

Supply Chain Mapping Assessment for Resilient Food Systems Infrastructure Grant

Final Report

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Executive Summary

Eastern Research Group, Inc. (ERG) and the Massachusetts Food System Collaborative (MAFSC) conducted a supply chain mapping assessment to understand how the Massachusetts Department of Agricultural Resources (MDAR) could best leverage Resilient Food Systems Infrastructure Program (RFSI) funds to strengthen the middle of the local food supply chain in Massachusetts. As part of this assessment, ERG and MAFSC conducted a literature review, developed a repository of mid-supply chain assets (e.g., entities working in the mid-supply chain), and conducted extensive stakeholder outreach.

In the literature review, ERG and MAFSC identified 20 resources that listed or mentioned mid-supply chain assets supporting the local food system in Massachusetts. ERG compiled the assets from these resources into an Excel-based repository and added other assets as they were identified throughout the project. The asset repository has a total of 146 entities, 107 of which are located within Massachusetts. Table E-1 presents a summary of the number of entities by their primary role in the supply chain.

Table E-1. Number of Entities Identified by Primary Role

Primary Role	Number of Entities
Aggregator	32
Cold storage	2
Commercial kitchen	25
Distributor/wholesaler	32
Food hub	18
Manufacturer	2
Meat slaughter	14
Processor	20
Transportation	1
Grand Total	146

A central component of this assessment was stakeholder outreach. ERG and MAFSC held 7 focus groups and interviewed 15 stakeholders across the middle of the supply chain with the goal of better understanding where a tool or a resource could improve coordination and increase efficiency in the mid-supply chain. Key takeaways from outreach include:

- Need for better coordination among entities doing similar work to increase collaboration and avoid redundancies;

- Interest in understanding the capacity of existing assets, and where there might be excess or idle capacity;
- Potential for reducing costs by coordinating transportation;
- Interest in understanding the source and supply relationships between assets;
- Challenge in maintaining any tool developed;
- Interest in using the tool for emergency response; and,
- The need to address the seasonality of production through expanded storage capacity and facilitating sales of excess product during peak production season by connecting sellers and buyers.

Based on ERG and MAFSC's literature review and conversations with stakeholders, ERG and MAFSC recommend that MDAR consider one or more of the following actions, which may be combined into projects with varying levels of resource commitments:

1. **Continue to develop the repository of existing mid-supply chain assets.** The repository could include updated information on publicly funded assets and static information on private assets (low level of effort); updated regularly with detailed information on all assets (medium level of effort); or updated continuously with detailed information on all assets (high level of effort).
2. **Update and market MassGrown Exchange.** Conduct a marketing campaign to advertise MassGrown Exchange to increase usership of the current platform (low level of effort). MDAR could also consider relatively minor modifications to the platform that would allow the capture of information from postings into the repository, and mechanisms to keep listings and profiles current (medium level of effort). Further, the MassGrown Exchange could be revamped to improve user experience, add functionality, and become a more widely used resource (high level of effort).
3. **Hire a third party convener to host regular coordination meetings.** A third party could host regular meetings with food hubs, processors, and aggregators to facilitate relationship building and collaboration. The frequency and target audiences of coordination meetings could be more or less involved, as needed to support the level of effort of other project activities.
4. **Commit MDAR staff time for mid-supply chain coordination.** A staff person could work on overseeing and coordinating any of the above actions and serve as the point of contact for these projects.

Finally, from among the potential actions and project alternatives, the ERG and MAFSC team recommends these steps for moving forward with the development of a mid-supply chain resource or tool:

1. Conduct targeted outreach to discuss coordination and lessons learned

2. Make design decisions
3. Survey for asset details
4. Build tool
5. Conduct analysis of needs for additional cold storage
6. Market and update MassGrown Exchange
7. Convene food hubs and other processors on a regular basis

Several overarching ideas have emerged over the course of the project, through the literature review, stakeholder outreach and additional research, that are relevant to any project MDAR pursues:

- Decisions regarding the scope and design of a new mid-supply chain resource or tool should consider existing efforts and tools to avoid duplication and take advantage of potential synergies.
- Successful tools often begin with a narrow scope and evolve to build additional features and functionality. An incremental or phased approach to tool development may be most appropriate.
- Maintenance needs of a resource or tool should be considered in resource or tool design, particularly in relation to building stakeholder trust.
- Additional information on specific assets held by mid-supply chain entities listed in the asset repository is necessary to inform any analysis of gaps or redundancies.
- The willingness of asset owners to provide details sought by MDAR and other stakeholders should be assessed prior to committing significant resources to develop a tool whose value depends on inclusion of those details.
- Stakeholders expressed a strong desire for opportunities to meet and coordinate and did not express a strong preference for the format or functionality of a new tool or resource.

Introduction

In the fall of 2025, MDAR partnered with ERG and MAFSC for a Supply Chain Mapping Assessment to better understand the current landscape of the mid-supply chain for local food in Massachusetts. Supported by Resilient Food Systems Infrastructure (RFSI) funds awarded by USDA to help states strengthen and build resilience in the middle of the supply chain, MDAR seeks to develop a comprehensive understanding of existing and relevant food system assessments and mapping assets. MDAR's objectives are to: (1) identify critical food supply chain infrastructure in Massachusetts and bordering areas and (2) inform the development of a tool or resource of local food supply chain assets. To meet these objectives, this study evaluates existing resources—focusing primarily on aggregation, processing, storage, and distribution of

locally grown, raised or harvested food products in Massachusetts—with the goal of developing recommendations for a future tool or resource that can guide policy and investments to strengthen the mid-supply chain.

To support this effort, the ERG team conducted a literature review, engaged local stakeholders, and identified knowledge and infrastructure gaps using the data collected. The literature review synthesized existing food system assessments and resources and identified relevant mid-supply chain assets, which were compiled into an initial asset repository. Building on this foundational knowledge, ERG and MAFSC conducted stakeholder interviews and focus groups, speaking with roughly 60 people working across the mid-supply chain in Massachusetts and beyond. Providing insight into current resources, stakeholder perceptions of these resources, and infrastructure gaps, this mixed-methods approach strengthens understanding of the mid-supply-chain landscape in Massachusetts and surrounding areas.

This report synthesizes the findings of the literature review and stakeholder engagement into key insights and recommendations. These results will help guide MDAR’s future resource allocation and support the development of a tool or resource that effectively strengthens the mid-supply chain.

Literature Review and Asset Repository

Approach

To support a more comprehensive understanding of the landscape of mid-supply chain assets in Massachusetts, ERG and MAFSC conducted a review of relevant literature and resources on the mid-supply chain and developed a repository of mid-supply chain assets located within the Commonwealth and surrounding areas. The literature review and the development of the asset repository consisted of three main steps: determining the asset types of interest, conducting a literature review, and compiling assets into the repository.

Determining Relevant Asset Types

Before developing the repository, ERG and MAFSC worked with MDAR to identify the types of assets to research and include in the repository, the location of assets we should consider, and the scale of the relevant assets. MDAR also conducted preliminary outreach with key contacts to get feedback on asset types to include in the repository.

The relevant asset types for this project include all mid-supply chain assets other than retailers or producers. These assets include the following organization types¹:

- Aggregators (including food banks)
- Food hubs
- Cold storage facilities
- Dry storage facilities
- Commercial kitchens
- Distributors/wholesalers
- Processors (including meat and dairy processing)
- Manufacturers
- Meat slaughter facilities
- Transportation

Relevant assets include those located within Massachusetts as well as assets in neighboring states that serve the Massachusetts food system. Specifically, the repository includes assets located in counties that border Massachusetts and assets located farther away that process or transport local food products² for distribution in Massachusetts. We focused on assets that are medium-to-large sized and work with mostly or a significant volume of local food.

Literature review

ERG and MAFSC conducted a literature review to identify reports, datasets, or other resources that documented existing mid-supply chain assets in Massachusetts and the surrounding areas. The literature review identified resources we could use to populate the repository. We reviewed resources that were recommended by MDAR, identified through online searches, and those suggested by interviewees or focus group participants.

After reviewing each resource, we pulled the following key information about each resource into a spreadsheet:

- Year published or year of last update;
- Summary of the resource;
- Geographic coverage; and,
- The relevant asset types the resource discusses.

¹ The project team conducted this phase of the project with an understanding that the definition of relevant asset types may change as the project continues and as we gain a better understanding of the potential scope of the tool.

² For the purposes of this project, local products were considered to be those produced, harvested or raised in the New England and New York region.

ERG and MAFSC identified a total of 20 resources that include lists of relevant assets in Massachusetts and bordering areas.

Repository Scoping and Building

We used the resources identified in the literature review to develop the asset repository. We pulled names of relevant entities and added information mentioned in each resource to a list, supplementing the information with additional details gathered through online searches. The initial asset repository captures the following details for all entities identified:

- Primary product type served (one or more of the following)³
 - Meat and Meat Products
 - Dairy Products
 - Eggs and Egg Products
 - Seafood and Seafood Products
 - Fresh Fruits and Vegetables
 - Processed Fruits and Vegetables
 - Grains, Grain Products and Baked Goods
 - All Other Food Products
- Primary role in supply chain (one of the following)
 - Aggregator
 - Cold Storage Provider
 - Commercial Kitchen
 - Distributor/wholesaler
 - Food hub
 - Manufacturer
 - Meat slaughter
 - Processor
- Secondary role (one or more of the above roles)
- Contact information
- Street Address
- County
- State
- The source of each asset (the resource the asset was pulled from).
- Whether the asset is likely in scope (Yes or Maybe).⁴

³ Product types were defined using the [Local Food Count](#) categories, excluding beverages and sweeteners.

⁴ Because we relied on publicly available information, some entities did not have sufficient information available to determine whether they fall within the defined scope. For example, an entity that is based

ERG, MAFSC, and MDAR decided to include the above information in the asset repository because it is publicly available, and provides enough information for a basic understanding of the geographic coverage of assets and availability of each type of asset in the Commonwealth. This initial set of information is also intended to facilitate a survey of asset owners in a subsequent project phase to gather additional information about each asset, such as capacity and equipment details. The “Design Considerations for MDAR” section of this report details the type of information that MDAR could consider surveying for.

Findings

The asset repository as of March 2026 is located [here](#). It includes all assets the team identified through reports, online resources and input from interview and focus group participants. However, the repository should be treated as a living document. If used for tool development in Phase II of the project, the repository should be updated to include all assets available at the time.

Summary of Asset Repository

The asset repository currently contains 146 entities. As seen in Table 1, ERG and MAFSC identified 107 mid-supply chain entities that are located in Massachusetts. The counties with the fewest identified assets are Berkshire, Dukes, and Hampshire counties, and the counties with the most identified assets are Essex, Middlesex, and Suffolk counties. Aggregators and distributors make up nearly half of all assets identified in the commonwealth.

in Massachusetts but does not have clear information on whether they work with a significant volume of local food would have a “Maybe” in this column.

Table 1. Number of Identified Entities in Massachusetts by Primary Role and County

County	Aggregator	Cold storage providers	Commercial kitchen	Distributor/ Wholesaler	Food hub	Manufacturer	Meat slaughter	Processor	Grand Total
Barnstable	5	0	1	6	1	0	0	0	13
Berkshire	0	0	0	0	1	0	0	0	1
Bristol	1	0	2	3	1	1	1	3	12
Dukes	2	0	0	0	0	0	0	0	2
Essex	2	1	3	2	4	0	0	3	15
Franklin	1	0	1	1	1	0	0	2	6
Hampden	1	1	3	1	0	1	0	0	7
Hampshire	0	0	1	1	0	0	0	0	2
Middlesex	4	0	5	4	1	0	1	0	15
Norfolk	1	0	1	0	1	0	0	1	4
Plymouth	4	0	0	2	1	0	0	0	7
Suffolk	7	0	2	5	1	0	0	1	16
Worcester	1	0	1	0	3	0	1	1	7
Grand Total	29	2	20	24	15	2	3	11	107

In the repository, ERG and MAFSC included the product type that each asset handles. One asset often had multiple product types listed if it worked with multiple types of products. Table 2 shows the number of assets that work with each product type.

Table 2. Number of Identified Assets by Product Type

Product Type	Number of Assets [1]
Fresh Fruits + Vegetables	63
All Other Food Products	47
Meat + Meat Products	45
Seafood + Seafood Products	38
Dairy Products	23
Grains, Grain Products + Baked Goods	21
Eggs + Egg Product	17
Processed Fruits + Vegetables	13

[1] Includes all assets within and outside of MA

As seen in Table 2, the entities in the asset repository are most commonly focused on fresh fruits and vegetables. In contrast, processed fruits and vegetables are supported by the fewest assets in the repository.

Limitations

The repository identifies the primary role each asset plays in the supply chain, but it does not capture all of the equipment or facilities that those entities may own. For example, a food hub might have additional physical resources (such as cold or dry storage, processing equipment and trucks), that are not listed in the repository. Because the repository is based solely on publicly available information, we were unable to document the full range of equipment or facilities each entity may possess beyond its main role. More detailed information is therefore needed to draw conclusions about where there are supply chain gaps across Massachusetts. A survey of entities could gather more detailed information about each entity's infrastructure and operations than what was possible to capture through publicly available sources.

Outreach

Approach

Stakeholder engagement was a primary component of the project. ERG and MAFSC developed a stakeholder engagement plan with three phases: preliminary MDAR outreach to key stakeholders, ERG and MAFSC outreach to a broader group of stakeholders, and a survey to

asset owners to gather asset details for the repository⁵. The results of MDAR's outreach were used to develop questions that were used by ERG and MAFSC in the second phase. ERG and MAFSC engaged with stakeholders across a diversity of supply chain roles and representing all geographic regions of the state through 15 interviews and 7 focus groups. ERG developed the list of stakeholders in cooperation with MDAR. We organized focus groups by grouping stakeholders with similar roles in the supply chain to facilitate sharing of ideas. We also conducted additional interviews to accommodate scheduling and to connect with stakeholders with unique positions within the supply chain. Prior to interviews and focus groups, attendees were told that all feedback would remain anonymous to MDAR, to ensure that participants felt they could speak freely. The questions discussed during interviews and focus groups can be found in Appendix A. Tables 3 and 4 summarize the number of interviews and focus group attendees.

Table 3. Number of Interviews by Organization Type

Organization Type	Number of Entities Interviewed
Non-profit	4
Academic	3
Producer	2
Government	2
Distributor/Wholesaler	2
Food Hub	1
Financial Institution	1
Total Number of Interviews	15

Table 4. Number of Attendees per Focus Group

Focus Group	Number of Attendees
Food Hubs & Processors	8
Food System Planning	7
Institutional Buyers	5
Hunger Relief	5
Dairy	5

⁵ Surveying asset owners is envisioned as part of the follow-on project, as described in more detail below.

Seafood	3
Meat & Poultry	3
Total Focus Group Attendees	36

Findings

Several cross cutting themes emerged from the stakeholder outreach that provide valuable insight into the potential value and design of a middle-of-the-supply chain tool or resource.

Coordination

Many stakeholders emphasized the need for better coordination to improve efficiency in the use of supply chain assets, especially storage and transportation. Stakeholders mention that coordination is currently achieved through existing relationships through phone calls or emails. A tool could facilitate coordination by showing assets by type and location to facilitate the identification of potential partners. Stakeholders also highlighted the value of information about capacity (total, excess, expansion potential) and transportation routes (routine schedules and/or sporadic) and suggested additional functionality that could facilitate further and more pointed communication.

Ultimately, stakeholders view a tool as a means to establish new relationships. Food hub representatives expressed the strongest interest in a tool to facilitate identification of potential partners, but also emphasized the need for opportunities to come together to exchange ideas and discuss opportunities for coordination. In contrast, representatives from the dairy industry noted that they already have established relationships within their sector, and therefore a tool for this purpose would have limited value for them. Some seafood sector stakeholders also expressed a reluctance about using a new tool to coordinate. Producers and buyers may use the tool to identify new partners. However, outreach suggested that the primary issue is not a lack of awareness of other entities in the space, but rather a lack of coordination among them.

Capacity

Another major theme from our stakeholder outreach is the importance of including information on the capacity of assets in a tool.⁶ Different measures of capacity offer value for different purposes. Total capacity provides insight into the maximum throughput of the existing supply chain and may help identify bottlenecks in certain asset types and/or locations. Excess capacity, and the willingness or ability of asset owners to offer excess capacity to additional partners or in an emergency response, is an indicator of potential gains in efficiency in the supply chain, but

⁶ Capacity metrics vary by asset type, for example square footage for storage, maximum weights for trucks, etc.

can be very dynamic and difficult to capture in a timeframe that is useful. Finally, expansion potential is also useful to understand in the context of efforts to increase capacity, where existing facilities and management might be scaled up more easily than establishing new facilities.

Several stakeholders expressed an interest in identifying where idle assets may be available (i.e. cold storage or warehouse space at businesses that are no longer in operation). Depending on the type of asset, including these in a tool may be more useful for long-term planning than for meeting any short-term needs. For example, managing unused cold storage spaces invokes food safety considerations due to requirements to maintain temperatures within specified ranges, whereas dry warehouse space may be easier to put into production quickly.

Transportation

Reducing operating costs through coordinated transportation emerged as a consistent theme in our outreach, given the large share of total costs that transportation can represent. Many stakeholders describe routes where trucks are empty in one direction because they cannot identify opportunities for route sharing. The high cost of owning and operating refrigerated trucks, in particular, contributes to inefficiencies when routes are not optimized.

Stakeholders repeatedly expressed a desire to improve transportation coordination but also emphasized the difficulty in coordinating routes that frequently change. Management of transportation logistics across independent entities is a particular challenge that can require regular communication, coordination and liability agreements. There may be regular routes that could be more easily incorporated into a tool, or a tool that allows users to post routes with available capacity could address more dynamic needs.

Several stakeholders mentioned the difficulty of finding truck operators with commercial drivers licenses. While a new supply chain resource or tool would not directly address this shortage, a tool that facilitates coordination of trucking, or even driver sharing, could alleviate this problem.

Relationships

Some stakeholders indicated an interest in seeing information about the relationships between assets. For example, a tool could include information on which producers are selling to a particular distributor, or who a distributor is selling to.⁷ Information about these relationships would enable users to see the flow of products through the supply chain, which would also

⁷ Two studies that illustrate supply chain relationships between assets are: [Five Borough Food Flow: 2016 New York City Food Distribution and Resiliency Study Results](#) and [Strengthening the Regional Value-Added Dairy Distribution System](#).

facilitate the identification of potential critical points or bottlenecks, though gathering this information may be an unreasonable burden on asset owners.

Maintenance

Many stakeholders pointed to the difficulty of maintaining a tool that keeps information up to date. The frequency and management of updates need to be considered in the design phase, and will depend on decisions about the specific goals and uses of the tool. For example, information for policy making or grant allocation may not need to be updated as often as information on transportation routes.

Records could be managed by dedicated staff and/or by asset owners. If asset owners are providing information, they will need to understand the value of the tool and trust that their information is being used appropriately. There may need to be additional marketing and trust building with the targeted users, as well as technical assistance depending on the final tool design and intended uses.

Without consistent resources allocated to mid-supply chain tools, tools may become outdated, and include inaccurate information about regional entities. Old and inaccurate information erodes trust in tools, which further disincentivizes entities from sharing information and using a tool. As stated by many stakeholders, relationships with other entities, where people know each other and trust that they have shared goals, are often the foundation of coordination in the mid-supply chain. Maps and repositories which are not maintained, or are maintained by an unknown entity, may not capture the trust of mid-supply chain entities, and subsequently may not get the needed buy-in to be useful.

Emergency response

Stakeholders suggested several ways a middle of the supply chain tool might be relevant to emergency response. As mentioned above, if excess capacity could be captured in a tool to indicate where there are underutilized facilities, that information could be leveraged during disruptions. A tool that allows users to post availability of excess products could be especially useful in an emergency. Asset information could include a tag for relevance to emergency response, which would facilitate identification of potential partners that could be mobilized. And in addition to facilitating the identification of critical points or bottlenecks in the supply chain, including information on climate vulnerabilities could highlight critical points in the supply chain that could be impacted in climate related emergencies. Some stakeholders emphasized the need for up to date information if a tool would be used in emergency situations.

Variable production

Stakeholders identified several potential uses of a supply chain tool as useful in addressing natural cycles and variation in food production. A tool that allows a user to post the availability of excess product to identify potential buyers could also be used to increase sales in periods with excess production, as well as a way to avoid food waste. Also, information on existing storage and processing assets can help justify further investments to address these gaps that could allow producers to process and store instead of having to sell at a lower price in times of excess production, such as during seasons with high seafood catch or to align availability of locally grown produce with institutional demand cycles.

Differing needs

Stakeholders expressed a range of needs for a potential supply chain tool, which varied by entity type. Some ideas of what different groups suggested as desirable attributes are summarized in Table 5. Among this long list of features, those that appear to be most relevant to the current project, primarily due to the feasibility of collecting or keeping information up to date, are in bold.

Table 5. Supply Chain Tool Features Desired by Entity Type

Entity Type	Feature
Farmers	• Detailed information about value added processing services offered • Clear directory of processors, co-packers, storage facilities • Tools that forecast demand from schools or food banks • Real-time and historical pricing data
Food Hubs	• Cross-docking and cold storage mapping. • More filterable, detailed directory of processors and distributors. • Communication platform for real-time coordination. • Shared logistics platform showing route directionality and capacity.
Institutional Buyers	• A way to find processors who can precut and prepare produce. • Detailed vendor directory including certifications, product size, seasonality. • Cost information. • System for matching multiple school districts with producers for bulk contracts.
Food Banks and Pantries	• Visibility into farm surplus. • Tool showing storage capacity across organizations, especially refrigerated space. • Directory of small and mid-scale farms who want wholesale buyers.

Entity Type	Feature
Seafood	• System showing available processors, cold storage. • Landing location information. • Access to up-to-date quota and landings data.
Processors	• Database showing available livestock aggregators and aggregation routes and capacities. • Inclusion of disposal services for livestock slaughter/processing facilities. • Tool showing product specifications required by buyers.
Planners and Policy Organizations	• Asset mapping of mid-supply-chain facilities. • Layered maps showing climate vulnerability, transportation corridors, and emergency assets.

Known Infrastructure Gaps and Research Needs

One of the goals of this project is to identify gaps in infrastructure and knowledge. Stakeholder outreach revealed two specific existing gaps in infrastructure: value added meat processing⁸ and dockside cold storage for the seafood sector on Cape Cod.

Beyond these two specific gaps, research is needed. Every other category of assets was mentioned during our stakeholder outreach as needing further investment, with cold storage, cross-docking and transportation mentioned most frequently. However, more information is needed to determine the extent and location of additional capacity needs. As a first step towards understanding the extent of the needs in different asset categories and regions, a survey of asset owners could be conducted requesting detailed information on assets owned by entities in the initial asset repository as well as any perceived needs for additional infrastructure. This more detailed asset information could be supplemented with other information to inform the demand for additional capacity could be used to determine where further investments are needed.

Use Cases

Throughout the stakeholder engagement process, participants recognized the need to increase efficiency of the mid-supply chain. Below we outline how different user groups might use a new tool to strengthen the mid-supply chain.

⁸ Berkshire Agricultural Ventures, 2025, *Strengthening Regional Meat Processing: Assessment, Feasibility, and Modeling to Support Increased USA Value-Added Meat Processing Services in the Berkshire-Taconic Region*.

- **Policy makers:** Legislators and other policymakers would use a tool to understand the level and nature of additional investment needs, to support budget requests and program development.
- **Grant makers:** Grant managers would use a tool to understand where resources and infrastructure is sparse to inform program development and funding decisions.
- **Food hubs:** Food hubs would use a tool to locate availability of cold storage and trucks, coordination around transportation, crossdocking, and additional capacity availability to increase efficiencies in sourcing and distribution. The inclusion of information on locations of producers and consumers would facilitate analysis of procurement opportunities and distribution needs.
- **Fruit and vegetable processors:** Processors would benefit from a database of sources for pre-processed local ingredients.
- **Meat and poultry processors:** Meat and poultry processors would use a tool to coordinate processing, distribution, storage and types of certification to increase their distribution around Massachusetts.
- **Food banks:** Food banks have mapping and warehouse information logistical tools that help with their coordination and logistics; they would not use a tool for logistics but may use it to find local food aggregators or processors to increase their purchasing of local food.
- **Farmers:** Farmers would use a tool to connect with processors to create value-added products that would increase their sales and decrease food waste, as well as for coordination around transportation, and better pricing which would increase their profits.
- **Fishers:** Fishers could use a tool to help identify opportunities to coordinate cold storage and transportation⁹.
- **Institutional buyers:** Schools/ institutional buyers would use a tool to potentially simplify their buying and enable them to buy from more processors, aggregators and distributors.
- **Food pantries:** Nonprofit organizations that distribute food would use a tool to increase coordination for joint purchasing purposes and cold storage, as well as for communication between buyers, sellers and consumers.
- **Retailers:** Retailers would use a tool to identify potential sources of local food products.
- **Food system planners:** Food system planners would use a tool to help centralize coordination to increase access to cold storage, processing, and commercial kitchens for the municipalities and clients they serve.

⁹ However, as noted above, seafood sector stakeholders in our outreach expressed a lack of interest in coordination.

Existing Resources and Tools

We identified several related resources and tools that are currently being used by stakeholders for various purposes and summarize the major characteristics in Table 6. While stakeholders expressed varying levels of confidence in the available resources and tools, consideration of existing tools can inform the development of any new resources either to avoid duplicating efforts or for their potential to be built on. We have also reviewed food supply chain tools that have been developed for other states, as examples that we draw from for ideas. A summary of tools developed for other states is presented in Table 7.

The supply chain resources and tools summarized below fall into four categories of functionality: databases, maps, dashboards and communications platforms. Several of the resources incorporate more than one of these categories. At one end of the spectrum of functional complexity, The Cornell Food Products Database has a straightforward spreadsheet format that can be filtered and sorted, and was recognized by stakeholders as extremely valuable. According to its website, the database was initially created with a narrow focus that has expanded over time, and is maintained by Cornell Cooperative Extension and New York State Department of Agriculture and Markets. The New England RFSI Visualization Dashboard represents a more sophisticated functionality, presenting information about funded projects in a series of maps and dashboards with interactive functionality to allow users to analyze trends and other patterns in the data.

Three existing resources seem to be especially relevant to MDAR's intention to develop a new mid-supply chain resource or tool: the BAV Livestock Farming Resource Directory and Facility Mapping, the MassGrown Exchange (MG Exchange) and the New England Food Hub, Processor and Distributor Directory. Berkshire Agricultural Ventures has developed and maintains a directory of regional business related to livestock production and a facility map with many of the entities in the meat and poultry sector that would be included in the MDAR resource or tool. The MG Exchange was developed by MDAR during the COVID pandemic to address supply chain disruptions. The MG Exchange is described as a business to business platform, allowing diverse types of users to register and post offers or requests for products and services. Use of the MG Exchange has tapered off over time, and some stakeholders suggested a need for more marketing, as its utility is based on the volume of active users. The New England Food Hub, Processor & Distributor Directory is an internal resource that has been described by stakeholders as including many of the asset types and information that MDAR seems to be

interested in including in a new mid-supply chain resource or tool. The status of this resource is unclear.

Examples of food systems tools from other states provide useful insight into the range of possibilities that MDAR might consider. These examples range in complexity from the Maine Food Atlas, which presents supply chain asset information in a map format, to extensively developed resources like the Ohio Food System map, which includes supply chain asset information as well as a multitude of layers of other information, including community characteristics, economic profiles, and environmental parameters. Many of the map examples from other states have a much broader scope than the current project, including supply chain assets that serve the overall agricultural sector, as opposed to the more narrow focus on local food systems for the MDAR mid-supply chain tool.

Table 6. Relevant Resources Used by Stakeholders

Tool	Owner(s) / Developer(s)	Tool Type	Description	Relevance
New England RFSI Visualization Dashboard	Vermont Sustainable Jobs Fund	Map Dashboard	Interactive maps/dashboards visualizing RFSI investments in New England. Only contains data on RFSI projects, high quality dashboards.	Format/Design Asset Information
MassGrown Exchange	MDAR	Online Marketplace	Online marketplace where entities can list items / foods / needs / job postings / services within the MA food system. Fulfills a lot of coordination needs stated by stakeholders, but is not widely used.	Coordination Platform
Resilient Food System Grants Viewer	MDAR	Database Map	Online map showing different funded projects across Massachusetts. Important for considering resource allocation	Asset Information
MassGrown Map	MDAR	Database Map	A state-run map listing farms and markets. Retail focused.	Data Layer
DTAFinder	Massachusetts Department of Transitional Assistance	Database Map	A map showing HIP vendors. Retail Focused	Data Layer
Mass Farm to School “Food Source Map”	Mass Farm to School	Database Map	Map and list showing local producers who are willing to sell to schools. Potentially helpful for aggregators.	Data Layer
Food Trails (K–12 procurement system)	Various Rhode Island Stakeholders	Tracking Tool	Allows users to track local food purchases.	N/A
CISA Local Food Finder	CISA	Database Map	Database showing local food options around specific geographies. Farm and retail focused.	Data Layer
Farm Fresh RI MarketMobile	Farm Fresh Rhode Island	Marketplace / Exchange	Online ordering tool for producers and buyers. Successful online ordering tool with multiple categories of products and vendors.	Coordination Platform
Local Catch Network	Various Seafood Entities/Stakeholders	Database Map	Seafood directory/map showing local purchasing options.	Data Layer Asset Information

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Tool	Owner(s) / Developer(s)	Tool Type	Description	Relevance
Routific	Routific	Routing software	Route design and tracking.	N/A
Seafood auctions	N/A	Market	Pricing and landing information, allows buyers and sellers to move product.	N/A
Cornell NY Food Products Database	Cornell Extension	Database Map	Directory of NY producers selling products that are made with at least 51% raw NY agricultural ingredients. Not focused on the mid-supply chain	Format/Design Asset Information
New England Food Hub, Processor & Distributor Directory	New England Food Hub and Processors Network and Farm to Institution New England	Database	Internal directory of food hubs, processors and distributors. Likely unavailable.	Format/Design Asset Information
BAV Livestock Farming Resource Directory	Berkshire Agricultural Ventures	Database Map	Directory of entities in the Berkshire region that support livestock production. Entity types include livestock feed businesses, meat processors, commercial kitchens, and more.	Asset Information
Berkshire Agricultural Ventures Facility Mapping	Berkshire Agricultural Ventures	Map	Interactive map of facilities in and around Massachusetts, filterable by facility type, active status, inspection status, animals handled, and ownership.	Format/Design Data Layer
New Hampshire Wholesale Producer Directory	New Hampshire Food Alliance; New Hampshire Department of Agriculture, Markets, and Food; University of New Hampshire	Database	Directory of farms that sell to wholesalers with information on product availability, how to place an order, and delivery information.	Format/Design
USDA Local Food Directories, Food Hub Directory	USDA	Map	Interactive map that shows food hubs in specified regions on a map and in a list. Likely redundant given more comprehensive MA data layers.	Asset information
Shared Use Kitchen Space	MDAR	Database	List of shared use kitchens across Massachusetts.	Asset Information

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Tool	Owner(s) / Developer(s)	Tool Type	Description	Relevance
Meat, Poultry and Egg Product Inspection Directory	USDA	Map	Map of USDA inspected meat and poultry processing and slaughter facilities.	Asset Information
Local Food Hub Listings	Massachusetts Farm to School	Map	Map of food hubs in Massachusetts with their contact information and website	Asset Information
The Kitchen Door	The Kitchen Door	Database	Online directory of shared kitchen space	Asset Information
Resilient Food System Infrastructure Program (RFSI) Dashboard	USDA	Dashboard	Interactive map of RFSI awards across the country with graphs and tables summarizing data. Likely redundant with other RFSI resources.	Asset Information
Vermont Food System Map	Vermont Farm to Plate	Map	Searchable map showing assets in the Vermont area	Format/Design Asset Information

Table 7. Supply Chain Tool Examples from Other States

Tool	Owner(s) / Developer(s)	Tool Type	Description
Maine Food Atlas	Center for Community GIS and Maine Network of Community Food Councils	Database Map	Interactive map showing listings of organizations by organization type.
Midwest Supply Chain Infrastructure Map	Builders Initiative	Database Map	Filterable map of six states showing crop categories, asset types, and area harvested
North Carolina Local Food Infrastructure Inventory Map	North Carolina Local Food Council	Database Map	Map of supply chain entities with contact information and location
Maine Food Access Map	Maine Ending Hunger Corps and Maine DACF	Database Map	Map with meal sites, gardens, farms, food pantries, and more.
Ohio Food System Map	Ohio State University	Map	Clearinghouse of information collected from government, public health, state environmental agencies and community partners.
Colorado Food Systems Data Explorer	Colorado State University	Map Dashboard	Mapping and Reporting tool of food systems indicators. The goal is to make state and national data more approachable to answer questions and guide decision-making related to food systems initiatives, planning and program management

Design Considerations for MDAR

As MDAR considers the development of a tool or resource for mid-supply chain assets, decisions will need to be made regarding the scope, target audience, functionality, features and maintenance of the tool.

Scope

As described above, MDAR has decided to focus on distribution of products of the broader New England and New York region through supply chain assets located within or serving Massachusetts markets. However, several options remain regarding the scope of a tool or resource:

- **Product categories:** A tool may include all or a subset of food products: fruits and vegetables, meat, seafood, dairy, grains, eggs. Based on stakeholder feedback, a tool or resource may be the least useful for the dairy sector, and questions were raised about the utility to the seafood sector.
- **Inclusion of privately held assets:** MDAR has more information on assets that have received public funding, and may have difficulty obtaining information on privately held assets.
- **Scale:** While MDAR has expressed an interest in mid-sized assets, it is difficult to define the upper and lower limits on what should be included. Related, the proportion or amount of local food may be considered in determining whether assets are in scope, but this is also challenging to define.
- **Asset types:** There continues to be some ambiguity over whether certain asset types should be included in a tool, specifically assets such as food pantries and transportation. Stakeholders in the meat processing sector suggested that disposal facilities should be included in the tool.

Target audience

MDAR will have to decide if the tool will be for internal use or made available for external audiences, which will affect the possible uses for the tool. If MDAR determines that this tool is for an external audience, MDAR will have to determine the target external audience for a tool or resource to inform design decisions. As described in the use cases above, potential audiences for a tool or resource include:

- Policy makers
- Grant makers

- Food hubs
- Fruit and vegetable processors
- Meat and poultry processors
- Food banks
- Farmers
- Fishers
- Institutional buyers
- Food pantries
- Retailers
- Food system planners

Functionality

As illustrated in the examples above, mid-supply chain tools or resources have been developed with differing functionality. These may generally fit into the following categories:

- **Spreadsheet:** Typically designed to be easily searchable, includes asset information.
- **Map:** Builds upon information in a spreadsheet, may include filtering or searching capabilities, and additional data layers to facilitate analysis.
- **Dashboard:** Provides insight into overall asset data.
- **Communication tool:** Range of options from messaging (e.g. Slack channel) to dynamic marketplace (e.g. MassGrown Exchange).

Features

Once decisions have been made regarding the scope, target audience and functionality, it will be necessary to determine the asset details that will be included in the tool or resource. A potential set of “core” features includes:

- Name of organization
- Short description
- Product type
- Asset type
- Contact information
- Location details
- Public support (name of program, date, amount)
- Capacity (total, available, potential for expansion)
- Availability for use by other entities
- Certifications

Additional asset features that could be included are:

- Transportation routes (established, ad hoc)
- Input suppliers
- End customers
- Links to online ordering platforms
- Short videos highlighting services offered
- Pricing information

In addition to asset features, a tool or resource could include layers of other information to facilitate identification of relationships between assets and demographic, climate or demand characteristics, such as:

- Demographic information
- Climate vulnerability
- Agricultural production data

Maintenance

The utility of a mid-supply chain tool or resource is greatly impacted by the accuracy of the information it contains. A critical decision needs to be made regarding whether the tool or resource is intended to reflect the supply chain at a single point in time, or if the intention is to keep it updated. The utility of a tool over time is certainly increased if it is updated with current information. However, maintaining a tool requires ongoing management. The level of management required may be reduced if asset owners take responsibility for keeping their information up to date instead of having someone manage input of this information. This decision will also influence other decisions related to the scope, target audience, functionality and features of the tool.

Recommendations and Project Alternatives

There are several actions that MDAR could pursue to support a tool with varying scope, features and functionality: continuing to build the asset repository, enhancing the MassGrown Exchange, engaging a 3rd party convener, and committing MDAR staff resources. Below we describe varying levels of effort in each of these action categories before presenting a vision of three “bundles” of actions with increasing levels of scope, features and functionality.

Action 1: Continue to Build Asset Repository

The initial asset repository developed by ERG and MAFSC (described above) should be further developed with additional asset details. MDAR would likely need to conduct a survey of asset owners to ensure accurate information and to collect information that is not publicly available

(as described above in the Design Considerations section). ERG and MAFSC have identified three potential approaches for further development of the asset repository, ranging from a low level of effort to a high level of effort:

Small: Updated publicly funded assets and static private assets. Only update asset information for publicly funded assets, which is more readily available to MDAR. Gather information once for privately owned assets.

Medium: Regularly updated asset information for public and private assets. This option would produce a more comprehensive database, as it would include both public and private entities and would be updated on a regular basis (depending on resources). Data for these updates could be gathered by conducting a survey of entities to see if any of their information has changed since the last update, as well as by conducting an online search to see if any new assets have come online since the last update.

Large: Frequently updated asset information. This option would produce the most comprehensive database. Updates could be made as needed by asset owners if they had the ability to update their own records. In addition, MDAR could prompt asset owners to update information, and conduct active outreach to obtain updated information and cull out of date information.

Action 2: Update and Market MassGrown Exchange

As described above, MDAR currently manages a business-to-business platform that offers a way for agricultural producers, processors, aggregators, distributors and retailers to connect. This platform already offers a way for mid-supply chain assets to communicate and collaborate, and while it proved to be a valuable resource during the Covid pandemic, it is currently underutilized. ERG and MAFSC identified a few potential approaches, ranging from a low level of effort to a high level of effort, for leveraging MassGrown Exchange to support supply chain coordination.

Small: Conduct MassGrown Exchange marketing campaign. The current platform could be marketed to raise awareness of the potential to post opportunities for mid-supply chain coordination, such as storage availability/needs or transportation sharing. A marketing campaign would also help raise general awareness and increase users.

Medium: Update MassGrown Exchange. Market the Exchange and set up a feature (such as an email reminder) so that registered users are prompted to update their information to keep their registration active and remove posts that are outdated. Also link the Exchange to a broader supply chain repository. When a business posts information on the Exchange, key

details about that entity could automatically populate the repository. For example, if a processor posts that they have trucking capacity, the repository could auto populate with the information of that processor. While the current map on the MassGrown Exchange displays only active postings, the supply chain repository linked to the Exchange would function as a longer-term database of supply chain entities.

Large: Revamp MassGrown Exchange. In addition to marketing the exchange, developing a repository that is linked to the exchange, and setting up reminder emails, MDAR could invest in revamping the user experience. Changes could include developing an app or improving the mobile functionality, adding a chat feature, adding more filters, and offering technical assistance.

Action 3: Support a Third-Party Convener

Instead of developing a map, MDAR could hire a third-party convener to help increase communication and collaboration among mid-supply chain entities. This third-party convener would create space for stakeholders to build trust and community so that communication and collaboration in the middle of the supply chain increase. Stakeholders suggested several potential discussion topics for this group, including current challenges facing the mid-supply chain, opportunities to create economies of scale, strategies for strengthening emergency preparedness, and resources available to support mid-supply chain assets, including funding opportunities. In addition to virtual meetings, the third party convener could set up a communication channel, such as a Slack channel or Google Group, so that communication can occur outside of scheduled meetings. Engaging a third-party to convene these meetings provides an opportunity for more open conversations.

Small: Support Third party convener for limited engagement. A third-party convener could organize annual meetings for food hubs and other aggregators. Infrequent meetings could serve as an opportunity for making connections that would be pursued outside of any MDAR supported effort.

Medium: Support Third-party convener for regular engagement. More frequent meetings for food hubs and aggregators, on a bi-weekly or monthly basis, could serve as a platform for food hubs and other aggregators to actively collaborate on inventory or transportation sharing.

Large: Support Third-party convener for broader engagement. A large project could include convening a broader group of stakeholders from across the supply chain, in addition to regular meetings for food hubs and other aggregators. These meetings would be an opportunity for more cross-cutting conversations around challenges in strengthening the mid-supply chain.

Action 4: Commit MDAR staff resources to mid-supply chain coordination

In support of any of the above actions, MDAR could commit staff to shepherding the development and maintenance of a mid-supply chain tool or project. A single point of contact within the department would facilitate decision making, communication and technical assistance around a tool. In addition, an MDAR staff person could serve as a liaison between the department and a third-party convener, should such an effort be undertaken.

Project Alternatives

MDAR may consider pursuing one or more of the actions described above. ERG and MAFSC recommend that MDAR consider “bundling” actions together to maximize overall impact. Table 8 presents one potential approach for combining these actions into small, medium, and large sized projects, indicating which stakeholder groups would benefit and the advantages and disadvantages of each.

Table 8. Potential Projects by Size

Project Size	Suggested Actions	Policy/ Grant Makers	Asset Owners	Producers	Retailers	Advantages and Disadvantages
Small	1. Updated publicly funded assets and static private assets	X				Advantages - Supports near term decision-making - Addresses high level of interest in coordination by food hubs - Takes advantage of existing MassGrown Exchange communication platform - Limited resource commitment Disadvantages - Value of information erodes over time - Does not meet need for more frequent convening
	2. MassGrown Exchange marketing		X	X	X	
	3. Support third-party convener for limited engagement		X			
Medium	1. Regular updates for all assets	X	X	X	X	Advantages - Supports longer term decision-making - Provides forum for regular coordination of food hubs - Expands value of MassGrown Exchange communication platform Disadvantages - Requires ongoing commitment of resources
	2. MassGrown Exchange data capture	X	X	X	X	
	3. Support third-party convener for more frequent engagement		X			
Large	1. Frequent updates for all assets	X	X	X	X	Advantages - Inclusion of current information leads to increased trust and use - Broad engagement opens opportunities for collaboration and coordination Disadvantages - Requires larger commitment of resources
	2. Revamp MassGrown Exchange	X	X	X	X	
	3. Support third-party party convener for broader engagement	X	X	X	X	
All	Commit MDAR staff time aligned with needs of chosen actions	X	X	X	X	

Recommended Next Steps

Among the potential actions and project alternatives, the ERG and MAFSC team recommends these steps for moving forward with the development of a mid-supply chain resource or tool. This is essentially a more elaborated description of a “medium” sized project. The first five steps are intended to be pursued sequentially, and could be done in conjunction with improvements to MassGrown Exchange and convening food hubs.

1. Conduct targeted outreach to further discuss coordination and lessons learned

We recommend starting with some focused conversations with New England Food Hubs, Processors and Distributors and Berkshire Agricultural Ventures (BAV), to follow up on ideas that emerged from our conversations with these two groups. As mentioned when we discussed examples of other tools, both of these groups have developed resources that have considerable overlap with MDAR’s interests. The New England Food Hubs, Processors and Distributors network includes many Massachusetts based organizations in the mid-supply chain, and their experience collecting asset information may provide some lessons learned as MDAR moves forward. There may also be an opportunity to collaborate with a broader regional effort provided this effort continues. BAV maintains a directory of supply chain businesses in the livestock/meat sector with information that would be relevant for a MDAR mid supply chain resource or tool. In addition, BAV was recently awarded a USDA grant to work on strengthening the supply chain for institutional buying. MDAR might approach both groups to discuss the status of those efforts, any lessons learned, and how and whether it makes sense to coordinate efforts.

2. Make design decisions

We suggest that MDAR make as many design decisions as possible regarding the scope, target audience, functionality, features and maintenance of a new resource or tool prior to further development efforts. MDAR may consider an incremental approach that begins with a more limited tool, with expanded scope and functionality over time.

3. Survey for asset details

As mentioned in the discussion of stakeholder outreach, we suggest MDAR use the information on asset owners that was gathered in the initial asset repository to gather more detailed information on specific assets and other business information. Surveys might vary depending on the role in the supply chain, whether any public funding has been awarded, product types¹⁰,

¹⁰ For example, questions for asset owners in the livestock/meat sector may be different from questions for the fruit and vegetable sector.

or other characteristics. Businesses that have received public funding may be more willing to provide information that could be especially useful to granting agencies such as MDAR. Surveys could include questions to assess not only existing asset capacity, but also need for additional capacity. MDAR might consider some additional focused outreach or surveying of producers and retailers, beyond what was outlined as the scope of this initial exploration, to understand their perspectives on mid supply chain bottlenecks or constraints.

4. Build tool

We recommend building a tool that incorporates a range of functionality, including a searchable database, map(s) and dashboard presentation. By combining these functionalities, MDAR can meet the needs of a range of users. A database is the foundation of maps and dashboards, but also provides the data for even unanticipated uses. Maps are a user-friendly way to present asset information when location and proximity matters, and can include carefully selected additional layers of information on demographics, producers, markets and climate vulnerability. Dashboards can provide insights into data through carefully developed key performance indicators and visualizations.

5. Conduct analysis of needs for additional cold storage

We suggest conducting an analysis of the needs for additional cold storage, using survey results as well as additional information on potential demand for expanded capacity across the state. This suggestion is based on cold storage being among the most frequently mentioned in our outreach as needing further investment. Cold storage has higher upfront investment requirements, operating costs and ongoing management needs, which underscores the need for a more thorough analysis to determine needs.

6. Market and update MassGrown Exchange

The MassGrown Exchange could be leveraged immediately through marketing, and eventually with relatively minor modification, could be expanded to capture information that could be added to an asset repository and cull out of date information.

7. Convene food hubs

As described above, food hubs and other aggregators were very interested in opportunities to meet to discuss coordination. Initial meetings could explore willingness and interest in more regular convening, and perhaps information gathering that could inform ongoing needs for meeting. In the longer term, regular convening could serve as a platform for coordinating inventories, storage and transportation.

Appendix A: Interview and Focus Group Questions

Appendix A presents the questions asked during interviews and focus groups with key stakeholders. ERG and MAFSC developed standard questions that were asked to all stakeholders, as well as additional questions for certain groups. The standard and group-specific questions are listed below.

Standard questions (asked to all groups)

1. Do you use any supply chain coordination resources, databases, or maps (such as the ones presented earlier) to support your work? If so, which do you use and how do you use them?
2. What kind of tool or resource would be most useful to support local food supply chain coordination?
 - a. What information/data would you want to see in the tool?
 - b. What format or functionality would be most helpful for your work (e.g, searchable database, interactive map)?
 - c. How would your organization use such a tool or resource?
3. The tool could provide data on numerous attributes related to supply chain entities, such as an entity's location, services provided, and available capacity.
 - a. Would you benefit from seeing this kind of information, and if so, how?
 - b. How is capacity measured in your sector (e.g. square footage, throughput)?
4. Can you think of other ways to use RFSI funding beyond a map or database to strengthen coordination and efficiency within the middle of the supply chain MA food system?
5. What gaps, constraints or redundancies do you see in the local food supply chain (e.g. a lack of cold storage, redundant transportation routes, opportunities to improve value chain coordination)?
 - a. Do these constraints vary across the state?
 - b. How could a new local food supply chain tool/resource assist in identifying these constraints and improving efficiency?
6. Are there existing assets with available capacity that could be leveraged either during normal operations or during an emergency to fill gaps (e.g. cold storage at schools)? Would it be helpful to include these assets in the envisioned tool/resource?
7. Where do we need more research to understand potential gaps?

8. What aspects of the supply chain are vulnerable to disruption from natural disasters or other emergencies that could limit effective delivery of local food in an emergency? How could a new local food supply chain tool/resource facilitate delivery of local food in an emergency?
9. How could a new local food supply chain tool/resource help to maximize the impact of previous public and private investments in food system infrastructure?
10. For assets relevant to your sector, how far outside of Massachusetts should we consider for inclusion in the new local food supply chain tool/resource?
11. Please provide any suggestions for the process of developing and maintaining a tool or resource, such as how often to update underlying data.
12. Is there anything else you'd like to add that we have not covered?

Group-specific questions

Dairy

1. In what ways, if any, does the supply chain for local dairy products (products produced and consumed in New England/Massachusetts) differ from the supply chain for conventional dairy products?

Schools/Institutional Buyers

1. How much local food do you source (either in terms of a rough % of total food spend or in terms of volume) and how do you source it (directly with producers or through food hubs/distributors)?
2. What challenges do you face when procuring local food? Are there specific local food products that are challenging to procure?

Seafood

1. How would you define "local" seafood for the purposes of the tool (i.e. caught by MA based fleet)?

Meat

1. What proportion of Massachusetts-based meat and poultry slaughter/processing is offered as a service to farmers?
2. What proportion is for farmers in Massachusetts? for farmers in New England (including NY)?