As more frequent and intense climate change disasters imperil food supplies around the world, where our food comes from matters more than ever.

A regional approach to food system resilience is both an investment in our shared future and an insurance policy against future risks. A regional approach to food system resilience means that we work collectively to adapt, expand, and fortify New England’s food production and distribution systems to ensure the availability of adequate, affordable, and culturally appropriate food for all who call New England home.

Can the six New England states provide 30% of their food from regional farms and fisheries by 2030?

New England Feeding New England explores this question and what it will really take to grow, raise, produce, harvest, and catch more regional food and move it through a complex supply chain to our homes and other places where we eat. Our research presents an opportunity for the region: significant changes in diet (e.g., dramatically reducing consumption of ultra-processed foods and increasing fruit and vegetable consumption), a significant increase in land in agriculture, stopping the decrease in farmers and fishermen, and finding a way to actually get local/regional food in the places people shop are daunting challenges, but addressing them will leave our food system stronger and more resilient.

Extreme rainfall flooded fields at World Farmers in Lancaster in July 2023.
How self-reliant is our region?

*New England Feeding New England Volume 2* estimates regional food self-reliance (RSR)—how much food we produce compared to how much food we consume—for the five major food groups. RSR percentages varied widely from food product to food product, showing a rather lopsided capacity for self-reliance. A small number of foods were produced in large quantities relative to consumption and had self-reliance ratios near or exceeding 100% (e.g., dairy, maple syrup, potatoes, lobster, clams). Most foods, however, had self-reliance ratios of less than 10% (e.g., beef, lettuce, wheat).

» New England Regional Self-Reliance for Major Food Groups

<table>
<thead>
<tr>
<th></th>
<th>Servings</th>
<th>Calories</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRAINS</td>
<td>1.6%</td>
<td>1.7%</td>
</tr>
<tr>
<td>VEGETABLES</td>
<td>28.3%</td>
<td>41.0%</td>
</tr>
<tr>
<td>FRUITS</td>
<td>8.7%</td>
<td>6.9%</td>
</tr>
<tr>
<td>DAIRY</td>
<td>50.0%</td>
<td>47.4%</td>
</tr>
<tr>
<td>PROTEINS</td>
<td>3.2%</td>
<td>2.6%</td>
</tr>
</tbody>
</table>

Source: *Volume 2: Estimating Production for 30% Regional Self-Reliance*. Note: vegetables consists of a significant amount of calorie-dense potatoes grown in Maine; dairy includes a significant amount of production in Vermont.

What can each New England state do to increase food security and access while building resilience for the whole region?

What strengths does Massachusetts’ food system possess and what opportunities can be pursued? What weaknesses persist and what threats loom?

This State Brief contextualizes important characteristics of Massachusetts’ food system for consideration.

For example, as New England’s economic powerhouse—it has the largest regional economy and population—Massachusetts naturally has the largest food system: it accounts for 46% of food system jobs and 45% of food system sales. After Maine, Massachusetts is the largest regional food producer, with production from fisheries, agriculture, and aquaculture. Massachusetts also accounted for 49% of New England’s retail food sales.

Dollar stores are by far the most common type of major grocery chain in Massachusetts, but the state also has a significant number of independent grocery stores, 12 food co-ops, and many corner/general stores. These smaller stores may also facilitate access to regional food.

Moving toward the 30x30 regional goal outlined in *New England Feeding New England* will require, for example, substantial investment in retaining and expanding land in agriculture in the northern states, with most of the people, political influence, and economic power based in southern New England. Massachusetts has already made significant investments in long-term food production, increasing the viability of local farms and food businesses, protecting and preserving agricultural land, and supporting working water fronts. It now may be called upon to support regional food system development.
Massachusetts Food System Collaborative

The Massachusetts Food System Collaborative supports collective action toward an equitable, sustainable, resilient, and connected local food system in Massachusetts.

The Collaborative’s work is centered on public policy campaigns and building the capacity of food system stakeholders to engage in policy advocacy. For example, the Campaign for Food Literacy seeks to ensure access to food system education for all students.

Their priorities are driven by the 2015 Massachusetts Local Food Action Plan, which set goals for issues ranging from farmland access and protection, to resilient agriculture and fishing, to public health and food security.

State Snapshot

» Top Agricultural Products by Sales, 2017

Produce—vegetables, fruits, berries—made up nearly 43% ($209 million) of agricultural sales in Massachusetts.

<table>
<thead>
<tr>
<th>Product</th>
<th>Sales Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetables</td>
<td>23.5%</td>
</tr>
<tr>
<td>Fruits/Berries</td>
<td>19.4%</td>
</tr>
<tr>
<td>Bedding/Garden Plants</td>
<td>16.8%</td>
</tr>
</tbody>
</table>

includes bedding/garden plants, cut flowers, florist greens, foliage plants, potted flowering plants, etc.

» Top Seafood and Aquaculture Products by Sales, 2022

In 2022, sea scallops accounted for 55.5% ($390,117,734) of the combined value of seafood and aquaculture sales, followed by lobster, ocean-harvested oysters, and aquaculture-raised oysters.

<table>
<thead>
<tr>
<th>Product</th>
<th>Sales Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sea Scallops</td>
<td>55.5%</td>
</tr>
<tr>
<td>American Lobster</td>
<td>11.6%</td>
</tr>
<tr>
<td>Eastern Oyster</td>
<td>4.9%</td>
</tr>
</tbody>
</table>

» Top Retail Food Sales by Market Channel, 2017

<table>
<thead>
<tr>
<th>Channel</th>
<th>Sales Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grocery Stores</td>
<td>48.4%</td>
</tr>
<tr>
<td>Restaurants/FAST FOOD</td>
<td>39.5%</td>
</tr>
<tr>
<td>Liquor Stores</td>
<td>6.7%</td>
</tr>
<tr>
<td>Direct Sales</td>
<td>0.3%</td>
</tr>
</tbody>
</table>
Food System Economy

How big is Massachusetts’ food system? What sectors are growing? What sectors are contracting?

Massachusetts’s food system employs about 460,000 people and generates over $85.2 billion in sales. Agriculture and fisheries employment and sales were flat or declined from 2007 to 2017. Employment and sales for every other category—except for a very slight decrease in grocery store sales—all increased from 2007 to 2017.

**Economic Impact of Massachusett’s Food System, 2017**

<table>
<thead>
<tr>
<th></th>
<th>2017 Employment</th>
<th>% of Total</th>
<th>Growth from 2007-2017</th>
<th>2017 Sales</th>
<th>% of Total</th>
<th>Growth from 2007-2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>27,330</td>
<td>6.0%</td>
<td>-0.1%</td>
<td>$516,132,000</td>
<td>0.6%</td>
<td>-2.4%</td>
</tr>
<tr>
<td>Fisheries</td>
<td>3,091</td>
<td>0.7%</td>
<td>-1.0%</td>
<td>$652,067,000</td>
<td>0.8%</td>
<td>-0.3%</td>
</tr>
<tr>
<td>Food Manufacturing</td>
<td>22,318</td>
<td>4.9%</td>
<td>0.9%</td>
<td>$8,546,092,100</td>
<td>10.0%</td>
<td>0.1%</td>
</tr>
<tr>
<td>Beverage Manufacturing</td>
<td>3,750</td>
<td>0.8%</td>
<td>4.3%</td>
<td>$1,871,739,700</td>
<td>0.7%</td>
<td>4.0%</td>
</tr>
<tr>
<td>Wholesaling + Distributing</td>
<td>23,967</td>
<td>5.2%</td>
<td>0.4%</td>
<td>$30,699,210,600</td>
<td>36.0%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Stores</td>
<td>98,789</td>
<td>21.6%</td>
<td>0.9%</td>
<td>$23,469,398,400</td>
<td>27.5%</td>
<td>-0.1%</td>
</tr>
<tr>
<td>Food Services + Drinking Places</td>
<td>278,738</td>
<td>60.9%</td>
<td>2.1%</td>
<td>$19,496,150,600</td>
<td>22.9%</td>
<td>2.0%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>457,983</td>
<td>100.0%</td>
<td>1.6%</td>
<td><strong>$85,250,790,400</strong></td>
<td>100.0%</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

Source: *Volume 3: Economic Impact of New England’s Food System*. Note: Agriculture sales in this table includes support activities. Sales values are adjusted for inflation to 2020 dollars. Agricultural sales are adjusted using producer price indices for crops and livestock.

**Food System Employment Multiplier**

The employment multiplier calculated in Volume 3 shows that for each additional job created in Massachusetts’ food system, total employment in the state’s economy will increase by 1.51 jobs (i.e., for every 1 additional food system job, there will be 0.51 jobs spun-off those).

![Total Food System Employment Impact](image)

The additional 0.51 job (in aggregate) is actually a set of fractional jobs spread over the entire economy, the result of linked activity in other food system and nonfood system sectors. These include jobs in transportation, utilities, finance, trade, and government.
How much do food system workers in Massachusetts earn?

Wages/salaries are the most common source of income for the majority of Americans. Connecticut’s food system workers, particularly food service workers, receive some of the lowest wages of any occupational category in the state. Massachusetts is tied with Connecticut for the highest minimum wage of the New England states ($15), but median hourly wages for many food system jobs are below the living wage level for adults with no children.

**Median Hourly Wages by Major Occupational Category, 2022**

The U.S. GAO found that restaurants and other eating places employed the largest percentage of working adult Medicaid enrollees and SNAP recipients in states that provided employer data.

**Median Hourly Wages by Selected Food System Occupations, 2022**

**Food Access**

Do Massachusetts residents have equitable access to food stores?

Hispanic/Latino, Black, Asian, Indigenous, Native Hawaiian/Pacific Islander, and Massachusetts residents of two or more races or some “other” race—made up 32.4% of the state’s population, but 48.8% of its population living in low income/low access (LILA)* census tracts.

![Map showing food access in Massachusetts](image)

<table>
<thead>
<tr>
<th>% OF POPULATION</th>
<th>% LIVING IN LILA TRACTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>67.6% (4,748,897)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>12.6% (887,685)</td>
</tr>
<tr>
<td>Asian</td>
<td>7.2% (504,900)</td>
</tr>
<tr>
<td>Black</td>
<td>6.5% (457,055)</td>
</tr>
<tr>
<td>2 or More Races</td>
<td>4.7% (328,278)</td>
</tr>
<tr>
<td>Other Race</td>
<td>1.3% (92,108)</td>
</tr>
<tr>
<td>Indigenous</td>
<td>0.1% (9,387)</td>
</tr>
<tr>
<td>Hawaiian/PI</td>
<td>0.02% (1,607)</td>
</tr>
</tbody>
</table>

**% NON-WHITE OR HISPANIC BY LILA CENSUS TRACT**
- 78-99%
- 59-78%
- 41-59%
- 21-41%
- 2-21%

A higher percentage (i.e., a more purple census tract) means that residents are more likely to be non-White, Hispanic, and/or low income with limited access to grocery stores, particularly in cities.

**Food Insecurity**

The Great Recession triggered higher rates of food insecurity for several years after the fact. However, Massachusetts was 1 of 3 states that had statistically significant increases in employment from 2007 to 2019.

- Average monthly SNAP benefits per participant increased 57% in Massachusetts, from $134 in 2019, to $211 in 2021.

The COVID-19 pandemic triggered economic hardship across the country, but USDA estimates of food insecurity were not noticeably higher in 2020 and 2021. What explains this? The federal government rapidly fortified the social safety net to fight the pandemic.

- However, other research estimates that as much as 18.4% of Massachusetts’ population—including 34% of its Hispanic population and 33% of its Black population—were food insecure in 2023.

**Sources:**
- USDA Economic Research Service, KFF (SNAP Benefits)
- USDA Food Research Atlas, American Community Survey
- Project Bread

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Food Expenditures

How much do Massachusetts residents spend on food? Where do they shop?

Massachusetts residents spent over $41.9 billion at stores and restaurants in 2017. Grocery stores (48.4%) and restaurants (36.0%)—which includes full-service and fast food restaurants—accounted for 84.4% of total sales. Direct sales from farmer to customer made up 0.3% of total retail sales.

Food Stores and Services Sales, 2017

**TOTAL = $41.9 BILLION**

**Grocery Stores/Supermarkets**  
$17.8 billion  
48.4%

**Restaurants**  
$16.6 billion  
39.5%

**Liquor Stores**  
$2.8 billion  
6.7%

**Food Service Contractors**  
$1.6 billion  
3.9%

**Specialty Stores**  
$770 million  
1.8%

**Conv. Stores**  
$1.3 billion  
3.1%

**Caterers**  
$484 million  
1.2%

**Bars**  
$107 million  
0.3%

**Mobile Food Services**  
$29.2M, 0.03%

**Direct Sales**  
$106M, 0.3%

Count of Food Stores in Massachusetts

Dollar stores are by far the most common type of national grocery stores in Massachusetts. It has historically been challenging for local and regional food producers to get their products stocked in national chains.

Massachusetts has over 250 independent stores, including many small grocery stores, general/country stores, bodegas, and ethnic markets, but they are not depicted here.

**TYPE OF STORE**

- **MASSACHUSETTS BASED STORES**
- **NEW ENGLAND BASED STORES**
- **NATIONAL CHAINS**

Note: this estimate does not include gas station convenience stores or pharmacy chains like Walgreens and CVS.
What would it take to meet a 30% food expenditure goal?

Massachusetts had the sixteenth highest per capita food expenditures ($5,251) of any state in the country in 2020. With an average annual food expenditure growth rate of 1.8% from 1997 to 2020—and population increase to 7,012,000 by 2030—per capita food expenditures may reach $6,239 by 2030. About $1,872 per capita would then have to be spent on regional food to meet our 30% goal.

Northeast consumer expenditure data indicates that ultraprocessed food and beverage products make up the top 3 food expenditure categories, followed by fresh fruit.

#16 miscellaneous foods $1,147 (18.7%)
Frozen prepared meals, canned food, chips, desserts, etc.

BAKERY PRODUCTS $585 (9.5%)
Bread, crackers, cookies, cakes, pies, doughnuts, etc.

NONALCOHOLIC BEVERAGES $576 (9.4%)
Soda, coffee, tea, ice, sports drinks, etc.

FRESH FRUIT $467 (7.6%)

Source: USDA State-Level Food Expenditure Series
Climate Change

How will climate change impact Massachusetts’ food system?

Food system activities like cultivating crops, raising livestock, and land use changes, are major drivers of climate change and food systems are particularly vulnerable to a changing climate. July 2023 was the warmest month on record and major changes are already underway across Massachusetts and New England:

» **Loss of Seasonality**: less distinct seasons, milder winters, earlier spring conditions, and more unpredictable and extreme weather are expected to impact agricultural production. For example, *excessive rainfall* in 2023 has created wet and muddy fields that makes harvesting challenging, if not impossible.

The average temperature in Massachusetts in 2022, 50.4°F, was 3.5°F higher than the average temperature during the previous century. Massachusetts was the sixth warmest state in the country in 2022.

» **Air Temperature Anomaly**

![Graph showing air temperature anomaly from 1901-2000 Mean: 46.9°F to 50.4°F, with an increase of 3.5°F.]

Source: NOAA National Centers for Environmental Information

» **Threats to Health**: increases in heat and humidity, ground-level ozone pollution, air pollution from wildfires, mold, pollen season, vector-borne diseases (e.g., Lyme disease), and gastrointestinal illnesses from waterborne and foodborne contaminants can lead to more illness and death.

» **Projected Climate Risks**

**HURRICANES**

Since 1980, 9 hurricanes, including Hurricanes Bob (1991) and Sandy (2012) were billion-dollar disasters that impacted Massachusetts.

**WATER STRESS**

MA has experienced *abnormally dry days* since 2012, but precipitation is expected to be above normal over this century.

**EXTREME RAIN**

From 2005 to 2014, MA experienced the largest number of 2-inch extreme rain events in its history, about 30% above the long-term average.

**Ocean Under Threat:** the Atlantic Ocean supports tourism, recreation, and economic activities, including fisheries. Warmer ocean temperatures—the Northeast Continental Shelf is warming much faster than the global average—sea level rise, acidification, and increased storm frequency and intensity all threaten marine ecosystems and the communities that depend on them. For example, research indicates that ocean acidification depresses the growth of juvenile sea scallops, a species of economic and cultural importance in Massachusetts.

About 68% of Massachusetts’ seafood catch in 2020 (mostly sea scallops) was classified as having very high or high vulnerability to changes in abundance or distribution due to climate change.

**Climate Vulnerability of Massachusetts Catch**

![Graph showing the value of landings from 2010 to 2020](image)

Source: NOAA Fisheries, Northeast Vulnerability Assessment

**Risks to Cities:** the Northeastern U.S. is home to densely populated cities, including Boston, rural communities, critical transportation corridors and infrastructure, and culturally and historically significant sites. Climate change impacts, including from flooding, hurricanes, and sea level rise can damage infrastructure, displace populations, strain our emergency response system, and unevenly affect historically marginalized and low-income communities. 

About 68% of Massachusetts’ seafood catch in 2020 (mostly sea scallops) was classified as having very high or high vulnerability to changes in abundance or distribution due to climate change.

**Projected Climate Risks**

- **Sea Level Rise:**
  - The sea level off the MA coast rose by over 8 inches since 1950. Sea level is expected to rise by 6 inches by 2032. Sea level near Martha’s Vineyard is projected to rise 1 to 6 feet by 2010.

- **Wildfire:**
  - Wildfires in MA are small compared to the West, but the number of wildfires has increased in recent years due to drought conditions.

- **Heat Stress:**
  - Temperatures have risen about 3.5°F since the beginning of the 20th century. Warmer temperatures increase vulnerability for agriculture and densely populated cities.

Agriculture

What kinds of agricultural products does Massachusetts grow/raise? How have land uses changed over time?

>> Land in Agriculture

TOTAL 491,653 ACRES

- CROPLAND 164,836 acres (33.5%)
- WOODLAND 176,415 acres (35.9%)
- PASTURE 70,774 acres (14.4%)
- FARMSTEADS 79,627 acres (16.2%)

Harvested cropland: 140,922 acres

>> Agricultural Sales, 2017

TOTAL $487,221,000

Massachusetts had the highest percentage of vegetable, fruit, and berry sales as a percentage of total sales, 42.9%, of any New England state.

Note: Agriculture sales in this table do not include support activities. Sales values are adjusted for inflation to 2020 dollars using producer price indices for crops and livestock.

END USES

- ANIMAL FEED
- EDIBLE
- LANDSCAPING

Acreage for animal feed equaled 65.8% (92,693 acres) of harvested cropland and 18.9% of total land in agriculture. Massachusetts had the highest percentage of total farmland devoted to fruits (3.3%), second highest for berries (10.6%), and third most for vegetables (13.5%) of the New England states.

Massachusetts is the second largest producer of cranberries in the United States, after Wisconsin.

Cropland decreased from 703,000 acres in 1945 to 165,000 acres in 2017.

Pastureland decreased from 247,000 acres in 1945 to 71,000 acres in 2017.

Source: USDA 2017 Census of Agriculture
Massachusetts had the third highest average farm real estate value, $15,200 per acre, of any state in the country in 2022.

An analysis from the American Farmland Trust (AFT) estimates that Massachusetts could lose an additional 73,800 acres by 2040 under a “Business as Usual” development scenario and 89,400 acres under a “Runaway Sprawl” scenario.

AFT projects that Worcester, Plymouth, and Bristol counties will experience the biggest decreases in land in agriculture.

#3 Massachusetts had the third highest average farm real estate value, $15,200 per acre, of any state in the country in 2022.
Fisheries

What kinds of seafood products does Massachusetts harvest?

58%

Dozens of species are caught or harvested by Massachusetts fishermen/lobstermen, but sea scallops account for the majority of sales (58% in 2022) and 33% of pounds landed. Sea scallop harvests have been relatively consistent over the past 12 years, but ocean acidification and warming are expected to increasingly impact production.

Pounds of Commercial Seafood Landings

Value of Commercial Seafood Landings

Source: NOAA Fisheries and the Atlantic Coastal Cooperative Statistics Program.
Aquaculture

In 2022, Massachusetts had more than 1,358 acres of shellfish farms. Oysters account for the majority of shellfish sales ($31.2 million), followed by Quahogs ($1.5 million).

Source: Massachusetts Division of Marine Fisheries, 2022 Annual Report

Food Waste

How much food waste is landfilled in Massachusetts?

A 2030 Solid Waste Master Plan reported waste disposal data for 2018. It found that food waste is the most common material in Massachusetts’ municipal waste stream at over 1.1 million tons, despite Massachusetts Department of Environmental Protection regulations that ban food wastes from businesses and institutions that generate more than ½ ton per week.

Landfilled Food Waste

<table>
<thead>
<tr>
<th>Total Food Waste</th>
<th>1,134,673 tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food waste</td>
<td>1,134,673 tons</td>
</tr>
<tr>
<td>Construction and demolition</td>
<td>897,317 tons</td>
</tr>
<tr>
<td>Plastic</td>
<td>608,315 tons</td>
</tr>
<tr>
<td>Paper</td>
<td>971,577 tons</td>
</tr>
<tr>
<td>Bulky waste</td>
<td>433,101 tons</td>
</tr>
<tr>
<td>Other organics</td>
<td>232,341 tons</td>
</tr>
<tr>
<td>Special waste</td>
<td>170,665 tons</td>
</tr>
<tr>
<td>Textiles</td>
<td>255,047 tons</td>
</tr>
<tr>
<td>Metal</td>
<td>58,512 tons</td>
</tr>
<tr>
<td>Glass</td>
<td>70,502 tons</td>
</tr>
</tbody>
</table>

Total 5,018,082 tons

Source: Massachusetts Department of Environmental Protection, October 2021, Massachusetts 2030 Solid Waste Master Plan: Working Together Toward Zero Waste
Key Massachusetts Strengths, Weaknesses, Opportunities, and Threats

**STRENGTHS**

Significant consumer base with demonstrated commitment to purchasing local food

Historically innovative farming sector with opportunities to farm on a range of soil types and in a range of numerous climatic conditions

Extensive support system of engaged nonprofit organizations, businesses, state and federal agency staff and legislators

Significant state investment demonstrating the importance of the local food system to state food security, climate, and equity goals

Important commercial seafood industry including New Bedford, the most valuable fishing port in the U.S.

**WEAKNESSES**

Low pay in many food systems jobs

Inadequate opportunities for low-income consumers to support a healthy, culturally appropriate, nourishing diet

Persistent racial, class, and gender inequities in the local food system

Increased frequency of extreme weather events leave food production, distribution, and access vulnerable to disruptions

Greater demand than production capacity in most food sectors

Inadequate Extension and other technical assistance resources

**OPPORTUNITIES**

Increasing state and local government support for local food systems issues through existing, scalable programs that support both food security and increased production

Soon to be released state Farmland Action Plan

Innovative means of connecting farmers with markets and consumers with locally-grown foods

Growing efforts to educate children and consumers about the local food systems

**THREATS**

Development pressure, climate migration, high land costs, and aging farmer population all threaten land-based production capacity

Warming Gulf of Maine threatens $670 million annual seafood industry

Lack of centering of equity by many stakeholders and processors leads to distrust and disengagement by community members whose work and input are necessary for the creation of a sustainable, equitable, resilient food system

Next Steps in 2030: What Can Massachusetts do to Meet the 30% by 2030 Goal?

Areas of priority include:

» Significantly increase purchases of Agricultural Preservation Restrictions to permanently protect more farmland, as identified in multiple state plans

» Increase investments in production infrastructure

» Build relationships with independent, regional and national grocery chains and distributors to get more local food into more traditional points of sale

» Strengthen relationships between racially and geographically diverse communities, as well as between all sectors of the food system, to gain trust, share expertise and build momentum for food system change.

Funding for this project has been made possible by the Henry P. Kendall Foundation and the Angell Foundation.