

**Critical Issue  
Project / Program**Improving Plant and Animal Agricultural Systems  
Agronomic Crop Production Systems**NC State Extension Provided Research-Based Information and New Technology to Empower Agronomic Crop Growers to Make Better-Informed Decision****In 2-3 sentences, briefly describe the issue or problem that your project addresses.**

North Carolina agronomic crop producers grow approximately 3.6 million acres of row crops annually, with the highest acreage being planted with soybean, corn, cotton, and wheat ranked in order respectively. Row crops contributed nearly \$2 billion in sales to North Carolina farms, as reported in the 2020 USDA State Agriculture Overview. Most counties in the state grow corn, soybean, and small grains (wheat, barley, or oats), with cotton being confined to fewer, better-suited areas of the state.

North Carolina crop producers face increasingly complex environmental, financial, and logistical challenges in growing row crops. Profit margins for corn producers have remained extremely tight in recent years. Rising fertilizer costs and other variable expenses are impacting grain producers, with a projected \$200 per acre increase or greater in 2022, and growers continuously struggle to optimize peanut production due to challenges in timing maturity at harvest. In addition, cotton producers face large upfront production expenses in the form of cotton seed costs, and the rapid turnover of modern cotton varieties in the market makes it difficult for producers to develop best practices for variety selection.

According to the United Nations-FAO, the world's population will grow from 7.9 billion today to nearly 9.7 billion by 2050. To meet demand, agriculture in 2050 will need to produce almost 50 percent more food, feed and biofuel than it did in 2012. Research is needed to develop new and hybrid varieties and best management practices to increase crop production efficiency through increased yields, improved quality, and decreased input costs. To feed this growing population, NC State Extension needs to effectively transfer knowledge of innovative technologies, new varieties, and research-based agronomic crop production best management practices developed or recommended by NC State researchers to crop producers and industry representatives; effectively transfer knowledge and skills into practical applications for crop producers to adopt; and empower growers to make better-informed decisions.

**Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.**

To support sustainable growth in row crop production, NC State Extension Specialists developed innovative products, technology, and research-based agronomic crop best management practices (BMPs) through a combination of methods, including applied research, official variety testing, and on-farm variety evaluation. Extension Specialists and Agents transferred knowledge of these innovations and practices to producers through meetings, research and demonstration plots, field days, expos, workshops, on-farm consultations, and educational media. As a result of NC State Extension programs, **45,911 best management practices related to nutrient management, conservation, production, pest management, business management, and marketing were adopted by agronomic and horticulture crop producers.**

- NC State Extension Specialists disseminated new agronomic crop information and best practices through the publication of 91 **peer-reviewed Extension publications** to educate Extension Agents, producers, and members of industry.
- NC State Extension Agents used **social media and mass media** to provide educational information to crop producers. Agents had a social media reach of 1,299,179 and a mass media reach of 25,574,049. Extension Specialists posted educational content on social media 1,129 times with a reach of 256,271 and created 57 newsletters with a reach of 1,096.
- NC State Extension Specialists maintained 13 agronomic crops, pest, and disease **web portals** containing 10,909 individual web pages. 35 new web pages were added in 2021 along with 359 new educational posts made to existing pages. The crop, pest, and disease websites maintained by Extension Specialists were viewed 677,886 times.
- NC State Extension Specialists produced 60 on-demand **educational videos** delivering information on agronomic crop production viewed 30,307 times.
- Extension Agents delivered **in-person and virtual training** to 7,292 growers on agronomic crops and another 9,897 individuals attended pesticide safety training programs. An additional 9,554 growers attended training provided by Extension Specialists.

The Pasquotank Cooperative Extension Center's agriculture program, with the assistance of Extension Specialists, provided relevant and timely information to growers and others in the agricultural community by producing 15 **educational videos** covering wheat and soybean production, corn and soybean pest management, and corn fertility, which attracted 1,120 views and allowing access 24/7 to information that people may not have otherwise had the opportunity to obtain and utilize. In Jones County, Extension produced 18 educational [Crop Sense podcast episodes](#) featuring interviews with Specialists. Crop Sense episodes are short, stackable 15-to-20-minute segments that answer specific questions on distinct topics so that growers can choose relevant episodes. The episodes, that provide key information about crop production, profitability, and environmental sustainability, have been downloaded 2,165 times. **Empowering NC growers by providing on-demand resources to increase the knowledge of best management row crop production strategies is just part of how we are growing the future of agriculture in North Carolina.**

Winter [wheat](#) is an economically important grain crop in North Carolina, producing almost \$140 million in revenue for NC farmers. But Italian ryegrass is an herbicide-resistant weed that plagues winter wheat yields, especially in NC's Piedmont region. In many fields, once the weed appears, it can't be chemically controlled. NC State Extension Specialists have successfully drone-identified early-stage Italian ryegrass in winter wheat, using **remote sensory technologies**, allowing for holistic weed management options. Early Italian ryegrass identification opens the door to early-season management techniques beyond herbicides. Knowing where weed populations exist would empower growers to make informed decisions. This work creates future opportunities for Extension Agents to assist growers with image collection, processing, and interpretation. Agents can then collaborate with Extension Specialists to analyze the field data for various biotic and abiotic stresses then farmers or agronomists would translate field results into prescription herbicide application files or drone sprayers for precise application. **Enhancing NC agriculture by transferring and utilizing practical, in-field decision-making tools, including remote sensory technologies, is part of how we are growing the future.**

**Briefly describe how your target audience benefited from your project's activities.**

In 2021, Camden County Cooperative Extension offered a broad range of research-based agricultural programs and materials, including on-farm consultations, collaborative regional field days, production meetings, variety trial demonstrations, and a newsletter series. These programs supported the adoption of BMPs for nutrient and pest management, variety selection, business management, and marketing, securing an estimated \$1,712,349 in additional revenue for local producers. The **Southern Piedmont Corn and Soybean Field Day** was held in Cleveland County. Extension provided growers with information on BMPs related to grain bin safety, soybean and corn production, and grain marketing. This field day was attended by 115 individuals. Attendee feedback indicated that the field day improved knowledge of yield optimization, disease, and pest management and that growers were interested in using new practices to improve yield on their farms. The **Northeast Ag Expo Winter Meetings** used online technologies to bring subject matter experts to local farmers. The Expo offered 7 meetings, each averaging 46 attendees, with 322 total participants. Post-meeting evaluations indicated that 49 of the 51 soybean growers and 37 of the 38 corn growers expected increased yields because of attending the Winter Meetings. The **Northeast Ag Expo Summer Field Day** provided growers and other members of the agricultural community with information on cotton and peanut production, technology, and crop-related practices. The 47 attendees represented 4,400 acres of cotton and peanuts. As part of the event evaluation, attendees valued the increase in bushels/acre gained over the past 12 months from information provided by Extension at last year's field day at \$568,158. **As a leader in experiential education, NC State Extension equipped row crop farmers to effectively transfer best management practices into practical applications.**

Variety selection is one of the most important decisions growers make every year. It can be challenging due to the abundance of varieties offered that are suitable for a wide geographic area. Growers look to Extension's variety demonstrations as their key source of local, unbiased information on variety selection. Cooperative Extension in Camden, Chowan, Currituck, Gates, Pasquotank, and Perquimans counties coordinated 6 **variety demonstrations** and presented yield data to farmers, allowing them to see which varieties performed best on nearby farms. Decisions about 60,150 acres were informed by this data, resulting in an estimated \$2,232,768 in additional revenue for corn producers through improved variety selection. Local variety information is a critical educational tool in production agriculture in Johnston County because of the county's wide range of soil types and rolling to reasonably flat topography. **Variety trials** included cotton, corn, soybean, and wheat. By utilizing the local variety yield results and selecting varieties with higher yields, county wheat yields can be increased by 22 bushels/acre, corn yields can be increased by 39 bushels/acre, cotton yields by 258 pounds/acre, and soybean yields by 13 bushels/acre, equating to \$6,000,000 in added value annually. **NC State Extension provided solution-driven research and technology to empower growers to make better-informed variety selection decisions.**

**Cotton** seed is one of the costliest inputs of the total production costs of cotton. Cotton farmers are also faced with modern cotton varieties entering the market very quickly, with very little supporting data from the pre-commercial stages. This makes the selection of cotton seed an important yet difficult decision. The [\*\*NC On-Farm Cotton Variety Evaluation Program\*\*](#) consists of 16 to 17 trials in producers' fields across the state annually. The varieties entered are determined to be the most widely adapted and best-fit varieties of each commercial brand for NC producers, and collectively this program captures the predominant soil types in all regions, geographies, and environments in NC's cotton belt. Trials are established in all parts of the state, based on each region's contribution to total cotton acreage. After one year of testing, growers are trained on how to manage each variety and in what scenarios or type of environment each variety should be positioned for maximum yield potential. The 2020 on-farm

program resulted in an estimated economic impact of \$9,999,150 to \$13,083,000 in 2021, and the potential economic impact of the 2021 program is estimated to be \$53,550,000 to \$115,850,000 in 2022 and beyond. **NC State Extension demonstrated the utility and applicability of variety-selection decision models utilizing meta-data gathered from the [NC State Official Variety Trials](#) to enhance the utilization of Extension-developed decision-making tools by crop producers.**

Field studies conducted by Extension Specialists found that [corn](#) plants that emerge first had more rows of kernels on the cob and more kernels per row, resulting in more grain weight and yield compared with seedlings that emerge later. Twenty-three **field trials** were conducted over 6 years using innovative techniques that marked corn seedlings as they emerged to determine the impact of time of emergence on ear characteristics and corn yield. Results from these studies were presented at meetings and conferences and at 3 agent training sessions. Growers in North Carolina responded to this information by developing new approaches for determining when to plant corn, by planting deeper, and by choosing hybrids tested in these studies that showed better emergence and early vigor. A technique was developed and presented to growers so that they can choose corn hybrids with good early emergence and growth characteristics. **NC State Extension conducted applied research to provide trusted solutions and empower corn producers to make better-informed decisions.**

Determining peanut maturity is an important production decision for [peanut](#) farmers. Maturity affects flavor, grade, milling quality, and shelf life. Cooperative Extension provided **peanut maturity clinics** to help producers determine the optimal time to harvest their crop. Using a pressure washer, the agent "blasts" the outer layer off the peanut pods. The color of the pod after blasting can indicate how mature the pod is. In Bertie County, 25 growers brought samples from approximately 3,572 acres corresponding to a potential minimum increase of \$264,325 in grower profits. In Halifax County an event reached 15 farmers, who left the event with knowledge of the maturity levels of their peanut fields and were able to decide which fields would be best to dig first and which fields would be better left undisturbed for a few more days. Duplin and Sampson County produce around 17,000 tons of peanuts; Extension Agents held 6 Peanut Pod Blasting Clinics providing an economic value of over \$7,514,000. The Northampton County Cooperative Extension Center helped 68 peanut farmers representing 3,226 acres determine maturity, which translated into an additional \$387,120. Six pod blasting clinics were held in Chowan County, once a week, every week starting in September. In Pitt County, 32 growers reported an average increase in the yield of 427 pounds per acre, representing a potential value of \$290,7683 because of the clinic. Wilson County Cooperative Extension pod blasted 16 samples that represented 1,040 acres of peanuts. Producers were able to increase gross income by \$40,950. **NC State Extension provided tools and resources to help peanut growers make better-informed decisions and improve crop production efficiency through increased yields and improved quality.**

### **Briefly describe how the broader public benefited from your project's activities.**

Agriculture and agribusiness combined is the leading industry in NC, where more than 45,000 farms occupy 8.3 million acres of farmland, accounting for 17.5% of all jobs in the state and an annual economic impact of \$95.9 billion. NC faces population growth, loss of farmland, and impacts from climate change, which have affected agricultural and food systems. **NC State Extension leads efforts to solve global challenges and create economic, societal, and intellectual prosperity by merging creative, innovative ideas with purposeful action.**

Soil testing is the predominant way growers assess specific soil nutrient status and evaluate supplemental needs. Soil testing provides the backbone for nutrient management programs in modern, intensive agricultural production systems. Most science-based soil fertility

recommendation systems derive phosphorus (P) and potassium (K) fertilizer guidance from soil test results. While soil testing has the common goal of determining where fertilizer is needed and how much to apply, soil testing laboratories in the USA differ in soil analytical methods, interpretative terminology, and philosophical approaches to fertilizer recommendations. These differences often result in different fertilizer recommendations among labs within and across states, leading to end-user confusion and reduced confidence in soil testing, which ultimately proves detrimental to application and educational efforts that encourage 4R Nutrient Stewardship.

NC State Extension Specialists are leading a national effort to address the interstate nutrient divide by creating the [Fertilizer Recommendation Support Tool](#), or “FRST.” The project aims to develop a soil-test and crop-response-to-fertilization searchable web-based tool that provides more consistent, transparent, and science-based decision support for nutrient recommendations across the USA. FRST’s searchable database is designed to benefit both researchers and growers. Initially, it will support phosphorus and potassium recommendations for 15 major crops, including corn, cotton, grain sorghum, peanuts, soybean, and wheat. The tool is founded on a relational soil-test correlation and calibration database.

The FRST effort currently consists of 90 individuals from across the USA, and the participants are growing; all have volunteered to be part of this project. Agencies involved in the project consist of 38 land-grant universities in 37 states and 1 territory, 1 private university, 2 state universities, 10 ARS scientists, 3 Natural Resources Conservation Service personnel, 1 FSA, 3 private not-for-profit individuals, and 1 State Department of Agriculture employee engaged in this project. The database will reside at the National Agricultural Library so that it is accessible by all and provides perpetuity of this resource. New data from current trials are constantly being added. The group has plans to expand to other crops, cropping systems, micronutrients, and even worldwide growing regions in the future.

While many agricultural practices contribute to resource conservation, nutrient management addresses potential excess at the source. Limiting fertilizer application initially is vastly more efficient and environmentally effective than down-the-line mitigation strategies. **Because agriculture is tasked with feeding a growing world population on fewer acres of arable land, growers strive for production efficiencies. Sound nutrient management seeks to balance environmental stewardship and crop production goals. In the end, farmers and taxpayers stand to save millions of dollars annually.**

## Comments

The following professional development workshops were provided by Extension Specialists for Extension Agents in 2021 to facilitate the use and transfer of new research-based knowledge:

- Abiotic Disorders
- Bees, Pesticides & Politics
- Burndown: Fall, Spring, and Everything In-between, Cotton and Peanut Agent Training
- Corn agent training
- Corn Insect Pest Management: Focus on Corn Earworm
- Cotton & Peanut Agent Training Field Day
- Cotton & Peanut Agent Training: Entomology
- Cotton Crash Course
- Cotton Management
- Cotton Physiology and Management Decisions
- Cotton Seed Quality
- Disease and Insect Update
- Entomology and Plant Pathology County Agent Training

- Field Crops Market Outlook and Agricultural Policy Updates
- Grains Agent Training
- Herbicide-resistant Italian Ryegrass and GPA and Nozzle effect on Cotton Injury
- Insights into Basis and Movement of Corn in NC
- Late-Season Peanut Disease Management Session
- New Variety Placement Tool for Wheat, Corn, and Soybeans
- Soil & Plant Tissue Sampling for Better Nutrient Management
- Soybean Agent Training: Future of US Soy
- Soybean Agent Training: Soybean Seed Quality
- Soybean Diagnostic Key Training
- Soybean On-Farm Research
- Stink Bug Management in Soybean
- Train-the-Trainer Toolkit for Grain Safety
- Twin v. Single-Row Grain Production: Which is best?
- Using Historical Basis to Inform Grain Marketing Decisions
- Variety Placement using the VST
- What is the future of hemp? Regulations, research, and markets
- Winter Cotton & Peanut Agent Training

**Critical Issue  
Project / Program**Improving Plant and Animal Agricultural Systems  
Animal Production Systems**NC State Extension Provided Solution-Driven Research, Technology and Technical Assistance to Increase Profitability and Reduce Environmental Impact of the Food Animal Industry****In 2-3 sentences, briefly describe the issue or problem that your project addresses.**

In 2020, North Carolina generated around \$10.1 billion in agricultural cash receipts with the highest valued commodities being broilers, hogs, and turkeys. The food animal industry represents approximately 70% of North Carolina's agricultural economy. North Carolina is ranked #1 for production of all poultry species and #2 for overall hog and trout production nationally, with all 100 counties producing some type of animal-sourced product. NC has nearly 8 million hogs, 785,000 cattle and 916 million broilers (chickens grown for meat). According to an economic impact report, North Carolina's hog and pork processing industry contributes more than \$7.1 billion in economic output to the state's economy and supports nearly 19,000 jobs. In addition, small ruminants remain a key source of meat for NC consumers. In fact, over the last 10 years, there has been an increased interest in small ruminant production in NC, especially meat goat production. The total populations of sheep and goats in NC increased by 7.4% and 4.3%, respectively, from 2018 to 2019. This has fueled an increased need for the education and training of small ruminant producers.

Although NC may currently be a leader in supplying meat products, the world's population is projected to surpass 9.7 billion by 2050. According to the United Nations-FAO, global meat production will have to increase to 455 million tons (from approximately 350 million tons today) to meet consumption demands. As a nation, farms and rangelands are being lost due to population growth and development and our farms have contributed to environmental damage due to greenhouse gas emissions, fossil fuels, and other pollutants. Farms will need to implement climate-smart agricultural practices and find innovative ways to increase food animal production on less land. To help feed a growing population, NC State Extension needs to effectively transfer innovative technologies and research-based animal science best management practices developed by NC State researchers to food animal producers and industry representatives, effectively transfer new knowledge and skills into practical applications for food animal producers to adopt; and empower producers to make better-informed decisions.

**Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.**

To support increased profitability of animal agriculture, equine, and forage producers, Extension Specialists developed innovative products, technology, and research-based animal science best management practices (BMPs). Extension Specialists and Agents delivered information on BMPs to producers using workshops, certification programs, webinars, factsheets, newsletters, and specialized training sessions. Extension also led the development of new disease and waste management plans as well as novel technologies to enhance animal health. **As a result of NC State Extension educational programs and technical assistance, 4,457 producers increased their knowledge of nutrition, ration balancing, mineral supplements, breeding, and reproduction, and 4,310 producers increased knowledge of strategies for promoting animal health and welfare and reducing the risk of infectious diseases through proper**

**use of vaccines, biosecurity, detection and identification of common diseases, appropriate use of animal medications, and mitigation of antimicrobial resistance transmission.**

- NC State Extension Specialists disseminated new animal science information and best practices through the publication of 71 **Extension publications** to educate Extension Agents, producers, and members of the industry.
- NC State Extension Specialists maintained 10 livestock, aquaculture, and poultry-related **web portals** containing 1,893 individual web pages. 16 new web pages were added in 2021 along with 161 new educational posts made to existing pages. The animal agriculture production websites maintained by Extension Specialists were viewed 119,783 times disseminating up-to-date research-based information and best practices.
- NC State Extension Agents had a **digital media** reach of 732,047 and a **mass media** reach of 16,997,264 providing animal and poultry science educational information.
- NC State Extension Specialists produced 74 **on-demand educational videos** on animal and poultry science-related topics that were viewed 38,437 times.
- 11,889 individuals attended **training** provided by Extension livestock agents, and an additional 14,540 individuals attended training provided by Extension Specialists.
- 1,582 **on-farm consultations** were provided by Extension livestock agents.

The [animal feed industry](#) represents about 70% of animal production costs, and the professionals responsible for animal feed quality, safety, and regulatory compliance require considerable training and access to emerging technologies, knowledge, and methods. This is a problem for those in rural and remote locations, where animal production operations are often located. To resolve this issue, 2 virtual short courses were developed to train new and experienced feed industry professionals about aspects of feed ingredient quality, feed formulation optimization and simulation modeling, and feed manufacturing and quality assurance. One virtual short course was designed for users of US soybean products (the major protein source used globally in animal feed). The first cohort of this 8-week short course enrolled 65 participants. The other course was designed for users of premixes (amino acids, vitamins, minerals, pharmaceuticals, enzymes, etc.) and enrolled about 360 participants from North, Central, and South America. Participant evaluations ranked the quality of the content, lecturers, and delivery of each of these virtual short courses very high, and nearly all the participants reported that they would adopt several of the concepts they learned in the course. **Increasing the knowledge of feed industry professionals and promoting the adoption of research-based BMPs by developing virtual training opportunities is just part of how we are growing the capacity of the food animal industry.**

In recent decades there has been a growing number of consumers who prefer products from production systems perceived as more respectful of the environment and animal welfare and a shift in the purchasing habits of consumers. [Pasture pork production systems](#) represent an alternative for these consumers. As with other livestock species, grazing pigs can pose environmental impact risks. Best management practices for pasture pork production systems were tested and are being disseminated by different means to alleviate the gap in information related to these differentiated production systems and technical support was offered to farmers. **Supporting farmers of the pasture-based pork supply chain in their search for more sustainable ways to produce pork is part of how we are growing North Carolina.**

Poultry Agents delivered a series of 6 **webinars** for small flock poultry producers, providing 420 people from 70 NC counties, 9 states, and 1 individual from Latvia with BMPs spanning general animal husbandry, poultry health, and disease management, and poultry processing. The webinars received glowing feedback from participants, with 90% reporting plans to implement



new feeding practices and 87% reporting an enhanced understanding of brooding practices. Extension poultry Agents also published a **quarterly newsletter**, providing about 2,200 producers across 18 vertically integrated NC poultry complexes with information about a broad range of poultry production topics, including programs and incentives available to contract producers. **As a leader in experiential education, NC State Extension provided training and resources for poultry producers.**

**Briefly describe how your target audience benefited from your project's activities.**

**Extension Poultry** Agents and Specialists partnered with two poultry integrators and a manufacturer of production equipment to provide free training on 4 broiler farms to 63 production staff, indirectly reaching 600 contract growers. This training on the proper operation and maintenance of ventilation, heating, and cooling systems positively impacted the environment of over 300 million broilers across 3,000 commercial houses in Central and Eastern NC. The broilers increased their average daily weight gain and feed conversion, thus increasing grower profits and the quality of consumer products. In another effort, Extension Poultry Agents helped 12 poultry producers across 4 companies in 4 counties develop **waste management plans**, impacting over 1.1 million birds and ensuring proper processing and application of 14,000 tons of poultry waste on nearly 1,100 acres of NC farmland.

In Perquimans County, Cooperative Extension worked with public and private partners to provide over 45 credit hours of **waste management** training to licensed animal waste operators at the 2021 Northeast Pork Conference, generating an estimated \$60,000 in added value for pork producers. Extension in Person County took advantage of a train-the-trainer session facilitated by the National Pork Board and subsequently offered pork quality assurance training and certification to 8 producers and transport quality assurance training and certification to 6 producers, generating an estimated \$120,000 in added value.

Identifying avenues for utilizing lagoon sludge was a priority for swine producers across NC. Through applied research activities, a series of studies were conducted by Extension Specialists to characterize sludge and assess how different technologies can improve its properties. Outreach/field days were held to share preliminary findings and media content with Extension Agents, Technicians, and Specialists. Four hundred stakeholders and agents were introduced to principles of sludge processing (via composting, drying, pelletizing, and combustion) through training and field days. As a result, two full-scale greenhouse drying systems were constructed by a stakeholder to process sludge at a commercial scale. Several greenhouse structures were commissioned to dry sludge using solar greenhouses, and two pilot-scale sludge pelleting were commissioned at fertilizer plants to generate material for wider distribution. Following Extension training and outreach efforts across the state, 2,453 producers increased their knowledge of animal waste management practices, 5,191 animal waste management credits were earned, 1,400 producers implemented Extension-recommended BMPs for animal waste management, 198 on-site sludge surveys or equipment calibrations were conducted, and 206 waste utilization/waste management plans were developed or updated. **As a leader in experiential education, NC State Extension provided information, training, and waste management plans for poultry and hog producers to increase profitability and improve environmental quality.**

To support new **sheep and goat** producers, Cooperative Extension in Davidson County delivered 6 webinars in the fall of 2020 and the spring of 2021, covering topics such as fencing and facilities, nutrition, lambing and kidding, and reproductive management. The live webinars reached 582 individuals from NC and other US states and territories, and an additional 49 individuals requested the webinar recordings. Over 95% of the 290 surveyed participants reported increased knowledge of sheep and goat husbandry, and 64% reported implementing

new practices thanks to the webinar, with the most common practices involving fencing and rotational grazing. As a result of Extension training and outreach efforts across the state, 2,383 livestock producers adopted Extension-recommended best management practices and production changes related to nutrition, ration balancing, mineral supplement, breeding, and reproduction. **Extension provided the latest research findings on best management practices to empower small ruminant producers to make better-informed decisions about nutritional requirements and reproductive practices.**

**Cattle producers** benefited from Rutherford County Cooperative Extension's collaboration with local and national partners to provide breeding soundness workshops which secured an estimated \$227,500 in added profit. The producers were also provided tools to participate in value-added marketing channels for calf sales, including the use of electronic identification (EID) tags, co-mingled truckload lots, and quality assurance evaluations, resulting in \$187,500 increased profits. Cooperative Extension in Haywood and Watauga Counties worked with local and state partners to provide bull breeding soundness exams, vaccinations, and other health procedures for a total economic impact of \$247,000. In addition, Extension in Surry County tailored diverse educational and certification programs to help cattle producers secure an estimated \$1,599,248 in added revenue based on producer evaluations, new marketing options, purchasing plans, adopted BMPs, and research projects. As a result of Extension training and outreach efforts across the state, 2,171 livestock producers adopted Extension-recommended BMPs and production changes related to quality assurance (vaccinations, castration, culling techniques, etc.), and 1,362 producers adopted Extension-recommended BMPs and production changes related to genetic improvement (AI, heifer/bull selection). **NC State Extension provided Cattle Producers with technical assistance and training on best management practices to increase the profitability of their operations.**

NC State **Extension Aquaculture** Agents and Specialists collaborated on the innovative development of an automatic feeding system to feed fish larvae that begin to feed soon after hatching. A prototype of this system was used in the spring of 2021, enabling efficient, highly controlled specification of feed characteristics, feed intervals, and number of daily feedings, all from an intuitive tablet-based user interface. The highly precise, consistent feeding provided by this device can help prevent fish mortalities common in both industry and research settings.

Aquaculture Agents also addressed a key health problem plaguing the development of small striped bass: oil residues from larval feed floating into culture tanks and preventing larvae from reaching surface air. Extension developed a device that floats on the surface of the water and collects the oil for periodic removal. The use of this oil skimmer is so efficient that it increased a key marker of larval health to over 95%.

Aquaculture Agents made a major contribution to aquaculture by developing a control plan for a key pathogen (*streptococcus* sp.), including plans for fish vaccination, disinfection, and fish health monitoring. This plan was implemented for 8 tilapia producers, some of whom reported a nearly 50% increase in fish production after implementation. This health plan will provide an estimated \$1 million in increased profits for NC producers. **NC State Extension provided solution-driven research, technology, and technical assistance to aquaculture producers to empower them to make better-informed decisions.**

### **Briefly describe how the broader public benefited from your project's activities.**

Members of the **Apiculture program** have collectively provided approximately 182 presentations to local and regional beekeeping groups over the last three years, resulting in over 32,000 direct contacts. During 2021, 11 scientific publications, 19, extension publications, 38 extension presentations, and 6,262 individual contacts were made. An exciting

new [Beekeeper Education & Engagement System \(BEES\)](#) online learning community for beekeepers that includes multiple mini-courses and a 2-day in-person Intermediate BEES Academy aimed to bolster beginning beekeeper knowledge and practical skills to enhance their colony survival and beekeeping success, were developed. The apiculture program also runs the [Queen & Disease Clinic](#) to provide scientific bioassays to beekeepers on queen health and colony pathogens so that they can make real-time management decisions that affect their operations.

State- and nationwide media coverage of apiculture program activities have collectively resulted in a public increase in honey bee awareness and concern for their welfare. We conservatively estimate a 50% increase in the managed honey bee population in the state as a result of the increased interest in apiculture due to our Extension program. If honey bees account for \$200 million in agricultural productivity in the state and there are now approximately 150,000 managed bee colonies in NC, then each managed hive has the potential to contribute roughly \$2,000 to the state's economy. A 50,000 colony increase in the bee population, therefore, may have potentially added another \$100 million to the state's agricultural economy. This is all in addition to the countless intangible impacts of the NC State Apiculture program: the Q&A session with 10 beekeepers on the steps of the Extension office because the building was locked; the hour-long phone conversation allaying the fears of a woman deathly afraid of stinging insects; the spark ignited in the young 4-H student to start his first hive. **These efforts collectively result in a tremendous impact for the general public that has a significant inherent value, even though it is impossible to place a dollar figure on it or measure its impact following any sort of objective criteria.**

## Comments

The following professional development workshops were provided by Extension Specialists for Extension Agents in 2021 to facilitate the use and transfer of new research-based knowledge:

- Animal Ag Economic Update
- Animal Waste Management
- Forage Research Update
- Forage & Grassland Management
- Meat Rabbit Workshop for Livestock Extension Agents
- North Carolina Small Ruminant Improvement Program
- Regenerative Grazing v. Rotational Stocking
- Renewable Energy from Animal Manures
- Small Ruminant Extension Updates
- Value-Added Opportunities for NC Dairy Farms & How to Help

**Critical Issue  
Project / Program**Improving Plant and Animal Agricultural Systems  
Horticulture Plant Systems**Adoption of NC State Extension's Recommended Best Management Practices Increased Profitability and Efficiency of Horticulture Production****In 2-3 sentences, briefly describe the issue or problem that your project addresses.**

Fruit and vegetable production plays a key role in NC's agricultural economy with farm cash receipts for horticulture totaling more than \$1.4 billion in 2016. NC horticultural production includes a diverse portfolio of traditional and specialty crops including sweet potato, tomatoes, cucumbers, blueberries, strawberries, and apples. Commercial growers need resources to navigate a broad range of challenges including production costs, soil health and fertility, pest and disease management, and variety selection. Private residents also need support to cultivate home and community gardens. Public outreach efforts are crucial to ensure that residents understand how horticultural practices impact food security, economic security, and environmental health.

The world's population will surpass 9 billion by 2050. To meet consumer demand, almost 50 percent more food, feed and biofuel will need to be produced. Coupled with this, there is pressure placed on horticulture producers because of climate change, soil erosion, pests, and diseases. To meet the challenge of feeding a growing population, research-based horticulture best management practices need to be developed and adopted in the production of fruits and nuts, vegetables, floriculture, herbs, mushrooms, turf, and other specialty commodities. In addition, home gardeners and landscape professionals need to learn and adopt practices that provide sustainable landscapes, and conserve and protect environmental health.

**Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.**

To support sustainable horticultural production, NC State Extension Specialists developed innovative products, technology and research-based horticulture best management practices (BMPs) through a combination of methods, including applied research, diagnostic testing, and variety performance evaluations. To support commercial growers, nursery professionals, resident gardeners, and landscape professionals, Extension promoted the adoption of BMPs through workshops, clinics, seminars/webinars, consultations, community and demonstration gardens, education and certification programs, and public outreach efforts. Extension also led research efforts to curb plant diseases and pests through improved crop management, variety selection, and pesticide management. **As a result of NC State Extension programs, 45,496 participants use Extension-recommended best management practices in landscapes, turf, and gardens, including pests (insect, weed, disease, wildlife) and soil management. In addition, 47,627 individuals gained knowledge or acquired skills related to vegetable/fruit gardening.**

- NC State Extension Specialists disseminated new horticulture information and best practices through the publication of 119 **peer reviewed factsheets** to educate Extension Agents, producers, and members of industry.
- NC State Extension Specialists maintained 29 horticulture **website portals** containing 9,356 educational **websites** that were viewed 760,712 times in 2021. 29 new pages

were added along with new content added to 259 existing pages to disseminate up-to-date research-based information and best practices.

- NC State Extension Specialists produced 294 demand horticulture-related **educational videos** viewed 96,557 times.
- 35,986 individuals attended horticulture-related **training** provided by Extension Agents and 31,592 individuals attended training offered by Extension Specialists.
- 3,808 Master Gardener **volunteers** donated 158,634 hours valued at \$4.1 million, reaching 77,371 NC residents.

NC State's turf insecticide efficacy program is the largest and most comprehensive in the Southeast. Extension maintains the most widely used turf entomology **Facebook page** in the world, with almost 1,000 hits per day, providing users with daily posts and weekly videos. In addition, NC State Extension maintains the **Twitter** account Dr. TurfBug, the Extension **web portals** [NC Turf Bugs](#) and [Turffiles](#). These sites are accessed millions of times per year. More turf entomology information is disseminated through NC State Extension's program than anywhere else worldwide. This significant effort impacts turfgrass managers on a global basis.

The North Carolina [Extension Gardener Plant Toolbox](#) was developed and populated with detailed descriptions and photographs of 4,615 plants that grow in and around North Carolina. Users of the plant toolbox can enter the name of a plant into the search box to view the plant's profile. The toolbox features a "find a plant tool" to assist with selecting a plant. Users choose desired characteristics from an array of filters and narrow the results until their perfect plant is found. The toolbox also includes an "identify a plant" tool for someone who has a plant but does not know its name or profile. Filters are used to pick attributes of the plant, and the results display plants with those characteristics. **NC State Extension empowers individuals to make decisions by providing research-based information through websites and social media.**

In collaboration with entomologists, plant pathologists, and horticulture scientists, Extension has conducted **statewide surveys** of commercial blackberry, grape, and apple orchards to identify fungal pathogens and gather information about production factors associated with plant disease and death. Knowledge gained from these applied research projects has been communicated through 9 **presentations** to fruit stakeholders, 2 agent trainings, and 2 field days, reaching a total of 1,242 stakeholders. This research has also led to state and federal funding, including funding of a USDA-NIFA Specialty Crop Research Initiative (SCRI) proposal in 2021. **NC State Extension Specialists equipped commercial blackberry, grape, and apple producers to prevent and control plant diseases by increasing their knowledge of related production factors.**

Experiential learning can be the most impactful way to teach someone a new skill.

The [Sandhills AGInnovation Center's Demo Farm](#) provides a venue where participants can get their hands dirty and try a new skill or project, such as pruning blueberry bushes, setting up a caterpillar tunnel, building a trellis, or harvesting sweet potatoes. The Demo Farm is managed by the horticulture agents at Cooperative Extension's Richmond County Center, who grow the crops and plan activities. **Workshops** are confidence-building exercises that provide participants with diverse levels of expertise and experience with ways to explore new ideas and opportunities, while knowing expert guidance is available to answer questions or provide help if needed. **The workshops at the Demo Farm provide inspiration and support, enabling participants to use their new skills on their farm or home garden, with the ultimate goal of supporting farmers and helping more people grow fruits and vegetables at home for themselves and their families.**

NC State Extension Specialists updated 35 tomato, cucurbit (i.e., cucumber, watermelon, squash, and pumpkin), sweetpotato, and other [vegetable disease factsheets](#). These

factsheets provide a brief synopsis that highlights the pathogen, symptoms, pathogen source and spread, and management techniques. Typically, there is a disease factsheet available for every common disease of crops produced in North Carolina, although some may be combined if the pathogen attacks more than one host. These important resources enable Extension agents to quickly diagnose problems in the field. The disease factsheets were updated and enhanced by adding helpful diagnostic tools and tips and adding additional images to help agents identify the most common plant diseases more quickly. Responses from agents have been overwhelmingly positive: 82% of agents reported that the new factsheets allowed them to better serve their clients, and almost 50% commented that the additional pictures helped with field diagnoses. **NC State Extension provided educational opportunities to facilitate the use and transfer of research-based knowledge of commercial berry, grape, tree fruit, and other fruit or vegetable producers to grow agricultural production.**

At the Western region **strawberry pre-plant meeting**, 16 growers and 9 Extension Agents learned about new strawberry varieties, weed management, plasticulture production, direct marketing, produce safety, and demonstrations of equipment used in plasticulture. Of the growers who completed the evaluation, over 82% increased knowledge in 4 out of the 5 topic areas covered. In Macon County, Extension held 7 **seminars** on strawberry, blueberry, grape, and fruit tree cultivation, providing essential information about site selection, fertility practices, plant selection, pruning, and harvesting. A total of 117 individuals attended, representing 16 NC counties, 8 states, and 3 countries. All participants reported learning something new about horticulture, and 89% expressed intention to start using best practices, including organic gardening practices. **NC State Extension transfers the latest practices to growers at workshops, seminars, and meetings.**

### **Briefly describe how your target audience benefited from your project's activities.**

Cucurbit downy mildew is a devastating disease in cucurbit crops and the number one threat to production, especially in cucumber. The disease must be managed with frequent, expensive fungicide applications to prevent devastating yield losses. The solution-driven efforts of Extension Specialists resulted in the development of a field biosurveillance system that provides host risk and fungicide resistance information for precision management, registration of novel active ingredients for chemical control through collaborations with fungicide companies, and release of two resistant commercial pickling cucumber varieties through collaborations with seed companies. According to the National Agricultural Statistics Service, NC has approximately 8,499 acres of cucumbers, 1,509 acres of melons, 2,514 acres of pumpkins, 2,531 acres of squash, and 5,498 acres of watermelon. Extension efforts saved growers approximately 4-6 fungicide sprays per year. Since fungicide sprays can cost about \$30-\$50 per acre, per application, per product, this would translate into \$2.5 to \$6 million in savings yearly for NC cucurbit growers alone. Extension evaluated 50 fungicide products and spray programs for effectiveness in controlling disease in tomato, pepper, and cucurbit crops, yielding insights that have been disseminated through plant disease management reports, spray guides, and crop handbooks used by over 50 growers in NC, TN, VA, SC, and GA.

Wilkes and Alexander Counties are the 2nd and 3rd largest apple-producing counties in NC, representing over 300 acres of production and over \$3 million in gross sales. Local growers rely on Cooperative Extension for pest identification and management recommendations. Extension worked with commercial orchards to install 2 weather stations in orchards, monitored 13 traps in 7 orchards for 25 weeks, and ran pest and crop development models based on local scouting through the Network for Environment and Weather Applications at Cornell University using local station data. Through regular scouting and running a pest and crop load management model, Cooperative Extension was able to recommend the timing of pest management practices and

pesticide applications throughout the growing season. This resulted in several benefits, including reducing applications, saving growers time and money, effectively managing oriental fruit moths to protect fruit quality, detecting peach tree borer damage and protecting unaffected trees using a rescue insecticide application, timing fireblight applications, and timing and applying the correct rate of thinner. This system of Extension-based insect trapping and scouting, coupled with weather station data, is a benefit to orchardists and is a model of how Extension can engage a group of growers while helping them be more successful. **NC State Extension provided solution-driven research and technology to empower growers to make better-informed decisions.**

Cooperative Extension in Chatham County provided three 2-hour blueberry production webinars to 527 gardeners and growers, delivering key information about blueberry cultivars, site selection, crop management, and pest and disease management. Of the participants surveyed, 100% gained knowledge of identifying and managing blueberry pests and diseases, and 93% reported improving their blueberry production through improved crop management. Cooperative Extension Agents from four of the largest wine producing counties in Western NC collaborated to provide vineyard managers timely research information via a virtual workshop and outdoor pruning demonstration. Pressing information on vineyard weed management, sour rot, spotted lantern fly, fungicide spray schedules, and industry updates were presented by NC State's Top Viticulture Specialists, along with pesticide credits. Seventy-one vineyard managers attended the virtual workshop, and 18 attended the in-person outdoor spur and cane pruning demonstration. Attendees were surveyed following the event; 74% indicated intent to implement practices presented at the workshop, and 40% estimated the information would save them up to \$2,000 in management costs. **NC State Extension provided educational opportunities to facilitate the use and transfer of research-based knowledge of commercial berry, grape, tree fruit, and other fruit or vegetable producers to grow agricultural production.**

Many wholesale produce buyers require GAP certification before purchasing from farms. GAP certification is a new process for many farms, and they must remain up to date on any changes. Cooperative Extension in Surry County offered guidance on GAP certification and re-certification via phone, email, text, and farm visits. Extension also offered 2 commercial winter meetings attended by 115 growers. With Extension's help, several growers have become GAP certified over the past several years, and 2 growers were re-certified this year. For these 2 growers alone, Extension's assistance enabled the sale of \$1,900,000 worth of vegetable crops. Richmond County Cooperative Extension helped the largest commercial horticulture grower in the county become GAP certified so he could more easily sell some of his 100,000 collard plants to wholesalers. With technical assistance from Extension, the farm successfully passed the GAP audit and will pursue GAP certification in other crops. **NC State Extension provided educational opportunities and technical assistance to fruit and vegetable producers on good agricultural practices (GAP) to enable farms to successfully receive their GAP certification and expand their market potential.**

Specialists conducted over 70 on-site diagnostic visits with golf course turf clients, impacting over 10,000 acres of pesticide and nutrient applications, and conducted over 60 on-site diagnostic visits with lawn care, sod farm, and landscape turf clients, impacting over 15,000 acres of pesticide and nutrient applications. As a result, turf managers make more cost-effective, environmentally responsible decisions regarding turf cultural practices, fertilizer, and pesticides. Over 5,000 turfgrass managers attended workshops, seminars, and professional talks provided by Extension. Survey results indicate that 85% of participants greatly increased their knowledge of pesticide application products and techniques, 85% will use more IPM strategies, 80% will change at least 1 management practice, and all participants indicated this

knowledge will help them be more efficient and environmentally conscious in their turf pesticide and nutrient programs.

Continuing education for landscape professionals is vital to improving sustainability and reducing environmental impacts. Horticulture Agents at the Cooperative Extension Forsyth and Chatham County Centers organized a 5-part webinar series for 367 landscape and green industry professionals. Extension presented information about managing invasive species, identification and management of conifer diseases and scale insects, improving urban soils for landscape tree plantings, and using smart irrigation systems. Ninety-nine percent of participants increased their knowledge of key topics, and 80% indicated they would adopt recommended BMPs. A total of 178 continuing education credits were earned by licensed pesticide applicators, arborists, and landscape contractors. **As a leader in experiential education, NC State Extension provided turfgrass managers and landscape professionals with best management practices, equipping them to make environmentally and economically informed decisions.**

### **Briefly describe how the broader public benefited from your project's activities.**

**Extension Master Gardener volunteers** help their neighbors understand and use research-based information and practices that decrease the misuse of fertilizers, insecticides, and pesticides in gardens, home lawns, and landscapes; increase overall food production and availability; enhance wildlife habitats and improve human health and wellbeing. Because of the work of Master Gardeners, more people are growing food locally, planting pollinator-friendly gardens, and creating resilient landscapes that help manage stormwater runoff. In 2021, despite ongoing limitations due to COVID-19 restrictions, Extension's Master Gardener program (EMG) continued to provide exceptional horticultural education to the general public. Statewide, 77,371 residents benefitted from the program's demonstrations, community gardens, workshops, and personalized consultations. Master Gardeners reported 158,634 service hours from 3,808 volunteers for the year, valued at an estimated \$4.1 million. EMG accomplished all this while continuing to support the development and launch of self-paced, non-credit online courses in plant identification and therapeutic horticulture, helping residents gain a deeper understanding of plants while exploring their capacity to enhance human health and wellness.

EMG also delivered a monthly Plants, Pests, and Pathogens webinar series in collaboration with the NC State Plant Disease and Insect Clinic. The live sessions were attended by 1,249 Extension agents and Master Gardener volunteers, and recordings attracted an additional 2,887 views on YouTube. Thanks to this webinar series, 74% of attendees increased their knowledge of pest and plant disease issues, and 72% increased their knowledge of using variety selection to sustainably reduce the impact of pests.

A few examples of the work of Extension Master Gardeners at the local level include EMG in Vance County launched a comprehensive outreach program in 2021, including a quarterly newsletter, a table at the Farmers Market, online seminars, and public demonstration gardens, reaching about 400 residents, virtually 100% of whom reported acquiring knowledge of best practices for horticulture. In addition, 300 of the participants reported implementing recommended best practices, for an estimated economic value of nearly \$23,000. In Johnston County, EMG partnered with local businesses to host mobile plant clinics from April through October, providing gardening and landscaping advice to 674 residents. Assuming a value of \$50 per consultation, they provided residents with \$33,700 worth of expert advice. NC State's Extension **Master Gardeners connect their neighbors to horticulture through science-based education and outreach that empowers North Carolinians to cultivate healthy plants, landscapes, ecosystems, and communities.**



## Comments

The following professional development workshops were provided by Extension Specialists for Extension Agents in 2021 to facilitate the use and transfer of new research-based knowledge:

- Abiotic Disorders
- Assessing Risks to Promote a “Food Safety Culture” in NC Produce
- Building a Plant Growth Regulator Program
- Climate-resilient Landscaping: Action Steps for Homeowners
- Disease and Insect Updates
- Google Hacks for Horticulture Agents
- Horticulture - Never Miss a Call!
- How to Implement a Master Gardener Volunteer Mentoring Program
- Interpretation of Soil Test Reports
- Introducing the Extension Master Gardener Toolkit!
- Irrigation water and produce safety
- It's Getting Hot Out There: Urban Tree Species & Climate Change
- Muscadine Pruning Workshop
- Practical Biological Control for Aphid and Thrips in Greenhouses
- Produce Handling Facility Tour and Training
- Produce Safety Alliance Training
- Rose Rosette
- Soil & Plant Tissue Sampling for Better Nutrient Management
- Soil Fertility
- Spotted Lanternfly Update & Training
- Substrate Amendments for Large Containers
- Tree Fruit Orchard Establishment - Take II
- Trends in Greenhouse Ornamental Diseases
- Turf and Lawn Update
- Vegetable IPM Field Training
- Winter Vegetable Production in High Tunnels

**Critical Issue**                      Protecting Environmental and Natural Resources  
**Project / Program**                Environmental and Natural Resources

## **NC State Extension Programs Conserve and Protect the Environment, Boost Sustainable Energy, and Mitigate Climate Change**

### **In 2-3 sentences, briefly describe the issue or problem that your project addresses.**

North Carolina remains the 9th largest state in the nation with 10.6 million residents. In recent years, the state has gained more new residents than nearly all other states (after Texas, Florida, and Arizona). This population growth and associated sprawling development cause agricultural and recreational land loss, deforestation, loss of biodiversity, increased stormwater runoff, encroachment on riparian buffers, increased surface runoff, and an increase in pollutants compromising the quality of our water, soil and air. In addition, more people generate more waste. Litter accumulates in high-traffic areas, resulting in millions of dollars in annual government spending on roadside and community clean-up. The NC Department of Transportation reported \$11 million in costs for roadway clean-ups in 2020 alone.

North Carolina's forests are facing increasing native and non-native threats, from invasive pests to a rapidly changing climate. As current landowners age and transfer property to the next generation, new landowners are struggling to sustainably maintain forested areas. NC also faces a growing threat from pesticide pollution. Farmers and homeowners find themselves with banned, outdated, or unwanted pesticides that are hazardous to landfills and waterways. Pesticide applicators must comply with changing environmental regulations to protect the environment, ensure worker safety, and avoid hefty fines.

Climate change, deforestation, air pollution, water pollution, loss of wildlife, and natural resource depletion threaten our ecosystems, increase rates of disease, decrease security (food, water, air), raise sea levels and temperatures, and cause severe weather events. To sustain the quality and diversity of North Carolina's natural resources, conserve and protect the environment, boost sustainable energy, and mitigate climate change, there is a need for research-based natural resource stewardship, and climate-smart agricultural and forestry best management practices to be developed, transferred to stakeholders and adopted.

### **Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.**

Through efforts of NC State Extension to sustain the quality and diversity of North Carolina's natural resources by conserving and protecting the environment, boosting sustainable energy, and mitigating climate change:

- NC State Extension Specialists disseminated new environmental and natural resource information and best practices through the publication of 57 peer-reviewed **factsheets** to educate Extension Agents, forest owners, natural resource professionals, municipal officials, homeowners, engineers, municipal governments, and private contractors.
- NC State environment and natural resource Extension Specialists maintain 8 **web portals** containing 2,049 individual webpages to disseminate up-to-date research-based information and best practices. 13 new webpages were added in 2021 along with 49 new educational posts made to existing pages. The environment and natural resource websites maintained by Extension Specialists were viewed 208,071 times.

- NC State Extension Agents had a **digital media** reach of 257,567 and a **mass media** reach of 298,6361 in providing new environmental and natural resource educational information.
- 8,245 individuals attended **training** provided by Extension Agents, and an additional 14,134 individuals attended training provided by Extension Specialists on environmental and natural resource topics.

To protect North Carolina's forests, NC State Extension collaborated with 14 forestry programs through Southern Region Extension Forestry to develop the [Woodland Stewards webinar series](#). The series provides Extension agents with a 4-week forestry program designed to educate new landowners. Since the series launched in 2019, it has reached a total of 542 participants from 44 states and Canada, impacting an estimated 79,000 acres of managed woodland.

[Extension forestry](#) held 2 **workshops** via Zoom, each featuring guest speakers and topics such as forest pest and disease identification and management, pine straw production, and the threat of rising sea levels to forest health. These events were widely promoted through social media and other agencies and NGOs. A total of 431 individuals participated, and an additional 31 viewed the workshops online. **As a result of NC State Extension forestry programs, new research-based forest conservation and climate-smart forestry information were transferred to stakeholders, empowering them to make better decisions to conserve and protect the environment.**

Under Extension's direction, the [Center for Applied Aquatic Ecology](#) (CAAE), in partnership with local government, maintains a network of **real-time remote monitoring systems** (RTRMs) in 3 major potable water supply reservoirs in partnership with local governments. The RTRMs provide high-frequency data 24/7 as an early warning system to help water treatment plants safeguard drinking water for about 750,000 NC residents. In 2021, the RTRMs collected more than 1 million key data points and posted data summaries to the CAAE's website, providing near real-time information to help water treatment plant operators optimize their filtration techniques cost-effectively. These data are also used by NC's environmental agency to improve the assessment and protection of these reservoirs. **As a result of NC State Extension's water monitoring programs, data on water quality was transferred to water treatment plants and other stakeholders, empowering them to make better decisions to ensure safe drinking water.**

In response to complaints of contamination due to the off-target movement of herbicides, Extension partnered with NC State researchers and the NC State Climate Office to develop a [Spray Conditions Tool](#) for the [North Carolina Environment and Climate Observing Network](#) (ECONet). This tool uses data from 17 of ECONet's research-grade weather stations across the state to provide key data to pesticide applicators so they can carefully time their applications and minimize pesticide drift. The tool provides user-friendly, color-coded information about spray conditions via desktop or mobile. Since the launch of this tool in 2020, it has been accessed over 3,510 times by over 1,000 unique users, and it has been incorporated into the NC Soybeans App to assist soybean producers. **As a result of NC State Extension's efforts, technology was developed to provide real-time information to help pesticide applicators make better decisions and reduce pollution caused by pesticide drift.**

Riparian buffers are key to protecting water resources in North Carolina. Many state and local rules protect the areas surrounding intermittent and perennial streams. These rules themselves can be confusing, and identification of water bodies subject to protection can be challenging to local municipalities, developers, engineering firms, and even state and local officials hired to enforce the rules. Even the background behind why the rules exist is often lost on those affected

by these rules. Extension Specialists worked with the NC Department of Environmental Quality – Division of Water Resources to develop the 4-day [Surface Water Identification and Training Certification](#) workshop series. Since 2014, nearly 350 individuals have been trained during SWTIC workshops, including new regulators with DEQ, land developers/consulting engineers, and NC town officials with delegated authority to regulate the NC buffer rules. In 2021, Extension collaborated with DEQ to develop 3 half-day **workshops** for officials from NC towns on buffer rule background, updates, and examples of enforcement (60 participants). The combined training of regulators who enforce the buffer rules and the developers/engineers who navigate these rules has been extremely successful. Both entities that receive this training are not only more well versed in the background, rules, and practices to identify regulated water bodies, but also work together better. This will increase permitting efficiency and ultimately save agencies, towns, and developers time and money when dealing with development near buffers. **As a result of NC State Extension efforts, regulators and developers have increased their knowledge of riparian buffers so they can make more informed decisions and protect stream areas from pollutant runoff and erosion.**

**Briefly describe how your target audience benefited from your project's activities.**

In partnership with the [New Hanover County Arboretum](#), Cooperative Extension undertook a multi-year effort to expand and add stormwater BMPs to reduce or eliminate stormwater runoff into the nearby Bradley Creek. Thanks to these efforts, runoff from the arboretum has been nearly eliminated, and the suite of BMPs provides a hands-on, outdoor classroom for students and professionals to learn about stormwater control on a commercial and residential scale. A stormwater walking tour was created for visitors to view the BMPs, and 8 lab sections were hosted with over 200 undergraduate students from the University of North Carolina Wilmington (UNCW)'s Environmental Sciences Department. In addition, the arboretum has hosted 30 grad students from UNCW's School of Public Policy, 25 participants in a statewide NC Soil and Water Conservation Conference, and 80 attendees from NC State's Department of Biological and Agricultural Engineering. **NC State Extension's trusted research-based technical assistance provided solutions to a stormwater runoff problem, and as the leader in experiential education, providing opportunities for students to put learning into practice.**

Cooperative Extension trained and certified 4,379 people in [stormwater control measure inspection and maintenance](#). In 2021 Extension also supported the writing, production, filming, and promotion of 10 environmental educational videos and written materials to support the Town of Cary's urban water quality protection program. Cary plans to release these videos in 2022 and to share the information with other NC communities facing stormwater regulations. After attending Extension programs, 5,510 participants statewide implemented Extension-recommended practices to conserve water use and protect water quality. In addition, 9,414 participants increased their knowledge of best management practices for preserving natural resources, including practices associated with stormwater systems, septic system maintenance, erosion control, rain gardens, and forestry. **NC State Extension's leadership in experiential education equipped stormwater professionals to effectively transfer knowledge and skills into practice.**

To support compliance with pesticide regulations, Cooperative Extension in Hoke, Pasquotank, Camden, Chowan, Currituck, Gates, Perquimans, Rowan, and Cumberland Counties partnered with the NCDA to provide over 1,133 pesticide applicators with 1,386 hours of [pesticide safety](#) continuing education and re-certification credits via in-person and virtual classes. Extension in Wilkes, Surry, Stokes, Yadkin, and Forsyth Counties delivered an additional 8,400 credit hours of continuing education and re-certification credits to 400 growers and other

pesticide license holders. Statewide, 10,151 people attended pesticide training, including 6,619 pesticide applicators who received 19,751 continuing education and re-certification credits.

Within domestic and peridomestic environments, a variety of habitats support the growth and development of arthropod communities (e.g., spiders, bed bugs, cockroaches, termites, ants, flies, mosquitoes, wasps, bees, beetles, fleas, lice, ticks, and silverfish). Unfortunately, competing stakeholder needs (consumer versus professional), public perception of “pests,” concurrent management of beneficial arthropods, rapid evolution of insecticide resistance in urban pest populations, and the public health impacts of synthetic pesticide use make modern urban pest management exceptionally challenging. These issues have prompted the development of [integrated pest management \(IPM\)](#), a science-based strategy that uses multiple tactics (not just pesticide application) to manage pest populations until their presence falls below a predetermined threshold.

To improve pest management strategies in diverse pest systems, NC State Extension conducted applied research projects to develop control strategies relevant to stakeholders, and provided agent training, workshops, and fact sheets. The [Plant Disease and Insect Clinic](#) provided answers to stakeholder questions and direct consultation was provided to over 200 cases virtually, by phone, email, and on-site. This 1-1 attention to clients provided the education necessary to change stakeholder behavior, as less pesticide was applied after several consults. Continued efforts to educate stakeholders on the targeted, efficient use of pesticides will lead to improved pest management and reduced pesticide input statewide, improving the health and safety of humans and domestic pests in urban environments. NC State Extension extended research-based education on strategies for urban pest management to stakeholders through a variety of methods to promote the efficient use of pesticides. As a result, stakeholders applied fewer pesticides after consults. Further work in this area will lead to improved pest management and reduced pesticide input, improving human health and safety. **Transferring research-based pest management strategies is just one-way Extension is keeping our communities healthy and safe, protecting the environment, and reducing risk.**

To support sustainability practices, Extension Agents in Onslow and Jones Counties along with other local partners delivered a 5-week virtual education series covering topics such as recycling, composting, protecting pollinators and wildlife, rainwater harvesting, and minimizing food waste. This series reached 110 people from 4 states and 2 countries outside the US. Most participants reported gaining significant knowledge and a desire to implement these sustainable practices in their daily lives. Forty percent of respondents reported an increase in knowledge about reducing food waste, and 76% reported intent to use what they learned. Fifty-seven percent of respondents reported an increase in knowledge about composting, and 80% reported an intent to start composting. Fifty percent of respondents reported increased knowledge of recycling, and 100% reported intent to use what they learned. Respondents also reported improved knowledge of pollinators, with 85% reported an increase in knowledge about how to protect pollinators in their landscapes and 100% reporting an intention to use what they learned to protect pollinators. The majority of respondents also benefited from learning about rainwater harvesting, with 67% reporting an intent to implement new practices to conserve water quality in their landscapes. NC State Extension agents offered a variety of programs addressing issues related to environmental protection and sustainability. As a result of this programming, 10,876 participants demonstrated increased knowledge of natural resources and environmental issues, and 9,310 participants expressed a willingness to participate in conservation actions (such as rain gardens, wildlife management, conservation easements, land trusts, and generational planning). **NC State Extension’s leadership in experiential education has helped program**

**participants put learning into practice by implementing sustainable practices to conserve and protect the environment.**

**Briefly describe how the broader public benefited from your project's activities.**

Over the last 5 years, Extension has led over 11 [streambank repair](#) workshops in Western NC. Overall water quality improvements have been reported in 7 Madison County streams and 3 Buncombe County streams due to reduced concentrations of sediment, fertilizer contamination, and fecal bacteria. In addition, 2,530 feet of the stream were fenced off from livestock, 2,549 trees and other protective vegetation were planted by volunteers, 3,088 linear feet of the stream were stabilized through repairs and native plants, and 88,000 square feet of runoff was treated with stormwater BMPs to reduce erosion and petrochemical contamination.

Cooperative Extension led 6 streambank repair projects across the state in collaboration with local partners, engaging with 289 participants and repairing over 1,200 linear feet of streambank during the workshops. Local partners reported an additional 8,525 feet of streambank repaired after the workshops. Streambank repairs produce a long-term return on investment, for example, repairs installed in 2019 have reduced soil loss by 877 tons per year and facilitated the removal of 1,365 pounds of nitrogen and 1,338 pounds of phosphorus from streams annually. In addition, a survey of realtors and property appraisers estimated that properties with stable streams are valued at 10% higher than those with eroding streams, meaning that the properties where repairs were installed increased in value by an estimated \$2,900,000. **NC State Extension's streambank repair efforts sustain the quality and diversity of North Carolina's natural resources by protecting drinking water, increasing property values, and protecting recreational spaces for all North Carolinians to enjoy.**

In Edgecombe County, the landfill has a storage area for pesticide containers that was almost at the overflow stage. To protect the environment from pesticide pollution, Cooperative Extension partnered with the Edgecombe County Solid Waste Department and a recycling company to conduct a pesticide container recycling program. As a result, 14,000 half-gallon containers and 2,500 1-gallon containers were collected, 100% of which were accepted for recycling. This event saved the community over \$5,500 and saved room at the landfill. Extension in Johnston County processed 9,250 pounds of pesticide containers for recycling. In partnership with the North Carolina Department of Agriculture & Consumer Services (NCDA&CS), Extension in Franklin, Henderson, and Hoke Counties helped local farmers and homeowners dispose of 15,804 pounds of pesticide containers and unwanted pesticides, preventing a huge volume of pollution from entering the environment and saving an estimated \$2.5 million in potential contamination clean-up costs. Cooperative Extension in Pitt County encouraged the recycling of pesticide containers through the maintenance of various collection sites, which allow growers to deposit triple-rinsed empty pesticide containers. By diverting these containers for reuse, 10,163 pounds of plastic were recycled, reducing agricultural producer disposal fees and extending the life of the landfill.

In addition to pesticide waste, farm operations generate large volumes of used oil each year. The Northampton County Cooperative Extension Office worked with producers to provide a cooperative program to reduce and control pollution in the soil and water. Two oil pick-ups yielded a total of 6,814 gallons of used oil collected in Northampton County in 2021. **NC State Extension's pesticide and motor oil recycling programs sustain the quality and diversity of North Carolina's natural resources by ensuring pollutants do not cause soil, groundwater, and surface water contamination.**

To reduce the environmental impact of littering, Extension in Carteret County launched the Big Sweep Initiative, scheduling monthly roadside clean-up events for March through December of

2021. Local businesses, civic organizations, military groups, and family groups provided 127 volunteers to remove over 5,000 pounds of litter and debris from roadways. In Pamlico County, Cooperative Extension worked with local partners to develop a litter awareness campaign that included developing materials to educate and encourage litter prevention and organized 2 community clean-up events, engaging 100 volunteers in collecting over 300 bags of roadside litter and removing approximately 3,000 pounds of litter from roadways. Extension in Pamlico County has laid a foundation for re-occurring litter awareness campaigns and plans to host annual roadside clean-up events in the future.

In Alexander County, Cooperative Extension launched a specialized clean-up for hazardous household items, partnering with local government and the NCDA&CS to collect and safely dispose of 6,986 pounds of paint-related materials and 14,884 pounds of latex paint in cans. Cleaning products, aerosols, mercury, and various other hazardous materials were also collected, securing a total of \$16,860 in savings for citizens. **NC State Extension's litter and household hazardous materials recycling programs sustain the quality and diversity of North Carolina's natural resources by reducing litter in our public spaces and helping to improve aesthetic value, reducing pollution of waterways and environmental impacts on our local communities, and preventing harm to wildlife.**

## Comments

The following professional development workshops were provided by Extension Specialists for Extension Agents in 2021 to facilitate the use and transfer of new research-based knowledge:

- Agricultural & Environment Law and Transportation: Overview & Opportunity
- Carbon Markets, Conservation Practices, and Ag Labor
- NC State Climate Office: Tools, Resources & Climate Communication
- It's Getting Hot Out There: Urban Tree Species & Climate Change
- The Educational Needs of North Carolina's Forest Landowners
- A Walk in the Woods: Visualizing Benefits of Forest Management
- Streambank Repair Certification Workshop
- Forest Farming Woodland Botanicals (ginseng, goldenseal, etc.)
- Invasive Forest Pests: "Poolside Pests" Outreach & Hands-On ID
- Wood Products Going Stale? Not in North Carolina

**Critical Issue**                      Enhancing Food Safety, Nutrition and Health  
**Project / Program**                Food Safety

## **NC State Extension Enhanced Food Safety Through Information, Resources and Programming Aimed at Preventing Food Safety Hazards**

### **In 2-3 sentences, briefly describe the issue or problem that your project addresses.**

Despite food safety communication efforts by many sectors, foodborne illness remains a significant health issue in North Carolina and across the U.S. The Center for Disease Control (CDC) estimates that as many as 48 million cases of foodborne illness occur annually, leaving 128,000 people hospitalized and causing 3,000 deaths. The majority of foodborne illness is caused by 31 major identified pathogens, including norovirus, salmonella, and listeria. Regardless of cause, foodborne illness costs society an estimated \$152 billion annually.

Most estimates suggest that 70% of foodborne illnesses are acquired outside of the home. There are a multitude of opportunities for foodborne illnesses to be introduced into the food system including poor sanitation during production and processing; unsafe storage and handling of the raw products; improper washing and cleaning of equipment; undercooking, lack of proper chilling, and cross-contamination. Foodborne illness is nearly 100% preventable if safe food handling practices are applied from the time food is received until it is served, and if an outbreak occurs, the National Restaurant Association estimates it could cost an establishment \$75,000 in addition to posing a threat to public health.

Home food preservation continues to be an area of interest for North Carolinians wanting to take advantage of the abundance of available foods from home gardens or local markets. The local food movement and current economic situation have led to a resurgence in home food preservation as a viable alternative to contemporary food purchase. When preserving, it is essential to employ evidence-based, research-tested strategies and methods to ensure the safety of products.

### **Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.**

NC State Extension utilized various methods to enhance food safety throughout the supply chain through producer and consumer-based information, resources and programming aimed at preventing food safety hazards.

- NC State Extension Specialists disseminated new food safety information and best practices through the publication of 103 Extension factsheets and publications to educate Extension Agents, producers, members of industry and the public.
- NC State Extension Specialists maintained 5 food safety-related educational websites with a reach of 76,858 and made 1027 educational social media posts with a reach of 745,454.
- NC State Extension Specialists produced 60 on-demand educational videos on food safety-related topics that were viewed 506,278 times.
- 4,606 individuals attended food safety training provided by Extension Agents and an additional 3,683 individuals attended training provided by Extension Specialists.



- Food safety technical assistance was provided to 452 people by Extension Agents, and Specialists provided services to an additional 840 clients.

As required by U.S. food and drug regulations, the formulation and process to make acidified food are reviewed for product safety and to ensure critical limits of ingredients and thermal processing are met. The [Entrepreneur Initiative for Food \(EI4F\)](#) program ensures individuals and firms transform agriculture commodities into safe, nutritious, value-added food and beverage products by classifying foods according to FDA standards and providing research-based processing recommendations. In 2021, 855 requests for product testing services and 542 nutritional label requests were received. EI4F provided 696 processing recommendation letters and certified 308 individuals for the manufacture of acidified foods via the [Acidified Foods Manufacturing School](#) online course. **Good manufacturing practices (GMP)** is a system that consists of processes, procedures and documentation that ensure manufactured products, such as food, are consistently produced and controlled according to set quality standards. An Extension Specialist worked with a small company producing a locally manufactured food product in meeting GMP requirements for sanitation and improved product quality. Through consultation and technical assistance with equipment disassembly and sanitation procedures, the Extension Specialist pinpointed the cause of spoilage contamination, preventing further loss of finished product and ensuring a safe food product. **NC State Extension's extensive partnerships with agriculture, business, and industry resulted in the development of safe new food products.**

**Processing fresh produce into fresh-cut products** increases the risk of bacterial growth and contamination by breaking the natural exterior barrier of the produce. An Extension Specialist worked with the owners of a food hub to expand their business into fresh-cut processing. The Specialist assisted with achieving compliance with third-party audit requirements and state/federal food safety requirements. **NC State Extension's trusted research-based technical assistance increased processor knowledge of food handling, processing, cross-contamination, and hygiene-resource limitations that can occur in food production.**

**Hazard analysis and critical control point (HACCP)** and food safety go hand in hand. The HACCP system uses a systematic, science-based approach to identifying specific hazards and controlling critical points in food handling to prevent food safety problems and reduce the reliance on end-product inspection and testing. The [Retail Hazard Analysis and Critical Control Point \(HACCP\)](#) course for regulators and restaurant operators was transitioned to an online format in late 2020 in response to in-person meeting restrictions caused by the COVID-19 pandemic. Through online training and collaboration with local Extension agents, 306 regulators and operators from across the US received 3,672 contact hours of instruction surrounding retail hazard analysis and critical control point food processing safety standards. Also in 2021, Extension provided 14 seafood industry personnel with training in [Seafood HACCP](#) and assisted in writing or reviewing 10 HACCP plans for 5 companies. Technical assistance and advice regarding seafood science inquiries were provided to 11 individuals/companies through phone calls and meetings, and 3 quality analysis product tests were conducted for 3 companies. **The HACCP training and assistance with plan writing, science-based technical advising, and quality analysis product tests were just part of how NC State Extension increased producers' knowledge of BMPs that reduced the likelihood of foodborne illness.**

The [NC Safe Plates](#) program team develops practical food safety training and educational materials for retail and consumers to impact attitudes, norms, and behaviors around food safety. In 2021, 4 new Safe Plates programs were developed: Safe Plates for Food Managers (online), and Safe Plates at Home: General, Holiday Gatherings, and Disaster Preparedness and

Recovery. In addition, 100 new resources, including informational sheets and social media images, were developed. Through collaboration with local Extension Agents, a total of 2,712 hours of NC Safe Plates training was delivered, and 226 participants achieved Safe Plates for Food Managers Certification. Extension Specialists provided technical assistance in 800 food safety cases. The NC Safe Plates Food Safety Information Center created 1,027 posts and 55 videos on Instagram, Facebook, TikTok, and Twitter, which reached a total of 745,454 individuals. Utilizing a novel, yet popular approach to information sharing, 506,260 individuals were reached using 52 videos on TikTok and Instagram's Reels function. These novel communication methods reached consumers far beyond what we would be able to accommodate in in-person classes and training. **NC State Extension reduced food-related illness outbreaks through research-based education and consumer engagement.**

To enhance food safety, Extension helped individuals and families increase their knowledge of food safety through in-person and online workshops, educational social media content, articles and factsheets, instructional videos, and educational TV programming. Extension in Hyde, Gaston, Forsyth, Beaufort, Haywood, Nash, and Wilkes Counties helped over 10,393 individuals learn best practices for safe [home food preservation](#) via in-person and online workshops, articles, and instructional videos. Topics included canning, pickling, freezing, foodborne pathogen science, safe thawing, home-canned food storage, dehydration, and fermentation. Although most of the consumers who benefitted from these efforts were NC residents, Extension Agents reported engagement with consumers around the globe, including residents of England, Germany, and Canada. Extension in Dare County, via cable and video on demand, reached over 5,000 viewers with education programs spanning food safety, home food preservation, healthy recipes, and more. In Beaufort County, over 8,894 people received accurate information on the importance of proper canning methods as a result of articles and instructional videos on home food preservation of pickles, jams and jellies, and green beans; 42 consumer food preservation questions were answered by phone and email during the canning season, and seventeen dial gauge pressure canners were tested by a certified gauge during the summer at the Cooperative Extension Office. Two dial gauge pressure canners were inaccurate. Consumers followed up and replaced defective gauges to ensure safe food preservation products for their families. **NC State Extension's extensive statewide network of county-based agents provided families with trusted research-based knowledge to prevent foodborne illness.**

### **Briefly describe how your target audience benefited from your project's activities.**

Small farms that sell through direct market channels and to the local food hub are typically not GAP audited or subject to the requirements of the FSMA produce safety rule. Nonetheless, all farms need to be knowledgeable about how to manage [produce safety](#) risks and how to implement postharvest practices that will improve the safety of their produce. A local food hub no longer required growers to be GAP audited but they still wanted all growers to have basic produce safety training. To address this training need, a 2-hour **Quality Produce from Harvest to Market** workshop was held at the TRACTOR food hub facility. Nine growers and 1 food hub staff member attended the training. As a result of the training, all evaluation respondents indicated that they improved their knowledge in at least one area. **Extension Area Specialized Agents helped educate growers about the Food Safety Modernization Act (FSMA), the Produce Safety Rule, and the Preventive Controls Rule for Human Food.**

[Selling home prepared food](#) such as jams, jellies, cakes, and other baked goods has become popular. However, selling home-prepared food comes with risks. Community & Rural Development and Family & Consumer Sciences Agents in Nash, Edgecombe, and Harnett counties offered a program, **NC Homemade**, to bring awareness to food safety and the risk of

selling food products from home. NC Homemade was adapted from the University of Florida's Homemade Entrepreneur program and developed with the assistance of UF/IFAS Extension. Following the first year of the program, one participant reported that they already passed inspection with their home kitchen and started their new business venture, two participants branched out their products to offer a broader selection at the farmers market, and all participants reported increased knowledge in food safety, business marketing, budgeting, and NC food laws. **NC State Extension enhanced food safety through programming aimed at preventing food safety hazards during the food manufacturing process.**

To reduce foodborne illness outbreaks, FDA Food Code requires a Certified Food Protection Manager to be onsite during hours of operation at food service establishments. To address the growing need for food safety training opportunities, the Safe Plates team developed an online, self-guided, [Safe Plates for Food Managers](#) program. Hyde County was 1 of 5 counties to participate in the pilot of the Safe Plates for Food Managers online program. Participants independently completed the modules and contacted the Family and Consumer Sciences Agent with questions along the way. All 8 participants passed the exam on their first attempt. One of these individuals took the course in preparation to open her deli in a town that previously had no restaurant options, a dream for her that is now a reality. Bladen County Cooperative Extension also volunteered to pilot the new virtual Safe Plates for Food Managers program. As a result of participating in the Safe Plates for Food Manager's pilot, 2 foodservice employees in Bladen County have successfully passed the Safe Plates for Food Managers examination. For one participant the impact of being able to complete this course and take the exam doesn't end with just the passing score, it also means that she is now able to move forward with opening her restaurant, something she has been working towards since before the pandemic. **As a leader in experiential education, NC State's Safe Plates program equipped food production managers and handlers to effectively transfer best management practices into practical application.**

Food-insecure families took charge of their home food safety practices after participating in the [Expanded Food and Nutrition Education Program \(EFNEP\)](#). Educators used Zoom, Facebook Live, Google sites, and phone communications to engage with 3,177 low-income families and youth statewide. Ninety-one percent of EFNEP graduates improved their food safety skills. Participants were given a meat thermometer and shown proper use in McDowell County's EFNEP program. Ninety-four percent of EFNEP participants showed improvement in the food safety practice of using a thermometer, enabling these families to practice safe food preparation in the home.

The National Center for Home Food Preservation revealed that a large percentage of home food processors are using outdated and unreliable [home food preservation practices](#) that put them at risk for foodborne illness. One area of home food preservation that experienced a surge in interest in fermentation. Family & Consumer Science (FCS) Extension Agents from Haywood, Madison, Yancey, and Buncombe Counties collaborated to offer a virtual home food preservation series entitled "Ferment On." Agents offered a series of 5 virtual classes on fermenting kimchi, kombucha, pickles, sauerkraut and yogurt. An average of 45 participants attended each of the 5 classes and were provided with virtual demonstrations, Q&A sessions, fact sheets, recipes, links to reliable resources, and video recordings. Participants gained reliable information on fermenting as a means of food preservation. A group of 6 Extension Agents partnered to educate community members in a 7-county area about safe home food preservation of local foods. Six virtual workshops covering an introduction to home food preservation, pressure canning, boiling water canning, freezing, fermentation, and sweet spreads were provided to a total of 509 people. Participants commented that "I appreciated the expertise and the genuine concern that everyone learned safe methods of preserving" and "I am

just learning the basics. I thought I had canned correctly before using instructions from the internet, but I did it completely wrong. I sincerely appreciate Extension providing this information!"

FCS Agents in Nash/Edgecombe, Martin, and Bertie counties noticed an increase in misinformation about food preservation on the internet and videos showing improper food preservation techniques. In response, the agents hosted a virtual home food preservation program with 10 food preservation classes. Over 450 participants learned about water bath and pressure canning and fermentation. Several participants shared that they had done some home food preservation in the past but openly admit it was not the proper way and they were very thankful we offered these classes. Cooperative Extension's Gaston County Center conducted 8 online food preservation workshops for 205 participants. As a result of the training, 75% of participants plan to purchase local foods for home food preservation within the next 6 months, and 75% learned new food safety techniques and plan to use skills for home food preservation within the next 6 months. Gaston County found that the online workshops have been a great way to attract new Extension audiences to participate in other Extension programs such as local food workshops. By conducting in-person classes in Beaufort County with demonstration and hands-on education, over 65 individuals learned about proper techniques to prevent foodborne illness by preserving pickles, jams and jellies, and low-acid vegetables and meats. Ninety-eight percent of participants gained knowledge of proper canning methods and techniques. Participants left knowing Extension shared research-based information to improve their knowledge and practice in home food preservation and with the skills to preserve food that will be safe to consume. **NC State Extension improved consumer health and reduced food-related illness by increasing consumer knowledge of safe food preparation and preservation practices. NC State Extension is a reliable educational resource to teach food safety to consumers.**

### **Briefly describe how the broader public benefited from your project's activities.**

The global SARS-CoV-2/COVID-19 pandemic has caused unparalleled millions of illnesses and hundreds of thousands of deaths worldwide. This pandemic has had a direct impact on the US food supply, forcing the food sector and regulatory communities to address this emerging pathogen based on scarce data. Public health and regulatory officials scrambled to provide guidance for the food sector early in the outbreak. A multistate project team, [FoodCoVNET](#), led by NC State Extension Specialists stepped in to fill this gap.

A review and cataloging of the existing and expanding literature was conducted and utilized to provide ongoing, science-based technical support to the food sector. Through this project SARS-CoV-2/COVID-19 concerns are being addressed by evaluating practices and confirming efficacy through laboratory research on virus persistence, inactivation, and transfer. This knowledge is being translated into a variety of forms to aid in future decisions, and the outputs are being housed on a public website for widespread distribution. FoodCoVNET has a foundation of stakeholder engagement, utilizing an iterative approach to gather information from food sector constituents and industry leaders to ensure that data gaps are identified and filled.

FoodCoVNET has developed peer-reviewed resources providing best practices for preparing for COVID-19 and managing risk for individuals at home and for food environments based on guidance and best practices as outlined by the Centers for Disease Control and Prevention (CDC), the Environmental Protection Agency (EPA), the United States Department of Agriculture (USDA), the Food and Drug Administration (FDA), the World Health Organization (WHO), and the best available science. The resources, which include infosheets and social media images in multiple languages, have been developed for 3 distinct audiences: household and community management of the virus; retail and food establishments; and farms, gardens,

and produce. The FoodCoVNET project team has also coordinated a webinar series and offers the FoodCoVNET University for Businesses training series focused on providing the necessary knowledge and information needed to manage COVID-19 within businesses as restrictions are relaxed. The 5 courses in this series provide a consistent approach based on state and national guidelines and are designed to incorporate the best available science in social and physical distancing; employee health; and cleaning, sanitizing, and disinfection. As a leader in experiential education, Extension presents these courses considering adult education and behavior theories, with each of these short training sessions being designed to be less than 30 minutes long and delivered online in an engaging, interactive format.

Research has found that neither food nor food packaging are considered significant ways of spreading or causing the COVID-19 virus. However, it is always important to follow good hygiene practices when handling or preparing food for yourself and others to prevent foodborne illness. **Providing science-based strategies and practices to reduce the public health and economic impacts of COVID-19 on the food sector and all North Carolinians is how we are growing a healthy, vibrant North Carolina.**

### Comments

The following professional development workshops were provided by Extension Specialists for Extension Agents in 2021 to facilitate the use and transfer of new research-based knowledge:

- Assessing Risks to Promote a “Food Safety Culture” in NC Produce
- Disaster Preparedness and Recovery Training
- Home Food Preservation 101
- Irrigation water and produce safety
- Produce Handling Facility Tour and Training
- Produce Safety Alliance Training
- Safe Plates for Food Managers
- Who Regulates Our Food?

**Critical Issue** Enhancing Food Safety, Nutrition and Health  
**Project / Program** Nutrition & Health

## **NC State Extension Provided Evidence-Based Programming to Empower North Carolinians to Adopt Healthier Lifestyles**

### **In 2-3 sentences, briefly describe the issue or problem that your project addresses.**

Chronic diseases such as cancer, heart disease, stroke, and diabetes are among the leading causes of death, and in 2017 they accounted for half of all deaths in North Carolina. These 4 conditions accounted for 194,706 hospital admissions (20% of all admissions) and over \$9.9 billion in hospital charges (27% of total hospital charges). In 2020 the state ranked 20th in the nation for obesity, with 33.6% of the population obese, and 11th and 12th highest for diabetes and hypertension, respectively. Through a healthy diet and physical activity, many of these chronic conditions are preventable. However, in North Carolina, nearly one-quarter (23%) of adults reported not participating in any physical activities or exercises, 42.3% consume fruit less than once a day, and 22.4% consume vegetables less than once a day. Children are following closely in their footsteps, with only 1 in 4 eating the recommended amounts of fruits and vegetables and almost half spending more than 2 hours watching television each day.

Obesity is referred to as a grave public health threat, a national epidemic, a public health crisis, a global problem, and even a global pandemic. Obesity poses one of the most serious public health challenges of the 21st century. Coupled with obesity there is an increasing rate of food insecurity. NC is ranked the 10th hungriest state in the nation, with nearly 1.5 million NC residents experiencing food insecurity. Almost 1 in 5 children in North Carolina face hunger regularly (24.6%). Food insecurity has increased as a result of the pandemic, amplifying the needs of food-insecure families.

To help North Carolina reduce chronic disease risk and food insecurity, NC State Extension needs to promote policies, environments, and education that sustain healthy behaviors through the consumption of healthy diets, active lifestyles, access to nutritious food and the achievement and maintenance of healthy body weights.

### **Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.**

To promote health and wellness, prevent chronic disease, and increase access to healthy foods, NC State Extension utilized multiple methods and empowered individuals and families to implement behavioral changes focused on healthy eating patterns and physical activity to improve overall health and to use learned strategies, skills, and resources to reduce the risk of chronic disease and illness. As a result of NC State Extension programs, **22,009 adults increased their fruit and vegetable consumption, 7,279 increased their physical activity, and 7,720 consumed less sodium in their diet.**

- NC State Extension Agents made 103,150 **direct educational contacts**, had a **digital media** reach of 94,406,731 and a **mass media** reach of 35,932,627 providing food safety and **nutrition education** information.
- 8,702 adults and 18,383 youth attended **nutrition-related workshops** provided by Extension Family and Consumer Science (FCS) Agents.
- 5,121 adults attended **workshops related to cooking and food preparation** provided by Extension FCS Agents.

- 11,447 hours of service were donated by **Master Food Volunteers**, valued at \$297,339; and 7,029 hours of service were donated by **EFNEP volunteers**, valued at \$182,613.

Pitt County's EFNEP Educator was concerned that because schools were closed, many youths were suffering from food instability. After receiving notice of an extension of SNAP food benefits, the EFNEP Educator worked to get the word out. The EFNEP Educator reached over 340 people by **posting information on Facebook**. She received phone calls from individuals stating the posting helped them apply and receive the extra food dollars.

**Food banks** have a difficult time securing meat protein simply because of its cost. At the same time, farmers are dealing with deer damage, and hunters are harvesting more deer than they can consume. Cooperative Extension in Madison County partnered with other nonprofits/food banks, hunter groups, and food processors to **create a system for increasing the amount of venison donated** to food banks. The program included fundraisers, coordination, facilitation, and hands-on assistance and training in meat handling. As a result, several thousand dollars were raised to pay for the processing of venison, and 4,500 pounds of meat were donated to the local food banks in 2021. This equates to 18,000 meal portions of protein entering the food chain for food-insecure families.

As a result of job loss during the COVID pandemic, many people were struggling to provide meals for their families. All families with children in the Lenoir County Public Schools received a **Pandemic Electronic Benefit Transfer card (P-EBT card)** to support and promote the purchase of fresh local produce. The Lenoir County Farmers Market was able to reinstate the EBT system to accept the P-EBT card. The **Fresh Bucks Program** was implemented, where any customer purchasing with an EBT or P-EBT would receive a match of dollars to spend at the Farmers Market. Cooperative Extension found new ways to support individuals and families experiencing food insecurity and strengthen community capacity to tackle food security challenges through a broad range of community education efforts and by supporting local food distribution hubs. **As a result of NC State Extension efforts, 588,459 pounds of local food were donated for consumption by vulnerable populations.**

### **Briefly describe how your target audience benefited from your project's activities.**

To address hunger during unprecedented times, Extension in Wake County facilitated county-wide COVID-19 **Emergency Food Response** resulting in over 14 million meals being served to food insecure residents since March 2020. The county deployed diverse strategies, including the development and ongoing support of 13 community food distribution points (Emergency Food Hubs) operated by faith partners and nonprofits; an innovative phone app, Tangelo, designed to assist with home grocery delivery; farm gleaning support; summer meal support for children and families; and culturally appropriate Food Boxes for the Latinx population. Collectively, the Emergency Food Hubs distributed 6,833,765 meals since January 2020. In the first 4 months of the Tangelo grocery delivery pilot, 28,364 pounds of food were delivered to 370 food insecure and transportation-limited families.

In Lee County, Cooperative Extension supported food insecure families' access to healthy foods by providing technical expertise to support food distribution to over 700 families per month and distribution of over 500 educational healthy eating card decks to families. ***Through a variety of programs and services, NC State Extension increased access to healthy foods and provided information on healthy eating to food insecure North Carolinians.***

In 2021, [Steps to Health](#) direct education programs were delivered to 1,273 participants (1,031 youth and 242 adults). Steps to Health promoted policy, system, and environmental change initiatives across 53 sites and communities, 27 of which initiated change strategies that impacted 17,203 NC residents by increasing healthy food options, increasing physical activity

opportunities, and encouraging healthy choices. In addition, messaging to support healthy eating and physical activity made 4,511,420 impressions on social media and through social marketing implementation of digital messages and in-store signage. **Take Control**, Steps to Health's chronic disease prevention program reached 242 adults. Across all adult programs, 54% of participants reported improving healthy eating behaviors, and 49% reported improving their physical activity. Steps to Health includes **Color Me Healthy**, a nine-session sensory-rich pre-school nutrition education program that reached 481 children across 20 sites for a total of 3,799 educational contacts, and **Kids Club**, an eight-session nutrition and physical activity program that reached 340 students across 12 sites for a total of 1,676 educational contacts. The Steps to Health **2nd/3rd Grade Program** is a nine-session nutrition education program that encourages students to explore healthy foods from MyPlate and to practice proper handwashing. A total of 143 students participated in the program at 5 school sites with a total of 1,688 educational contacts. Preschool teachers in Columbus County reported that all 53 children that participated in Color Me Healthy improved their willingness to try fruits and vegetables, and many parents commented about their children being willing to try new foods after the class. Across all school-based Steps to Health programs, 29% of participants improved their healthy eating behaviors, 47% improved physical activity, and 46% improved their food choices. **Through Steps to Health, a comprehensive approach to impact the health and nutrition of limited-resource NC residents, Extension delivered nutrition education to food-insecure families and youth while promoting systematic community changes to support healthy living.**

In 2021, [EFNEP](#) used Zoom, Facebook Live, Google sites, and phone services to serve 1,233 adults and 9,032 youth, 84% of whom were enrolled in one or more food assistance programs. 97% of EFNEP participants improved dietary intake, 85% now practice daily physical activity, 96% practice better food resource management, and 91% have improved their food safety habits. For participating in EFNEP online classes in Franklin County, participants were given fruit and vegetable vouchers. Eighty-five percent of Ashe County School participants reported swapping sugary beverages for water or low-fat milk. In Chowan County, 400 elementary school children received jump ropes to encourage physical activity, and 72% of Chowan County youth participants increased their daily physical activity. A water bottle and lunch bag skill builder was used in Northampton County to help clients be intentional about drinking more water. As a result of the program, a mother and grandmother of 3, now keeps 8-oz. bottles of water in the office to make that her number 1 drink choice. She substitutes healthier snacks, such as fig bars and fruit, for cookies to keep in her desk drawer. She states, "With all of the 8-course lessons, I have learned so many nuggets to keep me more alert and spend my time wisely with my grandchildren. I plan to be more active and alert while running behind my grandkids. With all the great habits I am forming, I can reach my mental and spiritual goals." **NC State Extension's Expanded Food and Nutrition Education Program (EFNEP) empowered food-insecure families to take charge of their health and economic well-being by teaching families and school-aged youth how to provide nutritious, safe meals on limited budgets.**

Two small NC counties partnered with a regional health system to provide participants with a weekly **Meal Kit** that included all needed ingredients. Participants logged on each week and cooked along with instructors. In another county, an Extension Agent wanted to use a new and innovative approach to provide educational experiences to clientele. Thus, the **Make At-Home Meal Kit program** was initiated. The Extension Agent created and marketed family meal kits featuring the Mediterranean way of eating (Med Instead of Meds). Individuals and families signed up online to pick up healthy dinner kits they could make at home. As a result of this educational outreach, many families ordered the kits and became familiar with eating the healthy Mediterranean way. The director of the largest food bank in the county participated and



plans to make healthy meal kits to go for food bank clientele. **NC State Extension used innovative meal kits to deliver nutrition education to families and community members and bring about behavioral changes focused on healthy eating patterns to improve overall health.**

Extension in Burke County delivered the [Cook Smart, Eat Smart](#) Cooking School in a virtual setting, providing 98 adults across 5 counties with education in basic healthy cooking techniques. Each of the classes included demonstrations of fundamental cooking techniques and tips on eating healthy at home by reading nutrition labels and practicing portion control. Participants received tips for stretching their food budgets while eating healthy foods. Participants reported eating more meals at home, eating more fruits and vegetables, and eating smaller portions. Most participants also reported that the program helped them reduce the amount of money they spend on food. Extension in Gaston County offered 10 virtual workshops on **Healthy Cooking with Herbs** and local, seasonal produce to 468 adults from around the world. Participants reported that the workshops helped them both improve their cooking and eating habits and stay connected to others during the pandemic. **Through NC State Extension cooking programs, clientele used learned strategies, skills, and resources to reduce the risk of chronic disease and illness.**

### **Briefly describe how the broader public benefited from your project's activities.**

North Carolina's [Steps to Health](#) program is a comprehensive approach that impacts the health and nutrition of limited-resource residents by not only providing Extension-delivered direct education to food-insecure families and youth but also promoting systematic community changes to support healthy living. Policy, systems, and environmental (PSE) changes are a way of modifying environments to make healthy choices practical and available to all community members.

In 2021, Steps to Health promoted PSE change initiatives across 53 sites and communities, 27 of which initiated change strategies during 2021. These changes impacted 17,203 North Carolina residents by increasing healthy food options, increasing physical activity opportunities, and encouraging healthy choices. In addition, messaging to support healthy eating and physical activity made 4,511,420 impressions on social media and through social marketing implementation of digital messages and in-store signage.

The **Communities Moving Together Walk Audit Toolkit** was revised and is now available in North Carolina through Steps to Health. The toolkit can be utilized by Extension educators and community partners throughout the state to support policy, systems, and environmental work to support health in communities that are in most need of resources. Through collaboration with local community partners and leaders as well as local FCS Agents in each county, 3 walk audits were conducted. At each of these walk audits, long and short-term goals were identified, and many of these goals have already been addressed through collaborations between Steps to Health staff, Extension agents, local municipal leaders, and the Department of Transportation. Some highlights include town coordination with the DOT to install pedestrian safety signs to slow through traffic; locating, painting, and restoring benches to provide rest areas for seniors and others along major walkways; and new signage to protect students walking home from schools.

The Gastonia Farmers Market was facing two challenges: they needed to increase the utilization of the market, and they needed find a way to use the market as a location to collect community data. The market manager approached the Cooperative Extension Center in Gaston County seeking assistance. The farmers market, in partnership with the Steps to Health program, utilized the **Policy, Systems, and Environment (PSE) Toolkit for Farmers**

**Markets** to conduct approximately 30 in-person surveys. Staff then created an online survey to target a limited resource community located in proximity to the market. The survey was distributed via email (~50 contacts) to the Community's Neighborhood Advisory group to gather specific information about the interests and behaviors related to the Gastonia Farmers Market. In working through the PSE Toolkit, this project enabled Gaston County to begin data collection, including the completion of the market manager interview, patron surveys, and neighborhood surveys. This data showed an interest in additional seasonal produce such as apples, an interest in expanded produce varieties (including non-local varieties), additional operating hours, and concerns about pricing.

Many areas in Yadkinville, NC are not easily accessible to use for walking or other exercise because they do not have crosswalks, proper signage, space to walk, etc. Yadkin County Extension staff sought to make a difference by reaching out to local 4-H'ers to create an impactful 4-H Summer Enrichment Program to empower youth to help their community.

The **Steps to Health Walkability Program - Communities Moving Together** was adapted for a youth audience. Youth conducted a walk audit of the city of Yadkinville community and presented their findings to the Yadkin County Commissioners. The Commissioners were so impressed with their work that the findings were presented to the Department of Transportation, and the county plans to implement some of the youth's ideas in the city of Yadkinville area. This event also resulted in 90% of youth participants feeling empowered to be leaders in their community. One parent even exclaimed that her child now wants to go into a career centered around city planning and landscaping to help better communities for those with handicaps.

Led by the local Extension Agent, town and county officials, and residents, a **walk audit** around the Town of Princeville, NC was conducted to assess the walkability of key areas of town. The Extension Agent worked with the mayor of Princeville to address some of the short-term goals, including the need for signage related to the historical locations in the town and encouraging walking at Princeville Elementary. It is anticipated that the entire town of Princeville will be impacted.

Edgecombe County has high rates of poverty and persistent health disparities. Despite persistent health issues, Edgecombe County has significant health assets that can be harnessed. NC State Extension faculty and staff worked with local Cooperative Extension staff to create a **Parks and Recreation Advisory Board** and implement various activities, including 1) increasing the number and promotion of shared-use policies and practices in key community organizations; 2) connecting and promoting vital county and town physical activity resources through wayfinding and signage; 3) support municipalities in improving connectivity between places people live, learn, work, play, and pray through walking and recreation space audits; 4) support and promote walking and biking to and during school; and 5) create and implement a county park and recreation comprehensive plan.

As the need for Americans to be physically active becomes more evident, communities are looking for ways to build environments that encourage outdoor activity. A community member, who was tired of going outside of the county to participate in the newly popular sport of disc golf, approached Cooperative Extension at the Currituck County Rural Center (CCRC) with the suggestion of adding a course to the facility. Together they developed a plan to turn an underutilized space on the property into a disc golf course. After creating a plan to utilize the space, physical disc golf holes needed to be purchased. The volunteer and director of the CCRC acquired sponsorships and donations totaling over \$9,000 from outside individuals and area businesses. A complete 18-hole disc golf course was then able to be designed and installed on the county property. In the fall of 2020, this three-year-long project was completed. Thus far, the course has been utilized in two-disc golf tournaments and averages 100 disc golf players per month. This course has not only proven to be a great success for the community but

has also brought in new 4-Hers. Six weekly camps for the 4-H youth throughout the summer were held with attendance between 8 and 10 each week. **Currituck County Extension was instrumental in establishing a community disc golf course and improving the quality of life for residents and visitors.**

### Comments

The following professional development workshops were provided by Extension Specialists for Extension Agents in 2021 to facilitate the use and transfer of new research-based knowledge:

- Cook Smart, Eat Smart
- Cooking Essentials, Ingredients for Life
- Coordinate & Plan Nutrition
- EFNEP
- EFNEP Recipes: Guidance for Educators
- Food Labeling Facts and Myths
- Med Instead of Meds
- Pivoting for Maximum Impact: A Case Study Examining Nutrition Education
- Policy, Systems, and Environment Changes
- Steps to Health
- The Students are Hungry, 1 in 4 NC Children are Food Insecure

**Critical Issue  
Project / Program**Enriching Youth, Family & Community Well-Being  
4-H Youth Development**NC State Extension's 4-H Programs Provide Opportunities for all Youth to Identify their Passion or "Spark" and Develop Life Skills to be Prepared for Future Success****In 2-3 sentences, briefly describe the issue or problem that your project addresses.**

North Carolina has 2.3 million youth under the age of 18 or 22% of the state's population. 561,000 (25%) of those youth live in families that receive public assistance, and 451,103 children (20%) live in poverty. When the pandemic hit, the economic divide increased for many families, especially single mothers, who had to choose between employment and childcare. As schools shifted to virtual learning, the barriers to quality education increased for this population. A number of children also lost stable access to two nutritious meals a day. COVID-19 restrictions also exacerbated mental and physical health issues, leaving children in even greater need of support for a healthy lifestyle. Youth faced increased social isolation and the effects of increased screen time and social media usage.

National reports continue to show that the United States lags woefully behind other nations in STEM (science, technology, engineering, and mathematics) education both at the elementary and secondary levels. In addition, educators often report that students lack understanding and appreciation of the science behind critical fields that fuel individual and societal wellbeing, including technology, agriculture, and horticulture. This creates a continual need to provide students and educators with educational enrichment activities, and this need has been exacerbated by COVID-19 restrictions on hands-on, in-person learning.

4-H, NC State Extension's youth development program, focuses on positive youth development, providing safe experiences that increase the likelihood of enhanced wellbeing and optimal development for participating youth. When combined, the elements of youth "Sparks" - developmental relationships, program quality, and youth engagement create an enriching developmental context for youth participants in 4-H programs. To enhance the well-being and development of youth, there is a need for Extension to provide opportunities for all youth, ages 5 – 18, to identify their passions or Spark and develop life skills that prepare them for future success.

**Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.**

To help youth develop life skills that will prepare them for future success, NC State Extension provided [4-H Youth Development programs](#) that focused on civic engagement, healthy living, and STEM. In 2021 Extension offered a broad range of in-person and virtual 4-H educational programming. Activities included day camps and overnight camps; clubs; hands-on learning activities in the home, classroom, and community; online educational programs with video lessons and supplementary written materials; and interactive activity kits for children to enjoy during stay-at-home restrictions.

- NC State Extension 4-H Youth Development Specialists maintained 12 **websites** with a reach of 128,068 and created 276 social media posts with a reach of 269,052, providing educational information to educators, parents, and youth.

- 4,660 volunteers received **training** from Extension agents, 2,331 teachers were trained on how to deliver 4-H STEM curriculum, and an additional 4,703 teachers and other stakeholders participated in training provided by Extension Specialists to ensure youth were receiving high-quality delivery of 4-H content.
- NC State Extension 4-H Youth Development Specialists produced 29 **educational videos** viewed by 31,386 youth that provided engaging virtual learning experiences.
- 85,157 hours were donated by 4-H **volunteers**, providing opportunities for youth to work and learn in partnership with caring adults.

Despite COVID-19 restrictions, Cooperative Extension in Chowan County offered 120 second-grade students an opportunity to engage with local agriculture during a **Farm Day Adventure** where they visited a local cotton gin and pumpkin patch and rotated through educational stations on aquaculture, bees, chickens, cotton gin operation, cotton, peanuts, and pumpkins. Bladen County 4-H held a hybrid **Ag'em Up Day** for 392 third-grade students to learn about bee behavior and pollination, crop harvesting, animal husbandry, plant science, and nutrition through an online educational component, and in-person classroom demonstrations and hands-on activities delivered by local FFA and community volunteers. In McDowell County, Cooperative Extension collaborated with local partners to bring an **Agriculture Awareness Field Day** to approximately 1,459 6-8th graders. Students worked through hands-on learning stations covering beekeeping, animal husbandry, aquaculture, agricultural safety, and composting. **Through programs such as these, youth in North Carolina increased their knowledge of agricultural literacy and where their food comes from by using hands-on learning experiences to develop STEM skills that prepare them for future success.**

The [NC 4-H Horse Program](#) has an estimated 5,309 registered youth participants, 72 horse program-focused clubs, and 200 registered volunteer adult leaders. The program hosted 80 different stakeholder interactions this year through events, training, contests, and activities, with an approximate total of 500 contact hours reaching 1,784 participants. Six state contests were held, some virtual, some in person, with 506 participants, and a national virtual hippology contest with 74 participants from 15 states was created. The horse programs' 222 social media posts reached 170,319 people. The Extension Equine Husbandry website reached 33,543 individuals over the course of the year. **The NC 4-H Horse Program helps youth develop leadership abilities, build character, and assume citizenship responsibilities.** Youth across NC also participated in [livestock](#), [poultry](#), and [small animal](#) shows and judging; 4-H projects; and clubs among many others. Statewide, youth animal programs had a total of 12,732 youth participants. By participating in showing livestock and other events, youth learned communication skills, work ethic, responsibility, and sportsmanship. **Involving youth in 4-H animal programs helped introduce and inspire youth to consider career opportunities in agriculture.**

In Union County, 4-H launched the **Cool Kids Coding** 4-H club. More than 40 youth learned about robotics and coding using LEGO and robotics projects focused on improving community parks. The club also provided 8-to-14-year-olds with an opportunity to learn a coding technique (word block coding). Union County 4-H also partnered with community organizations to provide **STEM pop-up events** consisting of hands-on instruction at various sites in the county. Nearly 100 youth learned about robotics, electricity, mindfulness, and many other topics through this program. **STEM Educational Kits** were provided to more than 3,000 3rd graders across 147 classrooms. Each kit featured educational lessons and classroom activities focused on the history of agriculture, plant and solar system science, physics, and health science. **Engaging youth in STEM activities is just part of how we are growing future scientists.**

In Cumberland County, Cooperative Extension's 4-H program created 427 **Educational Activity Kits** to help students celebrate Earth Day and learn how they can make a positive

impact on the environment. Youth created seed bombs, recycled bee houses, discovered butterfly life cycles, and planted "clover heads" to observe germination and plant growth. Wake County 4-H put together **Camp in a Box Kits** for youth who were home due to schools moving to virtual learning. These activities included experiments around force and motion, weather systems, solar systems, and chemistry. The STEM packets were matched with activity guides for origami, youth yoga, and a gratitude scavenger hunt. Extension staff distributed 900 kits to families in Wake County at food distribution hubs based on GIS maps illustrating the highest-need areas of the county and information about schools with the highest virtual attendance absences and the most disconnected youth. Youth enjoyed valuable STEM-based learning experiences that also provided family engagement. The connections and partnerships made during distribution efforts led to ongoing partnerships with the hubs, resulting in additional programs to serve similar audiences. **NC State Extension's 4-H Agents used activity kits as a way for youth to gain hands-on learning experiences in STEM.**

Over 137 youth participated in the 15 single-day and multi-day camps that were offered by the Edgecombe County Cooperative Extension 4-H **Summer Fun Program**. Educational workshops on livestock management, poultry, embryology, and owl pellet dissection; a Sylvan Bird Park tour; goat yoga, kayaking, and other physical fitness programs; arts and crafts; and electrical projects were offered. Currituck County 4-H offered a robust summer program of workshops and camps for 114 youth. Over 60 **mini-camps** covered a wide array of interests, including biological and environmental sciences, arts and crafts, solar and wind energy, nutrition and food safety, animal and plant sciences, and many fun recreational activities such as sailing and kayaking. **4-H summer day camps were held across the state to provide youth with opportunities to identify their passions or spark and develop life skills for future success.**

### **Briefly describe how your target audience benefited from your project's activities.**

NC State's [4-H Healthy Habits](#) program uses a 4-pronged approach to strategically leverage the 4-H system to address food access, nutrition, and health equity for underserved youth and families. 583 youth, 116 families, and 34 teen ambassadors participated in the program and were provided with flexible online and in-person learning opportunities. Through the [4-H Health Rocks!](#) program, 4-H helped 1,805 youth develop healthier lifestyles by reducing tobacco, alcohol, e-cigarette/vaping, and drug use. **Youth learned to make healthy choices and live healthy lifestyles by participating in the 4-H Healthy Habits and the Health Rocks! Programs.** The [4-H Empowering Youth and Families Program \(EYFP\)](#) is opioid prevention education for middle school-aged youth and their caregivers in rural North Carolina with a focus on providing research-based information about the impact and statistics related to opioid misuse to help youth and families make healthy decisions. After attending the Powerful Communities Program, 75% of 39 youth were better able to discuss difficult situations with their caregivers, and 96% of the 37 caregivers were better able to discuss difficult situations with their youth. Six counties conducted Community Education Events during 2021. Over 4,000 members of the communities involved attended events that addressed opioid misuse, concrete supports, and community agencies. **NC State Extension helped rural families prevent opioid abuse among the youth population.**

In Madison County, 4-H teamed up with middle school health educators to offer a **positive stress management** program to 270 students. Through this program, students were encouraged to identify sources of joy and stress in their lives and develop healthier coping strategies such as gratitude, deep breathing, stretching, and accessing mental health resources. Teachers reported this was one of the most memorable and relevant classes for their students as they advance in their education and gain more responsibilities. In Cabarrus County, 4-H

supported student mental health through the **4-H Mindful Me** curriculum delivered to 325 students at 21 after-school centers. Thirty-two after-school teachers received curriculum training and kits to provide hands-on activities with each lesson. Students learned how to build positive relationships through expressing gratitude, self-reflection, and self-control. Teachers reported that students who completed the course could more easily discuss their feelings in a constructive way, expressed more positive emotions, and displayed improved focus in the classroom. **NC State's 4-H programs supported students' mental health through stress management and mindfulness activities.**

In Surry County, 4-H worked with a local middle school to provide 135 6th-8th grade students with **life skills** lessons on decision-making, goal setting, time management, study skills, problem-solving, leadership, self-motivation, communication, organization, and resume and interview skills. After this program, 90% of 6th graders, 86% of 7th graders, and 92% of 8th-grade students answered "yes" or "maybe" when asked whether they felt more prepared for their future academic and occupational careers. Surveyed students also reported improved self-understanding, time management, confidence, and planning skills. **As the leader in experiential education, NC State Extension provided relevant opportunities for students to put learning into practice and develop personal and career-ready skills.**

The 4th-grade teachers at a Cherokee County elementary school wanted to re-introduce hands-on learning, which had been restricted due to COVID-19. After using the **4-H Magic of Electricity** school enrichment curriculum, the teachers observed that students had a better understanding of electricity and the scientific method when they were able to "learn by doing." The 5th-grade science teacher also observed that current 5th graders had a weaker understanding of the scientific method than past students who had been exposed to the 4-H school enrichment curriculum. Through this 4-H experiential learning process, 34 students learned about the scientific method and the basic concepts of electricity. After the activity, the teachers had students choose one of the activities and describe the scientific method used to obtain the results of the activity. The teachers observed that the students had a better understanding of the scientific method than the students in 2020 and believe that the students will be more successful in their future science classes because they participated in the 4-H School Enrichment program. **Through 4-H science activities, youth learned skills that prepare them for the STEM jobs of the future.**

4-H offers an innovative embryology school enrichment program that teaches 2nd-grade students about the life cycles of poultry while fostering understanding and appreciation of agriculture and science. In 2021, the **4-H Embryology Program** was delivered by Extension agents and teachers in 54 counties to over 56,000 students using a combination of in-person, online, and hybrid lessons. Students were able to watch the development and hatching of chicks either in person or through videos, and some students were able to engage in hands-on learning activities, such as recording observations, turning eggs, and controlling temperature and humidity levels. Online support materials were provided, including worksheets, puzzles, and recipes. In Henderson County, teachers reported that 98% of students improved their basic knowledge of science through this program, and 96% improved their math skills. Robeson County teachers reported that 75% of students improved their knowledge of science terminology and improved their science grades after participating in this program. **Science-focused school enrichment programs provided youth the opportunity to learn about science, technology, engineering, and math (STEM) through fun, hands-on activities.**

4-H horticulture programs continued to help students learn about gardening and healthy living in 2021. Through hands-on activities, the **Just Grow It!** program taught youth about growing and harvesting vegetables, pest management, food safety, and healthy home cooking with produce. Over 650 youth in 52 counties participated in Just Grow It. Youth overwhelmingly increased

their knowledge of gardening, insects, the soil and the need to steward the environment. Positive attitudes toward science, nature, and environmental stewardship grew, and evaluation data suggested that they would do more to engage in these areas. More than 50% of the youth that participated were new to 4-H. As a result of the program, students were comfortable spending time in the garden, often spent time with their family outside or in the garden and increased their passion for science. In Bladen County, Cooperative Extension created a [virtual school garden](#) for 300 4th-grade students, provided educational packets, a Google site with videos and content for each session, and game-based learning challenges. This hybrid program allowed students to plant and manage their crops at participating schools while benefiting from weekly video lessons on best practices for managing garden crops. 90% of students reported increased knowledge of plant science and nutrition, and more than 90% indicated that they are now either confident or very confident about their ability to plant and maintain a garden at school or at home. In Cleveland County, 4-H provided 800 students with their own succulent **plant to care for** and a care instruction card. Teachers were given supplementary resources to teach their students about plant science and horticulture. Student and teacher participants reported not only improved knowledge of plant science but also stress relief benefits from caring for their plant daily. **Through 4-H horticulture activities, youth learned skills that prepare them for the STEM jobs of the future.**

### **Briefly describe how the broader public benefited from your project's activities.**

A ten-year longitudinal study conducted by Tufts University discovered that the structured out-of-school time learning, leadership experiences, and adult mentoring from 4-H experiences play a vital role in helping youth achieve success. The study found that compared to their peers, youth involved in 4-H programs are nearly 4X more likely to make contributions to their communities, and about 2X more likely to be civically active.

North Carolina's youth who participate in 4-H service projects and leadership roles learned about civic affairs and developed public speaking, leadership, and decision-making skills. These youth learned to advocate for themselves and others about the importance of giving back. Cooperative Extension's [4-H civic engagement programs](#) empower young people to become well-informed citizens who actively contribute to their communities and the world. Extension provided an array of programs to promote civic engagement among youth to improve the quality of life in our communities today as well as in the future. A sample of these activities follows.

To promote youth confidence, healthy development, and civic engagement, NC State Extension's [#PassTheMicYouth](#), a youth-led podcast and blog that shines a spotlight on youth development and activism, pilot-tested a 20-lesson curriculum focused on engaging young people to develop a critical awareness of social issues so that they can participate in informed action through creative expression and coalition building. The new curriculum reached approximately 75 youth and 13 facilitators. In 2021, this program helped launch 6 youth-led podcasts by providing resources and targeted consultations. Wake County engaged a mental health partner in the program to add an additional program component. The combined mental health, youth development, and social justice expertise enabled the team to launch a program that met the needs and interests of 21 urban youth. #PassTheMic created a space for youth to use their voices and connect and encouraged youth to have a voice in their community. citizens and public servants.

Cooperative Extension worked with Wake County public health to develop a COVID-19 Youth Council to engage youth in peer advocacy and address pandemic concerns. Seventy-four high schoolers answered the call and signed up to participate. The group developed 9 TV spots to encourage teens to get vaccinated and tested for COVID-19. The promotions were aired during local tv coverage of high school football games, attracting a total viewership of at least 9,000.



The [4-H Ambassador program](#) empowered teen 4-H leaders with the knowledge, skills, and aspirations necessary to be an effective advocate for 4-H. The program strengthened and expanded upon 4-H Ambassadors' current leadership abilities so that they could serve as positive role models for younger youth; build meaningful partnerships with other teens, adult volunteers, and 4-H professionals; and promote the 4-H mission in NC. In 2021, 51 youth participated in the training program, gaining knowledge in public speaking, youth development, etiquette, life skills, experiential learning, leadership, marketing, civics, and diversity and inclusion. In addition to class participation, 28 youth completed an additional 580 hours of elective activities consisting of leadership, citizenship, and community service. Twenty-eight youth completed their ambassador achievement portfolios and were recognized during the 4-H Congress.

Extension also provided opportunities for youth to perform Community Service Projects as a way to teach youth the importance of giving back. In Caldwell County, 3 youth completed projects, including the creation of 44 denim dog toys for a local pet rescue and the distribution of 60 joke books and 180 Valentine's Day cards to senior citizens, many of whom were experiencing isolation during the COVID-19 pandemic. One parent said of her son, "He has developed some permanent qualities that I'm so proud of - picking up trash, helping the neighbors, helping at home." Johnston County 4-H'ers and multiple FFA chapters helped collect food items for the Backpack Buddies program, which provides easy-open, ready-to-eat food for youth when they are not in school. In total, 1,217 pounds of non-perishable food were collected to help ensure that a child did not go hungry during the holidays and taught the youth involved about community service.

## Comments

In the summer of 2021, [4-H camps](#) enrolled a total of 1,382 youth, a 50% decrease from 2019 due to COVID-19's reduced capacity. However, over 2,000 COVID tests were completed thanks to 4-H agents, camper parents, and summer camp staff, and 136 youth from vulnerable populations were able to attend camp through scholarships. In addition, 4-H reached out to youth at home through educational activity kits, day camps, and hands-on, social-distancing-friendly outdoor activities were provided for smaller groups.

The following professional development workshops were provided by Extension Specialists for Extension Agents in 2021 to facilitate the use and transfer of new research-based knowledge:

- #PassTheMic: A Curriculum to Amplify Youth Voices
- 4-H and Citizen Science. It's Connected
- 4-H Camp Marketing & Recruitment 101
- 4-H Prof. & LGBTQ+ Youth: Examining Results from an NC Study
- Centering DEI in Youth Programs
- Cooking Up Confidence: Science w/ Your Snacks
- Developing youth entrepreneurship using mind-maps techniques
- Farm Safety Fun for 4-H: Hands-On Lessons about Farming Hazards
- Finances Matter: Financial Management for Teens!
- Incorporating Purpose Development in Youth Programs
- Kids Voting: Engaging Citizenship Activities for All Ages
- Soil to Seed
- Strategic Marketing for 4-H
- Understanding the 4th "H"

**Critical Issue  
Project / Program**Enriching Youth, Family & Community Well-Being  
Families and Communities**North Carolina Residents at All Stages of Life Used Effective Parenting and Life Skills to Create Stable, Safe and Secure Environments****In 2-3 sentences, briefly describe the issue or problem that your project addresses.**

Individuals and families in North Carolina face challenges to overall well-being. The state's population includes over 2.3 million children under age 18. Many young children's social, emotional, or mental well-being has been impacted by the pandemic. At the other end of the spectrum, North Carolina ranks 9th nationally in the number of people 65 and over. In 2019, the state had more people 60 and over than under 18. Elderly populations have faced disproportionately high rates of illness and death from COVID-19, and many experienced new levels of isolation, which exacerbated existing health problems and led to increased fear and emotional suffering.

The well-being of families is also impacted by where they live. Approximately two-thirds of American families live in a home with at least one health hazard. Further, 10.6% of housing in NC has the potential for elevated lead exposure risk. Radon exposure, the leading cause of lung cancer among non-smokers and the 2nd leading cause of cancer among all individuals, have elevated levels across the state. Home hazards are also a concern, as 24.8% of adults aged 65 and older reported falling in 2017. About \$50 billion is spent annually on medical costs related to non-fatal fall injuries, and \$754 million is spent related to fatal falls. Families spent more time in their homes because of COVID-19 and had more frequent exposure to these household risks.

Many families are also facing what seem like insurmountable financial challenges. Between the amount owed on student loans, home mortgages, and credit card debt, in 2020 Americans carried a record \$14.9 trillion of debt, surpassing the 2010 levels following the Great Recession. The average total consumer debt in North Carolina was \$84,343 in November 2020. The COVID-19 pandemic has brought financial hardships to North Carolinians, who added nearly \$1.5 billion more credit card debt in 2021. The state now ranks 9th in total outstanding consumer credit card debt, with \$30.4 billion outstanding. The average household debt due to consumer credit cards is \$8,158, and the average student loan borrower carries a debt of \$36,257. At the height of the pandemic, Wake County's Housing Department reported that upwards of 700 families faced eviction each week.

NC State Extension needs to empower individuals and families to build healthy lives and achieve optimal social and economic well-being.

**Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.**

To support individuals and families, NC State Extension Specialists developed and delivered in-service training, educational curricula, and materials to increase the knowledge and skills of Extension Agents thus increasing their ability to deliver subject matter content to target populations. Extension Specialists and Agents delivered educational content using programs, websites, social media, newsletters, and other methods to increase the knowledge and skills of the target populations.

- NC State Extension Agents used **social media and mass media** to provide educational information to individuals and families. Agents had a social media reach of 334,919 and a mass media reach of 7,366,129.
- NC State Extension Specialists maintain 2 **web portals** containing 255 individual web pages providing information on Families & Communities and Healthy Homes. 8 new web pages were added in 2021 along with new educational content added to 13 existing pages. The families and communities' websites maintained by Extension Specialists were viewed 208,071 times.
- Extension Agents delivered **in-person and virtual training** to 2,499 individuals on wellness, 649 individuals on budgeting/managing financial resources, 555 caregivers on parenting, and 245 individuals on healthy homes.

Extension in Durham County offered the **Positive Parenting Program®**, a parent and family support system designed to prevent and treat behavioral and emotional problems in children and teenagers. Over 28 Spanish-speaking parents and caregivers shared their experiences with the ups and downs of the pandemic while discussing topics such as stress, daily chores, supporting healthy relationships, and managing disagreements, as well as tips for school life. Families were appreciative and welcomed local and online resources that were shared during these virtual workshops.

Caregivers of ill relatives, as well as guardians raising children, take less time for self-care, as finding time to maintain basic levels of physical and mental health can be difficult. Cooperative Extension offered twenty **virtual classes** on stress management, nutrition information, communication topics, and parenting resources for caregivers. **Extension provided resources to help parents and guardians promote healthy relationships, utilize positive parenting practices, and manage stress.**

To help families be prepared for the increase in natural disasters and unprecedented events, NC State's [More in My Basket](#) (MIMB) team developed the **Versatile Pantry** session. Participants learned about the benefits of stocking a few pantry staples, strategies for creating a stocked pantry, versatile methods of pantry storage and organization, how to keep track of food in the pantry, and a variety of meals that can be prepared from a set of staple ingredients. MIMB staff developed a PowerPoint, recipe cards, leader's guide, pre and post-session evaluation forms, and various handouts to aid in agent delivery of the Versatile Pantry session, as well as a Versatile Pantry Guide for participants. **Extension improved the quality of life and well-being of consumers by teaching principles of disaster preparedness.**

The Pasquotank County Cooperative Extension staff worked together to assist senior citizens with **choosing prescription drug plans**. In 2021, counseling sessions were conducted primarily by phone to protect the vulnerable senior population who were at high risk of contracting COVID-19. Washington County Cooperative Extension, through the Senior Health Insurance Program, worked closely with seniors to help them make wise financial decisions about their Medicare Part D coverage. **NC State Extension improved individual and family financial stability by teaching older residents strategies that support economic security.**

Families across North Carolina experienced an increase in the cost of food used to cook traditional holiday meals. In 2021, COVID-19 introduced several disruptions to the food supply chain: rising food costs, food shortages, and uneven food availability in grocery stores. These conditions compounded the normal additional expense of preparing a holiday meal and underscore the importance of advanced planning and early action. A 6-part series, **Getting Ahead of the Holiday Meal Cost**, was developed to provide a just-in-time guide to encourage early, sequenced purchases of food ingredients and related preparation for upcoming holiday meals. The series allowed each participant to tailor their experience by using their favorite

holiday recipes as the basis for planning throughout the series. Eat Smart Move More North Carolina adopted the program as part of its Holiday Challenge, sharing the series with its 45,000 program participants. In total, the Getting Ahead of the Holiday Meal Cost program reached 235,325 individuals. **Extension's research-based programs provide solutions and empower clients to make better-informed decisions.**

**Briefly describe how your target audience benefited from your project's activities.**

Cooperative Extension in Currituck County provided a series of self-care and mental health programs, including a self-care challenge, a mental health pop-up seminar series, and a yoga challenge. As a result of these activities held throughout the year, 101 participants were able to access information that helped them develop life skills including goal setting, improving physical fitness, improving diet, and practicing mindfulness and gratitude. Of those who completed the evaluation, 85% stated they learned new ways to cope with stress, and 72% will continue to practice mindfulness and gratitude. **After attending Extension self-care programs, participants can use new strategies to cope with stress; practice self-care, mindfulness, and gratitude; and lead lives that balance physical, mental, and emotional health.**

Kinship care refers to relatives, or in some cases close family friends, caring for children in foster care. Kinship care families were impacted in different ways during COVID-19. Cooperative Extension in Cleveland County conducted limited in-person and/or virtual support group sessions (depending on COVID conditions). In-person meetings were held in outdoor settings and/or scheduled for 3-4 families at a time. Educational enrichment and community resource information were shared at each meeting and through electronic newsletters. **The Grandparents Raising Grandchildren (GRG) & Kinship Care Support Group** remained an important resource to the kinship care families. Families reported that the support group met its goals and the needs of the families and has helped families know they are not alone and that other kinship caregivers and children are living in the community. The participating adults and children made new friends; feel supported and acquired new skills for communicating with family members, advocating for their children, and reaching out to access new community resources. Support group programming also helped families learn new parenting skills and ways to strengthen their families. All the grandparents indicated they did not have support before their involvement with the support group and they would recommend the support group to other kinship caregivers. **North Carolina caregivers at all stages of life use effective parenting skills to create stable, safe, and secure environments by participating in NC State's Extension programs.**

Falls are the leading cause of fatal and nonfatal injury for older Americans, with 1 in 4 Americans aged 65+ suffering a fall every year. In partnership with the Centralina Area Agency on Aging, Cooperative Extension's Gaston County Center conducted 3 **Matter of Balance** workshops for residents in 9 area counties. The 25 participants adopted behaviors to reduce their risk of falling. Participants reported increasing physical activity by doing strengthening, flexibility, and balance exercises at home. Several participants reported making home modifications (i.e., improving light, removing area rugs, and adding grab bars to bathrooms). One participant reported that, based on what was learned in the workshop, she was able to correctly assist an older adult who had fallen in her apartment complex. She asked the fallen individual to do a self-assessment before moving and to report the fall to a healthcare provider. Participants of the Matter of Balance workshop were also referred to Extension's newest physical activity program, **LIFT (Lifelong Improvements Through Fitness Together)**. Washington County Cooperative Extension partnered with the local Senior Center to offer **LIFT** to older adults to improve balance and flexibility and help prevent falls.

Catawba County has a growing retirement community. Currently, the county emergency medical services report that 1 out of 3 emergency room visits is the result of someone over the age of 65 falling. With regular practice, Tai Chi improves balance by strengthening muscles and coordination; at the same time, it strengthens the mind, thereby improving calmness and confidence in not falling. **Tai Chi for Fall Prevention** was offered a total of 4 times a week by Cooperative Extension at both YMCAs in Catawba County as well as [online](#), and **Tai Chi and Hike**, a collaboration between Extension and Catawba County Library and the Catawba County Park System, was offered monthly. Ninety-eight percent of participants report that the classes have improved their balance. Ninety-three percent say that the classes have helped them reduce stress and be more active. Sixty-five percent reported that the program motivated them to visit county parks. **Extension improved quality of life and well-being for consumers by teaching principles of fall prevention.**

**Radon** is a naturally occurring radioactive gas produced by the normal breakdown of uranium in rocks, building materials, and soil. As radon breaks down, it produces radioactive particles that, when breathed in, become lodged in the lungs. Testing is the only way to determine radon levels in a home. To protect homeowners from the hazards of radon, NC State Extension partnered with the NC Radon Program to offer radon continuing education for real estate professionals and early childhood care providers. In all, six 4-hour sessions were conducted for real estate professionals and three 2-hour sessions were conducted for childcare providers. Nearly 60% (59.3%) indicated that they would test their facility for radon. If needed, just over 18% indicated that they would install a radon mitigation system. The real estate professionals that participated in the **Radon in Real Estate** Course reported having a better understanding of how radon exposure is a risk factor for lung cancer (97%), feeling more confident in their ability to educate clients about radon during the home buying/selling process (98%), and providing more radon resources to clients since completing the course (87%). **This program results in an increased number of homes in NC being tested for radon and mitigated radon exposure utilizing accredited standards, as well as the fulfillment of NC Cancer Control Plan strategies.**

Front line staff often find themselves dealing with emergency situations but don't feel comfortable providing care until emergency personnel arrives. **CPR and First Aid Certification Training** was provided by a Family and Consumer Sciences Agent throughout the year to hotel, preschool, and church staff members. The training provided these workers with a necessary level of comfort in dealing with emergencies by knowing the best care to provide in a variety of situations and providing them with the confidence to provide help until medical assistance arrives. Two hundred and twelve participants were certified, with 31 more participants who were trained and did not desire certification. All the participants shared that they felt more confident after the training knowing what they should and could do to help someone in need in their location. They also said they appreciated that they could use the skills not only at work but at home or anywhere. The participants know there might come a time when they need to help someone. **They now have the knowledge and skills to provide life-saving assistance and the confidence of knowing they are doing all they can until the professionals arrive.**

### **Briefly describe how the broader public benefited from your project's activities.**

In January of 2020, Durham's Board of County Commissioners approved an 18-month contract with the Durham Children's Initiative (DCI) to facilitate a community planning process to develop an **Early Childhood Action Plan (ECAP) for Durham County**. Despite the pandemic, Durham County Cooperative Extension staff, the Durham Children's Initiative, and over 150 community members worked together to develop recommendations about how to make things better for Durham families with young children. Parents, front-line workers, community-rooted leaders,

nonprofit and systems leaders with lived experience and expertise across maternal and child health, early care and education, and family support systems came together, built relationships, and shared their experiences. The plan was informed by the voices of over 1,000 parents and early childhood care providers.

Durham County's Early Childhood Action Plan has been finalized and released, and a representative, 36-member steering committee is made up of parents of young children, front-line workers in early childhood fields, community-rooted leaders, and nonprofit and institutional leaders have been established and are meeting monthly. To address the persistent disparities in early childhood outcomes in Durham, the plan focuses on the following goals: valuing the voices and experiences of families in the community; addressing root causes like poverty and racism to prevent acute stress and trauma for families; ensuring there is a set of universal, family, and child-focused supports that promote thriving for all; ensuring there is a set of culturally-affirming, anti-racist, affordable supports that address family stress and trauma; changing harmful mental models that prevent systems from changing in necessary ways; and building intentional collaboration across different parts of the system so that the entire system is stronger. Stakeholders have begun presenting the plan to county staff, external stakeholders, and funders, and the plan has already been leveraged to bring in significant grant funding for aligned strategies. **Extension collaborates with community partners to address the root causes of problems facing families with young children.**

As a result of the successful planning process that took place to create Durham's Early Childhood Action Plan, Duke Pediatrics, the medical home for a large number of Medicaid-eligible children in Durham, reached out to Extension and the manager of the Early Childhood Action Plan (ECAP) with a request to partner on a grant opportunity. The opportunity aligned with the pediatric and social-emotional health strategies in the Early Childhood Action Plan. The goal of the project is to transform pediatric care to strengthen parent/child relationships and family social-emotional health. Funding will support both evidence-based and community-rooted supports for families with children 0–3 years of age, as well as system and practice changes at Duke Pediatrics. Perhaps most importantly, the project begins with a community co-design process, in which the parents of young children at Duke Peds and community-rooted organizations working in maternal and child health will be partners and decision-makers in determining how the funds are allocated. **NC State Extension works as a catalyst to engage community members as active participants and leaders in making decisions that impact their communities.**

To build a foundation for financial well-being later in life, Cooperative Extension provides programs teaching youth financial literacy skills. Middle school students in Bertie County participated in the summer enrichment program **Money Smart**. The 35 middle-grade students enrolled in the Money Smart Curriculum learned about topics such as the path to success, earning, spending, saving, borrowing, and protecting. Eighty percent (80%) of the participants improved their knowledge about budgeting, savings, and keeping their identity safe. Hyde County 9th and 10th graders were introduced to the basics of **financial literacy**. Topics included SMART goals, how goals and values impact the use of financial resources, tracking spending, the importance of checking credit, and how to respond if there is inaccurate information. Students improved in their understanding of SMART goals. Most students increased their understanding of which types of expenses are considered fixed and flexible, why it is helpful to track spending habits, and important information needed for creating a spending plan (or budget). Additionally, all students learned where and how to check their credit from safe and reliable resources and learned why it is important to check their credit. Extension 4-H school programs provide youth with skills to reach their full potential, so they contribute to thriving communities

To support the financial literacy of seniors struggling with increasing medical expenses and complex Medicare plans, the **Seniors' Health Insurance Information Program (SHIIP)** teams in Pasquotank, Currituck, Chowan, Washington, and Surry Counties counseled over 1,812 seniors, helping them save a total of over \$1,244,000 in prescription drug costs and insurance premiums. SHIIP provides local, in-depth, and objective insurance counseling and assistance to Medicare-eligible individuals, their families, and caregivers. Cooperative Extension also partnered with the state SHIIP program and local partners to raise funding to bring the **NC MedAssist Drug Giveaway** program to Tyrrell County. Over 50 volunteers marketed the event and handled logistics. As a result of the MedAssist Drug Giveaway, 748 people were served in 1 day with medicine bags valued at \$50 each. An additional 252 medicine bags were distributed through Meals on Wheels to the homeless and isolated individuals. **NC State Extension's technical assistance empowered seniors to make better-informed decisions, resulting in a healthier North Carolina.**

At the height of the Pandemic, Wake County's Housing Department reported that upwards of 700 families faced eviction each week. Although federal relief housing resources were allocated to the county, there were months when 9,000 families were waiting to have their applications processed. Wake County Cooperative Extension hosted a community-driven **Eviction Clinic**. During the event, staff and volunteers assisted residents with completing House Wake Applications. Attendees received legal information to prevent eviction. One hundred and twenty-five residents attended the clinic, many of whom were grateful to have one-on-one application support and someone to listen to their concerns. In addition to application completions and receiving legal consultation, residents received economic mobility resources, information on civic engagement opportunities, and took home household goods and snack bags.

As a result of Extension programming to improve individual and family financial stability: 4,123 people gained knowledge to increase family economic security (such as how to access SNAP benefits, SHIIP Medicare Part D, food cost management, and cost comparison skills); 2,695 people accessed programs and implement strategies to support family economic well-being; 683 people gained basic financial management knowledge (such as budgeting and record-keeping); 340 people gained knowledge to increase family assets (such as home ownership, estate planning, savings and investments, and retirement planning); and 219 gained knowledge in managing financial products and financial identity (such as credit/debt management, identify theft, credit scores, and avoiding scams). **The increase in individual knowledge gained from participation in Extension's financial management and support programs not only leads to an improvement in the financial condition of the individual participant but results in a ripple effect felt throughout the economy.**

## Comments

The following professional development workshops were provided by Extension Specialists for Extension Agents in 2021 to facilitate the use and transfer of new research-based knowledge:

- Healthy Homes
- Household Cleanup after a Disaster
- Identifying and Helping Clients with Delusory Parasitosis
- Making Wood Furniture Last
- Mold 101 -- Prevention and Clean-Up Training
- More In My Basket Training
- Radon Education for Child Care Providers
- Supporting Breastfeeding for the Community

**Critical Issue  
Project / Program**Enriching Youth, Family & Community Well-Being  
Economic Development**NC State Extension is a Catalyst, Building Local Economies and Helping Communities Become Attractive Places to Live, Work, and Play****In 2-3 sentences, briefly describe the issue or problem that your project addresses.**

The well-being of North Carolinians is determined in a large part by local economies. Vibrant local economies have an engaged workforce with a sense of opportunity, thriving downtowns with many local businesses, and high-quality economic development planning that builds on local assets. In NC, small downtowns are building local identities to attract new businesses through placemaking and asset assessment. In the past 30+ years, over \$2 billion has been invested in North Carolina communities to spur economic development through downtown revitalization. This investment has increased the number of new businesses and new jobs. Communities investing in their downtown districts have also seen increased community pride, a greater commitment to historic preservation, and greater support for locally owned businesses. However, there is much more work to do, especially in the rural portions of the state, which have experienced a loss in small businesses over the past two decades. NC is facing increasing economic, social, and environmental pressures. As the lifeblood of local economies, businesses and communities need expert guidance, education, and planning to thrive. NC community leaders and businesses also need to be empowered and educated to create more inclusive, equitable businesses, public services, and community engagement initiatives. In addition, there have been tremendous negative impacts on our local economies as a result of COVID-19 on the leisure, hospitality, and manufacturing sectors.

**Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.**

To support workforce development, Extension provided education, guidance, and specialized training to entrepreneurs, Extension program staff and interns, and minority owned business. Extension conducted outreach to lay critical groundwork to strengthen NC's economy while fostering healthy, engaged communities in which individuals from all backgrounds can thrive.

**Farm-City Week** is a time of celebration and education about the wonderful benefits that agriculture brings to our lives each day. Alexander County Cooperative Extension typically celebrates and recognizes this special time with a banquet where rural and city leaders join forces to celebrate all things agriculture. However, with the pandemic still in the forefront, Alexander County Cooperative Extension instead chose to collect various items that represented various agricultural sectors to **make baskets that could be gifted to local county commissioners and town councilmembers**. Each item was paired with a tag describing the importance of that commodity to the county and the amount of revenue produced. Baskets included locally produced cornmeal, honey, a plant, goat milk lotion, a gift certificate to a blueberry farm, ground beef, blueberry jam, apple cider, and beeswax candles. **Social media posts** highlighting each industry were made to target a broader audience and highlight local agribusinesses. These items were presented to local dignitaries at their respective meetings. Extension shared recent agriculture-related census data and reiterated the importance of agriculture to Alexander County by way of revenue produced (\$176 million) and jobs created. The social media posts garnered over 7,270 organic views. **Extension helped raise**



**awareness of agriculture's profound impact on North Carolina's economy through innovative outreach.**

The [Social and Economic Vitality Program](#) of Wake County Cooperative Extension works to build an ecosystem of support for new or aspiring entrepreneurs in Southeast Raleigh and Eastern Wake County. The 10-week **Empowering Entrepreneurs and Seeding Innovation (EEASI)** program encourages new and aspiring adult entrepreneurs to develop an entrepreneurial mindset and recognize potential business opportunities. The latest EEASI cohort focused on increasing support to new and aspiring black entrepreneurs in Eastern Wake County. Nineteen graduates completed the program, with 11 participants going a step further to create and deliver pitches for a chance to win up to \$3,000 to seed into their businesses. The participants represented various industries, including clothing, childcare, subscription services, media, social justice, counseling, and more. One of the winners plans to use the prize money to support the addition of a treehouse called "The Urban Tree," which will increase the amount of space for the children to engage, garden, camp, and explore. The entrepreneurs in the EEASI program are part of the continued efforts of Wake County Extension to **create a community of entrepreneurs who work together to help reshape opportunities in Southeast Raleigh and Eastern Wake County.**

A **workforce development program** provided college students with experience working within Cooperative Extension. Despite the challenges of the pandemic, 24 Extension interns from across NC, representing 28 colleges and universities, assisted Extension Agents and experienced a first-hand view of Extension careers, County Extension Center operations, and community engagement. Interns reported that they developed the career readiness competencies identified by the National Association of Colleges and Employers. When asked what knowledge, skills, and experiences they gained through the internship, they reported improved skills in workplace communications and professional relationship building, community leadership, maintaining a healthy work-life balance, working with people from diverse backgrounds, and adjusting professional plans to adapt to unexpected setbacks and changes. **Through internship experiences, college students are better prepared for the workforce and contributing to the local economy.**

**Briefly describe how your target audience benefited from your project's activities.**

2021 marked the fourth year of the [Vacationer Supported Agriculture](#) (VSA) program, which connects vacationers to fresh local food through an online ordering system. The total VSA sales for 2021 reached \$91,397. This year's program included the expansion of the project to three additional counties and the addition of two new products as add-ons to the produce bags: i.e., "happy hen eggs" and "Shrimpers' catch." Approximately 77.1% of the revenue was generated by the sale of produce bags, 5.6% of revenue accounted for sales of eggs, and 17.3% from the sale of shrimp. **NC State Extension efforts catalyze NC's local economies to be attractive places to visit and play.**

A **small family farm** in upper Cleveland County sought to expand and improve sorghum syrup (molasses) production and explore the feasibility of producing heirloom grits and cornmeal for direct-to-consumer sales. They reached out to Cooperative Extension to help them navigate food safety regulations, investigate possible funding sources to construct an on-farm food manufacturing facility, and for advice on marketing their **value-added products**. Cooperative Extension helped the operators make connections with NCD&CS Food & Drug Protection Division personnel to determine food safety regulations for food manufacturing facilities. They also received guidance in applying for grant funding through the Western North Carolina AgOptions program, consultation regarding marketing their value-added food products, and advice on positioning their farm as an agritourism destination. The farm received funds to

construct a sorghum processing facility that passed a food safety inspection. They used the facility to process 135 gallons of molasses in 2021. Test marketing of their grits and cornmeal convinced them to become a new vendor at Foothills Farmers' Market in Shelby, where they have developed a strong and loyal customer base. They purchased and restored a 1935 farmhouse on adjoining property and are generating additional income by operating it as an Airbnb. The operators now have plans to improve their milling operation and expand the production of their corn products. **NC State Extension helps grow small businesses and enhance local economies.**

After losing much of their viniferous grape crop, a local vineyard wanted to replant a more reliable cultivar ('Carlos') of rotundifolia grapevines. The vineyard needed the grapes from this section of their vineyard to help supply the wine demands of their winery. The vineyard is an ag tourism/event venue, and the vines add to the atmosphere of the venue. To accomplish this task, they turned to Cooperative Extension for assistance. The horticulture agent in Person County worked with the vineyard in completing a grant application. By working with the Extension agent, they developed a strong grant application and were awarded funding that allowed them to replant the vines they needed for future grape production. **This service not only helps the vineyard with their wine production but also provides NC residents an opportunity to visit an agricultural venue and observe grapevines growing while contributing to the economy of Person County.**

To support economic development in NC's retail, accommodation, entertainment, and tourism sectors, Extension has implemented the [Create Bridges](#) process, a strategic planning initiative currently being piloted in 6 states to address challenges associated with sector-specific planning and workforce training that is often neglected or underemphasized despite a need to strengthen it. Because of NC's dependency on the tourism sector, the Mountain West Region (Jackson, Swain, Graham, Macon Counties, and the Qualla Boundary) was selected to test the impact and effectiveness of this 2 ½ year planning process to identify the region's strengths, challenges, and opportunities. The major challenge identified by businesses was the lack of qualified workers and the surveyed employees reported that only 54% feel valued by their employers. **The region is working now on strategy development, including how to be a better employer by offering cross-training and entrepreneurial skill-building programs for their employees.**

### **Briefly describe how the broader public benefited from your project's activities.**

During the COVID shutdown, Extension in Currituck County led a facilitation effort to initiate the [African American Experience of Northeast North Carolina \(AAENENC\)](#). The mission of this 6-county group is to inspire exploration and appreciation for the African American experience in Northeastern North Carolina and ultimately drive cultural tourism and economic benefit for the region. Phase one of the project included building a solid team of advisors and history advocates; creating a workflow, collaboration, and team spirit across 6 counties; establishing a mission and vision; locally showcasing African American history; obtaining a URL for the effort and engaging a black-owned business to build out the site; launching a social campaign and establishing a collaborative marketing strategy. Completion of phase 1 occurred on Juneteenth, 2020. Following the success of the initial effort, Currituck County Cooperative Extension re-engaged to facilitate Phase 2, in which a 3–5 year plan to guide the work of the group was completed and shared with the advisors. Short-term action plans were also delivered, and committees have begun the work. Several members of the team expressed that the initiative would have stalled long ago were it not for the guidance of Extension and the assistance with group process facilitation. Because of the success of this regional initiative, state leaders in NC tourism have approached Currituck County Extension for guidance on

expanding the program to other regions of the state. **To increase local tourism by facilitating local planning groups to develop and implement missions, visions, and strategic plans, NC State Extension supports local economic development efforts.**

Cooperative Extension was contacted by the Pamlico County Manager to participate in an action committee to address concerns of citizens and townships about the growing presence of **roadside litter**. Citizens were troubled about the negative economic and environmental effects that unsightly litter was contributing to local businesses and communities. Roadside litter remains an ever-present problem across all of North Carolina, with the North Carolina Department of Transportation reporting spending more than \$11 million to remove litter from NC roadways during 2020. To address these concerns, committee members agreed that both education and action were needed. As a result of this program, more than 200 tarps were distributed to citizens to prevent roadside litter loss during transport, and more than 100 volunteers took part in collecting over 300 bags of roadside litter. **Through these efforts, approximately 3,000 pounds of roadside litter were removed from the roadside of Pamlico County, helping to improve the aesthetic value and environmental and economic impacts on our local communities and businesses.**

The farming communities of Rutherford and Polk counties have been moving toward **small agritourism events** as a way to create additional revenue streams and for marketing purposes. In 2021 Extension's farm tour was split into small gatherings that were only advertised to local people through Facebook and email newsletters. The 5 events were held throughout the summer and fall seasons, with 2 farms participating each day, for a total of 10 farms participating across the 2 counties. The farms were highlighted when their products were at their peak. Customers were able to forge relationships with the farmers while learning about their local agricultural system and production methods. The farmers were able to sell products and encourage participants to engage with their sales outlets once the event was over as well. Feedback from participants was overwhelmingly positive, as they enjoyed getting to know their local farmers and hearing about their reasons for how and why they produce their goods in the way that they do. Farmers also enjoyed the smaller groups and more intensive farm tour style, and many of them are holding similar events on their own now as well. **Through Extension sponsored agritourism events, local farms can generate additional income streams while educating the public about food and farming.**

## Comments

The following professional development workshops were provided by Extension Specialists for Extension Agents in 2021 to facilitate the use and transfer of new research-based knowledge:

- Agritourism Curriculum: Western NC Success
- Ag Labor in NC: Challenges and Opportunities
- A Roadmap from Raw Ingredients to Value-Added Food Products
- Creating a game plan to develop entrepreneurial farmers
- Drone Videography Tips
- Farm School Online Course

**Critical Issue  
Project / Program**Enriching Youth, Family & Community Well-Being  
Community Development**NC State Extension Supported Leadership Development and Partnership Building****In 2-3 sentences, briefly describe the issue or problem that your project addresses.**

North Carolina's community well-being is built on a foundation of inclusive, empowered leadership and productive decision-making. NC has vast untapped potential and resources in its leaders, organizational governance, community decision making, and collaborations. Today's communities face issues too complex to be solved by community leaders using methods that preserve the status quo. Communities need more diverse leadership with new and innovative ideas. NC communities face intricate issues like economic mobility, bridging the rural-urban divide, and reconnecting to our communities that require engaging a diverse group of Extension clientele to serve as a resource to address these challenging issues. It also requires building leadership capacity and working alongside these community leaders to implement change. Communities can build capacity for civic dialog on complex issues and make leadership groups more productive and inclusive to create opportunities for partnership and collaboration and optimize community wellbeing.

As national, state, and county leaders contemplate a return to normalcy or a "new normal" from the COVID-19 pandemic, Extension leaders and staff are hopeful that the lessons of the pandemic might be incorporated into long-term actions, mindsets, and systems changes. As local communities and governments deal with the ongoing challenges of the pandemic, and as communities grow and become more urbanized, Extension must adapt to rapidly evolving needs by developing its staff, leaders, and partners. Fostering local-state partnerships is essential to Extension's effectiveness, and it can be difficult to collaborate, strategize, and share complex county workloads with partners.

**Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.**

In 2021, Extension supported leadership development and partnership building by providing specialized training; hosting in-person, virtual, and hybrid educational programs and presentations; and proactively engaging with a broad range of stakeholders, including community leaders, educators, growers, and consumers.

Professional, external organizations wish to tap into the expertise of NC State University to provide their employees with ongoing professional development opportunities beyond undergraduate and graduate degrees. NC State Executive Education coordinates with external clients, organizations, NC State faculty, staff, and external subject matter experts to develop and provide learning and development programs for clients' employees in a variety of areas. NC State Extension Specialists held two training programs with **military personnel** from Ft. Bragg with a total of 46 participants. In this program, participants explored new models for effective team practices and processes, developed personal skills in influencing effective team behavior and identified specific applications to improve organizational outcomes. In another program, **Women in Technical Leadership**, a networking session was held with 17 participants. This program taught high-potential businesswomen in STEM fields specific strategies and tools needed to demonstrate and communicate their value more effectively to key stakeholders and expand their portfolio of leadership experiences in their field.

The North Carolina Tobacco Trust Fund Commission [Agricultural Leadership Program](#) develops the leadership skills of North Carolina agriculturalists. The diversity of agriculture in North Carolina and agriculture being the #1 industry make it important to develop leaders who are willing to lead within their agricultural organizations, farms, and communities. This program assists in meeting this demand. Following each session, participants were asked to submit feedback on the session and share if there were any significant changes in their thinking, agricultural awareness, and leadership. By exposing participants to different realms of agriculture throughout the state, participants indicated their agricultural knowledge increased significantly. Agricultural issues that they once thought were unrelated to them or their industry they now realize are important for a united agriculture community that supports each other.

To better prepare **agriculture education teachers**, workshops were designed to meet their needs. These workshops focused on topics such as instructional strategies, teaching diverse learners, and working with colleagues. Based on the evaluations, teachers indicated an increase in knowledge and gaining resources they can easily replicate in their classrooms and programs.

Early career Extension professionals need focused training to develop leadership skills that support their work as change agents helping their communities address big, messy challenges (adaptive leadership) while ensuring that their process is democratic and their outcomes increase justice and equity. The [Agents for Change](#) program launched in January of 2021 with 15 professionals (4-H, FCS, Horticulture) to develop leadership capacity, the development of a project that applies these capacities in their communities, and access to one-on-one or small group meetings for troubleshooting or personalized support. Fourteen of the 15 cohort members have completed year 1 and are engaging in year 2. Preliminary results indicate growth in adaptive leadership and transformative leadership capacity.

### **Briefly describe how your target audience benefited from your project's activities.**

To support leadership development in Durham County, accommodate an increasing need for trained facilitators, and enhance public-private collaboration Extension created a virtual adaptation of **Facilitation 101 Training** for county employees. The format was changed from a 1-day in-person workshop to a 3-day training in shorter increments held via Zoom. The new virtual format incorporated practice meetings with coaches utilizing breakout rooms. In February 2021, 36 county staff participated in the training, received in-depth coaching and feedback, and had opportunities to use a mock meeting to practice facilitation roles. Nearly 100% of the participants found that the training helped them improve their virtual facilitation skills. **NC State Extension strengthens communities by increasing the knowledge and skills of community leaders.**

Cooperative Extension collaborated with local partners to provide 18 Chatham County Chamber of Commerce Leadership Academy participants with a **traveling tour of local Chatham County farms and agribusinesses**. Participants were introduced to a variety of agriculture types for which the county is best known, such as greenhouse and community supported agriculture (CSA) production, grass-fed beef cattle production, and native plant nursery production. Post-evaluations revealed that participants greatly enhanced their knowledge of the economic impact and the diversity of agriculture and agribusiness. As a result, 100% of tour participants expressed a greater appreciation for agriculture and its role in the economy. The participants also reported intention to seek out opportunities to support local agriculture from both monetary and advocacy standpoints. Some participants have even volunteered with local producers to help harvest/glean produce to share with local food pantries. Other leadership academy participants have directed their staff and clientele to the Extension office for technical

guidance and assistance. **NC State Extension grows communities by increasing the knowledge and skills of community volunteers and leaders.**

To engage with the local African American community, Cooperative Extension in New Hanover County partnered with the Friends of the Arboretum Board to launch a joint celebration of Black History Month and a **showcase of local black-owned businesses** in February 2021. The businesses were promoted through signage in the public garden and social media posts, culminating in a Sunday afternoon reception attended by 30 individuals. The informal gathering resulted in several lasting relationships and a planning team for a Juneteenth Festival at the Arboretum. The **Juneteenth Festival** was held with 18 vendors, music, dancing, a student reading of the Emancipation Proclamation, and more for an audience of over 500 attendees. One of the respected community leaders in attendance, a black male, spoke to the director following the event, saying "I have lived in Wilmington for a long time, but this is the first time that I have ever felt welcomed here." Informal observations 6 months later show that an average of 20% of Arboretum visitors are black, a good parity representation of the county's population. **NC State Extension strengthens communities by expanding the reach and increasing inclusive engagement.**

### **Briefly describe how the broader public benefited from your project's activities.**

Cooperative Extension engaged with the Gaston Together **Health in All Policies (HiAP)** program to help local governments and community partners integrate health and equity into their policies and programs to advance the health of Gaston County residents. The effort envisions land use planning, economic opportunities, active transportation, access to parks, violence prevention, healthy food systems, and education that create healthy opportunities for all residents to live, work, learn, and play. Gaston County Extension chaired the HiAP committee and involved partner organizations and planning departments from 8 municipalities to organize a HiAP virtual workshop in May 2021 to prepare diverse professionals and community members to understand HiAP, form collaborative community teams, create community work plans to build policies and programs that enhance health and equity, and integrate HiAP into their program planning and reviews. Extension efforts build organizational capacity to accomplish goals through training and technical assistance in strategic planning, governance, and facilitating complex decision-making. A total of 56 planners and community partners participated in the workshop, and participants reported an increased ability to incorporate HiAP into community decision-making. As a result of the workshop, a permanent HiAP work team was created and is currently developing a Health Assessment Tool to assist in planning decisions by local governments. **Extension agents work with community groups and coalitions to increase collaborative practices and effectiveness, amplifying the capacity of NC's leaders, organizations, and communities to ensure sustainable and equitable prosperity for all North Carolinians.**

### **Comments**

The following professional development workshops were provided by Extension Specialists for Extension Agents in 2021 to facilitate the use and transfer of new research-based knowledge:

- Disaster Preparedness and Recovery Training
- Extension's Role in Disaster Management and Community Resilience

**Critical Issue  
Project / Program**Enriching Youth, Family & Community Well-Being  
Community Infrastructure**NC State Extension Helped Strengthen Community Infrastructure and Resilience to Build Future Economic, Health, and Social Well-Being****In 2-3 sentences, briefly describe the issue or problem that your project addresses.**

North Carolina is changing rapidly. An increase in climate events, shifting climate patterns, changes in state demographics, shifts in living patterns, and the influx of migrant workers create a need for disaster preparedness, health and safety education, and financial literacy and planning. Evidence of rural stress, broadband connectivity rates, and utilization, number of communities needing upgraded infrastructure and services affect the state's opportunities to attract new businesses and residents.

The COVID-19 pandemic tested community and government infrastructure at every level, creating unprecedented challenges associated with public health, food security, working conditions, and much more. Essential workers and economically disadvantaged populations were particularly vulnerable. Within a year of the declaration of a global pandemic for COVID-19, many resources were available to protect people from infection, but state agencies did not have the local relationships to get these resources to people across the state. Access also felt very urban-centric, and rural reach was vital in protecting NC's population. The rural population was also hit hard as schools continued to operate in virtual learning environments. Many rural areas of the state lack the broadband infrastructure to support high-speed internet access.

The onset of the COVID-19 pandemic coincided with the time of year that farmworkers generally arrive in NC. The close working and living conditions and frequent communication barriers experienced by migrant farmworkers made them even more vulnerable to infection. Farmers are highly dependent on these workers to plant, harvest, and manage perishable crops on time. A 2-week illness and quarantine of multiple workers could be financially devastating to a farm operation and the security of local food systems. Due to the COVID-19 pandemic, personal protective equipment also became scarce and expensive, and essential businesses found it difficult to protect their employees and consumers. 2021 marked the second year of the COVID-19 global pandemic. As the year began, vaccines were just becoming available, and there was tremendous uptake. During this time, disinformation campaigns were rampant, trying to dissuade people from getting vaccinated.

NC State Extension programs are in a position to help to strengthen NC's infrastructure and resilience, build on technological opportunity, and meet rapidly shifting climate impacts, demographics, workforce health and safety, and consumer demands that build the future economic, health, and social well-being of NC communities.

**Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.**

The [Social & Economic Vitality \(SEV\) Program](#) of Cooperative Extension Wake County Center partnered with several organizations to reduce the community spread of COVID-19. With the support of local partners, Extension staff mobilized a community-led response that paired **mask distribution** efforts with **food and clothing distributions** to offset the impact of the pandemic in vulnerable communities. Over 290,000 cloth and disposable masks and over

150,000 personal bottles of **hand sanitizer** were distributed in the community through the partnership. In addition, Extension coordinated weekly food deliveries directly to homes and community centers, ensuring that thousands of pounds of food were provided to families in need during the pandemic. **Extension leveraged existing partnerships to distribute masks, hand sanitizer, and food to families in need during the pandemic.**

Migrant and seasonal farmworkers experience significant health inequities, compared to non-agricultural workers. To reduce these health inequities, NC State Extension worked to improve infrastructure and reduce health literacy barriers among migrant and seasonal farmworkers by improving the availability of culturally appropriate and evidence-based health information materials relating to farmworker health; increasing health information literacy skills and knowledge of resources among NC's farmworker-serving community health workers; and providing internet to farmworker camps and farmworker youth-serving organizations. Extension published a mapping review of the literature which contains 1,040 records, and identified, organized topically, and evaluated 773 health education materials for farm workers and their families. In addition, Extension conducted 3 focus group discussions with 28 farmworker-serving community health workers across the state; distributed 22 pieces of technology (e.g., megaphones, TVs, tablets, projectors, audio PA systems, and tripods for health education) to 12 sites; created 8 videos (4 in English, 4 in Spanish) on topics like searching and evaluating health information online; and provided 3 webinars to 61 total participants on technology and farmworker educational materials, finding online health information, and designing educational materials. Extension also partnered with community organizations to provide Chromebooks and hotspots for dissemination. **Extension played a key role in ensuring that the migrant farmworker community had access to culturally appropriate science-based health information and resources.**

### **Briefly describe how your target audience benefited from your project's activities.**

By leveraging 101 local Extension Centers across the state, each of which cultivates relationships with most of the state's farmers, Extension played a critical role in rolling out the North Carolina Department of Health and Human Services (NCHHS)'s plan to reach every farm in the state with COVID-19 response resources, including **vaccinations**. NC State Extension participated in **COVID-19 task forces** across NC's farming governmental and nonprofit agencies to coordinate additional support for farmworkers. The local capacity of Extension across the state provided great flexibility in how individual teams functioned to maximize results. Extension appointed contacts in every office to lead local teams that helped make vaccination accessible to farms. Agents contacted farmers, provided information, communicated with health providers, and completed NCDHHS's weekly data reports. Agents also worked with partners in the event of a breakout of infection to provide resources and promote strategies to reduce breakout size and impact. Through coordinated efforts, 21,947 doses of the COVID-19 vaccine were provided by local teams.

The partnership's ability to maximize results has led to an additional contract for \$614,000 from NCDHHS to continue the work and hire 5 Extension COVID-19 Regional Educators, greatly growing the NC Farmworker health and safety program. Extension also **distributed 585,970 masks, pallets of hand sanitizer, cleaning supplies, and toiletries to farmworkers**. All PPE came with educational materials to be posted on-farm and given to workers to promote proper usage and prevention strategies. **Through existing partnerships, Extension was able to quickly provide needed equipment and education to NC's farms and their workers.**

Cooperative Extension also provided much-needed extra support to Spanish-speaking migrant farmworkers. Ashe County Extension used its trusted community relationships to **spread information in English and Spanish about the importance of early vaccination, testing**



**and quarantining.** Because farmworkers were provided with science-based education in their native language, they were able to individually determine the best course of action, and by the end of 2021, the Latino population in Ashe County had an 18% higher vaccination rate than the non-Latino population, at almost 70% of the population fully vaccinated. **In addition to preserving the health and safety of this vulnerable population, this effort ensured that Ashe County's Christmas tree industry remained the largest economic sector in the county and experienced minimal financial impact from COVID-19.**

After vaccinating over 300 Hispanic workers and their families in the spring of 2021, it was a natural progression for Extension in Avery and Watauga Counties to work with partners at the beginning of the Christmas tree harvest season to launch a fall mass **booster vaccination clinic.** The High Country Farm Worker Health program, High Country Community Health, and Avery and Watauga County Cooperative Extension Centers worked together to provide 299 **COVID-19 booster shots** and 112 **flu shots** at these clinics. Extension provided the vaccination spaces in Avery County and made appointments to facilitate the vaccination process. Thanks to this clinic, over 88% of Latino farmworkers in these counties were fully vaccinated against COVID-19, and no workers during the harvest season lost any work time due to COVID. Many H2A farmworkers commented that they wanted the vaccination to protect their families when they return home, as vaccines were difficult to receive in their home country. **This cooperative effort not only provided necessary health education and services to our H2A guest workers but also ensured a healthy harvest.**

Cooperative Extension in Wake County convened a team with the County Health Department and a Hispanic serving organization to locate farmers in the area with H2A workers, contact them, and **deliver vaccines to their farms.** This effort was broadened to migrant workers, generally of Hispanic descent, and their families. As a result of Extension efforts with local partners, about 350 people were vaccinated, mainly H2A and migrant workers. The Extension agriculture agent established new relationships and strengthened existing ones with local growers. The team discovered a need for more medical-related support for migrant and H2A workers which has led to ongoing discussions to expand medical support for this population across the county.

Cooperative Extension also partnered with the NC Department of Health and Human Services, the Rowan County Department of Health, Rowan Emergency Services, and the Rowan Cabarrus Community Health Clinic to arrange **vaccine clinics for farmworkers.** Initial and follow-up clinics were set up near major H2A visa employers. By partnering with DHHS and the Rowan Cabarrus Community Health Clinic, Rowan County was able to fully vaccinate 584 farmworkers.

The Anson County Extension Agent and community partners coordinated **on-farm vaccination clinics** for Anson County farms. The Extension Agent sent out mailings to farms about the availability of vaccines and advocated for each farm interested. Times and days were carefully selected to minimize the impact on farm operations. Nurses, with the assistance of translators, were able to educate and inform the workers about the vaccine and its potential side effects. Over four days in May and June, 98 workers received their first and second doses of the vaccine.

With the support of local partners, Cooperative Extension in Nash County used **farmworker outreach** during the pandemic as an opportunity to provide migrant workers with a weekly **Health Fair**, which ran for 9 weekly sessions. In addition to delivering 159 **COVID-19 rapid tests**, the fair provided **CSA boxes** to 281 people, as well as **health screenings** (135 blood pressure checks and 133 blood sugar checks), and **educational resources** to farmworkers and the community. **Through a partnership with the NC Department of Health**

**and Human Services and other community organizations, Extension led efforts across the state to ensure the health and well-being of farmworkers and prevented significant disruption in agriculture production through vaccine distribution efforts.**

**Briefly describe how the broader public benefited from your project's activities.**

Tractors guided by GPS, cows milked by robots, data collected by drones to pinpoint where and when to use water, fertilizer, and pesticides, even biosensors that monitor animal health, with every passing year, North Carolina farmers increasingly turn to advanced technology to reduce losses, raise yields, and limit their impact on the environment. But they face obstacles. One of the most talked-about these days is the lack of affordable high-speed internet connections, or the lack of high-speed internet entirely, in some rural areas. Farms are businesses. And as with many other businesses, the technology they need to maintain profitability has evolved exponentially. So has the need to gather data and put it to use. NC State Extension plays an important role in broadband access, adoption, and utilization across North Carolina by focusing on ways to use broadband resources beyond entertainment and connection; and to increase opportunities in education, productivity, wellness, and commerce.

Responding to the growing need for NC State Extension to be involved in rural broadband issues, a Broadband Access and Education Coordinator position was developed. A broadband resources webpage outlining broadband resources by Extension programming area was created to help Extension personnel find an on-ramp for working on broadband in their Extension subject area of expertise. In addition to the resource page, other resources helpful to the mission of NC State Extension are curated and posted on the [Community Development Portal](#). Training has been conducted to build the capacity of Extension Agents. These broadband resources provide NC State Extension Agents and Specialists with research-based knowledge that can be extended to their communities helping transform science into everyday solutions that improve lives and grow our state.

The NC Agriculture Digital Alliance provides an avenue for partners to learn, share, and collaborate to support digital inclusion and equity among the agricultural community. This includes sharing models and funding opportunities, finalizing a broadband and agriculture mapping project, and collectively completing a digital literacy assessment for agricultural communities inclusive of farmers, farmworkers, and family members. The long-term objective is to promote better broadband infrastructure, adoption, and utilization in agricultural communities. Achieving these objectives would mean NC's rural agricultural areas would be connected via broadband and able to participate in the modern economy, receive health services, access educational opportunities, and many unconceived purposes.

In September 2021, NC State Extension's Broadband Access and Education Coordinator was named the National Broadband Fellow by the Extension Foundation and Extension Council on Policy (ECOP). The Fellowship is funded by NIFA's New Technologies for Ag Extension (NTAE) grant and supports the work of the National Digital Education Extension Team to build the capacity of Cooperative Extension Systems nationwide to address issues surrounding Broadband Access and Digital Skills Education. **This work is paving the way to ensuring that the lack of broadband access doesn't stand in the way of opportunities for our rural communities to thrive.**

## Comments

The following professional development workshops were provided by Extension Specialists for Extension Agents in 2021 to facilitate the use and transfer of new research-based knowledge:

- Carbon Markets, Conservation Practices, and Ag Labor

- NC State Climate Office: Tools, Resources & Climate Communication
- COVID-19 Community Health Outreach to Vulnerable Populations
- Disaster Preparedness and Recovery Training
- Extension's Role in Disaster Management and Community Resilience
- Farm Machinery and Highway Safety
- It's Getting Hot Out There: Urban Tree Species & Climate Change
- Land Utilization & Heirs' Property: Standing on a Lot of Love
- Land Summit: Right to Farm, Bona Fide Farm, PUV, VADs, & Tenancy
- UAV Training for Ag Agents & Extension Professionals

**Critical Issue  
Project / Program**Enriching Youth, Family & Community Well-Being  
Local Food Systems**NC State Extension Created Opportunities to Build Resilient Local Food Systems that Promote Food that is Grown, Caught, and Raised within North Carolina****In 2-3 sentences, briefly describe the issue or problem that your project addresses.**

Consumer demand for local foods contributes to the creation of jobs and opportunities throughout North Carolina for our farmers, businesses owners, and entrepreneurs that store, process, market, and distribute locally produced foods. As markets for local foods grow, so do opportunities for farms and local food businesses. Resilient localized food systems ensure a continual supply of safe, accessible food for all community members while supporting the economic vitality of farmers of all scales. There has been a renewed spirit for customers to purchase food locally and support local farms. Food shortages during the COVID-19 pandemic further emphasized the need to purchase foods locally. But the pandemic also brought unprecedented challenges to the in-person marketing efforts growers often use to engage with consumers, such as farm tours, fairs, and farmers markets.

Research shows that direct-to-consumer markets are important market channels for new and beginning farmers to build a customer base to build their business. Many of North Carolina's 20,298 new and beginning farmers lack prior agriculture experience, but growing support for local foods and sustainability has driven the interest of a diverse group of young people to go into farming and associated food businesses. Small farmers can meet consumer demands, but they need training and education to achieve this.

Engagement with local food systems increases grower profits and supports our agricultural economy and provides critical education and awareness to the public regarding the importance of agriculture. Educating consumers about the importance and significance of agriculture is a major concern in North Carolina. Soaring populations in North Carolina and rapidly accelerating development in rural areas have led to alarming increases in farmland loss.

**Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.**

A growing number of farms provide direct-to-consumer sales in their local communities through farmers markets, CSA programs, farm stands, and other channels. The shorter the distance between the farmer's field and the customer's plate, the less transportation and fewer intermediaries required. This benefits both the farmer in keeping a greater percentage of their sales and the consumer in purchasing fresher food. As an added benefit, the money spent in the community stays in the community, supporting other businesses that offer goods and services and creating jobs. Agricultural lands have been irrevocably lost in recent decades due to residential and commercial development. **NC State Extension Agents and Specialists work with local communities to provide education and advocacy, preserve fertile agricultural lands in North Carolina that feed us and provide a host of economic, environmental, and socio-cultural benefits.**

By using **Donation Stations**, [Extension Master Food Volunteers](#) (EMFV) and Farmer Foodshare volunteers manned tables at farmers markets where farmers and shoppers could donate local food to people in need. Food was then shared with local agencies serving

neighbors in need. Extension developed a resource guide and kits to help Extension Agents start a Donation Station in their county and report volunteer hours and pounds of produce collected for donation. **Cooperative Extension increased access to locally produced food through food assistance collection and distribution programs.**

NC State Extension created 12 **Local Food Posters** that feature a local fruit or vegetable that is in-season that month. Each poster contains nutrition information, local food facts related to NC agriculture, and low-cost recipe ideas. Posters were shared with Extension Agents for distribution; 92 food pantries across the state displayed the posters. **Local food demand was increased through partnerships and programs aimed at increasing the community's knowledge of and access to local foods.**

**Farm-to-School** programming has been unfolding in North Carolina for a long time in various ways. County Cooperative Extension Centers have been teaching kids about agriculture and cooking through **school programs, camps, and field days**. Agents supported farmers in finding new markets and meeting those market demands. Through **training, fact sheets, and programs**, NC State Extension's Farm-to-School Work Group increased Extension's capacity to support farm-to-school efforts across the state. The Extension Farm-to-Early Care and Education (ECE) workgroup created a **resource guide** for Extension Agents that shows how Farm to ECE programs serve families and provides ideas for potential efforts. Another goal of the guide was to enhance partnerships among ECE and food system entities within communities so Extension may better serve farmers and families. **NC State Extension developed and delivered research-based training and resources to increase the capacity of Extension Agents, farms, schools, and childcare providers to grow farm-to-school programs.**

### **Briefly describe how your target audience benefited from your project's activities.**

Extension in Davie County worked with local farms and agribusinesses to establish an online directory of local farms that sell products directly to consumers. A webpage was created that separated the farms into various categories, such as fruits and vegetables, meats and poultry, honey and honeybees, agribusinesses, etc. The directory included contact and product information as well as links to social media pages and/or websites. In 18 months, the online directory received almost 2,200 visits. The directory has proven to be an accessible, free marketing tool for Davie farmers and a resource for the community to find locally grown foods.

NC State Extension's **NC Choices** program expanded the **MeatSuite.com platform**, to provide a direct-to-consumer directory for bulk meat sales. The platform has over 170 farm users, and the marketing team has increased its social media presence and developed targeted promotions to direct buyers. **Extension helped agribusinesses take advantage of low-cost marketing opportunities that keep pace with rapidly evolving technology.**

Johnston County is the fastest-growing county in NC. As a result of the influx of new residents, farmland in the county is quickly being purchased by developers, leaving farmers to balance high land prices and preservation of their operations. As new homes are erected next to working farms, new residents are often disconnected from agriculture, farm practices, and food production, leaving them with many questions and concerns. The Johnston County Cooperative Extension Center, in partnership with the Johnston County Visitors Bureau, began a marketing initiative known as "**JoCo Grows Agriculture**" to connect consumers to local farms, driving traffic to purchase local foods and products directly from farms and encouraging them to engage in dialogue with farmers. A website, social media accounts, and the NC Farms App have been showcased to connect Johnston County residents to farms in their community. In 2021 alone, over 20,000 people received information regarding seasonality, production and harvest

practices, local food information, and recipes promoting local food and agriculture in Johnston County through social educational videos. This effort was complemented by Extension workshops, such as food preservation and cooking classes, to increase skills and confidence in utilizing local foods as part of nutritious meals. Extension agents hosted demonstrations to provide consumers purchasing local fruit and nut trees with skills needed for proper care of these plants for years to come. In addition to reaching the community through social media and in-person events, billboards were placed alongside high-traffic roadways in Johnston County, with approximately 6.6 million cars, conservatively, viewing these billboards since September of 2021. **With Extension's help, local agribusinesses are continuing to increase direct consumer spending at farms, narrowing the disconnect between consumers and the agriculture community.**

New and beginning farmers in the Northern Piedmont of North Carolina often lack the financial and marketing training needed to put together a formal farm business plan. Completing [NC Farm School](#) equips farmers with the knowledge to analyze their business enterprises, set pricing, budget their time and resources, and make more informed decisions about what products work best in their farming businesses. As part of NC Farm School, 4 farm visit days were organized, and the participants visited 2 farms on each day. The farm visits allowed the NC Farm School participants to hear from seasoned farmers about how they got started and how they make decisions on their farms. As a result of the 2021 Northern Piedmont farm school, 28 farmers were introduced to the AgPlan business planning software and the program material. Twenty-four completed the program class sessions, field days, and one-on-one farm visits. Among those 24 participants who completed the classes, 15 farmers received their graduate certificate, which meant they had a complete farm business plan and had completed 80% of the classwork assigned. These farmers are now equipped with a business plan they can use to secure financing and use as their roadmap to build a successful farming enterprise. **Extension fueled the continuous growth of robust local food systems by providing training, education, and guidance to new and beginning farmers.**

In 2020, Extension formed the Henderson County **Farmers Market Coalition** with market managers, health department leaders, and community non-profits to build a core group dedicated to promoting and improving equal access to locally grown and produced food. Since the formation of the Henderson County Farmers Market Coalition, two new markets have opened in the county, one of which is in a USDA-identified food desert. As a result, food access has increased in two previously underserved areas. The Henderson County Farmers Market Coalition has not only increased food access and affordability of local produce to numerous citizens, but its success has shown community partners that Extension is a local food leader and a key player in advancing community agriculture projects. NC State Extension's Local Food Program Team partnered with two organizations to build a **Network of [Farmers Market Managers](#)** to better respond to the unique needs of farmers markets in the state. These three organizations host regular webinars and other virtual gatherings for the emerging network. In addition to providing a space for markets and support organizations to network and collaborate, the network was able to coordinate with state government and law enforcement to keep markets open during the COVID-19 shutdown and provided data to the state government that resulted in \$750,000 in relief funds for farmers markets. In March 2020, 49 individuals registered for the first webinar. As of the end of 2021, the group has expanded to 120 contacts on the email list. **Extension helped create stronger local food systems by building capacity for Farmers Markets.**

**Briefly describe how the broader public benefited from your project's activities.**

**Cooperative Extension continues to play a key role in increasing local food system capacity by supporting and promoting farmland preservation.** To bring a much broader range of county citizens together to learn about Lincoln County farmland, Extension personnel worked with farmers to coordinate a sponsored **farm-themed concert**, beginning with a sponsored mixer and dinner well attended by county farmers, farm families, and county commissioners. A "State of Our Agriculture Address" was featured, as well as introductions of each farm family to the commissioners. Later that evening, a crowd of over 2,000 people gathered for a concert featuring a popular band. The concert included 4 brief, high-energy presentations on farmland and farming, as well as an appreciation of farmers and a clear call to favor local agriculture and farmland supportive policies. The crowd response was energetic and very positive. This was the largest public gathering in Lincoln County history that allowed farmers to directly address and influence the public for the sake of farmland preservation. Farmers expressed appreciation and gave a very positive response to being able to visit with each other, discuss important issues as a group, and influence our local community representatives. The commissioners responded very positively as well. The public was enthusiastic and responsive to the presentations in the concert, cheering for farmers when asked to and reacting energetically to prompts for responses during the presentations. Many people (including farmers, leaders, and the public) expressed appreciation and a desire to have a similar event next year.

NC Choices' USDA-funded Beginning Farmer and Rancher Development program identified and partnered with solar-farm, silvopasture, and land trust contacts to develop **land-sharing opportunities** for beginning farmers. In 2021, Extension helped install infrastructure and/or developed lease arrangements, budgets, and applied one-on-one technical assistance for land trust, solar, and silvopasture farmer/landowner partners, including a significant expansion of solar grazing partnerships. Over 10 beginning farmers are now actively farming on leased land opportunities in NC. Extension helped secure two new beginning farmer land-pair partnerships.

Wilson County approved an ordinance to allow **Voluntary Agricultural Districts (VADs)** in 2004. VADs help to promote agriculture and preserve farmland, increase countywide recognition of and pride in the agricultural community, encourage the economic health of agriculture, and increase the protection of agriculture from non-farm development and nuisance lawsuits. Extension provides leadership to the Wilson County VAD and works with the Wilson County Agriculture Advisory Committee, appointed by the Wilson County Commissioners, that oversees the VAD. When first created, 39 farms representing 3,379 acres enrolled in the program and made a voluntary commitment for 10 years. Recent population growth in Wilson County has re-emphasized the importance of the program, so Extension distributed information on the VAD, contacted all farms currently in the program, received a commitment from them to re-enroll, and encouraged farms not in the program to enroll. Twenty-nine new farms representing 943 acres have since enrolled in the program. This brings the total to 68 properties representing 4,322 acres in the VAD program in Wilson County. In addition, two VAD applications were found not to be enrolled in the Wilson County Present Use Value taxation program. Extension made them aware of the PUV program and how the program can save the landowner in taxes.

Cleveland County updated its **Comprehensive Land Use Plan** in 2021, to create a guiding document used by local elected and appointed officials planning for developmental growth, economic growth, zoning, and more. The farming community was concerned that the draft plan targeted a large segment of the county for future secondary growth (low-density housing and retail), with no consideration of the potential impact on commercial agriculture, needed a voice in the planning process. NC State Extension partnered with the Cleveland Soil & Water

Conservation District to convene meetings with leaders in the local farming community. The coalition sent a proposal to the County Commissioners, asking that "Prime Agricultural Land" be identified in the plan. Supporters also attended County Commission meetings to speak in support of the proposal and to stress the importance of agriculture to Cleveland County's economy and quality of life. County leadership adopted the proposal, issued a proclamation recognizing agriculture, and committed to keeping agriculture in focus when making future decisions on land use.

### **Comments**

The following professional development workshops were provided by Extension Specialists for Extension Agents in 2021 to facilitate the use and transfer of new research-based knowledge:

- Creating a game plan to develop entrepreneurial farmers
- Farm School Online Course
- Introduction to Small Farm Bootcamp
- Land Summit: Right to Farm, Bona Fide Farm, PUV, VADs, & Tenancy
- Local Foods Program - Agritourism: Western NC Success
- Resources for Engaging Volunteers in Local Food Programming