



National Institute of Food and Agriculture  
U.S. DEPARTMENT OF AGRICULTURE

A collage of various agricultural images including fresh produce like tomatoes, raspberries, and blueberries, a field with a tractor, and a laboratory setting with scientific equipment. The images are arranged in a diamond pattern with overlapping borders.

# NIFA LISTENS

FY 2023-FY 2024

July 2023

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## ABOUT NIFA

### **MISSION**

The USDA National Institute of Food and Agriculture (NIFA) invests in and advances agricultural research, education and Extension to solve societal challenges.

### **VISION**

Lead innovation across the nation through transformative discoveries, education and engagement that addresses agricultural challenges.

NIFA is the extramural research funding agency at the U.S. Department of Agriculture. Congress has entrusted us with more than 70 funding programs, totaling almost \$2 billion. We provide funding mainly through capacity, or formula, and competitive grant programs. Our team of nearly 400 experts is dedicated to serving agriculture through research, education and Extension across all communities, benefiting all ages of people who call America home.

USDA is an equal opportunity lender, provider and employer.

## EXECUTIVE SUMMARY

NIFA Listens FY 2023 – FY 2024 is a biennial stakeholder listening opportunity to collect input to understand key challenges, promising opportunities and recommended top priorities related to advancing agricultural research, education and Extension. An invitation to provide online input via email and/or participate on a Zoom call was circulated with a [Federal Register Notice](#) posted on Sept. 16, 2022. Information about the event was also published on [the NIFA website](#).  
<https://www.nifa.usda.gov/nifa-listens-investing-science-transform-lives>

Over 700 registered participants joined two 2.5-hour virtual Zoom sessions on Nov. 2, 2022, where 49 preregistered speakers offered oral statements in five-minute slots. Written input from 59 stakeholders was also received via email. A total of 108 stakeholders from 87 distinct organizations, located in 36 U.S. states and Washington, D.C., provided input during NIFA Listens FY 2023 – FY 2024.

Concurrently, NIFA Speaks gathered input from NIFA employees. Findings are available in this [report](#).

NIFA implemented text analytics workflows leveraging the USDA EDAPT Data Science Workbench. New natural language processing (NLP) algorithms supported sentiment analysis and unbiased identification of top topics clusters and semantic relationships. New Tableau dashboards were designed to support further insight discovery. As reference, this report includes a qualitative analysis RRDC Stakeholder report, including a qualitative analysis comparing priorities identified. (See Appendix 4.)

This report executive summary collected stakeholders’ challenges, their list of opportunities and top priorities. Bulleted sections within this document, unless numbered, do not indicate preferred ranking of importance. Consistently, the reader will find how stakeholder input aligns with [USDA strategic plan FY2022-FY2026](#) as well as with the [NIFA Strategic Plan](#).

### CHALLENGES

- Rapid ecosystem degradation: soil, water quality, pollutants and emergent pest and disease pressures, and biodiversity loss are all affecting the quality-of-life. “Long-term use of conventional pesticides, lack of efficacy, detection of microbials and chemicals (PFAS) as contaminants in food products and associated diseases.”
- “The science of carbon sequestration is still deeply uncertain.”
- “Over 100 million acres in the Midwest is exposed and unplanted between harvest and next crop.”
- Seed availability of stress-tolerant varieties and cover crop varietal options, organic varieties sustainable protein production varietal options.
- Supply-demand gap for locally produced organic products.

- Limited systems-based research at the nexus of nutrition, food production and climate, as “only 25 cents out of every 1,000 dollars spent by federal government is dedicated at this nexus.”
- Lack of understanding on food imports sustainability practices, including pesticides, therapeutics applied, overall U.S. dependency on imports for its food supply (i.e., seafood, fruits, produce).
- “Prevalence of nutritionally poor, unsustainably produced foods and inequity in food systems.”
- “Antimicrobial resistance (AMR) demands a multifaceted approach. The most daunting public health challenge facing the world.”
- Aging farmers in contrast to current rural youth development vulnerabilities.
- Sustaining health and safety of farmworkers, family farmers, timber harvesters, reduce their exposure to farm chemicals, occupational injury and death rates.
- Listed challenges around Integrated Pest Management (IPM), referenced limited IPM-trained Extension specialists.
- Maintaining a robust diagnostic network: reduced workforce dedicated to developing early detection and diagnostics of multiple pest and disease threats linked to global trade and climate change.
- Cooperative Extension System stagnated funding: “Below 1990s levels” while demand for their services has increased (climate change-related). Extension professionals have limited opportunities for their professional development: “We trained county agents for better jobs in private industry;” there is high turnover; there is inability to take advantage of competitive funding; low morale; “Extension support for aquaculture has been disappearing.”
- Data, availability and its interoperability across research, Extension and education.
- NIFA Data Gateway: “Lack of standardization; keywords and knowledge areas is inconsistent.”
- Grant application process is complex and time consuming: “The funding process for early career researchers is complex and time consuming: over 1,200 hrs./year, 4-6 proposals per year; a quarter or more than a half a faculty’s member time is spent writing grants, focus taking away time from research.”
- AFRI grant size: >\$600K-\$10M, increases inequities in entities funded.

## **MOST PROMISING OPPORTUNITIES**

- Support climate-related research, Extension and education; strengthen ag-food-climate tech innovation ecosystem: data, people, networks. “Future research and technological advancements must focus on greater efficiency, affordability and agility while improving nutritional value and reducing planetary impact; move away from siloed approaches and



embrace a broader systems approach to strengthen the efficiency, sustainability and resiliency of the food system and ensure better nutrition and health equity around the globe.”

- Carbon economy: “What climate-smart practices are most effective at reducing operational greenhouse gas emissions? And how does adoption of these high-impact practices affect other aspects of farm operations that producers care about, such as profitability and biodiversity? What technologies and tools are best suited to help monitor the true climate benefit that has been realized via adoption of climate-smart practices? How do these effective practices and new monitoring technologies come together in reliable, repeatable protocols or best practices, such that all producers, innovators, academics and companies are using the same yardstick to measure, report and verify success?” “The emerging ‘carbon economy’ of paying farmers for their emissions reductions can only be built on accurate quantification.” “Research is critically needed to develop valuation metrics for carbon-sequestration and GHG emissions in specialty crops.”
- Future cropping systems that maintain continuous living cover, incorporate a diverse range of crops, increase seed availability, public-funded lines. Conserve forest genetic resources and germplasm. Advanced perennial-based and perennial-annual integrated systems: livestock and crops.
- Continue to sustain organic research, develop seed and animal breeds, publicly accessible, regionally adapted, engaged BIPOC (Black, Indigenous, and other people of color) leadership and participation in organic plant breeding.
- Research opportunities that leverage entrepreneurship, food systems security, environmental and economic sustainability along the rural-urban continuum.
- Sustain Cooperative Extension services: “Expand Extension’s ability to participate in competitive programs and to build partnerships.” Develop Extension education: “A national Extension training center” certificate program. Attract and retain next generation Extension specialists.
- Increase and diversify staff and resources for Extension programs serving marginalized communities, engage with researchers to identify the research needs of these communities and fund projects that address their priorities; African American, Native American, Hispanic, Hmong and other traditions employ advanced agroecological and climate-friendly systems and practices that make vital contributions to the goals of resilience, food security and climate mitigation, and are the backbone of the success of these farming communities.
- Nutrition research support is necessary to continue to clarify linkages between diet and health and to enhance nutrition-related disease prevention.
- Farmers participatory opportunity to apply for research grants and be part of panels. Their integration to the research and Extension ecosystem is necessary as early adopters of technologies, knowledge dissemination and learning from their experiences and practices. “Farmer-led research is high impact with low overhead compared to academic.”

- Consistently monitor consumer trends: As consumers are shaping the demand to advance U.S. sustainable agriculture (aquaculture, alternative protein and organic produce [high value and faster growing market segments]).
- “Advance understanding of the role that microbial science plays in advancing modern food safety and security and resilience to a changing climate.”
- Food Animal Residue Avoidance Databank (FARAD) funding should be expanded to account for food offered for import into the U.S. from countries with drugs not approved for use in the U.S.
- Target new RFA directed toward farmworkers, family farmers and timber harvesters, and that focuses on reducing farm chemical exposure, occupational injury and death rates, and respiratory diseases, among other hazards.
- Federally funded AG-data repository, [enhance coordination and collaboration](#).
- Regional science innovation engines (NSF-like).
- Explore new communication approaches to convey scientific, technical accomplishments: sustainability practices, pest management, conventional and new alternative pesticides, farmer and consumer acceptance; make reporting accessible, links to outputs: tools, bulletins, source of new varieties released, who has benefit, demographics, more transparency.

## **TOP PRIORITIES**

### **MORE RESEARCH, FUNDAMENTAL AND APPLIED**

- To clearly define climate mitigation, resilience and climate adaptation-related research areas and fields: Adoption of climate-resilient, stress-tolerant (abiotic and biotic) nutritious varieties, monitor and secure soil and water quality, sustain research on the plant, animal (food), wildlife, soil, water and air systems continuum. Research into practices, technologies, tools and interventions that directly and significantly reduce net greenhouse gas emissions; in particular, reductions of methane and nitrous oxide emissions, while also studying opportunities to sequester carbon; methane emissions from enteric fermentation; methane-inhibiting feed additives targeting microbes in the rumen; livestock genetics targeted to reduce methane emissions, enhanced-efficiency fertilizers (EEFs) research; high carbon sequestration crop research, providing more transparent and detailed information on how funded projects related to climate mitigation improve data accessibility and transparency; “NIFA knowledge areas categories too broad” underestimates mitigation-related research.
- To continue investing in integrated, cross disciplinary research at the intersection of soil health, water quality, food production, ecosystem conservation and biodiversity.
- To improve nutrition security and improve the quality and diversity of and access to nutritious foods throughout the United States; school nutrition has a critical role to play in the fight against obesity. Support the child nutrition program, meal patterns development and research on the standards for various reasons including food and nutrition safety, health and well-being of children.
- To understand and mitigate pathogens on produce related to climate change impacts of pathogen contamination and proliferation on ready-to-eat (RTE) crops.

- To increase sustainable, high-value protein production. Animal protein production: beef safety, product quality, alternative to antibiotics, livestock sustainability, meat science. Aquaculture-based: fish; alternative proteins (plant and cell-based); insect, algae, fungi-based proteins. Uncover other plant genetic resources: wild and feral edible plant species; support protection of traditional Indigenous knowledge.
- To understand consumer trends, and technology acceptance.
- To broaden and diversify food production systems: new crops, plant breeding and seed production, support small seed companies, Indigenous seed keepers, organic producers, forest landowners, protect germplasm.
- To understand microbiomes: soil, water, plant, animal and human, genomic sequencing, and surveillance of pathogens, to bolster efforts to combat antimicrobial resistance; research initiatives and enhanced research capacity to support animal health.
- Climate-smart, climate resilience, climate adaptation science, climate hubs; all data is interoperable, better manage climate change risks, to create a clear plan for public access to federally funded research and data. Promote and enable data sharing practices across organizations, help identify opportunities to improve research, improve customer services, and identify areas where education and services may be needed.
- To understand food as medicine: “Research on nutrient-dense, organic/pastured and locally produced real foods is critical to the success of food-as-medicine treatment protocols.”
- Develop alternative biopesticides and fungal bioherbicides.
- Invest in broadening biosecurity networks: diagnostics, people and technology development.
- More longitudinal data both here in the U.S. and around the world to look at insect populations over time and research into the ways in which people may be creating additional challenges for the insect world through habitat disruption, overuse of insect management products to protect pollinators, increase international collaboration, improving the capacity for early detection and rapid response; zoonotic disease.
- Genomics and computing to revolutionize forest tree breeding.
- Incentivize farmer-led research and participation in panels.
- Data and analytics to evaluate, assess and allocate resources; timely responding to regional and local needs.
- To anticipate and mitigate effects due to food supply chain disruptions.
- NIFA enables technology innovation and knowledge transfer.

### **STRENGTHEN COOPERATIVE EXTENSION SYSTEM, MORE INTEGRATED APPROACHES**

- Encourage next generation Extension specialists, broaden scope and allow opportunities to apply for funding: Capacity for Success; make competitive funding programs more available to Extension by encouraging and supporting more integrated and Extension-led projects; consider strengthening language in RFAs and in policy and practice that provides Extension the opportunity to participate in meaningful ways in competitive funding programs. Support IPM extension.
- Support of Extension system programs and services to ensure local producers have a dependable market for their crops and livestock; to ensure food safety and food system



security: to help conserve natural resources. To engage K-12 and youths to develop appreciation and interest in our food ecosystems and become stewards and participants of sustainable food systems.

- Competitive grants to fund integrated research, education and Extension projects that enhance the ability of producers and processors to grow and market climate-smart/sustainable products or transition into operations of existing climate-smart and sustainable supply chains.
- Expand the Cooperative Extension System’s engagement with nonprofits and the private sector, including retailers, cooperatives, seed and feed companies, forest landowners, forestry consultants, and procurement foresters.

### **FOCUSED EDUCATION FUNDING**

- To sustain 4-H, rural youth development, and school health and wellness.
- To support students and early career researchers and researchers at small institutions and non-Land-grant institutions; graduate student funded research grants must be provided with adequate pay and resources to succeed.
- To develop new and broaden existing curricula on data science for agriculture and food.
- To promote next generation Extension specialists.
- To help producers commercialize their products.
- To encourage new career paths: next generation of professionals enabled with advanced skills in data science, modeling and analytics applied to precision farming, soil and water quality and management, weather, crop and livestock health monitoring, pest and disease detection and monitoring, and yield. New entrepreneurs in ag-tech, food-tech, climate-tech, diagnostics-tech, food safety, supply chain and logistics, and microbiome-related disciplines.
- To promote and support technical development of farmworkers, harvest workers, family farmers and timber harvesters’ health and safety.
- To create a clear plan for public access to federally funded research and data; Open Access publications.
- To consumers on NIFA research, and education outputs and impacts, sustainable agriculture programs, food safety.
- NIFA enables technology innovation and knowledge transfer; need to communicate it.

### **NIFA APPLICANT JOURNEY AND EXPERIENCE**

- To reduce complexity — award applicant journey is complex and time consuming.

# STAKEHOLDER OVERVIEW

Feedback from 87 stakeholders was classified under 21 distinct organization types, located in the 36 states as depicted in Figure 1

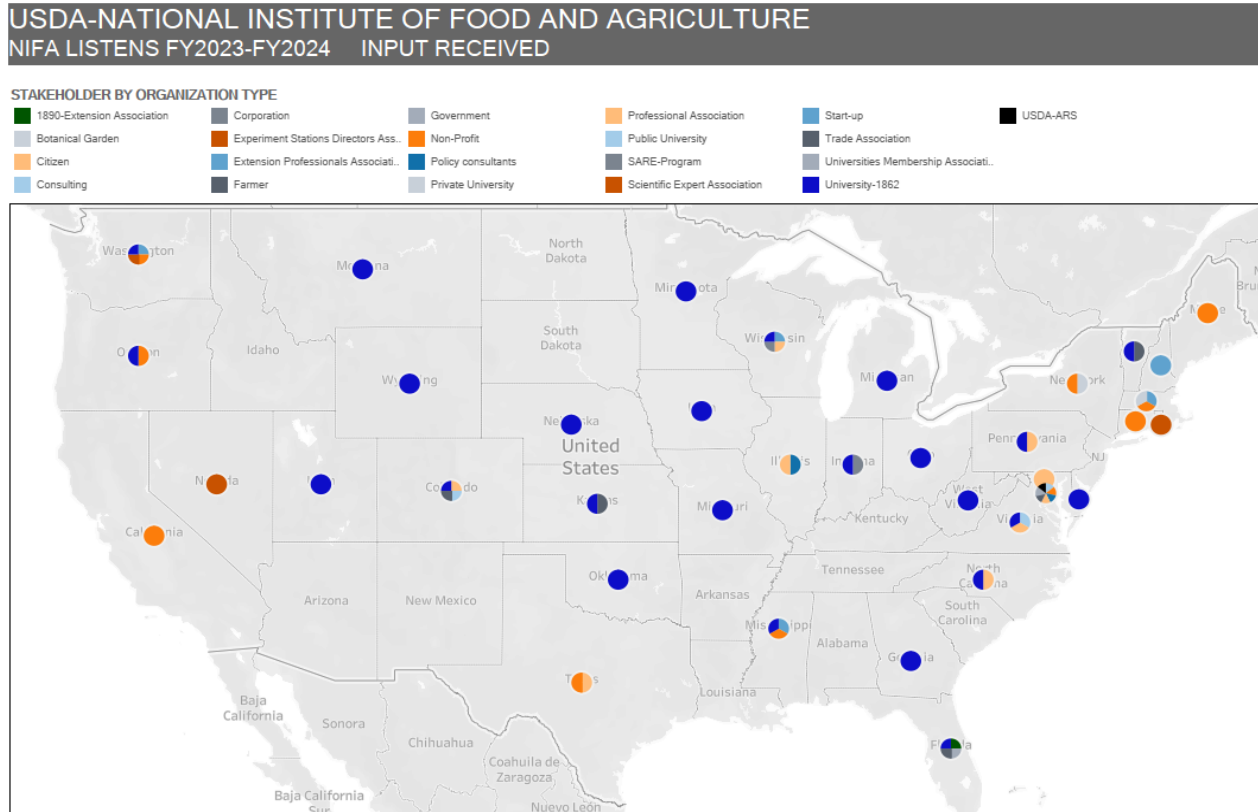


Figure 1. U.S map depicting NIFA listens FY202-FY2023 stakeholder organization type. It shows 21 distinct organization originally located in 36 states.

Most of the input was received from 1862 Land-grant Universities (34.48%), followed by nonprofits (17.24%), professional associations (17.24%), trade associations (4.6%) and Extension professional associations (4.6%). In addition, policy consulting firms (2.3%), Experiment Station directors (2.3%), farmers (2.3%) and other consulting firms (2.3%) provided input. One public non-Land-grant university (1.15%) and one private university (1.15%) submitted comments. Feedback was also shared by an 1890 Extension Association and University Membership Association (1.15%), and a scientific expert association (1.15%). The government category included contributions from the U.S. Fish and Wildlife Service (1.15%) and USDA Agricultural Research Service (1.15%). Independent comments were received from a Sustainable Agricultural Research and Education Program awardee (1.15%), citizen

(1.15%), an Ag-Tech start-up (1.15%), a public global corporation (1.15%) and a botanical garden (1.15%). The full list of contributing stakeholders can be found in [Appendix 1](#).

No input was received from representatives of the following organizations: 1994 Tribal Colleges and Universities and U.S Insular Areas. It is important to highlight that, concurrently to NIFA Listens FY 2023 – FY 2024, other targeted listening sessions were held: NIFA hosted a 1994 Tribal Colleges and Universities session on Nov. 16, 2022 (see other listening sessions in Appendix 5).

Sentiment analysis revealed positive sentiment scores across all 21 stakeholder organization types. Details can be found in [Appendix 2](#).

# EMERGENT THEMES

Two methods supported the identification of emergent themes, visualized below in Figure 2, Panels A and B. Panel A depicts the most frequent two-successive terms or N-Gram 2, listing climate change, Extension education, food security and natural resources as the most cited two successive terms. Panel B depicts the topics discovered using Lingo4G. The top five include organic, youth development, plant breeding, seed and capacity funding.

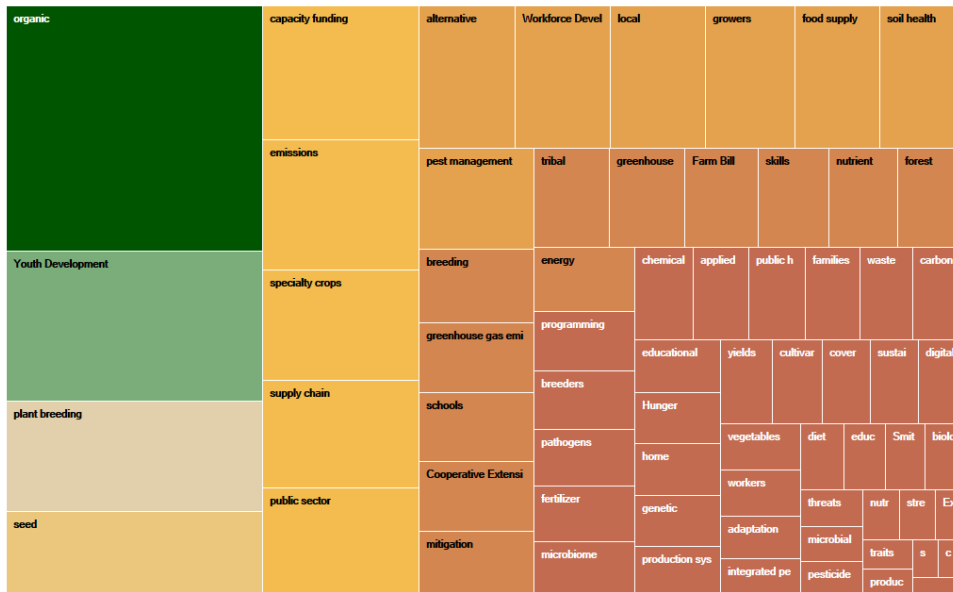
Figure 2. Panel A shows N-gram-2-word cloud visualization and Panel B shows high level topics revealed using scores from Lingo4G.

Panel A



Panel B

NIFA LISTENS FY2023-FY2024 THEMES-Lingo4G scores



- More research on climate adaptation science.

- Sustain, strengthen Cooperative Extension System.
- Consumer-driven demand of organic and protein production segments is strong (plant based, animal, alternative). Continue support for economic growth, with more research inbreeding, seed production and high-yield organic varieties releases. There is limited seed availability of organic and cover crops and diversification food systems. Limited organic breeding efforts.
- Consider a research system where producers/farmers and their farms have a participatory opportunity to become eligible to apply for research grants; farmers' knowledge, expertise, traditional knowledge, land stewardship, innovators, partners, adapting, and mitigating climate change real-time; early adopters.
- The majority of our issues and fundamental knowledge gaps are being addressed in the [USDA strategic plan for 2022 to 2026](#); the [White House task force on hunger](#) and the [NASEM](#) (National Academies of Sciences, Engineering, and Medicine) board consensus studies; focused, enhanced [coordination and collaboration](#) across LGUs and across agencies and food systems is the challenge that demands attention. Executing on these strategies, tracking progress towards goals.
- Reduce complexity, more time for research: grant application journey is time-consuming, complex grant application systems and processes.
- Data: availability, interoperability is essential to track success and impact.





- “Farmers can easily communicate their issues, but most researchers are not asking nor are they listening.”
- “The overwhelming volume (>90%) of seafood that is imported to the U.S. comes from countries without the stringent food safety and environmental standards.”
- “Insect biodiversity loss and the important ways in which insects underpin all life on earth.”
- “Robust breeding programs or biological control introductions require more supporting infrastructure and time than standard chemical efficacy trial work.”
- “Only about 2% of research funding currently goes into organic system: organic varieties unavailability, seed producers’ primary production challenges include estimating and achieving seed yields, controlling weed, pest and disease pressure”.
- “Focus on higher education does little to ease the logistical burdens to would-be skilled meat cutters, butchers and entrepreneurs of rural operations.”
- “PFAS (Per- and polyfluoroalkyl substances) chemicals can end up in wastewater treatment plants as sludge, and these sludge residuals have been permitted in many states to be spread on farm soils as a fertilizer; PFAS contamination endangers farm families, the agriculture sector and our food system.”
- “AFRI programs offer up to \$10 million per project, and grant funding is trending toward larger projects broader in scope. This leaves smaller projects with more targeted proposals going unfunded. We understand that larger projects have benefits, but they can also increase inequities in entities funded.”
- “To address the roadblocks created by non-standardized and random data structures long fostered by a research culture resistant to data sharing must invest considerable planning and resources into what data are collected, managing that data and then the long-term sustainability preservation and curation practices while open data policies.”



urban, inner-city small farms, community and school gardens; backyard and rooftop horticulture.”

- “Cooperative Extension System (CES) ability to participate in competitive programs and to build partnerships; Extension professionals help farmers, ranchers and landowners develop and adopt climate-sensitive practices. To address the lack of Extension support for U.S. Aquaculture. To evaluate whether it is possible to revive the federal-state partnership in Extension.”
- “Increase and diversify staff and resources for Extension programs serving marginalized communities, engage with researchers to identify the research needs of these communities, and fund projects that address their priorities; African American, Native American, Hispanic, Hmong and other traditions employ advanced agroecological and climate-friendly systems and practices that make vital contributions to the goals of resilience, food security and climate mitigation, and are the backbone of the success of these farming communities.”
- “Nutrition research support is necessary to continue to clarify linkages between diet and health and to enhance nutrition-related disease prevention.”
- “Advance understanding of the role that microbial science plays in advancing modern food safety and security.”
- “Safe and effective bioherbicides will be welcomed by organic and conventional farmers alike.”
- “Strengthening U.S. scientific capacity in coffee research.”
- “Envision future cropping systems that maintain continuous living cover through a combination of strategies, including cover cropping, relay planting and perennials. Integrated scientific advances are needed to achieve this vision.”
- “Health concept co-equal with human health and animal health.”
- “What alternative protein inputs are the best from a techno-functional, cost, scale, nutrition, food safety, environmental and consumer acceptance perspective?”
- “Increase research into developing seed and animal breeds publicly accessible, regionally adapted to organic systems.”
- “Proactively address farmer and consumer acceptance of new IPM technologies.”
- “MSU Extension found that the number one issue of importance to our stakeholders was water quality.”
- “Diversified perennial based and perennial annual integrated farming systems.”
- “I estimate 70% of proposals deserve funding; furthermore, we have no ability to pick the winners and losers in the outcome of such research.”







- “Public research investments in organic plant breeding and seed initiatives should continue to increase while diversifying who participates in research. Organic seed production challenges must be elevated to a high-priority research priority.”
- "Research on nutrient-dense, organic/pastured and locally produced real foods is critical to the success of food-as-medicine treatment protocols."
- “Systems-based research at the nexus of nutrition, food production, climate and environment; promote more equity in research.”
- “Coffee research and Extension is the expansion of ways to foster international research collaboration between U.S. scientists and researchers in coffee-producing countries.”

1890 EXTENSION ASSOCIATION- ASSOCIATION EXTENSION PROFESSIONALS



- “Climate resilient communities; health equity and well-being; economic and workforce development; 4-H Positive Youth Development; urban, closing the digital opportunity gap; and diversity, equity and inclusion.”
- “There's a fundamental knowledge gap that exists that limits the ability of Extension to respond to these challenges. These gaps include food availability and equitable access, water quality and quantity, extreme weather variability, sea level rise and saltwater inundation, population expansion and aging workforce and economic sustainability; a robust flexible and connected Extension system is critical.”











biodiversity, invasive species of plants and pests, threats to animal health and disease, antimicrobial resistance.”

- “Programming priorities: water issues, water management and forest management.”
- “Funding to go directly to producers for doing the research they want to do on the ground is very high impact.”
- “To support producers who want to take risks and try new things and share their findings with their peers.”
- “To support professional development opportunities for producers.”







- “Development and implementation of food processing technologies that minimize resource use (e.g., water, energy) while maintaining food safety and improving nutrient retention and quality.”
- “Supporting increased long-term funding for cultivar development and plant breeding research, including conservation and pre-breeding in the public sector through competitive grants and capacity funds.”
- “Weed genomics; site-specific or precision weed management.”



producers, especially in major aquaculture-producing states, with priority given to Extension programming, not grant writing.”











## NIFA LISTENS INPUT

### What is NIFA doing right?

- “To continue to expand their current efforts, such as “From Learning to Leading: Cultivating the Next Generation of Diverse Food and Professionals Program (NEXTGEN),” to consider how they may further engage and support students interested in pursuing careers in nutrition, food and sciences. Career training, as well as additional training opportunities, particularly for first-time AFRI applicants.”
- “NIFA is doing a great job at making information and personnel accessible to Extension at the regional level. Reestablishing state liaisons will help increase accessibility at the state level.”
- “NIFA’s valuable programming for advancing sciences, food production, and food safety and security.”
- “NIFA has made great (and appreciated) strides by providing integrated and Extension-led funding opportunities in AFRI and by providing leadership in partnering opportunities, such as with CDC. However, in too many of the integrated proposals which include Extension, it still appears that Extension is an afterthought and was assigned a limited role.”
- “AgrAbility is a crucial, credible ally and advocate for the farmer and rancher.”
- “NIFA has always stressed multidisciplinary efforts.”
- “NIFA has awarded over 15 million in research funding to 12 alternative protein research projects at universities across the country since 2020.”
- “SARE, ORG, OREI and AFRI and capacity programs including Hatch and Smith-Lever are instrumental in identifying sustainable farming solutions that improve climate change resilience adaptation and mitigation.”
- “We applaud NIFA’s efforts to foster the culture of innovation and see continued support for SBIR programs as integral to the success and competitiveness of the horticulture industry.”
- “To continue with their support for socially disadvantaged and underserved farmers.”
- “I have been impressed with NIFA’s commitment to LGBTQ in hiring practices and programs. Who knew the federal government could lead this effort by example.”
- “The accessibility to NIFA staff is greatly appreciated; the agency does a lot with the funds available but more funds are needed.”
- “Commend leadership for working to rebuild the agency staff capacity after the losses experienced as a result of the relocation from D.C. to Kansas City.”
- “Support New National Center for resilient and regenerative Precision in Lincoln, NE.”

## FY2023-FY2024 METHODOLOGY

NIFA encourages all stakeholder input to address key challenges and opportunities related to advancing agricultural research, education and Extension. An invitation to provide online input and or participate on a Zoom call was solicited with the [Federal Registry Notice](#) posted on Sep 16, 2022, and a specific [NIFA Listens website](#). The following seven questions were posted as a framework to solicit stakeholder feedback, most of the input received addressed one or few of these questions:

1. What are your top priorities for research, Extension or education for NIFA?
2. What are the most promising opportunities/solutions for advancement of these food and agricultural priorities?
3. What are the greatest challenges that you see facing food and agriculture in the coming decades, and what fundamental knowledge gaps exist that limit the ability of research, Extension and education to respond to these challenges?
4. Based on those challenges, what general areas of food and agricultural research should be advanced and supported to fill the knowledge gaps, and what is your top priority for research, Extension and/or education for NIFA investment?
5. How accessible do you find information about NIFA programs and activities to be?
6. What can NIFA do to make information and resources more accessible?
7. What is NIFA doing right, and are there opportunities to improve?

Online input from external stakeholders was received via email at [nifalistsens@usda.gov](mailto:nifalistsens@usda.gov) thru Nov. 30, 2022. On Nov. 2, 2022, two sessions were conducted via Zoom to receive oral input during a two and a half hour session. Registered stakeholders had up to five minutes to provide their input. All employees at NIFA were encouraged to attend these calls. Virtual sessions recordings are publicly accessible and can be accessed at the NIFA website: [morning](#) and [afternoon](#).

### ADVANCED TEXT ANALYTICS

Text analytics workflows were implemented leveraging USDA EDAPT Data Science Workbench. We applied unstructured text clustering on LINGO4G to initially identify top topics and clusters, and semantic relationships. New Natural Language Processing (NLP) workflows were also implemented for text categorization using Python (Pandas, NLTK, scikit-learn-TF-IDF) to support text preprocessing, tokenization into n-grams (word frequency analysis), word clouds generation and sentiment analysis (positive, negative, neutral). As we received unstructured input, further text analytics included Term Frequency-Inverse document frequency (TF-IDF) as a statistic to reflect how important a word(s) is to a document in a collection of all NIFA Listens input. It adjusts to the fact that some words or groups of words (N-GRAM-1,-2,-3 consecutive terms) appear more frequently in general and helps to identify topic-clusters of interest. Further visualizations and tableau dashboards were designed and are available for further insight generation.

NIFA LISTENS FY2023-FY2024 is in alignment with key engagement strategies in [the NIFA Strategic plan FY2022-FY2026](#).

# APPENDICES

## Appendix 1. List of stakeholders providing input

Organization	Org type
Florida A&M University	1890-University and Association of Extension Administrators
New York Botanical Garden	Botanical Garden
Citizen	Citizen
Citizen	Citizen
Biotech Investments	Consulting
Engle-Stone Aquatics LLC	Consulting
Corteva	Corporation
Northeastern Regional Association of State Agricultural Experiment Station Directors (NERA)	Experiment Stations Directors Association
Western Association of Agricultural Experiment Station Directors (WAAESD)	Experiment Stations Directors Association
Association of Northeast Extension Directors (NEED)	Extension Professionals Association
Association of Southern Region Extension Directors (ASRED)	Extension Professionals Association
North Central Cooperative Extension Association (NCCEA)	Extension Professionals Association
Western Extension Directors Association (WEDA)	Extension Professionals Association
Citizen	Farmer
Farmer also Kansas City Food Hub, North Central Administrative Council	Farmer
US Fish & Wildlife Service (Aquatics Animal Drug Approval Partnership Program (AADAP))	Government
Agricultural Viability Alliance Carrot Project <a href="https://www.thecarrotproject.org/agricultural-viability-alliance/">https://www.thecarrotproject.org/agricultural-viability-alliance/</a>	Non-Profit
Environmental Defense Fund	Non-Profit
Friends of the Mississippi River	Non-Profit
Hempcollective.org	Non-Profit
Maine Farmland Trust	Non-Profit
National Sustainable Agriculture Coalition (NSAC)	Non-Profit
North Eastern Integrated Pest Management Center- Cornell University	Non-Profit
Organic Farming Research Foundation (OFRF)	Non-Profit
Organic Seed Alliance (OSA)	Non-Profit
Rivers Of Life Center <a href="https://www.hempexemption.com/Horticulture">https://www.hempexemption.com/Horticulture</a> .	Non-Profit
The Breakthrough Institute	Non-Profit
The Homestead Education Center	Non-Profit
Union of Concerned Scientists	Non-Profit
Wholesomewave.org	Non-Profit
World Coffee Research	Non-Profit
Bipartisan Policy Center	Policy Consultants



FASS.org- Science Policy Committee- Animal Agriculture	Policy Consultants
Harvard Law School-HLS-Food Law and Policy Clinic	Private University
American Society for Nutrition	Professional Association
School Nutrition Association	Professional Association
Agricultural & Applied Economics Association	Professional Association
American Meat Science Association	Professional Association
American Society for Microbiology	Professional Association
American Society of Agronomy (ASA), Crop Science Society of America (CSSA), Soil Science Society of America (SSSA)	Professional Association
American Society of Animal Science (ASAS)	Professional Association
American Veterinary Medical Association (AVMA)	Professional Association
Association of Food and Drug Officials (AFDO)	Professional Association
Entomological Society of America	Professional Association
Entomological Society of America (ESA)	Professional Association
Institute of Food Technologists (IFT)	Professional Association
National Association of 4-H Youth Development Professionals	Professional Association
National Association of Plant Breeders (NAPB)	Professional Association
Weed Science Society of America (WSSA)	Professional Association
Colorado Mesa University - coloradomesa.edu	Public University
Sustainable Agriculture Research and Education (SARE)	SARE-Program
Washington State Academy of Sciences	Scientific Expert Association
Pioneer Public Affairs on behalf of Neutral Foods <a href="https://www.eatneutral.com">https://www.eatneutral.com</a>	Start-up
National Cattlemen’s Beef Association (NCBA)	Trade Association
Good Food Institute (GFI)	Trade Association
International Fresh Produce Association (IFPA)	Trade Association
National Aquaculture Association (NAA)	Trade Association
Association of Public and Land-grant Universities (APLU)	Universities Membership Association
Mississippi State University-Extension - Center for Government and Community Development - Extension Disaster Education Network (EDEN)	University-1862
Colorado State University	University-1862
Forever Green Initiative, University of Minnesota	University-1862
Iowa State University	University-1862
Kansas State University - Great Plains Diagnostic Network (GPDN)	University-1862
Michigan State University	University-1862
Michigan State University	University-1862
Montana State University Extension	University-1862
North Carolina State University (NCSU)	University-1862
North Carolina State University (NCSU)	University-1862
Ohio State University	University-1862

Ohio State University	University-1862
Ohio State University	University-1862
Ohio State University	University-1862
Oklahoma State University, Institute of Biosecurity	University-1862
Oregon State University	University-1862
Oregon State University	University-1862
Oregon State University	University-1862
Oregon State University	University-1862
Penn State Extension	University-1862
Purdue University - Cooperative Extension Service (CES) Extension Committee on Policy (ECOP)	University-1862
Purdue University 4-H	University-1862
University of Delaware	University-1862
University of Florida	University-1862
University of Georgia	University-1862
University of Minnesota	University-1862
University of Minnesota Extension	University-1862
University of Missouri Extension-HHP (Healthy Homes Partnership) and HHTC (Healthy Homes Training Center)	University-1862
University of Missouri - School of Natural Resources	University-1862
University of Nebraska - Institute of Agriculture and Natural Resources	University-1862
University of Vermont	University-1862
University of Wisconsin - Madison	University-1862
University of Wisconsin - Madison Division of Extension and Public Media	University-1862
University of Wyoming - Sustainable Agriculture Research and Education (SARE)	University-1862
Utah State University	University-1862
Virginia Tech - AgrAbility Program Coordination	University-1862
Washington State University	University-1862
West Virginia University Extension	University-1862
USDA - ARS	USDA-ARS

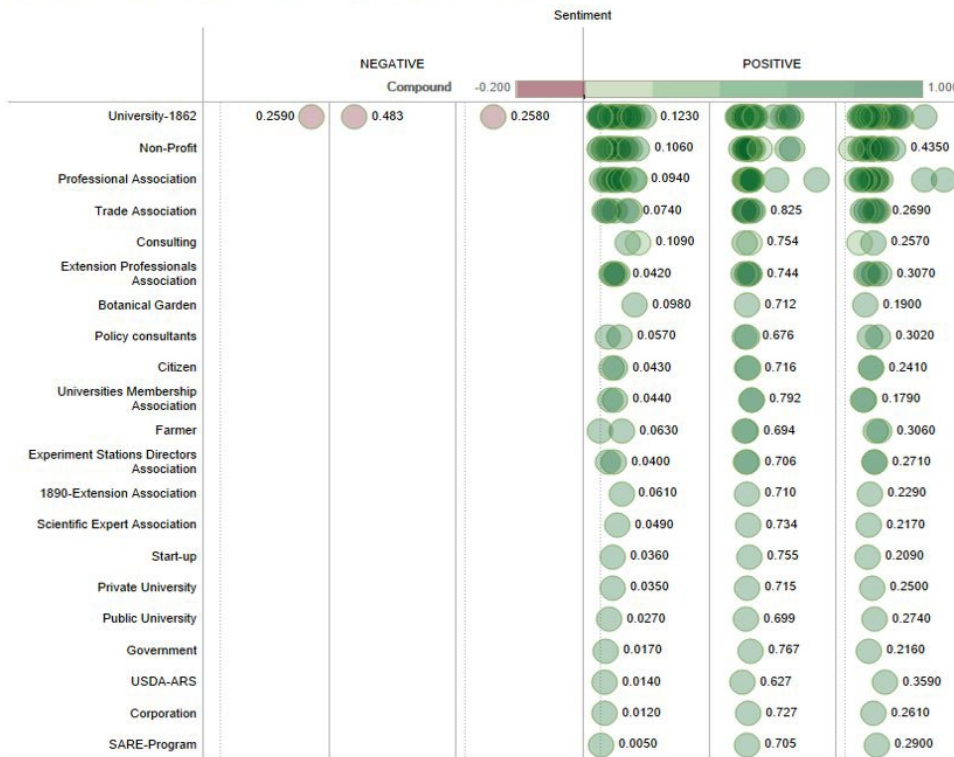


## Appendix 2. Sentiment Analysis

The graph below reveals the sentiment score after analyzing all NIFA Listens FY 2023 – FY 2024 input received. Sentiment scores were generated using a lexicon and rule-based, unsupervised learning algorithm (Valence Aware Dictionary and sEntiment Reasoner). The compound sentiment scores supported identification of positive, neutral and negative input. Overall, all input received (99%) was categorized as positive. By leveraging the sentiment score, only one record listed a negative score. This negative score reflects input provided to highlight opportunities to address and prioritize refugees, asylees and humanitarian parolees, and food insecurity and poor nutrition. This input was received from a Utah State University student.

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#### NIFA LISTENS FY 2023-FY2024 SENTIMENT ANALYSIS



**Org. type:** University – 1862, Utah State University Student

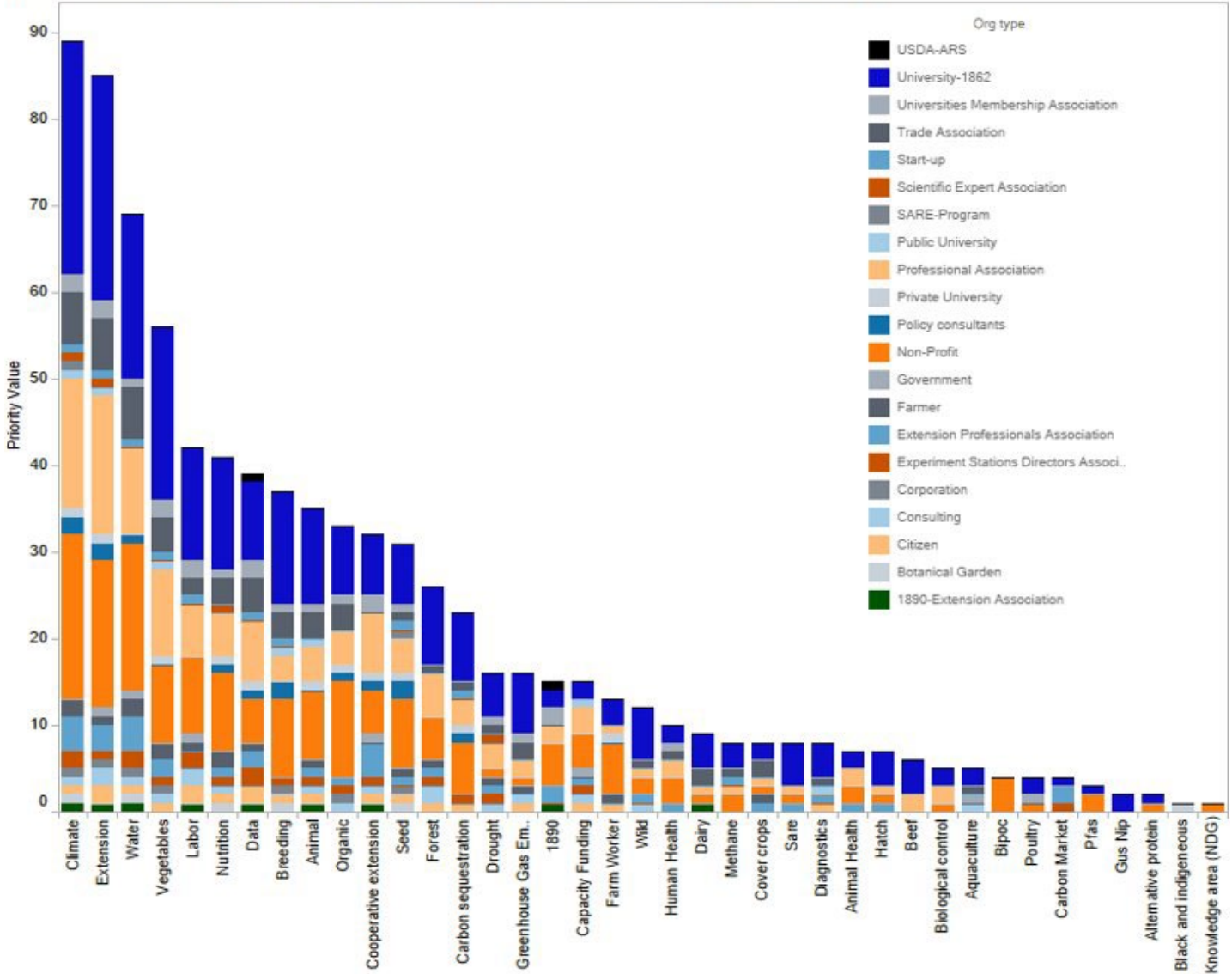
**Type:** Email

**Text:** “Thank you for the opportunity to provide input on priorities. Refugees, asylees and humanitarian parolees come to the U.S. under direct circumstances and are particularly vulnerable to poor nutrition and poor health, in addition to other risks such as food insecurity and poverty. The U.S. is also currently increasing numbers of refugees admitted each year and has recently resettled close to 80,000 Afghans. For these vulnerable immigrants to thrive and not fall into intergenerational poverty, it is critical to both research and apply best practices for nutrition, food security and nutrition education for this population. The inclusion of research, teaching and Extension creates an excellent opportunity for funding holistic, effective approaches for improving nutrition and health for refugees, asylees and humanitarian parolees.”

## Appendix 3. Visualization of stakeholder top priorities

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NIFA LISTENS FY2023-FY2024 PRIORITIES AT GLANCE BY ORGANIZATION TYPE



## Appendix 4. RRDC Stakeholder Report Analysis

In 2021, the Regional Rural Development Centers (RRDC) began a national listening session initiative with the goal of rapidly appraising stakeholder priorities related to the community, economic and workforce development of rural communities in the U.S.

RRDC collected structured stakeholder input with a survey instrument with pre-defined topic areas seeking to identify regional priorities, potential for expansion and programming of high value. [The RRDC report “Findings from a Rapid Assessment of Stakeholder Priorities” is included here as reference.](#) While this report is impactful for NIFA decision making and program development on its own, we attempted to investigate if there was any correlation between the RRDC topic priority ranks with NIFA Listens.

We leveraged the data reported in the RRDC report (Table 2) identifying eight topic areas:

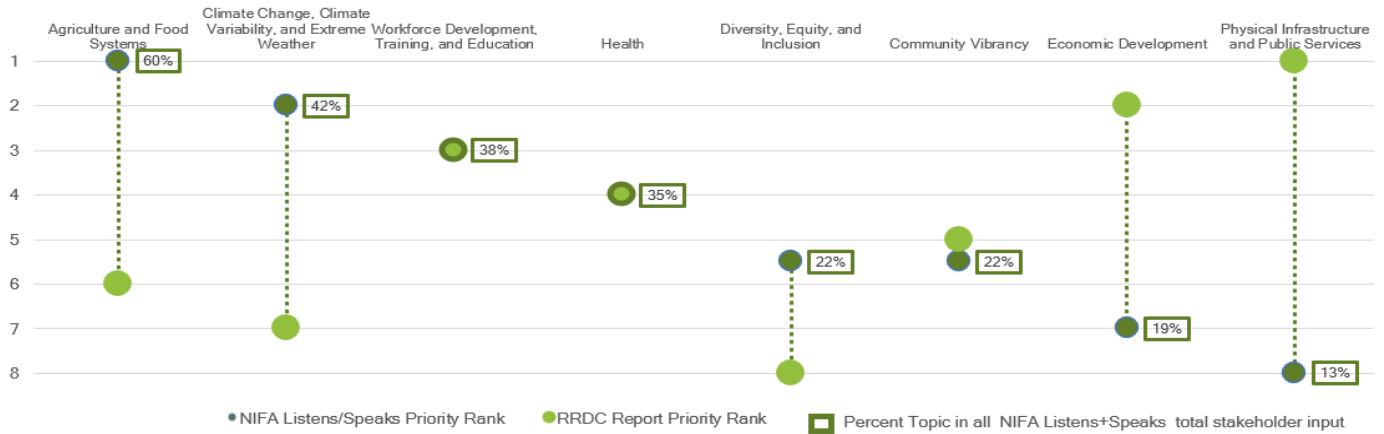
RRDC Report Priority Rankings of topic areas for the entire sample (n=641 stakeholders) and groupings

Topic Area	North Central (28%)	Northeast (13%)	South (32%)	West (18%)	National-scope (8%)	Total set of responses*	
Physical infrastructure and public services	3	1	2	1	2	1	
Economic development	1	2	4	2	3	2	
Workforce development, training, and education	2	3	1	4	6	3	
Health	5	5	3	3	1	4	
Community vibrancy	4	7	6	5	4	5	Priority 1
Agriculture and food systems	6	6	5	7	8	6	Priority 2
Climate change, climate variability, and extreme weather	8	4	8	6	7	7	Priority 3
Diversity, equity, and inclusion	7	8	7	8	5	8	Priority 4

\*All regions and 1% (no region)

We conducted a qualitative analysis by aligning each of the eight pre-defined priority topic areas identified in the RRDC report from Table 2 (Total Set of Responses) to the NIFA Listens data set. Each item of NIFA Listens input was assigned to any of the eight topic areas. The following figure shows how the RRDC topic areas are represented in NIFA Listens FY 2023 – FY 2024.

NIFA Listens and Speaks Priority Ranks Association with RRDC Report Priorities



$R_s = -0.56288$ ,  $p$  (2-tailed) = 0.14633

The RRDC topic area most represented within the NIFA Listens data set was Agriculture and Food Systems (60% of all NIFA Listens input received), followed by Climate Change, Climate Variability and Extreme Weather (42% of all NIFA Listens input received), Workforce Development, Training and Education (38%); Health (35%); Diversity, Equity and Inclusion (22%); Community Vibrancy (22%); Economic Development (19%); and Physical Infrastructure and Public Services (13%).

Below are the topics and subtopics described in the RRDC report:

**1. Agriculture and food systems**

- Local and regional food systems development
- Sustainable on-farm practices and value capture
- New market development for agricultural and forestry products
- Land access, heirs' property and farm transition

**2. Climate change, climate variability and extreme weather**

- Disaster preparation, mitigation and management
- Natural and environmental resources management
- Community and economic resiliency planning
- Mitigation and adaptation strategies

**3. Workforce development, training and education**

- Certificates and other professional training
- Apprenticeships and internships
- Skills gaps and strategic planning for workforce development
- Educational programs in high schools, colleges and universities for jobs of the future
- Retraining and transition assistance

**4. Health**

- Nutritional security, food access and food affordability
- Behavioral and mental health services
- Substance abuse issues, including opioids
- Public health, including availability and access to medical facilities and services

**5. Diversity, equity and inclusion**

- Equitable and inclusive economic growth
- Entrepreneurship among socially disadvantaged communities
- Community racial understanding
- Addressing disparities in access to programming

**6. Community vibrancy**

- Youth development, engagement and rural retention
- Community governance, leadership and resident engagement/participation
- Placemaking, culture and arts
- Aging and inter-generational engagement
- Population changes and demographics

**7. Economic development**

- Rural innovation, entrepreneurship, and small business creation and retention
- Sustainable growth (including "closed loop" and "circular" economies)
- Exports and international trade
- Tourism, recreation, travel and hospitality

**8. Physical infrastructure and public services**

- Energy, including renewable production and reliable access
- Broadband/high-speed internet access, affordability and reliability
- Housing access and affordability
- Transportation infrastructure renewal

## **Appendix 5. LIST OF NIFA STAKEHOLDER LISTENING OPPORTUNITIES**

LISTENING SESSION	SCOPE- Institute	Online Virtual-Date	Published	Links to announcement, recordings, notes-reports (public)
Gus Schumacher Nutrition Incentive Program (GusNIP)	Program Specific-IFSN	21-Oct-21	19-Oct-22	<a href="#">GUSNIP FY2021 LISTENING</a>
NIFA LISTENS FY 2023 – FY 2024	NIFA-wide	2-Nov-22	27-Jun-23	Internal Draft-this report
1994 Tribal College Research Grant	Program Specific-IYFC	16-Nov-22	27-Jan-23	<a href="#">1994 Tribal College FY2023 LISTENING</a>
Laying Hen and Turkey Research Program	New Program Specific-IFPS	14-Feb-23	24-July-23	<a href="#">Recording</a>
Research Facilities Act Program-RFAP for Minority-serving Institutions)	New Program Specific-IYFC	13-Apr-23	27-Apr-23	<a href="#">RFAP FY 2023 virtual session recordings</a>
Multiple Aquaculture Stakeholder Listening Sessions Hosted by NIFA and ARS: Research and Extension in Support of Tribal Aquaculture. Other: Catfish, Salmonids, Basses and Baitfish, Mollusk and Crustaceans; Warmwater Marine Fish; Aquaponics	New Program Specific-IFPS-ARS	12-Jun-23	April-2023	<a href="#">Tribal Aquaculture announcement</a>