

ROADBLOCKS TO THE ROADMAP: Barriers to Adoption of Natural Climate Solutions in Wisconsin

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Introduction

To achieve any of the three identified pathways to net-zero by 2050 in Wisconsin agriculture, widespread adoption of natural climate solutions will be needed. This process will require changes to policies and programs that currently incentivize practices that have negative environmental outcomes. It will require changes to production systems, supply chains, markets and economic structures. To navigate these broad changes and transitions and begin to put into place the systems to support them, we first must understand what the current barriers to widespread adoption of natural climate solutions actually are.

The complexity of agri-food system dynamics in Wisconsin makes it important to understand them from a system-wide perspective. Agri-food systems dynamics shape and influence federal- and state-level agriculture policies and programs. Understanding agri-food system dynamics and the barriers found throughout the system can help identify and design high impact leverage pathways to support adoption of climate-resilient food systems (The Climate Farmers and ReImagined Futures 2024).

In this report, we introduce concepts crucial to understanding systemic barriers in agri-food systems. We then contextualize these systems-level dynamics within Wisconsin, summarizing the key barriers to adoption of perennial systems. Our analysis focuses on barriers to adoption of perennial systems because they have the highest potential for significantly reducing agricultural emissions in Wisconsin *and* will require the greatest land-use change within each of the three pathways to net-zero. Our analysis is informed by the experiences Wisconsin farmers, processors and end-users shared with us during our three two-year pilot projects, which focused on a particular perennial crop (in this case, the dual-use intermediate wheatgrass known as Kernza®) cropping system (agroforestry) or dairy production system (grazed dairy heifers). Our analysis is further informed by discussions with state and regional thought leaders active in the perennial agriculture sector and by published literature and systems-change strategies currently at play within the wider regenerative food system movement—regionally, nationally and globally.

Background: *Systemic Barriers in the Agri-food System*

Understanding agri-food system dynamics can help identify and design high impact leverage pathways to support adoption of climate-resilient food systems

- The Climate Farmers and ReImagined Futures, 2024.

Systemic barriers are *the socio-political contexts, policies and programs embedded within the dominant agriculture production system that incentivize certain practices and pathways to reinforce the*

dominant system, drive norms of accepted practice, and create barriers to opportunities that exist outside dominant norms.

A plethora of research on global, U.S./national, and regional agri-food systems contextualizes systemic barriers of agri-food systems¹. Agri-food systems are *highly complex networks* that include all inputs and outputs tied to agricultural and food production and consumption, and shaped within larger economic, social and environmental contexts.

They encompass **on-farm production practices, harvest and post-harvest handling** of food and non-food agricultural products (including on-farm aggregation, sorting, pre-cleaning, quality control and storage); **off-farm post-harvest handling** (including transport, commercial-scale cleaning, sorting and aggregation, value-added processing, quality control and storage), **marketing and distribution** (including value-added product development, market entry, wholesale and retail distribution, consumer behavior, and disposal); **and the enabling environment** (including policies, infrastructure, and other factors that influence the entire agri-food system, such as regulations, insurance and finance, market access, and research & development).

Each interconnected component of the system is connected via feedback loops and impacted by external drivers, either directly (positively) or indirectly (negatively) correlated (**Figure 1**).

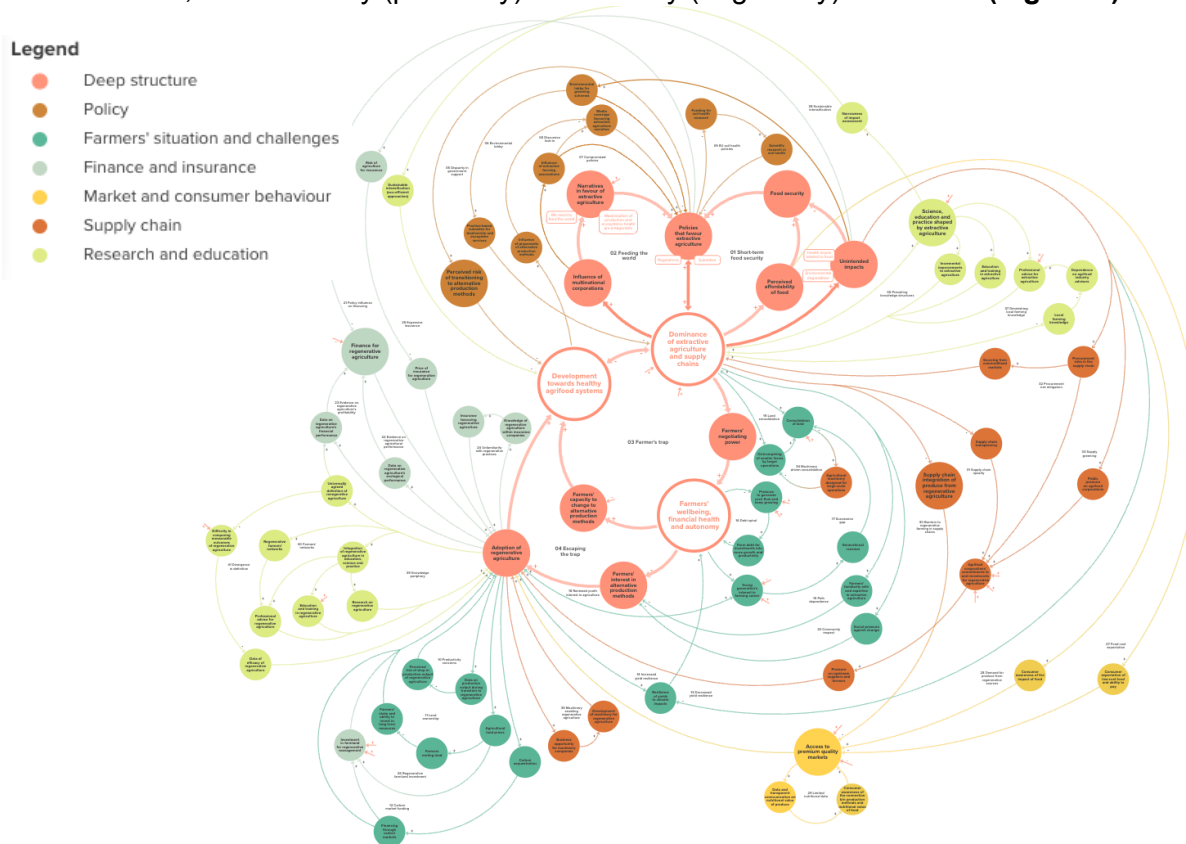


Figure 1: The complexity of agri-food systems, as conceptualized by The Climate Farmers and Reimagined Futures (2024).

¹See: (Global) Swinnen and Barrett 2025; The Climate Farmers and Reimagined Futures 2024; IFPRI 2022; Hebinck et al. 2021; IFPRI 2020; IPES-Food 2016; Allen and Prosperi 2016; Hobdod and Eakin 2015; Ericksen et al. 2012; Ericksen 2008; (U.S./National) National Academies 2015; Nesheim et al. 2015; Reganold et al. 2011; Heller and Keoleian 2003; and (Regional) Magliocca et al. 2025; Wald et al. 2025; Miller 2021; Duerfeldt 2014; Jordan and Warner 2013, among many others.

Systemic frameworks of the food system recognize the importance of social norms in the economy, political environment and broader culture as enabling and constraining factors for farmers and other actors in the food system:

- **Economic structures**— shaped by consumer demand for low-cost food, export-oriented trade policy, subsidies and risk management programs—create incentives for large-scale and capital intensive operations, driving agricultural market consolidation that favors larger firms and limits opportunities for smaller farmers and agricultural and food system businesses.
- **Agricultural policies** are shaped by political, economic and agricultural industry interests, cultural norms, environmental pressures, and consumer demand, driving what agricultural practices are prioritized for public investment in the form of research and development, subsidies, tax incentives, insurance and risk management, and other policy mechanisms.
- **Cultural norms** in rural communities, shaped by public policy and the economy, drive beliefs about ‘what good farming looks like’, how farms should operate and what is possible, and are socially reinforced within and between farm families and rural communities (See Bruce et al. 2025 and Leitschuh 2022).

The difficulty these three systemic forces create for farmers is widely recognized. The current agricultural landscape presents farmers with a complex web of economic, social and environmental challenges that inform their decision-making and ability to adopt alternative agricultural practices, particularly perennial cropping and grazing systems. Federal and state agricultural policies and programs reinforce dominant production practices and guide decision-making at the farm-level that can result in negative societal and environmental outcomes. Social pressures from family or neighbors, rising production costs, limited cost-share opportunities, fluctuating market prices, low profit margins and weak bargaining power against industry consolidation and monopoly, and market competition trap farmers in spirals of debt, undermining their financial stability (The Climate Farmers and Reimagined Futures 2024). A path of dependency or “systemic lock-in”, particularly in the dairy industry, makes it exceptionally challenging to break out of the dominant system due to reinforcing feedback loops between science, practice, market monopolies, policy and investments (Lowe et al. 2023).

While the broader systems-level dynamics cannot be ignored, a comprehensive agri-food system analysis falls outside the scope of this project. In our Wisconsin-based analysis, we adapt the USDA food-system framework (Figure 2) to include larger agri-food system components (e.g. the enabling environment) to examine the key barriers along the value chain of perennial crops and systems in Wisconsin. This framework provides a tangible understanding of existing barriers and the levers of opportunity to remove those barriers and scale perennial adoption across the landscape.

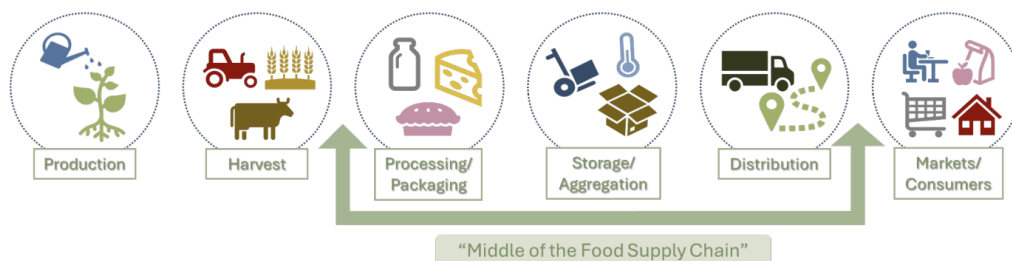


Figure 2: From Wisconsin Resilient Food Systems Infrastructure Program (USDA-RFSI 2025).

Components of agri-food systems:

Foreground: Key Barriers to Adoption of NCS Practices in Wisconsin

Increasingly, rural communities in Wisconsin contend with biodiversity loss, soil erosion, and contaminated surface and groundwater largely as a result of intensive agricultural practices (e.g. seasonal tilling, monocropping and herbicide applications, heavy use of fertilizers and pesticides and concentrated animal farming operations)– particularly from grains, oilseeds and manure management (Deller and Hadachek 2022). Rural communities also suffer economically; small farms continue to exit the industry at alarming rates as competition from large-scale, consolidated farming operations overwhelms small- and medium-sized farms’ ability to compete– particularly in the dairy industry (Hadachek and Deller 2025, Deller and Hadachek 2024). The average corn/soybean grower in Wisconsin nets a financial loss each year: **-\$140/acre (corn) and -\$162.50/acre (soy)** (Deitmann 2024), relying heavily on government subsidies and subsidized crop insurance. Supply chain concentration enables large-scale processors and aggregators to push down prices for farmers; **less than 16% of every food dollar goes to the farmer** (USDA-ERS 2025c). Equitable access to fresh, healthy, local foods in urban, rural and Tribal communities continues to be a challenge (Pettygrove 2016). Intensive agricultural consolidation, exurban development and food insecurity have stressed the fabric of rural communities.

The existing system isn’t sustainable.

In the following section (**Tables 1-3**), we summarize the primary barriers to adoption of perennial agri-food systems in Wisconsin and as informed by three two-year pilot projects focused on perennial agricultural systems: **agroforestry, managed grazing and perennial row crops** (in this case, the dual-use intermediate wheatgrass known as Kernza®). The barriers highlighted in the summary tables reflect common challenges across system types and are viewed to be actionable– they can be tangibly addressed in our state to scale adoption of natural climate solutions. Because agri-food systems are complex and systemic barriers exist at various scales simultaneously, several barriers intentionally appear within multiple tables. Other systemic barriers are intentionally withheld from the table to simplify interpretation and to highlight actionable levers within the state.

On-farm production practices, harvest and post-harvest handling
Agricultural systems, practices and inputs, harvesting, equipment and infrastructure, aggregation, cleaning, sorting, quality control, storage, waste and disposal, etc.
Off-farm post-harvest handling, marketing and distribution
Transport, cleaning, sorting and aggregation, value-added processing, quality control and storage, value-added product development, marketing, wholesale and retail distribution, consumer behavior, waste and disposal, etc.
The enabling environment Factors that influence the entire agri-food system:
Economic structures, capital & finance, policies, regulations, insurance and risk management, social norms, technology and infrastructure, market access, public agricultural research & development, etc.

Table 1. Summary of key barriers to adoption of NCS practices in Wisconsin: *Farm-operation level*

Systemic Barriers		Description
Establishment and transition costs	Land tenure	<ul style="list-style-type: none"> • Rising agricultural land prices (USDA-NASS 2023, Hadachek and Deller 2025) drive up land rental costs, limiting renters’ ability to buy land (USDA-ERS 2025a); lack of long-term lease opportunities limit land access and opportunities for adopting perennial crops and grazing systems, and may eliminate eligibility for conservation programs (Lowe et al. 2023, Sawadgo et al. 2020). • If recent trends continue, 515,200 acres (3%) of Wisconsin farmland will be converted to non-agricultural use by 2040 as low-density residential, commercial, industrial or moderate-high density residential areas (American Farmland Trust 2022). Development pressures and rising land values near urban areas can abruptly end land access to tenant farmers, especially for those farmers marginalized by race, gender or orientation (Lowe et al. 2023). • Declining farm numbers— down by 25% since 2007 and by 50% for dairy farms— and an aging farmer population— 34.3% of Wisconsin farmers are aged 60 and older (USDA-NASS, 2024b) underscore the need to protect existing farmland, support farm transition planning to the next generation of Wisconsin farmers, and reduce land tenure risks for all farmers (Hadachek and Deller 2025, Lowe et al. 2023).
	Information, Knowledge and Local communities of practice	<ul style="list-style-type: none"> • Perennial crops and systems have longer establishment periods than annual crops before they yield marketable returns, requiring careful decision-making and transition planning for farmers. • Agroeconomic analyses and enterprise budget models/tools are needed to quantify the potential of emerging perennial crops for rural economic development in Wisconsin. • Limited or underdeveloped science-based tools to assist in long-term decision and resilience planning— including comparisons of crop suitability under future projected climate conditions specific to their location and on-farm profitability comparisons— to ensure transition planning for perennial enterprises thrive both economically and ecologically (Bennell et al. 2021). • Field-based training, peer-to-peer knowledge exchanges, demonstration and research farms are essential for learning new or complex management practices and building support networks (Lowe et al. 2023, NRCS 2023a, Savanna Institute 2023). • Access to extension services, strong farmer-to-farmer networks, and perceived environmental benefits are key enablers of adoption (Fudge et al. 2025, Bogado et al. 2024, Lowe et al. 2023) • High demand for field-based training, peer-to-peer knowledge exchanges, demonstration and research programs for agroforestry, rotational grazing and perennial grains in Wisconsin (NRCS 2023b, Savanna Institute 2023), but availability is constrained by funding.

<p>Availability of commercially viable seed or seedling cultivars</p>	<ul style="list-style-type: none"> ● Public agricultural research & development for emerging crops and systems suitable to Wisconsin’s changing climate is significantly underfunded, resulting in slow emergence of regionally-adapted perennial crop cultivars that are both climate resilient and commercially viable. ● Weak and missing infrastructure—such as regional propagation centers, seed cleaning infrastructure, commercial tree crop nurseries, seed banks and commercial-scale distribution networks—compounds delay in distribution of commercially-viable perennial cultivars and limits access for farmers (Midwest Hazelnuts 2025, Savanna Institute 2025). ● Overcoming these challenges will require targeted investment in regionally-adapted seed and propagation centers, expanded public agricultural research and development breeding efforts, and better collaboration between research institutions, agricultural economic areas (AEAs), rural economic development offices and workforce development.
<p>Access to capital and financing</p>	<ul style="list-style-type: none"> ● Producers manage a multiplicity of business relationships and agreements to produce and market their products, including lenders, government agencies, suppliers, insurance and incentive programs (Bennell et al. 2021). ● Perennial crops and production systems typically have longer establishment periods before they yield marketable returns, require seasonal labor skilled in perennial system management, and often require new or modified on-farm equipment and infrastructure, which are often incompatible with conventional machinery. ● High costs of skilled labor, materials for installation, specialized harvesting equipment (e.g. commercial-scale nut and berry harvesters, stripper headers, etc.), post-harvest equipment (e.g. dehuskers, dryers, aerators, ProBoxes, etc.), and on-farm infrastructure (e.g. mobile water lines, electric fencing, season extenders like refrigeration and freezers, food-grade dry storage) creates financial barriers, especially for small and mid-sized farms. ● Traditional agriculture lenders often rely on established underwriting criteria and collateral models for annual operating loans which differ from cash flow needs and extended returns of perennial crops and systems (e.g. reduced production costs, lower input needs and environmental resilience) (TIFS 2025a); the misalignment of traditional lending structures creates barriers for farmers (e.g. cash flow deficits or high interest loans) pursuing transition to perennial crops or grazing systems (World Economic Forum 2024). ● Publicly subsidized programs like the NRCS Environmental Quality Incentives Program (EQIP) and Conservation Stewardship Program (CSP) can help with transition costs, but they receive far more applications than can be funded—only 36% of EQIP and 34% of CSP applications from Wisconsin were approved between fiscal years 2018 and 2022; recent and proposed changes to federal budget allocations further limit resource support for farmers, resulting in misalignment between need, demand and available assistance (NSAC 2023).

		<ul style="list-style-type: none"> ● Strict verification requirements of carbon and ecosystem services markets may be an added obstruction for those seeking an additional revenue stream from the emerging offset market (Bennell et al. 2021).
Risk management	Technical assistance capacity	<ul style="list-style-type: none"> ● Technical Assistance Providers (TAPs) play a crucial role in reducing risk for producers by assisting them with planning, design, establishment and management practices aimed at improving soil health, water quality, and overall environmental sustainability. ● Federal budget cuts to technical assistance services and NRCS programs, like EQIP and CSP, and insufficient state budget allocations for Land and Water Conservation Districts (LWCDs), UW Extension programs, and nonprofit organizations reduces state technical capacity (WI Land & Water 2023). ● Remaining TAPs are oversubscribed and underfunded, with limited capacity to develop technical knowledge in emerging perennial crops and practices like agroforestry. ● Expanded technical assistance is needed to adequately support farmers adopting practices that help to achieve net-zero goals in Wisconsin.
	Subsidies, crop insurance eligibility and disaster payments	<ul style="list-style-type: none"> ● Existing subsidies provide financial incentives for intensive systems such as mono-cropping and concentrated animal farming operations. ● Between 1995-20240, Wisconsin farmers received \$13. billion in subsidies. Of this amount, \$7.9 billion (approximately 61%) were allocated to commodity programs, which support crops like corn, soybeans, and dairy. In contrast, conservation programs, such as the Conservation Reserve Program, received about \$1.1 billion (approximately 8%) of the total subsidies during the same period (Environmental Working Group 2025). ● Federal crop insurance heavily favors major commodity crops and, offering subsidies up to 80%; in contrast, emerging or perennial crops and systems often receive minimal federal support with subsidies as low as 0–20%, leaving small grains, perennial crops and systems with minimal and often expensive coverage (NSAC 2023, USDA-ERS 2025b; Agroforestry Partners 2024, Asprooth et al. 2024, O’Neill & Kerska 2021, USDA-FSA 2019): <ul style="list-style-type: none"> ○ The Whole Farm Revenue Protection program (WFRP), designed to insure diversified farming operations, faces low adoption rates due to short coverage term, high premium rates, state availability, filing deadlines, complex record-keeping requirements, limited participation of insurance providers. ○ USDA-Risk Management Agency's Good Farming Practices rules are restrictive and often prohibit innovative practices that could enhance sustainability and resilience (e.g. interseeding cover crops or integrating trees into pastures, essential components of agroforestry and rotational grazing systems). ○ USDA-Farm Service Agency (FSA)’s Tree Assistance Program (TAP) covers eligible trees, shrubs and vines including commercial nursery fruit and nut trees, however adjusted gross income (AGI) and

		<p>indemnity payments place limitations on scale of operations and unlikely to be effective in recovering capital investments and lost production.</p> <ul style="list-style-type: none"> ○ USDA-FSA Noninsured Crop Disaster Assistance Program (NAP) provides risk assistance to producers for non-insurable crops, but with high premiums inaccessible to many producers. ● Traditional crop insurance relies on long-term data, such as yield history and risk assessment models, but for newly installed, perennial grains or tree crops that may not produce a marketable yield for 5-8 years after establishment, restrictive rules discourage adoption of practices that help mitigate flood and wind damage risks and may have higher tolerance to drought conditions than annual crops. ● Risks to diversified cropping systems from climatic variability and pests are not adequately addressed by federal risk mitigation insurance models leaving many farmers transitioning to natural climate solutions without sufficient coverage (Agroforestry Partners 2024, USDA-RMA 2024, Environmental and Energy Study Institute 2022). ● Policy reforms are needed to expand insurance options at affordable premiums, simplify program access, develop risk models for perennial and diversified cropping systems, and provide pre-disaster mitigation incentives for natural climate solutions.
<p>Market access</p>	<p>Business support and marketing</p>	<ul style="list-style-type: none"> ● Supply chain concentration enables large-scale processors and aggregators to push down prices for farmers; less than 16% of every food dollar goes to the average farmer (USDA-ERS 2025c). ● Exiting commodity production requires farmers to navigate new or emerging markets and market uncertainties, develop new products or supply existing product lines, optimize operations and financial performance and to market their products, either individually or cooperatively. ● Despite some premiums for grass-fed products and reduced processing, and transportation and marketing costs achieved by working with co-ops, producers at times still struggle to cover production costs (Grassland 2.0 2025). ● Consumers are often unaware of the nutritional and/or potential health benefits of perennial crops and products. For example, aronia (<i>Aronia spp.</i>) and elderberry (<i>Sambucus spp.</i>) are native Wisconsin berries with powerful antioxidant and anti-inflammatory properties (Sharma et al. 2025, Sidor and Gramza-Michalowska 2015)– well-suited to agroforestry systems– but their market presence is inferior to the now ubiquitous “superfood” açai (<i>Euterpe oleracea</i>) from Brazil. Kernza only recently received nutritional analysis (Craine and DeHaan 2024), which has the largest market pull for consumers second to price. Marketing has amplified the health benefits of açai and led to its success in U.S. food markets, highlighting a market opportunity for WI aronia and elderberry growers and food businesses to leverage.

		<ul style="list-style-type: none"> • Farmers need access to entrepreneurial tools, marketing and business development support for informed decision-making and effective marketing strategies, to ensure returns on investment and commercial viability.
	<p>Equitable and reliable market pathway</p>	<ul style="list-style-type: none"> • Farmers need a clear, reliable market pathway and committed farmgate buyers at fair, equitable prices. • Small- or medium-sized processors and intermediary buyers for perennial crops often lack the capital and infrastructure to purchase, aggregate and store farmgate products until economies of scale can be achieved for further processing. • Without subsidies to reduce costs of production and on-farm storage infrastructure, and a committed buyer at the farmgate, farmers risk spoiled field harvests and milk waste, lost income and debt. • In absence of commercial buyers to purchase at larger volumes, farmers will adjust their scale of production proportionally to costs of labor and market their products locally (e.g. farmers markets or CSA programs). While direct local markets and economies are key to thriving communities and should continue to be supported, scaling natural climate solutions to the level needed to achieve net-zero will require diversifying scales of production and processing, so as to expand market options for perennial crops beyond niche small-scale markets. • Supply and demand for grassfed milk and meat remain poorly aligned, resulting in periodic surpluses and shortages that create instability for producers and markets. • Value chain infrastructure like storage and market development is needed to secure reliable commercial farmgate buyers, ensure farmers earn a profitable return on investment, and to strengthen supply chains of perennial crops and systems.
	<p>Availability or access to off-farm cleaning and processing facilities</p>	<ul style="list-style-type: none"> • Emerging crops may require specialized cleaning or processing lines (e.g. dehusking, steam-flaking, etc.) that existing local or regional infrastructure may not have or be economically viable to operate at smaller scales of processing (MFAI 2025, Savanna Institute 2025). • In the absence of local processing options, farmers are forced to ship or transport raw products over long distances, increasing costs and carbon emissions, and removing economic opportunities from local communities (MFAI 2025). • Organic Valley has a <i>100% Grass-Fed</i> line of fluid milk but with just one truck route in the state, producers may have limited access unless enough dairy producers in their area are raising grass-fed livestock; smaller family-run farms often direct market grassfed milk or dairy to consumers from their farms or farmers markets (Grassland 2.0 2025, Organic Valley 2025a, Organic Valley 2025b). • Since 2020 there has been an increase in USDA-certified mobile slaughter units in Wisconsin; however, there are currently (17) mobile meat processors located in (15) counties (DATCP 2024b), leaving 16 counties with

		<p>significant agricultural focus (AEAs) and livestock graziers without sufficient access to processors certified to process grass-fed meats.</p> <ul style="list-style-type: none">• Investing in mobile processing and geographically-clustered infrastructure located where producers are can unlock local markets for emerging crops, keep value in local communities, reduce overhead costs that can reduce price to consumer, and reduce carbon emissions in transport."
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Table 2. Summary of key barriers to adoption of NCS practices in Wisconsin: “*The Missing Middle*” of Perennial Food Supply Chains

Systemic Barriers		Description
Off-farm post-harvest handling & processing	Limited processing and distribution infrastructure for perennial crops	<ul style="list-style-type: none"> • While existing state assets provide a foundation for perennial crops and grassfed milk or meat processing (e.g., cranberry, grapes, apples, cherries and strawberry processing centers; Northland College/UW-Madison Extension nut processing infrastructure; Artisan Grain Collaborative’s network of small-grain processors, Organic Valley grassfed dairy, and grass-fed beef cooperatives, etc.), they are limited across the state, reducing access for producers of perennial products (Grassland 2.0 2025, MFAI 2025, Savanna Institute 2025). • Underdeveloped processing (e.g. cleaning, drying, milling, juicing, packaging), storage (e.g. food-safe dry storage, refrigeration, freezers) and distribution infrastructure (e.g. dedicated transport) for specialty small grains, nuts, berries, and grassfed milk and meat products in Wisconsin limits entry to critical markets and stalls value-chain development (Grassland 2.0 2025, MFAI 2025, Savanna Institute 2025). • Significant infrastructure gaps constrain access and reduce adoption of perennial practices across Wisconsin’s agricultural landscape (MFAI 2025, Savanna Institute 2025)..
	High operating costs for small- and mid-tier processors	<ul style="list-style-type: none"> • Emerging perennial crops and grassfed products often require specialized equipment and infrastructure, such as dehusking and cracking equipment for nuts; steam-flaking and color-sorting for small-grains; de-stemmers, juice presses and sterilizing equipment for berries; food-safe dry storage such as ProBoxes, refrigeration and freezers, and refrigerated transport vehicles (Grassland 2.0 2025, MFAI 2025, Savanna Institute 2025).. • High equipment costs put this technology out of reach for small- and medium-scale processors without early-stage processing grants or cost-share support (Grassland 2.0 2025, MFAI 2025, Savanna Institute 2025). • Small- and medium-scale processors cannot match prices set by large facilities operating at 45,000+ lbs, as their operating costs exceed their processing capacity, increasing costs to producer and end-user (MFAI 2025).
Markets	Market access	<ul style="list-style-type: none"> • Outside of commodity systems, markets for nuts, small berries and perennial grains are underdeveloped with high entry costs for existing certified-organic and regenerative organically certified (ROC) markets, including certifications, and burdensome verification processes (Bennell et al. 2021).

		<ul style="list-style-type: none"> ● Absence of consistent grading standards and product specifications for emerging perennial crops (e.g., hazelnuts, elderberries, aronia, Kernza®) disrupts supply chain efficiency, complicates processing, product development, distribution, and logistics planning, and creates uncertainty for buyers, limiting market access (Savanna Institute 2025). ● Market development is needed to create consistent grading standards and product specifications, develop new products, diversify market opportunities and to strengthen supply chains of perennial crops and systems.
	Marketing and distribution	<ul style="list-style-type: none"> ● Processing of emerging, perennial crops and products requires post-harvest handlers and food-product businesses to navigate new or emerging markets and market uncertainties, develop new products or serve as intermediaries to supply existing product lines, optimize operations and financial performance and to market their products through wholesale or retail distribution, either individually or cooperatively (Savanna Institute 2025, MFAI 2025, Ecotone Analytics et al. 2023). ● Food-related entrepreneurs need access to entrepreneurial tools, marketing and business development support for informed decision-making and effective marketing strategies, to ensure returns on investment and commercial viability (MFAI 2025, Ecotone Analytics et al. 2023). ● Low consumer awareness of nutrient-dense foods grown in Wisconsin (such as hazelnuts, aronia, elderberry and Kernza®) is a result of under-resourced marketing and an untapped potential (Savanna Institute 2025, MFAI 2025). ● Warehouse infrastructure, distribution assets and traceability technology are all currently lacking for perennial product development and urgently needed.
Capital & Finance	Enabling investments	<ul style="list-style-type: none"> ● Many farmers and small businesses lack the financial resources to meet costly match obligations, effectively excluding them from critical infrastructure grants needed to build local processing facilities, storage, and distribution networks. ● High barriers to matching funds slows the development of essential supply chain infrastructure that could create rural jobs tied to emerging perennial crops and grazing systems (Savanna Institute 2025). ● While federal programs such as the USDA-Resilient Food Systems Infrastructure Grant (\$41 million for food supply chain resilience) and the USDA-Specialty Crop Block Grants (SCBG) (\$1.3 million for new and emerging crops) have supported physical infrastructure— particularly

		<p>for tree crops such as chestnuts and berry development– these federal grant programs are highly competitive and overly subscribed, leaving small and medium-sized food-businesses with few financially viable options to fund early-stage processing (DATCP 2023).</p> <ul style="list-style-type: none"> ● Complexity and time demands of grant applications deter smaller actors from pursuing funding, limiting the diversity and reach of perennial value chain investments (MFAI 2025, Savanna Institute 2025). ● Lack of early-stage processing subsidies for capital-intensive investments or dedicated capital pools for perennial agriculture infrastructure delays value chain development, hinders grower adoption by creating uncertainty around market access and long-term viability, and stalls job creation in rural areas where these facilities could serve as economic anchors (MFAI 2025, Savanna Institute 2025). ● Grant restrictions on soft-cost spending, such as value chain coordination (e.g. project management, post-harvest technical assistance, relationship and network building, and information-sharing channels) limits impact (Savanna Institute 2025, Food Systems Leadership Network, n.d.) ● Enabling investments are needed to support processing and storage infrastructure, and supply chain and traceability technology (RFSI 2025, World Economic Forum 2024, Bennell et al. 2021). Without more accessible and flexible funding mechanisms, rural communities struggle to develop the processing capacity and skilled workforce necessary to scale perennial agriculture and drive broader economic growth.
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Table 3. Summary of key barriers to adoption of NCS practices in Wisconsin: *State-level enabling conditions*

Systemic Barriers		Description
Research, development and extension	Public agriculture research and development of perennial crops and grassfed livestock	<ul style="list-style-type: none"> • Emerging crops may require further crop breeding to select for improved genetics under differing climate and soil conditions that are aligned with production/post-harvest processing needs and consumer tastes, or development of new propagation techniques to rapidly expand nursery stock and increase access for farmers (see <i>Wisconsin Emerging Crops Strategic Plan</i>, Fischbach and Mirsky 2024). • Nutritional analysis for many perennial crops suitable to Wisconsin is lacking, though such data is a foundational step for advancing emerging crops into mainstream markets and public food systems to guide public research and breeding investments, strengthen market adoption and consumer confidence, and advance public health and climate goals. • Applied agro-economic analyses are urgently needed to develop or refine average yield, production cost, market value, and potential return-on-investment for emerging crops and dairy heifer grazing to help inform farmer adoption decisions and to quantify total economic value potential for the state.
	Technical assistance and extension services	<ul style="list-style-type: none"> • Technical Assistance Providers (TAPs) implement federal, state and local agriculture and conservation programs through state NRCS offices, Land and Water Conservation Departments (LWCDs), university and extension programs (e.g. UW-Extension, UW-Madison’s Grassland 2.0, Food Finance Institute, etc.), and civic sector intermediaries (e.g. Savanna Institute, Michael Fields Agricultural Institute, Grassworks Inc., etc.). • TAPs provide critical training, demonstration, and technical support for natural climate solutions like agroforestry and rotational grazing; for example: <ul style="list-style-type: none"> ○ The Grassland 2.0 Academy have shown early success in training-the-trainers (i.e. LWCD and USDA-NRCS TAPs) in rotational grazing, generating over 130 graduates and 90 new grazing plans in just 2 years. ○ In 2024, USDA-NRCS partnered with the Savanna Institute to launch a \$1.4 million agroforestry demonstration network to create a support system focused on peer-to-peer education, demonstration, and on-farm research in the state in response to the high demand for agroforestry technical services in Wisconsin (NRCS

		<p>2023b; Savanna Institute 2023).</p> <ul style="list-style-type: none"> • Demand for assistance far exceeds supply due to insufficient state budgetary allocations– and subsequent staffing shortages– and recent federal funding cuts to USDA programs, limiting the capacity to support producers and meet statewide conservation and climate goals (WI Land & Water 2025). • Without consistent state investment in technical assistance and training programs, these efforts remain vulnerable to shifting federal priorities and short-duration philanthropic grant cycles. • Stable state investment is essential to maintain and expand technical assistance capacity to help farmers boost productivity, enhance soil and water quality, and achieve long-term ecological and economic resilience(WI Land & Water 2025).
<p>Policies & Programs</p>	<p>Agricultural programs and incentives</p>	<ul style="list-style-type: none"> • While much progress to advance water quality and soil health has been made in Wisconsin through state programs like Soil & Water Resource Management (SWRM) grant program, the Conservation Reserve Enhancement Program (CREP) and the Nitrogen Optimization Pilot Program (NOPP), among others, agricultural policies and state program incentives in Wisconsin fail to target the practices most effective at reducing GHG emissions for the long-term. • Public funding for improved agricultural practices are underfunded and oversubscribed, often duplicating practice incentives and reducing funding for more impactful climate solutions. • Strategic program and capital coordination is needed to direct financial and human resources into transitioning existing systems for climate resiliency, with expanded priority, eligibility and funding for natural climate solutions practices and systems, simplified application processes and metrics, realistic timelines for perennial establishment and transition. • See APPENDIX D_NCS Policy Recommendations
	<p>Risk management, Insurance and</p>	<ul style="list-style-type: none"> • The USDA-Risk Management Agency has discretion over crop insurance policy offerings, coverage, and administration. Federal crop insurance heavily favors major commodity crops,

<p>Pre-disaster risk mitigation</p>	<p>leaving high-value perennial crops and systems with minimal and expensive coverage, complex requirements, and restrictive rules that discourage adoption of sustainable practices like agroforestry and rotational grazing (NSAC 2025, USDA-ERS 2025b; Agroforestry Partners 2024, Asprooth et al. 2024, O'Neill & Kerska 2021, USDA-FSA 2019).</p> <ul style="list-style-type: none"> • Commercial insurance rates and forms are not filed within the Wisconsin's Office of the Commissioner of Insurance, so there is limited state oversight in the types of multi-state agricultural insurance policies farmers can choose from. • The Division of Wisconsin Emergency Management (WEM) provides mitigation, preparedness, response and recovery resources and planning services to municipalities, counties, regional planning commissions, federally-recognized Tribal Nations and non-profit organizations; according to the National Institute of Building Sciences (Multi-Hazard Mitigation Council 2019), for every \$1 spent on mitigation saves an average of \$6 in future reduced losses. • Pre-disaster mitigation in Wisconsin is advanced through WEM's 2021 State Hazard Mitigation Plan, including funding through the Pre-Disaster Flood Resilience grant program. • Currently there are no explicit incentives in place within the pre-disaster program stream for the adoption of agricultural practices that reduce flooding or wind damage risks and contribute meaningfully to climate risk mitigation. • Policy reforms are needed to expand insurance options and pre-disaster mitigation incentives, simplify program access, and develop risk models that better support natural climate solutions.
<p>Rural agro-economic development</p>	<ul style="list-style-type: none"> • Rural economic development programs offered through the Wisconsin Economic Development Corporation (WEDC) have provided crucial training, resources and support for rural communities including entrepreneurship and rural industry, housing, placemaking, broadband, leadership and organizational development, in partnership with USDA-Rural Development, regional economic development directors (REDD), UW-Extension Community Economic Development, UW System for Business and Entrepreneurship, and early-stage venture funds and fund managers. • Agricultural economic development has largely been within the purview of DATCP, with WEDC food-based services focused on cooperative development or export-oriented trade; growing interest within the WEDC-Office for Rural Prosperity to expand further into sustainable agriculture. • As of 2025, there are 51 Agricultural Economic Areas (AEAs) across 31 counties with significant agricultural focus in Wisconsin (DATCP 2025a).

		<ul style="list-style-type: none"> ● Business capitalization grants are needed to help rural, perennial agriculture entrepreneurs, cooperatives and established small- and medium-sized businesses invest in equipment, storage, processing and distribution infrastructure to help bring perennial crops and grass-fed products from farm gate to retail and consumers (Ecotone Analytics et al. 2023). ● Producers, processors, and buyers often operate independently, lacking a centralized system to coordinate efforts or share information; value-chain coordination is needed. ● Limited funding in existing DATCP grants for essential “soft costs” like facilitation, post-harvest technical assistance, and value chain engagement, which hampers supply-chain collaboration and economic network development needed for sustainable growth. ● The long-term sustainability of agriculture in Wisconsin requires strategic investments in value chains and market development to support grower adoption of perennial systems, infrastructure, and growth of rural workforces and economies.
	Labor and Workforce development	<ul style="list-style-type: none"> ● Wisconsin faces a persistent workforce shortage—averaging 93,000 openings monthly since 2021 (Boyce and Deller 2025, Deller and Hadachek 2022). ● In rural areas an aging workforce, mismatched skills compared to job requirements, challenges such as unreliable transportation, limited childcare and housing constraints disproportionately affect women and lower-income populations contribute to this shortfall (Boyce and Deller 2025). ● Immigration policies impede consistent labor supply across all agricultural sectors. ● Lack of skilled workforce in rural areas is amplified in sectors like perennial agriculture with less infrastructure and training services available. ● Workforce Development generally emphasizes automation, efficiency, robotics, and other broadly applicable agricultural technologies tailored to commodity crops and confined animal dairy operations (DWD 2024), but there’s a lack of programming for management, harvest and post-harvest handling, quality control, specialized processing, product manufacturing or distribution logistics tailored to the needs of perennial crops and products such as nuts, small berries, small grains and grassfed dairy.
	State coordination	<ul style="list-style-type: none"> ● The 2021 Wisconsin Department of Natural Resource (DNR)’s Greenhouse Gas Inventory utilizes outdated greenhouse gas emissions data.

		<ul style="list-style-type: none"> ● Governor’s Task Force on Climate Change and Office of Sustainability and Clean Energy (OSCE)’s Priority Climate Action Plan (OSCE 2022) authorized DATCP to pay farmers for increasing soil carbon through: <ul style="list-style-type: none"> ○ Producer-Led Watershed Protection Program (PWPP) grants ○ Commercial Nitrogen Optimization Pilot Program (NOPP) ○ Crop insurance premium rebates for planting cover crops ○ Nutrient management farmer education ● Our analyses indicate that these initiatives alone are insufficient to reduce Wisconsin’s agricultural emissions by 2050. ● While modest inter-agency collaboration exists (e.g. DATCP and WEDC on Beginning, Minority, and Underserved Farmer Assistance Program), WI state agencies and department programs remain highly siloed, missing key opportunities to streamline and direct targeted, high-impact public investments into natural climate solutions via rural, agro-economic development (DATCP, WEDC), water/conservation protections (DNR), and pre-disaster mitigation programs (WEM).
Capital and finance	Enabling investments	<ul style="list-style-type: none"> ● Market mechanisms—<i>such as product premiums, cost savings, and payments for ecosystem services</i>: <ul style="list-style-type: none"> ○ Product premiums exist in Wisconsin for grass-fed meat, poultry and dairy, organic and regenerative-organic certified (ROC) crops, but not guaranteed; timing of the financial benefit may not align to support the immediate transition stage (e.g. agroforestry tree crops)(RFSI 2025). ○ Payments for ecosystem services are under-developed or not well-established: <ul style="list-style-type: none"> ■ Voluntary Carbon Markets (VCMs) and Compliance Carbon Markets (CCMs) are becoming easier for smaller landowners to participate but are still relatively nascent outside of large landholdings (PDP 2025, UW Extension-Forestry 2025, Gathering Waters 2022). ■ Biodiversity markets have been around for decades—particularly for wetlands— but not particularly well-known nor utilized (Sarsfield 2025, Madsen 2024). ■ Biochar markets (CDR.FYI 2025) are in their infancy, and not yet available in Wisconsin. ● Public funding—<i>grants, loans, bonds and cost-share programs</i>: <ul style="list-style-type: none"> ○ Misaligned with the practices that will significantly reduce GHG emissions <i>and</i> provide economic gains. ○ Those that include eligibility for new/next generation farmers or perennial crops and grazing systems are underfunded and oversubscribed²: <ul style="list-style-type: none"> ■ Beginning, Minority, and Underserved Farmer Assistance:

² All FY24 funding/allocation summaries that follow provided by WEDC 2024.

		<ul style="list-style-type: none"> ● No state funding or incentives available³ ■ Buy Local, Buy Wisconsin Grant Program <ul style="list-style-type: none"> ● \$200k funded 5 projects ■ Farm to School and Institutions <ul style="list-style-type: none"> ● 26% of 31 applications selected, \$250k funded 8 projects⁴ ■ Grow Wisconsin Dairy Processor Grants <ul style="list-style-type: none"> ● 42% of 36 applications selected, \$400k funded 15 projects ■ Meat Processor Infrastructure Grant Program <ul style="list-style-type: none"> ● 54% of 70 applications selected, \$1.8m funded 38 projects ■ Organic Certification Cost-Share Program <ul style="list-style-type: none"> ● 99% of 498 applications received a rebate; \$490k was distributed to 30% of Wisconsin's 1,656 certified organic operations. ■ USDA-Specialty Crop Block Grant <ul style="list-style-type: none"> ● No data on % of total applications selected; \$1.2m funded 16 projects <p>○ Places burden on public tax dollars and is susceptible to changes in the political environment.</p> <p>○ With the prime interest rate at around 7.5%, most farmers, new agribusinesses, and small businesses cannot afford the loans and bonds available to them:</p> <ul style="list-style-type: none"> ■ The Economic Development Conduit Bond Issue Program was established through Wisconsin State Statute §234.65 to provide Wisconsin businesses financing that will create and retain jobs in the state of Wisconsin, and promote economic development in both rural and urban communities. <ul style="list-style-type: none"> ● Eligibility includes facilities for the production, packaging, processing, or distribution of raw agricultural commodities. ● In fiscal year 2024, no bonds were issued (WEDC 2024). ■ The Wisconsin Development Reserve Fund (WDRF) Agribusiness Program was established through Wisconsin State Statute §234 to provide loan guarantees to farmers, other agribusinesses and small businesses, with variable rate loans not to exceed the prime rate plus 2.75%. <ul style="list-style-type: none"> ● Up to \$34.8 million in guarantee authority is available for all WDRF programs, including agribusiness. ● In fiscal year 2024, no applications were received nor guarantee payments were processed (WEDC 2024). <ul style="list-style-type: none"> ● Corporate financing—industry partnerships that provide premiums or incentives for producers in their supply chain: ● Private capital— leveraged through direct and indirect investment through funds from investors, institutions, insurance companies and philanthropic organizations:
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³ FY24, five workshops/outreach events funded by USDA 2501 Grant, and The Wisconsin Beginning Farmer Resource Guide (WEDC, DATCP) funded by USDA-Farm Service Agency (WEDC 2024).

⁴ FY24, funded by USDA Specialty Crop Block Grant (\$100k) and USDA Farm to School Grant (\$400k); Farm to School Program Administration: \$90.6k (WEDC 2024).

		<ul style="list-style-type: none"> ● Public-private investments– Nascent. <ul style="list-style-type: none"> ○ Wisconsin Investment Fund (est. 2023) leverages <i>public and private dollars to increase investment in WI companies and to empower small businesses to access capital needed to invest in expanding opportunities</i> (WDEC 2024). <ul style="list-style-type: none"> ■ With a total 10-year program allocation of \$50 million, in fiscal year 2024, \$1.35 million funded five investments. ○ Green Innovation Fund (est. 2023) leverages <i>public and private funds to invest in strategic energy efficiency and renewable energy projects</i> (WEDC 2025). <ul style="list-style-type: none"> ■ Requests for proposals are open, though the current status of available funding is unknown. ○ Strategic Investment Fund (est. 2024) supports projects <i>strategically forwarding WEDC’s mission and vision</i>, including fueling financial stability, supporting healthy living, reinforcing community infrastructure and respecting the environment. <ul style="list-style-type: none"> ■ In fiscal year 2024, \$2.2 million funded 2 projects (WDEC 2024).
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