

# Final Abstract

Final Report Approved on October 5, 2026

## M.L. 2022 Project Abstract

For the Period Ending June 30, 2025

**Project Title:** Scaling a Market-Driven Water-Quality Solution for Row-Crop Farming

**Project Manager:** Nicholas Jordan

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**Funding Source:**

**Fiscal Year:**

**Legal Citation:** M.L. 2022, Chp. 94, Sec. 2, Subd. 04n

**Appropriation Amount:** \$476,000

**Amount Spent:** \$330,294

**Amount Remaining:** \$145,706

### Sound bite of Project Outcomes and Results

A new strategy is emerging for improving soil and water conservation: cool-season and winter grains followed by the winter-hardy crop camelina, enabling Minnesota farmers to grow three crops in two years, while better protecting soil, water, and wildlife. We built knowledge and experience needed to apply this new conservation strategy.

### Summary of Project and Outcomes

This project addressed critical water conservation and environmental stewardship challenges in Minnesota row-crop agriculture. Standard cropping systems often leave bare fields vulnerable to severe soil erosion, nutrient runoff, and persistent pest issues. To address this, the project aimed to enhance continuous living cover through novel multi-crop sequences built around winter camelina, an emerging winter-hardy oilseed crop; these sequences improve soil health, support wildlife, and generate high-value commodities. To advance this crop, researchers and agricultural partners collaborated with farmers in demonstration testing across several Minnesota watersheds. Activities engaged farmers in educational activities and field management, produced large quantities of camelina seed to refine industrial storage, processing, and manufacturing techniques, and advanced financial payment systems for environmental benefits (see EECO Implementation Program Forever Green Overview2026 in attachments). Cost/risk-share support covered 63 pilot

acres across four farms (see 2022-046 Tabulation of Farms Supported by This ENRTF Grant in attachments and related Explanatory Notes); 122 pilot acres on these farms and Farm F received ecosystem services payments. Agronomic support was provided to 978.5 additional pilot acres. Demonstration fields substantially advanced farmer experiences with winter camelina crop sequences, as documented in attached reports: Piloting of Winter Camelina: Lessons and Implications for Further Scaling, and Winter Camelina Piloting Report. Despite adverse weather, variable yields, and economic hurdles, state support and promising relay-cropping results encouraged regional growers to double seeded acreage for the 2024–2025 season. Additionally, the project advanced understanding of market opportunities, risks, and policy levers to scale winter camelina production, providing technical evaluations of seed, oil, meal, and straw (see Winter Camelina—Developing Sustainable Supply Chains and Enhancing Market Viability for Minnesota Producers in attachments). Ultimately, the project successfully reduced a range of deployment barriers to advance development of novel crop sequences involving winter camelina as a market-driven pathway to clean water.

### **Project Results Use and Dissemination**

We did a wide range of dissemination activities, including webinars, field days, public informational and discussion meetings, and descriptions of the piloting program and associated financing and technical assistance opportunities. Most dissemination items are in attachments, including: Winter Camelina Harvest Techniques Field Day; SE MN Winter Camelina Growers In-person Meeting; 2025 Cannon River Watershed Farmer Breakfast; Continuous Living Cover Crops Take Flight: Great River Greening Helps Pilot First Batch of Sustainable Aviation Fuel; UMN Forever Green Grower Meeting 1/30/23; Pilot program to grow winter camelina in the Cannon, Sauk, and Middle Minnesota River Watershed; WC LCCMR 2pager Outreach.



## Environment and Natural Resources Trust Fund

M.L. 2022 Approved Final Report

### General Information

**Date:** October 9, 2026

**ID Number:** 2022-046

**Staff Lead:** Lisa Bigaouette

**Project Title:** Scaling a Market-Driven Water-Quality Solution for Row-Crop Farming

**Project Budget:** \$476,000

### Project Manager Information

**Name:** Nicholas Jordan

**Organization:** U of MN - College of Food, Agricultural and Natural Resource Sciences

**Office Telephone:** (612) 625-3754

**Email:** jorda020@umn.edu

**Web Address:** <https://cfans.umn.edu/>

### Project Reporting

**Final Report Approved:** October 5, 2026

**Reporting Status:** Project Completed & Additional Update Approved

**Date of Last Action:** October 5, 2026

**Project Completion:** June 30, 2025

### Legal Information

**Legal Citation:** M.L. 2022, Chp. 94, Sec. 2, Subd. 04n

**Appropriation Language:** \$476,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota to work with farmers to accelerate adoption of grain-camelina rotations in targeted watersheds as a scalable and market-driven way to enhance stewardship of soil, water, and wildlife.

**Appropriation End Date:** June 30, 2025

## Narrative

**Project Summary:** Adding a year of grain/winter camelina production to Minnesota crop rotations provides a highly scalable market-driven clean-water solution; our pilot supply chains will accelerate wide adoption of this solution.

**Describe the opportunity or problem your proposal seeks to address. Include any relevant background information.**

A new option is emerging for improving water conservation in Minnesota row-crop agriculture: production of cool-season and winter grains (such as hybrid winter rye, oat, or pea), followed by the winter-hardy crop camelina. These pairs of crops (a grain, and camelina) can be grown between corn and soybean years of the common corn/soybean crop rotation, enabling farmers to grow three crops in two years while significantly enhancing stewardship of soil, water, and wildlife. The grain-camelina system safeguards water by providing continuous living cover of soil for most of the year, thereby substantially reducing soil erosion, runoff of rainfall, and losses of nutrients. In addition to safeguarding water, grain-camelina systems produce abundant yields of high-value commodities, for which large markets are beginning to emerge. Therefore, enabling Minnesota farmers to add a grain-camelina rotation year to row-crop crop production systems will create a highly scalable market-driven pathway to clean water. The grain-camelina system also provides habitat for pollinators and wildlife, and produces additional value for farmers by improving soil health and management of crop pests (including herbicide-resistant weeds). There is high potential to realize many environmental benefits from Minnesota agriculture by wide adoption of the grain-camelina system.

**What is your proposed solution to the problem or opportunity discussed above? Introduce us to the work you are seeking funding to do. You will be asked to expand on this proposed solution in Activities & Milestones.**

To realize the potential of grain-camelina production as a market-driven water-conservation strategy for row-crop farms, we must eliminate remaining barriers to wide deployment across Minnesota. The crucial next step is extensive watershed-scale pilot-testing of grain-camelina systems in three Minnesota watersheds with highly-valued water resources, including source water protection areas and trout streams. This work will build on promising results from a current LCCMR project that is testing camelina in much smaller plots, and on other successful proof-of-concept efforts. This extensive pilot-scale implementation is critically needed to activate market forces that can drive wide adoption of grain-camelina systems. Specifically, our piloting work will engage many farmers in building experience in growing the grain-camelina system across Minnesota. Our piloting work will also produce large quantities of camelina seed that are critically needed to develop storage, processing, and manufacturing methods that are key to creating strong markets for camelina. In addition, emerging markets for environmental benefits produced on farms can pay farmers for benefits produced by the grain/camelina system. Pilot implementation will help advance these payment systems. Together, environmental-benefit payments and end-use markets will support wide adoption of the grain/camelina system, providing major conservation benefits of value to all Minnesotans.

**What are the specific project outcomes as they relate to the public purpose of protection, conservation, preservation, and enhancement of the state's natural resources?**

Our key outcome is scaling up a market-driven water-quality solution for row-crop farming by piloting supply chains for the grain-camelina production system, through pilot implementation in three watersheds. Supply chains link farmers to markets for new crops, such as camelina, that can deliver major environmental benefits from row-crop farms. To achieve these benefits for the public, farmers must have markets, and markets cannot develop without supply chains. Specifically, our project will engage many farmers in piloting grain/camelina production, and produce large quantities of camelina grain that are critically needed to pilot storage, transport, and processing links in supply chains.

## Project Location

**What is the best scale for describing where your work will take place?**

Region(s): SE, Central,

**What is the best scale to describe the area impacted by your work?**

Region(s): SW, SE, NW, Central,

**When will the work impact occur?**

During the Project and In the Future

## Activities and Milestones

### Activity 1: Pilot Extended Rotation on Watershed Scale: Planning and Implementation.

**Activity Budget:** \$341,231

**Activity Description:**

Support groups of farmers in three watersheds or environs to test an extended crop rotation that adds a grain/camelina year to corn/soybean crop rotations. Watersheds include the Middle Minnesota, Cannon River, and Sauk River. We will engage with farmers in planning and implementing pilot testing of the rotation on their farms, evaluating results of pilot grain/camelina plantings, and implementing additional pilot plantings as warranted. Project coordinators in each watershed will organize these activities; technical assistance will be provided by UMN personnel. Coordinator staff will hold group and individual meetings with farmers to explore options for implementing the rotation. Interested farmers will collaborate to plan and execute strategically-placed implementation of the rotation in each watershed, to efficiently protect water while also enhancing crop production. We aim to plant and harvest 500 acres of grain/camelina during the project, working with 3-5 farmers per watershed (approximately 160-170 acres per watershed, staged over the three years of the project. Production and post-harvest handling will be supported by partial cost-share and derisking payments. Evaluation of crop performance will be done by observing soil protection, yield, and profit; farmers and project coordinators will make these observations; results will be widely shared.

**Activity Milestones:**

| Description                                                                                                   | Approximate Completion Date |
|---------------------------------------------------------------------------------------------------------------|-----------------------------|
| Recruit participating farm operations                                                                         | June 30, 2023               |
| Develop on-farm implementation plans for grain/camelina in 9-15 total farm operations across three watersheds | August 31, 2023             |
| Implement production plans in 9-15 total farm operations across three watersheds                              | June 30, 2024               |
| Evaluation of performance of piloted grain/camelina cropping systems                                          | May 31, 2025                |

### Activity 2: Supply-chain Development & Support

**Activity Budget:** \$29,095

**Activity Description:**

Much progress has now been made in formation and facilitation of a network focused on piloting grain/camelina cropping systems and associated supply-chains. This network includes end-use and intermediary firms, watershed groups, water-management agencies, the Forever Green Partnership and Commercialization Team, and others. Therefore, supply-chain development will focus on supporting farmers in piloting grain/camelina cropping systems, and accessing markets for grain from these cropping systems. Specifically, effort in this activity will focus on assisting farmers in accessing risk/cost-share payments, from project funds as noted above, and in accessing markets for grain from these pilot acres, thereby building a solid foundation for further supply-chain development and scaling. Specifically, effort in this activity will focus on assisting farmers in accessing risk/cost-share payments for production and for post-harvest handling required to access markets for grain from these pilot acres, supported by project funds. Experience has shown that assistance requires significant dedicated "hands-on" support. Contracts with farmers for production and post-harvest handling will be developed and managed by University of Minnesota personnel.

**Activity Milestones:**

| Description                                                            | Approximate Completion Date |
|------------------------------------------------------------------------|-----------------------------|
| Establish contracts for production cost-share with 3-5 farm operations | June 30, 2023               |

|                                                                                    |                   |
|------------------------------------------------------------------------------------|-------------------|
| Establish contracts for production cost-share with 9-15 farm operations            | June 30, 2024     |
| Establish contracts for post-harvest handling cost share with 9-15 farm operations | December 31, 2024 |

### Activity 3: Develop Crop Protocols for Ecosystem Service Market Development

**Activity Budget:** \$30,000

#### Activity Description:

The project will collaborate with the Ecosystem Service Market Consortium (ESMC) to its current pilot project in the Sauk River Watershed. The ESMC (represented by Minnesota by project partner The Nature Conservancy in Minnesota) is a major national project prototyping scalable methods for paying farmers for producing environmental benefits (i.e., ecosystem services). The ESMC protocols for establishing marketable water-quality and flow credits for farmers will be adapted for cool-season grains and camelina in the cropping system, and then administered on a pilot scale on acreage in the grain/camelina system in the Sauk River watershed. If the ESMC protocols are accurate, the ESMC marketplace will provide a scalable pathway for farmers to capitalize on the increase in ecosystem services provided by their cropping systems.

#### Activity Milestones:

| Description                                                                                                   | Approximate Completion Date |
|---------------------------------------------------------------------------------------------------------------|-----------------------------|
| Adapt ESMC protocols for establishing marketable water-quality and flow credits for the grain-camelina system | December 31, 2023           |
| Complete verification test of ESMC protocols for grain/camelina system in row-crop rotations                  | January 31, 2025            |

### Activity 4: Support End-Use Entrepreneurs

**Activity Budget:** \$75,674

#### Activity Description:

Work on this activity will support the development of sustainable supply chains for winter camelina through technical assistance, commercialization support, outreach, and development of ecosystem services models that enhance market-viability for Minnesota camelina producers. Technical work will focus on assessment of winter camelina uses and provide support for businesses in development of camelina-based food, feed, and/or biobased products. Results from this work will guide the development of pilot scale projects with private businesses to commercialize winter camelina-based products.

#### Activity Milestones:

| Description                                                                                                            | Approximate Completion Date |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Identify and assess potential uses of camelina-based food, feed, and/or biobased products.                             | December 31, 2024           |
| Build network connections to advance markets and support continued development of supply chains for camelina           | March 31, 2025              |
| Provide technical assistance to Minnesota businesses in the development of camelina-based products                     | June 30, 2025               |
| Collaborate in development of ecosystem services models that enhance market-viability for Minnesota camelina producers | June 30, 2025               |
| Disseminate information developed during project through forums, publications, and other targeted outreach activities  | June 30, 2025               |

## Project Partners and Collaborators

| Name                                                                                    | Organization                                                       | Role                                                                                                                                                                                                                                                                            | Receiving Funds |
|-----------------------------------------------------------------------------------------|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Brad Gordon, Program Manager – Southern MN                                              | Great River Greening                                               | Watershed planning and coordination in Rogers Creek, via individual and group meetings with interested farmers, and support for watershed planning in Rogers Creek and Rice Creek, by modeling agricultural practice impacts in the target watersheds with PTMApp and ACPF.     | Yes             |
| Kristi Pursell, Executive Director                                                      | Clean River Partners (formerly Cannon River Watershed Partnership) | Watershed planning and coordination in Rice Creek, via individual and group meetings with interested farmers, and water-quality and flow monitoring in Rice Creek.                                                                                                              | Yes             |
| Tom Raymond, Director of Environmental Sustainability                                   | Hormel Foods Corporation                                           | Participate in supply chain development for grain/camelina systems.                                                                                                                                                                                                             | No              |
| Tai Ullmann, Sustainability Manager, Global Edible Oilseeds                             | Cargill, Inc.                                                      | Participate in supply chain development for grain/camelina systems.                                                                                                                                                                                                             | No              |
| Leif Fixen, Agriculture Strategy Manager                                                | The Nature Conservancy                                             | Watershed planning and coordination in Sauk River Ecosystem Service Market Consortium Minnesota pilot project, via individual and group meetings with interested farmers; other integrate grain/camelina into the Sauk River Ecosystem Service Market Consortium pilot project. | Yes             |
| Michael Stutelberg, Scientist, Chemistry                                                | Agricultural Research and Utilization Institute                    | Support end-use entrepreneurs developing products from grain/camelina system, through a range of activities as detailed in Activity 4                                                                                                                                           | Yes             |
| Stefani Millie Grant, Senior Manager, External Affairs & Sustainability                 | Unilever North America                                             | Participate in supply chain development for grain/camelina systems.                                                                                                                                                                                                             | No              |
| Samantha Wells, Associate Professor, Agronomy & Plant Genetics, University of Minnesota | University of Minnesota                                            | Technical advice and support for on-farm pilot production pilot of grain-camelina systems                                                                                                                                                                                       | Yes             |
| Jack Grushcow, President and CEO                                                        | Smart Earth Camelina Corp.                                         | Participate in supply/value chain co-design for grain/camelina systems.                                                                                                                                                                                                         | No              |
| Dennis J. Fuchs, Administrator                                                          | Stearns County Soil and Water Conservation District                | Watershed planning and coordination in Sauk River Ecosystem Service Market Consortium Minnesota pilot project, via individual and group meetings with interested farmers.                                                                                                       | Yes             |
| JoAnne Berkenkamp,                                                                      | MBOLD                                                              | Participate in supply chain development for grain/camelina systems                                                                                                                                                                                                              | No              |

|                   |                         |                          |     |
|-------------------|-------------------------|--------------------------|-----|
| Managing Director |                         |                          |     |
| Constance Carlson | University of Minnesota | Supply-chain development | Yes |
| Colin Cureton     | University of Minnesota | Supply-chain development | Yes |

## Dissemination

**Describe your plans for dissemination, presentation, documentation, or sharing of data, results, samples, physical collections, and other products and how they will follow ENRTF Acknowledgement Requirements and Guidelines.**

Project activities and outcomes will be disseminated by a wide range of activities by project partners, including public presentations, earned media content, websites of project partners, and field days and other events. Support from the Environment and Natural Resources Trust Fund will be acknowledged through use of the trust fund logo or attribution language on project print and electronic media, publications, signage, and other communications per the ENRTF Acknowledgment Guidelines

## Long-Term Implementation and Funding

**Describe how the results will be implemented and how any ongoing effort will be funded. If not already addressed as part of the project, how will findings, results, and products developed be implemented after project completion? If additional work is needed, how will this work be funded?**

If we are successful, our key outcome—a grain-camelina option for Minnesota row-crop farms—will be rapidly adopted in row-crop farming across Minnesota. There is very strong market interest in sustainably-sourced grains, oils, and protein produced from the grain-camelina system, as reflected by our many private-sector partners. By building prototype supply/value chains, project partners—from farmers to corporations such as Cargill, Unilever, and Hormel—will “work out the kinks” in their systems, setting the stage for wide adoption of this market-driven water-quality solution, resulting in major benefits for water, soil, and wildlife, and for all Minnesotans.

## Other ENRTF Appropriations Awarded in the Last Six Years

| Name                                                                    | Appropriation                                  | Amount Awarded |
|-------------------------------------------------------------------------|------------------------------------------------|----------------|
| Farmer-Led Expansion of Alfalfa Production to Increase Water Protection | M.L. 2018, Chp. 214, Art. 4, Sec. 2, Subd. 04i | \$500,000      |

## Budget Summary

| Category / Name                                                    | Subcategory or Type | Description                                                                                                                                                                                                                                                                                                    | Purpose | Gen. Ineligible | % Benefits | # FTE | Classified Staff? | \$ Amount       | \$ Amount Spent | \$ Amount Remaining |
|--------------------------------------------------------------------|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----------------|------------|-------|-------------------|-----------------|-----------------|---------------------|
| <b>Personnel</b>                                                   |                     |                                                                                                                                                                                                                                                                                                                |         |                 |            |       |                   |                 |                 |                     |
| Technical assistance support for farmers                           |                     | Develop, coordinate, and deliver custom learning opportunities for individual farmers, groups, and others engaged in integrated grain/camelina in pilot-project region.                                                                                                                                        |         |                 | 32%        | 0.36  |                   | \$37,308        | -               | -                   |
| Supply-chain Organizer                                             |                     | Organize and facilitate planning and implementation of supply-chain development for grain-camelina production system                                                                                                                                                                                           |         |                 | 32%        | 0.21  |                   | \$25,000        | -               | -                   |
|                                                                    |                     |                                                                                                                                                                                                                                                                                                                |         |                 |            |       | <b>Sub Total</b>  | <b>\$62,308</b> | <b>\$62,308</b> | -                   |
| <b>Contracts and Services</b>                                      |                     |                                                                                                                                                                                                                                                                                                                |         |                 |            |       |                   |                 |                 |                     |
| Great River Greening                                               | Subaward            | Support farmers in Roger's Creek watershed (Nicollet Co.) to design and test an extended crop rotation using the grain/camelina system in watershed farms, engaging at least 5 watershed farms; collaborate locally on outreach.                                                                               |         |                 |            | 0.42  |                   | \$57,100        | \$57,097        | \$3                 |
| Clean River Partners (formerly Cannon River Watershed Partnership) | Subaward            | Support farmers in Rice Creek watershed (Rice Co.) to design and test an extended crop rotation using the grain/camelina system in watershed farms, engaging at least 5 watershed farms; collaborate locally on outreach.                                                                                      |         |                 |            | 0.39  |                   | \$64,804        | \$64,804        | -                   |
| Agricultural Resources Utilization Institute                       | Subaward            | Establish opportunities and investigate new camelina markets with private businesses; pilot R&D projects for food and non-food uses; organize annual educational field days; organize events for dissemination of market and supply-chain opportunities for grain/camelina system; travel (technical, business |         |                 |            | 0.51  |                   | \$70,485        | \$70,323        | \$162               |

|                                       |                    |                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                    |   |  |      |                  |                  |                  |                 |
|---------------------------------------|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|---|--|------|------------------|------------------|------------------|-----------------|
|                                       |                    | development, outreach) @ AURI mileage & M&IE, \$3,750 total.                                                                                                                                                                                                                                                                                     |                                                                                                                                                    |   |  |      |                  |                  |                  |                 |
| The Nature Conservancy                | Subaward           | Support farmers in Stearns Co. to test an extended crop rotation using the grain/camelina system, engaging at least 5 watershed farms; work with the Ecosystem Service Market Consortium (ESMC) to adjust ESMC protocols and algorithms for grain/camelina, obtain available validation data; evaluate results; collaborate locally on outreach. |                                                                                                                                                    |   |  | 0.78 |                  | \$102,100        | \$51,066         | \$51,034        |
|                                       |                    |                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                    |   |  |      | <b>Sub Total</b> | <b>\$294,489</b> | <b>\$243,290</b> | <b>\$51,199</b> |
| <b>Equipment, Tools, and Supplies</b> |                    |                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                    |   |  |      |                  |                  |                  |                 |
|                                       | Tools and Supplies | Supplies required for Activity 4                                                                                                                                                                                                                                                                                                                 | Activity 4: Product R&D: Reagent and consumable supplies/chemicals for all years (\$3,000).                                                        |   |  |      |                  | \$3,000          | \$2,998          | \$2             |
|                                       | Tools and Supplies | Supplies required for Activity 4                                                                                                                                                                                                                                                                                                                 | Activity 4: Refreshments for field days and other events (\$1,189)                                                                                 | X |  |      |                  | \$1,189          | -                | \$1,189         |
|                                       | Equipment          | Storage containers                                                                                                                                                                                                                                                                                                                               | Storage containers were needed to enable efficient drying of freshly-harvested grain from pilot production of winter camelina by piloting farmeres |   |  |      |                  | \$3,000          | \$3,000          | -               |
|                                       |                    |                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                    |   |  |      | <b>Sub Total</b> | <b>\$7,189</b>   | <b>\$5,998</b>   | <b>\$1,191</b>  |
| <b>Capital Equipment</b>              |                    |                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                    |   |  |      |                  |                  |                  |                 |
|                                       |                    |                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                    |   |  |      | <b>Sub Total</b> | -                | -                | -               |
| <b>Acquisitions and Stewardship</b>   |                    |                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                    |   |  |      |                  |                  |                  |                 |
|                                       |                    |                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                    |   |  |      | <b>Sub Total</b> | -                | -                | -               |
| <b>Travel In Minnesota</b>            |                    |                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                    |   |  |      |                  |                  |                  |                 |

|                                 |                             |                                                                               |                                                                                                                                                                                                                                                                                                        |  |  |  |                  |                |          |                |
|---------------------------------|-----------------------------|-------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|------------------|----------------|----------|----------------|
|                                 | Miles/<br>Meals/<br>Lodging | Travel by UMN staff for related to work in project watersheds.                | Travel to project watersheds in Nicollet, Rice, and Stearns Counties, involving individual and group meetings with participants in and near those watersheds. Projected travel: 646.65 miles per year, x 3 years, at 0.56/mile                                                                         |  |  |  |                  | \$1,087        | -        | \$1,087        |
|                                 | Miles/<br>Meals/<br>Lodging | Travel by UMN staff to provide technical assistance to participating farmers. | Technical support (5 Minneapolis-St. Peter round trips/yr, all years x \$95 trip for mileage, per diem). (5 Minneapolis-Dundas round trips/yr, all years x \$69 trip for mileage, per diem). (5 Minneapolis-Freeport round trips/yr, all years x \$109 trip for mileage, per diem). \$4095 total       |  |  |  |                  | \$4,095        | -        | \$4,095        |
|                                 | Miles/<br>Meals/<br>Lodging | Travel by UMN staff related to supply-chain development and support           | Supply-chain organizing (5 Minneapolis-St. Peter round trips/yr, all years x \$95 trip for mileage, per diem). (5 Minneapolis-Dundas round trips/yr, all years x \$69 trip for mileage, per diem). (5 Minneapolis-Freeport round trips/yr, all years x \$109 trip for mileage, per diem). \$4095 total |  |  |  |                  | \$4,095        | -        | \$4,095        |
|                                 |                             |                                                                               |                                                                                                                                                                                                                                                                                                        |  |  |  | <b>Sub Total</b> | <b>\$9,277</b> | <b>-</b> | <b>\$9,277</b> |
| <b>Travel Outside Minnesota</b> |                             |                                                                               |                                                                                                                                                                                                                                                                                                        |  |  |  |                  |                |          |                |
|                                 |                             |                                                                               |                                                                                                                                                                                                                                                                                                        |  |  |  | <b>Sub Total</b> | <b>-</b>       | <b>-</b> | <b>-</b>       |
| <b>Printing and Publication</b> |                             |                                                                               |                                                                                                                                                                                                                                                                                                        |  |  |  |                  |                |          |                |
|                                 | Publication                 | Flyers, signage, and other printed materials for field days and other events  | Provide information on grain/camelina cropping systems for attendees at field days and other events                                                                                                                                                                                                    |  |  |  |                  | \$1,000        | -        | \$1,000        |

|                           |  |                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |  |                        |                  |                  |                  |
|---------------------------|--|-----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|------------------------|------------------|------------------|------------------|
|                           |  |                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |  | <b>Sub<br/>Total</b>   | <b>\$1,000</b>   | <b>-</b>         | <b>\$1,000</b>   |
| <b>Other<br/>Expenses</b> |  |                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |  |                        |                  |                  |                  |
|                           |  | Risk-share payments to growers for grain/camelina production and post-harvest handling. | Cost- and risk-share payments (\$60,000 total) to growers of grain/camelina (\$120/acre expected payout, projected scope 500 acres total, distributed approximately equally across all three target watersheds), in partial compensation for costs of camelina production, a reasonable mark-up for grain produced, and risk of lost income in participating in pilot project. \$45,000 will cost-share (at 25% of total projected costs) post-harvest aggregation, storage, transportation, and processing of product harvested from winter camelina acres supported by the project. These funds are needed to de-risk both production and early post-farmgate activity of these crops. |  |  |  |                        | \$93,024         | \$10,064         | \$82,960         |
|                           |  | Ecosystem Service Payments                                                              | Ecosystem service payments to farmers piloting winter camelina                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |  |  |                        | \$8,713          | \$8,634          | \$79             |
|                           |  |                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |  | <b>Sub<br/>Total</b>   | <b>\$101,737</b> | <b>\$18,698</b>  | <b>\$83,039</b>  |
|                           |  |                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |  | <b>Grand<br/>Total</b> | <b>\$476,000</b> | <b>\$330,294</b> | <b>\$145,706</b> |

## Classified Staff or Generally Ineligible Expenses

| Category/Name                  | Subcategory or Type | Description                      | Justification Ineligible Expense or Classified Staff Request                                                                                                                                                                                                               |
|--------------------------------|---------------------|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Equipment, Tools, and Supplies |                     | Supplies required for Activity 4 | Budget (\$1,189) is requested to provide refreshments at educational events associated with Activity 4. This assumes a budget of \$5 per person for light refreshments such as coffee and rolls, and a total of 237 attendees at a total of 5 field days and other events. |

## Non ENRTF Funds

| Category         | Specific Source                                                                                                                       | Use                                                                                                                        | Status                     | \$ Amount       | \$ Amount Spent | \$ Amount Remaining |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|----------------------------|-----------------|-----------------|---------------------|
| <b>State</b>     |                                                                                                                                       |                                                                                                                            |                            |                 |                 |                     |
| Cash             | Clean Water Legacy/MDA/FGI Grant: Extending the Forever Green EECO Implementation Program to a Suite of Perennials and Winter Annuals | Provide cost-risk share and ecosystem-service payments to farmers supported with technical assistance by project personnel | Secured                    | \$60,438        | -               | \$60,438            |
|                  |                                                                                                                                       |                                                                                                                            | <b>State Sub Total</b>     | <b>\$60,438</b> | <b>-</b>        | <b>\$60,438</b>     |
| <b>Non-State</b> |                                                                                                                                       |                                                                                                                            |                            |                 |                 |                     |
| Cash             | University of Minnesota Agricultural Experimental Project 0013144                                                                     | Cover erroneous payments made to participating farmers due to clerical errors                                              | Secured                    | \$220           | -               | \$220               |
|                  |                                                                                                                                       |                                                                                                                            | <b>Non State Sub Total</b> | <b>\$220</b>    | <b>-</b>        | <b>\$220</b>        |
|                  |                                                                                                                                       |                                                                                                                            | <b>Funds Total</b>         | <b>\$60,658</b> | <b>-</b>        | <b>\$60,658</b>     |

## Attachments

### Required Attachments

#### *Visual Component*

File: [3baf7254-111.pdf](#)

#### *Alternate Text for Visual Component*

Photograph of winter camelina crop and map illustrating the project region for watershed-scale pilot implementation of the grain/camelina system for safeguarding water in Minnesota row-crop farming, indicating that the project area contains many highly-valued water resources such as high-value trout fisheries, and vulnerable groundwater and drinking water source protection areas....

### Supplemental Attachments

#### *Capital Project Questionnaire, Budget Supplements, Support Letter, Photos, Media, Other*

| Title                                                                                                                                         | File                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| Letter of support from Headwaters Agriculture Sustainability Partnership                                                                      | <a href="#">8f59d17c-0b0.pdf</a> |
| Letter of support from Cannon River Agricultural Collaborative                                                                                | <a href="#">bd4fd2d5-009.pdf</a> |
| Background check document                                                                                                                     | <a href="#">26e5e068-f60.pdf</a> |
| Final Product: Winter Camelina Piloting Report- Great River Greening                                                                          | <a href="#">c38091ec-dec.pdf</a> |
| Final Product: Winter Camelina Ecosystem Services Modeling Report                                                                             | <a href="#">b6eac52a-872.pdf</a> |
| Winter Camelina Harvest Techniques Field Day                                                                                                  | <a href="#">9ea6f073-e6d.pdf</a> |
| SE MN Winter Camelina Growers In-person Meeting                                                                                               | <a href="#">d3f7eb60-805.pdf</a> |
| Announcement: 2025 Cannon River Watershed Farmer Breakfast                                                                                    | <a href="#">ef38550d-800.pdf</a> |
| Continuous Living Cover Crops Take Flight: Great River Greening Helps Pilot First Batch of Sustainable Aviation Fuel                          | <a href="#">506829ee-cfd.pdf</a> |
| Announcement: UMN Forever Green Grower Meeting 1/30/23                                                                                        | <a href="#">f18e1bda-a01.pdf</a> |
| Announcement: Pilot program to grow winter camelina in the Cannon, Sauk, and Middle Minnesota River Watershed                                 | <a href="#">7fb5908f-4fc.pdf</a> |
| Final Product: Winter Camelina--Developing Sustainable Supply Chains and Enhancing Market Viability for Minnesota Producers. A report by AURI | <a href="#">f6b0b1f8-ea2.pdf</a> |
| Winter Camelina Grower's Guide                                                                                                                | <a href="#">e2937c23-a15.pdf</a> |
| Piloting of Winter Camelina: Lessons and Implications for Further Scaling                                                                     | <a href="#">133dd6b7-217.pdf</a> |
| ECCO Implementation Program _ Forever Green_ Overview_ 2026                                                                                   | <a href="#">bbdd415b-4b2.pdf</a> |
| 2022-046 Tabulation of Farms Supported by This ENRTF Grant                                                                                    | <a href="#">da597dad-310.pdf</a> |
| WC_LCCMR_2pager_Outreach_2023                                                                                                                 | <a href="#">cdd93c15-228.pdf</a> |
| 2022-046 Tabulation of Farms Supported by This ENRTF Grant - Explanatory Notes                                                                | <a href="#">2b7064a4-a7a.pdf</a> |

#### *Media Links*

| Title        | Link                                                                                                                                                                |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ECCO Program | <a href="https://forevergreen.umn.edu/commercialization/eeco-implementation-program">https://forevergreen.umn.edu/commercialization/eeco-implementation-program</a> |

## Difference between Proposal and Work Plan

### *Describe changes from Proposal to Work Plan Stage*

To adapt the project workplan and budgeting to the funding allocated, the following modifications have been made:

Activity 1: The number of farms has been reduced by 50% and most associated budget items have been reduced proportionately. Target acreage has been reduced by 33%. Funding for cost-share for production and post-production handling reflecting lessons learned in piloting of other crops, and other experience; specifically the production cost-share rate has been reduced, but post-production handling cost-sharing has been added.

Activity 2: Since proposal submission in April 2021, much progress has been made in formation and facilitation of a network of end-use and intermediary firms, water-management agencies, watershed groups, the Forever Green Partnership, and others. Therefore, we shifted the nature of supply-chain development activities to focus on coordination of support for farmers piloting the grain/camelina system and post-production costs. Experience shows coordination is time-consuming and critically important.

Activity 3: No changes.

Activity 4: The scope of each sub-activity has been reduced by 50%, as has associated budgeting.

## Additional Acknowledgements and Conditions:

The following are acknowledgements and conditions beyond those already included in the above workplan:

**Do you understand and acknowledge the ENRTF repayment requirements if the use of capital equipment changes?**

N/A

**Do you understand that travel expenses are only approved if they follow the "Commissioner's Plan" promulgated by the Commissioner of Management of Budget or, for University of Minnesota projects, the University of Minnesota plan?**

Yes, I understand the UMN Policy on travel applies.

**Does your project have potential for royalties, copyrights, patents, sale of products and assets, or revenue generation?**

No

**Do you understand and acknowledge IP and revenue-return and sharing requirements in 116P.10?**

N/A

**Do you wish to request reinvestment of any revenues into your project instead of returning revenue to the ENRTF?**

N/A

**Does your project include original, hypothesis-driven research?**

No

**Does the organization have a fiscal agent for this project?**

Yes, Sponsored Projects Administration

**Do you understand that a named service contract does not constitute a funder-designated subrecipient or approval of a sole-source contract? In other words, a service contract entity is only approved if it has been selected according to the contracting rules identified in state law and policy for organizations that receive ENRTF funds through direct appropriations, or in the DNR's reimbursement manual for non-state organizations. These rules may include competitive bidding and prevailing wage requirements**

N/A

## Work Plan Amendments

| Amendment ID | Request Type      | Changes made on the following pages                                                                                                                                                                                                                                                                                           | Justification For Amendment Request (word limit 75)                                                                                                                                                                                                                                                                                                                                                                                                                   | Date Submitted | Approved | Date of LCCMR Action |
|--------------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------|----------------------|
| 1            | Amendment Request | <ul style="list-style-type: none"> <li>• Budget</li> <li>• Other</li> <li>• Attachments</li> <li>• Budget - Personnel</li> <li>• Budget - Professional / Technical Contracts</li> <li>• Budget - Capital, Equipment, Tools, and Supplies</li> <li>• Budget - Other</li> <li>• Budget - Non-ENRTF Funds Contributed</li> </ul> | Minor increases to personnel and subcontract costs needed to cover slight overspending. Budget lines needed to be added to cover ecosystem service payments to piloting farmers and for storage containers needed to support drying of freshly-harvested winter camelina grain on piloting farmers. Budget for cost- and risk-share payments for farmers was reduced as these payments were less than budgeted. Please see Additional Update for further explanation. | June 20, 2026  | Yes      | September 22, 2026   |

# Additional Status Update Reporting

## Additional Status Update February 7, 2026

**Date Submitted:** June 19, 2026

**Date Approved:** September 22, 2026

### Overall Update

No changes from previous overall update except for clarification of work under Activity 1 conducted by Clean River Partners, Great River Greening, and The Nature Conservancy

### Activity 1

This additional update details activities by project partners using these ENRTF funds. CRP (Clean River Partners) focused on southeast Minnesota, providing comprehensive support to growers from planting through harvest. They conducted farm visits, advised on relay cropping, and assisted with harvest logistics. Additionally, they secured funding for cleaning sites and harvester networks, collected field data to inform best practices, and hosted educational events such as watershed breakfasts. CRP supported three farms (farms A, D, and E) listed in the tabulation of farmer risk-management and post-harvest handling payments. Great River Greening (GRG) operated in the Middle Minnesota River Watershed, and provided hands-on technical assistance for production and post-harvest cleaning, drying, and storage. They connected farmers to emerging markets, and coordinated cost-share opportunities and produced a report (Winter Camelina Piloting Report- Great River Greening) available in Attachments. GRG supported one farm (farm C) listed in the tabulation of farmer risk-management and post-harvest handling payments. The Nature Conservancy (TNC) targeted the Sauk watershed, focusing on outreach and recruitment. They engaged over 100 farmers at conservation events and collaborated with agricultural retailers to promote camelina as a fall rotation. TNC also identified critical participation barriers, including low grain prices, high input costs, and market

*(This activity marked as complete as of this status update)*

### Activity 2

We note that cost/risk-share payments provided to growers were patterned after another cost/risk-share program we operate, which pays cost-share payments on a sliding scale (\$20-40 per acre for winter camelina) based on field-specific nitrate leaching reductions as modeled by the Nutrient Tracking Tool. The more the predicted reduction in water pollution, the higher cost share, based on the idea that higher cost-share is warranted in fields that produce more value for the public by keeping nitrate out of water. Risk-share payments are outcomes-based and are triggered in the event of loss such as winter injury, market failure, production issue outside the grower's control, etc. If a crop succeeds in the market bringing in returns above the cost of production, there is no economic risk payout. In other words, that is how our cost- and risk-share payments are administered, and the ecosystem service payments are referring to the cost-share part of the cost- and risk-share payments. An overview of the other cost/risk-share program we operate, which provided a functional model for cost/risk-share payments provided to growers in detailed in a document entitled EECO Implementation Program \_ Forever Green\_ Overview\_2026, provided in the Attachments page.

*(This activity marked as complete as of this status update)*

### Activity 3

This activity was previously marked complete.

*(This activity marked as complete as of this status update)*

### Activity 4

This activity was previously marked complete.

*(This activity marked as complete as of this status update)*

**Dissemination**

No changes from previous update

# Additional Status Update Reporting

## Additional Status Update February 3, 2026

**Date Submitted:** June 19, 2026

**Date Approved:** September 22, 2026

### Overall Update

No changes from previous overall update

### Activity 1

Production support provided under Activity 1 included ecosystem service payments, which pay cost-share production support payments on a sliding scale (\$20-40 per acre for winter camelina) based on field-specific nitrate leaching reductions, so that payments index public value. Payments were made to each of the five farms that received risk-share payments in 2024 and 2025, as detailed in the document "Tabulation: Pilot Production Payments to Farmers" in the Attachments page. Post-harvest handling was supported by provision of temporary storage containers for harvested grains. The storage containers (Pro boxes) are necessary for storing grain in/out of the processing line so the line can function as intended. In total, 12 pro boxes were purchased on 06/26/24 from FBN (\$3000 in pro-boxes, at \$250/box). These containers are owned by University of Minnesota, and are located in Chatfield, MN, so that they can be efficiently shared with farmers involved with piloting of winter camelina. Minor increases to subcontract costs needed to cover slight overspending, which arose due to costs of providing support for farmers to troubleshoot unanticipated challenges in production and post-production activities related to winter camelina. Cost/risk-share payments to farmers were reduced due to low demand.

*(This activity marked as complete as of this status update)*

### Activity 2

This activity was previously marked complete.

*(This activity marked as complete as of this status update)*

### Activity 3

This activity was previously marked complete.

*(This activity marked as complete as of this status update)*

### Activity 4

This activity was previously marked complete.

*(This activity marked as complete as of this status update)*

### Dissemination

No changes from previous update

# Additional Status Update Reporting

## Additional Status Update January 14, 2026

**Date Submitted:** June 19, 2026

**Date Approved:** September 22, 2026

### Overall Update

No changes from previous update

### Activity 1

This activity was previously marked complete.

*(This activity marked as complete as of this status update)*

### Activity 2

This activity was previously marked complete.

*(This activity marked as complete as of this status update)*

### Activity 3

This activity was previously marked complete.

*(This activity marked as complete as of this status update)*

### Activity 4

This activity was previously marked complete.

*(This activity marked as complete as of this status update)*

### Dissemination

No changes from previous update.

# Status Update Reporting

## Final Status Update August 14, 2025

**Date Submitted:** June 19, 2026

**Date Approved:** September 22, 2026

### Overall Update

Through all four project activities, our project made progress on its intended outcome, of scaling up a market-driven water-quality solution for row-crop farming by piloting supply chains for the grain-camelina production system. First, as detailed under Activity 1 and in supplemental materials, we provided technical support for pilot implementation of the grain-camelina system, focusing on target watersheds. Second, through Activity 2, we supported access to financial assistance for piloting farmers, and provided a range of post-production assistance to these farmers to assist them in accessing markets. Third, in Activity 3, we substantially advanced capacities to model ecosystem services produced by winter camelina, helping to enable growers to participate in ecosystem service markets as these develop. Fourth, under Activity 4, we explored the current and future utilization opportunities, risks, and policy factors that affect scaling of winter camelina, and produced technical findings that evaluated WC bioproducts to provide potential users with key understandings of this crop's commercial potential. Production piloting under the program was considerably less than anticipated, due to the emergence of other private and public-sector pilot support, reducing demand for support from our project.

### Activity 1

Pilot production of grain-camelina systems advanced during the final reporting period. Specifically, cost/risk-share support was provided from project funds for 63 pilot acres on four farms from project funds (Farms A, C, D, E in document "'2022-046 Tabulation of Farms Supported by This ENRTF Grant", see Attachments); 122 pilot acres on these farms and Farm F in the tabulation received ecosystem services payments in addition. During the project, pilot production increased greatly in Minnesota through private-sector efforts, and other public-sector programs. Agronomic support was provided to 978.5 additional pilot acres (Farms B, G, H, I, J K, L, M, N in tabulation) by UMN personnel and by project collaborators; these acres received cost-share and other payments from other funds. Communications and educational efforts on winter camelina were done by UMN and project partners. An evaluation of piloted grain/camelina cropping systems was conducted (see Attachments); it was an evaluation of more than the work funded by this appropriation and these ENRTF funds were not used to develop the evaluation; Also, a winter camelina grower's guide (see Attachments) was produced, informed by results from piloting funded by this appropriation, but these funds were not used to develop the guide.

*(This activity marked as complete as of this status update)*

### Activity 2

During the final reporting period, we continued to help farmers access risk/cost-share payments from project funds, and in accessing markets for grain from these pilot acres. Regarding the latter, the project produced commercial quantities of camelina grain that moved into the supply chain to advance market development for winter camelina. Also, the project was critical to developing farmer-led solutions to mobile, on-farm camelina pre-cleaning, a crucial factor in accessing markets. For example, achieving contract-specified foreign material percentage (FM) of 5-10% is a challenge for new camelina growers, and grain drying proved to be an important post-harvest issue on some piloting farms. Project personnel worked closely with farmers to support these market-access efforts, borrowing equipment on behalf of farmers, and helping farmers obtain other funding to develop innovative post-harvest processing methods. As noted re. Activity 1, an ambitious piloting program has been implemented since project inception by our colleagues in the firm Cargill. Their program reduced need for the cost- and risk-share payments and cost-sharing of post-harvest management

costs.

*(This activity marked as complete as of this status update)*

### **Activity 3**

This activity is led by project partner TNC. The original intent was to work with the Ecosystem Services Market Consortium to build modeling capacity. Since project inception, TNC chose to develop relevant modeling capabilities internally, and hired staff accordingly. This decision slowed inception of this activity; for this reason, and because TNC was unable to recruit piloting farmers in the Sauk River watershed, no piloting was done in support of Activity 3. During the reporting period, TNC modeler Dr. Negar Tafti completed work on modeling work for this Activity. Dr. Tafti adapted the DNDC model to simulate carbon and nitrogen dynamics associated with winter camelina production, accomplished model calibration and validation, and then used the model to simulate production on 43,661 fields across five Minnesota counties, representing over 1.8 million acres. Analysis of model outputs determined impacts of integrating winter camelina on soil carbon, GHG emissions and nutrient cycling, as detailed in "Final Product: Winter Camelina Ecosystem Services Modeling Report" provided as supplemental materials. This work has achieved the core goal of Activity 3, by substantially advancing capacities to model ecosystem services produced by winter camelina, helping to enable growers to participate in ecosystem service markets as these

*(This activity marked as complete as of this status update)*

### **Activity 4**

Project partner AURI's technical and commercialization teams worked to complete project deliverables during the final reporting period, completing exploration of current and future utilization opportunities, risks, and policy factors that affect scaling of winter camelina, and produced technical findings that evaluated WC seed, oil, meal, straw to provide potential users with key understandings of this crop's unique properties. Project activities included coordination with researchers at a federal research facility to examine the potential use of winter camelina straw in renewable fuel production. Staff also engaged in conversations with industry representatives from multiple states interested in obtaining characterization data on winter camelina and oil samples for further assessment as a feedstock for sustainable aviation fuel. Commercialization team members continued to work in collaboration with industry partners as part of wider ongoing efforts to develop markets for winter camelina meal and oil. Over the course of the project, AURI staff provided support for businesses in development of camelina-based food, feed, and/or biobased products. AURI staff made many presentations about their technical work and analyses during the project period. AURI team members prepared a final report (Final Product: Winter Camelina-Developing Sustainable Supply Chains and Enhancing Market Viability for Minnesota Producers).

*(This activity marked as complete as of this status update)*

### **Dissemination**

We have continued a wide range of communications and dissemination activities in various media. Over the course of the project, these communications and dissemination activities included webinars, field days (visits to piloting farms open to the public), public informational and discussion meetings, and descriptions of the piloting program and associated financing and technical assistance opportunities. We have included copies of most communications items in the attachments page.

# Status Update Reporting

## Status Update March 1, 2025

**Date Submitted:** April 10, 2025

**Date Approved:** April 16, 2025

### Overall Update

Our project continues to support and advance the adoption of grain-camelina production as a market-driven water-conservation strategy for row-crop farms. Additional impetus has developed for adoption during this reporting period, as interest in the crop as a feedstock for sustainable aviation fuel (SAF) builds. This interest heightens the importance of our project's efforts to alleviate barriers to adoption and marketing of the crop. During the reporting period, the scale of pilot production increased considerably in the region (as detailed in Activity 1 report); our project contributed to that increase, with a particular emphasis on adoption in several watersheds of concern re. water quality. This piloting is enriching understanding of production of grain-camelina systems across a range of climate, soils, and cropping systems, setting stage for the millions of acres of adoption that could be supported by demand for SAF and other emerging markets. In addition, we have accelerated the pace of modeling work needed to enable farmers to receive payments for benefits produced by the grain/camelina system, as well as to verify claims made by producers and users of SAF. Finally, we continued R&D and other programming aimed at supporting new commercial enterprises built on winter camelina.

### Activity 1

Our pilot production and scaling of grain-camelina systems has progressed well during the reporting period, in which we directly supported planting of ca. 170 acres of new pilot acres, while ca. 1650 pilot acres were planted in MN, supported by other public resources. Still other pilot acres were supported by private-sector resources: we estimate a total of ca. 2000 pilot acres in Minnesota. In the Upper Midwest (MN, Dakotas, and IA), we estimate that ca. 5000 pilot acres were planted in Fall 2024, despite challenging weather. To date, 339 acres have been planted in MN with cost/risk-share support from ENRTF, on 11 farms, and in the Middle Minnesota and Cannon River watersheds. Overall, there has been strong progress toward the goal of the piloting, which is to expand the geographic and agronomic scale of pilot production. As in previous seasons, we collaborated with farmers to monitor the piloting, document yields, and to collect observations from participating farmers. An evaluation report has been written based on 2024 harvest (available on request); we will revise and distribute widely after 2025 harvest. We continued to organize and offer engagement and outreach events, with a variety of partner organizations.

### Activity 2

During the reporting period, we progressed in assisting farmers in accessing risk/cost-share payments, from project funds as noted above, and in accessing markets for grain from these pilot acres. During the reporting period, we established additional contracts with these farmers for production and post-harvest handling in the upcoming reporting period. However, we have spent much less than budgeted. The main reasons for this are as follows. As noted re. Activity 1, an aggressive piloting program has been implemented since project inception by our colleagues in the firm Cargill. Their program has complemented our efforts, but their efforts have reduced need for the cost- and risk-share payments and post-harvest management costs. Finally, our project partners CRP, GRG, and TNC were not able to recruit many growers in the geographic areas targeted in the project, for a variety of reasons including reduced organizational capacity. Largely because of these factors, we anticipate using only about 50% of the funds that we budgeted for cost- and risk-sharing with piloting farms. The thousands of acres of winter camelina piloting that has occurred in Minnesota during the project period has largely occurred in other parts of the state, funded by other public and private sources.

### Activity 3

This activity is led by project partner TNC and has progressed during the reporting period. The original intent of developing GHG and carbon modeling for winter camelina in crop rotations was to work with the Ecosystem Services

Market Consortium (ESMC) to build this modeling capacity. Since project inception, TNC has realized the importance of developing these modeling capabilities internally, and has hired staff to provide this internal capacity. This decision slowed inception of this activity; for this reason, and because TNC was unable to recruit piloting farmers in the Sauk River watershed, no piloting will be carried out. During the reporting period, TNC modeler Dr. Negar Tafti began work on this Activity. She is adapting the DNDC model to model carbon and nitrogen dynamics associated with winter camelina production, and has been gathering data needed to calibrate and validate the model for winter camelina. By project's end, Dr. Tafti will accomplish model calibration and validation work. This work will achieve the core goal of Activity 3, by substantially advancing capacities to model ecosystem services produced by winter camelina, enabling growers to participate in ecosystem service markets as these develop. We project that work will be completed by 6/30/25.

#### **Activity 4**

AURI commercialization activities over the reporting period included ongoing collaboration with the Forever Green Initiative to update data measuring winter camelina's carbon intensity and sustainability metrics. AURI staff also continued efforts to support the use of winter camelina in biofuel production and as a protein source for animal nutrition products and networked with multiple industry stakeholders. Technical work over the past six months included collaborating with a Minnesota-based industry partner to characterize winter camelina meal and assess its glucosinolate profile, and analysis of the biomethane potential of winter camelina straw and defatted meal to assess their use as feedstocks to produce renewable natural gas (RNG), in consultation with UMN research partners at the University of Minnesota. AURI staff shared information at events focused on biodiesel and sustainable aviation fuel, and met with researchers and other stakeholders to explore opportunities for collaboration on additional winter camelina research and development. Work on Activity 4 is nearing completion; reports summarizing project findings being developed for delivery by 6/30/25. AURI is reviewing and finalizing analytical work for these reports. Outreach to stakeholders is ongoing and dissemination of findings will continue after the project ends as part of AURI's wider winter camelina commercialization

#### **Dissemination**

As in previous reporting periods, project activities and outcomes are being disseminated by a wide range of activities by project partners, including public presentations, earned media content, websites of project partners, and field days and other events.

# Status Update Reporting

## Status Update September 1, 2024

**Date Submitted:** November 1, 2024

**Date Approved:** November 19, 2024

### Overall Update

To realize the potential of grain-camelina production as a market-driven water-conservation strategy for row-crop farms, we must eliminate barriers to wide deployment across Minnesota. Our project focuses on alleviating these barriers. Specifically, we have continued to progress in watershed-scale pilot-testing of grain-camelina systems in several Minnesota watersheds; during the reporting period, we did groundwork needed to support planting of 325 acres of winter camelina, which occurred in late summer and fall in two of the three project watersheds. Through this planting, we continue to progress on our goal to produce large quantities of camelina seed for pilot development of a wide range of post-production R&D that is key to creating strong markets for camelina. We will make a final round of cost-share and derisking payments Spring 2025. Importantly, our piloting has induced considerable investment in additional piloting by the private sector, expected to be approximately 2000 additional acres in fall 2024. In addition, we have made progress in modeling work needed to enable farmers to receive payments for benefits produced by the grain/camelina system. Finally, we carried out a range of R&D and other programming aimed at supporting new commercial enterprises built on winter camelina.

### Activity 1

Work in our watershed-based pilot production and scaling of winter camelina production has continued to progress well during the reporting period, in which our farmer engagement and assistance supported farmers in planting a total of 325 acres of pilot production plots were established at a total of six sites in the fall 2024 planting window. This piloting work constitutes continued progress on the goal of the piloting, which is to expand the geographic scale of pilot production, both in terms of different biophysical factors, such as soil, climate, and landscape factors, and in terms of farmer experience in the production practice. We continued to work with participating farmers to monitor the progress of piloting, such as planting operations, emergence, establishment, and growth after planting in the early fall season, and to collect observations and impressions from participating farmers. We continued to organize and offer supporting activities with a variety of partner organizations such as SWCDs and agricultural coops. These included including coordinating with UMN agronomy and commercialization staff to present programming, including monthly meetings for farmers doing piloting, several farmer dinners, community events, and publicity events. We also carried out detailed discussions about piloting winter camelina with interested farmers, although not

### Activity 2

Project personnel have made progress in assisting farmers in accessing risk/cost-share payments, from project funds as noted above, and in accessing markets for grain from these pilot acres, thereby building a solid foundation for further supply-chain development and scaling. Specifically, effort in this activity will focus on assisting farmers in accessing risk/cost-share payments for production and for post-harvest handling required to access markets for grain from these pilot acres, supported by project funds. During the reporting period, we supported farmers in planning for expanded production (from 125 planted in Fall 2023 to 325 acres planted in Fall 2024. As is our protocol, we will establish contracts with these farmers for production and post-harvest handling in the upcoming reporting period.

### Activity 3

Work on this activity by the project partner TNC has been launched, supported in new modeling capabilities that TNC has established in the organization. TNC staff have been planning for the modeling, including identifying other relevant modeling efforts that have been undertaken since the project began in July 2022.

#### **Activity 4**

Personnel of project partner AURI continued to focus on building connections and sharing information with current and potential winter camelina supply chain stakeholders. In March-May, AURI continued its focus on outreach and dissemination, featuring content on winter camelina as part of an AURI Connects Fields of Innovation event series on post-harvest handling, aggregation models, and market development pathways. The series also showcased an AURI-produced video on post-harvest handling of winter oilseeds. AURI and other stakeholders discussed protein isolation opportunities for winter camelina in workshops at the University of Minnesota in May. In July, AURI technical staff participated in a Minnesota Biodiesel Taskforce meeting, discussing winter camelina's potential as a feedstock for biofuels. In August, AURI shared information about winter camelina at the Central Lakes College Field Day. AURI commercialization staff met with potential aggregators, seed cleaners, and end users to share information and discuss commercialization opportunities for winter camelina. Finally, technical and analytical assessment of winter camelina for use in biobased products also continued to progress. Recent R&D activities included anaerobic digestion trials of winter camelina straw, and coordination with partners to conduct future chemical analyses of winter and spring camelina produced during field trials by affiliated researchers.

#### **Dissemination**

Project activities and outcomes are being disseminated by a wide range of activities by project partners, including public presentations, earned media content, websites of project partners, and field days and other events.

# Status Update Reporting

## Status Update March 1, 2024

**Date Submitted:** March 14, 2024

**Date Approved:** April 26, 2024

### Overall Update

To realize the potential of grain-camelina production as a market-driven water-conservation strategy for row-crop farms, we must eliminate barriers to wide deployment across Minnesota. Our project focuses on alleviating these barriers. Specifically, we are progressing in watershed-scale pilot-testing of grain-camelina systems in three Minnesota watersheds; we have established ca. 125 acres in Fall 2023, and intend to plant at least the remaining 325 acres in project watersheds in Fall 2024. Through this planting, we are progressing on our goal to produce large quantities of camelina seed for pilot development of a wide range of post-production R&D that is key to creating strong markets for camelina. Farmers are enrolling but we will not begin our cost-share and derisking payments until Spring 2024. In addition, we are working to advance emerging markets for environmental benefits produced on farms can pay farmers for benefits produced by the grain/camelina system. Finally, we carried out a range of programming and other activities aimed at supporting new commercial enterprises built on winter camelina.

### Activity 1

Work in our watershed-based pilot production and scaling of winter camelina production progressed well during the reporting period. In particular, a total of 124 acres of pilot production plots were established at a total of six sites in the fall 2023 planting window. This well advances the principle goal of the piloting, which is to expand the geographic scale of pilot production, both in terms of different biophysical factors, such as soil, climate, and landscape factors, and in terms of farmer experience in the production practice. An important part of the piloting work was also accomplished during the reporting period, namely working with participating farmers to monitor the progress of piloting, such as planting operations, emergence, establishment, and growth after planting in the early fall season, and to collect observations and impressions from participating farmers. A variety of supporting activities were carried out by our watershed-based project partners, including coordinating with UMN agronomy and commercialization staff to present programming (including two field days during the reporting period), detailed discussions about piloting winter camelina with interested farmers, which were at least 15 in number during the reporting period, and also assisting farmers with key post-production matters, such as accessing seed cleaning.

### Activity 2

Project personnel have made progress in assisting farmers in accessing risk/cost-share payments, from project funds as noted above, and in accessing markets for grain from these pilot acres, thereby building a solid foundation for further supply-chain development and scaling. Specifically, effort in this activity will focus on assisting farmers in accessing risk/cost-share payments for production and for post-harvest handling required to access markets for grain from these pilot acres, supported by project funds. Contracts with six farmers for production and post-harvest handling have been established to date, exceeding our milestone for this activity

### Activity 3

We have had preliminary discussions with the project partner (TNC) that will lead this work, but we have not advanced beyond that stage.

### Activity 4

Project personnel continued to focus on building connections and sharing information with current and potential winter camelina supply chain stakeholders since its last update. Specifically, project partner AURI's commercialization team met with multiple researchers and companies involved in winter camelina market development to identify opportunities for

collaboration and alignment of efforts. Collaboration with the University of Minnesota is a continued area of focus, with AURI staff participating in multiple meetings and events with the Forever Green Initiative to coordinate winter camelina market development efforts. As part of its outreach work, AURI is coordinating the production of an informational video for farmers and end users on post-harvest handling of winter oilseeds including winter camelina. Technical assistance activities have included meetings with producers exploring the development of new crop aggregation, handling, and cleaning capacity for winter camelina produced in Minnesota. Technical staff also took part in October's 2023 Biodiesel Technical Workshop which featured discussions about the use of winter camelina for biofuel production. AURI is participating in the new Minnesota Working Group for Climate-Smart Commodities and is making connections with stakeholders developing carbon and ecosystem services market models to explore how winter camelina production may fit into these emerging opportunities.

**Dissemination**

Project activities and outcomes are being disseminated by a wide range of activities by project partners, including public presentations, earned media content, websites of project partners, and field days and other events.

# Status Update Reporting

## Status Update September 1, 2023

**Date Submitted:** October 16, 2023

**Date Approved:** January 31, 2024

### Overall Update

Our key outcome is scaling up a market-driven water-quality solution for row-crop farming by piloting supply chains for the grain-camelina production system, through pilot implementation in three watersheds. Supply chains link farmers to markets for new crops, such as camelina, that can deliver major environmental benefits from row-crop farms. Specifically, our project is engaging many farmers in piloting grain/camelina production, and will produce large quantities of camelina grain that are critically needed to pilot storage, transport, and processing links in supply chains. At this point in project implementation, we have established work with our three watershed partners, implemented our watershed-specific engagement strategies, and held multiple project meetings with project participants in all three watersheds. We are now in the process of assisting farmers in planting winter camelina in September and October 2023, by providing them with technical assistance, providing seed, and enrolling them in the financial support and risk-sharing mechanism that is part of the workplan. At I write, 141 acres of winter camelina are confirmed; most have been planted. These pilot plantings are on six different farms, with acreage ranging from 13 to 41 acres. Approximately 50 additional acres may be planted this fall.

### Activity 1

As noted in the Overall Update, we are progressing well on Activity 1; the weather has been conducive to good germination in the planted pilot acres.

### Activity 2

The essence of Activity 2 is to assist farmers in accessing risk/cost-share payments for production and for post-harvest handling required to access markets for grain from these pilot acres, supported by project funds. We in the midst of providing the dedicated "hands-on" support necessary to enable participating farmers to obtain these forms of financial support.

### Activity 3

Activity 3 entails collaboration with the Ecosystem Service Market Consortium (ESMC) in its pilot project in the Sauk River Watershed. The ESMC protocols for establishing marketable water-quality and flow credits for farmers will be adapted for cool-season grains and camelina in the cropping system, and then administered on a pilot scale on acreage in the grain/camelina system in the Sauk River watershed. We have had extensive discussions with ESMC personnel around adaptation of protocols, and are poised to move forward once participating farmers are identified in the Sauk River watershed. We do not expect to establish piloting acres in that project area during the 2023 planting season, so work under Activity 3 will await that development.

### Activity 4

Activity 4 focuses on development of sustainable supply chains for winter camelina through technical assistance, commercialization support, outreach, and development of ecosystem services models that enhance market-viability for Minnesota camelina producers. Activity 4 is led by project partner AURI, whose commercialization, technical and outreach teams have scaled up work over the past several months. Identification and development of post-harvest processing options is an area of focus for AURI's market development activities. In September, team members attended the grand opening of the Ag Innovation Campus (AIC), a new oilseed processing and research facility in Crookston, Minn, to share information about winter camelina with attendees. The AIC is exploring options to operate a crush line for specialty oilseeds, and AURI is networking with industry stakeholders to examine opportunities this may create to

develop the supply chain for winter camelina in Minnesota. AURI is also working with project collaborators including Clean River Partners to develop connections with current and potential winter camelina producers as part of ongoing efforts to develop marketing models that enhance market-viability for Minnesota farmers. AURI is currently finalizing results from another LCCMR-funded project focused on winter camelina; these results will be leveraged in upcoming work under activity 4.

**Dissemination**

Project activities and outcomes are being disseminated by a wide range of activities by project partners, including public presentations, websites of project partners, field days and other events. Specifically, field days and other events have been held by our watershed partner related to recruitment of farmers to piloting activities.

# Status Update Reporting

## Status Update March 1, 2023

**Date Submitted:** March 23, 2023

**Date Approved:** March 24, 2023

### Overall Update

Our key outcome is scaling up a market-driven water-quality solution for row-crop farming by piloting supply chains for the grain-camelina production system, through pilot implementation in three watersheds. Supply chains link farmers to markets for new crops, such as camelina, that can deliver major environmental benefits from row-crop farms. Specifically, our project will engage many farmers in piloting grain/camelina production, and produce large quantities of camelina grain that are critically needed to pilot storage, transport, and processing links in supply chains. At this point in project implementation, we have established contracts to support the work of our watershed partners, planned our watershed-specific engagement strategies, and held multiple project meetings with project participants in all three watersheds. Presently, project personnel are engaging with farmers interested in planting winter camelina in September and October 2023. We have also just hired a new staff member who will provide technical assistance to farmers piloting winter camelina. Overall, we feel off to a good start!

### Activity 1

As noted in the Overall Update, we are progressing well on Activity 1; in particular we expect to meet the first milestone (Recruit participating farm operations) in advance of the June 2023 target date.

### Activity 2

The essence of Activity 2 is to assist farmers in accessing risk/cost-share payments for production and for post-harvest handling required to access markets for grain from these pilot acres, supported by project funds. We have not yet entered the phase of providing the dedicated "hands-on" support necessary to enable participating farmers to obtain these forms of financial support, but are poised to do so once participating farmers are identified.

### Activity 3

Activity 3 entails collaboration with the Ecosystem Service Market Consortium (ESMC) in its pilot project in the Sauk River Watershed. The ESMC protocols for establishing marketable water-quality and flow credits for farmers will be adapted for cool-season grains and camelina in the cropping system, and then administered on a pilot scale on acreage in the grain/camelina system in the Sauk River watershed. We have had extensive discussions with ESMC personnel around adaptation of protocols, and are poised to move forward once participating farmers are identified in the Sauk River watershed.

### Activity 4

Activity 4 focuses on development of sustainable supply chains for winter camelina through technical assistance, commercialization support, outreach, and development of ecosystem services models that enhance market-viability for Minnesota camelina producers. This phase of the project has not yet begun.

### Dissemination

Dissemination of project activities and outcomes has begun, via preparation of a two-page fact sheet on the winter camelina piloting opportunities provided by the project. This fact sheet will be used in upcoming participant recruiting activities in our three project watersheds.