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.

Through 7 research Volumes, New England Feeding New England lays out the case for a regional approach to food system resilience.

» [https://nefoodsystemplanners.org/](https://nefoodsystemplanners.org/)
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>GRAINS</th>
<th>VEGETABLES</th>
<th>FRUITS</th>
<th>DAIRY</th>
<th>PROTEINS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Servings</td>
<td>1.6%</td>
<td>28.3%</td>
<td>8.7%</td>
<td>50.0%</td>
<td>3.2%</td>
</tr>
<tr>
<td>Calories</td>
<td>1.7%</td>
<td>41.0%</td>
<td>6.9%</td>
<td>47.4%</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 Maine’s food system possess and what opportunities can be pursued? What weaknesses persist and what threats loom?

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

For example, Maine generates the highest total agriculture and seafood sales—over $1.3 billion—and has the most agricultural land—1.3 million acres—of any New England state. It has the third largest food system economy by sales—$15.3 billion in 2017—after Massachusetts and Connecticut. Maine also has the highest rate of food insecurity in New England, and the second highest per capita food expenditures of any state in the country.

Maine has the largest amount of acreage devoted to vegetables and berries, and the second most for fruit. Along with Vermont it may have the most capacity to boost vegetable, berry, fruit, and grain production in the region. Maine has already made significant investments in long-term food production, increasing the viability of local farms and food businesses, and protecting and preserving agricultural land.

Dollar stores are by far the most common type of major grocery chain in Maine, but the state also has a significant number of independent grocery stores, like Mainely Provisions, 8 food co-ops, and many country/general stores. These smaller stores may also facilitate access to regional food.
The Maine Food Strategy

The Maine Food Strategy, published in 2016, provides a framework for connecting people and resources that can achieve measurable advances in Maine’s food system. Key goals include:

» Increasing the market share of foods farmed, fished, foraged and/or processed in Maine;
» Improving food system business viability;
» Improving incomes and access to benefits for food system workers;
» Developing public policies that support food system activities;
» Reducing food insecurity in Maine.

State Snapshot

» Top Agricultural Products by Sales, 2017

Vegetables, mostly potatoes, made up a significant amount ($248 million out of $672 million) of agricultural sales in Maine.

- VEGETABLES 36.9%
- MILK FROM COWS 16.0%
- GREENHOUSE/NURSERY 10.1%

» Top Seafood Products by Sales, 2022

In 2022, American lobster accounted for 67.7% ($389,593,287) of the value of seafood sales and 59.3% (98,053,905) of live pounds landed. The next nearest catch by sales value, American eel, accounted for 3.5% of sales.

- AMERICAN LOBSTER 67.7%

» Top Manufactured Products by Sales, 2017

- NONALCOHOLIC BEVERAGES 29.3%
- FRUIT/VEGETABLE PRESERVING 18.6%
- OTHER PRODUCTS 14.8% (EXAMPLES: SOUP MIXES, POWDERED DRINK MIXES)

» Top Retail Food Sales by Market Channel, 2017

- GROCERY STORES 54.7%
- RESTAURANTS/FAST FOOD 36.0%
- CONVENIENCE STORES 2.9%
- DIRECT SALES 0.6%
Food System Economy

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

Maine’s food system employs about 110,000 people and generates over $15.3 billion in sales. Agricultural employment increased slightly and sales decreased slightly from 2007 to 2017. Employment and sales in every other category, except grocery store sales, increased from 2007 to 2017.

Economic Impact of Maine’s Food System, 2017

<table>
<thead>
<tr>
<th>Sector</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>28,067</td>
<td>25.6%</td>
<td>-0.5%</td>
<td>$702,513,100</td>
<td>4.6%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Fisheries</td>
<td>6,838</td>
<td>6.2%</td>
<td>0.2%</td>
<td>$622,164,000</td>
<td>4.1%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Food Manufacturing</td>
<td>5,112</td>
<td>4.7%</td>
<td>-1.7%</td>
<td>$1,713,427,700</td>
<td>11.2%</td>
<td>-2.6%</td>
</tr>
<tr>
<td>Beverage Manufacturing</td>
<td>1,750</td>
<td>1.6%</td>
<td>3.0%</td>
<td>$873,478,500</td>
<td>5.7%</td>
<td>-3.7%</td>
</tr>
<tr>
<td>Wholesaling + Distributing</td>
<td>4,858</td>
<td>4.4%</td>
<td>-0.5%</td>
<td>$4,184,488,700</td>
<td>27.3%</td>
<td>2.1%</td>
</tr>
<tr>
<td>Stores</td>
<td>18,269</td>
<td>16.7%</td>
<td>0.6%</td>
<td>$4,433,197,000</td>
<td>28.9%</td>
<td>-0.5%</td>
</tr>
<tr>
<td>Food Services + Drinking Places</td>
<td>44,641</td>
<td>40.8%</td>
<td>1.1%</td>
<td>$2,792,142,900</td>
<td>18.2%</td>
<td>1.7%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>109,535</strong></td>
<td><strong>100.0%</strong></td>
<td><strong>0.3%</strong></td>
<td><strong>$15,321,411,900</strong></td>
<td><strong>100.0%</strong></td>
<td><strong>0.1%</strong></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 Maine’s food system, total employment in the state’s economy will increase by 1.45 jobs (i.e., for every 1 additional food system job, there will be 0.45 jobs spun-off those).

Total Food System Employment Impact

The additional 0.45 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.
Food System Wages

How much do food system workers in Maine earn?

Wages/salaries are the most common source of income for the majority of Americans. Maine’s food system workers, particularly food service workers, receive some of the lowest wages of any occupational category in the state. However, Maine has the third highest minimum wage of the New England states, and median hourly wages for many food system jobs are above 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

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.
Do Mainers have equitable access to food stores?

Maine’s Indigenous, Black, Asian, Hispanic, biracial, and other non-White populations disproportionately live in low income/low access (LILA)* census tracts. 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.

EXAMPLE
Penobscot Indian Island Reservation, which spans the Penobscot River, is 72% Indigenous. More than 19% of the population lived below the poverty level.

* Low Income/Low Access (LILA) = Where a large proportion of the residents have low-incomes and are more than 1/2 mile from a food source for urban populations, and over 10 miles for rural populations.

% NON-WHITE OR HISPANIC BY LILA CENSUS TRACT

<table>
<thead>
<tr>
<th>% of Population</th>
<th>% Living in LILA Tracts</th>
</tr>
</thead>
<tbody>
<tr>
<td>90.2% (1,228,264)</td>
<td>9.0% (110,741)</td>
</tr>
<tr>
<td>3.9% (53,573)</td>
<td>8.6% (4,611)</td>
</tr>
<tr>
<td>2.0% (26,609)</td>
<td>10.5% (2,805)</td>
</tr>
<tr>
<td>1.8% (25,115)</td>
<td>13.2% (3,303)</td>
</tr>
<tr>
<td>1.2% (16,668)</td>
<td>13.2% (2,208)</td>
</tr>
<tr>
<td>0.5% (7,293)</td>
<td>28.0% (2,041)</td>
</tr>
<tr>
<td>0.3% (4,430)</td>
<td>5.2% (230)</td>
</tr>
<tr>
<td>0.03% (407)</td>
<td>2.9% (12)</td>
</tr>
</tbody>
</table>

Sources: USDA Food Research Atlas, American Community Survey

Food Insecurity

Maine’s recovery from the Great Recession was slower than the rest of the nation due to a variety of factors, including budget austerity and an increase in low-wage jobs.

The COVID-19 pandemic also triggered economic hardship across the country, but USDA estimates of food insecurity were not noticeably higher from 2020 to 2022. What explains this? The federal government rapidly fortified the social safety net to fight the pandemic.

However, other research found that as much as 34% of Maine’s population experienced food insecurity from July 2021 to July 2022.

Sources: USDA Economic Research Service, KFF (SNAP Benefits)

Food Access

Maine is also home to predominantly rural, White populations with low income and low access. Penobscot Indian Island Reservation, which spans the Penobscot River, is 72% Indigenous. More than 19% of the population lived below the poverty level.
How much do Mainers spend on food? Where do they shop?

Mainers spent over $7.0 billion at stores and restaurants in 2017. Grocery stores (54.7%) and restaurants (36.0%)—which includes full-service and fast food restaurants—accounted for 90.7% of total sales. Direct sales from farmer to customer made up 0.6% of total retail sales.

Food Stores and Services Sales, 2017

TOTAL = $7.0 BILLION

Grocery Stores/Supermarkets
$3.8 billion
54.7%

Restaurants
$2.5 billion
36.0%

Count of Food Stores in Maine

Maine has over 160 independent stores, including many small grocery stores, general/country stores, and ethnic markets.

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

TYPE OF STORE

<table>
<thead>
<tr>
<th>TYPE OF STORE</th>
<th>MAINE BASED STORES</th>
<th>NORTHEAST BASED STORES</th>
<th>NATIONAL CHAINS</th>
</tr>
</thead>
<tbody>
<tr>
<td>INDEPENDENT STORES</td>
<td>166</td>
<td>93</td>
<td>25</td>
</tr>
<tr>
<td>DOLLAR TRENDY DOLLAR</td>
<td>66</td>
<td>63</td>
<td>21</td>
</tr>
<tr>
<td>HANNAFORD</td>
<td>25</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>DOLLAR GENERAL</td>
<td>4</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>WAWAS</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>SHAW’S</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: this estimate does not include gas station convenience stores or pharmacy chains like Walgreens and CVS.
Maine had the second highest per capita food expenditures ($6,225) of any state in the country in 2020. With an average annual food expenditure growth rate of 1.5% from 1997 to 2020—and population increase to 1,411,097 by 2030—per capita food expenditures may reach $7,013 by 2030. About $2,104 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.
Climate Change

How will climate change impact Maine’s 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 Maine and New England:

» **Benefits to Agriculture:** longer growing periods and milder temperatures should allow farmers to experiment with new crops or practices that were previously not viable in Maine.

» **Loss of Seasonality:** at the same time, 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 Maine in 2022, 43.3°F, was 3.2°F higher than the average temperature during the previous century.

**Projected Climate Risks**

- **Hurricanes:** Hurricanes Gloria (1985) and Bob (1991) were billion-dollar disasters that impacted Maine.

- **Extreme Rain:** Annual precipitation and extreme precipitation events in Maine have been above average in recent years.

- **Sea Level Rise:** The sea level around Bar Harbor has increased by 8 inches since 1950. Sea level is expected to rise by 2 feet by 2050.

**Ocean Under Threat:** The Atlantic Ocean supports tourism, recreation, and economic activities, including fisheries. Warmer ocean temperatures—the Northeast Continental Shelf (i.e., Gulf of Maine) 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. As a result, for example, some lobstermen are diversifying their incomes by seeding and harvesting seaweed in the offseason.

About 10% of Maine’s seafood catch in 2020 was classified as having very high or high vulnerability to changes in abundance or distribution due to climate change.

**Climate Vulnerability of Maine Catch**

![Graph showing climate vulnerability of Maine catch over the years, with 2020 values highlighted.](source)

**Risks to Cities:** The Northeastern U.S. is home to densely populated cities, including Portland, 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. Source: Fourth National Climate Assessment, Chapter 18: Northeast

**Projected Climate Risks**

- **WATER STRESS:** Maine has experienced abnormally dry days in the early 2000s and over the past 10 years, but precipitation is expected to be above normal over this century.
- **HEAT STRESS:** Temperatures have risen about 3.5°F since the beginning of the 20th century, resulting in warmer nights, shorter freeze-free seasons, and longer growing seasons.
- **WILDFIRE:** Large wildfires are not very common in Maine: fewer than 500 fires, covering about 300 acres occurred in 2023.

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

**Land in Agriculture**

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Acres</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>CROPLAND</td>
<td>460,943</td>
<td>35.3%</td>
</tr>
<tr>
<td>WOODLAND</td>
<td>664,573</td>
<td>50.8%</td>
</tr>
<tr>
<td>FARMSTEADS</td>
<td>87,207</td>
<td>6.7%</td>
</tr>
<tr>
<td>PASTURE</td>
<td>94,890</td>
<td>7.3%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1,307,613</td>
<td></td>
</tr>
</tbody>
</table>

Harvested cropland: 360,295 acres

**END USES**

- **ANIMAL FEED**
- **EDIBLE**
- **LANDSCAPING**

Acreage for animal feed equaled 55.6% (200,575 acres) of harvested cropland and 15.3% of total land in agriculture. Maine already has the largest amount of acreage devoted to vegetables and berries, and the second most for fruit, and it may have the most capacity to boost vegetable, berry, fruit, and grain production in the region.

**In 2021, Maine was the 8th largest grower of potatoes in the US**

- Cropland decreased from 1.49 million acres in 1945 to 461,000 acres in 2017
- Pastureland decreased from 439,000 acres in 1945 to 95,000 acres in 2017

**Agricultural Sales, 2017**

TOTAL $672,265,500

Vegetable production, mostly potatoes, generated the highest percentage of sales, 36.9%, and 19.1% of Maine farms were engaged in vegetable production.

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.

Source: USDA 2017 Census of Agriculture
Projected Changes in Land in Agriculture, Business as Usual Scenario

TOTAL

1,307,613 ACRES EXISTING ACREAGE
-53,400 ACRES BUSINESS AS USUAL SCENARIO

LAND USES

- CULTIVATED CROPS
- PASTURE/HAY
- EASEMENT
- DEVELOPED LAND
- PROJECTED URBAN AND HIGHLY DEVELOPED AND LOW-DENSITY RESIDENTIAL

An analysis from the American Farmland Trust (AFT) estimates that Maine could lose an additional 53,400 acres by 2040 under a “Business as Usual” development scenario and 72,500 acres under a “Runaway Sprawl” scenario.

AFT projects that Somerset, Aroostook, and Cumberland counties will experience the biggest decreases in land in agriculture.

Source: American Farmland Trust, Farms Under Threat 2040: Choosing an Abundant Future

Aroostook County had the most land in agriculture of any county in New England in 2017, 317,082 acres. Aroostook County also had the highest sales value of any New England county, over $213 million.

Number of Farms Engaged in Each Category, 2017

TOTAL 7,600 FARMS

Note: the number of farms has decreased since 2017.

26.3% of farms were engaged in hay production, which accounted for 3.2% of sales.
Fisheries

What kinds of seafood products does Maine harvest?

Dozens of species are caught or harvested by Maine fishermen/lobstermen, but lobster accounts for the majority of pounds landed (59%) and sales (68% in 2022). Lobster harvests have been relatively consistent over the past 12 years, but have declined since 2016. Warmer ocean temperatures are expected to increasingly impact production. Maine also has significant aquaculture production, equal to nearly $49 million in 2020, mostly Atlantic salmon.

Source: NOAA Fisheries and the Atlantic Coastal Cooperative Statistics Program

Impact of COVID Pandemic
Aquaculture

As of 2021, Maine had over 180 active aquaculture leases. Farm-raised Atlantic salmon accounts for the majority of the value of aquaculture harvests, but production data were suppressed from 2011 to 2020. For example, in 2020, harvest values for American/Eastern oysters, blue mussels, and marine algae equaled $9.9 million (20%). This means that Atlantic salmon accounted for the remaining value $38.7 million (80%).

Food Waste

How much food waste is landfilled in Maine?

A 2011 “Waste Characterization” study found that food waste (vegetative and protein) is the most common material in Maine’s residential waste stream at about 331,000 tons, or 661.5 million pounds.

Landfilled Food Waste

1,187,265 TONS TOTAL MSW
330,772 TONS FOOD WASTE

Food waste
330,772 tons 27.9%

Other organics
183,076 tons 15.4%

Plastic
159,568 tons 13.4%

Paper
303,584 tons 25.6%

Textiles
50,577 tons 4.3%

Metal
38,705 tons 3.3%

Construction and demolition
33,773 tons 2.9%

Glass
58,512 tons 2.7%

Special waste
1,187,265 TONS TOTAL MSW

# Key Maine Strengths, Weaknesses, Opportunities, and Threats

## STRENGTHS
- Generational experience and knowledge in farming and fishing
- Strong network of technical and business assistance providers
- Strong state and community conservation programs for working farmland and waterfront
- State legislation to expand subsidies for local foods in school lunch programs and strong state and nonprofit farm to school support
- Strong farm to food pantry relationships and programs

## WEAKNESSES
- Lack of statewide definition of “local food” in Maine statute, institutions and food distributors
- High rates of food insecurity and significant disparities in healthy food access
- Minimum wage excludes farmworkers and is below estimated living wage for the state
- Access to markets, cost-effective infrastructure such as transportation, and food hubs for very small, geographically dispersed farms

## OPPORTUNITIES
- Growing food-related sectors in Maine including greenhouses, aquaculture, and value-added food and beverage products
- About 20% of farms grow vegetables, a crop important to a resilient diet
- Expanded investments in agriculture, seafood, and food value chain businesses
- Upcoming state investments in electric grid upgrades for rural and energy intensive industries
- Tech innovations in workforce automation and workforce development programs for jobs in the food value chain

## THREATS
- Real estate development pressure and land use changes that conflict with maintaining working farms and waterfronts
- Effects of climate change on growing conditions and seafood production
- Very high per capita food expenditures
- Tight labor market restricts growth and the viability of some businesses
- Declining number of mid-sized farms

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

To help meet the region’s 30x2030 goal, Maine needs to strengthen its local food system while also working with policymakers and leaders in the region to develop strategies that leverage regional markets and build supply chains to help bolster the viability of Maine food businesses and increase regional food self-reliance. In Maine, the state needs to aggressively implement strategies from recent state government planning initiatives, including:

» Investments that expand Maine’s food infrastructure such as processing, storage capacity and distribution networks

» Investments aimed at lowering energy costs for food infrastructure businesses, farmers, fishermen and residents

» Promoting personal and regional food self-provisioning and self-sufficiency by protecting and restoring farmland and fisheries and encouraging urban agriculture and community gardens

» Including food supply chain workers in wage and workplace protections to prevent food insecurity among food system workers

» Ensuring that food system workers have adequate access to mental health resources and supports.

Additional strategies supporting the 30% goal include:

» Ensuring that evaluation processes and awards for public investments in food infrastructure address historical inequities

» Building systems for supply chain mapping and data collection to build capacity for stronger systems of support in connecting small and mid-sized farmers and producers to new markets

» Encouraging planning for community food supply chain resiliency in regional, community economic development and emergency management planning efforts

» Support for initiatives that create opportunities for small and mid-sized food supply chain businesses, farmers and fishermen to develop collaborative working relationships

» Support for research and development on sustainable agriculture, fisheries and food production

» Develop a statewide planning process to establish a state food system plan

Additional References


» Everyone at the Table: Maine’s Roadmap to End Hunger by 2030

» A Four-Year Plan for Climate Action: Maine Won’t Wait (December 2020)

» Permanent Commission Recommendations to the Maine Legislature (2020)