

2023



Northeast Agenda

A JOINT VISION FOR THE FUTURE OF THE NORTHEAST
*THE INTERSECTION OF THE PEOPLE, COMMUNITIES, ECONOMIES,
AND ECOSYSTEMS THAT MAKE OUR REGION UNIQUE.*

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Disclaimer:

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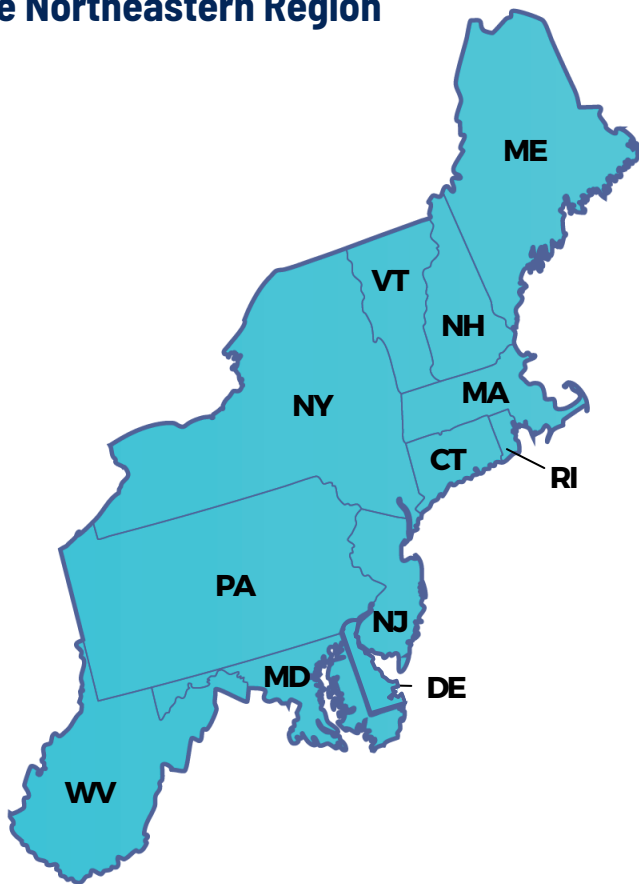
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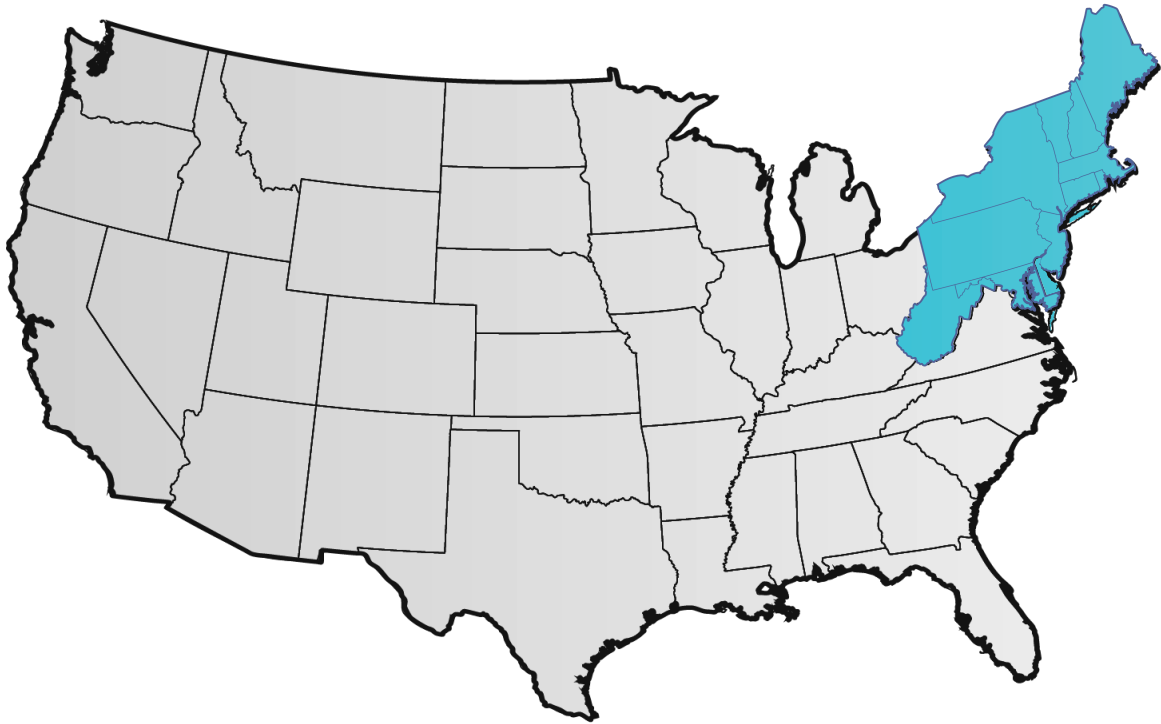
The Northeastern Region



We gratefully acknowledge the Native Peoples on whose ancestral homelands Land-grant universities were built, as well as the diverse and vibrant Native communities who make their home in the Northeast today.*

Land Acknowledgement

*Respectfully modeled after the Smithsonian National Museum of the American Indian's Land Acknowledgement Statement



PART 1: THE NORTHEASTERN PERSPECTIVE

INTRODUCTION

The Northeast Agenda identifies challenges and opportunity areas for the regional Land-grant programs to ensure a regenerative, livable, and vibrant Northeastern United States. It describes the unique characteristics of the Northeastern United States and shares the vision, mission, and purpose of Northeast regional Land-grant programs, our Extension services, and state agricultural experiment stations.

The Northeast Agenda is the product of directors from two organizations: the Association of Northeast Extension Directors (NEED) and the Northeastern Regional Association of State Agricultural Experiment Station Directors (NERA).

UNIQUE ATTRIBUTES OF THE NORTHEASTERN UNITED STATES

In the context of NEED and NERA, the Northeastern United States includes Connecticut, Delaware, the District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, New Jersey, Pennsylvania, Rhode Island, Vermont, and West Virginia. According to the 2020 Census, more than 67 million people live in the Northeast. This is approximately 20% of the total US population living on 6% of its total land area while producing 24.0% of the nation's GDP. The disproportionately high output per capita is largely the result of the agglomeration benefits of people living in the densely-settled metropolitan areas, which are associated with higher productivity and incomes.

The people who live in the Northeast represent a diverse population and share a rich and long history of independence, self-reliance, and the ability to innovate. From our largest cities (New York, Boston, Philadelphia, and Washington, DC) to our smallest communities in northern Maine and the Appalachian region of West Virginia, the Northeast is a microcosm of the diversity present from coast to coast.

Diverse Peoples, Communities, and Landscapes

Many immigrants, historically and in recent times, come to the U.S. through the Northeast, and they have often planted roots and raised families here, giving the region a rich diversity in culture, food, and ethnicity. Our towns and cities represent the oldest settler communities in the United States, and our local governments vary from commonwealths to the District of Columbia. Across the Northeast, county government remains strong, and local decision-making is paramount throughout the Northeast. Many towns still hold in-person town meetings to encourage local participation. Towns and cities in the Northeast often control policies affecting water and energy.

Our landscapes span mountain ranges to sandy beaches and everything in between. Fifteen percent of the total US tidal shoreline runs from Maine to Maryland. The shore, large estuaries (including the Chesapeake Bay, the largest estuary in the world), and the Atlantic Ocean support a bustling seafood fishery and offer recreation opportunities, access to power generation (e.g., offshore wind), and numerous other ecosystem services from products to health and well-being. Collectively these assets create opportunities in a new "Blue Economy"¹. The Appalachian Mountain range runs through the Northeast, and fertile farmland can be found in all states, with particularly large areas in New York, Pennsylvania, and West Virginia. High forest density areas in the northern and southwestern parts of the region provide revenue through timber sales and recreation.

1. NOAA Strategy to Enhance Growth of American Blue Economy, <https://oceanservice.noaa.gov/economy/blue-economy-strategy/>

Northeast Agriculture

The Northeast Region has approximately 25 million acres of agricultural land (167,000 farms). From a national perspective, the Northeast accounts for approximately 4.3 percent of total U.S. crop cash receipts and 6.3 percent of total U.S. animal and animal product cash receipts. That translates to a contribution of more than \$19 billion to the U.S. agricultural economy. Although the average farm size is only 133 acres (compared to the US average of 445 acres); the productivity of those farms is high. Northeast farms generate about 2.5 times as much income per acre than farms elsewhere in the United States. NE farmers use their resources efficiently!

While dairy continues to lead Northeast agriculture, the region has a rich diversity in crops and economic impact, including agrotourism, nursery and horticulture, and maple syrup. Challenges to farming in the Northeast include a limited amount (and high cost) of farmland and a high population density. However, opportunities exist for innovators in food systems given the proximity to large cities.

Grounded in History with a Vision for the Future

Many of the towns and cities in the Northeast were established in the 1600s and cobblestone streets can still be found in virtually every state. While the colonial days are an important part of the history and culture in the Northeast, the region is also a leader in innovative thinking, progress, and collaborative vision for economic growth, environmental sustainability, and social justice. With the greatest concentration of colleges and universities in the U.S., there is an above-average proportion of high school and college graduates and a strong connection between communities and Land-grant universities.



THE NORTHEAST IS A
LEADER IN INNOVATIVE
THINKING, PROGRESS, AND
COLLABORATIVE VISION
FOR ECONOMIC GROWTH,
ENVIRONMENTAL
SUSTAINABILITY, AND
SOCIAL JUSTICE.

Urban-Rural Juxtaposition

In general, the Northeast has a very high population density; however, quintessentially low-population rural areas can be found from northern communities in Maine, New Hampshire, and Vermont to the rural Appalachian and eastern shore communities in the mid-Atlantic. In both the most rural and the most urban areas, there exists incredible wealth as well as deep generational poverty. This creates economic, education, and policy challenges that influence the Land-grant enterprise as researchers and Extension professionals work to balance the application of limited resources.

Despite often stark differences between nearby communities, the Northeast's signature population clustering means that almost everyone is within a reasonable drive to a large city. The I-95 corridor runs the entire length of the region, allowing easy transport of goods and services and convenient access to major airports.

Additionally, the existence of five of the top 25 most productive seaports in the nation² means that access to global markets can and should be strong.

This creates many opportunities for local and regional systems to emerge and opportunities for overcoming the many barriers—through access to education and resources—that have kept some communities from realizing their full potential.

The urban-rural juxtaposition also plays a critical role in food production and natural resources created and used in the Northeast.

2. 2023 Port Performance Freight Statistics Program: Annual Report to Congress <https://rosap.ntl.bts.gov/view/dot/65990>

Land itself is a limited and essential resource for the viability and sustainability of food production and natural resource management. Access to available and affordable land is essential in developing local and regional food supply chains, which are critical for increasing community resilience.

That said, access to farmland is the number one barrier to the viability of new and existing food producers across the United States. It is a particularly acute issue in the Northeast where aspiring farmers are struggling to gain access to land suitable for food production. In cases when they do overcome formidable barriers—land prices, competition with developers, and financing—and gain access to farmland, the viability of their farm businesses is threatened by barriers to developing their business by local land use restrictions.

Compact and Collaborative

Close proximity means that most people living in the Northeast can easily travel from state to state for work, school, and recreation. State legislative delegations are often small, requiring decision-makers to join forces on thorny issues, while state agency staff can work closely with land-grant faculty and staff to accomplish their goals. This sense of “we can get more done together” is prevalent. As an example, Northeast states have been working collaboratively for several years to develop a path to increase the amount of local food produced in the region. Each state has its own food system goals, but there are also regional goals, and leads from each state share data and report on collective metrics to assess progress in the region.

CRITICAL CHARACTERISTICS AFFECTING THE NORTHEAST

Water

With more than 13,000 miles of coastline and hundreds of lakes, streams, and rivers, water quality and flooding continue to be key concerns of the Northeast. High population density, development pressure, industry, and agriculture production all have the potential to reduce water quality through non-point source pollution. While not unique to the Northeast, environmental justice and drinking water quality issues are critical to our region. Access to clean water can be affected by many factors, including aging water infrastructure in our cities and towns. Low-income communities are often disproportionately affected by pollutants in the ground and in municipal water. Identification of pollutant sources as well as prevention and mitigation strategies are important for all communities in the Northeast to protect water quality, prevent flooding, and ensure public health for everyone.

Although the Northeast doesn't have the same level of concern of limited water supply as the Western U.S., a rapidly changing climate is quickly changing the historical notion that water quality is the Northeast's primary challenge. Since 2015, the Northeast has experienced droughts the levels of which have not been observed since the 1960s, signaling the potential trajectory of continued water access challenges in the region.

Climate Change

The Northeastern region has experienced some of the most dramatic changes in climate as anywhere in the U.S. Examples include:

- A 71% increase in extreme precipitation events in the Northeast in recent years.
*In 2016, while record rains fell in the southern part of this region (WV), many other parts of the Northeast experienced the worst drought in 50 years (NY, MA, CT, RI, NH). Unusually warm winters (2010, 2012, 2016, and 2017) are leading to early breaking of plant dormancy and increased freeze losses.*³

3. USDA Northeast Climate Hub, <https://www.climatehubs.usda.gov/hubs/northeast/about>

- Winters are warming, affecting crops from fruit to maple syrup production.
*Recent winters have been unusually warm leading to early release from dormancy in perennial plants and damage from late winter or spring cold. In 2016, peach crops in the northern half of the Northeast were affected in this way with almost total losses. Grapes, apples, cherries, and other fruit crops in this region suffered widespread losses following cold conditions after warm winters in 2010 and 2012. In 2012, for example, record-high March temperatures were followed by record-low temperatures at the end of April leading to huge losses for growers in NY, VT and other states.*⁴
- Even as flooding and heavy rain events are increasing (for example, Superstorm Sandy and Hurricane Irene), the region faced its worst drought in 50 years in 2016.

As climate change continues, the growing season in the Northeast will change, threatening products/crops that require colder winters and cooler summers (maple syrup, apples, root vegetables, etc.). Alternatively, climate change is also causing crop production belts to move northward. Shifting production belts will also have implications for the Northeast agricultural supply chain. Invasive pests and diseases will threaten the health of our woodlands and crops. New growing techniques and alternative cultivars may be required to successfully produce more local food in the Northeast to feed our growing population.

Population Growth and Distribution

Within the United States, the Northeast is the most heavily forested and most densely populated region in the country, and the urban coastal corridor between Washington, DC and Boston is one of the most developed environments in the world. Between 1996 and 2010, upland forests (51%), agriculture (13%), and open waters (13%) were the most common land covers of the region; however, more than two-thirds of all new development during this time was classified as low intensity or open space developed, converted from lands previously categorized as upland forest and agriculture. At the same time, the region has struggled with a declining productive land base (e.g., agriculture and other working lands), decreasing regional self-reliance, and population migrating towards the coastline.⁵

According to the U.S. Census Bureau, the total U.S. population is projected to grow by 79 million people by 2060, while the average age increases and the total population becomes more racially and ethnically diverse. 2030 is expected to be a turning point year in these population trends.⁶ While the COVID-19 pandemic led to a spike in domestic migration out of city centers,⁷ we expect that the Northeast populations—in both city centers and small towns—will grow significantly in coming years. This may be due to an increasing prevalence in remote and hybrid work schedules leading families to settle in rural or suburban areas that are easily accessible to cities and transportation, younger more diverse generations moving to cities believed to be accepting, creative, and full of opportunities, or other factors. No matter the reason, an increasing population will continue to stress the region's food system, resources, and related infrastructure.

Science Literacy

While the Northeast has a relatively large percentage of the population with a bachelor's degree or higher, there is still work to be done to ensure voters and people in decision-making roles have a basic understanding of the science that drives our food systems and environmental challenges. The prevalence of localized decision-making in many Northeast communities makes it even more critical that there is a basic understanding of scientific concepts for those who serve on local conservation commissions, planning and zoning boards, and in leadership roles. With eroding public trust toward higher education, Land-grant universities must recommit to providing science-based information to the people in our communities. It will be more important than ever for us to forge strong partnerships and foster trust between communities and researchers.

4. USDA Northeast Climate Hub, <https://www.climatehubs.usda.gov/hubs/northeast/about>

5. "Ecosystem Services in Working Lands Practice and Policy of the US Northeast," April 15, 2022, <https://online.flippingbook.com/view/749315583/>

6. <https://www.census.gov/content/dam/Census/library/publications/2020/demolp25-1144.pdf>

7. <https://www.brookings.edu/blog/the-avenue/2022/04/14/new-census-data-shows-a-huge-spike-in-movement-out-of-big-metro-areas-during-the-pandemic/>

THE PURPOSE OF THIS EFFORT: A COLLABORATIVE APPROACH TO SOLVING REAL ISSUES

The purpose of the Northeast Agenda is to promote opportunities for research and Extension to collaboratively advance the Land-grant mission to improve lives and the environment in the Northeastern United States. To provide a foundation for and a context to the Northeast Agenda, it is important to understand the organizations that will move this agenda from the page and into action.

The Northeast Agenda is the product of directors from two organizations, the Association of Northeast Extension Directors, NEED, and the Northeastern Regional Association of State Agricultural Experiment Station Directors, NERA.

NEED is a non-profit professional association where Cooperative Extension Directors and Administrators from the Northeast region come together to set priorities, link resources, collaborate on new projects, and support an effective Extension System.

NEED supports Cooperative Extension in the Northeast region by convening regional symposiums and conferences, connecting experts, providing professional development, and fostering partnerships. Cooperative Extension meets the unique needs of the region by being embedded in and listening to communities. Cooperative Extension services in the Northeast continue to meet legacy agriculture needs by providing business and risk management support, technical training, climate adaptation tools, and numerous other services to farmers, producers, and land managers. At the same time, Extension works in population centers and across the urban-rural interface to develop urban forestry projects, support community food systems, deliver youth developed through 4-H, address the opioid epidemic, and respond to other emerging priority issues.

NERA is a formal coalition of Directors of 14 state agricultural experiment stations (SAES) and one of five such organizations nationally. The Northeastern SAES are primarily located on the campuses of the region's 13 Land-grant Universities with the exception of Connecticut, which houses a stand-alone station in New Haven and another at the University of Connecticut, Storrs. All of these stations contribute to a nationwide research system dedicated to meeting the global, national, and regional challenges associated with agriculture, food systems, natural resources, and human nutrition by offering the best available science. Members of NERA are participants in a partnership with the National Institute of Food and Agriculture, USDA.

Federal funding (Hatch Multistate Research Fund) and state matching funds are strategically deployed for the research missions at member institutions. Managing collaboration is an essential role of NERA, located at the University of Rhode Island. NERA serves as the premier connecting organization for the region's agricultural experiment stations.

The **Morrill Land-grant Act of 1862** created a mechanism for every state to establish a college for teaching agriculture and the mechanical arts: Land-grant colleges and universities. Land, much of it in the West made available by the forcible movement of native peoples, was "granted" to each state to sell with the stipulation that the money from the sale be used for those Land-grant colleges and their tripartite mission of teaching, research, and Extension.

The **Hatch Act of 1887** then established the state agricultural experiment stations (SAES) to conduct original research that has contributed to the growth of the agricultural industry in the United States ever since. By 1890, legislators understood that the system that was set up to serve all was only serving some. As such, the second **Morrill Land-grant Act of 1890** established a regular funding stream for the Land-grants and stipulated that to receive that funding states must either ensure that the Land-grant university admitted and served black Americans or establish a new second Land-grant institution for that purpose.

Formal funding for Cooperative Extension services came in 1914 through the **Smith Lever Act** and in 1977 through the **National Agricultural Research, Extension and Education Act (NAREPTA)**. These laws acknowledge the need for sustained funding for Extension as the nationwide system that links communities with the Land-grants, brings information to the agricultural experiment stations to spur new research, and informs citizens about information produced by that research.

The **Tribal College Program** began in 1994 with the passage of the **Equity in Educational Land-Grant Status Act** which established tribally controlled colleges and universities as Land-grant institutions. Collectively, the legacy of the Land-grant mission is access: access to higher education, research-based knowledge, and application of that knowledge to improve the health and well-being of all Americans.

Today, the Land-grant legacy is alive and thriving in the Northeast through the efforts of the member institutions of NEED and NERA. The beauty and the strength of the region is encapsulated in the diversity of Land-grant institutions in the Northeast from small to large, north to south, and east to west. Our institutional knowledge and expertise base is perfect for implementing the Northeast Agenda, an agenda that is intended to inspire research, education, and Extension collaborations that create vibrant communities and resilient food systems and working lands in the Northeast.


NEED and NERA hope that readers come away from this agenda with a better understanding of why the Northeast matters and what we hope to accomplish together—from scientists and Extension professionals in the Northeast to Land-grant partners nationwide to non-scientists who care about the public good and decision-makers of all stripes.

PART II: THE NORTHEAST AGENDA

OUR PROMISE TO THE PEOPLE OF THE NORTHEAST

Individual Land-grant Universities are state-focused by design. They were created to serve the needs of farmers, families, and communities within each state, and they continue to address local needs through a trusted network of Extension professionals, experiment station scientists, and on-campus educators. At its best, the Land-grant University acts as a hub in a cycle that connects embedded Extension professionals (who learn what people need from the communities themselves) to researchers who conduct science and create programs to meet those needs, and back again. Science-backed solutions are continually co-created. What works, works. What doesn't is left behind.

The Northeast Agenda honors the legacy of local solutions for local issues and builds upon it. Many issues are not unique to a single state, and climate, problematic pests, and systemic issues do not care about political boundaries. With this agenda, we identify key common issues and needs we must and can address together.



THE NORTHEAST
AGENDA HONORS THE
LEGACY OF LOCAL
SOLUTIONS FOR LOCAL
ISSUES AND BUILDS
UPON IT.

Common areas of opportunity and need are organized here under high-level thematic key priorities, which we have identified as:

- Priority 1** Develop resilient, sustainable, and equitable food systems.
- Priority 2** Lead effective adaptation and mitigation for our changing climate.
- Priority 3** Promote environmental, human, animal, and community health and well-being.

These priorities can only be addressed through a set of clear collective actions. NEED and NERA commit ourselves to the following as our promise to the Northeast.

Action: Enhance collaboration across research, education, and Extension enterprises

In an ideal world, research, education, and Extension work together in a cycle where community-based or connected Extension professionals are embedded within organizations, neighborhoods, and cultural spaces in a way that allows them to formally and informally assess present and pressing needs. They pass this information through to research and on-campus education colleagues to develop the curriculum and conduct the research necessary to support the informal education and programs at the core of Extension's transformational education work. Without those connections, important findings sit on the shelves of a university library, inaccessible and overlooked. Collaboration takes effort.

When research, education, and Extension do not work together, the Land-grant University cannot meet its promise to the communities it was created to serve. We know that there is no one-size-fits-all methodology that we can implement uniformly. Instead, we are committed to identifying and addressing the structural impediments that limit collaboration, trust, and information sharing. We know that success depends on promoting collaborative solution-making whenever possible and embracing ways of working together that are creative, innovative, and evidence-based.

Action: Advance innovation and technology-focused research and Extension programs

Cooperative Extension and the agricultural research stations have well-established, proven ways of working. Extension thrives on face-to-face teaching, learning, and convening. The agricultural research stations have invested years of time, energy, and resources on long-term test farms. While these activities and processes work and will remain our core, we need to embrace the possibilities. Technological advancements have a direct impact on health, food systems, community development, and family dynamics. Generational changes in culture, expectations, and population diversity also drive research, education, and Extension needs.

In order to meet changes head on, Extension and research must be willing to innovate. The Extension Committee on Organization and Policy (ECOP) has framed innovation as follows:

Innovations that are responsive to community and system needs – for example, in delivery, constituent identification, program types and design, and communication methods – necessarily come from the ground up. Conversely, supporting structural innovations that require institutional or systemic change – for example, institutionalizing equity principles across program areas, program restructuring, budgeting adaptation, developing new external partnerships, and positioning within the University – are the responsibility of Directors, Administrators, or other individuals in strategic vision positions.

NEED and NERA are committed to supporting bottom-up visions and rethinking our top-down leadership so that a culture of effective innovation can flourish across the Northeast.

Action: Communicate our impact both externally and internally

The Land-grant University system often calls itself the nation's "best kept secret". NEED and NERA are committed to combating that narrative across the region through our public-facing communication strategies. With resources decreasing across universities, the higher the return on investment on our efforts that we can see and communicate, the better. Coordinated external communication of multistate and regional impacts can strengthen the ability for all Northeast institutions to make larger "asks" for funding and support at the state level. It will also help them be successful in showcasing that there will be a large Land-grant return on investment (ROI), even if or when the impact of an individual state's specific program is not as big in isolation.

NEED and NERA are committed to providing external communications to showcase that the importance of our work in the region is larger than the sum of its parts.

At the same time, consistent and effective internal regional communications are needed to build stronger coalitions, minimize duplicative efforts, and maximize program impacts. The Northeast region is highly diverse, and each state has unique challenges due to that diversity. Greater coordination will be key to ensuring that our region's needs are recognized and responded to at the multistate, regional, and national level.

Action: Engage in intentional diversity, equity, inclusion, and accessibility opportunities

The Northeastern United States has a rich history of diversity and cultural amalgamation. While there is a legacy of inequity that has impacted quality of life across different racial and ethnic groups, gender, religious affiliation, native language, and abilities, the region is committed to building a more equitable and inclusive future for all. The Land-grant university ecosystem, represented in the Northeast by NEED and NERA, recognizes its duty to ensure programs and services promote equity and do not perpetuate systems of oppression and injustice. With a commitment to a meaningful exploration of past and current programs through a lens of diversity, the organizations are actively developing future initiatives to ensure inclusion and accountability.

For research, NERA is a part of a nationwide Diversity Catalyst Committee that champions a long-term diversity and inclusion agenda with goals, metrics, timelines, and implementation activities to enhance diversity among Experiment Station Directors, Research Directors, and their associates and assistants.

In education and Extension, NEED plans to continue to expand program design and reach to ensure that the Land-grant universities are meeting their mission to serve all people across the United States. This includes working directly with communities to build coalitions, organizing and facilitating dialogues among diverse groups, co-creating solutions to diverse community problems, and developing pathways for historically underserved communities to access new opportunities for the future.

With a multi-disciplined approach, NEED, in partnership with the other Extension regions, plans to bring human and financial resources to bear to help individuals, families, and communities build wealth, close the digital divide, positively influence health outcomes, support socially disadvantaged farmers and foresters, empower youth, identify and leverage community assets, and build capacity among disadvantaged groups.

Increased resources for individual and joint NEED and NERA efforts have the potential to advance diversity, equity, and inclusion principles within the land-grant universities and in the communities they serve. Both organizations are well-positioned to manage place-based funding for promising innovations identified through community dialogues. They can also guide the development of national research initiatives to explore the efficacy of local innovations and their implications for future policies. Finally, as federations of institutional leaders, they can work to build higher education cultures that are supportive of diverse people and ideas. Overall, the Northeast is committed to building a more equitable and inclusive future for all.

Action: Secure sustainable funding for scientific research, education, and Extension priorities

In the Northeastern United States, land-grant universities graduate more than 36,000 students annually in food, agricultural, and natural resources disciplines. The agriculture and related industries in this region contributed more than \$150 billion to the U.S. GDP in 2019, representing 1.5% of the total GDP. Furthermore, the agricultural industry in the Northeast provides 2.3 million jobs, accounting for 5.4% of employment in the region.

Despite the significance of the industry, researchers and educators in the Northeast rely on outdated technology, programs, and facilities. These under-resourced systems threaten the region's food, fuel, and fiber security and hinder innovation in food and agriculture. Sustainable funding is crucial for the research, education, and Extension programs that form the foundation of this industry.

While funding should not be solely profit-driven, flexible and sustainable funding allows for responsive research and extension activities that meet key needs. It is imperative for the research, education, and Extension enterprises in the Northeast to demonstrate a collective need for funding that addresses the region's unique regional needs. One way to achieve this is to cultivate strategic partnerships across institutions, with non-traditional federal partners, and with private innovation and technology sectors in the region. By attracting new investment and diversifying funding sources to Land-grant programs, the Northeast's research, education, and Extension enterprises can leverage their high-impact work for the benefit of the region's agriculture and related industries.

KEY PRIORITY 1: DEVELOP RESILIENT, SUSTAINABLE, AND EQUITABLE FOOD SYSTEMS

Land-grant universities in the Northeast are engaged in helping to establish long-term, environmentally sustainable systems for the production and distribution of safe, healthy food. We are uniquely positioned to conduct programs of scientific research on all aspects of the food system: from soil and water to agricultural production (at a local, regional, and internal scale) in ways that are integrated with educational programs, resources, tools or technologies that meet the needs of citizens, communities, organizations, businesses, government agencies, and policymakers.

Access to fresh local food is a persistent issue. Increasingly, we are approaching agriculture and food systems in the Northeast through this lens, and we are developing initiatives and strategies that seek to expand food production capacity to ensure a healthy, fresh, and secure food system for all citizens.

Local and Regional Food Systems

Local/regional food systems refer to the geographic location in which food is produced, marketed, and consumed along with all other intermediary supply chain steps taking the food from farm to table. While numerous factors affect the viability of food systems, the vulnerability of our collective food systems became readily apparent during the COVID-19 pandemic.

The pandemic significantly affected the production and distribution of food across the globe. In the U.S., many portions of the food supply chain were disrupted. Consumers, forgoing public venues and eating at home, stocked up on groceries and supplies. Sales declined at restaurants. Distribution channels were upended, with food stranded upstream, creating food-security risks for vulnerable populations. Likewise, agricultural workers left the workplace due to illness.

Farmers, distributors, producers, consumer- and packaged-goods companies, and retailers all faced distinct challenges. In the wake of the pandemic, many states declared agricultural entities, including research and Extension, as essential systems. Collectively, this clearly demonstrated the need to build resilience in our food systems.

Local/regional food systems can increase resiliency in times of uncertainty, ensure more equitable access to food, and decrease nutritional losses from transportation. Notably, the Northeast is steeped in the history of having local/regional food systems and can serve as a model for other regions to develop local/regional food systems.

Northeastern land-grant institutions work with producers, processors, regulators, and distributors to address challenges to the sustainability of the local/regional food system to ensure:

- Access to high-quality and nutritious food
- Identifying and addressing food deserts
- Producers and growers having access to the marketplace
- Innovative and sustainable food production systems
- Development of food processing systems
- Effective and equitable food distribution systems
- Access to markets
- Biosecurity

Innovative Agriculture

The geographical and demographic characteristics of the Northeast require the application of innovation in agriculture to support local food systems while safeguarding the environment and our natural resources. Further, food preferences of consumers are evolving and food choice serves as drivers of health and disease (e.g., from food-borne illnesses to obesity). Importantly, the Northeast is a region known as a leader in innovative thinking, progress, and collaborative vision. Development of innovative agricultural approaches (e.g., climate-smart agriculture, conservation agriculture, integrated agriculture, regenerative agriculture, and precision agriculture) poses opportunities for the research, education, and Extension missions of our Northeast Land-grant universities. All of this will require reimagination of Northeast food systems where collaborations enable new technologies, consumer demand drives production, and sustainability shapes agricultural investment decisions.

Below, we describe six opportunity areas for development and application of innovative agriculture which include urban agriculture, organic agriculture, specialty crops, agricultural technologies, controlled environment agriculture, and aquaculture, along with conventional production agriculture.

Urban Agriculture

Urban agriculture nourishes communities with local, healthy food, provides jobs, strengthens communities, teaches generations the joy and fulfillment of farming, benefits the environment, and creates green spaces in cities. In short, urban agricultural systems reduce “food miles”, i. e., the distance food travels from farm gate to plate.

Safeguarding access to local, healthy foods is a regional priority, and the Northeast can lead the way in the development and implementation of urban agricultural strategies to feed a dense and growing populace. The Northeast is home to four of the top ten most populous urban areas of the United States, yet it is the smallest geographic region of the country by area.

Urban Agriculture continued.

Small geographic size has unique challenges (e.g., competition for available land, zoning disputes) and opportunities (e.g., large consumer bases, close proximity of Land-grant institutions for collaboration) for advancing a regional urban agricultural initiative.

Coordination of programming across Land-grant institutions in controlled-environment agriculture, agribusiness, nutrition education, Ag economics, and marketing will be critical in developing the sector and the workforce poised to enter the urban agricultural space in the next decade. Innovative approaches to urban agriculture require producers, processors, and distributors to engage in collaborative system development.

Research and Extension will play extremely important roles in the development and utilization of urban agriculture. Major topics include:

- Food access
- Nutrition education
- Emerging food systems
- Food business development
- Organizational development of food cooperatives
- Controlled-environmental agriculture
- Food demand aggregation and distribution
- Land rehabilitation and zoning

Organic Agriculture

The organic industry is now the fastest growing segment of U.S. agriculture, and organic agriculture is thriving in the Northeast. Since 2001, sales in all organic food categories have increased annually in the Northeast. Not surprisingly, the Northeast is home to three of the top five US states experiencing an increase in the number of organic farms: Pennsylvania, New York, and Vermont. The fact that farms in the Northeast have an average acreage below the national average actually poses an opportunity for the establishment of small-scale organic operations. Further, the urban-rural interface connects the growing organic agriculture sector with the nation's largest megalopolis between Boston and Washington, DC. Collectively, the region is poised to be the leader and a test case for the success of small-scale organic agriculture.

Northeast land-grant universities are examining numerous ways to understand, support, and improve organic agriculture, including:

- Identifying sustainable organic strategies that improve soil health and nutrient management and effectively controls diseases, pests, and weeds.
- Developing seeds and breeds critical to the development of the industry.
- Addressing the challenges of organic animal production. The availability of certified organic feedstuffs, certified land for grazing, and identity-preserved supply chains from slaughter to the consumer are significant barriers to entry into the organic sector.
- Developing innovative management strategies for certified organic growers and to inform transition choices.

Specialty Crops

The Northeast is home to a tremendous array of edible crop production operations that collectively fall under the banner of specialty crops.⁸ Indeed, the Economic Research Service (USDA) notes that specialty crops account for 30-40% of the total value of U.S. crops, and the Northeast is considered a significant contributor to the market. The region has a wide variety of climate zones, soil types, and accessible, large markets, and a long history of terminal markets that connect specialty crop products to regional, national, and international buyers.

Northeast farmers also tend to be early adopters in terms of new crops and new production techniques. The fact that Northeast farms tend to be smaller allows the industry, as a whole, to be responsive to change. These attributes help counterbalance the high land values, diminishing access to prime farmland, urban-rural conflicts, invasive pests, and an extremely variable climate. This provides opportunities for collaboration of Land-grant universities and producers to add value to a growing agricultural sector. In an increasingly interconnected world, scientific advances require cooperation.


Northeast land-grant universities are studying, determining the impacts of, and supporting Extension and education work specific to:

- Identify and address threats from pests and diseases, including threats to specialty crop pollinators.
- Improve production efficiency, handling and processing, productivity, and profitability over the long term.
- Develop methods to prevent, detect, monitor, control, and respond to potential food safety hazards in the production efficiency, handling and processing of specialty crops.
- Developing innovative management strategies for certified organic growers and to inform transition choices.
- Enhance the competitiveness of specialty crop farmers through consumer awareness programs.

Agricultural Technologies

The Northeast is an important zone for advancement of agricultural technology. This reflects the high concentration of universities in the region and the proximity to technology clusters, most notably, the Route 128 corridor in Boston. Likewise, the region has access to investors and venture capital. This is a perfect recipe for public/private partnerships. As noted earlier in this report, the future of our food is being shaped by demographic changes, changes in consumer demands, the confluence of food and healthcare, sustainability and environmentally focused consumers and investors, and advancements in biology, chemistry, engineering, computer sciences, and physics. Agriculture is undergoing profound changes.

The farm of tomorrow will have to be climate-smart with reduced inputs. Modern dairy and livestock farms utilizing advanced engineering building systems will ensure the welfare of our livestock and meet regional, national, and global demands for beef, pork and poultry. Agriculture will require greater precision, with advanced technology applications, robots, sensors, and Big Data, that will



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8. Specialty crops are defined in law as "fruits and vegetables, tree nuts, dried fruits and horticulture and nursery crops, including floriculture." (Section 10010 of the Agricultural Act of 2014, Public Law 113-79)

Agricultural Technologies continued.

enable Northeast farm businesses to be more profitable, efficient, safer, and more environmentally friendly while providing consumers with products that they want. Finally, our food system must reduce its footprint—from greenhouse gasses to food waste. The future of agriculture will be shaped by the innovations in technologies that we build today.

Northeast land-grant universities are studying, determining the impacts of, and supporting Extension and education work specific to:

- Basic research and development on the application of life sciences, physical sciences, engineering, and computer sciences to plant and animal agriculture.
- Development of agricultural devices, sensors, and systems.
- Translational research that assesses how to employ/deploy technologies economically and with minimal disruption to existing practices.
- Assistance and instruction to farmers on how to use new technologies.
- Advancing Northeastern agricultural public/private partnerships.

Controlled-environment agriculture

The Northeast's variable, seasonal climate has given way to the rise of Controlled Environment Agriculture (CEA), the production of bedding plants, pot plants, cut flowers, plugs, and vegetables in greenhouses and indoor spaces including high tunnels. CEA systems are designed to overcome the vagaries of outside weather conditions by automating the precise control of variables such as light, temperature, irrigation, soil and are expected to increase in market size five-fold in the next decade.

CEA operations also provide a viable method to produce non-native crops locally in the Northeast, out of the traditional growing area and in a high-quality way. Locally CEA grown produce can result in lower total carbon emissions than imported food. Compared to outdoor agriculture, CEA growing can result in higher yields using similar amounts of space and far less water.

The Northeast's position at the urban-rural interface creates increased demand for locally grown food. In urban areas, CEA has been used in different settings, from containers to basements to warehouses. CEA has stimulated the need for a modern agricultural workforce that has expertise in chemistry, horticulture, engineering, plant physiology, plant pathology, computer science, and entomology. The proximity of Northeast Land-grant universities makes it possible to align programming to prepare the CEA workforce of the future.

Northeast Land-grant universities are taking an interdisciplinary approach to studying resource optimization in controlled-environment agriculture by investigating:

- Crop-specific guidelines for light quantity and quality in both supplemental and sole-source lighting applications.
- Conversion efficiency of electric light sources used for controlled environment crop production.
- Environmental control strategies that incorporate artificial intelligence techniques.
- Wavelength selective greenhouse coverings and agrivoltaics applications for environmental controls and reduced resource use.
- Co-optimization of environmental variables and enhancing resource use efficiency in indoor crop production.

Aquaculture

The Northeast is home to a vibrant commercial aquaculture industry that commonly farms oysters, mussels, Atlantic salmon, and kelp. It is an industry that unifies our coastal states. In the greater Atlantic region, aquaculture is the third most valuable fisheries sector in terms of economic revenue behind scallops and American lobster. Terrestrial and freshwater aquaculture poses additional opportunities for regional producers in areas that are land-locked or in areas prone to user conflict (e.g., high value coastal sites).

Importantly, the region's high population represents a tremendous market for fish, shellfish and aquatic plants. Moreover, the Northeast is blessed with a world-class research and technology sector with hubs at regional Land-grant universities and a center of excellence in aquaculture, the Northeast Regional Aquaculture Center (NRAC). Collectively, Northeast aquaculture creates employment and business opportunities and provides safe, nutritious, and sustainable shellfish and finfish.

Northeast land-grant universities are responding to the opportunities and challenges posed by aquaculture in numerous ways including:

- Developing and/or improving aquaculture marketing and sales strategies that facilitate growth of the aquaculture industry including expansion into urban agriculture.
- Researching and demonstrating opportunities and methods that can lead to greater commercial profitability, viability, and/or sustainability of aquatic plants and animals.
- Identifying new aquaculture species (plant, shellfish, and finfish) with commercial potential.
- Creating innovative strategies to address social barriers to development and creating sustainable expansion of the aquaculture industry in the Northeast region.

Conventional Production Agriculture

Conventional agriculture is alive and well in the Northeast. The thirteen states and the District of Columbia that comprise the Northeast account for only 3% of U.S. agricultural acres. Despite the small footprint, the Northeast produces 14% of the U.S. corn silage harvest and 14% of U.S. milk production. Northeast conventional agriculture accounts for 8% of the national hay crop, 9% of the broiler production, 5% of the turkeys, and 2% of the beef cow herd. In addition, 3% of the corn grain and 2% of the soybean crops are grown in the Northeast on its small agricultural footprint. Of note, the Northeast is home to 62% of the U.S. mushroom crop and produces 90% of the maple syrup in the country.

With an average operation size of 150 acres, producers in the Northeast are closely connected to their land and are engaged in adopting new technologies such as passive feed and water intake monitoring, robotic milking, agrivoltaics and Big Data-driven management approaches. They scout crops and animals with drones and participate in citizen science to assess pest infestation. Near urban centers throughout the Northeast, conventional agriculture is present in crop fields, dairies, beef herds, and in pockets of significant fruit and vegetable production.

Northeast land-grant universities are responding to the opportunities and challenges posed by conventional agriculture in numerous ways including:

- Supporting this important sector which continues to represent the vast majority of food production and access across Northeastern communities.
- Assessing how this sector acquires and adopts new knowledge and new technologies as successful acquisition and adoption of innovations must support social equity and environmental preservation.
- Encouraging innovation development to ensure that Northeast producers are able to compete with producers in other U.S. regions, who might have advantages due to lower costs and access to more land.

Cultivating the Next Generation of Our Agricultural Workforce

According to USDA, the average age of a farmer in the United States is approximately 58 years old.⁹ Numerous barriers exist for individuals interested in entering farming. These include land and input prices, experience, access to land, and access to start-up and operating capital. Given that the current average age of a beginning farmer is approximately 46, the United States is challenged to provide young people with opportunities to engage in production agriculture in its most traditional sense.

The NEED/NERA funded report, “*Ecosystem Services in Working Lands Policy and Practice in the US Northeast*,” cited above, described the issue:

According to USDA, the average age of a farmer in the United States is approximately 58 years old. Numerous barriers exist for individuals interested in entering farming. These include land and input prices, experience, access to land, and access to start-up and operating capital. Given that the current average age of a beginning farmer is approximately 46, the United States is challenged to provide young people with opportunities to engage in production agriculture in its most traditional sense.

Land-grant universities occupy a rare space where they are connected to current students, recent graduates, networks of alumni, and the multifaceted agricultural industry. This allows the agricultural research stations and Extension to connect with potential and current farmers to address the industry's workforce development needs..

NEED and NERA can work together in ways that include:

- Engaging diverse young professionals to consider and succeed in agricultural careers.
- Collaborating with industry stakeholders on workforce development opportunities that meet evolving industry needs such as:
 - *Stackable credentials*
 - *Apprenticeships*
 - *Training and technical assistance*
 - *Workforce training for English-limited audiences*
 - *Legal resources related to land access, heirs property, and business management*
 - *Agricultural engineering and technology development to replace human labor.*
- Translating research into transformational agricultural practices.
- Encouraging innovative approaches to emerging problems.
- Evaluating the regionally specific factors currently inhibiting youth from working lands careers with a particular eye to issues of land tenure, healthcare, and higher education.¹⁰
- Evaluating the role of cash-transfer and basic income programs to supplement conventional, market-based systems.¹¹

KEY PRIORITY 2: LEAD EFFECTIVE ADAPTATION AND MITIGATION FOR OUR CHANGING CLIMATE

Our global climate is changing faster than at any point in the history of modern civilization. The Northeast United States feels the effects of this change in everything from high-intensity storms and rising temperatures to

9. USDA - National Agricultural Statistics Service - Census of Agriculture, <https://www.nass.usda.gov/AgCensus/index.php>

10. “Ecosystem Services in Working Lands Practice and Policy of the US Northeast,” April 15, 2022, -<https://online.flippeningbook.com/view/749315583/>

11. USDA Northeast Climate Hub, <https://www.climatehubs.usda.gov/hubs/northeast/about>

to sea-level rise and saltwater intrusion. These effects are projected to intensify unless nations, businesses, local governments, and individuals take actions to reduce greenhouse gas (GHG) emissions.

We know that all aspects of the food-system—from the production, processing, distribution, and consumption of food and natural products to the built environments that support them—both drive and are affected by climate change, with positive and negative outcomes. For example, unlike many other regions, the Northeast is expected to see some benefits of climate change with increases in the length of the growing season; this has already been reported/observed in forest growth and carbon sequestration.

Climate-related stresses influence changes in inter- and intra-state demographics, the extent of urban sprawl, what can be successfully grown when and where, and the spread of pests. These food-system stressors are compounded by labor shortages, land costs, and numerous other business-related hurdles. These conditions call for developing and implementing new climate-smart technologies and/or repurposing existing technologies to new uses for climate-adaptive and climate-resilient farming.

They also present a significant opportunity for food-system players, from producers through consumers, to play a crucial role in climate mitigation through carbon storage and reduction in GHG emissions. Such efforts will allow the broader agricultural community in the Northeast to mitigate climate change, sustain production, and remain economically viable.

NEED and NERA envision a Northeast that is looked to as the leading example of how climate adaptation and mitigation can be simultaneously and effectively achieved.

Climate Seasons and Extreme Weather

The Northeast experiences four distinct seasons, which are important drivers for rural and urban economies. With milder winters and earlier spring conditions, climate change is leading to less distinct seasons. In addition, the Northeast is experiencing an uptick in extreme climate events such as more days of extreme heat, increases in growing season length, warmer nights, and incidences of both drought and very heavy precipitation events which are expected to continue at an increasing rate for the next 80 years.

According to the Fourth National Climate Assessment,¹² the Northeast is projected to be more than 3.6°F warmer on average by 2035 than during the preindustrial era. Furthermore, an increase in average temperatures by as much as 8.5°F is expected by the end of the century, with the greatest warming in the winter. This has led to reported crop losses of 38.1% due to drought and 33.8% due to excess moisture.

In response to observed changes in seasons and extreme events, the Northeast land-grant universities are carefully analyzing observed and projected future climate data to determine changes, effects of those changes, and how to increase adoption of practices that adapt to or mitigate those effects. Tracked information includes:

- **Seasons.** Examples include the beginning of seasons, length of seasons, shifts in the date of the last spring freeze and the date of the first fall freeze (i.e., the length of the frost-free period). This has implications for changes in the length of the growing season, the northward shift in agricultural production belts and crop productivity, as well as the creation of favorable conditions for pests and invasive species.
- **Temperatures.** Examples include changes in maximum and minimum daily temperatures, nighttime temperatures, duration of high and low temperatures, temperatures that have significant impacts on yield and quality of a particular commodity, and changes in extremely hot and cold days. These all affect heat-related illnesses to farmworkers, crop yield, disease-carrying insects and pests, and heating and cooling demands which drive energy use in agricultural production.

12. National Climate Assessment, 2018, <https://nca2018.globalchange.gov/>

- **Precipitation.** Examples include changes in average annual and seasonal precipitation, which affects crop production and field operations; changes in rainfall intensity, duration, and frequency, which impacts flood risks; farm operations, drainage, erosion, soil health, and transport of sediment and other contaminants; changes in extreme rainfall events, which has implications for erosion, nutrient runoff, and crop productivity; and length of dry periods between rainfalls relevant to agriculture, which affects crop production, soil health, water deficits requiring irrigation, and water quality.

Water Quantity and Quality

Water-related issues in the Northeast are multifaceted. Unlike other regions, such as the West, water is generally abundant in the Northeast. However, demand for freshwater (both surface and groundwater) is high and increasing because of urban expansion, irrigation demand due to short-term (flash) droughts, and more. This demand for water has outpaced groundwater replenishment, especially in the Mid-Atlantic coastal plains, resulting in saltwater inundation of coastal aquifers.

At the same time, the amount of rainfall and the intensity of storms are increasing, which has led to flooding across long-standing, population-dense areas along rivers, canals, and other water bodies. Flooding due to intense storms has the potential to spread contamination in soil and surface waters, affecting ecosystems, animals, and people. These high-intensity storms also lead to increases in soil erosion and agricultural runoff of nutrients, pesticides, and pathogens, causing excessive nutrient loading of water bodies and threats to food safety and animal and human health. In addition, warming during the winter-spring transition and earlier snowmelt-related streamflow timing are expected to change the streamflow regime (higher winter flows and lower spring flows). This has implications for water supply, water quality, and reproduction of many aquatic species.

Northeast land-grant universities are responding to observed and projected water-related climate issues in numerous ways, including:

- Investing in water reuse research and transformational education.
- Evaluating how changes in precipitation intensity, seasonal temperatures, and flow regime are affecting freshwater ecosystems and aquatic communities (e.g., stream invertebrates, freshwater mussels, amphibians, coldwater fishes, and salamanders).
- Determining how increased nutrient and contaminant runoff is changing the water quality and productivity of coastal waters (e.g., Chesapeake Bay) and developing tools to address them.
- Investing in irrigation efficiency and water use efficiency research and Extension.
- Developing and implementing innovative approaches (e.g., cover crops, no-till) to decrease soil and nutrient loss due to floods or drought.
- Developing approaches to reduce inundation of agricultural fields while reducing contamination of surface water bodies.
- Investing heavily in programs and policies to increase afforestation of riparian areas and afforestation in general.
- Conducting Extension and outreach to build coalitions and increase community capacity to address water quality issues.

Coastal Resilience

The health of coastal communities and the coastal landscape are inexorably linked. According to the National Oceanic and Atmospheric Administration, “Forty percent of the nation’s population lives in U.S. coastal counties. Annually, coastal counties produce more than \$9.5 trillion in goods and services, employ 58.3 million people, and pay \$3.8 trillion in wages.”

Increases in atmospheric carbon dioxide, warmer ocean temperatures, sea-level rise, coastal flooding, ocean acidification, and saltwater intrusion have a profound impact on the resilience of coastal communities. We are experiencing a loss of productive coastal agricultural land and important habitats and changes in ocean-supported commerce, tourism, recreation along with broader socioeconomic and ecological outcomes.

According to the Fourth National Climate Assessment, “The Northeast has experienced some of the highest rates of sea level rise and ocean warming in the United States” with the projection that these exceptional increases will continue through the end of the century.

Northeast land-grant universities are studying, determining the impacts of, and supporting Extension and education work specific to:

- Climate change impacts along the coast from storms and sea level rise in the diverse Northeastern coastal landscape including uplands and forested areas, wetlands and estuarine systems, mainland and barrier beaches, bluffs, and developed areas.
- Impacts on marshes, fisheries, and coastal ecosystems from shifts in temperature, ocean acidification, sea level storm surges, flooding, and erosion.
- How rural-urban linkages could be altered by climate change.
- How climate change will alter ecosystem services, such as carbon sequestration, wave attenuators, and fish and shorebird habitat provided by coastal areas.
- How ocean acidification will affect shell-forming organisms (e.g., lobsters, scallops, blue crabs, and oysters) and how rising water temperatures will increase the prevalence of shell diseases and pathogens.
- The socioeconomic impact of climate change on coastal communities that have strong ties to marine fisheries.
- How proactive conservation and management measures can improve the climate resilience of fished species

Invasive Pest Migration and Expansion

Rapid development, high-density populations, and numerous ports of entry in the Northeast pose opportunities for the introduction of invasive species. Invasive species include any non-native organism that has the potential to cause harm to agriculture, the environment, the economy, and/or human health.

Currently, the Northeast agricultural and forest ecosystems are challenged by invasive terrestrial plants and weeds (e.g., nutsedge, bindweed, lambsquarters, mile-a-minute, knapweed, knotweed), aquatic plants (e.g., milfoil, waterweed, fanwort), aquatic animals (e.g., mitten crab, veined whelk), and invasive insects (e.g., spotted lantern fly, emerald ash borer, Asian long-horned beetle).

As the risks posed by the invasion of pests grow, stress from climate change is reducing the resilience of native plants and animals and increasing vulnerability of native species. The Northeast has been a crucible for tick-borne zoonotic diseases including Lyme disease, anaplasmosis, and babesiosis. Collectively, the Northeast could serve the nation as an early warning system for invasive pests.

Northeast land-grant universities are studying, determining the impacts of, and supporting Extension and education work specific to:

- Identifying and mapping invasive pests.
- Developing early detection and rapid response systems.
- Implementing mitigation of invasive species using conventional and next generation strategies.
- Introducing and utilizing climate-smart, native species.

KEY PRIORITY 3: PROMOTE ENVIRONMENTAL, HUMAN ANIMAL, AND COMMUNITY HEALTH AND WELL-BEING

In 2021, the national Extension system published the *National Framework for Health Equity and Well-Being*.¹³ This document describes the current human health and well-being landscape as follows:

Every day, people make choices that impact their health. Those choices have been the focus of health professionals for years. Generations of time, energy, and resources have been dedicated to informing and influencing these choices through education, social marketing, and scores of other methods. As a result, our public discourse around health has been framed as a personal responsibility where good health is seen as a personal success, and ill health as a personal failing.

Without question, there is much that we can do as individuals to improve our health such as increasing physical activity and eating healthier meals. Currently, only 23 percent of adults engage in the minimum amount of recommended leisure-time physical activity and only one in ten adults meet federal guidelines for fruit and vegetable consumption.

We now know that linking a person's health outcomes to their individual choices alone tells an incomplete story. Those choices exist within a system of contextual factors that together have a far greater influence on health than their individual behaviors. Collectively, these factors are referred to as the social determinants of health. When an individual or community is negatively impacted by the social determinants of health, they are said to be experiencing health inequities. Among the groups experiencing the greatest inequities are people of color and those who live in rural areas. While we must all accept personal responsibility for doing what we can to maintain and improve our own health, we as a nation must act now to eliminate the unfair and unjust policies and practices that prevent all of us from being as healthy as we can be.

The Northeast region is the most densely and diversely populated region in the United States and has the largest number of small and medium-sized farms. Those farms represent a broad, highly differentiated portfolio of crop and livestock activities and abundant assorted forestry activities areas that together provide both economic and recreational opportunities.

Extension and agricultural research must understand and respond to this high degree of diversity to help producers and communities strategically, responsibly, and resiliently align food and natural resource production systems. We also must work to ensure equitable access to these resources across all socioeconomic, demographic, and geographic aspects of the Northeast's population.

Developing and delivering science-based solutions that meet the challenge will enable people in all Northeast communities to improve their health and well-being while securing environmental sustainability for future generations.

Community Health/One Health¹⁴

The health of individuals in the Northeast has large implications for the region's long-term economic sustainability and the population's overall well-being. Issues such as incomplete knowledge of nutritional needs, inactive lifestyles, poor access to healthy foods, social inequities that exacerbate access to food and knowledge, and evolving diseases such as long COVID can significantly increase morbidity and mortality, and strain public health systems. Moreover, because the Northeast is a region with the oldest and fastest aging population—with nearly one in five individuals 65 or older—concerns about ensuring a high degree of community health are particularly acute.

13. Cooperative Extension's National Framework for Health Equity and Well-Being, 2021, <https://www.aplu.org/wp-content/uploads/2021/20EquityHealth20Full.pdf>

14. One Health is a collaborative effort of the human health, veterinary health, and environmental health communities, recognizing that the health of animals, people, and the environment is connected. The One Health approach seeks optimal health outcomes for both animals and people.

Understanding the trends in nutrition and health behaviors across diverse populations and communities within the Northeast and delivering important information about factors that contribute to healthier lives are key to ensuring the long-term well-being of the region's citizens.

In response to these issues, the Northeast land-grant universities aspire to:

- Develop and improve methods that incorporate multidisciplinary perspectives on social, genetic, behavioral, and policy aspects to more deeply understand the individual and health issues faced by the diverse communities in the Northeast, with an increasing focus on under-served and under-represented populations.
- Produce and deliver educational content that is tailored to and highly effective in engaging and impacting diverse communities, ensuring equitable access regardless of socioeconomic, demographic, or geographic differences.
- Study and test innovative behavioral interventions that can enable individuals to take on less risky and more healthy living behaviors.
- Increase emphasis on understanding the health behaviors of children and younger adults to increase the likelihood of lifelong healthy choices.

The National Framework for Health Equity and Well-Being, cited above, suggests that health equity should be a core value in the land-grant system to ensure that everyone has a fair and just opportunity to be healthy. They also recommend using community assessment processes that integrate data science and resident input to identify and address health inequities more precisely.

The framework proposes investing in the success and visibility of health-related professionals, programs, and initiatives. Additionally, they recommend establishing new as well as expanding existing partnerships with various organizations committed to reducing health inequities. Finally, the framework recommends using a community development approach to advance the work of coalitions that aim to influence the social determinants of health.

Nutrition and Physical Activity

Trends in poor nutritional intake among Americans track closely with trends in increased incidences of chronic diseases and exposure to greater health uncertainties. These outcomes not only affect an individual's quality of life but strain families, communities, and the larger healthcare system. In the highly racially, ethnically, and economically diverse populations of the Northeast, overcoming these challenges is particularly difficult because one-size-fits-all solutions are simply not viable.

In response to these issues, the Northeast land-grant universities aspire to:

- Apply state-of-the-art tools and methods to more deeply understand how different individuals absorb and process foods and nutrients within those foods.
- Work across disciplines to better understand holistically how the production-to-consumption food process—from the choices made by a farmer to the way that a person's body absorbs the processed foods' nutrients—can be enhanced to increase production, economic, and nutritional outcomes throughout the food supply chain and for consumers.
- Assess individuals' behavioral choices when making nutritional decisions and develop direct (through educational materials) and indirect (through incentives) interventions to increase the likelihood of better food choices.

- Increase knowledge about and access to information that can lead to improved nutritional choices for underserved and underrepresented populations.
- Leverage the impact of Cooperative Extension as the nation's largest provider of nutrition education for individuals and families eligible to receive food assistance through the Supplemental Nutrition Assistance Program - Education (SNAP-Ed) by critically examining and filling the gaps in current related regional Extension and research activities.

Sustainable Agriculture

The term “sustainable agriculture” is defined in the U.S. Code and rests on the principle of meeting the needs of the present without compromising future generations from meeting their needs. The USDA's Sustainable Agriculture Research and Education (SARE) program describes sustainability as “Farmer-driven innovations in agriculture that improve profitability, stewardship and quality of life.” This section describes sustainable agriculture through those domains.

As we have noted throughout this agenda, the Northeast is characterized by a highly diversified agricultural and food system that produces, processes, and delivers food, fiber, and myriad environmental services for our citizens. For the health of people and ecosystems across the Northeast, our diversified agricultural enterprise and food system must be sustainable and, in doing so, ensure profitability, stewardship and quality of life.

Agricultural enterprises are businesses that provide livelihoods to some 143,000 primary farm operators in the Northeast. For those businesses to be competitive and profitable in local, regional, and national markets, our producers must be innovators.

To ensure the profitability of our agricultural enterprises, the Northeast land-grant universities aspire to:

- Engage in research and outreach that identifies strategies that mitigate the impacts of climate change and sustain livelihoods.
- Create and promote innovative agricultural practices (e.g., precision agriculture, alternative energy systems, new marketing channels, and value-added processing).
- Identify and evaluate opportunities for agricultural enterprise diversification (e.g., agritourism, crop/livestock integration, niche products, and ecosystem service adoption).

Stewardship is a cornerstone principle of agricultural sustainability. *Ecosystem Services in Working Lands Practice and Policy* addressed the challenge of balancing private land conversion with land conservation in the U.S. Northeast. The study suggests that the role of Cooperative Extension and Agricultural Experiment Stations will become even more essential in helping landowners adopt practices on working lands in ways that not only help them to navigate rising uncertainty but to mitigate the impacts of climate change. Effective stewardship of working lands and managing those lands as a system is essential for preserving our natural resources. Importantly, stewardship also extends to the role that producers have in the care and use of livestock.

To promote sustainability through stewardship, the Northeast land-grant universities aspire to:

- Create and promote practices and technologies that ensure soil health (e.g., use of cover crops, conservation tillage systems, crop rotation, organic matter additions, and management-intensive grazing).
- Work closely with working lands managers and producers to develop comprehensive economic and ecological sustainability plans.



- Develop best practices in livestock health and husbandry and assist with the implementation of preventive health practices, reduction in the use of antibiotics/hormones, effective breed selection, and promotion of animal welfare.
- Monitor, respond, mitigate, and educate about emergent animal disease to protect the region's food security as well as minimize the risk of zoonotic diseases.
- Make significant strides in highly innovative genetic and genomic analyses to advance plant and animal agriculture
- Provide new knowledge about more effectively using land and waters (e.g., agrivoltaics, silvopasture and agroforestry, carbon sequestration, and recreational services).
- Create and promote practices and technologies that ensure the health of waters (e.g., nutrient management, manure management, and irrigation and drainage systems).
- Ensure biodiversity on working lands.

Quality of life (QOL), a pillar of sustainability, transcends many of the priority areas identified in the Northeast agenda. Personal finance, work/life balance, health, and well-being are all indicators of QOL and have important implications in Northeast agriculture. Despite the fact that the Northeast is challenged by the limited availability of trained agricultural workers, cultivating the next generation of our agricultural workforce, as shared earlier, is an important component of the Northeast agenda and serves as a feeder for community vitality.

To ensure Northeastern quality of life from individuals to communities, the Northeast land-grant universities aspire to:

- Develop and share strategies that ensure social justice and equity and food sovereignty.
- Support mental and physical health, workplace safety, fair compensation, social networking, and interpersonal skills of Northeasterners.
- Identify indicators of resilience at various scales and for various stakeholders across the Northeast.
- Develop resilience strategies at the household and farm.

Biodiversity

The Northeast's remarkable biodiversity has enabled the region to be an abundant provider of food, fiber, beauty, and opportunities for economic growth. However, as food and timber management practices evolve to be more specialized, human and animal communities are increasingly stratified and separated through policies and socioeconomic barriers. Systemic events such as climate change exacerbate rapid changes in historical human, plant, and animal interactions. As a consequence, the sustainability of the biodiversity that has been one of the Northeast region's biggest assets is becoming less certain. This threatens the environmental, economic, and health outcomes that enable Northeast communities to thrive today and be highly resilient to the challenges of tomorrow.

In response to these issues, the Northeast land-grant universities aspire to:

- Build and leverage multidisciplinary teams that develop and implement new knowledge for strategically managing, balancing, and stewarding priorities, including land, water, forests, wildlife, domesticated crops and animals, social equity, community sustainability, among many others.



**STEWARDSHIP IS A
CORNERSTONE
PRINCIPLE OF
AGRICULTURAL
SUSTAINABILITY.**

- Better understand, quantify, and develop solutions to overcome challenges that threaten biodiversity today and mitigate potential threats that may emerge as population and climate changes occur in the region.

Food Safety

The CDC estimates that one out of six Americans (i.e., 47.8 million people) get sick from foodborne illnesses every year. About 128,000 of them are hospitalized; 3,037 die. Ensuring a safe food supply is critical to maintaining a healthy population and trust in Northeast food producers, processors, and distributors.

Cooperative Extension and agricultural research must work together to identify factors that can increase the risk of food safety issues, determine methods that can prevent and mitigate adverse health outcomes, and provide timely and accurate education. This support will enable producers and processors to adopt legally required and optional best management practices critical to minimizing the negative health and economic ramifications of food-borne illness outbreaks.

In response to these issues, the Northeast land-grant universities aspire to:

- Develop innovative methods to more quickly and accurately detect and eliminate causes of food-borne illnesses.
- Assess economic consequences to food system participants of food-borne illness outbreaks and develop information for how to remain resilient.
- Create and deliver research-based educational programming to food producers and processors to identify and address food safety issues in their workplaces and to comply with emerging and changing federal and state food safety policies.
- Educate food consumers about best practices to reduce their risks for food-borne illness exposure.
- Bring state-of-the-art research into undergraduate classrooms to train the next generation of workforce participants who will produce and process food products.



Recreation and Tourism

The increasing importance of the recreation economy has been recognized by the USDA as a national priority, as many small towns and rural communities look to recreation and tourism for economic diversification and growth.

The Northeast is endowed with diverse tourism opportunities: rural authenticity, unique culture and heritage, distinctive and “alive” assets of traditional music, art and craft, local food and drink, and outdoor beauty and recreation. While rural tourism has been widely examined locally as a means for economic development, the Northeast Region has the interest, expertise, and capacity to examine and address the challenges in developing a broader outdoor recreation/rural tourism economy to ensure community resilience.

In response to these issues, the Northeast land-grant universities aspire to:

- Assess, inventory, and classify the impact of recent, current, and potential external shocks such as the COVID-19 pandemic, hurricanes, and drought on ecosystem-based tourism at a Northeast regional level.
- Investigate the resilience, adaptability, and recoverability of different components of the rural tourism system (i.e., suppliers, buyers, and destinations).
- Identify, implement, and evaluate strategies for Northeast tourism-related businesses and destinations to be resilient to external shocks.

PART III: CONCLUSION

The Northeast Agenda is a living, evolving document that identifies numerous challenges affecting our region and our work.

It is also a call to action. Under the umbrella of the three key priorities we've identified in this report are suggested actions we hope will galvanize our regional institutions, colleagues, and community to create a prospectus of collaboration and investment opportunities.

We invite you to engage with us. The Northeast agenda seeks participation, collaboration, and investment. To learn more about the Northeast Agenda and how to become a part of this enterprise, please contact Ali Mitchell, Executive Director-NEED (Amitchell@northeastextension.org) or Rick Rhodes, Executive Director-NERA (rchrhodes@uri.edu).

A final note

NEED and NERA members worked purposefully to establish a mission, vision, and purpose that inspires research, education, and Extension collaborations to create vibrant communities, resilient food systems, and working lands in the Northeast. Our Northeast agricultural research stations and Extension professionals will continue to work collaboratively to advance the Land-grant mission to improve lives and the environment in the Northeastern United States. We acknowledge the investments that will be required and look forward to undertaking the work that will move us toward our ultimate goal: a regenerative, livable, vibrant Northeastern United States.



**THE NORTHEAST
AGENDA IS A CALL
TO ACTION.**

