, and elements of the certification process. These pilots confirm that retailers can deliver consistent, auditable information that meets state program standards—provided they receive appropriate training, support, and clear expectations.

Retailer-delivered verification activities observed in MAWQCP include:

- Supporting producer applications and assembling certification files
- Generating as-applied maps, nutrient rate/source/timing/placement summaries, and field-level inventories
- Completing pest management checklists, tile drainage information, and conservation practice documentation
- Providing nutrient management plans aligned with University of Minnesota guidance
- Collecting soil, irrigation water, or manure samples where applicable
- Conducting full MAWQCP assessments at advanced training levels

These functions illustrate that retailers already possess the agronomic expertise, digital tools, and client relationships needed to generate high-quality, verifiable nutrient management data. They also highlight the operational barriers—staff capacity, training demands, and uncompensated time—that must be addressed for these services to scale statewide.

MAWQCP pilots therefore offer a practical proof-of-concept for the recommendations above. They show that Minnesota can expand verified nutrient management by investing in retailer capacity, compensating technical labor, and pairing private-sector advisory strengths with state program oversight. With structured support, retailers can help streamline verification, reduce administrative burden, and extend conservation delivery across more acres than public agencies can reach alone.

Recommendation 3: Harmonize Programs to Improve Efficiency and Regulatory Certainty

Minnesota can significantly improve efficiency, reduce administrative burden, and enhance producer experience by better integrating nutrient management and verification requirements across existing state programs. Aligning these systems ensures that retailer-generated, third-party-audited records—particularly those produced under 4R Certification and Verification-as-a-Service—can satisfy multiple program requirements without duplication.

Integration with the Minnesota Agricultural Water Quality Certification Program (MAWQCP)

Recognizing 4R Certification as a pre-verified module within MAWQCP would allow audited retailer records to satisfy the nutrient management component of certification, reducing redundant documentation, and accelerating enrollment. Completing a crosswalk between 4R Nutrient Stewardship standards and MAWQCP requirements will streamline enrollment for clients of 4R-certified retailers, improve consistency in nutrient management documentation, and strengthen verification across both programs.

Alignment with One Watershed, One Plan (1W1P)

Watershed partnerships could adopt a Direct Contractor model by issuing performance-based contracts to 4R-certified retailers. Retailers would be compensated per acre of verified nutrient management delivered, enabling watershed-scale implementation without overburdening local Soil and Water Conservation District (SWCD) staff. This approach increases delivery capacity while ensuring verified implementation of nutrient management actions prioritized in watershed plans.

Maximizing Soil Health and Climate Program Funding

Requiring verified nutrient management as a prerequisite for soil health or climate-related grants ensures that public dollars land on acres where nutrient balance supports soil function, productivity, and emissions-reduction goals. Aligning program requirements around verified nutrient management reduces fragmentation and strengthens the environmental return on investment.

Nitrogen Fertilizer Management Plan

Minnesota can strengthen long-term compliance with the Nitrogen Fertilizer Management Plan by aligning 4R Certification with existing voluntary expectations and supporting retailers who help growers meet nitrogen management requirements. Retailer-led verification can help demonstrate adoption of best management practices and alternative management tools in high nitrate townships, and public cost-share can be targeted to vulnerable groundwater areas to reinforce compliance and accelerate adoption.

Long-Term Support for a Durable 4R Nutrient Stewardship Certification Program

A harmonized program architecture requires stable funding for Minnesota's 4R Nutrient Stewardship Certification Program. Legislative appropriations will be needed. AFREC funds can support research, education, and standards-related activities, while retailers would continue to pay only a nominal processing fee. This model ensures accessibility while supporting the program's core public-benefit functions.

Recommendation 4: Build Technical Assistance and Verification Capacity Across the Delivery System

Expanding Minnesota's nutrient management capacity requires sustained investment in the people and partnerships that support conservation delivery. As retailer roles evolve toward service-oriented agronomy and verification responsibilities, Minnesota should strengthen technical assistance capacity through targeted

training, professional development, and strategic partnerships with conservation agencies, academic institutions, and local governments.

Building capacity across the delivery system will help ensure that retailers, certified crop advisers, conservation staff, and watershed partners have the skills, tools, and support needed to implement 4R Nutrient Stewardship, generate verifiable documentation, and meet the expectations of integrated state programs such as MAWQCP, 1W1P, and work in high nitrate townships. This recommendation provides the workforce foundation necessary for scaling the models described above and maintaining the rigor and consistency required for long-term nutrient management success.

Recommendation 5: Explore Piloting Required Certification in Priority Geographies

Minnesota should explore piloting required 4R Nutrient Stewardship Certification for agricultural retailers operating in priority geographies—particularly areas with vulnerable groundwater or other high-risk nutrient conditions identified through the Nitrogen Fertilizer Management Plan. These regions, representing roughly 13 percent of Minnesota cropland, offer a focused and high-value setting to test how retailer certification and verified nutrient management can accelerate adoption, improve documentation quality, and strengthen compliance with state nutrient management expectations.

A pilot would not introduce a new delivery model but would apply the two core recommendations outlined above—the Retailer Readiness & Innovation Fund and Verification-as-a-Service—in a targeted geography. Doing so would allow MDA to evaluate how investments in retailer capacity, standardized certification, and compensated verification perform when deployed together in areas where improved nutrient management is most critical.

A pilot could also test which implementation pathway works best in Minnesota’s regulatory and program context, including potential use of Direct Contractor approaches, incentive-linked eligibility, or outcome-based (pay-for-performance) payments where appropriate. Rather than re-evaluating these models statewide, a targeted pilot would allow the MDA to examine their feasibility, cost, verification rigor, and producer response under real-world conditions.

Piloting required 4R certification in priority geographies would provide insight into:

- retailer readiness and training needs,
- the scalability of Verification-as-a Service model,
- impacts on producer participation and documentation quality,
- opportunities for integration with MAWQCP and work in high nitrate groundwater areas, and
- the operational and fiscal implications of expanding certification requirements more broadly.

At present, the MDA is not positioned to implement any pilot requiring retailer certification without a dedicated funding source. Successful pilot development would therefore depend on securing resources to support retailer training, certification costs, verification labor, and any associated producer incentives.

Taken together, these recommendations illustrate how Minnesota can strengthen its nutrient management delivery system by aligning retailer capacity, verified documentation, and existing state programs. Retailer digital platforms standardize record-keeping and generate consistent, auditable datasets. These systems reduce paper

record errors, support third-party audits, and allow standard practices to be tracked and contracts to pay for deliverables and actions completed. By credentialing advisors and compensating professional verification, Minnesota can leverage the existing retail infrastructure to achieve scalable, accountable, and cost-effective water quality improvements.

Conclusions

Minnesota has a strong scientific and regulatory foundation for nutrient stewardship, but scaling verified 4R adoption will require strengthening the delivery systems that support annual nutrient decisions. The research reviewed in this report shows that agricultural retailers, conservation staff, and state agencies each play important but distinct roles in advancing consistent, science-based nutrient recommendations. Retailers remain the primary source of fertilizer guidance for most Minnesota producers, and their existing infrastructure offers a clear opportunity to expand verified nutrient management when paired with coordinated standards, training, and oversight.

No single program model evaluated in this study provides a perfect or fully transferable administrative template for Minnesota. Each approach—Direct Contractor, Incentive Eligibility, Pay-for-Performance, and Regulatory Certainty—has been implemented only in limited contexts, is supported by different funding structures, and carries trade-offs between scalability, verification rigor, and administrative burden. Importantly, none of the models has yet demonstrated a durable, long-term business model for technical service delivery in the agricultural retail sector, and each requires substantial ongoing oversight and funding to maintain. These realities underscore the need for strategic, phased implementation should Minnesota pursue a retailer-integrated framework.

Given these considerations, Minnesota may benefit from incremental, pilot-based testing—particularly in high-priority geographies identified through the Nitrogen Fertilizer Management Plan or where MAWQCP enrollment is already strong. Pilots would allow the state to assess feasibility, cost, retailer readiness, data-sharing expectations, and administrative needs under real-world conditions before considering expansion.

Overall, the findings in this report support exploring a mixed-model framework for Minnesota that blends certification-based eligibility, service-based payments for verified documentation, and outcome-based incentives in select geographies. The success of any future approach will depend on clear administrative design, stable funding, shared interagency roles, transparent data expectations, and incremental testing to ensure that the system is both technically credible and administratively manageable.

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Appendix A

Minnesota 4R Nutrient Stewardship Certification Program Overview

mcpr-cca.org/minnesota-4r-nutrient-stewardship-certification-program/

The Minnesota 4R Nutrient Stewardship Certification Program is a voluntary, third-party-audited standard for agricultural retailers, crop advisers, and nutrient service providers. It ensures that nutrient recommendations and fertilizer applications follow the “Right Source, Right Rate, Right Time, Right Place” principles using Minnesota-specific agronomic and regulatory guidance. The program aligns retailer practices with University of Minnesota fertilizer recommendations, NRCS 590 criteria, Minnesota fertilizer and manure rules, and state expectations related to nitrogen timing, phosphorus placement, and frozen-ground application. Certification follows a two-year audit cycle, combining on-site and remote verification of 19 standards.

Training Standards

1. Staff performing soil sampling, making nutrient recommendations, or applying fertilizer receive initial training in 4R principles; certified providers offer annual 4R education to growers.
2. Staff who make nutrient recommendations complete 4R/soil/nutrient training at least every three years (CCA, CPAg, CNMP credentials qualify).
3. Soil sampling personnel receive training to ensure representative and accurate sampling; full compliance required by Year 3 of certification.

Documentation & Recordkeeping Standards

1. Certified retailers keep current copies of all relevant nutrient-related laws and regulations.
2. Certified professionals maintain active credentials (CCA, CPAg, CNMP, etc.).
3. Nutrient application equipment is calibrated at least annually.
4. Nutrients are applied only according to a written recommendation issued within the prior two years; application rates must not exceed recommendations.
5. Four years of field-level records are maintained and reviewed annually with growers.
6. Soil tests are completed at least every four years using MDA-certified labs and Minnesota sampling guidelines.
7. Yield goals are documented and supported by evidence such as past yield history or agronomic data.
8. Recommendations follow region-specific BMPs and are signed by a certified professional and acknowledged by the grower.

9. All nutrient sources—manure, biosolids, starter fertilizer, crop credits—are fully accounted for in recommendations.
10. Manure nutrient analyses follow University of Minnesota guidance and are conducted using MDA-certified lab methods when manure is applied.

Nutrient Recommendation Standards

1. Advisors discuss nitrogen BMPs with growers, including fall application risks, inhibitors, and timing strategies.
2. Recommendations for urea, UAN, and anhydrous ammonia follow Minnesota BMPs for timing, soil temperature, and incorporation.
3. Advisors provide phosphorus BMP guidance including placement and variable-rate technologies.
4. Nitrogen and phosphorus are not recommended or applied on frozen ground.
5. Phosphorus application does not exceed University of Minnesota guidelines and is limited to crop needs for the next two years.
6. Recommendations that deviate from university guidance require adaptive management documentation demonstrating equal or improved yield without increasing risk to water quality.