NEW ENGLAND FEEDING NEW ENGLAND

A REGIONAL APPROACH TO FOOD SYSTEM RESILIENCE

MAY 2023

Can the 6 New England states provide *30% of their food from regional farms and fisheries by 2030?*

The **New England State Food System Planners Partnership** is a collaboration between six state-level food system organizations and Food Solutions New England, a regional network that unites the food system community. In 2019, the Partnership launched **New England Feeding New England**, a 10-year initiative to prepare the region for system shocks such as climate-related weather events and public health emergencies. Our aim is to increase regional food production for regional consumption. We work collaboratively to improve the reliability of our regional food system by strengthening supply chains.

Connecticut Food System Alliance

We work toward a just, sustainable food system by fostering collaboration and alignment among the state's food system actors and advocating for food policy and systems change informed by food justice. CFSA is working with network members to develop a state food action plan rooted in food justice to transform the Connecticut food system. This plan will serve as a roadmap for equitable food access, diverse ownership of food system assets, and sustainable, viable food production and distribution.

The Maine Food Strategy

We are a statewide initiative aimed at facilitating collaborations where cross-sector sharing of expertise and resources support innovative solutions to food system issues and advance goals in the 2016 Maine Food Strategy Framework. The initiative accomplishes its work by partnering with the Maine Food Convergence Project, Selling More Maine Foods, and the Maine Food Policy Alliance Design Team.

Massachusetts Food System Collaborative

We support 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. Our priorities are driven by the 2015 Massachusetts Local Food Action Plan, which presented a broad agenda for issues ranging from farmland access and protection, to farming and fishing, to public health and food access.

New Hampshire Food Alliance

We are a statewide network of 150+ partners that engages and connects people dedicated to growing a thriving, fair, and sustainable local food system in the Granite State. We work together to grow and sustain local farms, fisheries, and food businesses, secure healthy food access for all, build climate resilience, and ensure racial equity in our communities and workplaces.

Relish Rhody Food Strategy & Rhode Island Food Policy Council

The Relish Rhody food strategy was established in 2017 to create a vision and "roadmap" for a more equitable, accessible, economically vibrant, and environmentally sustainable food system in the Ocean State. Led by the Director of Food Strategy and supported by the Rhode Island Food Policy Council, our strategic initiatives are designed to further a just and resilient food system across five integrated focus areas.

Vermont Farm to Plate

Farm to Plate is Vermont's food system plan being implemented to increase economic development and jobs in the farm and food sector, improve soils, water, and resiliency of the working landscape in the face of climate change, and improve access to healthy local foods for all Vermonters. The 15 strategic goals and 34 priority strategies contained in the Vermont Agriculture and Food System Strategic Plan 2021-2030 are being implemented by over 350 organizations who comprise the Farm to Plate Network.

Food Solutions New England

We are a regional, multi-racial, six-state network that unites the food system community around a shared set of values—democratic empowerment, racial equity and dignity for all, sustainability, and trust—and strengthens the movement's ability to achieve the New England Food Vision of 50% x 2060. We are organized around 4 overlapping impact areas: Visionary Policy, Network Building & Strengthening, Racial Equity & Values Leadership, and Narrative Strategy.

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Acknowledging Our Shared Legacy of Oppression

We acknowledge that New England occupies the unceded territory and homeland of many Native peoples. The Indigenous people of New England include, but are not limited to, the Pequot, Mohegan, Schaghticoke, Narragansett, Nipmuc, Wampanoag, Nauset, Pocomuk, Pennacook, Abenaki, Passamaquoddy, Mi'kmaq, Maliseet, and Penobscot.

Indigenous people remain in our region, resisting a history of erasure by settler culture. This land, known as the "dawnland" to the people of the Wabanaki confederacy of Northern New England, has a long agricultural history. With rich fisheries and many game species, the land provided rich sources of animal protein. Archaeological evidence suggests that a diversity of native plants were harvested, including blueberries, blackberries, ramps, groundnuts, sunchokes, small grains, and pseudo-grains like little barley and relatives of quinoa. Later corn, beans, and squash were introduced from regions farther south and became centerpieces of agricultural production. Many of these crops remain distinct features of the New England food system, having been adopted by those from many different backgrounds who now call New England home.

The history of agriculture in New England also includes a legacy of forced labor, land seizure, segregation, and other forms of systematic oppression. A legacy of unequal land access and barriers to education and economic opportunity create a landscape of inequality that we must rectify to reach our goals of food security for all. From indentured servitude in the early colonial era, through chattel slavery that impacted our region, to 20th-century redlining and other forms of economic segregation, forced prison labor, and heavy reliance on migrant labor, agriculture and economic activity in our region have never equally benefitted everyone in our region. We acknowledge the long, complex history of food production in our region, including its deep Indigenous roots and legacy of systematic inequality.

Land and labor acknowledgments like ours can be contentious. Some statements may assuage the guilt of those writing them, without addressing the considerable pain and suffering inflicted by historical and ongoing injustice. Others may engage in surrogate advocacy, and wade into difficult political realms. On a gradient from empty platitudes to calls to political action that exceed organizational mandates, there is a space between that encourages conversation. We must understand the harm inflicted in the past and present from the voices and perspectives of those who have been hurt most. We need meaningful conversation to put forward policies with broad support, that help the arc of history bend towards justice.

Executive Summary

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

This question guided research conducted by the [New England State Food System Planners Partnership](#) to help policy-makers, funders, food system businesses and stakeholders, community groups, and consumers understand the relative resilience of New England's food system. Why does this question matter? After all, America's food and beverage production capacity—farms, fisheries, processors, and manufacturers—is enormous, abundant, and diverse. Food imports from around the world have also steadily increased. Our food distribution systems are timely and efficient. Our grocery stores and restaurants are stocked, affordable, and convenient. Even our waste disposal systems are a flush and weekly pickup away.

In most of our lived experiences, we have not had to answer the question—***Where does our food come from?***—with specificity, although our ancestors certainly could. And yet, accumulating evidence indicates that we are entering a new era of human experience. Due to linked challenges that are *simultaneously taking place everywhere across the planet*, Americans will no longer be able to reasonably expect that every food they want will be easily available for them to buy year-round.

New England Feeding New England

If where our food comes from suddenly mattered, would New England be prepared with a reliable, safe, and abundant food supply? What will it really take to grow, raise, produce, harvest, and catch more regional food and move it through supply chains to our homes and other places where we eat? There are very few examples of long-term planning for healthy, reliable food supplies. Unlike other systems that provide essential goods and services, like energy and water, *no one* is currently in charge of planning and preparing for healthy, reliable, and resilient long-term food supplies.

In 2014, Food Solutions New England published [A New England Food Vision](#), which imagined what it would take to produce 50% of New England's food supply from regional sources by 2060. It found that the region *could* theoretically supply 50% of its food by focusing production on fruits, vegetables, dairy products, and grass-finished meats, while importing the majority of food grains, feed grains, oilseeds, and sweeteners. Based on a target of 2,300 calories per person per day, 4 million additional acres of land in agriculture would be required to do this (about three times more than is currently in active production, although about 6.8 million acres were in cropland and pasture in New England in 1945).

New England Feeding New England updates the analysis from *A New England Food Vision* by exploring opportunities at an intermediate and more easily imaginable range: **what would it take for *30% of the food consumed in New England to be regionally produced by 2030?*** Our objective was to better understand our current regional food system and exactly what it will take to grow, raise, produce, harvest, catch and move more food through a complex regional supply chain to our homes and other places we eat. No single county, state, or region can become food self-*sufficient*. But the quest for increased regional food self-*reliance* is both an investment in our shared future and an insurance policy against future risks, particularly due to climate change.

We started with 5 key questions about our long-term food supply and assembled four research teams from across New England to answer them:

1. **What might change if we intentionally and regionally plan for our future, making significant investments in strengthening our regional food system and communities?**

A central concept of this approach is the idea of **regional food self-reliance (RSR), which is an estimate of how much food we produce compared to how much food we consume.** No single county, state, or region can provide a full menu of food products to meet the needs of its population. For example, within New England, Vermont and Maine have *most of the farmland*, while Massachusetts and Connecticut have *most of the consumers*. Moving toward *30x30* will require, for example, enormous investment in retaining and expanding land in agriculture in the northern states, with most of the people, political power, and potential sources of funding based in southern New England. This dynamic—big population centers in the southern states, and major agricultural production in the northern states—sets the stage for exploring regional food self-reliance.

2. **If we ate in a healthier, more resilient way, could more of our food be supplied by regional production?**

A **Dietary Patterns Team** was formed to investigate how food consumption patterns would have to change in order to make the best use of what regional food producers can grow, harvest, and catch. This Team developed dietary scenarios for "Unchanged Eating"—a continuation of how we currently eat—and "Resilient Eating"—a dietary pattern much more closely in alignment with U.S. Dietary Guidelines—in 2030 (see Volume 1: Estimating Resilient Eating Patterns).

3. **Could the six New England states meet a goal of supplying 30% of the region's food by 2030?**

A **Food Production Team** was formed to investigate how much food we produce in New England compared to how much food we consume. This Team analyzed current regional food self-reliance and developed a model to explore New England's potential to increase its self-reliance based on dietary scenarios prepared by the Dietary Patterns Team (see Volume 2: Estimating Production for 30% Regional Self-Reliance).

4. Do we have the right mix of industries to ramp up food production? What sectors are growing? What sectors are contracting?

An **Economic Impact Team** was formed to investigate if we have the right mix of industries to ramp up food production. This Team estimated the number of people employed in New England's food system, the economic impact of food system activities, economic multipliers for each industry, and areas of growth or contraction (see Volume 3: Economic Impact of New England's Food System).

5. What market channels offer the best opportunities for sourcing regional and local products?

A **Market Channels Team** was formed to investigate what market channels offer the best opportunities for sourcing local and regional food products. This Team analyzed market concentration trends, sales data from retail food market channels, consumer expenditures for the six states, and explored specific challenges within each market channel (see Volume 4: Understanding Market Channels and Food Expenditures).

Report Outline

This report provides detailed analyses of what it would take to meet 30% of New England's food consumption in 2030 with regional production.

» **Executive Summary: A Regional Approach to Food System Resilience** summarizes the four research volumes and discusses what a regional approach to food system resilience could look like.

» **Common Food System Challenges: Backgrounder** discusses seven food system challenges that every food system on earth is grappling with.

» **Volume 1: Estimating Resilient Eating Patterns** analyzes what it would take to eat in a healthier, more resilient way.

» **Volume 2: Estimating Production for 30% Regional Self-Reliance** analyzes what it would take to produce more of the region's food.

  • **Volume 2 Supplement: Increasing Regional Self-Reliance Through Seafood** discusses the scope for increasing RSR through pathways similar to those analyzed for terrestrial production, as well as factors that could potentially increase or decrease the contribution of seafood to RSR.

» **Volume 3: Economic Impact of New England's Food System** analyzes whether New England has the right mix of food system businesses to expand regional food production.

» **Volume 4: Understanding Market Channels and Food Expenditures** estimates food and beverage expenditures in New England, analyzes market concentration in retail stores and identifies what market channels offer the best opportunities for sourcing local and regional food products.

Each research Volume, as well as individual state reports and a data dashboard, are available at https://nefoodsystemplanners.org/.

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Key Findings

Volume 1

If we ate in a healthier, more resilient way, could more of our food be supplied by regional production?

TODAY NEW ENGLANDERS EAT ABOUT **2,940** CALORIES PER DAY (INCLUDES ALCOHOL) THIS IS WELL ABOVE DIETARY GUIDELINES FOR MOST PEOPLE

A SWITCH TO "RESILIENT EATING" WOULD MEAN REDUCING CONSUMPTION BY 600 CALORIES ↓ **2,320** CALORIES PER DAY

REQUIRES SIGNIFICANTLY MORE

REQUIRES SIGNIFICANTLY LESS

Volume 2

Could the six New England states meet a goal of supplying 30% of the region's food by 2030?

NEW ENGLAND'S FARMERS + FISHERMEN COULD MEET **30%** OF SERVINGS FOR A POPULATION GROWING FROM **15.3** MILLION TO **15.6** MILLION THIS WOULD REQUIRE MAXIMIZING USE OF **401,000** EXISTING UNDERUTILIZED ACRES **+** **588,000** ADDITIONAL ACRES OF CLEARED LAND

Volume 3

Do we have the right mix of industries to ramp up food production?

NEW ENGLAND'S FOOD SYSTEM EMPLOYS **1,000,000** PEOPLE = **10%** OF ALL JOBS AND GENERATES **$190** BILLION IN SALES = **11%** OF ALL SALES *BUT* EMPLOYMENT AND SALES IN AGRICULTURE AND FISHERIES ARE *FLAT OR DECLINING*

Volume 4

What market channels offer the best opportunities for sourcing local and regional food products?

4 MARKET OUTLETS → GROCERY STORES · FAST FOOD · RESTAURANTS · WAREHOUSE CLUBS ACCOUNT FOR **$71.5** BILLION **84%** OF NEW ENGLAND FOOD SALES ACCESSING THESE MARKETS HAS BEEN CHALLENGING FOR SMALL PRODUCERS

NEFOODSYSTEMPLANNERS.ORG

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What is a Food System?

A "food system" simply refers to all the people, resources, and processes—food production, processing, packaging, distributing, selling, preparing, and disposing—that move food from farm and ocean to our plates (Figure 1). Food systems operate at multiple linked scales, from local, state, and regional, to national and global. **In this report, food system refers to the people, resources, and processes engaged in these activities within the 6 state New England region.**

Using a variety of data sources, we can measure:

» **Food production trends:** number of farms and fishing businesses; land in agriculture; pounds of food produced or caught; value of sales;

» **Economic trends:** employment, number of businesses, sales, and wages by industry; market concentration within industries;

» **Health trends:** prevalence of diet-related health problems by race, ethnicity, and gender; food expenditures;

» **Environmental trends:** energy use and greenhouse gas emissions by food system sector; climate change disaster impacts on food system sectors;

» **Equity trends:** prevalence of food insecurity; differences in access to healthy food based on race, ethnicity, income, and geography.

Taken together, these trends can help us understand if our food system is moving in a resilient direction and where we need to intervene through policy, investment, education, technical assistance, and other levers. Each component of the food system, and each state in New England, has an important role to play.

The seven organizations that make up the New England Food System Planners Partnership offer a variety of services to farmers, fishermen, entrepreneurs, businesses, students, advocates, funders, policy-makers, and other stakeholders across the region's food system. For instance:

Vermont Farm to Plate provides food system job openings on its website.
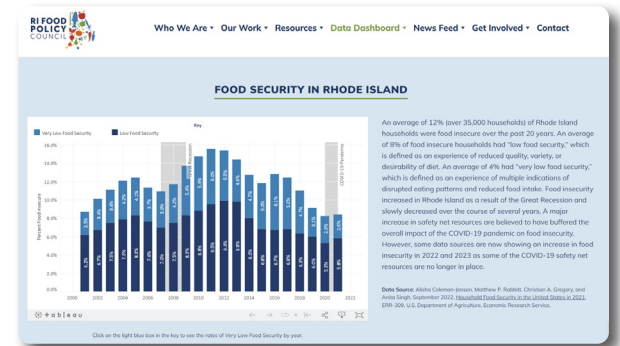
Rhode Island Food Policy Council created a Data Dashboard to provide a more comprehensive picture of the state's food system.

New Hampshire Food Alliance hosts an Annual Gathering that brings stakeholders together to strengthen the state's food system.

FIGURE 1: New England's Food System

New England's Municipal
Solid Waste

**Food
Waste** → The largest single
material in waste stream

22.8%
2,436,372
tons

77.2%
8,233,748
tons

**All other
MSW**
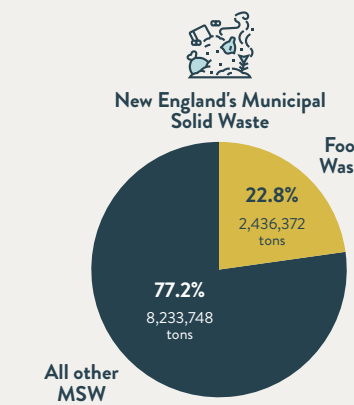
Sources: Waste characterization studies from each
state from different years. Values for New Hampshire
were approximated.
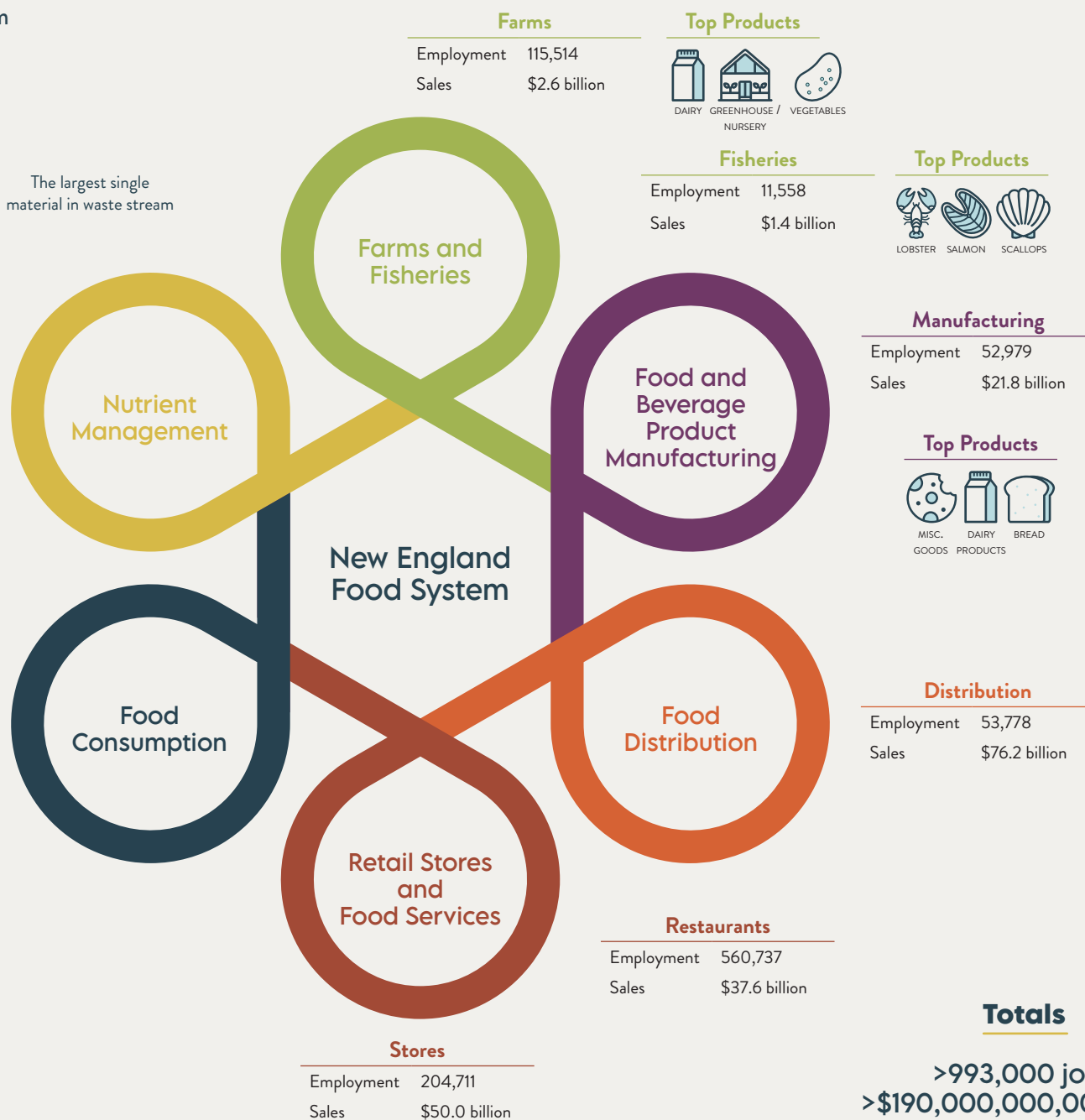
Estimated Consumption

32 billion pounds

Food Insecure*

MA	>590,000
CT	>346,000
NH	>74,000
ME	>124,000
RI	>88,000
VT	>50,000

*AVERAGE: 2019-2021

Source: Alisha Coleman-Jensen, et al., September 2022, Household Food Security
in the United States in 2021, USDA Economic Research Service, report #309.

Farms

Employment	115,514
Sales	$2.6 billion

Top Products

DAIRY GREENHOUSE /
NURSERY VEGETABLES

Fisheries

Employment	11,558
Sales	$1.4 billion

Top Products

LOBSTER SALMON SCALLOPS

Manufacturing

Employment	52,979
Sales	$21.8 billion

Top Products

MISC.
GOODS DAIRY
PRODUCTS BREAD

**Farms and
Fisheries**

**Nutrient
Management**

**Food and
Beverage
Product
Manufacturing**

**New England
Food System**

**Food
Consumption**

**Food
Distribution**

Distribution

Employment	53,778
Sales	$76.2 billion

**Retail Stores
and
Food Services**

Restaurants

Employment	560,737
Sales	$37.6 billion

Stores

Employment	204,711
Sales	$50.0 billion

Totals

**>993,000 jobs
>$190,000,000,000 sales**

Source: Volume 3: Economic Impact of New England's Food System

Research Process

The New England State Food System Planners Partnership put out a call for food systems researchers who were interested in exploring our key questions. Ultimately, 16 researchers were engaged in this project across four research teams, each tasked with a set of questions to explore in detail. Each research team answered a question that informed the analyses of the next research team. The 16 NEFNE researchers developed this foundational research so that we can understand where we are and begin to mobilize around a regional food goal, develop strategies, and take action to build a more just, equitable, resilient, and reliable regional food system. The teams met every two weeks between November 2021 – June 2022. At key points in the process, the full research team met for half and full day work sessions.

Food Production Focus Group Sessions

The Food Production Team held 10 focus groups sessions with farmers, fishers, fisheries managers, producers, processors, and other experts, under University of Vermont IRB approval no. 10293. Each session addressed a key product area or common theme, with the goal of speaking with a range of stakeholders across both land-based and sea-based production systems. We hosted virtual, video-based focus groups on ten topics: Annual Crops, Fruit Crops, Beef and Small Livestock, Dairy, Eggs/Poultry, Food Manufacturing, Aquaculture, Wild Capture Fishery: Production, Wild Capture Fishery: Harvest and Marketing, and BIPOC/Indigenous/Ethnic Food Production.

Focus Group with Nutrition Experts

The Dietary Patterns Team convened a panel of seven food and nutrition experts for a semi-structured virtual focus group. The purpose was to get their reaction to our spectrum of dietary patterns.

The experts supported our methodological decisions, including deviations from dietary guidelines for dairy and protein consumption. They also provided critical insights into ensuring that the "Resilient Diet" is relevant to racially and ethnically diverse audiences and can fit within any food budget. They stressed the importance of ensuring that no community perceives barriers to integrating culturally diverse and economical foods into these diets.

Advisory Committee

Fifteen food system development professionals from across the country were assembled to meet three times with our Research Team leads to provide important feedback on our research processes and preliminary findings. They provided valuable insights, suggested additional data to consider, and served as a thoughtful sounding board during the final months of our research.

Data Limitations

Research and data on food system topics are widely available, but not necessarily in the exact format that researchers, policy-makers, and the public might desire. Throughout the research process, team members wrestled with methodological options and used their informed judgments to move forward. Key methodological approaches and directions are discussed below.

» LAFA or NHANES?

In **Volume 1**, we analyzed current dietary patterns using the USDA-ERS Loss-Adjusted Food Availability (LAFA) national data. We compared these estimates to National Health and Nutrition Examination Survey (NHANES) survey data, and also considered whether they could be corrected to better fit the New England region. While most discrepancies between LAFA and NHANES were small, two differences stood out. The largest was for animal protein

(including meat, poultry, and seafood). NHANES was 38.7% lower than LAFA at 4.8 oz eq/day vs. 6.6 oz eq/day. Added sugar intake was 17 tsp eq/day for NHANES compared to 22.5 tsp eq/day for LAFA, amounting to a 31.5% difference.

While little evidence has been documented to explain these discrepancies, at least one study has examined assumptions in the estimates of food loss in the LAFA dataset. Researchers note that loss estimates for meat, poultry, and seafood are especially difficult to accurately capture due to the iterative nature of processing and lack of reliable supplier shipment data. Thus, LAFA estimates of meat consumption may be overstated as estimates of loss are less reliable.

Conversely, self-reported NHANES data may *underestimate* consumption for various reasons. Consumers may not be able to accurately state the level of added sugar or fats in their foods, as they are often visible only on the ingredients panel or nutrition label. Additionally, consumers may be less willing to accurately relay their level of consumption of foods that are perceived to be less healthful.

Ultimately, given the small differences for most food groups, and lack of a compelling reason to prefer NHANES estimates where there are differences, the research team decided to use the LAFA dataset to characterize the average diet of *American* consumers. The LAFA dataset is available exclusively at the national level, with *no* information on regional subsets of the American population. All consumption levels noted in this report thus reflect the average American consumer, not the average New England consumer specifically. In other words, the average American has to suffice for the average New Englander. These data were judged to be accurate enough for our purposes, and compatible with production estimates used elsewhere in the study.

After constructing a preliminary version of Resilient Eating, we convened a panel of food and nutrition experts for a semi-structured virtual focus group. The overarching goal was to get their reaction to

our two dietary patterns. We focused the discussion on four topics: (1) our comparison of LAFA to NHANES data; (2) the caloric target we used to construct the "Resilient Eating" diet; (3) places where we deviated from the 2020-2025 Dietary Guidelines for Americans; and (4) the cultural appropriateness of "Resilient Eating" for meeting racially and ethnically diverse audiences.

The panel supported our decision to use LAFA data to characterize current consumption. However, the experts felt strongly that the *original* calorie target for the Resilient Eating pattern needed to increase from 2,100 calories to at least 2,300, to better align with the reality of average consumption patterns today. The panel felt that our proposed Resilient Eating deviations from the Dietary Guidelines for Americans in the dairy and protein food groups were reasonable. **They also stressed the importance of ensuring that no community perceives barriers to integrating culturally diverse and economical foods into these diets,** which is why the recommendations in Volume 1 are not prescriptive, but rather "meet people where they are" and account for personal preferences, cultural traditions, and budgetary considerations.

» *Pounds, Calories, or Servings?*

In **Volume 2**, our estimates of current regional self-reliance compared the weight of food commodities produced to the equivalent weight consumed. This provides a sound benchmark for comparing results to earlier work. Weight-based estimates of regional self-reliance give a clear picture of the region's potential to supply individual food commodities. However, when these data are aggregated into an estimate of total regional self-reliance, water-rich foods, like fruits, vegetables, and fluid milk, have a big impact on the final value relative to their caloric contribution to the diet. Likewise, foods produced in a drier form, like grains and oilseeds, have a smaller impact on the self-reliance estimate, relative to their caloric contribution. **Weight may not be the best measure for understanding the overall ability of the region to feed itself.**

This presents a quandary for which there is no single correct answer. Each metric of regional self-reliance provides its own perspective. Weight may be relevant to the transportation and handling of food, while calories tell you something about the how much of a person's diet can come from regional food. Percentage of food expenditures would give an indication of the importance consumers place on sourcing their food from New England, but data is very limited on this topic. **For our purposes, we relied on *weight* for the current self-reliance assessment to permit easy comparison with earlier work, and we used *calories* and *servings* to assess capacity for supplying 30% of the food eaten in the region.** Bear in mind, the choice of metric depends on why one cares about regional self-reliance.

An additional important caveat to our analysis in Volume 2 is that we were unable to model the impact of *food and beverage product manufacturing* on regional self-reliance. No data is available that quantifies the amount of local, regional, or imported food *ingredients* in our manufactured food and beverage products. If we were able to include food and beverage products—made from any amount of local or regional ingredients—in our analysis, then our regional self-reliance would be higher.

» *Federal Data Sources or More Refined Local Sources?*

In **Volume 3**, our estimates for jobs, sales, and value-added are developed from the U.S. Census Bureau's Economic Census for 2007, 2012, and 2017. Data from the Department of Commerce's National Oceanic and Marine Fisheries Services was used for the fishery sector, and the U.S. Department of Agriculture's Census of Agriculture was also used. For the data we have used, the sources and methods are consistent for the states and the region, even if the latest available year is now 6 years out of date.

It is possible that, for some states, other locally sourced data could be used in Volume 3. For example, Dr. Thomas W. Sproul found

that official data sources significantly underestimated the number of jobs in Rhode Island compared to survey data that he collected. The challenge is that differences in coverage or collection methodology make it very difficult to compare results for surveys conducted in one state to the other New England states.

It is also difficult to estimate the number of people employed in certain food system activities. For example, Nutrient Management activities (e.g., food waste collection, composting, and related activities), the number of people employed in food system support activities at nonprofit organizations, or professors and support personnel working on food system issues at colleges and universities are difficult to estimate. As a result, **our estimates undercount the total number of people employed in food system activities in New England.**

» *How much do New Englanders Spend on Local/Regional Food?*

National, regional, and state food expenditure and market channel data are available from the USDA Food Expenditure Series, the USDA State-level Food Expenditure Series, the U.S. Census Bureau's Economic Census, and the Bureau of Labor Statistics' Consumer Expenditure Survey. From this data we can see long-term trends, including how much money we spend on food, what kind of food we buy and where we buy it from. Unfortunately, we have *extremely limited* information on the amount of local or regional food purchases in all market channels. For example, there is only one official data source, direct to consumer sales (e.g., farmers markets) quantified by the USDA Census of Agriculture, that we can compare to total retail food sales. To date, only Vermont has attempted "Local Food Counts" to estimate the value of local food purchases. We discuss the challenges of estimating local and regional food sales in **Volume 4**.

Common Food System Challenges

People living in New England have worked hard to feed themselves, their families, and their communities healthy food for millennia. Indigenous peoples living in this land ate local, regional, and seasonal food—wild game, corn, beans, pumpkins, cranberries, blueberries, maple sugar, seafood—for thousands of years. European colonists also mostly ate local, regional, and seasonal food—albeit from a mix of native and non-native livestock and crop species—for centuries. But, over the past 75 years, the way food is caught, raised, grown, processed, prepared, shared, and consumed has dramatically changed as waves of technological (e.g., refrigeration), societal, economic, and environmental shifts have made our modern world.

This tiny, but momentous, window of change unleashed enormous benefits. New Englanders undeniably benefit from linkages to national and global food systems. For example, our taste buds are used to the flavors of imported food and beverages that are challenging to grow in our region: coffee, cacao, tea, bananas, oranges, and more. New England farmers, fishermen, and food businesses benefit by exporting cheese, lobster, ice cream, and other products around the world. Tourism is a major contributor to the regional economy, and a key reason visitors show up is to sample our seafood, farm to table restaurants, craft beer, ice cream, and other culinary offerings.

Like everyone else, however, New Englanders are also vulnerable to the significant risks that the industrialization of food systems has created, whether from an epidemic of diet-related health problems, chronic food insecurity, climate change disasters, and extraordinary economic pressures exerted on small and midsize farms, fisheries, and food businesses.

Photo credit: RIFPC

Rhode Island lands over half of the East Coast's squid catch, as seen here at the Port of Galilee, but a significant portion is sent overseas for processing before being *reimported*.

Common challenges across all food systems include risks to long-term food production, challenges to farm, fishery, and food business viability, rising inequality and stagnant wages, and limited progress on reducing food and nutrition insecurity. Although conditions on the ground vary by local contexts, cultures, and ecologies, every food system on earth is grappling with these challenges. Seven common food system challenges are discussed in a backgrounder report:

» **Lack of Planning for Long-Term Food Supplies:** There are very few examples of long-term planning for healthy, reliable food supplies. New England Feeding New England marks one of the first regional approaches to food system planning in the country.

» **Risks to Long-Term Food Production:** Climate change, land use changes, and lack of equitable access to land for Black, Hispanic, Indigenous, and other Americans all pose a risk to long-term food production, including in New England.

» **Challenges to Farm, Fishery, and Food Business Viability:** Market concentration—mergers and acquisitions among food system businesses—limits opportunities for small and midsize farms, fishing operations, and other food businesses in New England to succeed.

» **Ongoing Exploitation of Food System Workers:** Food system workers, particularly retail and food service workers and farm-workers, experience some of the lowest wages of any occupational category in New England, as well as limited benefits.

» **Limited Progress Reducing Diet-Related Health Problems:** Poor diet is the leading cause of death in the United States. Many diet-related health trends continue to move in the wrong direction. For example, diabetes prevalence and the percentage of adults and children who are overweight or have

obesity have increased. The United States also has the lowest life expectancy of any other wealthy country. The amount of food we eat and the *composition of ingredients* in our food have changed: ultra-processed foods—high in sugar, fat, sodium, and artificial flavors—comprise an estimated 58% of caloric intake in the United States.

» **Limited Progress Reducing Food and Nutrition Insecurity:** Black, Hispanic, Indigenous, and other communities of color are disproportionately burdened with food and nutrition insecurity and low food access throughout New England.

» **Limited Progress Reducing Wasted Food:** We estimate that food waste makes up about 22.8% (2.4 million tons) of New England's municipal solid waste stream— the largest single material in the waste stream. When food is wasted, so are all of the resources that went into producing it. Food waste is also a major contributor to greenhouse gas emissions.

Photo credit: Grow Compost

Compost production, which turns food waste into a useful product, has increased in New England.

A Regional Approach to Food System Resilience

Six of the organizations that make up the New England State Food System Planners Partnership have separately advocated and planned on behalf of more just, sustainable, and resilient policies, investments, business services, technical assistance, and education within their states. Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont also make up a *New England food system* with shared histories, cultures, and ecologies. In partnership with Food Solutions New England (FSNE), Farm to Institution New England (FINE), the Northeast Sustainable Agriculture Working Group (NESAWG), and other regional networks, and with support from regional funders like the Henry P. Kendall Foundation and the John Merck Fund, these organizations have also worked toward a New England Food Vision that connects regional production and consumption.

A *regional approach* to food system resilience means that we work collectively to adapt, expand, and fortify New England's food production, processing, manufacturing, distribution, retail, and waste collection systems to ensure the availability of adequate, affordable, and culturally appropriate food for all New Englanders. A regional approach to food system resilience recognizes that we need to invest now in the slow process of increasing our capacity to produce more food closer to home that is available to all.

A recent report, A Regional Imperative: The Case for Regional Food Systems, articulates some unique features of a regional approach:

> "'regional' is larger geographically than 'local,' and also larger in terms of functions: volume, variety, supply chains, markets, food needs, land use, governance, and policy. A regional food system operates at various scales and geographies toward greater self-reliance. Thinking regionally provides the opportunity to frame food production, needs, and economies in a larger context—within locales and regions, and across state borders, as well as among and across regions, however they may be described and bounded."

Several criteria, attributes, and trends that shaped our regional approach are listed below:

» In the same way that references to the West, Midwest, or South call to mind certain commonalities in history, culture, cuisine, economic relationships, agricultural practices, political dynamics, and ecology, New England is evocative of shared characteristics and identities. Our shared geography means that we are also vulnerable to the same climate disruptions, particularly extreme rainfall.

» A central concept of this approach is the idea of **regional food self-reliance**, **which is an estimate of how much food we produce compared to how much food we consume.** Within New England, the northern states have *most of the farmland* (Figure 2), while the southern states have *most of the consumers* (Figure 3). Maine and Vermont hold about 65% of land in agriculture in New England (note that nearly half of land in agriculture in New England is woodland). In fact, the county with the most acreage of farmland in New England—Aroostook County, Maine—is the farthest away from the population centers of the region. Massachusetts and Connecticut account for about 69% of New England's population, mostly in the Boston metropolitan region and Connecticut's I-91 corridor.

Moving toward 30x30 will require, for example, enormous investment in retaining and expanding land in agriculture in the northern states, with most of the people, political power, and potential sources of funding based in southern New England.

FIGURE 2: New England Agricultural Density by County

NEW ENGLAND FEEDING NEW ENGLAND

KEY
- CULTIVATED CROPS
- PASTURE/HAY
- EASEMENTS

MAINE
1,307,613 ACRES

AROOSTOOK 317,082 ACRES

Significant amount of cropland, including 46,000 acres of potatoes, 20,000 acres of oats 15,000 acres of barley

PISCATAQUIS 51,061 ACRES

PENOBSCOT 105,452 ACRES

SOMERSET 145,833 ACRES

WASHINGTON 124,845 ACRES

Significant amount of dairy production and forage

ADDISON 189,699 ACRES

ORLEANS 128,388 ACRES

ESSEX 42,801 ACRES

FRANKLIN 47,201 ACRES

GRAND ISLE 18,799 ACRES

LAMOILLE 53,155 ACRES

CALEDONIA 86,999 ACRES

COOS 46,910 ACRES

WALDO 56,531 ACRES

HANCOCK 65,209 ACRES

Significant amount of blueberry production (+25,000 acres)

CHITTENDEN 64,226 ACRES

WASHINGTON 64,443 ACRES

OXFORD 76,837 ACRES

KENNEBEC 82,132 ACRES

VERMONT
1,193,437 ACRES

ADDISON 169,874 ACRES

ORANGE 85,629 ACRES

GRAFTON 73,575 ACRES

ANDROSCOGGIN 55,613 ACRES

LINCOLN 25,269 ACRES

KNOX 25,601 ACRES

CARROLL 32,464 ACRES

CUMBERLAND 50,021 ACRES

Significant amount of dairy production and forage

RUTLAND 98,863 ACRES

WINDSOR 112,638 ACRES

BELKNAP 25,406 ACRES

YORK 61,039 ACRES

SAGADAHOC 17,687 ACRES

SULLIVAN 39,492 ACRES

MERRIMACK 54,293 ACRES

STRAFFORD 23,186 ACRES

BENNINGTON 33,079 ACRES

WINDHAM 44,844 ACRES

CHESHIRE 53,620 ACRES

HILLSBOROUGH 44,216 ACRES

ROCKINGHAM 32,231 ACRES

NEW HAMPSHIRE
425,393 ACRES

FRANKLIN 88,247 ACRES

MIDDLESEX 27,332 ACRES

ESSEX 20,726 ACRES

Significant amount of cranberry production (+11,000 acres)

HAMPSHIRE 50,644 ACRES

WORCESTER 95,308 ACRES

SUFFOLK 21 ACRES

MASSACHUSETTS
491,653 ACRES

BERKSHIRE 58,647 ACRES

HAMPDEN 35,992 ACRES

NORFOLK 7,627 ACRES

PLYMOUTH 60,036 ACRES

TOLLAND 35,647 ACRES

PROVIDENCE 16,328 ACRES

BRISTOL 32,025 ACRES

BARNSTABLE 6,564 ACRES

LITCHFIELD 90,322 ACRES

HARTFORD 47,858 ACRES

WINDHAM 51,990 ACRES

KENT 9,626 ACRES

BRISTOL 1,331 ACRES

CONNECTICUT
381,539 ACRES

NEW HAVEN 26,938 ACRES

MIDDLESEX 35,647 ACRES

NEW LONDON 16,417 ACRES

NEWPORT 9,713 ACRES

DUKES 7,715 ACRES

NANTUCKET 769 ACRES

FAIRFIELD 52,245 ACRES

WASHINGTON 19,866 ACRES

RHODE ISLAND
56,864 ACRES

Map Source: 2019 National Land Cover Database.

NEW ENGLAND BY STATE
3,856,499 ACRES

- VT 30.9%
- MA 12.7%
- NH 11.0%
- CT 9.9%
- RI 1.5%
- ME 33.9%

NEW ENGLAND BY LAND USE
3,856,499 ACRES

Note: nearly 47% of land in agriculture in New England is woodland.

- HARVESTED CROPLAND 1,141,311 29.6%
- WOODLAND 1,795,668 46.6%
- OTHER CROPLAND* 202,659 5.3%
- OTHER PASTURE THAT COULD HAVE BEEN USED AS CROPLAND 53,973 3.9%
- PERMANENT PASTURE 287,500 7.5%
- FARMSTEADS 375,388 9.7%

* Includes cropland idle or used for cover crops or soil improvement, cropland on which all crops failed or were abandoned, and cropland in summer fallow.

Source: USDA 2017 Census of Agriculture.

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NEFOODSYSTEMPLANNERS.ORG

FIGURE 3: New England Population Density by Town/City
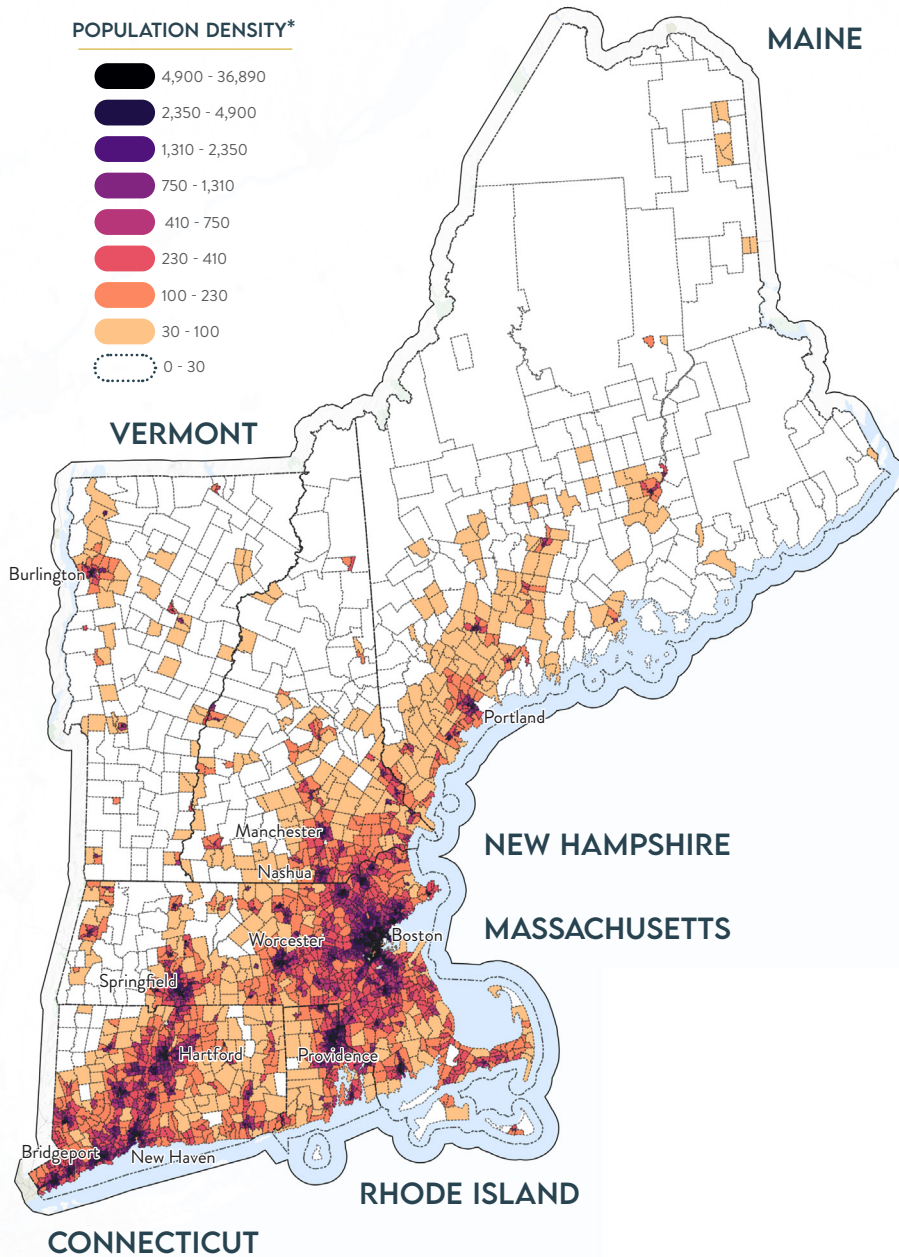
POPULATION DENSITY*

- 4,900 - 36,890
- 2,350 - 4,900
- 1,310 - 2,350
- 750 - 1,310
- 410 - 750
- 230 - 410
- 100 - 230
- 30 - 100
- 0 - 30

MAINE

VERMONT

Burlington

Portland

Manchester

NEW HAMPSHIRE

Nashua

Worcester   Boston   MASSACHUSETTS

Springfield

Hartford   Providence

Bridgeport   New Haven

RHODE ISLAND

CONNECTICUT

* Number of people per square kilometer

Photo credit: 2p2jploy, Shutterstock

Massachusetts and Connecticut account for 69% of New England's population. The population of Boston, pictured, is larger than for the entire state of Vermont.

Photo credit: Vermont Agency of Agriculture, Food and Markets

Vermont, pictured, and Maine have much lower population densities than southern New England states, but hold the majority of the region's farmland.

This dynamic—big population centers in the southern states, and major agricultural production in the northern states—sets the stage for exploring regional food self-reliance.

» New England's population is projected to grow from **15.3 million in 2020 to 15.6 million by 2030**, an increase of over 300,000 people (Figure 4). Massachusetts and New Hampshire are projected to account for about 89% of that population growth, while Vermont, Connecticut, and Maine are projected to experience modest gains, and the population of Rhode Island is projected to *decrease* slightly. Where development takes place in Massachusetts and New Hampshire may impact food production options, as well as food access and food security. Although the largest age cohort in 2030 will be 0-17, the biggest growth is expected in the cohorts 70-79, 80+, and 40-49. The number of people over the age of 60 is projected to increase by 16.4%, from 3.7 million in 2020, to 4.3 million

in 2030. The aging of the New England population will have health, labor force, food access, and food security implications (Note: population projections to 2030 by race or ethnicity at the state level were not available, but we assume that the region will continue to diversify).

» Our food systems are *unjust*, built from violence, stolen land, underpaid work, discrimination, and unequal access to healthy food. New England is markedly Whiter than the US average—61.1% of Americans were White in 2020, compared to 71.3% of New Englanders—but the region became more diverse from 2010 to 2020. The White population decreased by nearly 681,000, from 79.4% of New England's population, to 71.3% (Figure 5). The number of Hispanic New Englanders increased from 1.2 million to 1.8 million, that is, from 8.4% of the population to 11.9%. The number of New Englanders of two or more races dramatically increased, from 71,000 (0.5%

FIGURE 4: New England Population by Age Cohort, 2020 Actual and 2030 Projection
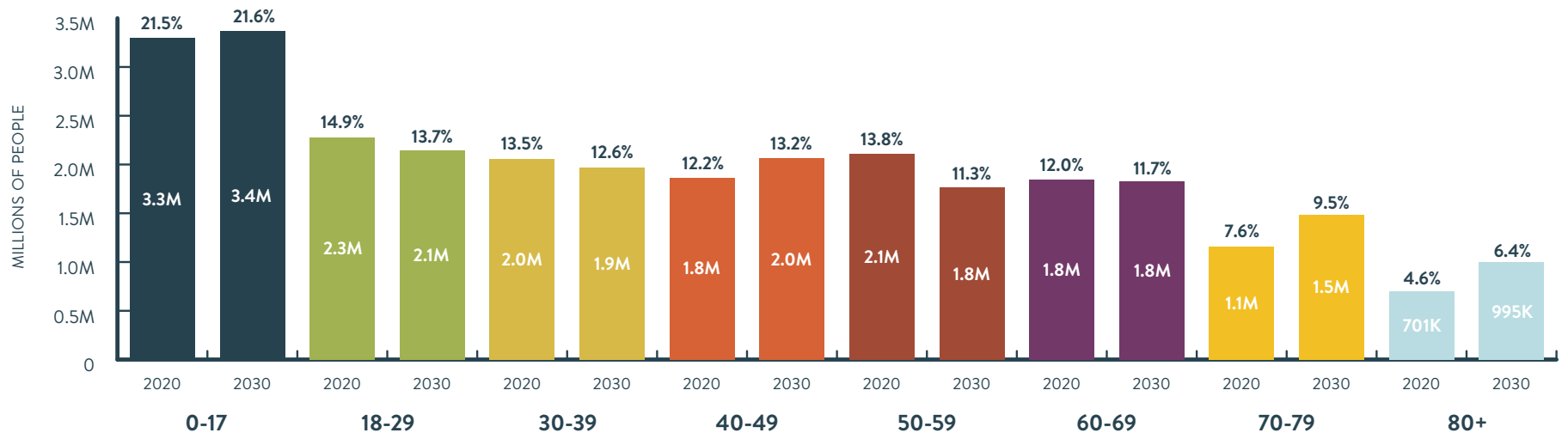
Source: Population Projections, United States, 2004 - 2030, by state, age and sex, CDC WONDER Online Database.

FIGURE 5: New England Population Racial and Ethnic Composition, 2010, 2020
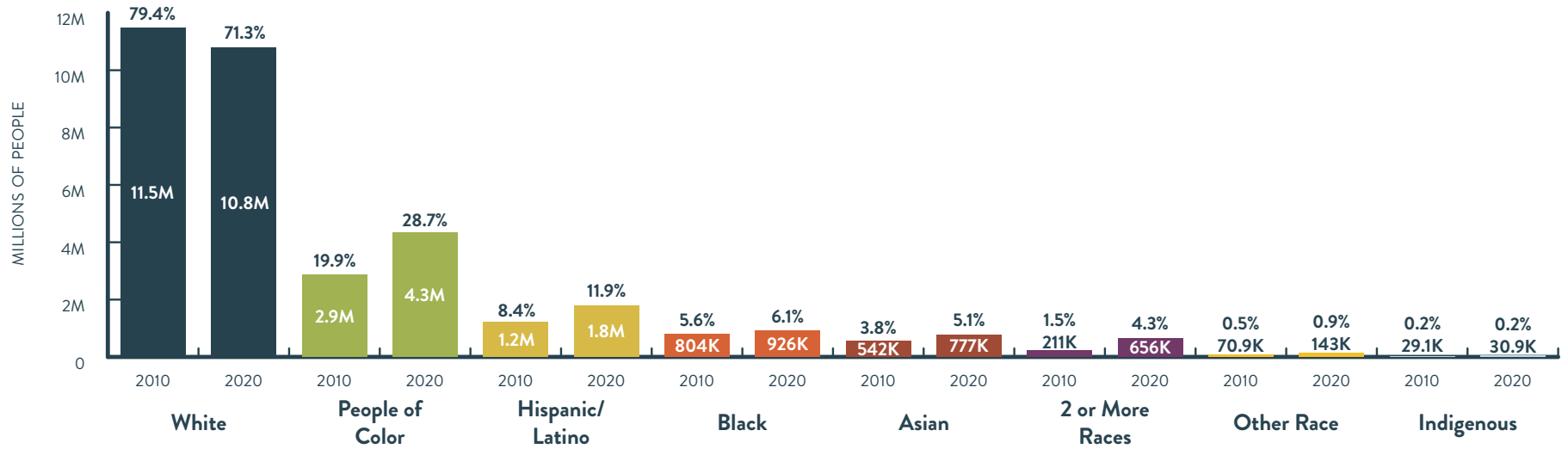
Source: US Census Bureau, American Community Survey, https://data.census.gov/table?q=hispanic&g=040XX00US09,50,33,44,23,25&y=2010&tid=ACSDT5Y2010.B03002.

of the population) to 656,000 (4.3% of the population). The number of Asian New Englanders increased by over 200,000, from 3.8% of the population to 5.1%. The number of Black New Englanders increased by 120,000, from 5.6% of the population to 6.1%. The Indigenous population of New England stayed approximately the same: 29,000-31,000 people.

Overall, New Englanders of color increased from about 2.9 million to 4.3 million and now account for 28.7% of the population. **A regional approach must prioritize health, wealth, leadership, and power for communities of color, including opportunities for land ownership.**

» Our food systems are *unsustainable*, they withdraw too much water, soil, and other resources, and add too much waste and pollution to ecosystems. Food system activities are major contributors to greenhouse gas emissions through land use

changes, livestock production, refrigeration, and food waste. Crop and livestock production are also particularly vulnerable to the impacts of a changing climate. **A regional approach must invest in climate-smart practices, plant-rich diets, reducing food waste, and other adaptations along supply chains.**

» Our food systems are *not resilient*, they are too dependent on hyper-specialized, vertically integrated supply chains that are too vulnerable to climate change. These systems currently function without any strategy for a healthy, reliable, and resilient long-term food supplies. **A regional approach must emphasize community-wealth building opportunities, adaptive and flexible supply chains, and proactive governance.**
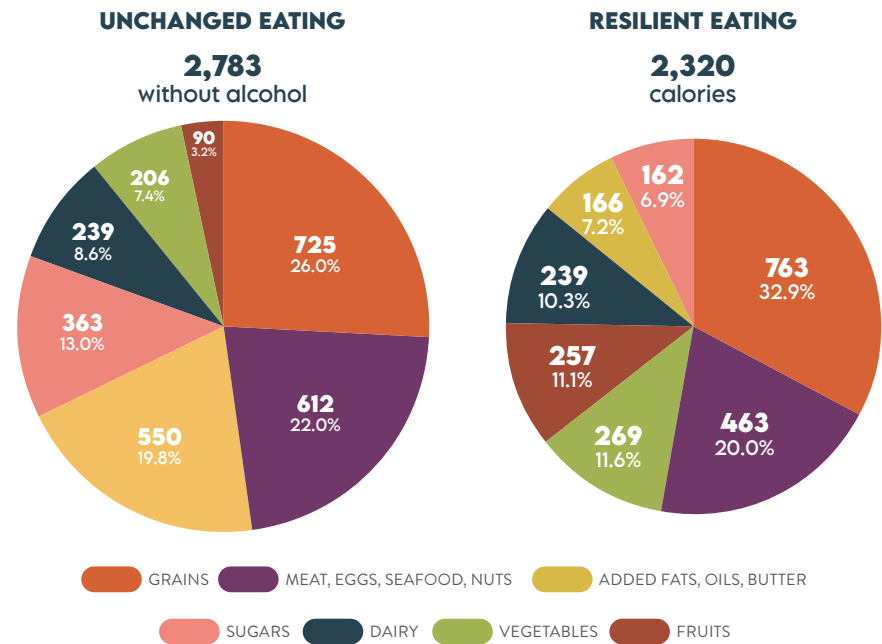
Volume 1: Estimating Resilient Eating Patterns

Motivated by the question—***If we ate in a healthier, more resilient way, could more of our food be supplied by regional production?***—a Dietary Patterns Team analyzed dietary patterns across the major food groups. To estimate the amounts of major food groups that might be consumed by New Englanders in 2030, the team identified a spectrum of possibilities. One end, called **"Unchanged Eating,"** is a simple continuation of the way people, on average, are eating today: the average American consumes about **2,940 calories per day** across all food groups, including added fats, sugars, and alcohol (or 2,783 calories without alcohol). This is well above USDA Dietary Guidelines for the majority of men and women.

At the other end of the spectrum, the Dietary Patterns Team articulated a **"Resilient Eating"** pattern that consumes an average of **2,320 calories per day**. This Resilient Eating pattern is based on significantly more fruit and vegetable consumption and significantly less consumption of ultra-processed foods, added sweeteners, and fats (Figures 6 and 7). This pattern, which would have enormously positive health outcomes, informed the development of the Food Production Team's biophysical model of land requirements to meet this diet in Volume 2.

Volume 1 highlights that transitioning to a more Resilient Eating pattern that is aligned with dietary guidelines presents a daunting challenge for New Englanders. To begin with, reducing the average caloric intake by over 600 calories—from about 2,940 today to 2,320 per day by 2030—would be no easy feat. Under this scenario, the average New Englander would need to reduce meat consumption by

FIGURE 6: Comparing "Unchanged Eating" to "Resilient Eating"

UNCHANGED EATING — 2,783 without alcohol

RESILIENT EATING — 2,320 calories

Legend: GRAINS; MEAT, EGGS, SEAFOOD, NUTS; ADDED FATS, OILS, BUTTER; SUGARS; DAIRY; VEGETABLES; FRUITS

Unchanged Eating values: 725 (26.0%), 612 (22.0%), 550 (19.8%), 363 (13.0%), 239 (8.6%), 206 (7.4%), 90 (3.2%)

Resilient Eating values: 763 (32.9%), 463 (20.0%), 269 (11.6%), 257 (11.1%), 239 (10.3%), 166 (7.2%), 162 (6.9%)

Unchanged Eating Source: USDA Loss-Adjusted Food Availability Data System.

over a third, while increasing levels of both seafood and plant protein. We would need to cut our consumption of added fats and sugars in half, while increasing vegetables by 60%, and doubling fruit intake. These changes may not happen in seven years, but they point the way toward a future where people in the region eat more healthfully and resiliently.

Would it cost more to eat more resiliently, compared to the way the average New Englander eats today? This is a complex question that cannot have a precise answer. We can think of Resilient Eating differing from how we eat today in two important ways: 1) the cost of eating a healthier diet; and 2) the cost of eating a more sustainably and justly-produced diet, with a larger proportion coming from local and regional sources. Food is the third highest expense for Americans

FIGURE 7: Estimates of Shifts in Servings Required to Move From Unchanged Eating to Resilient Eating in 2030

Unchanged Eating
≈2,940 calories

Resilient Eating
≈2,320 calories

FRUITS

0.8 cup
equivalent/day

increases to

2 cups
equivalent/day

Fruit consumption would markedly increase.

VEGETABLES

1.9 cups
equivalent/day

increases to

3 cups
equivalent/day

Vegetable consumption would increase.

DAIRY

1.5 cups
equivalent/day

stays the same

1.5 cups
equivalent/day

Dairy consumption would stay roughly equivalent to how people currently eat.

PROTEINS

1 cup
equivalent/day

decreases to

0.8 cups
equivalent/day

Total protein consumption would decrease, but more seafood, nuts, and beans is encouraged.

GRAINS

0.9 cup
equivalent/day

stays the same

0.9 cups
equivalent/day

Grain consumption would stay about the same, but more whole grain consumption is encouraged.

SWEETENERS

21.5 teaspoons
day

decreases to

9.5 teaspoons
day

Additional calories from added sugars would dramatically decrease.

FATS AND OILS

0.3 cup
equivalent/day

decreases to

0.1 cup
equivalent/day

Fats and oils consumption would be cut in half.

of all income levels (behind housing and transportation), but we do not pay the [true cost of food](). The "opportunity benefit" of the Resilient Eating pattern is eliminating the hidden health, economic, and environmental costs of our food system.

FIGURE 8: Vegetable Intake by Type

To illustrate one example, moving from consuming about two cups of vegetables per day to 3 cups may not seem like much, but it is a 60% increase from today.

This goal is unlikely to be achieved without targeted action based on how far 3 cups lies outside the projected confidence bounds based on historic consumption. Additionally, potatoes account for about 55% of New England's vegetable acreage, followed by sweet corn, pumpkins, squash, and snap beans. The New England states would need to significantly ramp up production of these and other crops to meet a 30x30 goal: **Volume 2 estimates that about 138,000 additional acres devoted to vegetables would be needed to meet the goal.**
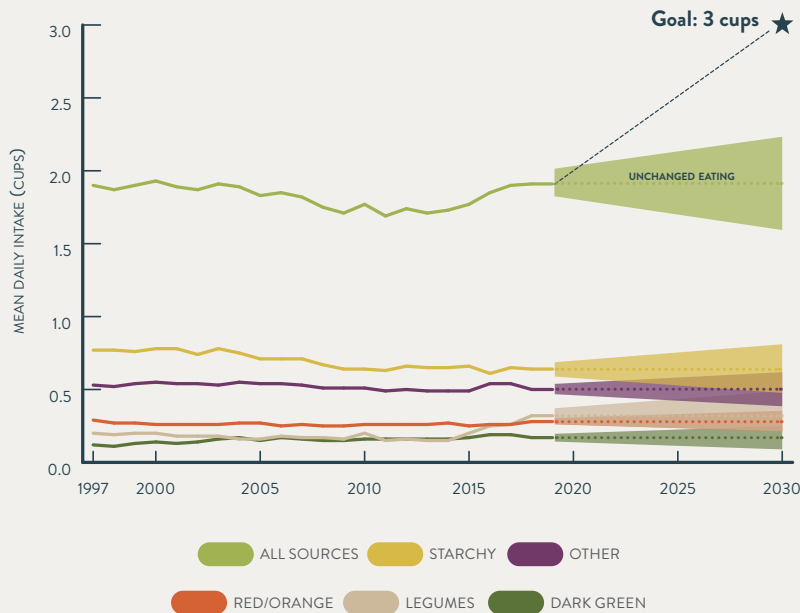
Volume 2: Estimating Production for 30% Regional Self-Reliance

A Food Production Team used the caloric and servings requirements of the Resilient Eating diet to answer the question—***Could the six New England states meet a goal of supplying 30% of the region's food by 2030?*** The key insights of Volume 2 are estimates of **regional food self-reliance (RSR)—how much food we produce compared to how much food we consume**—for the major food groups. RSR percentages varied widely from food to food, showing a rather lopsided capacity for self-reliance. With *weight* as our metric (Table 1), New England produces a lot more food than can be consumed in the region for a few categories: clams (911%), cranberries (545%), blueberries (264%), potatoes (96%). For major food categories, the region is most self-reliant in dairy (45%) and vegetables (32%) and least self-reliant in sweeteners (1.1%), fats and oils (1.3%), and grains (1.8%).

Estimating the region's capacity to produce food in nutritionally meaningful units—food group *servings* and *kilocalories*—yields quite different results. The **Reference Scenario** estimates the land requirements to supply the level of regional self-reliance observed for the benchmark year 2019. In this scenario, regional consumption is estimated based on per capita eating patterns from the Unchanged Eating dietary pattern estimated in Volume 1 and the New England population of 2019. Production levels are set to the ten-year average for 2010-2019. Land requirements for each food are based on ten-year average crop yields and livestock feed requirements from published literature, assuming reliance on grain-finished meats. The scenario restricts land to the *existing* area of cropland and pasture on farms.

TABLE 1: Current Plant- and Animal-Based Foods Grouped by Regional Self-Reliance

No Production / No Data		Less Than 5%		5-20%	20-50%	50-100%	>100%
Plant-Based Foods							
Almonds	Avocados	Apricots	Artichokes	Brussels sprouts	Apples	Potatoes	Barley
Bananas	Cane and beet sugars	Asparagus	Beans (dry, lima, snap)	Cabbage	Beets		Blueberries
Coconut	Dates	Broccoli	Canola	Collard greens	Blackberries		Cranberries
Figs	Grapefruit	Cantaloupe	Carrots	Cucumbers	Eggplant		Edible syrups
Hazelnuts	Kiwi	Cauliflower	Celery	Endives and escarole	Kale		Rye
Lemons	Limes	Cherries	Corn	Mustard greens	Oats		
Macadamias	Mangoes	Corn sweeteners	Garlic	Peaches and nectarines	Squash		
Mushrooms	Olives	Grapes	Honeydew	Peppers (bell)	Sweet corn		
Oranges	Other nuts	Lettuce	Okra	Radishes			
Papayas	Peanuts	Onions	Pears	Spinach			
Peas (dry)	Pecans	Peas	Peppers (chile)				
Pineapple	Pistachios	Plums and prunes	Raspberries				
Pumpkins	Rice	Strawberries	Sweet potatoes				
Tangerines	Walnuts	Tomatoes	Turnip greens				
		Watermelon	Wheat				
Animal-Based Foods							
Anchovy		Beef		Eggs	Cod	Oysters	Clams
Catfish		Chicken		Lamb	Crab		Flounder
Crawfish		Lard			Dairy Products		Haddock
Herring		Pork			Halibut		Lobster
Tilapia		Shrimp			Honey		Mussels
Trout		Tuna			Salmon		Pollock
		Turkey			Tallow		Scallops
							Seafood (other)
							Whiting

Under the Reference Scenario, the average New Englander consumes 2,940 calories per day, there are 2,079,661 acres of land in agriculture, and 18.3% of servings and 8.3% of calories can theoretically be fulfilled with regional production (Table 2).

TABLE 2: Servings and Total Food Energy Supplied by Reference Scenario

Scenario	RSR of Five Core Food Groups by *Servings*	RSR of Total *Calories* in Diet
Reference (2019)	18.3%	8.3%

The scenarios for increased RSR, **Scenario 1: Unchanged Eating** and **Scenario 2: Resilient Eating**, differ from each other only in terms of per capita dietary patterns but differ from the Reference dietary pattern in important ways. Consumption is estimated based on the region's estimated population in 2030. Estimated land requirements are based on the target self-reliance ratio for each food and regional productivity under improved yields, in which yield gaps are closed by half (where data are available) or where yields are assumed to double by 2050.

We considered two variations—or pathways—for each scenario. One pathway restricts land to the *existing* area of cropland and pasture cover in New England, including land that is cleared but may not be used as part of existing farms. The other pathway allows *additional land* to be brought into production that has suitable soils but is currently forested in order to achieve the 30% RSR target.

Two estimates of aggregate RSR are provided for each scenario. One approach takes the average of the percent RSR of the five major food groups: grains, vegetables, fruit, dairy, and protein-rich foods (a category that includes meat, poultry, beans, and seafood). The other approach estimates self-reliance based on the total edible energy, or kilocalories, provided from regionally sourced foods. Neither approach is necessarily superior.

However, the servings-based approach consistently yielded higher levels of RSR than the calories-based approach. This is true for two reasons: first, the servings-based approach only considers the core food groups, whereas the calories-based estimate also includes fats and sweeteners (i.e., food groups with low RSR levels). Second, the calories-based estimate gives greater weight to calorically-dense food groups, and these groups (grains, protein-rich foods, oils, and sweeteners) have low RSR levels.

Looking ahead to 2030, our model scenarios show that New England could increase regional self-reliance without clearing more land for agriculture. That is, food output could be expanded by *increasing crop yields* and *intensifying land use*, using a greater share of the available land and using more of that land for fruits, vegetables, and other food crops than is currently done. The results do show that significant improvements in self-reliance can be made (Table 3).

TABLE 3: Servings and Total Food Energy Supplied by Each Scenario Using Current Farmland

Scenario	RSR of Five Core Food Groups by *Servings*	RSR of Total *Calories* in Diet
Unchanged Eating: Pathway A-Current Land	27.4%	13.4%
Resilient Eating: Pathway A-Current Land	23.6%	16.8%

Neither scenario met the 30% goal when limited to the current footprint of agricultural land. The regional self-reliance scenarios presented in Volume 2 fell short of the 30% regional food consumption goal if we only utilized our *existing* land base and fisheries landings. Following current eating patterns (i.e., Unchanged Eating), the region could provide 27.4% of major food group *servings* by maintaining current production of dairy products and increasing production of vegetables, fruits, grains, and grass-based meat production. Following healthier eating patterns (i.e., Resilient Eating), the region could supply 23.6% of major food group servings, due to

higher consumption of fruits and vegetables. Both scenarios showed increased self-reliance compared to a 2019 baseline of 18.3% of the major food groups.

Reaching 30% of servings for the major food groups would still not reach 30% of calories required by 2030 under Unchanged Eating or Resilient Eating (Table 4). It would also require bringing approximately 290,000 acres based on the Unchanged Eating scenario and 590,000 acres based on the Resilient Eating scenario (Table 5, Figure 9).

TABLE 4: Servings and Total Food Energy Supplied by Each Scenario Using Additional Farmland

Scenario	RSR of Five Core Food Groups by *Servings*	RSR of Total *Calories* in Diet
Unchanged Eating: Pathway B-Reach 30% RSR	30.0%	14.5%
Resilient Eating: Pathway B-Reach 30% RSR	30.0%	20.9%

For the pathway variations that strive to reach 30% regional self-reliance, the model permits forested land with prime farmland soils to be brought back into production. Achieving 30% RSR under a Resilient Eating dietary pattern would require acreage devoted to vegetable production to increase 141%, from 98,000 acres currently, to 235,000 by 2030. Fruit acreage would have to increase 154%, from 73,000 acres today, to 186,000 acres by 2030. Achieving 30% RSR under a Resilient Eating dietary pattern would also require more intensive land use, with a larger share of the productive area in cultivated cropland, for example:

» Grazing or cutting hay on all land in the "Permanent pasture" category (i.e., no pasture cover goes unused);

» Leaving much less cropland idle (i.e., at a percentage that is more like the Corn Belt rather than New England);

» Tilling more land for cultivated crops.

New England is very self-reliant when it comes to cranberries and lobsters.

TABLE 5: Land Required to Supply Food From New England Sources by Each Scenario (Acres)
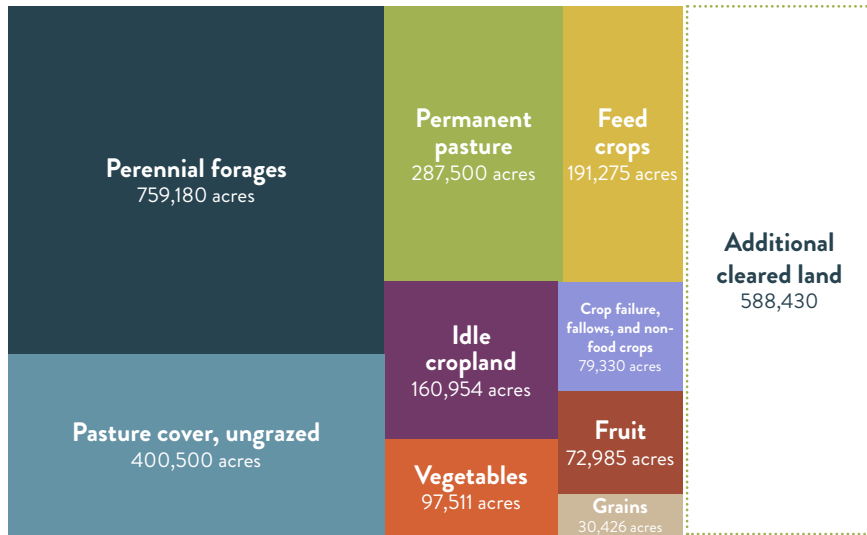
Land Use Category	Specific Use	2017 Reference (Census of Agriculture)	Current Land: Unchanged Eating	Current Land: Resilient Eating	Reach 30%: Unchanged Eating	Reach 30%: Resilient Eating
Cultivated Cropland	Grains for food	30,426	89,442	71,792	96,167	126,011
	Vegetables	97,511	158,776	158,077	170,655	235,258
	Fruits	72,985	100,512	121,303	108,567	185,770
	Feed Grains + Oilseeds	191,275	240,182	204,316	335,429	338,416
	SUBTOTAL	**392,197**	**588,912**	**555,488**	**710,818**	**885,455**
Cropland - Perennial Forages	Hay + Other Perennial Forages	705,207	784,640	801,505	841,364	881,473
	Used for Pasture	53,973	-	-	-	-
	SUBTOTAL	**759,180**	**784,640**	**801,505**	**841,364**	**881,473**
Cropland - Non-Food or Non-productive Use*	Idle Cropland	160,954	96,281	95,120	108,802	123,855
	Summer Fallow	22,820	27,301	26,972	30,852	35,120
	Land on Which Crops Failed	18,885	22,594	22,321	25,532	29,064
	Non-Food Crops	35,851	42,891	42,374	48,469	55,175
	Seed Uses of Grains	1,774	2,638	2,210	3,454	3,717
	SUBTOTAL	**240,284**	**191,705**	**188,997**	**217,109**	**246,931**
Permanent Pasture	Used for Pasture	287,500	513,837	533,441	599,517	654,232
	Pasture Cover, Ungrazed	400,500	n/a	n/a	n/a	n/a
	SUBTOTAL	**688,000**	**513,837**	**533,441**	**599,517**	**654,232**
	TOTAL	**2,079,661**	**2,079,094**	**2,079,432**	**2,368,808**	**2,668,092**
	ADDITIONAL CLEARED LAND	n/a	(567)	(230)	289,147	588,430
	VIRTUAL LAND IMPORTS**	n/a	95,248	101,422	-	19,057

* Our model assumes that (a) future production would reduce the percentage of cropland that is idle, and (b) the percentage of land in summer fallow, failed crops, non-food crops, and seed uses of grains increases as cropland increases.
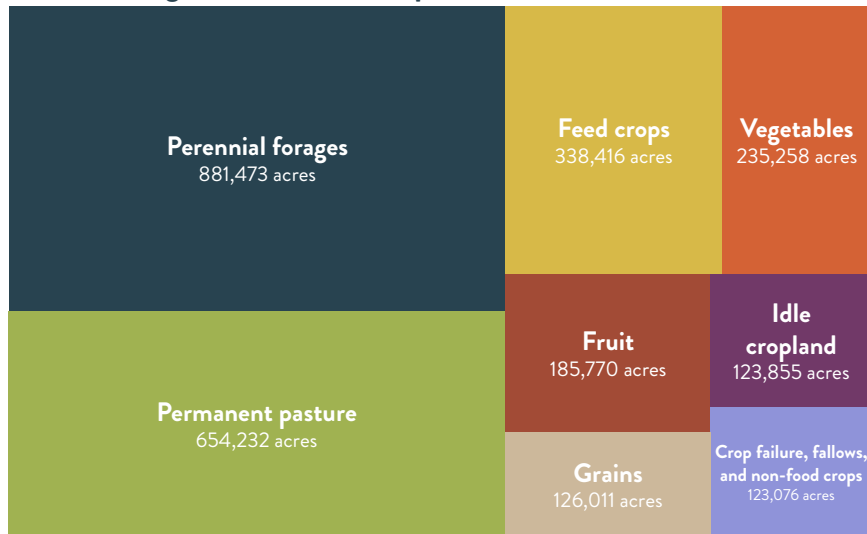
** The equivalent area of New England cropland needed to grow imported feed grains.

FIGURE 9: Agricultural Land Use in 2019 and Estimated Agricultural Land Required for Meeting 30% RSR by 2030

Land in Agriculture (2019): 2,079,661 acres

Perennial forages
759,180 acres

Permanent pasture
287,500 acres

Feed crops
191,275 acres

Additional cleared land
588,430

Pasture cover, ungrazed
400,500 acres

Idle cropland
160,954 acres

Crop failure, fallows, and non-food crops
79,330 acres

Fruit
72,985 acres

Vegetables
97,511 acres

Grains
30,426 acres

Estimated Agricultural Land Required for 30% RSR: 2,668,092 acres

Perennial forages
881,473 acres

Feed crops
338,416 acres

Vegetables
235,258 acres

Permanent pasture
654,232 acres

Fruit
185,770 acres

Idle cropland
123,855 acres

Grains
126,011 acres

Crop failure, fallows, and non-food crops
123,076 acres

Increasing regional self-reliance may be theoretically possible yet difficult to achieve. To ensure that our modeling of future potential was cognizant of the challenges, we organized a series of stakeholder focus groups and reviewed the current literature to better understand opportunities for and barriers to expanding regional production. The Focus Groups covered ten topics: Annual Crops, Fruit Crops, Beef and Small Livestock, Dairy, Eggs/Poultry, Food Manufacturing, Aquaculture, Wild Capture Fishery: Production, Wild Capture Fishery: Harvest and Marketing, and BIPOC/Indigenous/Ethnic Food Production. Each session addressed a key product area or common theme, with the goal of speaking with a range of stakeholders across both land- and sea-based production systems. Many of the concerns brought up in these Focus Groups are discussed in the Common Food System Challenges Backgrounder.

Unfortunately, data limitations mean that our total projections are based on a default estimate for seafood landings volume that is equal to 2010-2019 averages, with no changes assumed to occur in New Englanders' seafood preferences. This methodological choice belies the complex and dynamic nature of marine food production. To compensate for this omission, the **Volume 2 Supplement, Increasing Regional Self-Reliance Through Seafood,** provides a qualitative consideration of how marine food production could conceivably change by 2030.

Volume 3: Economic Impact of New England's Food System

More farmland would be required to meet a goal of healthier people and greater regional food self-reliance, but *do we have the right mix of industries to ramp up food production? What sectors are growing? What sectors are contracting?* An Economic Impact Team estimated the number of people employed in New England's food system, the economic impact of food system activities, economic multipliers for each industry, and areas of growth or contraction. The Team found that **the economic contribution of New England's food system is significant, employing about 1 million people (more than 10% of all jobs, Table 6, Figure 10) and generating $190 billion in sales (11% of New England sales for all industries, Table 7, Figure 11).**

From our data, we see the regional food system as one with moderate growth over the ten-year period from 2007 to 2017. Regional job growth occurred at a 1.1% rate per year, computed as a compound annual rate. This is much faster than regional employment growth, which was 0.7% per year for all industries combined in the New England region. Sales growth, measured as value of sales in constant 2020 dollars, was 1.5% per year. This growth rate is significantly higher than that of the regional economy (for all industries), which was 0.8% per year for the 2007-2017 period. These rates are also more than double the regional population growth rate which was steady at 0.5% per year.

Employment and sales growth was evident in many New England food system industries, including food and beverage product manufacturing, distribution, stores, and food services in New England from 2007 to 2017.

Food service jobs, like food preparation and serving jobs at Throwback Brewery in North Hampton, New Hampshire, are the most common type of food system job in New England.

The *exception* was in farms and fisheries, where employment was essentially flat and sales were down during this period. This may present a significant challenge for meeting regional self-reliance goals.

Most New Englanders appreciate and value the community of people working together to catch, raise, and grow food across the region. But, we need to be concerned about the future of regional agriculture and fisheries: farmers, farmworkers, and fishermen are crucial—and undersupported—resources. Without their expertise—and a pipeline of new farmers, farmworkers, and fishermen—opportunities for a healthy, reliable regional food systems are drastically decreased.

The largest employment by sector is found in the Services category, which consists entirely of eating and drinking places (i.e., restaurants and fast food). In 2017, regional employment in Food Services amounted to nearly 560,000 jobs, which is just a little more than one-half of the region's food system employment. This category

TABLE 6: Employment by Sector for the Region, 2007, 2012, 2017

Sector	Employment (Jobs)			Annual Employment Growth Rate		
	2007	2012	2017	2007-2012	2012-2017	2007-2017
Agriculture and Fisheries	127,575	134,643	127,072	1.1%	-1.2%	0.0%
Food and Beverage Manufacturing	48,239	47,619	52,979	-0.3%	2.2%	0.9%
Food Distribution and Retail Trade	241,668	257,583	258,489	1.3%	0.1%	0.7%
Food Services	471,494	495,349	560,737	1.0%	2.5%	1.7%
TOTAL	**888,976**	**935,194**	**999,277**	**1.0%**	**1.3%**	**1.1%**

TABLE 7: Sales by Sector for the Region, 2007, 2012, 2017

Sector	Sales			Annual Sales Growth Rate		
	2007	2012	2017	2007-2012	2012-2017	2007-2017
Agriculture and Fisheries	$4,591,867,000	$4,384,963,000	$4,114,361,000	-0.9%	-1.3%	-1.1%
Food and Beverage Manufacturing	$22,949,659,000	$19,698,306,000	$21,821,352,000	-3.0%	2.1%	-0.5%
Food Trade and Distribution	$104,797,226,000	$112,717,864,000	$126,229,082,000	1.5%	2.3%	1.9%
Food Services	$31,787,648,000	$32,291,029,000	$37,569,985,000	0.3%	3.1%	1.7%
TOTAL	**$164,125,400,000**	**$169,092,163,000**	**$189,734,780,000**	**0.6%**	**2.3%**	**1.3%**

generates many jobs, but is characterized by having numerous part-time employees. In 2022, 43% of eating and drinking places jobs were part-time. The next largest sector in terms of regional employment is Trade and Distribution employment, with 258,489 jobs, about one-quarter of regional food system jobs. This sector, which consists of grocery and beverage wholesaling and retailing, characteristically has about 30% of its jobs as part-time.

Agriculture and fisheries are the third largest sector in the regional food system with 127,072 jobs in 2017. This sector includes crop and animal production, fisheries, support for crop and animal production, hired labor, and farm producers. This sector saw modest growth from 2007 to 2012, which was offset by a moderate decline in the 2012 to 2017 period. **Overall, agriculture and fisheries had a 10-year job growth rate of 0.0% per year.**

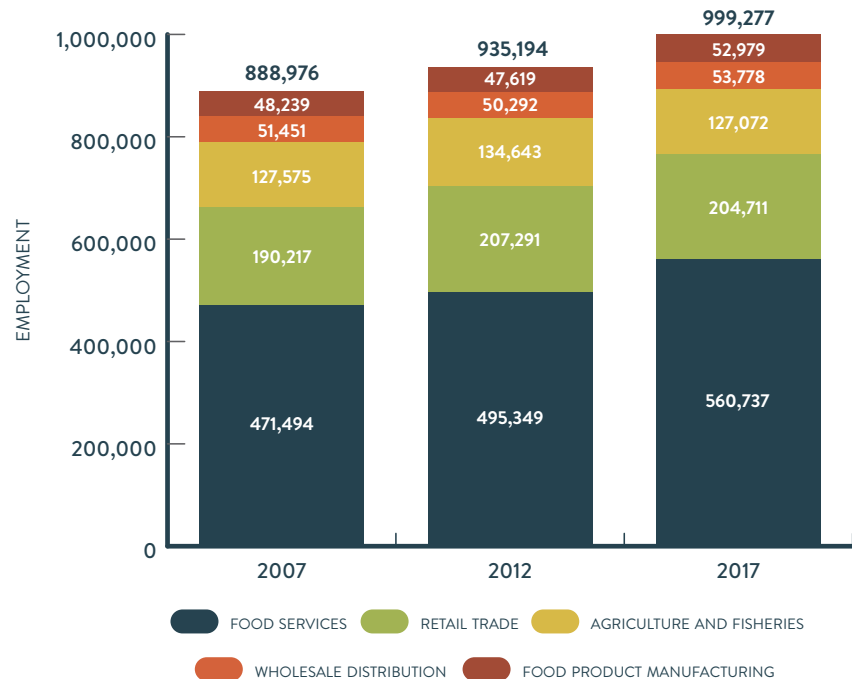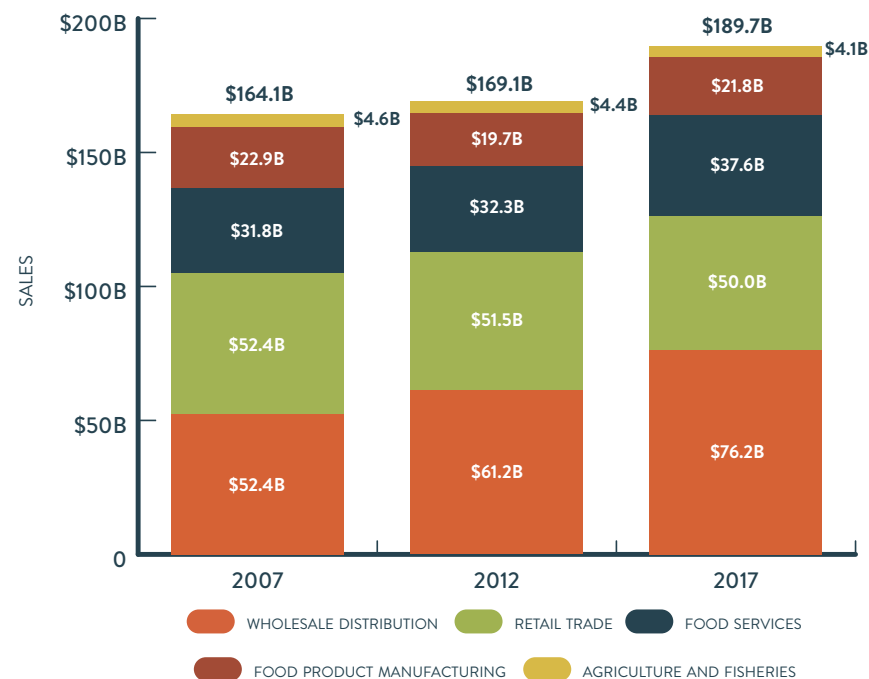**FIGURE 10:** New England Employment by Sector, 2007, 2012, 2017

FIGURE 11: New England Sales by Sector, 2007, 2012, 2017

The smallest sector in the regional food system is in Food and Beverage Product Manufacturing, with approximately 53,000 jobs, or 5%, of 2017 total employment. This sector experienced a small decline in the first half of the 10-year period, -0.3% per year, but picked-up 6,000 jobs over the second half, growing at 2.2% per year for a 10-year growth rate of 0.9% per year.

Sales data offer a somewhat different view of the New England food system. By dollar volume (constant 2020 dollars), the Trade and Distribution sector generates two-thirds of all food system sales, with the Services sector representing one-fifth of the total (Table 5, Figure 11). Manufacturing, which had 7% of food system employment, generates about 12% of total sales, reflecting the greater productivity

of manufacturing activities. Agriculture and Fisheries had about 2% of total sales in 2017, significantly lower than its share of jobs.

Taken together, the regional food system saw annual growth of 1.3% per year over the 10-year interval from 2007 to 2017. Trade and Distribution sales grew at the highest 10-year rate, at almost 2% per year, with accelerated growth in the later 5-year period (2.3%). Agriculture and Fisheries saw declining sales value of 1.1% per year over those ten years.

Employment and sales in New England's food system closely mirrors distribution of the region's population. Massachusetts has the largest share of population and food system employment and sales, with

TABLE 8: Projected 2030 Farm Production and Employment Change

Sector	2017 Farm Production Sales	2030 Projected Farm Production Sales		2030 Projected Change in Farm Sales		2030 Projected Change in Employment (Jobs)	
		Unchanged Eating	Resilient Eating	Unchanged Eating	Resilient Eating	Unchanged Eating	Resilient Eating
Grain and Oilseed Farming	$56,195,000	$255,046,000	$265,036,000	454%	472%	607	631
Vegetable and Melon Farming	$468,142,000	$820,789,000	$1,131,506,000	175%	242%	348	480
Fruit Farming	$213,049,000	$316,914,000	$542,276,000	149%	255%	415	710
All Other Crop Farming	$232,768,000	$277,709,000	$290,948,000	119%	125%	964	1,010
Cattle Ranching	$110,329,000	$593,300,000	$649,170,000	538%	588%	1,007	1,102
Dairy Cattle and Milk Production	$652,362,000	$676,882,000	$682,224,000	104%	105%	83	84
All Other Animal Production	$199,019,000	$607,977,000	$864,806,000	305%	435%	677	962
Poultry and Egg Production	$71,975,000	$358,467,000	$519,524,000	498%	722%	278	403
Support for Crop Production	$50,693,000	$87,286,000	$200,615,000	172%	396%	685	1,574
Support for Animal Production	$68,345,000	$147,881,000	$388,516,000	216%	568%	861	2,262
TOTAL	**$2,122,876,000**	**$4,142,252,000**	**$5,534,621,000**	**195%**	**261%**	**5,924**	**9,217**

approximately 45-46% of the totals for each measure, respectively. Connecticut follows with 24.1% of the region's population, 21.2% of employment, and about 26% of sales. New Hampshire had about 9% of New England's population and food system jobs, but only 7.5% of sales. Maine accounted for 9% of the region's population, 11% of food system employment, and 8.1% of sales. Rhode Island made up 7.2% of New England's population but only 6.6% of food system employment and 6.3% of sales. Finally, Vermont made up only 4.3% of New England's population but 6.1% of food system employment and 7.5% of sales.

We can use the data assembled in Volume 3 on New England's farm production to quantify the effect the Resilient Eating dietary pattern

would have on local output and employment. Using the change in production acreage and assuming no change in productivity, we can estimate a change in output assuming both Unchanged Eating and Resilient Eating dietary patterns (Table 8).

Under the assumptions of the Resilient Eating dietary pattern, total output of all farming and support activities would rise to $5.5 billion, about one-third greater than under the Unchanged Eating assumption, and with a growth rate of nearly 8% per year over the 2017 values. Total employment would rise by 9,200 jobs, to reach approximately 124,700 jobs in 2030, a gain of nearly 8% from 2017 to 2030.

Volume 4: Understanding Market Channels and Food Expenditures

If regional food production was substantially increased by 2030, *what market channels offer the best opportunities for sourcing local and regional food products?* A Market Channels Team analyzed sales data from retail food market channels and consumer expenditures for the six states. As a practical matter, a relatively few companies dominate almost all aspects of global food production, processing, manufacturing, distribution, and *retailing*. It will be challenging to meet goals of 30% by 2030—or 50% by 2060— without finding ways to get local and regional products into grocery stores and restaurants, which has historically been difficult to do.

Our access to food is heavily concentrated in two major market channels: grocery stores and supercenters for food eaten at home, and fast food and restaurants for food eaten away from home. Food services (e.g., restaurants) and retail food trade (e.g., grocery stores) also account for the majority of food system jobs and sales in New England. While substantial progress has been made supporting local and regional food via direct sales (e.g., farmers markets), co-ops, institutional sales (e.g., farm to college), and independent grocery stores, the majority of retail food sales are made through grocery stores, supercenters, restaurants, and fast food.

Our current understanding of regional food sourcing is limited within these channels due to lack of transparency on product cost/profit margin, limited tracking and reporting due to lack of information, capacity, interest or obligation, and business models, and purchasing incentives that do not prioritize regional goods. **Unlike in other channels, there is limited cohesive advocacy capacity to influence change in**

grocery stores and restaurants, where the customer base is completely decentralized. For example, unlike in the institutional sector—where students, families, and communities may know one another and have infrastructure for collaborative advocacy—it is much harder to coordinate among customers of a particular grocery store or restaurant.

The USDA Economic Research Service estimates that grocery store market concentration has increased from 1990 to 2019: the top 4 grocery stores and supercenters—Walmart, Kroger, Albertsons, and Ahold Delhaize—accounted for about 15% of total sales in 1990 and 34% of total sales in 2019. **Within New England, these top 4 chains— Ahold Delhaize (Stop and Shop, Hannaford), Albertsons (Shaw's and Star Market), and Walmart—have at least 699 stores (Kroger currently has no stores in New England).** Note, however, that the most prolific type of grocery chain in America and New England are dollar stores: Dollar Tree/Family Dollar and Dollar General operate at least 914 stores in New England (Table 9, Figure 12).

The total number of grocery stores in the United States increased 7% (from 47,000 to 51,000) from 2005 to 2015. The number of independent, non-chain stores (i.e., stores with fewer than 4 locations) also increased during this time period, albeit at a much slower pace. The number of independent stores declined in 1,116 counties (36%) and increased in only 915 counties (29%). The net effect, the USDA Economic Research Service found, was that **the share of independent stores declined in 41% of all counties, including every county in Connecticut and most counties in Massachusetts.** Independent stores are often more likely to stock local and regional food products, and the loss of these stores may impact our ability to reach our 30% by 2030 goal.

Reduced competition enables firms to exercise market power, and can lead to fewer choices—especially locally or regionally sourced choices—and higher prices for consumers. This happens because these companies use their dominant positions to reduce quality,

TABLE 9: Sample Geography of Supermarket Chains in New England

Company	MA	CT	NH	ME	VT	RI
Dollar Tree/ Family Dollar	246	121	61	93	24	73
Dollar General	55	76	43	63	39	20
Walmart	48	34	28	25	6	6
Trader Joe's	19	8	3	1	1	1
Whole Foods	32	10	3	1	0	3
ALDI	16	29	9	0	3	9
Shaw's + Star Market	78	0	27	21	19	8
BJs	30	13	7	3	0	5
Price Chopper	15	9	4	0	15	0
Shop/Price Right	16	19	2	0	0	2
Market Basket	53	0	33	2	0	2
Hannaford	30	0	38	66	19	0
Costco	6	3	1	0	1	0
Stop & Shop	127	88	0	0	0	27
Big Y	29	20	0	0	0	0
Roche Bros.	20	0	0	0	0	0
Wegmans	6	0	0	0	0	0
Seabra Foods	4	0	0	0	0	2
Patel Brothers	3	1	1	0	0	0
Donelan's Fresh Market	4	0	0	0	0	0
Caraluzzi's	0	3	0	0	0	0
Stew Leonard's	0	3	0	0	0	0
Gala Foods	1	1	0	0	0	0
Highland Park Market	0	2	0	0	0	0
Tops	0	0	0	0	2	0

Orange = stores in all New England states
Green = stores in 5 New England states
Blue = stores in 4 New England states
Yellow = stores in 3 or fewer New England States

increase prices, decrease innovation, and erect barriers of entry to new entrants. Market concentration is also very pronounced in the types of food products available in grocery stores: when consumers look at the grocery shelves they may see dozens of brands owned by a few companies. Those companies also have tools to access premium in-store real estate. Plus, they can use their market power to exclude new brands. With increased consolidation, there is less overall shelf space in a store for new brands to put their products. Another issue of local foods accessing grocery stores is stocking fees and free-fills. These are fees, free products, or premiums that brands must pay or provide to grocery stores to get access to shelf space or high value locations like end caps. Dominant and established brands have budgets for these fees. Start-ups and smaller firms have less capital available, which limits their placement in retail. For brands to compete successfully, they need a lot of capital, which creates another barrier for underserved communities that have less access to capital and are often provided with worse terms than larger firms with more resources.

Market concentration is also evident in the scale and ubiquity of full-service and limited-service (i.e., fast food) restaurants like McDonald's, Starbucks, Olive Garden, and Applebee's. The economic impact of the COVID-19 pandemic exacerbated pressures on independent restaurants: for example, Yelp found that over 90,000 restaurants permanently closed in 2020, and major chains are buying up available commercial real estate.

Grocery retail corporations spatially "manage" different sections of the New England region (Table 9). Dollar Tree/Family Dollar, Dollar General, Walmart, and Trader Joe's are present in all New England states. Whole Foods, ALDI, and Shaw's & Star Market (Albertsons) are present in five states of the region. Price Chopper, Shop/Price Right, Market Basket, Hannaford, BJ's, and Costco are present in four states of the region. Thirteen food retail outlets have stores in three or fewer states of the region, among them some significantly important "subregional" chains like Big Y, Stop & Shop, Roche Bros., and Wegmans.

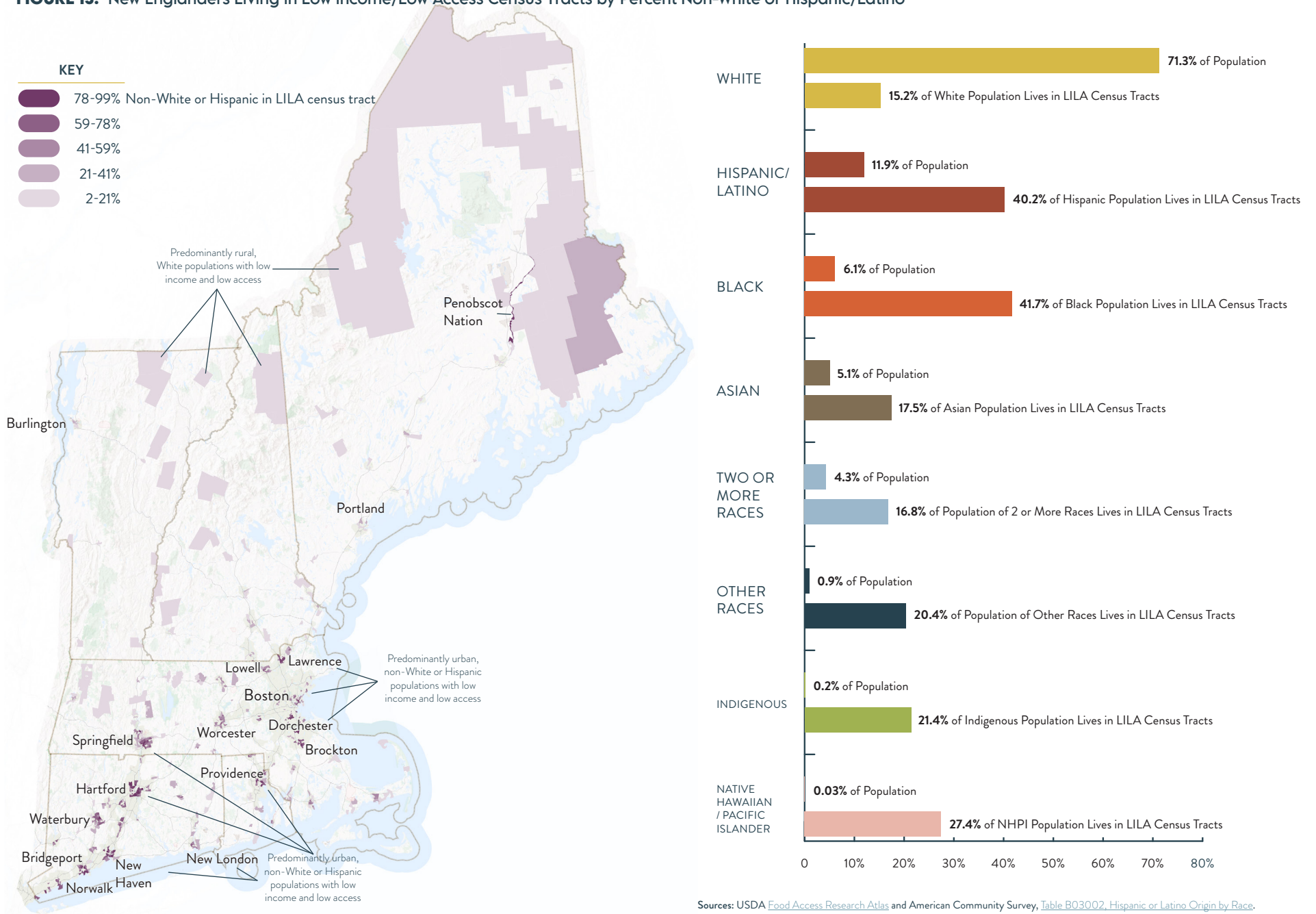**FIGURE 12:** Top 10 Grocery Stores in New England by Number of Stores
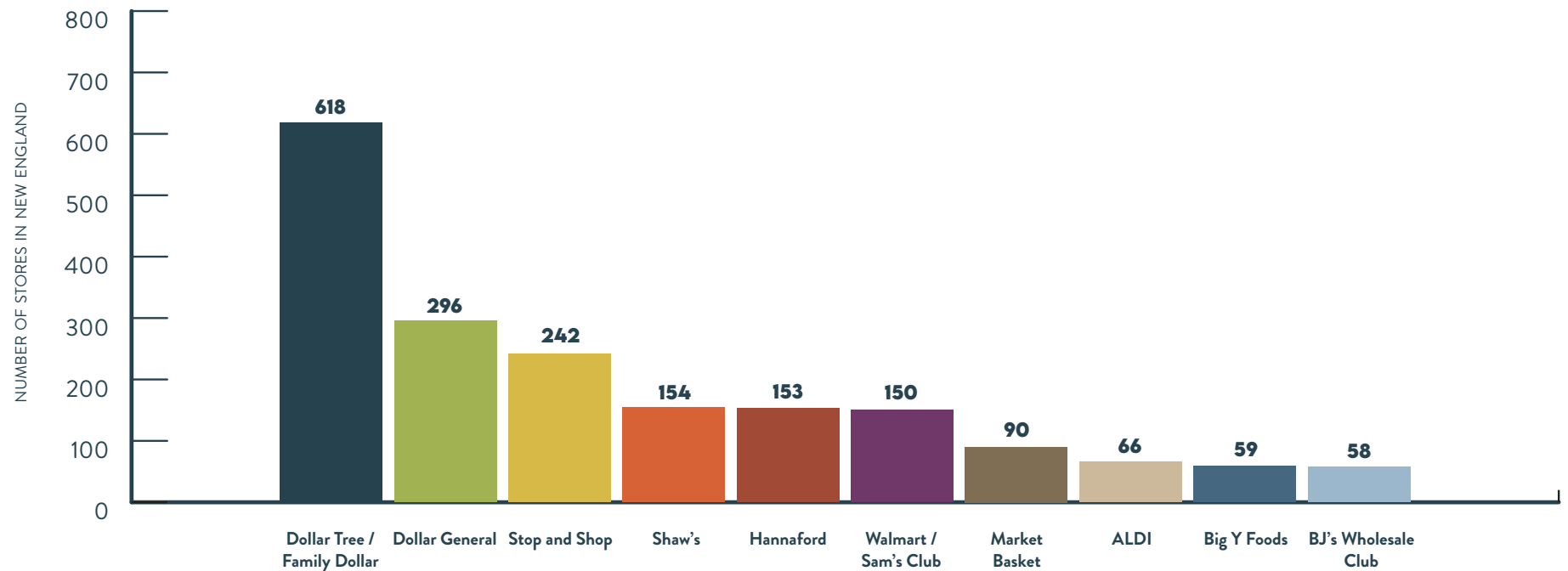
The geography of supermarket chains also impacts food access and security: from rural communities in Essex County, Vermont, to urban neighborhoods in Providence, healthy food is easier to get for some people, but expensive or far away for others. These disparities and inequities in food access are systemic and the result of structural racism and poverty: food access challenges and food insecurity disproportionately impact Black, Hispanic, Indigenous, low income, and rural New Englanders.

We used data from the USDA Food Access Research Atlas to map **low-income** (i.e., the tract's poverty rate is greater than 20%) and **low access** (i.e., where a significant number of the population is greater than one-half mile from the nearest store for an urban area or greater than 10 miles for a rural area census tracts) by race and Hispanic/
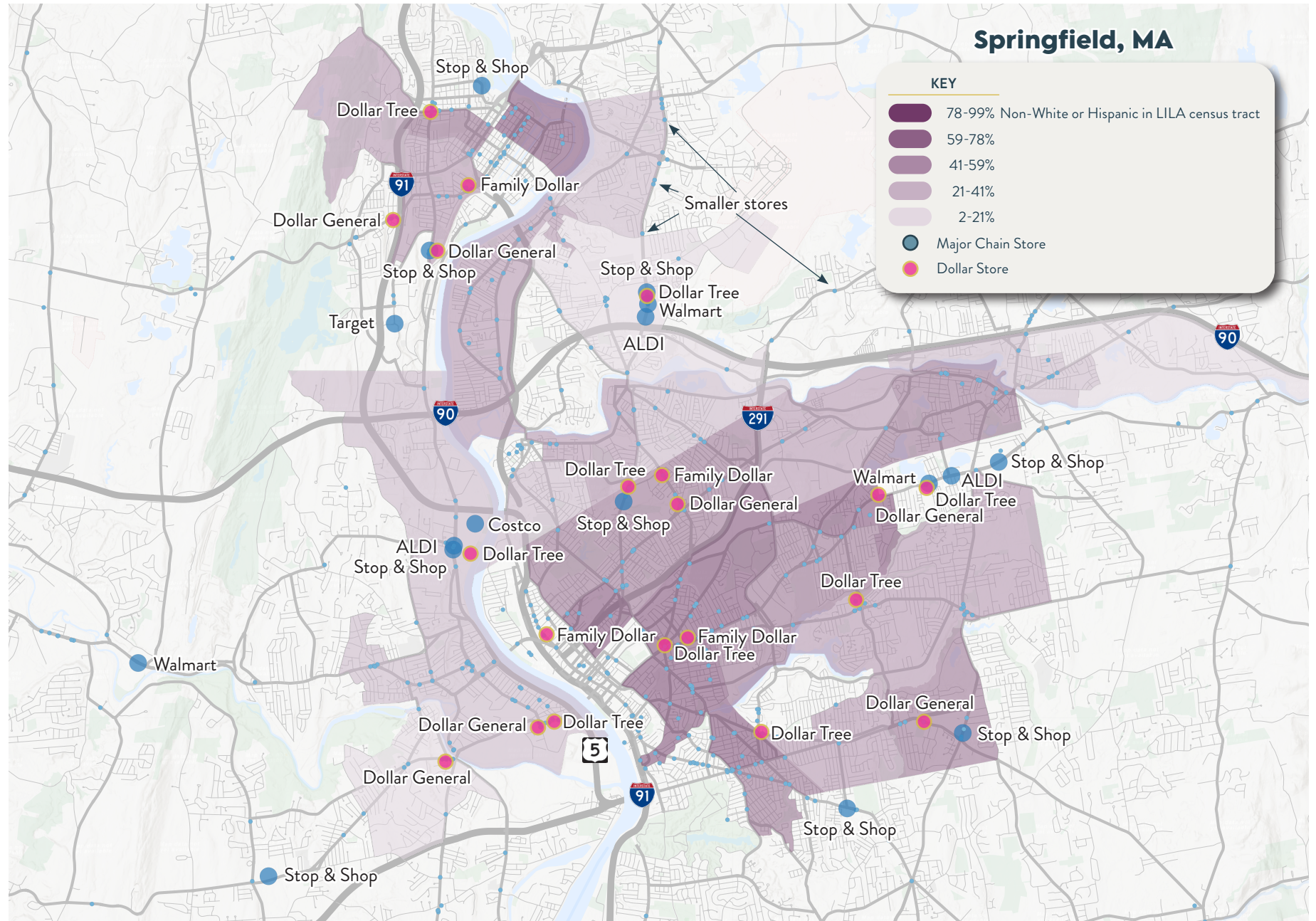
Latino ethnicity. The Food Access Research Atlas includes proximity to supercenters (i.e., very large big box stores), supermarkets (i.e., grocery stores with 10 or more checkout lanes), and large grocery stores (i.e., grocery stores that are smaller than supermarkets). We found a strong correlation between race and Hispanic/Latino ethnicity and the likelihood of living in a low-income, low access (LILA) census tract in New England. When we intersect LILA census tracts by the percent of the population that is Black, Hispanic, Indigenous, Asian, two or more races, some other race, or Native Hawaiian/Pacific Islander (i.e., by the percent that is not White) a disturbing—but not unexpected—pattern emerges: Nearly 20% (2.9 million) of New Englanders live in a LILA census tract. Although White New Englanders make up 71.3% of the region's population, only 15.2% of White people live in LILA census tracts. Every other

FIGURE 13: New Englanders Living in Low Income/Low Access Census Tracts by Percent Non-White or Hispanic/Latino

KEY

- 78-99% Non-White or Hispanic in LILA census tract
- 59-78%
- 41-59%
- 21-41%
- 2-21%

Predominantly rural, White populations with low income and low access

Penobscot Nation

Burlington

Portland

Predominantly urban, non-White or Hispanic populations with low income and low access

Lowell
Lawrence
Boston
Worcester
Dorchester
Brockton
Springfield
Providence
Hartford
Waterbury
Bridgeport
New London
New Haven
Norwalk

Predominantly urban, non-White or Hispanic populations with low income and low access

WHITE
- **71.3%** of Population
- **15.2%** of White Population Lives in LILA Census Tracts

HISPANIC/LATINO
- **11.9%** of Population
- **40.2%** of Hispanic Population Lives in LILA Census Tracts

BLACK
- **6.1%** of Population
- **41.7%** of Black Population Lives in LILA Census Tracts

ASIAN
- **5.1%** of Population
- **17.5%** of Asian Population Lives in LILA Census Tracts

TWO OR MORE RACES
- **4.3%** of Population
- **16.8%** of Population of 2 or More Races Lives in LILA Census Tracts

OTHER RACES
- **0.9%** of Population
- **20.4%** of Population of Other Races Lives in LILA Census Tracts

INDIGENOUS
- **0.2%** of Population
- **21.4%** of Indigenous Population Lives in LILA Census Tracts

NATIVE HAWAIIAN / PACIFIC ISLANDER
- **0.03%** of Population
- **27.4%** of NHPI Population Lives in LILA Census Tracts

0 10% 20% 30% 40% 50% 60% 70% 80%

Sources: USDA Food Access Research Atlas and American Community Survey, Table B03002, Hispanic or Latino Origin by Race.

FIGURE 14: Location of Grocery Stores in Low Income/Low Access Census Tracts in Springfield, Massachusetts by Percent Non-White or Hispanic/Latino

Springfield, MA

KEY

- 78-99% Non-White or Hispanic in LILA census tract
- 59-78%
- 41-59%
- 21-41%
- 2-21%
- Major Chain Store
- Dollar Store

category— **Hispanic/Latino, Black, Asian, Indigenous, Native Hawaiian/Pacific Islander, two or more races, some "other" race— make up 28.7% of New England's population, but 45.9% of its population lives in LILA census tracts (Figure 13).**

Figure 14 zooms into a specific example: Springfield, Massachusetts, a city that was redlined in 1935. Here we see a clustering of LILA census tracts with predominantly Hispanic/Latino and Black residents and an abundance of dollar stores, with some of the major chains like Walmart on the periphery.

While institutions—schools, colleges, hospitals—only account for a small percentage of total food expenditures (3.7%, $3.1 billion in 2017), these market channels provide some of the clearest insight available on regional sourcing progress and potential. Four million New Englanders, or 25% of the region's population, spend time in one of New England's 20,000 institutions every day. **Institutions touch the lives of all New Englanders and can be a key lever in making sure people have access to local, nutritious, culturally connected, and reliable food sources regardless of their income level, race/ethnicity, and geography.** Many residents rely on institutions for multiple— and in some cases all—daily meals. This level of reliance makes the institutional sector a critical area of focus for building a resilient and equitable regional food system.

The unsatisfying reality is that data for local and regional food purchases for most market outlets in New England is very limited. Even estimating the overall size of the New England retail food market is not without complication. We provide food and beverage expenditure estimates from three data sources— the State-level Food Expenditure Series, the Economic Census, and the Consumer Expenditure Survey. From these sources we can essentially create lower and upper estimates of *current* total (Figure 15) and per capita

(Figure 16) food and beverage expenditures for the 6 New England states, and *project* out to 2030:
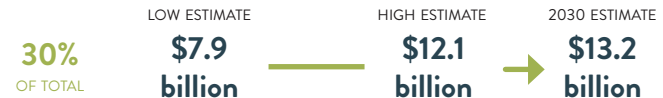
Currently, **total food and beverage expenditures** *in New England range between $57.4 billion and $87.1 billion. By 2030, food and beverage expenditures are estimated to reach $98.4 billion.*

	LOW ESTIMATE	HIGH ESTIMATE	2030 ESTIMATE
TOTAL FOOD AND BEVERAGE EXPENDITURES	$57.4 billion	$87.1 billion	$98.4 billion
30% OF TOTAL	$17.2 billion	$26.1 billion	$29.5 billion
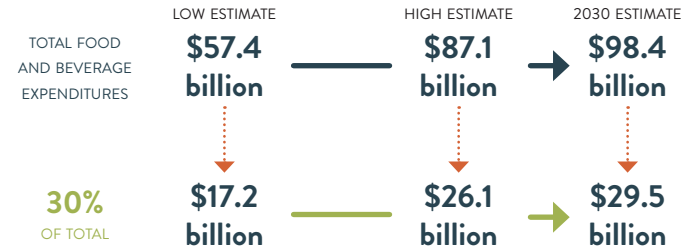
On a **per capita basis,** *the average New Englander would currently have to spend between $1,139 and $1,760 on regional food and beverage products per year to reach 30%. By 2030, that amount would increase to $1,890.*

	LOW ESTIMATE	HIGH ESTIMATE	2030 ESTIMATE
30% PER CAPITA	$1,139	$1,760	$1,890

Given the relative size of its population, **Massachusetts** *would have to do the heavy lifting for the region, spending between $7.9 billion and $12.1 billion to reach 30% currently, and $13.2 billion by 2030.*

	LOW ESTIMATE	HIGH ESTIMATE	2030 ESTIMATE
30% OF TOTAL	$7.9 billion	$12.1 billion	$13.2 billion

Reaching 30% of total food expenditures requires an adequate supply of regional food and beverage products that are carried by the suite of market channels. **The question is: are sales from New England's farms, fishing operations, food and beverage processors and manufacturers** *remotely* **close to our low ($17.2 billion), high ($26.1 billion), and 2030 ($29.5 billion) estimates?** As shown in Table A1

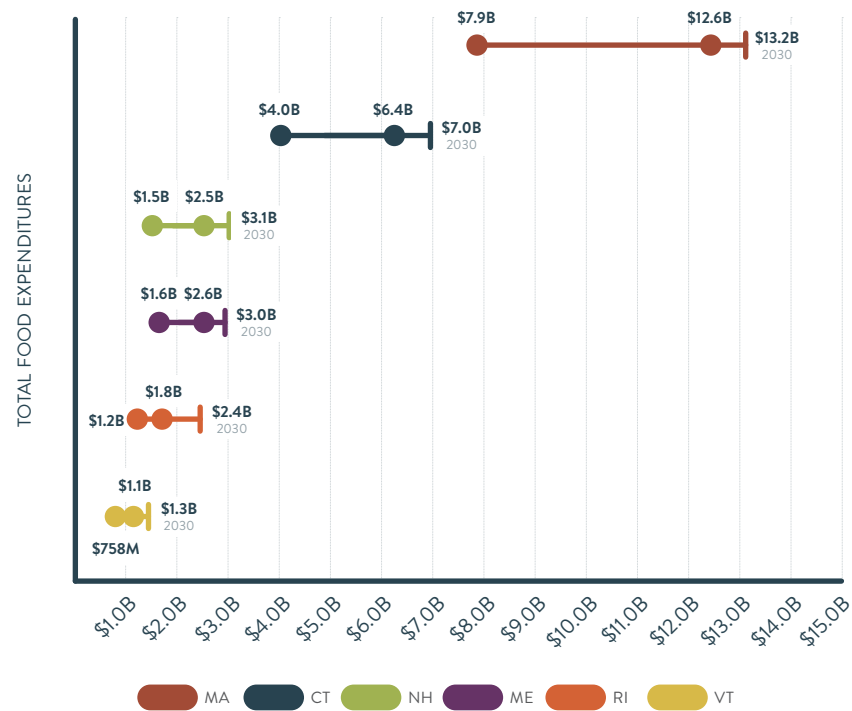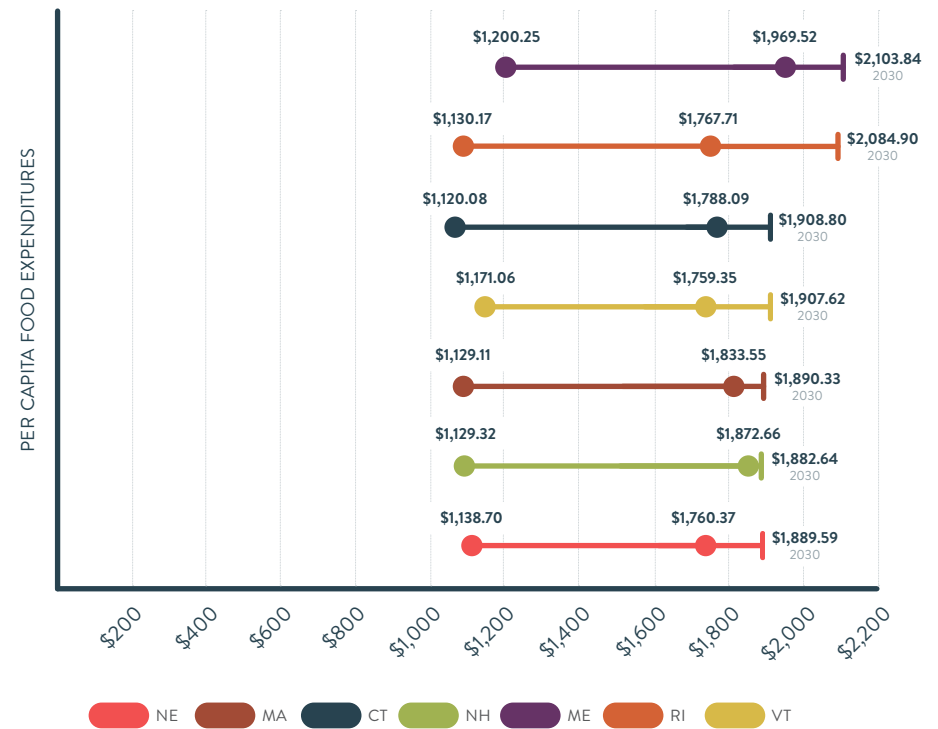**FIGURE 15:** Low and High Estimates of Total Food Expenditures by State

TOTAL FOOD EXPENDITURES

MA — $7.9B — $12.6B — $13.2B 2030

CT — $4.0B — $6.4B — $7.0B 2030

NH — $1.5B $2.5B — $3.1B 2030

ME — $1.6B $2.6B — $3.0B 2030

RI — $1.2B $1.8B — $2.4B 2030

VT — $758M — $1.1B — $1.3B 2030

$1.0B $2.0B $3.0B $4.0B $5.0B $6.0B $7.0B $8.0B $9.0B $10.0B $11.0B $12.0B $13.0B $14.0B $15.0B

MA   CT   NH   ME   RI   VT

FIGURE 16: Per Capita Low and High Estimates of Food Expenditures by State

PER CAPITA FOOD EXPENDITURES

ME — $1,200.25 — $1,969.52 — $2,103.84 2030

RI — $1,130.17 — $1,767.71 — $2,084.90 2030

CT — $1,120.08 — $1,788.09 — $1,908.80 2030

VT — $1,171.06 — $1,759.35 — $1,907.62 2030

MA — $1,129.11 — $1,833.55 — $1,890.33 2030

NH — $1,129.32 — $1,872.66 — $1,882.64 2030

NE — $1,138.70 — $1,760.37 — $1,889.59 2030

$200 $400 $600 $800 $1,000 $1,200 $1,400 $1,600 $1,800 $2,000 $2,200

NE   MA   CT   NH   ME   RI   VT

in [Volume 3: Economic Impact of New England's Food System](), it is fortuitously the case that New England farms, fishing operations, and food and beverage processors and manufacturers had total output of **$25.9 billion** in 2017. A significant amount of that production leaves the region, but it is at least conceivable, then, that 30% of sales could be generated by regional food and beverage products. *Comfortably* reaching 30% of total food expenditures would require regional farms, fishing operations, food and beverage processors and manufacturers to significantly scale up production by 2030.

One unique food expenditure caveat is Vermont's [Local Food Counts methodology](). Conducted four times (2010, 2014, 2017, and 2020), Vermont's Local Food Counts showcase growth in local food sales at most market outlets, as well as improved data reporting and collection. In 2020, Vermont's local sourcing was estimated to equal 16.1% ($371 million, $595.17 per person) of total food purchases. **Grocery stores accounted for the majority of local food sales, followed by direct sales, restaurants, and distributors. Dairy products, processed/manufactured food products, beverages, and meat were the top local products sold.** Given their value to understanding actual regional food purchases, Local Food Counts are intended to be conducted in the five other New England states.

Next Steps

Can the six New England states provide 30% of their food from regional farms and fisheries by 2030? The New England State Food System Planners Partnership, through its *New England Feeding New England* project, set out to explore this question. Inspired by Food Solution New England's *New England Food Vision* of achieving 50% regional consumption by 2060, our objective was to better understand our current food system environment, and exactly what it will take to grow, raise, produce, harvest, catch and move more food through a complex regional supply chain to our homes and other places we eat.

The 16 NEFNE researchers developed this foundational research so that we can begin to mobilize around a regional food goal, develop strategies, and take action to build a more just, equitable, resilient, and reliable regional food system. A central concept of this approach is the idea of **regional food self-reliance**, **which is an estimate of how much food we produce compared to how much food we consume.** No single county or state can provide a full menu of food products to meet the needs of its population.

A resilient regional food system is both an *investment* in our shared future and an *insurance policy* against future risks, particularly due to climate change.

As a reminder, the questions we started with include:

» What might change if we intentionally and regionally plan for our future, making significant investments in strengthening our regional food system and communities?

» If we ate in a healthier, more resilient way, could more of our food be supplied by regional production?

» Could the six New England states meet a goal of supplying 30% of the region's food by 2030?

» Do we have the right mix of industries to ramp up food production? What sectors are growing? What sectors are contracting?

» What market channels offer the best opportunities for sourcing regional and local products?

After a year of intensive exploration by four research teams, we can answer these questions. We have identified key stakeholder groups that we want to engage with over the coming years, because we believe that they have a big role to play in producing and sourcing more regional food and getting into the market channels where most New Englanders access it. We have identified a number of areas where additional investments are most needed to have the greatest impact.

We intentionally did not generate a list of recommendations as a result of our research, but rather a series of strategic questions that are suggestive of the direction we might take at state and regional levels. We invite you to explore these questions with us and to take action towards the regional self-reliance goal of 30% x 2030.

The Questions We Now Have

What do we need to do by 2030 to make tangible progress towards this bold vision? What can we do as a region to make our regional food system more equitable and fair, resilient and reliable?

Food Consumption Questions

» What strategies and policies can discourage consumption of ultra-processed food and beverage products?

» How can the number of low income/low access census tracts be reduced in urban and rural areas?

» What additional public support is necessary to enable lower income New Englanders to purchase/access regional food and beverage products?

» What public awareness and messaging campaigns are needed to inspire and enable New Englanders to eat more regionally produced foods?

» How can we increase the amount of regional and local food and beverage products in our stores?

» How can we institutionalize food is medicine strategies throughout the region?

» How can we create a more integrated food and nutrition security system throughout the region?

» What would need to change for people to change their dietary patterns?

Food Production Questions

» To reach 30% regional self-reliance by 2030 we need to protect existing farms and farmland, and add an additional ~590,000 acres in farmland production. What will it take to make this happen? Where will it need to happen?

» How can we support more BIPOC and young farmers in accessing affordable farmland and the working capital to be successful?

» What public awareness and messaging campaigns are needed to inspire and enable New Englanders to eat more regionally produced foods?

» How can we focus more effort on expanding production of crops that we eat most?

» How can we keep more of what we already produce in the region from being exported, so it can be consumed in the region?

» What strategies and/or policies would enable more of the wild-caught fish and seafood from the region to be consumed here?

» What strategies/policies/investments need to be made to help farmers and fishermen in New England adapt to climate change?

Fisheries and Seafood Questions

» What strategies and/or policies would enable more of the wild-caught fish and seafood from the region to be consumed here?

» What role can habitat protection/restoration and stock enhancement play in increasing RSR for seafood?

» What are the tradeoffs, if any, between aquaculture production and wild capture seafood production?

» What are the most promising strategies to replace imported seafood with seafood landed within the region?

» How can we expect seafood RSR to change as a result of climate change and offshore renewable energy development? What steps can food system planners and seafood eaters take to help the seafood system adapt and build resilience to these changes?

» To what extent is it possible—or preferable—to use ecosystem modeling and harvest management to increase production of species prefered by New Englanders?

Economic Development Questions

» What strategies/policies should be advanced to retain and expand independent ownership of all types and scales of farms, fishing, and food system businesses?

» How will climate change impact the viability of agriculture and fisheries in New England?

» How can we attract more young people to careers in the food system so that we can continue existing and expand additional state-level production in the region?

» Would converting tipped minimum wage jobs to standard minimum wage jobs be enough to attract people to food service jobs? What additional benefits in fixed work places (e.g., flexible hours, family leave time, benefits) are required?

» What strategies for expanding value-added production should be explored? What are current limits for expanding value-added production? Should targets for specific industries be created?

» Should we be concerned about the future of automation in food system occupations?

» What is the relationship between immigrant labor constraints and national/state policies? How might this issue unfold in New England?

» How can local/regional demand for food production (including processed and manufactured food and beverages) be increased in the region? What additional infrastructure would be needed to support this?

» What scale of agricultural production could New England move to? If the average size of farms doubled, would that increase production without necessarily requiring new labor? How could the productivity capacity of agriculture in Vermont and Maine be increased?

» What existing public sector programs and policies need to be expanded to support the viability of regional farms and fisheries?

Market Channels Questions

» Since most people get their food from grocery stores and restaurants, how do we get more local and regionally produced food into these market channels?

» How do we contend with corporate consolidation and proliferation of discount stores in grocery retail? Can federal or other interventions shift power over food choices back to communities?

» How do we help regional products into relevant distribution channels?

» What level of public and private investment will be needed to build out infrastructure (including production, processing, distribution, aggregation, storage infrastructure) scaled to small- and medium-producers?

» How do we maintain and expand important gains made in institutional market channels (e.g., schools, colleges, and hospitals) as advocacy expands to other market channels?

» What models of food retail could bring more local and regional foods to low income/low access communities?

» What additional public support is necessary to enable lower income New Englanders to purchase/access regional food and beverage products?

» How do we market and position local and regional foods to be competitive against lower cost options from farther afield?

» How do we expand state specific local food purchasing incentives to recognize regional foods?

» How do we connect more consumers to the sources of their food and grow direct to consumer sales in tandem with other market channels?

» How do we collectively advocate to policy-makers to revise long standing spending programs that disadvantage New England farmers and fishers and hamper increased utilization of regional foods in our local institutions?

» How do we build the capacity to consistently track and report local and regional purchases, including capturing local and regional ingredients incorporated into value-added products? How can we different between residential and visitor purchases?

» How do we build on local and regional values to ensure that markets are also prioritizing purchases that meet other values like environmental sustainability, fair labor, animal welfare, and so on?

What Comes Next for the Region?

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. As a collaboration between state-level food system organizations and the region-wide Food Solutions New England network, the New England Feeding New England project provides additional focus for communication, collaboration, and coordination in the region.

It is clear that sustained and collaborative action along with a significant and coordinated investment of resources will be required to meet the 30% by 2030 goal. But we know that the work we intend to do together is by no means the totality of what will be needed. We invite you to consider—and then act upon—how your business, your organization, your community and your choice around the food you consume can contribute towards the regional goal we are inspired to work towards. All of us will need to work together, in alignment, to make progress toward this goal. Each of us—whether we are a farmer, fisher, food entrepreneur, retailer, nonprofit organization, researcher, educator, capital provider, government official, community organizer, or an "eater"—has an important role to play. Each of us has something to contribute, to advance, to accomplish.

System-level change is by its very nature complex, and no one organization, entity or state can change it alone. System-level change requires collaboration, highly networked multi-stakeholder alignment, transparency, continuous communication and strategic action that is properly resourced and built upon trusted relationships.

So let's come together around this goal of 30% by 2030 so that we can build the kind of equitable, resilient, and reliable regional food system that we need to adapt to climate change and ensure that everyone who lives in New England has access to healthy, regionally sourced food from successful food producers and retailers.

We need to do this. We can do this. We invite you to be part of what comes next.

Contributors

The members of the New England Food System Planners Partnership and Food Solutions New England are extremely grateful for the expertise, commitment, and passion of New England Feeding New England's Contributors.

Dr. Sarah Amin
Dietary Patterns
Dr. Sarh Amin is Assistant Professor and Director of Community Nutrition Education (SNAP-Ed, EFNEP, & CYFAR) in the Department of Nutrition and Food Sciences at the University of Rhode Island. Her research lies at the intersection of health promotion and community-based research. She works in partnership with the community to develop and test innovative nutrition education approaches that promote positive health outcomes and reduce disparities among racially and ethnically diverse families. She completed her post-doctoral training at Tufts University and received her PhD in Nutrition from the University of Vermont, MPH from Brown University, and BS from Wheaton College.

Laura Barley
Dietary Patterns | Food Production | Market Demand
Laura Barley is the Farm Viability Planner for the Massachusetts Department of Agriculture in West Springfield, MA, where she helps to manage the Farm Viability Enhancement Program and support succession planning opportunities. Prior to her work with the state of Massachusetts, she was a Program Manager with the American Farmland Trust, where she co-authored the 2020 Farms Under Threat: New England report that examines recent trends in farmland loss and launched an interactive Agricultural Viability Index website to analyze the Northeast regional agriculture system. This work informed the development of the production milestones methodology for the New England Feeding New England project, including the analysis of current production levels, soil suitability, and future conversion of agricultural land. Laura also contributed to connecting current dietary patterns to regional food production, as well as analyzing local food market trends. Laura has previously worked as an analyst for Organic Valley CROPP Cooperative, as a farmers market manager in Boston, and has completed the Tufts' Agriculture Food and Environment masters' program.

Ramón Borges-Méndez
Food Production | Market Demand
Ramón Borges-Méndez, born in Puerto Rico, has worked in the US, Latin America, and Asia. He is an Associate Professor of Urban Planning and Community Development at the International Development, Community, and Environment Department at Clark University (Worcester, MA), where he is coordinator of the undergraduate Urban Studies concentration, and he teaches graduate courses on food systems, inequality, labor economics, migration, and globalization. He holds an MCP and a PhD in Urban and Regional Planning from the Massachusetts Institute of Technology (MIT). Prof. Borges-Méndez is co-founder and Director of Development of Fundación Bucarabón in Maricao (Puerto Rico), currently Co-Chairs the board of directors of Worcester Common Ground Community Development Corporation, and he is a member of the Massachusetts State Council of the Conservation Law Foundation. He has occupied leadership positions in organizations and nonprofits such as the Massachusetts Endowment for the Humanities, Farm-to-Institution New England, the Latino Education Institute/WSU, the Mauricio Gaston Institute/UMASS-Boston, and the Association for Research on Nonprofit Organizations and Voluntary Action (ARNOVA). He has been a consultant for the World Bank, the US Dept. of Labor, The Ford Foundation,

SEIU-1099 Health Care Workers NYC, the Brookings Institution, and the United Nations. His research has been published in CENTRO Journal, the Economic Development Quarterly, Local Environment, Agriculture and Human Values, and the Journal of Extreme Events. Prof. Borges-Méndez's research has been supported by the USDA, The Marion Ewing Kauffman Foundation, The Immigrant Learning Center, Working Cities Challenge/Boston-FED, The Ford Foundation, The Leir Foundation/Clark University, American Institute for Sri Lankan Studies, among other organizations.

Brian Donahue
Dietary Patterns Team Leader | Food Production
Brian Donahue is Professor Emeritus of American Environmental Studies at Brandeis University. Donahue holds a BA, MA, and PhD from the Brandeis program in the History of American Civilization. He co-founded and for 12 years directed Land's Sake, a nonprofit community farm in Weston, Massachusetts. For three years he was Director of Education at The Land Institute in Salina, Kansas, and now sits on the boards of the Massachusetts Woodland Institute, the Friends of Spannocchia, and The Land Institute. Donahue is author of *Reclaiming the Commons: Community Farms and Forests in a New England Town* (Yale University Press, 1999), which was awarded the book prize from Historical New England; and *The Great Meadow: Farmers and the Land in Colonial Concord* (Yale Press, 2004), which won book prizes from the New England Historical Association, the Agricultural History Society, and the American Society for Environmental History. He also published *American Georgics: Writings on Farming, Culture and the Land* (Yale Press, 2011), an anthology co-edited with Edwin Hagenstein and Sara Gregg. Donahue is co-author of *Wildlands and Woodlands: A Vision for the New England Landscape* (Harvard Forest, 2010) and *A New England Food Vision: Healthy Food for All, Sustainable Farming and Fishing, Thriving Communities* (Food Solutions New England, 2014). He and his family co-own and manage Bascom Hollow Farm, in Gill, Massachusetts, which raises beef cattle, pork, pumpkins, and timber.

Holly Fowler
Market Demand Team Leader
Holly Fowler is co-founder and CEO of Northbound Ventures Consulting, LLC, a small, woman-owned firm based in Montpelier, Vermont and centered around food systems, outdoor recreation, population health, and community economic revitalization. She routinely supports organizations and institutions nationwide to identify and implement strategies that prioritize equitable development. Prior to starting Northbound, Holly served as the Senior Director of Sustainability & Corporate Social Responsibility for Sodexo North America, the world's second

largest provider of institutional food service. There she guided progressive operational and sourcing practices across all markets - corporate, academic, healthcare, leisure, and government. Holly holds a Professional Certificate in Sustainable Food Systems Leadership from the University of Vermont, a Masters in Business Administration from Babson College, and a BA from Bowdoin College.

Michelle Klieger
Market Demand
Michelle Klieger is the co-founder of Helianth Partners, LLC a consulting firm that identifies and deploys innovations that create more equitable solutions in our agricultural systems, by creating the building blocks that are required to move the system from the current state to the desired future. As an agricultural economist, Michelle uses her lens to examine on-farm profitability, rural economic activity, and local environmental metrics. With this understanding, she strategically considers value chain solutions that are needed to realize the desired outcomes. Michelle is a professional speaker, the author of The Demise of Free Trade, and host of The Grower and The Economist podcast. She is a professor of Economics at Bentley University and holds a Masters in Agriculture Economics from Purdue University and an MBA from Indiana University's Kelley School of Business.

Hannah Leighton
Market Demand
Hannah Leighton is the Director of Research and Evaluation at Farm to Institution New England (FINE), a six-state cross-sector regional network that is transforming the food system by mobilizing the power of New England institutions. In this role, Hannah oversees FINE's metrics project, manages internal and collaborative research efforts, and leads FINE's efforts to measure the impact of farm to institution activity across the region. Prior to her work at FINE, Hannah spent several years writing about food, working in hospitality, and farming on vegetable and small-scale livestock farms across the country. She has a Bachelor's degree in Creative Writing from the New School University and a Master's degree in Sustainability Science with a concentration in Sustainable Agriculture and Food Systems from the University of Massachusetts, Amherst.

Ashley McCarthy
Food Production
Ashley McCarthy served as a Research Associate on the New England Feeding New England project, working to estimate suitable land area for crop production and develop production milestones for 2030. Ashley is also a Postdoctoral Research

Associate in the Department of Nutrition and Food Sciences at the University of Vermont. Her interdisciplinary research focuses on meeting the food and nutrition needs of the growing population while improving sustainability and resiliency to disruptions in the food system. She's particularly interested in the role that regional food systems could play in overall food system resilience and sustainability. Ashley uses a variety of methodological approaches in her work, including geospatial analysis, quantitative food systems modeling, and statistical analysis. She received her BA in Economics from Creighton University and MS and PhD in Agriculture, Food, and Environment from the Friedman School of Nutrition Science and Policy at Tufts University. Ashley lives in Burlington, VT.

April McIlwaine
Food Production

April McIlwaine is a MS candidate at the University of Vermont in the Food Systems program. She holds a degree in Biology from SUNY Purchase and was the recipient of the Women in Tech award in 2019. She has worked on a number of urban organic farms and taught farm and environmental education to NYC youth through the educational non-profit City Growers. Her current masters project seeks to create a publicly accessible narrative exploring the history of land use in Burlington and the effect residual issues, such as soil contamination, have on community gardens and gardeners. Her work with NEFNE was for the production milestones team where she calculated the land use acreage data for the region. She also worked alongside Dr. Ramón Borges-Méndez and Dr. Eric von Wettberg to assess Urban Agriculture (UA) throughout the region including a review of UA's socio-cultural benefits and identification of UA indicators present in New England.

Christian Peters
Food Production Team Leader

Christian Peters, PhD is the Research Leader of the USDA Agricultural Research Service's Food Systems Research Unit in Burlington, Vermont. He comes to the USDA from the Friedman School of Nutrition Science and Policy at Tufts University where he taught in the Agriculture, Food and Environment graduate degree program for 11 years. He joined Tufts University as an assistant professor in 2010 and was promoted to associate professor, with tenure, in 2016. Dr. Peters studies the sustainability of food systems using computational modeling and through interdisciplinary research. He is interested in understanding how dietary patterns influence sustainability, how much food can be supplied through locally and regionally scaled systems, and how transdisciplinary approaches can help to design and study such systems. Some of his best-known work includes development of a framework for estimating land requirements of diets and human carrying capacity,

and a spatial modeling approach for mapping potential foodsheds. His work is well grounded in the Northeast, but also national in scale, and he is a widely acclaimed researcher in food systems. He received his BS in Environmental Sciences from Rutgers, The State University of New Jersey and his MS and PhD in Soil and Crop Sciences from Cornell University.

Scott Richardson
Dietary Patterns | Market Demand

Scott Richardson, PhD, MBA is co-founder and Partner of Northbound Ventures Consulting, LLC. He brings a broad range of public health, operations, finance, and strategy experience to his work serving the public, private, and philanthropic sectors. Previously, Scott was the Director of Research and Strategic Initiatives for Project Bread, Massachusetts' statewide anti-hunger organization, where his responsibilities included identifying, implementing, and measuring the impact and feasibility of new projects to improve access to healthy food for underserved populations. Scott's research on improving public school nutrition has been documented in several academic journals. Scott holds a PhD in Population Health Sciences with a focus on nutrition from the Harvard T.H. Chan School of Public Health, an MBA from the FW Olin Graduate School of Business at Babson College, a BA from Rutgers College, and a Professional Certificate in Sustainable Food Systems Leadership from the University of Vermont.

Nicolas Rockler
Economic Impact Team Leader

Nicolas Rockler is an economic consultant specializing in regional impact measurement, modeling, and assessment. He is highly experienced in the development and application of regional econometric, input-output, and hybrid models. He has more than 35 years experience as a regional economist. Since 2006, Dr. Rockler has been CEO of Kavet, Rockler and Associates, a Vermont consulting firm. He has served on the staff of the Multiregional Planning Group at the Massachusetts Institute of Technology (MIT). While there, he conducted research on climate change, completed several studies for the Economic Development Administration on the long-run impact of public infrastructure investment, done research for the Joyce Foundation, and the National Institute of Standards and Technology (NIST). Current project work concerns the State of New England's food industries and agricultural sector performance, evaluation of Vermont Capital Improvement Program, and development impact consequences of hazardous waste disposal in Western New York State. Dr. Rockler completed his Ph.D. at MIT with his dissertation titled, "Regional Economic Performance and Public Infrastructure Investment." He received BA and MA degrees in regional

science at the University of Pennsylvania. Prior to attending MIT, Dr. Rockler was a senior economist at Data Resources, Inc. (DRI, now Global Insight, Inc.) and F.W. Dodge, both subsidiaries of McGraw-Hill, Inc. at the time. Prior to that position, he was an economic analyst at Abt Associates, Inc. and an economist at HSMM, an engineering firm (now part of AECOM).

Sarah Schumann
Food Production

Sarah Schumann is the principal of Shining Sea Fisheries Consulting, a mission-driven research and education firm specializing in fisheries, wild seafood, and environmental information and decision-making. Shining Sea combines roots in the commercial fishing community with a commitment to sound science, public engagement, and systems thinking to support coastal and ocean environments and the fishermen who make their livelihoods in these places. Shining Sea's business model blends contract consulting with pro-bono services to support fishing communities and their allies in advancing healthy fishery habitats and resilient seafood systems. Sarah is also a commercial fisherman in Point Judith, RI, the author of *Rhode Island's Shellfish Heritage: An Ecological History and Simmering the Sea: Diversifying Our Cookery to Sustain Our Fisheries*, and editor of the online multimedia journal *Ecosystem-Based Fisheries Marketing*.

Dr. Joshua Stoll
Food Production

Dr. Joshua Stoll, PhD is an assistant professor in the School of Marine Sciences at the University of Maine. His research focuses on questions about coastal community resilience, ocean governance, fisheries policy, and food systems. Joshua is the co-founder of the Local Catch Network and has been working to elevate the role of seafood in local and regional food systems for more than a decade. He holds a B.A. in Environmental Studies from Bates College, a Masters in Coastal Environmental Management from Duke University, and a PhD in Ecology and Environmental Sciences from the University of Maine. Prior to returning to Maine, he was an early career research fellow in the Global Economic Dynamics and the Biosphere Program at the Royal Swedish Academy of Sciences in Sweden.

Dr. Eric von Wettberg
Food Production

Dr. Eric von Wettberg, PhD is an associate professor in Plant and Soil Science and the former director of the Food Systems graduate program at the University of Vermont. He has studied the genetics and agroecology of a number of legumes over the past decade, with an aim towards improving the climate reliance of nutritious,

culturally meaningful crops. His work aims to preserve crop genetic diversity, introduce new crops to the northeast, and improve the sustainability of crop rotations and cropping systems. He is keen to bring his experience working with the Vermont Land Trust, the Association of Africans Living in Vermont, and the Vermont Indigenous Heritage Center to bear on providing farmland access to new farmers, and facilitating the production of climatically resilient and nutritious crops.

PROJECT EDITORS

Scott Sawyer edited and designed the New England Feeding New England report, and wrote sections throughout, including the Common Food System Challenges Backgrounder. Scott was the primary analyst, writer, and designer for the first phase of Vermont Farm to Plate while at Vermont Sustainable Jobs Fund, as well as the primary analyst and writer for San Diego County Food Vision 2030 while at the San Diego Food System Alliance. Scott lives in Southern California with his wife, daughter, and bernedoodle. He teaches *Intro to Food Systems* at Pitzer College.

Ellen Kahler is the Executive Director of the VT Sustainable Jobs Fund (VSJF) which manages Vermont statewide food system development efforts known as VT Farm to Plate. VSJF/VT Farm to Plate is part of the New England State Food System Planners Partnership and provided grants management and administrative support to the New England Feeding New England project. Ellen was actively involved in working with all the researchers associated with this project and in ensuring the project deliverables were achieved. Ellen helped shape and publish the 2011-2020 Farm to Plate Strategic Plan and the 2021-2030 Vermont Agriculture & Food System Strategic Plan, as well as support the development and work of the statewide Farm to Plate Network. Ellen has served on the Working Lands Enterprise Fund since its inception in 2012, which annually distributes grants to food system businesses and service provider organizations, and was appointed by Governor Phil Scott to serve on the Future of Agriculture Commission in 2021.

Sarah Axe served as the New England Feeding New England Project Manager from February 2021 - March 2022. supporting the Partnership as it began this project, interviewed and assembled the team of 16 researchers, developed and invited participants to the 10 focus groups that were conducted, and identified and secured the Research Advisory Committee. She now serves as an Agricultural Marketing Specialist at USDA-Agricultural Marketing Service.

Elliot Pearson is a cartographer and geo-transportation specialist based in San Francisco, California. He is an alumnus of Deering High School in Portland, ME. He prepared the maps used throughout New England Feeding New England.

New England Feeding New England Research Advisory Committee

Molly Anderson is the William R. Kenan Jr. Professor of Food Studies at Middlebury College, Vermont. She directs the Academic Program in Food Studies and teaches courses on agroecology; hunger; food sovereignty; food justice; and environmental, social and cultural problems in our food system. Her current research is on narratives of food system transformation and better food system governance. She works on teams at the local, state, regional, national and international levels and is a member of the International Panel of Experts on Sustainable Food Systems. She tries to contribute regularly to Working Groups and the annual meetings of the Civil Society & Indigenous Peoples' Mechanism of the Committee on World Food Security. She also participates in the (national) Inter-institutional Network on Food, Agriculture & Sustainability, and has attended Vermont Farm to Plate Food Access Working Group meetings for several years. She enjoys travel (especially to meetings in Rome) and helps to tend the large garden that supplies most of her family's food through the year. It's a great space to learn about agroecology on the ground!

Patrick Baur is Assistant Professor of Food Policy and Innovation in the Sustainable Agriculture and Food Systems Program, Department of Fisheries, Animal and Veterinary Sciences at the University of Rhode Island. He has a doctorate in environmental science, policy, and management from the University of California, Berkeley and prior to starting at URI was a USDA National Institute of Food and Agriculture Postdoctoral Fellow. His research blends political ecology, social-ecological systems science, and science and technology studies. He seeks to learn from practitioner perspectives on navigating competing demands on food production and to identify ways to better support diverse and equitable opportunities in sustainable food systems. Current research includes the politics of farm mechanization and automation, evaluating and governing equity dimensions of urban agricultural intensification, and participatory mapping of alternative food provisioning networks.

Kristen Cooksey Stowers is an Assistant Professor in the Department of Allied Health Sciences. She has a strong interdisciplinary background in health equity, agricultural economics, public policy, and medical sociology. Her program of research focuses on reducing inequities in diet-related health outcomes by improving macro- and micro-level food environments through sustainable policy solutions. She conducts community-engaged and mixed methods research to examine: (a) the impact of food swamp environments on racial, geographic and socioeconomic disparities in diet-related health outcomes; (b) the potential of inclusive public policy processes (e.g., zoning) to prevent disparities in diet-related

health status regardless of racial/ethnic minority and citizenship status; and (c) the influence of micro-level food environments (e.g., food pantries, family child care homes) on health risks in food-insecure populations, communities of color, and other historically marginalized groups. Dr. Cooksey Stowers' research has been funded by NIH (i.e., NIA, NHLBI), the USDA, the Food Trust Center for Healthy Food Access, the Robert Wood Johnson Foundation, and the Reinvestment Fund. Her leadership experience includes service with the W.K. Kellogg Foundation and an appointment as a Public Service Leader Scholar with the USDA in Washington, D.C. Since coming to Connecticut in 2016, she has worked with community partners and residents aiming to improve grocery store access in the North Hartford Promise Zone. She also serves as a board member of the Connecticut Food Bank advising on their Hunger to Health initiative with health care organizations throughout the state. She mentors both undergraduate and graduate students.

Vanessa Garcia Polanco co-designs the strategy and implementation of Young Farmers' policy campaigns, ensuring the team is pursuing and advocating for equity-driven, farmer-centric research, policy, and programmatic interventions. She serves as an organizational council member and co-chair of the Farming Opportunities & Fair Competition Committee of the National Sustainable Agriculture Coalition. She is a Food Solutions New England Network Leadership Institute alumna, formerly a RI food Policy Council Member, and worked previously at the US Department of Agriculture, Michigan State University Center for Regional Food Systems, and the University of Rhode Island Cooperative Extension. She is a James Beard Foundation Scholar, an Agriculture and Food Human Values Society Innovation Leader, and a 2021 Emerging Leader in Food and Ag. She is an alumna of Michigan State University College of Agriculture and Natural Resources and the University of Rhode Island College of the Environment and Life Sciences. As an Afro-Dominican immigrant, she brings her experiences and identities to her policy and advocacy activities for a bright and just food system.

Laura Ginsburg is the Dairy Development, Innovation, and Policy Lead at the Vermont Agency of Agriculture, Food and Markets. In this role she leads dairy focused efforts for the Agency on behalf of Vermont and the Northeast Dairy Business Innovation Center, one of four national centers funded by the USDA and representing the eleven states of the Northeast. The NE-DBIC provides funding, research, and business assistance to farms, processors, producer associations and is currently managing over $38 million. Laura received her master's degree from the University of Montana, where her thesis research focused on the state's dairy supply management system and impacts on farmer decision making. She received a Fulbright scholarship to conduct a study in New Zealand of free market system impacts on dairy farmers. Laura authored the Dairy Brief chapter of the Vermont Agriculture and Food System Plan.

Gray Harris recently became the Senior Advisor, Food Systems Finance, Rural Business-Cooperative Service at USDA Rural Development. Prior to her current position, she served in a number of senior leadership roles at Coastal Enterprises of Maine (which she held while serving on the NEFNE Advisory Committee). She is a senior executive with a proven track record of success in driving strategy, delivery and operations, who has dedicated her career to creating healthy, vibrant, sustainable and financially viable food systems celebrating rural communities and entrepreneurs. Experienced in recognizing the potential in opportunity and builds cross-functional teams to drive towards quantifiable results. Proven expertise mission-driven finance and creative investment solutions, innovative financial tools and structures, and creating opportunities, particularly for people outside of the economic mainstream. A creative problem-solver who thrives on collaboration and grounding big vision in action and impact and who works to bridge political and cultural divides, to identify and achieve shared goals.

Erin Lane is the Coordinator for the USDA Northeast Climate Hub. The Hub focuses on communicating how we can adapt our farms and forests to climate change, and how working lands can contribute to climate mitigation. Erin has worked for the USDA Forest Service since 1997 in both management and research. She also has expertise in fire ecology of New England. Her current research is aimed at finding solutions to climate change by storing carbon in the soil. Erin is passionate about collaborating on teams and developing partnerships.

Dr. Isaac "Ike" Leslie (they/them) is an Extension Assistant Professor of Community Development at the University of Vermont. Ike researches and organizes with Vermont communities for social and environmental change. Ike is an environmental sociologist specializing in justice, sustainability, and economic viability in food systems. They also research and organize with LGBTQ+ farmers and rural residents. They earned a Ph.D. in Sociology/Community & Environmental Sociology from the University of Wisconsin-Madison as well as an M.A. in Sociology and M.S. in Natural Resources from the University of New Hampshire. They also own and operate Magnetic Fields Farm, an agroecological fruit farm that attracts and sustains multiracial rural queer farm community.

Kate Masury is the Executive Director at Eating with the Ecosystem, a small nonprofit whose mission is to promote a place-based approach to sustaining New England's wild seafood, through healthy habitats, flourishing food webs, and short, adaptive seafood supply chains. As the organization's sole full time staff person, Kate performs many roles from organizing and running educational and outreach events, to coordinating a citizen science project with 86 participants from across New England to collect data on the availability and preference for local seafood in the New England marketplace, to conducting key informant interviews with seafood supply chain businesses about shifting species distributions, coordinating efforts to increase access to local seafood in the emergency food system, to designing fisheries interpretive signs in collaboration with local fishing communities and local seafood guides for restaurants and chefs. She has built an advisory network of chefs, fishermen, scientists, and other seafood supply chain members who lend advice and support to the organization. Kate is also a member of the Rhode Island Seafood Marketing Collaborative, Food Solutions New England, and the Local Catch Network.

Ken Meter is one of the most experienced food system analysts in the U.S., integrating market analysis, business development, systems thinking, and social concerns. Meter holds 50 years of experience in inner-city and rural community capacity building. His local economic analyses have promoted local food networks in 144 regions in 41 states, two provinces, and 4 tribal nations. He developed a $9.85-milllion plan for local food investment for the state of South Carolina, and completed similar studies for New Mexico, New Hampshire, Hawai'i, Alaska, Mississippi, Indiana, Ohio, and Minnesota. He developed strategic regional food plans for nearly 20 regions across the U.S. Meter consulted with the USDA Agricultural Marketing Service and Colorado State University as one of 14 co-authors of a toolkit for measuring economic impacts of local food development. He is author of Building Community Food Webs, published by Island Press in 2021. He is one of 3 co-editors of *Sustainable Food System Assessment: Lessons from Global Practice*, published by Routledge (UK) in 2019. Meter is also a member of the International Economic Development Council, where he presented at several annual meetings. He has taught at the Harvard Kennedy School and the University of Minnesota.

Jacob Park is Visiting Professor at the University of Johannesburg (South Africa) and Associate Professor in Castleton University (USA), who specializes in innovation, entrepreneurship, and sustainability management, with a special focus/expertise in energy, climate change, and food system issues in emerging and developing economies in Africa, Asia-Pacific, and Caribbean islands regions. He is the Co-Chair, Shareholder Consortium, Journal of Agriculture, Food Systems, and Community Development, and served as the Coordinating Lead Author of the *UN Environment Global Environment Outlook* (GEO-6) Report, Lead Author for the United Nations Millennium Ecosystem Assessment initiative, and as an Expert Reviewer for a number of IPCC publications including the Sixth Assessment Report. He is a Co-Executive Editor of *Subsistence Marketplaces*, Associate Editor at the *Journal of Social Entrepreneurship*, Academic Editor (Adaptation) at *PLOS Climate*, and Editorial Adviser: SDG 10 for *Springer Sustainable Development Goals Book Series*. He also serves on the Board of Trustees of the Vermont Food Bank and on the editorial boards of *Business Strategy and the Environment*, and *Emerald Emerging Market Case Studies*.

Eric Rimm is professor of epidemiology and nutrition and director of the program in cardiovascular epidemiology at the Harvard T.H. Chan School of Public Health, and professor of medicine at the Harvard Medical School. He is internationally recognized for his extensive work in the study of the health effects of moderate alcohol consumption, whole grains, micronutrients, and polyphenols. He also studies the impact of local and national nutrition policy as it relates to the improvement of diets of school children, the 1 in 8 Americans on the Supplemental Nutrition Assistance Program (SNAP), and other federal nutrition assistance programs. He served on the National Academy of Sciences' food policy advisory committee for the USDA's Economic Research Service and previously served on the scientific advisory committee for the 2010 U.S. Dietary Guidelines for Americans. He is also a nutritional advisor to the Boston Red Sox and the Liverpool Football Club in the English Premier League. He has published more than 800 peer-reviewed publications during his 28 years on the faculty at Harvard. Eric has received several awards for his work including the American Society for Nutrition Innovation Award.

Rachel Schattman is an Assistant Professor of Sustainable Agriculture at the University of Maine, and a fellow at the George J. Mitchell Center for Sustainability Solutions. The overarching goal of her research and outreach is to facilitate agricultural and food system resilience in a changing climate while simultaneously protecting natural resources. In pursuit of this goal, she works with specialty crop producers and agricultural advisors to identify and address production challenges, specifically through the lens of climate change adaptation. This approach is grounded in complimentary traditions of agroecology and participatory action research (PAR). Prior to starting her position at the University of Maine, she owned and operated a diversified vegetable farm in Monkton, Vermont. She has served with the University of Vermont Extension as a sustainable agriculture research associate, a food safety educator, and a local food program coordinator. Additionally, she was a postdoctoral research fellow with the United States Department of Agriculture Northeast Climate Hub. To learn more about Dr. Schattman's work, visit the University of [Maine Agroecology Lab website](#).

Tom Sproul recently began a new data science product management role in Amazon Device Economics to pursue his love of building tools. Previously he was a professor at the University of Rhode Island with a research background in Agricultural and Resource Economics, with a focus on risk modeling, insurance and risk management. He has done research on a variety of topics, including pollution regulation, farm policy, strategic behavior in fisheries, and behavioral economics and finance. Here, he shares his perspectives on offshore wind energy, and how resource economics research can help us understand the benefits and tradeoffs of developing wind farms.

Lindsey Williams is a social scientist and policy specialist with over 18 years of experience in research, teaching, and practice on ocean and coastal management issues, including 10 years in federal government service in several budget, policy, and communications roles. Her current work focuses on the science-policy interface, negotiation and consensus building, and collaborative processes particularly as they relate to coastal and environmental matters. She holds a PhD in Natural Resources and Environmental Studies from the University of New Hampshire, a Master of Marine Policy from the University of Delaware, and Bachelor of Arts in Biology from Colby College. In addition to her professional roles at the University of New Hampshire, Lindsey works as a consultant, advisor, and lecturer. She is the founder and President of RiverSea Advisors, the founder of Eight Legged Octopus, and also serves as an At Large member of the City Council in Dover, NH.

Estimating Resilient Eating Focus Group of Nutrition Experts

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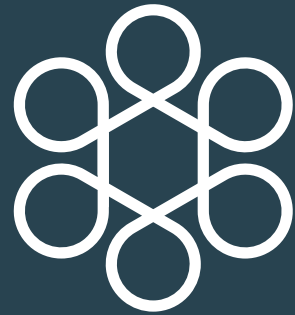
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