2019 Annual Report of Accomplishments and Results

Nevada
University of Nevada, Reno Cooperative Extension
University of Nevada, Reno Agricultural Experiment Station

I. Report Overview

The NIFA reviewer will refer to the executive summary submitted in your Plan of Work. Use this space to provide updates to your state or institutions as needed.

1. Executive Summary (Optional)

The University of Nevada, Reno Cooperative Extension (herein referred to as "Extension") and Agricultural Experiment Station (herein referred to as "Experiment Station) are reporting against the 2020-2025 Plan of Work as it more closely aligned with the accomplishments and results for 2019.

The planned programs addressed include: 1) Sustainable Dryland Agriculture; 2) Natural and Environmental Resources; 3) Horticulture and Food Systems; 4) Health, Nutrition and Food Safety; 5) Community and Economic Development; and 6) Children Youth and Families.

The rationale for these planned programs is as follows:

Sustainable dryland agriculture is the application of plant and animal production practices in dry areas of the world where lack of moisture limits crop production. Nevada is the driest state in the nation. Growing a strong agriculture economy in the driest state requires research and extension programs addressing topics such as pest management, efficient irrigation, sustainable range management, alternative crops for high-desert areas, agricultural entrepreneurship, business and financial management, and risk management for producers.

Issues that impact Nevada's **natural and environmental resources**, include drought, floods, watershed and riparian management, wildfires, invasive species, noxious weeds, and conservation wildlife and their associated habitats. Protection and management of these resources is necessary to the economic and ecological well-being of the state.

With respect to **horticulture and food systems**, there is a growing interest in locally grown food. As such, research and science-based education for growing in Nevada's climate and soils is needed for successful backyard gardens and urban farms to grow produce locally and alleviate the impact of food deserts in Nevada. This will help improve food security and contribute to economic development.

Improving the **health** of all Nevadans and making available a safe and nutritious source of food are critical issues. A priority of the state is reducing the risks and behaviors that contribute to chronic disease with an emphasis on decreasing obesity through increased physical activity and the promotion of healthy diets. Contributing to this problem, over 12% of households in Nevada are food insecure, where access to healthy food is limited or uncertain.

Nevada is the seventh largest state in the country in terms of land mass and one of the least densely populated states. The culture and economics of rural Nevada are vastly different from that of the two metropolitan areas – Clark and Washoe counties. Clark County alone represents over 73 percent of the state's total population and approximately 70 percent of total business licensees. As such, improving the **economic and community development** of rural areas as well as business development in urban areas are strategic priority in Nevada.

Nevada ranks 48th among the 50 states for children's well-being. Issues in the state affecting **children, youth, and families** include early literacy, science and math proficiency, college readiness, healthy child and adolescent development, and domestic violence. Children need safe environments for optimal social, emotional, physical, and cognitive development – inclusive of the family, child care facility, and school setting.

Nevada's Extension programs directly impacted the lives of over 906,300 youth and adults. Indirect methods were designed to reach every Nevadan. Highlights of successful projects that cut across these planned programs include:

- Native Waters on Arid Lands enhanced climate resilience of agriculture water resources on reservation lands.
- Water for Seasons used a collaborative modeling approach for water managers to assess and simulate climate resiliency and adaptation in snow-fed arid lands river systems.
- Nevada Risk Management Education increased ranchers and farmers knowledge about agricultural risks, profitability and sustainability, and access to available insurance programs.
- Addressing Human Health Impacts from Emerging Contaminants in Reclaimed Water to Enhance its Use for Urban and Peri-Urban Agriculture improved knowledge, skills and capacity to practice sustainable agriculture and water management to enhance the nation's food security and water resiliency.
- Collectively, Rangeland Resources and Range Management Education, Sagebrush Cache Project, Noxious Weed Control and Management, and Native Plant Materials in Nevada, improved rangeland management, management and control of noxious weeds, increased use of native plants in rangeland restoration projects, and developed effective sagebrush restoration tools and protocols.

- Intermountain Regional Evaluation and Production of Native Plants increased knowledge and use of native plants in landscaping for water conservation and pollinator protection benefits.
- Living with Drought improved knowledge of drought, monitoring and planning for drought and its impacts.
- Living with Fire reduced wildfire threat to homes and communities.
- Home horticulture programs such as Master Gardener, Grow Your Own Nevada, Growing in Small Places, and Growing Self-Sufficiency increased residents' knowledge and skills related to home horticulture throughout the state to produce more locally grown foods.
- Commercial Landscape Horticulture improved the knowledge and skills of entry level landscape workers, increased use of water efficient landscaping, and provided certification to nursery workers and landscapers.
- Integrated Pest Management increased awareness and understanding of integrated pest management and pesticide safety principles by private citizens, Master Gardeners, and industry professions. Those participating in the Pesticide Safety Education Program report a potential $1.00-$5.00 per acre profit as a result of the program.
- Nevada Radon Education increased knowledge of radon – a cancer causing gas – among residential and commercial homeowners, residents, real estate agents and builders and led to mitigation efforts and increased the number of homes built radon resistant.
- Through the Healthy Kids, Healthy Start and Health Kids, Healthy Schools multi-level approaches preschool and elementary school children's knowledge about healthy eating improved, consumption of fruits and vegetable increased, and physical fitness and activity improved. Additionally, early childcare centers and schools adopted new or improved practices, professional's and educator's knowledge and skills improved, and the systems and policies supporting children's healthy behaviors for obesity prevention were positively affected.
- Targeted senior programming, such as Healthy Aging, increased strength, coordination, balance, healthy food consumption, and food resource management among seniors improving mortality and independent living.
- Expanded Food and Nutrition Education Program (EFNEP) improved diet quality, physical activity, and food security within insecure food populations to reduce the risk of negative physical and mental health problems among Nevada's youth and adults.
- Nevada Economic Assessment Project provided socioeconomics, fiscal attributes, and impact assessments to several of Nevada's counties. Data was used to for assessing the economic impact of a new lithium mine in one county and development of a master plan for growth. In another county data was used to assess the economic impact and business feasibility for expanding outdoor recreation – specifically mountain biking. Other impact studies for the healthcare sector have been carried out by the Nevada Rural Health Works leading to expansion of health care in rural parts of the state.
- Collectively other projects, such as Let's Discover STEM, Little Books and Little Cooks and Family Storyteller, targeting preschool and early elementary school children and families have equipped families with the confidence and skills to support early literacy, school readiness, and STEM education, as well as increased children's interest and emerging STEM skills, literacy and school readiness.
- Nevada 4-H Youth Development worked with over 100 different organizations/agencies to deliver high-quality youth development programs to over 14% of Nevada's youth. 4-H youth thrived and reported improved life skills development and academic achievement and motivation that support a successful transition to adulthood.

- Heart and Shield Family Violence Prevention Program for parents and children exposed to domestic violence improved parenting knowledge and skills, parent-child relationships, and developed skills in children (e.g., conflict resolution, emotion regulation) that are known protective factors reducing the risk of perpetuating the cycle of violence.
- Workforce Preparedness for Early Childhood professionals improved workforce skills among professionals and center directors, provided certificate programs, successfully prepared graduates for the Child Development Associate credential, and improved the quality of care in Nevada's early child care settings.

This past year, the Experiment Station capacity funds programs included Hatch, Multi-State, McIntyre-Stennis, and Animal Health funding opportunities, driven by peer and stakeholder review, and embraces the Federal-State partnership directed by the Hatch Act and subsequent Farm Bill provisions.

One of Experiment Station's performance metrics is external funds leveraged per dollar of formula funds funding. In 2019, $2.25M in federal-state appropriations were leveraged by faculty to generate $6.59M in external fund (a return of $3 for every $1 invested). Our faculty published 86 peer-review journal articles, 7 chapters in books, trained 109 graduate and 78 undergraduate students, gave 199 presentations, conducted 45 workshops, and filed for 1 patents.

Highlights of successful projects that cut across these planned programs include:

- Stress-tolerant sorghum development for Nevada's climate
- Improving commercial crops resistance to fungal infections like stem rot & blossom blight
- Identification of rootstocks and mechanisms for salinity and boron tolerance in tomato grown in Nevada
- Development Prickly Pear Cactus As A Low-Water-Input Oleogenic Biofuel And Biomass Feedstock
- Improving Nevada's calf industry: effects of milk replacer, carbohydrate-based, and fat-based diets
- Micro plastics in drinking water of dairy cattle: unexpected consequences of agriculture intensification
- Understanding the role of root hydraulics and fungi symbiosis to improve nutrient capture and drought resistance in tomatoes
- Selection of grapevine genotypes for drought and salt tolerance in Nevada
- Improving teff grass: a forage, fodder, and highly nutritious, low-gluten grain crop
- Increasing seed size and oil content in Camelina: a rapid-growing oilseed feedstock for Nevada
- Grazing preferences, sward structural and morphological characteristics, persistence, nutritional quality and animal intake of popular existing, new, and alternative forage crops in arid conditions
- Understanding the biochemical mechanisms by which mercury is sequestered in plants like the model plant Arabidopsis, rice and Aspen trees
- Using salt-loving plants to improve food security and environmental quality in dryland ecosystems

- Identifying the causes of greater sage-grouse population decline
- Conserving soil carbon and sage grouse habitat in Great Basin meadows
- Developing decision support tools for management of wild horses on public lands in the arid west: an ecological assessment
- Characterizing the shifting role of wildfire in dryland ecosystem and watershed processes
- Predicting changes in Great Basin forest community stability under drought and ongoing climate change
- Application of State-and-Transition modeling for natural resource management
- Hydrologic and vegetative response to pinyon juniper treatment at the watershed scale
- Identifying at-risk snow water resources in the Great Basin
- Pheromone research to improved bark beetle management
- Using tree-ring data and satellite imagery to reconstruct historical dryland carbon storage at local, regional and continent scales
- Long-term health of aspen stands: understanding the drivers of population decline for a critical foundation species
- Quantifying the impact of pinyon-juniper removal on curl-leaf mountain mahogany stands and potential mule deer habitat
- Identification of climate-resilient traits and lineages for a keystone tree species of the Great Basin
- Understanding how Obesity Change Heart Enlargement and Stiffness Genetically
- Health benefits of bioactive compounds found in garlic, onions, leeks, chives, scallions, and shallots
- Analyzing economic impacts in changes to public-lands policies

II. Merit and Scientific Peer Review Processes

The NIFA reviewer will refer to your Plan of Work. Use this space to provide updates as needed or activities that you would like to bring to NIFA's attention.

Process	Updates
1. The Merit Review Process	No updates from the 2020 POW.
2. The Scientific Peer Review Process	The 2020 POW did not include Extension's scientific peer review process, which is detailed below. **Extension's scientific peer review process** Extension's publication policies are designed to enhance the credibility and professionalism of Extension publications, protect the authors' work and strengthen scholarship credentials. Publications fall under two main categories: 1. **Peer-reviewed** publications are educational materials that are research-based, referenced and peer reviewed. 2. **Editorially reviewed** publications are educational materials that are informational and do not include any scholarly application of research-based information. Although they are not peer reviewed, their content and presentation should be of high quality and consistent with University and Extension standards. Peer reviewed publications include fact sheets, special publications, curriculum materials, audio-visual/electronic materials, computer software programs, apps, and web-based programs. Peer review allows other experts within the field to review the author's publications and verify information. Each type of peer reviewed publication requires a different number of reviewers, ranging from three to five.

	All require subject matter experts as well as one intended audience member. Editorially reviewed publications include informational publications, newsletters, training materials/workbooks. All publications undergo periodic review of no greater than five years but may be more frequent.

III. Stakeholder Input

The NIFA reviewer will refer to your Plan of Work. Use this space to provide updates as needed or activities that you would like to bring to NIFA's attention.

Stakeholder Input Aspects	Updates
1. Actions taken to seek stakeholder input that encouraged their participation with a brief explanation	No updates from the 2020 POW.
2. Methods to identify individuals and groups and brief explanation.	No updates from the 2020 POW.
3. Methods for collecting stakeholder input and brief explanation.	No updates from the 2020 POW.
4. A Statement of how the input will be considered and brief explanation of what you learned from your stakeholders.	No updates from the 2020 POW.

IV. Planned Program Table of Contents

No.	Program Name in order of appearance
1.	Sustainable Dryland Agriculture
2.	Natural and Environmental Resources
3.	Horticulture and Food Systems
4.	Health, Nutrition and Food Safety
5.	Community and Economic Development
6.	Children, Youth and Families

V. Planned Program Activities and Accomplishments

Please provide information for activities that represent the best work of your institution(s). See Section V of the Guidance for information on what to include in the qualitative outcomes or impact statements. Add additional rows to convey additional accomplishments. You may expand each row as needed.

EXTENSION

No.	Title or Activity Description	Outcome/Impact Statement	Planned Program Name/No.
1.	**Native Waters on Arid Lands**	Enhancing the climate resiliency of agricultural water resources on reservation lands of the Great Basin and southwestern United States is increasingly threatened by the risk of prolonged drought and flash floods, and projected declines in surface and groundwater supplies. Increased temperatures will further stress agricultural productivity in this region due to lower soil moisture content, crop failures, and desertification. Native American tribes on arid lands are especially vulnerable to climate change due to marginal soils, geographic isolation, and ongoing challenges to quantify agricultural water rights. Additionally, historical federal policies have created a complex land tenure system on reservation lands that directly impacts tribes' agricultural water access, use, and planning efforts. Research and extension experts from 1862 and 1994 land grant institutions partner with tribal communities to assess the impacts of climate change on future water supplies, identify barriers and solutions, and evaluate and prioritize actions to enhance the climate resiliency of tribal agricultural water resources and food systems. This multi-state integrated research and outreach project targets the nation's most water challenged and economically vulnerable populations. A participatory research approach ensures that the local knowledge and perspectives of tribal communities remain at the forefront of the	Sustainable Dryland Agriculture

		project, providing for social learning while protecting Native American cultural traditions and sensitive information. The goal of the Native Waters on Arid Lands project is to increase the climate resilience of tribal agriculture and water resources on American Indian lands of the Great Basin and Southwest. Additional goals are to support tribal college efforts to strengthen teaching, research, and outreach expertise on reservation lands. As such, the target audience is Native American federally-recognized tribal nations within the Great Basin and American Southwest region, in addition to faculty, staff and students at 1862 and 1994 institutions. Our team planned and facilitated the annual Tribal Summit that was attended by 92 people from Indian tribes and agencies across the United States. The annual Tribal Summit integrates research and outreach by providing the opportunity for researchers to share project findings and for tribal members to educate researchers about the successes and challenges in managing agricultural water resources – at the farm unit and reservation scale. The summit targets tribal farmers, ranchers, resource managers, and leaders; along with 1862 and 1994 land grant faculty and students; and USDA, BIA, and other federal agencies that work directly with tribes on natural resource issues. Participants at the summit who completed evaluations increased their understanding of: The relationship between surface and groundwater and its effect on reservation agriculture; ways in which tribes stimulate their reservation economies through innovative water use; innovative tribal livestock and range land conservation practices; ongoing water rights settlement negotiations; future climate projections for reservation lands in the region; tribal efforts to conserve water for future generations; tribal college programs and internships; the role of Traditional Ecological Knowledge in climate planning; results of current research on information needs of tribal colleges and universities in	

		climate adaptation teaching, research and education; and results of current research on information needs of tribal resource managers in climate adaptation planning of tribal lands. Findings indicate that the tribal summit was successful in outreach education for a majority of breakout sessions offered. Mean scores for knowledge gains ranged between 3.43 and 4.7, with 5 being the highest rating available. These scores varied considerably by session topic and instruction provided. Evaluative results to date demonstrate that the five annual tribal summits held to date have effectively facilitated learning. Behavioral impacts are reflected in an approximate 20% increase between 2015 and 2016, and a 34% increase between 2016 and 2018, in the number of tribal summit participants. The relatively consistent participation in the annual tribal summit demonstrates educational value to federally-recognized tribes on reservation lands in the Great Basin and American Southwest regions. Other activities included: Identifying project needs with participating tribes and facilitating the process of the research team addressing the identified needs; the expansion of secondary data used to identify study boundaries and include 49 reservations in the study project region; the evaluation and reporting of an analysis of primary data collected from 2015-2017 summit participants to assess tribes' climate data and information needs; the development of future climate projections (precipitation and temperature) to facilitate and support climate planning for 9 selected reservations within the study region; the ongoing development and refinement of an "information management portal" to further support tribes' climate planning efforts; and presentations and publications developed to share research-based information. From these efforts over 750 adults and 150 youth benefited from direct extension methods and over 700 people indirectly.	

		Complete data on the project is located at: http://nativewaters-aridlands.com/ Long-term project goals are to continue to identify and address science information needs to support tribes in efforts to sustain or adopt innovative strategies to enhance the climate resilience of agricultural water resources and food systems. Accomplishing these goals will serve to build the capacity of tribal communities to prepare for a changing climate while improving quality of life on reservation lands.	
2.	**Nevada Risk Management Education**	Second to mining, the livestock, forage, and specialty crop industries in Nevada comprise an essential component of the economic stability in rural communities. According to the 2006 Nevada Agricultural Statistics Report, 95% of all land in Nevada is devoted to farming and ranching activities (82% rangeland, 13% cropland). The 2017 U.S. Census of Agriculture reports, that there are 6,128,153 land in farm acres in Nevada producing cattle and/or hay including alfalfa, timothy, and other hay products. The census also reported that the size of farms decreased from 2012 to 2017 with a focus more on smaller acreage production. Cattle and calves rank number one in cash sales for Nevada at $247,173,000. The Nevada Risk Management Education Program is an integrated research and extension program run in partnership with the United States Department of Agriculture, Nevada Department of Agriculture, American Indian Tribes, Nevada Cattlemen's Association, Nevada Farm Bureau, and Nevada Agricultural Foundation. The program teaches commercial, beginning, socially disadvantaged, and transitioning farmers and ranchers in Nevada about current federal crop/livestock and revenue insurance programs. This program utilizes risk management education tools to ensure the competitiveness of Nevada agricultural operations in future markets and educates producers about crop/livestock insurance programs to help minimize agricultural risk.	Sustainable Dryland Agriculture

		There were 1,757 producers reached through the Nevada Risk Management Education program with 37 different workshops offered and 7,581 participant hours. An additional 910 youth were reached through direct education, and 2,500 adults and 1,000 youth through indirect extension methods. Notable activities include: • The Cattlemen's Update provided current research-based information about important management practices and issues in the Great Basin region that may affect the efficiency, productivity, profitability, and sustainability of the state's cattle production businesses. The five-day event, in seven locations across the state, included the following workshops: Cost of production and current market outlook; weather outlook and changes to pasture, rangeland, and forage insurance programs; improving cattle grazing distribution through bull selection; animal nutrition research projects; transition to electronic identification; new harvesting/processing policies for Wolf Pack Meats; and local veterinarian updates. 408 cattlemen attended the meetings. Fifty-seven percent of producers had been farming and ranching 21 plus years with 66% of producers ranching over 641 acres or more. Twenty-six percent of the respondents reported that they would save over $500 because they attended the Update, and 26% reported they planned to make changes based on the educational program. • The Nevada Agricultural Outlook Conference provided Nevada agricultural producers with forecasts of future agricultural production and prices and how they may potentially impact net returns to Nevada farmers and ranchers. • A value supply chain analysis was completed to identify potential supplier bottlenecks. • A series of podcasts explained the potential impacts to Nevada agriculture from federal government policies and forecast of	

		Nevada agricultural prices, and the potential impacts to the Nevada agricultural industry from higher tariffs and trade sanctions on China. • The high school education program reached 910 students who reported an increased in knowledge for agricultural risk (Pre: 45%; Post: 86%). • Worked with the USDA's Risk Management Agency and insurance agents to create hypothetical circumstances to help producers determine if crop insurance is necessary, and better inform producers about deadlines for purchasing different types of insurance. • Expanded outreach and community connections through social media, along with county fairs, conventions and other public events. Overall, results of the program indicate increased knowledge around agricultural risks, profitability and sustainability, and access to available insurance programs. It is expected that informed decisions regarding markets, pricing and production based on strong financial analysis will lead to sustainable agricultural practices and enhanced quality of life for farmers and their surrounding communities.	
3.	**American Indian Outreach Program**	American Indian farmers and ranchers are socially disadvantaged due to the impacts of historical federal Indian policies, significant disparities in education and income levels, and issues that accompany geographic isolation and Indian land tenure designations. While American Indian farm and ranch operations contribute significantly to the economic base of rural reservations, opportunities exist to increase the profitability and sustainability of operations. According to the 2017 agriculture census, 265 American Indian producers have 1.3 million acres in land for farming in Nevada.	Sustainable Dryland Agriculture

		The American Indian Outreach Program is a multistate program that provides education to American Indian tribes in Nevada, Arizona and New Mexico. A survey of reservation agents identified that the reservations in these states need assistance in working with tribal farmers, ranchers and tribal staff in managing money, assisting tribal governments with business opportunities, budgeting and estimating costs, business planning, and evaluating financial opportunities for financing. The University of Nevada, Reno Extension teaches land-tenure and marketing. The UNR Extension team held trainings and workshops on reservations in Nevada and Arizona on financial management, rangeland planning and Beef Quality Assurance. Another training session at a reservation in New Mexico discussed how to plan for the tribe's agricultural future and how to get new farm startups. Seventy five adults participated in these workshops. In Nevada, three days of Indian Land Owner training reached 95 participants. The land owner trainings focused on Indian Land Ownership on reservations and how to obtain land (lease or purchase) for agricultural purposes. There was extensive discussion about Indian allotments and how they worked. Thirty-three percent of the attendees have owned Indian land for over 21 years, while 22% of attendees had owned land for 6-10 years. After the workshop, 66% of the 95 attendees reported they had a better understanding of how Indian allotment ownership works, and 68% reported they understood how fractionation or an undivided interest affected land ownership. Sixty-seven percent also reported that they increased their knowledge regarding the American Indian Probate Reform Act; and 53% reported that they had increased their knowledge on how to lease Indian land on a reservation.	

		It is expected through increased knowledge that there will be increased profitability and sustainability of American Indian farmers and ranchers contributing to the economic base of rural reservations.	
4.	**Addressing Human Health Impacts from Emerging Contaminants in Reclaimed Water to Enhance its Use for Urban and Peri-Urban Agriculture**	Wastewater from domestic and industrial sources has the potential to provide both water and nutrients to support agriculture within close proximity to urban areas. Due to its close proximity to consumers, urban agriculture is an important economic driver and also enhances food security. Direct wastewater reuse for agriculture is limited in the United States Currently, wastewater is treated for key constituents and some inorganic/organic chemicals; however, further treatments may be required to remove additional pollutants that could be potentially harmful to the ecosystem or human beings even at low concentrations. This project addresses the knowledge gap by investigating the possible use of reclaimed water in urban irrigated agriculture and identifying any potential human health impacts and necessary mitigation measures. The objectives of the project are: (1) Identify chemical contaminants in reclaimed water used for urban and peri-urban irrigated agriculture (forage crop and animal production); 2) Determine pathways (namely water, soils, and sediments) of contaminant entrainment into agricultural products; 3) Develop predicative models for the fate of trace organic chemicals during wastewater reuse and evaluate associated human health risks of identified contaminants at their respective concentrations; and, 4) Develop health risk mitigation strategies over the course of the agricultural production chain, particularly focusing on reclaimed water production for irrigation. A team of UNR and Experiment Station scientists partnered with Extension to implement this integrated research, education and extension project to increase food security in arid water scarce regions of the USA. Researchers developed methods to identify emergent chemical contaminants in reclaimed water and solid media; identified	Sustainable Dryland Agriculture

		emergent chemical contaminant levels in reclaimed waters; developed methods to conduct greenhouse experiments to measure uptake of emergent contaminants by agricultural produce; educated four graduate students and approximately 50 producers about the significance of reclaimed water for urban agriculture; and integrated science research with extension outreach through initiating the development of a series of peer-reviewed Extension publications. An Extension fact sheet reported on the development of an effective method for detecting and analyzing the environmental fate of CNTs in the soil–plant system and ultimately to human exposure. The fact sheet demonstrated research on the uptake and translocation of p-MWCNT and c-MWCNT in lettuce plants grown in hydroponic media in a greenhouse environment. Extension publications were made available through the website and library system to water utility personnel, agricultural producers, State Water Engineer office staff, and NV-EPA staff. Extension faculty also established research networks with Israeli researchers during a week-long workshop focused on water conservation, alternative water sources for irrigated agriculture, water pricing, and water production. In total, over 270 people received education through direct extension methods. The results will enhance the decision-making capacity of: Agricultural producers concerning the benefits and risks associated with reclaimed water use; water reclamation facility and water utility staff about the potential risks and mitigation needs and methods to improve suitability of reclaimed water for use in irrigated agricultural production; and stakeholder communities and policy makers about the feasibility and benefits/risks of using reclaimed water resources for irrigated agriculture. Improved knowledge, skills and capacity to practice sustainable agriculture and water management will enhance the nation's food security and water resiliency.	

5.	**Establishing and testing new field facilities in Nevada to support genomics-assisted approaches to breeding abiotic stress-tolerant sorghum**	Heat, drought, and soil salinity are three major abiotic stresses that typically occur together in the Southwestern United States and impair crop growth. Sorghum is a key species being used to replace other crops in arid and semiarid regions of the world due to its natural drought tolerance. The goal is to develop more stress-tolerant sorghum developed specifically for Nevada. The team set up saline field sites in Nevada, Texas and Argentina, tested over 426 accessions, and studied whole-plant, root, and pollen responses to heat, drought, and saline stress. The team use a genome-wide association study to identify genes associated with stress tolerance. Molecular markers for stress-tolerance genes were developed in to assist in breeding stress-tolerant sorghum cultivars that grow well in Nevada environments. Trained four students in applied agriculture, plant breeding, and basic laboratory techniques such as DNA and RNA extraction, PCR, and nucleotide sequencing Leveraged $150K in additional funds and trained four students.	Sustainable Dryland Agriculture
6.	**Enhancing tomato production in arid and semi-arid regions**	Research goal is to determine novel traits in tomatoes that can improve whole plant response and growth under high salinity and high boron to benefit growers through better genotypes and higher yields. Carried out screening of plant material from tomato genetic resource center, and commercial varieties (15 varieties). Created our own seed stock from the 15 varieties. Developed a fast-screening method where tomato plants are grown in Petri dishes with varying levels of salt. Commonly done in Arabidopsis but not in tomatoes. Vertical system is allowing for image analysis.	Sustainable Dryland Agriculture

		Adoption from 30% of local producers of rootstock technology directed to improve crop performance under high soil salinity and boron toxicity. In the short term, local growers who adopted this technology. Leveraged over $107K in new research funds and trained 5 people in plant physiology methods and leaf gas exchange measurements.	
7.	**Understanding the role of root hydraulics and fungi symbiosis to improve nutrient capture and drought resistance in tomato**	Research goal is to understand how the interaction of plant nutritional status and water availability affects young root development and physiology under drying soil and upon re-watering, and whether fungi interactions with the plant change the drought response to maintain higher root water uptake capacity and leaf carbon assimilation. Determined what changes in root hydraulic anatomy and physiology resulted from nutrient deficiency and drought in tomato plants. Also learned how the interactions between nutrient and water deficits affect root development. Assessed the effect of symbiotic fungi's associations in plant water relations in nutrient and water limited environments. Leveraged over $70K in new research funds. Publish a book chapter on "Advances in understanding vegetable physiology: Root systems as the next frontier to improve sustainable vegetable production."	Sustainable Dryland Agriculture
8.	**Improving USA's calf industry: effects of milk replacer, carbohydrate-based, and fat-based diets**	From to 2008 to 2018, the veal production in the United Sates decreased from 143 to 76 million pounds. Major reasons include the reopening of the American market to Dutch veal and successful campaigns of animal-rights groups that claim animals are poorly fed and undergo stress caused by the confinement. The team evaluated the effects of feeding starch and omega 3 oils on growth performance, blood stress indicators, pH, tenderness, sensory attributes, and fatty acid profile of veal as a feeding strategy to improve animal welfare and overall veal quality. Leveraged $180K in additional research funds and trained four students.	Sustainable Dryland Agriculture

9.	**Understanding the biochemical mechanisms by which mercury is sequestered in plants like the model plant Arabidopsis, rice and Aspen trees**	A better understanding of mercury (Hg) in the environment is of particular importance for Nevada because it is located within a global belt of Hg geologic enrichment. Many areas in the State have rock and soil that is naturally enriched in Hg. Hg was also used in the late 1880 to 1900's in Northern Nevada mining operations to amalgamate gold and silver from ores, and as a result of this uncontrolled use there are many areas that are highly contaminated with Hg. This research is gaining biochemical insight into how Hg is absorbed and accumulates in plant tissues. The plant species Arabidopsis (a model organism in biology), when exposed to atmospheric mercury at half the legal limit for drinking water established by the EPA, had 17 times greater concentrations of mercury when compared to non-exposed. When testing how trees (Aspens) handle mercury, results showed that trees when exposed immediately took in the atmospheric mercury. After initial spikes of atmospheric mercury, trees were then found to move mercury into different portion of the plant, as if mercury was a nutrient. Something that has never been shown. Trained a total of 14 students in Hg isotope analysis.	Sustainable Dryland Agriculture
10.	**Selection of grapevine genotypes for drought and salt tolerance in Nevada**	Global warming is increasing chaotic weather events, especially the incidence of drought across the world, making water scarcity a major agricultural problem. Crop water use efficiency is an important research priority. Cultivated grapevines originated from and grow well in a Mediterranean type climate; they are relatively tolerant to drought as compared to many other plant species. The Vitis grapevine genus, consisting of 79 accepted species, is genetically diverse making it an excellent plant family to explore for drought tolerance. Using proteomics, investigated the physiological and transcriptomic responses to water deficit of four different genotypes that differ in drought tolerance: Ramsey (*Vitis champinii*), Riparia Gloire (*Vitis riparia*),	Sustainable Dryland Agriculture

		Cabernet Sauvignon (*Vitis vinifera*), and SC2 (*Vitis vinifera* x *Vitis girdiana*). The drought tolerant Ramsey maintained higher photosynthesis at equivalent water deficit than the three other grapevine genotypes. Ramsey was more responsive to water deficit; its transcriptome responded at smaller water deficits, whereas the other genotypes did not respond until more severe water deficits were reached. There was a common core gene network responding to water deficit for all genotypes that included ABA metabolism and signaling. The gene clusters and sub-networks identified in this work represent interesting gene lists to explore and to better understand drought tolerance molecular mechanisms. RNA sequencing data were deposited and released to the public in the Sequence Read Archive database with the accession number PRJNA516950. Data indicated that abscisic acid (ABA) was the stress hormone most associated with drought tolerance. This data provides planter breeders with the genetic markers to identify drought-tolerant species of wine grapes. Trained 3 post docs, 3 graduate and 18 undergraduate students. Developed RNA sequencing data and released to the public in the Sequence Read Archive database with the accession number PRJNA516950.	
11.	**Development of prickly pear cactus as a low-water-input biofuel and biomass feed stock**	The project is creating a novel biofuel feedstock production platform with increased energy density within vegetative tissues that is capable of producing biodiesel, renewable diesel, or jet fuel with only 20% the water inputs required for traditional biofuel feed stocks.	Sustainable Dryland Agriculture

		New information about the effect of irrigation levels on prickly pear cactus (Opuntia) biomass or fruit production in a field setting in the U.S. was gathered. Some significant differences were detected among the irrigation conditions. Information about the selection of the best species or cultivars of Opuntia to use for biomass and fruit production has also been gained. A total of 165 new (or replacement) accessions were collected from D'Arrigo Bros. in Salinas, CA and added to the NALPGRU Opuntia collection to preserving all the plant materials developed by the D'Arrigo Brothers. Leveraged $115K in new research funds, trained seven students and two post docs, and published 4 peer-review journal articles and two book chapters.	
12.	**Improving teff grass: a forage, fodder, and highly nutritious, low-gluten grain crop**	Teff is a warm season grass that is gaining popularity in the U.S. as a high-quality summer forage, fodder, and grain. The long term goal of this project is to improve the relative drought tolerance and lodging resistance. Two drought tolerant lines suitable for Nevada growing conditions have been identified. New germplasms were developed that produces a larger seed size. A callus induction protocol for teff was developed for use in transformation trials using CRISPR/Cas constructs. We are the first to report a stable transformation method using mature teff embryos (from seed). Previous reports indicated that mature embryo were not a good explant source for callus induction. Trained 26 students in applied agronomy and molecular biology.	Sustainable Dryland Agriculture
13.	**Increasing seed size and oil content in Camelina: a rapid-**	Drought tolerant, rapidly growing oilseed feedstocks can provide a source of dietary oil and a renewable biofuel feedstock as part of a foundation for improving Nevada's agricultural economy. Camelina is a	Sustainable Dryland Agriculture

	growing oilseed feedstock for Nevada	rapidly maturing short-season species typically planted as an annual or a winter annual crop best adapted to cooler climates and is currently grown in traditional flax-growing regions of the upper Midwest. The adaptability of Camelina to a broad range of environmental conditions, particularly suited to cold climates with limited water availability, makes this oilseed crop potentially useful as a feedstock for both dietary oil and a renewable biofuel feedstock in Northern Nevada. Characterized the seed yield, seed oil content, and fatty acid methyl ester (FAME) profile of a desert-adapted oilseed called Saharan mustard has proven it to be an excellent candidate rotation crop with alfalfa. Significantly lower pectic residues in certain lines improves the flow characteristics of the resultant oil and require less washing during biodiesel production. The "Columbia" variety of camelina has proven to be a good candidate for commercial production in semi-arid regions of the west. The team also produced a transgenic Camelina line that expresses a second generation cys-oleosin/DGAT construct that is predicted to improve carbon fixation in soybean. Leveraged $120K in additional research funds, published six peer-reviewed journal articles, and trained 24 students.	
14.	**Using salt-loving plants to improve food security in Nevada's marginal lands.**	Irrigated agriculture provides almost half of world food production, but about 20% of irrigated lands are undergoing salinization, which results in reduced or complete loss of crop yields. The research involved investigating the potential for plants that prefer to grow in salty soils or waters (i.e., halophytes) to produce food for human or livestock consumption, and produce biofuel for bioenergy production.	Sustainable Dryland Agriculture

		Quinoa, amaranth and green wheatgrass have a high potential to perform well in Nevada's marginal lands (salty soils). However, quinoa does not appear to tolerate Nevada's temperatures very well. The addition of a salt stress component to the Texas A&M's Agricultural Policy/Environmental eXtender (APEX) model has broadened the usage for evaluating various nutrient management practices, conservation practices, alternative cropping systems and other land management strategies. Trained seven students in applied soils science.	
15.	**Characterization, development, and enhancement of plant cell walls and forage feed stocks**	Plant cell wall polysaccharides collectively represent the most abundant biomolecules on the planet, and they have been used since the dawn of human civilization as a source of fiber, fuel, and textiles. Plant cell walls are also an important nutritional component of ruminant forage, and the polysaccharides within cell walls have recently received increased attention as a potential feedstock for renewable liquid transportation fuels and other value added renewable products. Due to the economic value and pervasive demand for cell wall polysaccharides as well as raw biomass, it is important to understand the molecular mechanisms of plant cell wall component biosynthesis, how plants accomplish the ordered deposition of these assembled components, and how the process of cell wall biosynthesis is regulated so that these processes can be manipulated to tailor plant biomass for specific uses. The team characterize a model plants (arabidopsis) dry matter composition of potential biomass and animal feed stocks that are extremely productive in Northern Nevada, investigated potential cell wall compositional changes that occur during the imposition of drought, heat and saline stress, and then genetically enhance cell wall digestibility to increase the productivity of biomass and forage feed stocks. The team found a mutation in cell wall building proteins that allow for the production of greater quantities of cellulose per cell in seedlings.	Sustainable Dryland Agriculture

		This trait is now being moved into agriculturally significant crops to produce more biomass or plant material, specifically alfalfa. Leveraged over $915K in additional research funds.	
16.	**Rangeland Resources and Range Management Education**	Among those who use and manage Nevada's rangelands there is incomplete knowledge about how plants grow and respond to grazing; the forage utilization concept; the processes of vegetation change and management; managing vegetation to reduce the risk of catastrophic fire; habitat elements important for managing sage-grouse; and monitoring management outcomes. This incomplete knowledge results in substantial conflict among the general public, interest groups, land users and land managers for how to use, allocate and manage rangeland resources. Rangeland management decisions that do not incorporate the full research base can adversely affect the range livestock industry, a suite of wildlife species, other resource attributes, and local economies that depend upon access to federally administered rangelands. Many of the rangeland management issues in Nevada also occur globally. The Rangeland Resources and Range Management program is an integrated research and extension activity that occurs in Nevada, adjacent states and at International levels. The target audience is county residents along with state and federal land management and wildlife agencies, livestock producers, domestic and foreign agency resource management staff and administrators, policy developers, and individuals/organizations interested in rangeland resources. Educational programming provides research-based information to address range management issues and continuing education for users of rangeland resources. Activities include: • Completed the Resource Needs Assessment process with the Nevada Association of Conservation Districts (NACD) for seven	Natural and Environmental Resources

		Conservation Districts (CDs) to help CDs increase their role as leaders of locally led conservation in Nevada. • Published the Nevada Range Monitoring Handbook and Nevada Ranchers Monitoring Guide. These publications will help land managers determine if current management actions are maintaining or improving resource conditions. As monitoring increases, it is anticipated that management actions will improve resource conditions. • Taught rangeland and rancher monitoring workshops. • Developed and delivered workshops to educate and initiate better grazing management on uplands and riparian areas in partnership with the Range Management School and Nevada Riparian Cadre. • Developed the Rangeland Quality Assurance program through the Nevada Cattlemen's Association. • Led a team in collaboration with Bureau of Land Management (BLM), United States Forestry Services (USFS), Natural Resources Services (NRS) and Intermountain West Joint Venture (IWJV) to update the Cooperative Permittee Monitoring Handbook, and provide training to BLM range staff and producers throughout Nevada. • Worked with land management agency range staff in developing and establishing a grazing management monitoring program. • Helped organize the Free Roaming Equid and Economic Sustainability Summit, Reno, Nevada which was attended by 200 people from 90 organizations across the United States. The summit focused on developing a stakeholder-based process to better manage free-roaming equids (wild horses and burros) in concert with other public lands multiple-uses to achieve western rangeland ecosystem sustainability. • Presented alternative management scenarios for Wild Horses and Burros to congressional staffers in Washington D.C. (Panel	

		speaker, panel invitation by Congressman Stewart). This effort played a direct role in increasing funding to BLM for wild horse and burro management, from $6 million to $21 million. • Conducted three multi-day field tours, two multi-day seminars, one nine-day short course, and a one-day monitoring workshop to over 700 students related to rangeland resources. • Provided input about fire fuels management for the Humboldt County Natural Resources Management Plan developed by the County Commissioners. • Participated in numerous planning and collaborative projects. For example, participated in three collaborative grazing projects with the USFS and the BLM intended to improve grazing management on two BLM allotments and the Santa Rosa Ranger District (collectively about 400,000 acres). • Faculty helped the US Farm Service Agency (FSA) implement its Non-Insured Disaster Assistance Program through completing a statewide Forage Production/Loss Assessment. FSA uses this report to determine eligibility for insurance payments, which have ranged from none to 1 million dollars or more per year. • Continued collaboration with the USFS International Program (USFS-IP) and the Northern Rangeland Trust in Kenya in their effort to develop a range management education program for the tribal areas of north-central Kenya. Developed seven short animated videos (5-7 minutes) that address key management concepts related to soils, desired perennial plants, clean year-round surface water, livestock production, maintaining wildlife populations, people, and ecosystem resilience to climatic variability. • Taught in Samarkand, Uzbekistan at the International Seminar on Sustainable Rangeland Management (for policy makers) and the Rangeland Ecology and Management Short Course for graduate students. As a result, the policy makers tasked with	

		implementing Uzbekistan's 2019 law (comparable to the 1934 Taylor Grazing Act in the US) to improve management of the country's rangelands have a much better understanding for how an integrated research, education, and extension program can result in ecological improvements for rangelands and support sustainable livestock production. The students who attended the Range Management Short Course were the first to receive any management-oriented formal education about rangelands and their resources, and how appropriate management can slow and/or eliminate the degradation that is occurring. Through these vast activities, over 1,100 adults and 110 youth received direct education and another 2,172 people were reached through indirect extension methods. Through improving rangeland management decisions the range livestock industry, a suite of wildlife species, other resource attributes, and local economies are positively affected.	
17.	**Sagebrush Cache Project**	Within the sagebrush steppe ecosystem, sagebrush plants influence a number of ecosystem properties, including nutrient distribution, plant species diversity, and soil moisture and temperature. Sagebrush is also a critical habitat component for a number of sagebrush-associated wildlife species. Recent increases in frequency and size of wildfires and associated annual grass expansion within Wyoming big sagebrush communities have increased the need for effective sagebrush restoration tools and protocols. The sagebrush cache study started in 2016 as a partnership between Extension and the USDA. The investigators used modified "pile seeding" to enhance sagebrush establishment from seed in islands. Sagebrush seeds naturally disperse in late fall or early winter, and artificial seeding on snow has been successful in some areas. Because sagebrush seeds tend to germinate where snow accumulates, soon after snowmelt the researchers planned to use cut sagebrush plants both as the source of	Natural and Environmental Resources

		sagebrush seed and as a means of trapping snow for enhanced germination. The study's primary objective was to evaluate the fall placement of Wyoming big sagebrush plants, harvested at near seed-ripe, in recently burned areas. Results demonstrate that permanently staking several sagebrush branches (i.e., can't move) with many viable seed stalks on recently burned areas can substantially increase the number of sagebrush seedlings compared to the standard broadcast seeding method or no seeding at all, when winter and spring precipitation are well above average. There were far fewer seedlings present on plots established in 2017 when precipitation was near average and snowfall was a less prevalent form of the precipitation. The initial success in the spring of 2017 was followed by substantial loss of seedlings in the following years. The study design did not allow for identification of definitive cause for seedling decline but incidental observation indicated the likely cause was browsing from rodents and antelope. This suggests a significant question for future research, is the number of caches and seedlings needed per unit of land area to surmount wildlife herbivory and establish a persistent sagebrush population. The Northeastern Nevada Stewardship group and the Lincoln County Conservation District have established additional study sites in Elko and Lincoln counties to test the technique across other sagebrush species and locations. Land managers have yet another tool for establishing islands of sagebrush in burned areas. These islands would presumably become seed sources for gradual colonization of sagebrush into larger areas for postfire rehabilitation.	
18.	**Native Plant Materials in Nevada**	The most significant native plant materials (NPM) challenge facing Nevada – and the western United States more broadly – is ensuring the supply of large quantities of NPMs needed to rehabilitate hundreds of	Natural and Environmental Resources

		thousands of acres in large wildfire seasons. Supplying large quantities of NPMs requires that more desired species be produced under cultivation. The University of Nevada, Reno Extension is working in partnership with the U.S. Fish and Wildlife, BLM, U.S. Forest Service, Nevada Department of Agriculture, Nevada Department of Wildlife, Natural Resource Conservation Service, Nevada Division of Forestry, Great Basin Institute, The Nature Conservancy, and Walker Basin Conservancy to increase the use of genetically-appropriate native plant material in rangeland restoration projects. Activities include monthly stakeholder meetings and annual workshops for agricultural producers reaching 25 people, along with peer-reviewed publications on native plant material production, wildland collection, and purchasing. Additionally, in partnership with federal and state land managers and stakeholders, a strategic plan for the native plant material industry in Nevada was drafted. The strategic plan will be finalized in early 2020. It is expected that this work will increase the use of native plant materials in restoration projects in Nevada and increase the volume of native plant materials grown under cultivation in Nevada.	
19.	**Intermountain Regional Evaluation and Introduction of Native Plants**	Nevada is the driest state in the nation, and landscape water use accounts for more than two-thirds of residential water use. Use of low-water-requiring native plants in landscapes can reduce water needs and support native pollinators and other wildlife. Further, adopting the "watershed approach" to landscaping can make the best use of water delivered by irrigation and natural precipitation and support wildlife populations, including pollinators. Intermountain Regional Evaluation and Introduction of Native Plants is a USDA-NIFA multistate collaborative project that focuses on introduction	Natural and Environmental Resources

		of native plant species to the horticulture industry and education of the public about the use of native plants for landscape water conservation and pollinator protection. The target audiences are the gardening public, Master Gardeners, commercial landscapers, production and retail nurseries and other professionals related to the horticulture industry. This project is in its fifth year. Extension faculty in Nevada have planted 6 demonstration pollinator gardens throughout the state for use in future outreach/education related to use of native plants for pollinator protection. 102 adults benefited from direct instruction at these demonstration pollinator gardens. Another major outcome for Nevada Extension is bringing together the efforts of multiple local organizations, such as the Nevada Landscape Association, Wilbur D. May Arboretum, Truckee Meadows Water Authority, the City of Reno, and the Nevada Chapter of the American Society of Landscape Architects, for the common goal of bringing native plant landscaping to western Nevada for water conservation and pollinator protection benefits. Other state accomplishments appear in the annual report. More long-term goals include supporting nursery adoption and sales of native plant species for water conservation. A long-term goal is to stabilize and expand the market for Great Basin native plants for landscaping.	
20.	**Living with Drought**	Stakeholders need research-based information to understand drought, information on Nevada's drought status, essential research, and tools that can be used to help address and assess the impacts of drought in Nevada. Living with Drought is Nevada's resource for drought status information, drought-related resources, and tools that can be used to help monitor, address, and mitigate the impacts of drought. The target audience for the program is Nevada's general public, farmers, ranchers, natural resource managers and stakeholders in Nevada, and the Truckee and Colorado River watersheds.	Natural and Environmental Resources

		Education occurs primarily through the Living with Drought website, which provides current drought status information for both Nevada and the United States, including up-to-date monthly and seasonal drought outlook maps. The Living with Drought website also contains educational information about the basic causes of drought, types of drought, resources for understanding the effects of drought, and provides data and tools that can be used track drought, plan for drought, and report drought impacts. Individuals can report directly through the Drought Impact Reporter, which is linked to the Living with Drought website. The website has had 3,972 page-views. Additional program activities included presenting educational workshops, giving presentations to agency and community groups, booths at community events, and meetings with various stakeholders and the public to promote the program with other potentially interested groups/constituencies. Through these methods 163 people received direct education. 15 drought impact reports were produced and distributed. The impact of this program is greater information and outreach, increased statewide monitoring and research data, and supply augmentation and long-range planning, including water reuse.	
21.	**Water Sustainability in Snow-Fed Arid Lands River Systems: Water for the Seasons**	Management of large-scale river systems in the western United States has taken on critical importance in the last few decades due to increasing and diverse demands for water use, urban population growth, and decreasing and more variable water supplies due to shifting hydroclimatic regimes. Water policy has been slow to adapt. Arid river systems in the Great Basin, such as the Truckee-Carson River System, that depend on spring snowmelt to supply water for agriculture, urban communities, and natural resource protection, are expected to be impacted significantly by climate change. Assessing and enhancing the	Natural and Environmental Resources

		climate resilience of snow-fed river dependent communities in the arid western United States has taken on critical importance in response to changing climatic conditions. Participatory research approaches, such as collaborative modeling, are well suited in this context because they are intended to draw upon local stakeholders' knowledge and their diverse, often competing, perspectives to inform science research. A key feature of the Water Sustainability in Snow-Fed Arid Lands River Systems project is collaborative modeling research design that involved a diverse group of local water managers (stakeholders) in assessing and simulating climate resiliency and adaptation in the Truckee-Carson River System, as a case study site representative of snow-fed dependent arid lands in the western United States. Accomplishments include: (1) development, implementation, and evaluation of a collaborative modeling research design to assess coupled human and natural factors contributing to climate resiliency across the river system; (2) the development of primary data sets (interview surveys and focus groups) to quantify local water managers' perceived impact of climate change on agriculture, environmental, and municipal/industrial sectors; (3) the development of secondary data sets and specification of econometric models to analyze the efficiency of existing water management institutions in allocating scarce water supplies; (4) the development of hypothetical climate scenarios to probe stakeholders' adaptation strategies to prolonged drought and warming temperatures; (5) the development and refinement of hydrologic and operation models to simulate stream flows under these hypothetical climate conditions; and (6) development and simulation of adaptation strategies collaboratively between the research team and stakeholders. Biannual workshops continued to bring together researchers with the project's Stakeholder Affiliate Group, an identified group of local water managers who serve as key informants.	

		Over 1,500 adults were directly impacted by this project. Undergraduate and graduate students, post-doctoral fellows, faculty, and local water managers increased their awareness of collaborative research approaches to address contentious water scarcity issues involving diverse, competing water uses. Periodic evaluations of the workshops indicated that as a result of the project, Stakeholder Affiliate Group participants strengthened working relationships with project scientists, improved coordination with other stakeholders, and are more likely to continue working with other stakeholders to increase system resiliency. The participants also reported that as a result of the project they better understand climate resiliency, current resiliency of the river system, and the impacts of climatic extremes (prolonged drought and warming temperatures) on the river system. As a result of these knowledge gains, they reported that they are improving their respective organizational planning and operations to enhance resilience. Local adaption strategies have been mobilized that include communicating with other water managers, collecting data to monitor climate impacts, and planning for future water supply variability by investigating the performance of institutionalized water management regimes. Results have been shared through workshops, Extension publications, referred journal articles and presentations at state, national and international professional meetings. The results of this project are paramount to helping snow-fed dependent river system communities in the western United States, and other arid river systems in the world, to adapt to climate uncertainty and subsequent variable water supplies, while sustaining ecosystem diversity.	
22.	**Living With Fire**	Wildfires are increasingly common and catastrophic across the western United States and recently across the world (e.g., 2019-2020 Australia Bush Fires). The state of Nevada is known for some of the largest rangeland fires in the country, including the 2018 Martin Fire which was the largest fire in state history (178,000 ha). The cause of large wildfires	Natural and Environmental Resources

		is multi-faceted and complex. Decades of complicated land management history (e.g., fire suppression, grazing, logging, etc.) has created landscapes that are no longer resilient to disturbances like fire. Residential and urban developments interspersed on the border and throughout wildlands has increased both the frequency of fire ignitions and the effects of wildfires as they consume more property and impact human health and safety. Climate change and increases in the frequency of extreme events (e.g., drought, rain-on-snow events, flooding) exacerbates this already complex situation. Areas of particular vulnerability are in the wildland-urban interface, which is the border between communities and surrounding forests or rangelands. Government agencies, community leaders, and academics have urged a call-for-action to increase education and implementation of fuels management projects and homeowner/community-driven defensible space projects to reduce fire risk and prepare communities for the eventuality of fire in their backyard. The mission of the Living with Fire (LWF) program is to provide recommendations to residents on preparing for wildfire and reducing wildfire threat to homes and communities. Since its inception in 1997, LWF has created materials for residents that have been shared and applied to fire-prone regions throughout the country. LWF provides resources to homeowners, educators, community groups, and firefighting professionals to improve defensible space, ensure homes have proper building materials, manage native and non-native vegetation, and prepare for evacuation. Through community outreach events, peer-reviewed publications, social media and television and radio interviews, the LWF team brings the most up-to-date information on wildfire preparedness to Nevada residents and others across the country. The educational efforts of LWF reached 7,481 direct contacts and 10,601 indirect contacts. Through in-person events and web-based platforms,	

		17,087 publications were distributed in the state of Nevada and 5,330 throughout the rest of the United States. The distribution of publications serves as a metric for the reach and impact of the program. Long-term goals are to change human behavior regarding defensible space and wildfire preparedness.	
23.	**Noxious Weed Control and Management**	Noxious and invasive weeds threaten ecosystems throughout Nevada. The Nevada Noxious Weed Needs Assessment (2008) identified two important needs: 1) Identify the priority weeds for each county; and 2) The need for knowledge about herbicide and other methods of weed control. Land owners and managers lack a well-grounded understanding of weed biology, ecology and physiology, both above and below-ground, and how those parameters affect both management and treatment options. The target audience for noxious weed control and management education include agricultural producers, land owners, managers and administrators, users of public rangelands, weed managers, and the general public. The University of Nevada, Reno Extension faculty collaborated with the Paradise Valley Weed Control District, the Humboldt Watershed Cooperative Weed Management Area, the Nevada Department of Agriculture, and the Nevada Conservation Districts at two levels. Faculty provided input toward weed control treatments that was being proposed by these organizations or their clientele. This typically involved confirming the appropriateness of proposed chemical treatments or providing alternative herbicides; whether the timing of the proposed treatments was appropriate given the weeds' various stages of plant growth; and how to integrate chemical treatment with other approaches into a long-term, integrated management and control program. Workshops were provided in several counties throughout Northern Nevada. Information was presented on the different plant lifeforms weeds poses, their different root systems, their annual growth pattern,	Natural and Environmental Resources

		and how these attributes influence carbohydrate flow at different growth stages. This information is critical for the successful management of hard to control deep-rooted, complex perennial forbs (i.e., buds on both the roots and root crowns). The education focused on the importance of properly timing herbicide treatments for each species, and the need for a long-term, follow-up control program. Other workshops focused on the size and spatial extent of seedbanks and management options for their control. A 26-part series about the 25 weeds of greatest agricultural concern across Nevada's 17 counties was developed and distributed at the previously mentioned workshops. Peer-reviewed publications are under development. Direct extension methods reached 167 people and an additional 123 through indirect methods (such as popular publication). As a result, weed control and management efforts were implemented on several thousand acres in Paradise Valley, and addressed two significant issues: 1) A significant infestation of medusahead; and 2) Weed control along the right-of-ways of county roads. For the first time, the Quinn River Conservation District expressed an interest in weed control along roads in the Kings River Valley. And, owners/managers of ranch and farm property used herbicide to address infestations of Russian knapweed, perennial pepperweed, hoary cress and Scotch thistle. These efforts will improve the ecosystem in Nevada, livestock productivity, crop yield and quality, and human health.	
24.	**Identifying the causes of greater sage-grouse population decline**	Population declines prompted greater sage-grouse designation as a candidate species under the Endangered Species Act in 2010 (USFWS 2010). Identifying the causes of greater sage-grouse population decline will help state agencies, including the Nevada Department of Wildlife, implement steps to reverse population decline, preventing additional federal regulations for land owners under the Endangered Species Act.	Natural and Environmental Resources

		Captured and radio-marked 30 Common Ravens across Nevada to understand their space use in relationship to Sage Grouse Nests. Completed 823 raptor and raven points counts across Nevada, contributing to USGS' database for statewide occupancy and density modeling. Monitor 53 raven nests across Nevada, including collecting pellets for diet analysis in relation to sage-grouse nest predation and collecting data on nest success. Develop a statistical and mathematical methods for monitoring and evaluating drivers of Greater Sage-Grouse population dynamics. First case of using neuro-networking analysis (Bayesian hierarchical marked point process in modeling) on a wildlife population. This method of modeling is typically used only in neuro-imaging research into multiple sclerosis. Leveraged $250K in additional funds and trained two graduate students in Marked-Point Process Models, and Animal Movement models.	
25.	**Hydrologic and vegetative response to pinyon-juniper treatment at the watershed scale**	Woodlands dominated by pinyon pine and juniper have been expanding across the sagebrush-steppe since the turn of the century and currently occupy over 18 million hectares. In water-limited systems a primary motivation for reducing woody vegetation is the possibility that water-savings will be realized, providing increased water for shrub and herbaceous species production, and increased spring flow, stream flow, and groundwater levels. The team is in phase II to determine the effects of pinyon-juniper presence or removal treatments on various components of the water cycle, particularly tree water use, soil moisture, evaporation from plant canopies, snow and rainfall interception by tree canopies, surface runoff and groundwater recharge. Porter canyon experimental water shed is the only full instrumented water shed in the Great Basin. This facility is allowing scientists to	Natural and Environmental Resources

		quantify climate changes through its eleven-year dataset. At 7,000 feet elevation, change is occurring from snowpack driven vegetation like pinyon, juniper and sagebrush to spring rain driven forbs and grasses. Field tours have showcased the work in Porter Canyon and educated the public on rangeland management science. Attendees have included numerous Nevada land management agencies, state representatives, Governor's office representatives, and many students. Collaboration with federal research partners and other universities continues to grow thus increasing the scale of attainable grants and complexities of potential projects. Additional projects have begun with collaboration between USGS, ARS, NDOW, and UNR. Observations in Porter Canyon have led to coordination with BLM to cut more pinyon and juniper based on ecological knowledge gained from this project.	
26.	**Application of State-and-Transition modeling for natural resource management**	Nevada lands are no stranger to fire. Last year, two fires burned nearly one million acres. The year before, 1.3 million acres burned. In the last 20 years, more than 20 fires greater than 100,000 acres raged. These fires unleashed devastating losses on ranches, grazing areas, and habitat for wildlife and recreation. In their wake, Nevada lands are now more vulnerable to future fires. Knowing how to care for Nevada's land before and after it is affected by fire and other disturbances is key to reducing wildland fire risk and repairing lands post-fire. Scientists have conducted and distilled decades of rangeland ecology research into what firefighters would call clear text or plain language. They put it into documents known as state-and-transition models, which describe how different combinations of plants and soil respond to events	Natural and Environmental Resources

		like fire, grazing, soil disturbances and invasive plants. The models also describe, when recovery is possible, pathways to help restore lands. The team has created these models for over 40 million acres of Nevada and has contracted with the Nevada Bureau of Land Management to help map the entire state. The maps help determine the potential of the land for different uses. To help get these models into the hands of those who protect and restore Nevada's lands, the team used the models this past year to teach a course to wildland firefighters with the BLM. The team also developed spatial tools that will allow land managers to create their own state-and-transition model maps and ecological condition maps of large areas. The tools are used by several state and federal organizations to see how land responds to management decisions, such as management and rehabilitation of grazing land and wildlife habitat, including critical habitat for sage grouse. Leveraged over $570K in additional funds, published seven peer-reviewed journal articles, one book chapter, created six database that are available to the public and trained three graduate and 19 undergraduate students.	
27.	**Identifying at-risk snow derived water resources in the Great Basin**	The scale of forest restoration needed for fuel management is significant in the Sierra Nevada, and represents one of the few ways that humans can manage their upland water supply systems. Given this societal need, continued work at the interface of basic process research and large-scale forest restoration applications are an avenue that could yield important advances. A decision support tool using machine learning (random forest) was developed to synthesize SnowPALM (Physics and Laser Mapping) results, and was applied to neighboring watersheds.	Natural and Environmental Resources

		This computationally efficient tool is easy to implement for forest managers to predict changes to snowpack after thinning that resolves tree-scale processes. These results will inform ongoing forest management practices in California, and improve our understanding of the effects of snow-forest interactions at scales relevant to water management. Leveraged over $219K in additional funds and trained 3 students.	
28.	**Pheromone research to improved bark beetle management**	Pine bark beetles have a significant negative economic impact on western coniferous forests. They are difficult to control by conventional methods because they spend the majority of their lives protected beneath the bark of their hosts. The biochemical mechanisms bark beetles use to survive their environment are only beginning to be understood. Comparing how similar beetles survive in different trees with different turpentine compositions can help us understand how the beetles and trees co-evolve and help predict future population trends. The Mountain Pine Beetle (MPB) and Jeffrey Pine Beetle (JPB) are sister species that co-exist in the Sierra Nevada, but infest different host trees. Thus, they provide an excellent opportunity for comparative analysis. Genomic resources for MPB already exist. The team complement them with a database of genes that are active when JPB are exposed to turpentine. They identify and characterize some of the biochemical tools JPB uses to deal with turpentine and other resin components, including heptane. The data was then compared to understand how these two species have evolved. The team has characterized the first reported monoterpene carbon-carbon double bond reductase in an animal. The role of IDONER in the pheromone-biosynthetic pathway was confirmed by this study. This study also contributes understanding to the question of how different	Natural and Environmental Resources

		mass and ratios of two turpentine like pheromones are achieved by bark beetles. The assembled transcriptome was submitted to GenBank for public usage. Leveraged $403K in addition funds and trained 5 students.	
29.			Natural and Environmental Resources
30.	**Growing in Small Places**	Horticulture remains very popular in the United States, and in some urban areas, gardening is more than a pastime; it can be a significant source of fresh fruits and vegetables. The Mojave Desert is not a place where growing food and other plants is easy, yet there is interest in local and home-grown foods. Extension faculty receive large numbers of calls from people who are not interested in becoming Master Gardener volunteers but want classes in horticultural topics that are appropriate to this environment. Some local residents are only now coming to believe that gardening is possible in the Mojave Desert; hence, they need accurate information. Best horticulture practices not only improve gardening outcomes for residents, but also conserve water and reduce waste of other limited natural resources. The "Growing in Small Places" (GISP) program grew out of this consumer demand. The target audience is potential gardeners in the Mojave, and gardeners who are interested in learning one or more particular aspects of desert horticulture. GISP includes 11 monthly classes taught by a horticulture professional. Topics include tree selection and care, solving garden problems, dirt on soil, organic gardening, cacti, roses, native and desert adapted plans in the landscape, cucumbers and squash, irrigation, and wildlife habitat. The Growing in Small Places Facebook page has 1789 likes and 1770 followers. Two-hundred and fifty people participated in the GISP classes. Each GISP class begins and ends with a quiz to determine topic knowledge before	Horticulture and Food Systems

		and after the class. Results indicate significant knowledge gain. For all classes, more than 50% of the material was new to students. In an evaluation of all previous participants 96% said the information was useful, 95% had applied the information from the classes, and 96% would recommend the series to others. Through improved knowledge of horticulture, irrigation, the soil, compost, and other topics it is expected that people will improve their gardening practices and become more environmentally aware of how horticulture can maintain and improve the Mojave environment.	
31.	**Master Gardener**	Horticulture continues to be one of the most popular home activities in the nation. Master Gardener volunteers are a critical component of horticulture programs in every land-grant university. Through an intense program of basic horticulture training and continuing education, Master Gardeners provide science-based horticulture information to Nevadans. They expand the reach of Extension horticulture professionals and create a vital link between the university, Extension, and the general public. The University of Nevada, Reno Extension has over 431 certified master gardeners. Master Gardener trainings are offered annually. Each Master Gardener completes a 50 hour course (or 80 hours, depending on the county), passes a comprehensive final, and contributes at least 35 hours annually to an approved project (or 50 hours, depending on the county). Each Master Gardener must complete at least 15 hours of continuing education annually (or 50 hours, depending on county). Certified Master Gardeners teach classes, answer consumer questions through email, over the phone and in person; support youth horticulture, community gardens and horticultural events; conduct workshops, lead demonstrations at demonstration gardens and orchards; and act as docents at public parks, among other activities. In total Master Gardeners reported 55,983 volunteer hours, a value of	Horticulture and Food Systems

		$1,423,648 (value obtained from Independent sector.org.). Over 20,247 people received horticulture education through direct extension methods. In addition, Horticulture staff responded to 260 eXtension "Ask-An-Expert" questions. Other noteworthy activities included: • Master Gardeners planted and maintained 22 beds at the Joule St. Demo Garden, with 500 pounds of produce donated to the Veteran's Guest House and St. Vincent's Food Pantry. • "The Mad Hatter's Tea Party" at the Outdoor Education Center. Over 200 visitors came and saw the study areas: youth garden, mini-orchard, demonstration gardens, compost and palm areas; and attended brief classes on topics ranging from "Six Impossible (or at least surprising) Garden Truths" to "Ergonomics in the Garden". • Master Gardeners created the butterfly habitat and milkweed variety trials. • 25th anniversary celebration of the Center for Urban Water Conservation in North Las Vegas in partnership with the University of Nevada, Las Vegas. Master Gardeners staffed booths, answered questions and led tours of the facility. Over 300 people attended, listened to brief workshops, saw the range of research being done there, and enjoyed butternut squash pizza, with the squash courtesy of the vegetable gardens on site. As a result of these efforts, UNR Extension has a sustained program of diverse committed volunteers that provide accurate, university-based scientific horticulture information to the gardening public. The long-term impact is improved horticulture practices statewide, more locally grown foods, and reduced food deserts and food insecurity in Nevada.	
32.	**Commercial Landscape Horticulture**	There is an identified need for more professional education in the green industry, including landscape architects. Surveys of local green industry	Horticulture and Food Systems

		professionals further indicate a desire by the industry for one-day seminars, nursery worker training, and continuing education opportunities for professional certification. Topics deemed important to the industry included diagnosing plant problems, plant insects and diseases, plant identification, integrated pest management, weed management, soil fertility and plant nutrition, native plant landscaping, pesticide certification/safety training, and pruning. The industry has recently expressed the need to focus on landscape water conservation issues and more professional certification options. The commercial landscape horticulture programs target green industry professionals, including nursery workers and owners, arborists, pesticide applicators, landscapers, irrigation specialists, and landscape designers and architects. Within the commercial landscape horticulture programming are: • Green Industry Basic Training Program (providing Nursery Worker Certification) • Green Industry Continuing Education Series • Bilingual Landscaper Training for the Hispanic landscaper community • Qualified Water Efficient Landscaper (QWEL) Training and Certification Program Northern Nevada's Green Industry Training Program provided basic training in a course consisting of 9 classes for entry-level industry workers. Topics included plant diseases, garden center basics, water management, soils/fertilizers, insects, weed identification and law, turfgrass management, integrated pest management (IPM), and pesticide safety. 20 of the 22 attendees who went on to take the exam to be Nursery Worker Certified received a passing score of at least 70%. Additionally, fourteen advanced classes were taught for continuing education credits for certification and licensing, including 4 in English	

		and Spanish. Bilingual classes included pesticide safety, IPM, hands-on pruning and planting techniques. Two sessions of the Qualified Water Efficient Landscaper (QWEL) were held, which is a training and certification program certified by the Environmental Protection Agency as a WaterSense program. The trainings consisted of 21 hours of classroom and hands-on training on water-efficiency in the landscape including information on sustainable landscapes, soils, irrigation systems and irrigation auditing, troubleshooting and maintenance. 29 of 31 attendees passed the exam to be QWEL-certified. Throughout the year, 952 people participated in these workshops. As a result, participants reported increased knowledge gain. Specifically, participants in the QWEL program had a 34% gain in confidence in capturing and retaining water on the landscape and utilizing irrigation systems for water efficiency. The commercial landscape horticulture programming is designed to increase the skill level of entry level workers by providing classes, certifications and continuing education opportunities, and increase professionalism by training existing workers to use scientifically based and sustainable practices, including landscape water conservation in their work.	
33.	**Grow Your Own, Nevada**	The USDA's 2014 survey on food deserts in the United States showed that Nevada had food deserts in 40 of 687 census tracts with 154,623 Nevadans living in low-income food deserts. With an increased interest in locally grown food, science-based education for growing in Nevada's climate and soils is needed for successful backyard gardens and urban farms to grow produce locally and alleviate the impact of food deserts in Nevada. Grow Your Own, Nevada is a statewide horticulture education program that provides information to homeowners who desire to become	Horticulture and Food Systems

		successful backyard food producers in Nevada's unique high-desert climate. The program consists of 8 two-hour sessions and covers topics including edible landscaping, soils, raised bed hoop houses, composting, fruit tree selection and pruning, weeds, growing grapes, insects, growing garlic, greenhouses, and integrated pest management. Topics were selected based on responses from the most recent program evaluation where participants are asked what additional topics interest them. Across the state, 815 people attended the Grow Your Own, Nevada! classes. Attendees participated at 10 locations statewide, including 9 counties by interactive video. Participants who attended the spring series had a 48% overall gain in understanding of the topics discussed, while fall participants had a 52% gain in understanding. It is expected that the program will increase local food sustainability as measured by an increase in the number of families involved in backyard food production or community gardens and decrease in the number and size of "food deserts" in Nevada.	
34.	**Integrated Pest Management (IPM)**	Studies have shown that homeowners use as much as ten times more pesticides per acre on their lawns as farmers use per acre of agricultural land. As such, it is important provide education to improve the safety of pesticides used on agricultural and recreational lands, and to decrease pesticide use in urban environments by increasing awareness and adoption of IPM by professionals and the general public. The University of Nevada, Reno Extension IPM program seeks to increase awareness and adoption of the principles of Integrated Pest Management (IPM) and Pesticide Safety on agricultural and recreational lands and in home and commercial landscapes to manage pests efficiently while protecting human health and the environment. To do this IPM and pesticide safety education is incorporated into the basic	Horticulture and Food Systems

		training programs for Master Gardeners and Green Industry professionals, who then extend their knowledge to the community. Faculty also provides continuing education on IPM and Pesticide Safety to Agricultural Producers, Recreational Lands Professionals and Certified and Licensed Pesticide Applicators. Extension activity methods varied from direct education to sharing information through social media. More specifically, direct activity methods include: • Pesticide Applicator Continuing Education Credits were offered through Green Industry training, Green Industry Continuing Education Series, Nevada Landscape Association annual conference, Hispanic Landscaper Training, local county and statewide Pesticide Safety Education Program workshops, and eXtension. A total of 71.5 Continuing Education Units were offered through these programs to 1,331 participants. • One-on-one consultation with producers on pest problems in various crops (Total contacts: 5) • Four (4) IPM-related workshops to the Hispanic Landscaper community in Reno (Total contacts: 56). • Two (2) Pesticide Use and Safety workshops to Hispanic Landscaper community in Las Vegas (Total contacts: 50) • Master Gardener training consisted of 8, 3-hour classes (24 hours of instruction), all of which discussed IPM. • General public IPM instruction consisted of the Bartley Ranch Gardening in Nevada series. The Bartley Ranch series offered 8 classes (16 hours of instruction) in IPM-related topics to 629 participants. • The Grow Your Own, Nevada! spring program offered 8, 2-hour classes (16 hours of instruction) to 483 participants statewide. The Grow Your Own, Nevada! fall program offered 4, 2-hour	

		classes (8 hours of instruction) on IPM-related topics to 210 participants statewide. For many of the rural counties, this is the only IPM-related instruction they receive. • Workshop on "The Down Side of Fertilizers" presented at the Desert Green, annual conference for landscape professionals in Nevada, Arizona, California and Utah (Total contacts: 45). Indirect extension activity methods included: • Ten (10) Extension bilingual fact sheets on pesticide safety practices and, two (2) Know Nevada Insect fact sheets were created. • 3,284 copies of the Nuisance Weed Field Guide, published in 2018, were distributed in 2019 throughout the state to federal and state agency personnel, green industry, master gardeners and homeowners. • Eight (8) articles on IPM-related topics were published in the Reno Gazette Journal, with a potential readership of 544,000. • A total of 804 television PSA were purchased on major local networks and targeted cable channels. According to Breen Media, total impressions or views for the PSAs were 1,351,000 and the total rating points were 696.2. An additional 222 radio PSAs were also broadcast. • IPM education at annual field days to over 1,000 people. • Our IPM website, www.manageNVpests.info, was accessed by 38,856 total visitors, with 513,225 total web hits. • The Pesticide Safety Education Program website, www.nevadapesticideeducation.info, was accessed by 30,881 total visitors, with 201,591 total web hits during that period. Evaluation results indicate that there is greater awareness and understanding of IPM and Pesticide Safety principles by private citizens,	

		and a greater adoption of such strategies by Master Gardeners and industry professionals. It is important to mention that 86% of those participating in the Pesticide Safety Education Program indicated that this program will help improve the profitability and/or efficiency of their operation. When asked how much profit per acre could be realized from attending this program, their responses ranged from $1.00 - $5.00 per acre. As IPM is adopted, long-term outcomes are expected to include improved water quality due to reduced input of pesticide residues, greater capacity for the Green Industry to meet customer demand for lower risk pest control strategies, improved profitability of industry, and overall improved quality of life in Nevada due to reductions in pesticide use.	
35.	**Growing Self-Sufficiency**	Obesity and food insecurity are recognized problems. Even though access to produce is available for most in the region, it may not be fresh or may contain additives or pesticides that are problematic to some individuals. Teaching adults and families, who want to be more self-reliant and prepared, how to grow and/or can food will increase the available amount of fresh vegetables and fruits and encourage their consumption by youth and adults, benefiting the physical and financial health of entire families. The Growing Self-Sufficiency program was developed to teach youth and adults how to grow and preserve their own food and has expanded to encompass reuse/recycling of materials and emergency preparation. The program includes classes, demonstration gardens, and one-on-one education. Classroom and field classes were taught by Extension horticulturalist, master gardeners, master food preservers, and outside experts. Classes include tomatoes, jump start veggies, successful desert gardening, drip irrigation, native plants, native bees, pollinator gardening, making specialty items from scratch ingredients (such as	Horticulture & Food Systems

		kombucha, homemade bread, exotic ice cream), edible landscaping, backyard livestock (e.g., chickens, rabbits, goats), and emergency preparation. In addition to classroom and field instruction, "Ask a Master Gardener" sessions occurred monthly at the local library. Clients came in with specific questions and problems for help during this time. A total of 960 people directly benefited from this program (910 adults and 50 youth). The results from the pre-test (M = 2.18, SD = 0.93) and post-test (M = 4.02, SD = 0.51) surveys indicate a significant improvement in knowledge gained, t(108) = 1.66, $p < .001$. In addition, three new pollinator beds were added for a total of six at one of the demonstration gardens. This has had a large impact on the 60 plot holders who grow vegetables and fruit for their households here, as the majority of HOA's in the community do not allow food to be grown on individual property owner's lots. With the knowledge gained, families will be able to expand their ability to provide healthy food for their own households and to reduce food insecurity in the state.	
36.	**Food Handler Card Video Training**	There is a significant number of food establishments in the Las Vegas area. Currently the Southern Nevada Health District does not provide complete preparation material for food handlers. This may not only impact the passing rates on the food handler test but also increases the number of non-prepared food handlers working in small establishments that are not frequently inspected. Without proper food safety training the risk of foodborne illness is increased affecting individuals, businesses, and the healthcare system. This program, in partnership with the Southern Nevada Health District, produced a total of 20 video modules to be used as training material for preparation of food handlers, initially in Clark County. The target	Health, Nutrition & Food Safety

		audience for the program are employees that work in restaurants, caterers, mobile food establishments, and other food handlers. The 20 videos are currently available on the Southern Nevada Health District website through the YouTube platform. Video Modules include: 1. Importance of food safety, 2. Hand washing, 3. Personal hygiene, 4. Employee illness and injury, 5. Basic equipment and facilities, 6. Effective communication and conduct in the workplace, 7. Thermometer calibration and verification, 8. Food product receiving, 9. Food product storage, 10. TCS foods, 11. Safe cooking, 12. Food holding temperature, 13. Changing food temperature, 14. Avoiding cross contamination, 15. Food hazards, 16. Cleaning and sanitizing equipment, 17. Cleaning facilities and documentation, 18. Pest control, 19. Food trucks, and 20. Catering Results are measured by the numbers of views and the number of certified food handlers per year. After only 7 months, the program was viewed by almost a half million people (464,874 views). It is estimated that 100,000 people take the test annually. The number of food handler cards that were granted was not available at the time of reporting, and will be obtained in July 2020.	
37.	**Nevada Radon Education Program**	Radon is a naturally occurring radioactive gas that has no odor, color, or taste and is produced by the breakdown of uranium in soil, rock, and water. Uranium is found in all soils and in higher concentrations in granite, shale, and phosphates. As it decays into radon gas, it moves through the soil into the atmosphere, where it is harmlessly dispersed in outdoor air or can enter buildings through the foundation and become trapped inside. When it enters a building, it can accumulate and present a health risk for occupants. Radon is classified as a Group A carcinogen, a substance known to cause cancer in humans. Next to smoking, scientists believe that radon is associated with more lung cancer deaths than any other carcinogen. More than 20,000 Americans die of radon-related lung	Health, Nutrition & Food Safety

		cancer each year, making it the leading cause of lung cancer in nonsmokers. Not everyone exposed to radon will get lung cancer, but the greater the radon level and the longer the exposure, the greater the risk of developing lung cancer. The Nevada Radon Education Program is a partnership with the Nevada Division of Public and Behavioral Health to educate Nevadans about the health risk posed by elevated levels of radon in the home. The Nevada Radon Education Program's efforts involve presentations, social media, news releases, and tabling events. Over 9,600 direct contacts were made promoting radon education, and indirect education occurred through 21 newspaper articles, 202,354 distributed publications , 24 exhibits, 6 TV reports, 352 PSAs, 241,521 website hits, and over 40,458 people reached through social media. Behavior changes are reflected in the number of test kits the public receive (through program distribution), the number of test kits that are used, along with the number of homes mitigated, tested during real estate transactions, and built radon resistant. The total number of kits distributed over the year was 4,247. The total number of homes self-tested and reported from professionals was 1,791, along with 2 schools, and 5 large buildings. The number of reported homes mitigated was 153 and 2 large buildings. The total number of reported homes tested for radon in a real estate transaction was 594. And, the total number of reported homes built with Radon-Resistant New Construction (RRNC) technique was 27. These numbers reflect the impact the Nevada Radon Educational Program's education efforts are having in testing and mitigating, building new homes radon-resistant, and for home purchase education. These efforts are improving the health of Nevadan's and reducing the risk of cancer that is costly to individual's and society at large.	

38.	**Healthy Kids, Healthy Start**	Almost one-third of children in America are overweight or at risk for becoming overweight, increasing their probability of developing chronic illnesses such as high blood pressure, high cholesterol, and type 2 diabetes. The national prevalence of obesity among preschool-aged children (2–5 years) is 14%. In Nevada, 33% of children entering kindergarten were obese (21%) or overweight (12%). Nevada estimates the cost associated with treating conditions related to overweight and obesity is $337 million annually. In response, Nevada AB152 was passed in legislation requiring each licensee that operates a child care facility, other than an accommodation facility or a child care institution, to provide a program of physical activity that meets specific criteria. Educating young children about healthy eating and being physically active, is key to long-term success and targeting prevention of obesity. Systematic reviews of early efforts to improve nutrition and increase physical activity in preschools have been met with limited success, especially in regards to physical activity where studies have shown that increased time alone may not be sufficient to increase the activity levels of children. This demonstrates the need for intentional teacher-led activities and strategic adult involvement in teaching children movement is critical in promoting physical activity and targeting obesity. Healthy Kids, Healthy Start (HKHS) integrates nutrition, feeding, physical activity, child development, family dynamics, and the role of caregivers and teachers together into one comprehensive program addressing childhood obesity and healthy growing. The target audience is preschool-aged children, their primary caregivers, and their preschool administrators, teachers and teacher's aides in Clark County. Approaches include center development, capacity building, professional resources, indirect and direct education and community-based outreach such as the Healthy Kids Festival. **Center Development, Capacity Building & Healthy Kids Resource Center**	Health, Nutrition & Food Safety

		Resources provide focus on education, activities, lessons, media, environmental changes, policy implementation and evaluation tools aimed at providing healthy options for preschoolers and their families; and increasing access and appeal for nutrition and physical activity in early childhood centers. Resources are distributed online through the website (Healthy Kids Resource Center) as well as direct training/professional development and center development. Self-assessments (NAP SACC) administered by Extension staff provide early care and education programs with a measure to compare existing nutrition and physical activity practices to best practice standards, help to set goals and implement action plans. HKHS worked with 18 centers to improve access and appeal for nutrition and physical activity; 18 sites made at least 1 environmental or systems change, totaling 37 changes with a total reach of 2,537. NAPSACC self-assessment tools were implemented in 2 new licensed child care facilities to assess physical activity needs, areas of improvement and develop strategies to improve programming in early childhood settings; action plans were implemented at both new sites and at 16 renewed sites with support from 16 established champions in early childcare centers; healthy messaging boards were displayed in 7 early childhood sites reaching 660 participants (child/parent pairs) and 71 teachers; physical activity prompts (playground stencils) were installed at 7 early childhood sites providing increased physical activity to 500 children. A garden was installed at another site. Furthermore, eight physical activity trainings were conducted for early childhood professional capacity building reaching 97 teachers. All trainings were approved through the Nevada Registry for required child care hours. **Direct Education** HKHS utilizes the All 4 Kids curriculum in early childhood centers. All 4 Kids takes a multi-dimensional approach to childhood obesity that	

		incorporates learning activities, music and dance to teach preschool children about nutrition, physical activity and healthy living. The school-based version includes a 21-lesson curriculum. Materials are sent home weekly to inform parents about what their preschoolers have learned. In addition, separate facilitated discussions are conducted with parents and staff to enhance understanding of their child's development and how these issues impact their behavior. Parents attend three All 4 Kids Family Events to gain further understanding and implement healthy eating and physical activities at home. Preschool center staff also attend training to reinforce a healthier and more active learning environment. A series of 39, All 4 Kids curriculum were delivered across 11 Clark County sites to both low-income and non-low-income sites reaching 761 preschool children, 238 parents (17 family events). **Community Partnerships & Healthy Kids Festival** This is an annual event that utilizes a public health approach to provide long term solutions related to nutrition and physical activity while building community outreach partnerships with Southern Nevada. Promoting cultural sensitivity, the event targets the large Latino community in Clark County and includes educational vendors for nutrition education, physical activity, growing fruits and vegetables, healthy food tasting, music and dance instruction, BMI and health assessments, city/county recreation, sports and outdoor venues. The 8th annual event was attended by 1,051 attendees (544 children, 310 parents/caregivers, 100 volunteers, and 97 exhibitors). Additionally, through combined efforts including the HKRC webpage and social media, indirect education reached 4,750 unique users and 12,553 page views/Facebook likes. The website featured the Healthy Kids Resource Center Nutrition Toolbox (http://www.unce.unr.edu/healthykids/) that was launched for parents and child care providers to use in implementing nutrition programming	

		in their center or home. Google analytics reported 10,911 page views were browsed by 3,574 unique users. Furthermore, Extension developed a permanent, annual participation partnership with *UNLV Didactic Nutrition and Dietetic Internship Program* to provide a permanent community nutrition experience to 16 Dietetic Interns (DICAS) seeking Registered Dietitian licensure; and a relationship established with the *UNLV School of Medicine* led to 2 medical student interns each year for their tenure in the program. Preschoolers participating in All 4Kids completed pre- and post-test assessments. Results indicate that 72% improved their ability to correctly identify food items ($p < .001$); 64% improved their option to choose healthy snacks over unhealthy snacks when given a choice between the two ($p < .001$); and 61% improved their ability to distinguish between healthy snacks and unhealthy snacks ($p < .001$). With respect to children's ability to perform 12 fundamental movement tasks, 77% increased their total combined scores ($p < .001$); 36% of preschoolers who didn't demonstrate competency before the program showed improved ability to cross the midline at post-test on the first attempt ($p < .001$); 41% improved balance ($p < .05$); 49% of preschoolers who could not balance on one foot for 5 seconds [Nevada Pre-K standard] at pre-test improved the length of time they could balance on one foot at post ($p < .05$) and 19% reached the 5-second standard ($p < .001$); and 56% of preschoolers improved the number of times they could hop in 15 seconds ($p < .01$). There were no statistically significant improvements on the primary caregiver's perception of weight status, eating behaviors, physical ability, and feeding cues of their preschooler. An integrated approach to preventing obesity will provide early childhood centers and families the tools to educate children in healthy eating and being physically active for heathy growing and long-term success.	

39.	**Healthy Kids, Healthy Schools**	The 2016 Community Health Assessment for Southern Nevada provided the basis for the 2016 Community Health Improvement Plan to be implemented from 2016-2020. One of the three priority areas is the reduction of risks and behaviors that contribute to chronic disease with an emphasis on reducing obesity rates through increased physical activity and the promotion of healthy diets. With respect to diet, the two main objectives focus on increasing the number of people meeting daily fruit and vegetable serving recommendations and decreasing consumption of sugary beverages. Additionally, the USDA requires all schools that participate in federal child nutrition programs such as the National School Lunch Program to implement a School Wellness Policy (SWP) which includes meeting 3 goals focused on nutrition promotion and education, physical activity, and other school-based activities that promote student wellness. This is an unfunded mandate that could make a considerable difference in the school wellness environment depending on each school's ability to implement the SWP. The Healthy Kids, Healthy Schools (HKHS) multi-level programming in elementary schools is guided by the socio-ecological model. This theoretical framework helps illustrate how factors at different levels in a system can work to influence individual behavior, such as individual factors, settings, sectors, social and cultural norms, and values – thus helping identify points where interventions may be made. The interventions used in the HKHS program are designed to target different levels along the Spectrum of Prevention, an evidence-based tool that acknowledges that the most effective prevention programs consist of more than just education. The tool endorses activities that when performed together work synergistically to create a greater impact than when done in isolation, including strengthening individual knowledge and skills, promoting community education, educating providers, fostering coalitions and networks, changing organizational practices, and	Health, Nutrition & Food Safety

		influencing policy. The target audience for HKHS is the school district community, including staff, students, and their families. HKHS team strengthened individual knowledge and skills through the following: • Direct nutrition education (Pick a Better Snack monthly lessons) to 6,018 2nd and 3rd grade students in 35 schools across 4 counties, including Washoe, Lincoln, Lyon and Clark Counties. Pre- and post-test evaluations indicated that fruit and vegetable consumption increased. Students reported an increase in the number of times per day that they consumed fruits ($p < .001$) and vegetables ($p < .001$). Attitudes toward fruits and vegetables improved, such that students reported increases in liking to try new fruits ($p < .05$) and vegetables ($p < .001$). Students showed an increase in liking (preference) for all fruits and vegetables (jicama, cauliflower, mango, bell pepper, blood orange, asparagus, and blueberries) except cantaloupe and dried cranberries. Students reported a decrease in the number of times they drank juice ($p < .01$). There was not a significant increase in the number of students that preferred to do physical activities during recess from pre- to post-intervention. • Direct nutrition education to 447 youth enrolled in summer programming at 11 Boys & Girls Clubs of Southern Nevada sites, totaling 33 classes. • Interactive nutrition education sessions to 152 diverse youth in 4th-8th grades participating in a sports camp, totaling two 30-minute sessions. • Kids Cook cooking class series consisting of 4 half-days of culinary training to 32 youth, totaling 16 half-day classes. Students averaged a score of 83% on a post-test consisting of culinary questions consisting of measurement techniques, and kitchen and food safety.	

		HKHS promoted community education through the following: • Indirect nutrition education to at least 6,018 parents statewide through the distribution of bilingual newsletters and bingo cards to all students participating in the Pick a Better Snack program. The bingo cards provide families with an opportunity to do physical activities and consume fruits and vegetables to complete a "bingo", which the student can exchange for a small educational reinforcement. • Chef demonstrations in the classroom or cafeteria to 1,275 students at 3 Clark County schools. • Maintained bulletin boards dedicated to nutrition promotion, posting Team Nutrition or other nutrition-themed posters throughout the school, reinforcing fruit and vegetable consumption in the lunchroom with sticker giveaways, school-wide broadcasts of student-led wellness announcements, and creation of school staff wellness newsletters. • One of the twelve monthly Fitness Minute segments aired on a local TV station focused on nutrition for student athletes. HKHS educated providers through the following: • Direct education (Enhancing Fruit and Vegetable Tastings in the Classroom) to 98 teachers who participated in Green Our Planet Teacher Trainings at 2 CCSD schools, totaling 6 classes. 92% of teachers reported feeling moderately to very confident they could pair nutrition education with fruits and vegetables offered to students; 80% of teachers reported they were somewhat or very likely to use fruit and veggie cards and scorecards with their students. • Completed School Physical Activity and Nutrition Environment Tool (SPAN-ET) Assessments in 7 Clark County schools to help schools identify and act upon several opportunities to improve	

		their school nutrition and physical activity environments. Lyon County completed 3 bringing the statewide total to ten completed assessments. In Clark County, the average overall school physical and nutrition score in all environments was 65% which translates to good practice overall, while in Lyon County the average was 48% translating to fair practice. HKHS changed organizational practices through the following: • The establishment of or participation in school wellness councils at 12 schools. • Technical assistance and resources to support school wellness activities for 22 Clark County elementary schools with the potential to impact an estimated 12,691 students. • Systems changes implemented in schools, such as: Rotating salad bars, Snack Shack changes to favor nutritious options, sponsoring a field trip to the Extension Botanical Gardens for all 2nd grade students, extra-curricular physical activity, making water available in the classroom, safe active transportation, healthier vending machine options in staff lounge, physical activity breaks in the classroom, participation in the Fresh Fruit and Vegetable Program, adoption of nutrition education in the classroom, and use of Extension Fruit and Veggie Trading Cards. • Environmental changes included installation of raised garden beds, the use of art to enhance the school garden, creating a more pleasant lunchroom environment, and purchase of portable playground equipment to support physical activity. HKHS influenced policy through the following: • Four presentations made to the Governor's Council on Food Security and other agencies and councils or non-profits on SPAN-ET assessment results along with a recommendation to prioritize the codifying of school wellness during the next legislative	

		session in 2021 if other avenues are not fruitful to help create a system for accountability. Through this multi-level approach 6,410 unique people were reached through direct extension methods (2,069 adult contact, 4,341 youth contact). Indirect extension methods reached 39,930 adults and 34,960 youth. In addition, a quasi-experimental study of 1,272 2nd and 3rd grade students participating in the Fresh Fruit and Vegetable Program in Clark County School District, Las Vegas, Nevada was conducted. The intervention group received Pick a Better Snack and the comparison group received no nutrition education in the classroom. Although all students in the Fresh Fruit and Vegetable Program schools received fruit and vegetables as snacks in their classrooms, students that participated in the Pick a Better Snack program had more favorable attitudes towards fruits and vegetables, and greater improvements in nutrition knowledge and recognition of MyPlate and associated food groups as compared to students who did not receive these lessons. Results indicate nutrition skills and positive attitudes, such as willingness to try new fruits and vegetables, are enhanced when fruit and vegetable tastings are paired with the Pick A Better Snack nutrition lessons in the classroom. Overall the Healthy Kids, Healthy Schools program improved health-promoting dietary and physical activity behaviors, especially fruit and/or vegetable intake, in the school setting, and supported implementation of the School Wellness Policy. This effort has the potential to reduce obesity rates and associated chronic diseases by establishing healthy habits early.	
40.	**Healthy, Sustainable, Resilient Food Systems**	The state of Nevada relies heavily on imported food. This leaves Nevada vulnerable to disturbances in the food system that could have drastic effects on residents, restaurants, and other businesses. As it stands now, over 12% of households in Nevada are food insecure, where access to food is limited or uncertain. Also, 1 in 8 people struggle with hunger and	Health, Nutrition & Food Safety

		that number increases to 1 and 5 among children. A comprehensive and interdisciplinary approach to increase food security can provide economic benefit to the state through the development of new industries and, relatedly, income and job creation. The University of Nevada, Reno is positioned to lead the way and help build a more resilient and sustainable food system with its diverse faculty and facility resources. The Healthy Sustainable Resilient Food Systems (HFS) is an emerging program developed to help increase access to healthy food in the community. Foundational principles are built upon four areas that are interrelated, including nutrition and health, social, cultural, and ethical capital, environmental stewardship, and economic vitality. Educational programming is targeted to food system stakeholders (e.g., producers, food-related job creators, consumers, legislators) and Southern Nevada (Clark County) residents as they are all eaters, a vital part of the food system. As part of the program, food system assessments were conducted for the City of Las Vegas. Faculty also led the Southern Nevada Food Council (SNFC) in facilitating focus groups to identify access and barriers to healthy foods in Henderson neighborhoods identified as food deserts, as well as develop a map of healthy food retailers. Key findings of the focus groups were: (1) Low-income residents are knowledgeable about the healthy foods they should consume; (2) While quality, variety, and affordability of healthy foods is what they desire for themselves and their families, these foods may not be accessible to low-income residents, even if several supermarkets are located in their residential community; (3) Organizations, food pantries, and other supplemental food resources, may not always provide the freshest or best quality foods; (4) Each focus group requested community classes on nutrition education, meal planning, and food preparation; (5) Women with young families expressed a need to have support in providing healthy foods for their families from their children's school, and the community; and, (6)	

		Adequate and reliable transportation is imperative for healthy food access. Also, in partnership with the SNFC, faculty conducted an inventory and compiled a directory of local food system-related businesses in Southern Nevada, facilitated a workshop to discuss lessons learned and best practices on nutrition incentive programs, and promoted SNAP acceptance at farmers markets. HFS worked to increase awareness through direct and indirect education to youth and adults. Four of the programs are highlighted below: 1) Healthy Eating on a Budget nutrition education was delivered in 8 consecutive days to 133 adult participants in Clark and Washoe Counties - 77 graduated from the series. The "Eat Healthy Be Active" Facebook page reached 8,022 and had 385 likes. The social media page is primarily targeted to Healthy Eating on a Budget program participants with the aim of reinforcing positive dietary and physical activity behaviors. The Adult Behavior Checklist was used to assess behavioral changes from pre- to post-intervention. Of those that completed the program, 92% showed improvement in one or more diet quality indicators; 68% improved in one or more physical activity behaviors; 74% improved in one or more food safety practices; 53% improved in one or more food security indicators; and 77% improved in one or more food resource management practices. 2) SNAP Into Farm Fresh Foods education was provided to 177 SNAP-eligible adults. Lessons taught participants about seasonal produce, its relationship to health, and provided a fruit or vegetable recipe sampling. Participants learned they can use their benefits at farmers markets. 160 SNAP-eligible participants toured the farmers market, received information on Nevada grown seasonal produce, and sampled a fruit or vegetable recipe. Extension developed and distributed environmental prompts promoting SNAP acceptance at farmers' markets, in addition to	

		providing technical assistance to a non-profit organization and a farmers' market manager on how to become SNAP authorized. 3) Five food system field trips for 48 members of the Southern Nevada Food Council and the community taught about specific elements of the food system. Field trips were conducted at: a dairy farm, a recycling center, a large produce distribution and processing facility, three very different community gardens, and a large commercial indoor agriculture operation. Survey results indicated that 86% of respondents learned about more educational resources available to inform their work; 80% now have people they can contact who are passionate about this work; 76% gained more confidence to take action related to food systems; and 92% gained more confidence in knowing how food systems are affected in all aspects of their work. 4) The Food Preservation Program provided technical assistance, resources, and hands-on training emphasizing USDA food-safety guidelines. The program reached 218 people (1,600 contacts) through 31 workshops to the community. Participants reported high knowledge gains and high interest in the topic after taking a class. Other activities were numerous and include presentations at professional associations and meetings, such as the Governor's Council on Food Security about SNAP acceptance at farmers markets. Twelve monthly Fitness Minute segments focused on fitness and nutrition were filmed and aired on local TV. Publications included newsletters to professionals, peer-reviewed journal articles, technical reports and Extension special publications. Faculty also served as preceptors for dietetic interns in partnerships with the UNLV Department of Kinesiology & Nutrition Sciences and hosted undergraduate student interns from institutions of higher education. Faculty advocated for inclusion of local food policy council updates at the Governor's Council on Food Security. Faculty also participated in a legislative workgroup to provide	

		information on healthy food financing initiatives for AB326, a bill sponsored by Assemblyman William McCurdy. As these activities illustrate, UNR Extension engaged with and supported individuals, communities, businesses, government, and educational institutions to improve the food system.	
41.	**Healthy Aging**	In Nevada, older adults are the fastest growing population. Aging trends indicate this population consists of three generations: Pre-retirement (ages 50-64), retirement qualified (ages 65-84) and oldest (85 and older). Over 16% of Nevada's population are older adults, primarily ages 55 to 84 (95%). Nevada's older adult population is anticipated to increase by 36% over the next 10 years. Urban areas, such as Clark (Las Vegas) and Washoe (Reno) counties have the largest older Nevadan population (consistent with these counties also having the highest population base throughout the state). Nye County, a small county just outside Clark, has the largest population of older Nevadans when compared to the other remaining frontier and rural counties. The number of older adults in Nevada that were told they had COPD, diabetes, pre-diabetes, hypertension and cardiovascular and heart disease was more than twice compared to the overall U.S. adult population. Nationally, Nevada has the third highest growth rate of Alzheimer's disease (64%), currently found in 1:9 people of those over the age of 65. Older adults in Nevada also have higher inactivity rates. One in seven older Nevadans ages 60 years and older (15 %) are food insecure, and 8% of older Nevadan's (ages 65 and older) live 100% below the poverty line. Risk factors for older adult poor health are attributable to food insecurity, poverty, lack of reliable social support and transportation, low fixed incomes, and disability or functional limitations, all of which are prevalent in Nevada. A nutritious diet, physical activity, social engagement, and mentally stimulating pursuits have all been associated with helping people stay healthy as they age.	Health, Nutrition & Food Safety

		Healthy Aging is a statewide strategy that addresses health in older adults through nutrition, physical activity, maintained independence of Activities of Daily Living (ADLs) and fall prevention. Using a variety of approaches including direct education, policy, multi-level systems, environmental changes (PSE) and community partnerships, public health changes are implemented in both residential and community senior centers to promote access and opportunities for healthy living. To address healthy aging, Nevada implemented two statewide programs both targeting older adults in Nevada (ages 50 and older). Stay Strong, Stay Healthy (SSSH) is an evidence-based exercise program for older and sedentary aged adults. The program provides sixteen lessons over an eight-week period. The program provides older adults with access to a safe, structured and effective exercise program capable of building muscle and increasing bone density, thus decreasing frailty, osteoporosis and the risk of falls. SSSH helps participants meet the CDC 2018 physical activity guidelines for Americans, which call for strengthening activities that work all major muscle groups at least two days a week combined with aerobic activities. Classes are led by a certified instructor. Seniors Eating Well (SEW), a health and nutrition education program, designed to meet the needs of older adults and address food insecurity amongst these individuals. SEW increases healthy food consumption through education, healthy food demonstrations and healthy recipes. There are nine, 45-minute lessons that address management of chronic conditions, promotion of MyPlate and planning of nutritious meals, evaluation of dietary supplements, shopping on a budget and increasing physical activity. Healthy Aging reached over 1,162 seniors. Of the individuals that completed the SSSH program most (89%) were over age 60 and female	

		(92%). Fitness results indicated that 76% improved in Chair Stands (lower body strength and endurance), 74% improved in Sit-and-Reach (lower body flexibility), 68% improved in 8 Foot Up-and-Go (balance and agility), 77% improved in Back Scratch (upper body flexibility) and 61% improved in Progressive Balance. Finally, respondents reported currently meeting the national guidelines for strength and flexibility (96%), increased knowledge of strength training (88%), and felt confident to continue on their own (78%). Seniors Eating Well (SEW) participants were mostly were over age 60 (85%) and 15% were ages 50-59. Respondents demonstrated significant improvement in all areas including 59% improved dietary quality choices; 55% improved dietary behavior patterns; 25% reported less cooking barriers; 58% improved healthy food preparation; 43% reported higher cooking confidence; 46% improved food resource management; and for the SEW curriculum only, 67% of respondents improved their overall score related to diet quality, use of herbs as alternative to salt and food safety, and using MyPlate to plan food choices and increasing fruit and vegetable consumption. Healthy aging in an effective statewide strategy that increases strength, coordination, balance, healthy food consumption, and food resource management among seniors, which are critical to aging population mortality and independent living (associated ADLs).	
42.	**Veggies for Kids**	Children are below the national average in eating the daily recommended amounts of fruits and vegetables, increasing the risk of obesity and related chronic diseases. Efforts to boost fruit and vegetable consumption in the U.S. population have generally been unsuccessful, possibly due to the limited access to and affordability of fruits and vegetables. Veggies for Kids is an in-school program that teaches youth how to grow vegetables and about nutrition by providing a 12-week series of one-hour lessons in the classroom, a four-day summer institute, and a	Health, Nutrition & Food Safety

		specialty-crop demonstration project at the school. The program objectives directly support healthy eating by: promoting increased intake of fruits and vegetables, whole grains, water and nutrient-dense beverages; increasing appreciation and use of healthy traditional Native American and Hispanic foods; and introducing vegetable-growing concepts and experiences. Veggies for Kids was implemented at elementary schools on three reservations: Walker River Reservation, Pyramid Lake Reservation, and Duck Valley Reservation. Each of these sites included a school garden that was coordinated under the program. 176 elementary school children have participated in the program. Overall program results indicate significant knowledge gains. More specifically, as a result of participating in the program students were able to correctly identify MyPlate Food Groups - Protein (Pre: 18%; Post: 78%), Grains (Pre: 20%; Post: 72%), Fruits (Pre: 40%; Post: 88%), and Dairy (Pre: 41%; Post: 86%). Additionally, more students were able to correctly name fruits and vegetables. The biggest increases in knowledge were seen with asparagus, squash and spinach, followed by raspberries and blueberries. Students also showed an increased preference for water (Pre: 36%; Post:50%) and milk (Pre: 45%; Post: 49%) as a result of participating in the program. It is expected that increased knowledge of healthy foods will lead to increased fruit and vegetable intake, increased water intake and overall knowledge to stay healthy and safe. Long-term impacts are a decreased risk of obesity and related chronic diseases that are costly to individuals, families, and society at large.	
43.	**Veggies for Seniors**	In Nevada, older adults are the fastest growing population. The 2015 U.S. Census Bureau reports 16% of Nevada's population are older adults, primarily ages 55 to 84 (95%). The number of older adults in Nevada that were told they had COPD, diabetes, pre-diabetes, hypertension and cardiovascular and heart disease was more than twice compared to the	Health, Nutrition & Food Safety

		overall U.S. adult population. Risk factors for older adult poor health are attributable to food insecurity, poverty, lack of reliable social support and transportation, low fixed incomes, and disability or functional limitations, all of which are prevalent in Nevada. Similarly, food insecurity is a strong predictor of poor health and disease, such as heart disease, stroke, lung disease, and diabetes. In 2015, 8% of older Nevadans (ages 65 and older) lived below 100% poverty, which is slightly lower than the U.S. rate of 9%. An additional 10% of older Nevadans lived between 100 to 149% poverty. A nutritious diet, physical activity, social engagement, and mentally stimulating pursuits have all been associated with helping people stay healthy as they age. The Veggies for Seniors program was created in 2010 after there was a need identified in Mineral County that senior citizen access to fresh fruits and vegetables was limited. As part of the program, all produce from the school garden combined with purchased produce from local growers is distributed. This program works with Mineral County Senior Center and the Mt. Grant General Hospital in-home health program providers to deliver fruits and vegetables and educational information to local residents. The target audience is seniors 65 years and older. The Veggies for Seniors Program provided fresh fruits and vegetables, recipes and education to 105 seniors countywide for 9 weeks. Program evaluation surveys indicated that seniors had participated in the program for an average of 3 years. Seniors reported that the program had increased their access to fruits and vegetables by 53% and had improved their eating habits by 59%. Seniors reported that they participate in the program because it improves quality of life (71%); improves their health (58%); decreases health care costs (41%); and assists with disabilities (31%). Impactful qualitative comments include: “I hardly ever ate veggies before.”, “I like the idea of the fresh items over the store bought items. The produce given has helped me with some digestive issues.”.	

44.	**Healthy Steps to Freedom**	In most substance abuse treatment programs, women make up more than half of the clients treated for methamphetamine. One study indicates that five times the percentage of females than males attributed initial meth use to a desire to lose weight and more females than males reported using meth as a way to get more energy. While Nevada ranks 4th for methamphetamine/ amphetamine treatment admissions and drug overdose mortality rate in the United States, meth remains the most prevalent substance of abuse among incarcerated women and is higher among females arrested than males. There is an ongoing need for treatment professionals to augment health and body image curriculum with traditional treatment for women in substance abuse and mental health recovery settings. Healthy Steps to Freedom (HSF) is an evidence-based, gender-responsive health, nutrition and body image program designed to augment existing broad-based drug prevention and community education programs for women and girls under correctional supervision for amphetamine, opioid, and other illegal drug use. Healthy lifestyles are taught to improve recovery, help rebuild healthy families, as well as provide a healthy approach to weight loss and desire for increased energy, one of the primary reasons women use drugs. HSF includes exercise and nutrition; weight bearing exercise and calcium intake to rebuild muscles and bone loss; MyPlate, family meal planning and healthy eating patterns for mothers and young families; and educational programs which address body dissatisfaction, eating pathologies and other poor lifestyle practices. Food demonstrations and garden education efforts empower women to grow their own affordable, nutrient dense food, increase fruit and vegetable consumption, develop healthy habits and learn marketable job skills. The HSF curriculum was reviewed and	Health, Nutrition & Food Safety

		accepted for publication in the USDA, FNS, SNAP-Ed Evaluation Toolkit as an evidence-based program for use in national SNAP-Education. In Nevada, HSF was taught to 439 adult participants through 21 program sessions at residential treatment facilities, a women's correctional center, and a conservation camp for female offenders. 245 people completed the 12-week/90 min program and 194 partially completed the program. In addition, Extension coordinated the implementation of a walking track near the prison yard at the correctional center and installed spin bikes and weights through a partnership with a fitness center to provide more opportunities for inmates to increase cardio and strength activity. Extension installed and renovated garden beds at the residential treatment facilities providing more produce and increasing workforce development. Close to half (38%) of the HSF program participants agree or strongly agree that weight gain could be a trigger for relapse. After participating in the program, participants demonstrated significant increases in knowledge of health information (p <.001), improvements in healthy behaviors (p < .002), improved physical activity (p < .002), and decreased sitting (p < .001). Women also show improvement in reliance on internal hunger and satiety cues that determine when and how much to eat (p < .01) and significant decreases in binge eating attitudes (p <.001). They also self-reported an "ideal weight" that was significantly higher at post-test than pre-test (p < .001), indicating that clients learned the ability to perceive a more realistic weight goal. Measurement of perceived body image also improved significantly (p <.001). To support delivery and expansion of the program, HSF provides professional development and UNR credit course for clinical providers and counselors to obtain licensing credit for completion of the Enhanced Professional Learning Series (7 sessions). Professional development (UNR credit classes) and HSF instructor training is offered through the	

		Center for Application of Substance Abuse Treatment (CASAT) and the national Addiction Technology Transfer Center (ATTC Network) for clinical directors, prison staff and treatment providers across 23 states to understand gender-responsive, health-related treatment issues and promote the facilitation of HSF in their facilities. In total, 206 people were reached through these efforts for a total of 283 contacts. As a result of the HSF and partnerships built, a Women's Sustainable Recovery (WSR) Coalition has been developed, which advocates a sustainable recovery for women through a network of providers and resources. This includes promoting gender-responsive treatment, education and provision of services; providing women with a plan for continuum of care while in recovery; and equipping and empowering women to be self-reliant. Taken together, over 3757 adults and 12 youth received educational programming through direct extension methods; and 621 adults and 657 youth through indirect extension methods. Prior to implementation of HSF, there were few programs developed and implemented, but none monitored, evaluated or published using evidenced-based practice. HSF has led to an increased focus on teaching gender-responsive education around health issues linked to substance use disorders and promoting the implementation of HSF in treatment centers and correction settings. HSF promotes healthy lifestyle behaviors to enhance recovery while providing an alternative approach to stimulant use for weight loss and desire for increased energy.	
45.	**EFNEP**	Food insecurity exists when the availability of nutritious and safe foods OR the ability to acquire those foods is limited or uncertain. Food insecurity exists in every county and congressional district in the country. The national average is approximately 12.3% of people are food insecure. That rate is higher for children than adults as households	Health, Nutrition & Food Safety

		with children are more likely to be food insecure than those without children. The state of Nevada and Clark County have slightly higher rates of food insecurity than the national average. In 2016, 12.7% of Nevada residents and 12.8% of residents of Clark County were food insecure. In Clark County that amounted to about 264,000 people. There are several serious consequences to food insecurity. Food insecurity may reflect a household's need to make trade-offs between important basic needs, such as housing or medical bills, and purchasing nutritionally adequate foods. In order to make their dollars stretch, many opted to purchase unhealthy cheap food or to water down food or drinks or sell personal property to eat. Food insecurity has significant effects on children's development. The most common issue for food insecure children is the increased risk of iron deficiency anemia leading to poor developmental outcomes. Food insecurity in children also increases anxiety, depression, binge eating, and food hoarding. Finally, food insecure children have higher levels of aggression and behavioral problems than food secure children. EFNEP is a nutrition education program aimed at SNAP eligible participants. The program is federally funded and runs in all U.S. states and territories. The EFNEP program uses paraprofessionals to deliver education on diet quality and physical activity, food resource management, food safety, and food security. Participants learn how to read food labels, save money on groceries, plan meals, safely handle food, make healthy food choices, and be more active. The adult classes are 90-120 minutes long and taught weekly for eight weeks. The youth classes are 60 minutes long and taught weekly for six weeks. The target audience for EFNEP are adults who are low-income, i.e. eligible for SNAP benefits. The target audience for the youth program in Nevada is 5th and 6th graders in low-	

		income schools, with a focus on improving diet quality and physical activity. Adult EFNEP Classes were conducted at 18 different locations. A total of 370 adult participants attended an average of 7.7 lessons each (2849 contacts). There were also 1369 total family members potentially reached by our education. All Expanded Food and Nutrition Education Programs (EFNEP) in the U.S. states and territories use the same evaluation tools to provide consistent national data. Evaluations are conducted before the program begins and again at the end of the program. The evaluations consist of a 24-hour dietary recall and the Food and Physical Activity Questionnaire, which is a 20-item validated survey. Based on the results from the 24-hour dietary recall (N=225), diet quality improved from a baseline Healthy Eating Index (HEI) score by 2.2 points, which was statistically significant ($p < .05$). Whole grain consumption improved by 0.5 servings/day ($p < .001$). Calories from added sugars and solid fats decreased by 49 kcal/day ($p < .01$). EFNEP participants reported decreasing their monthly household budget spent on food by $59/month ($p < .001$). Therefore, based on 225 participants, the overall amount saved on food budgets was $13,275/per month. The Youth EFNEP curriculum was delivered to 20 different groups of 5th and 6th grade students for a total of 1126 children. Youth attended an average of 6.05 lessons each (6,816 contacts). Results from pre and post surveys (N = 951) indicate that 92% improved at least one behavior related to diet quality, 57% improved physical activity behaviors, and 55% improved food safety behaviors. The long-term goals of EFNEP are to improve diet quality, physical activity, and food security within insecure food populations to reduce	

		the risk of negative physical and mental health problems among Nevada's youth and adults.	
46.	**Understanding how Obesity Change Heart Enlargement and Stiffness Genetically**	Previous work from the team at UNR and others have found that inhibition of a specific class of epigenetic regulators within the heart, histone deacetylases (HDAC), block heart enlargement and stiffness in animal models of heart failure, yet a role for HDAC in obesity has yet to be examined. The continuation of research has shown that foods and more importantly food bioactives regulate epigenetic marks in the heart to prevent cardiovascular disease. This work has also shown that rhubarb-containing emodin inhibited HDAC activity with fast-on, slow off kinetics, which was sufficient to inhibit thickening of the heart muscle in cultured cells and in hypertensive mice. This work has led to a patent, "Compounds and Compositions Useful for Treating Metabolic Syndrome, and Methods Using Same" (Provisional Application No. 62/329,843; Invention Disclosure No. CU4120H-PPA1). Leveraged fund based upon this work $1.54M in additional grant dollars, 15 peer-review publications, three book chapters, and trained four graduate students and 14 undergraduates.	Health, Nutrition & Food Safety
47.	**Area Sector Analysis Process**	Rural counties in the U.S. were greatly impacted by the Great Recession. Some have come back to pre-2008 levels but many have not. Rural economies desire information to direct their economic development opportunities. Given the unprecedented economic challenges facing states and their respective communities throughout the United States, economic development through job retention and creation is a priority for economic survival – especially in rural counties/communities in the Western United States. Some of the challenges for sustainable economic	Community and Economic Development

		development efforts include: 1. Lack of capacity, including human, infrastructure, and capital, for systematic economic growth. 2. Traditional economic development efforts focus only on the needs of businesses and discount other important factors essential for systematic economic growth. 3. Community economic development goals and available assets are commonly not reflected in economic development efforts. The Western States of Nevada, Idaho, Hawaii, and Montana under the Western Rural Development Center have worked together under a multistate and integrated project titled Area Sector Analysis Process (ASAP). ASAP is a highly adaptable community economic development tool that matches a community's economic development goals and physical assets with industry needs. The ASAP procedure derives desirability and compatibility indices. Desirability measures how businesses match the development goals of a community or region. Compatibility measures how a community or area meets the demands of businesses. By deriving desirability and compatibility indices, a community or region can target desired industries and/or targeted community or regional resource developments to meet business demands. The ASAP program is useful for communities, counties, and states. This program can also be delivered in a regional setting such as multicounty. The targeted audiences include state and local government, economic development districts, chamber of commerce's, and various economic development organizations and agencies. Since the inception of the ASAP program, approximately 25 communities in four western states (Nevada, Arizona, Utah, Idaho, Montana, New Mexico, Alaska, Hawaii) and Minnesota have gained a better	

		understanding for sustainable economic development practices; how to identify and assess community assets critical for economic development; how to recognize industry opportunities that best match community goals and industry needs; how to strategically plan for future economic growth; and feel more empowered to engage in community sustainable economic development. Nine Nevada counties have participated in the ASAP program over the last eight years. These activities have resulted in the development of 15 comprehensive economic development plans. Follow-up data continues to be collected to report measurable impacts and how plans are being applied. For example, the ASAP model results led to the creation of a business retention and expansion program in Madison County, Utah; and, the Hopi Tribe in Arizona is working to initiate economic development activities to address closure of coal mining operations At the conclusion of the ASAP program, participants have a strong understanding of economic development principals and customized targeted industry analysis that contributes to the development of a localized strategic economic development plan.	
48.	**Nevada Economic Assessment Project (NEAP)**	Public Lands encompass nearly 87 percent of Nevada's land mass. These lands are managed by the Federal Government (Bureau of Land Management, Forest Service and Department of Defense) and land decisions can have a significant impact on economic development opportunities for communities of all sizes. Currently Nevada, and all 17 counties, do not have adequate or timely analytical tools or programs established to comprehensively respond to economic development and public land policy decisions. This makes Nevada vulnerable to land management decisions that can have significant long-term economic development impacts on communities and the overall state. The University of Nevada, Reno Extension in partnership with the University Center for Economic Development established the Nevada	Community and Economic Development

		Economic Assessment Project (NEAP). The primary goal of this project is to paint an accurate picture of individual socioeconomics, fiscal attributes, and impact assessments using verifiable, objective, and universally accepted substantive data that will be available to all 17 Nevada Counties. These methods will provide counties throughout Nevada with timely and accurate socioeconomic data and analyses to respond to economic development and public land policy proposals. Consistent local, and timely socioeconomic data and analysis will benefit a variety of public entities including, county and municipal governments as well as state and federal agencies. Activities included: • Assembling a program advisory NEAP team including representatives from CABNR, UNCE, BLM, FS, USDA Rural Development, and NACO. • Setup of a systematic approach to collecting relevant socioeconomic data platform of all census data. • Data collected for 5 Nevada Counties (Lincoln, Humboldt, Elko, Nye, and Esmeralda). Baseline analysis published in technical reports. • Developed economic impact models (IMPLAN) for five counties (Lincoln, Humboldt, Elko, Nye, and Esmeralda). • Developed 15 fact sheets for three counties (Lincoln, Humboldt, and Elko). • Developed five press releases and made a series of county and state presentations to commissioners, community groups, agencies, and stakeholders. The effectiveness of NEAP is evaluated using the following metrics: Are counties working better with land agencies and organizations with land use planning? How counties use program outputs for land use and economic development planning? And, do quantity and quality of jobs	

		change? Two examples of NEAP implementation are provided below: **HUMBOLDT COUNTY** – NEAP was used to conduct a comprehensive Socioeconomic Economic Impact Assessment for a proposed new lithium mine, lithium processing plant, and sulfuric acid manufacturing plant in Humboldt County, Nevada. Since the release of the technical report, Humboldt County, Lithium Nevada, and Bureau of Land Management have been working together to minimize environmental impacts and maximize economic and social impacts. For example, with the increased demand on county/city services as a result of new mining operations, the county, business operator, and land agency are working together to construct a new school to meet new educational demands. Humboldt County is using NEAP data and economic impact analysis results to assess and plan for future growth. For example, a master plan update is being considered and data is helping influence future direction and decisions. Some of the master plan involves public lands that requires engaging land agencies Humboldt County is preparing for significant job creation that is planned to start in early 2021. It is estimated that over the next five years Humboldt County can add over 500 new jobs and nearly 1,200 new residents. This can change the whole landscape and operation of Humboldt County. **LINCOLN COUNTY** – NEAP was use to provide technical assistance for local government and small emerging businesses to understand the economic and business feasibility for expanding outdoor recreation opportunities. The program identified the potential impacts and	

		opportunities of expanding outdoor Mountain Biking tourism for the City of Caliente and provide timely education to enable businesses to succeed at servicing these new opportunities for greater economic development and sustainability. Since the release of the technical report, Lincoln County and Bureau of Land Management have been working together to minimize environmental impacts and maximize economic and social impacts. Through this partnership and using available land assets, both entities have worked together to construct 40 mile of mountain biking trails. Lincoln County is using NEAP data and economic impact analysis results to increase business activity. The town of Caliente has responded to new outdoor recreation business demands by opening a new bike repair and sales shop, physically expanding business operations (diner) and adjusting business operations to meet increased demand. Lincoln County has experienced modest job growth (+15). This metric will continue to be monitored.	
49.	**Business Development**	Economic and business development is a strategic priority in Nevada. Clark County represents over 73 percent of the state's total population and approximately 70 percent of total business licensees. According to the United States Small Business Administration (SBA), small businesses, 500 employees or less, represent 99.7% of all employer enterprises. Over the next five years Clark County is projected to add over 6,000 new business and create nearly 87,000 new jobs. The current landscape of business education and counseling programs in Clark County are fragmented, with only a handful of organizations providing any consistent education and counseling to the business community. Collaborations and partnerships are needed to better serve the technical and educational needs of Clark County businesses.	Community and Economic Development

		The Business Development program is a partnership with the University of Nevada, Las Vegas (UNLV). Extension delivers small business educational workshops to new and existing small businesses. Workshops are presented face-to-face and via webinar in both English and Spanish. The focus of the workshops are concepts such as marketing, taxes, customer service, sales, etc. All individual small business counseling is provided by UNLV Small Business Development Counselors from the referral of Business Development team of instructors. This program is in its infancy. Activities included developing curriculum in both English and Spanish in the areas of Marketing and Financial Management/Taxes. A total of 29 classes were taught in Clark County; 13 of which were taught in Spanish. 348 people representing different small businesses attended one or more classes, there were 77 unique types of businesses attending. Pre- and post-test questionnaires are being developed to measure knowledge gain and six follow-up surveys will measure behavior change. However, it is expected that, by applying knowledge from these sessions, individuals can identify potential problems in their own businesses and develop more successful businesses. With this program Extension has a great opportunity to be the premier educator for small businesses in Clark County and the entire state.	
50.	**Rural Health Works**	With current interest in healthcare and potential changes in healthcare policy, the relationship of the healthcare sector to other economic sectors in the state and local economy are of interest. Good healthcare sectors are essential for industrial development and recruitment of the retirement population. In addition, information as to feasibility and impacts of expanded or new healthcare facilities is of interest to local decision makers.	Community and Economic Development

		Nevada Rural Health Works is under a new national extension program Center for Economic Analysis for Rural America at the University of Kentucky. The program is designed to help state and county leaders understand the importance of local healthcare sector to the viability of a state and county economy. Also selected budget analysis can be completed to estimate the potential feasibility or subsidy required for a local selected health service. In Nevada, a series of economic impact analysis of 15 of 17 counties has been completed. Also impact studies have been completed for local hospitals in Humboldt and Elko counties as well as additional medical service feasibility studies in Humboldt County. In addition, workshops have been offered and presented in Lander, Elko, Lyon, and Humboldt counties reaching 84 people. To date, impact studies have been used by local healthcare officials to address issues in the Affordable Healthcare Act. A feasibility study for a kidney dialysis was used by Humboldt General Hospital to get a private firm to locate in Humboldt County. Also, impact analysis of expanded hospital facilities has been used by Humboldt General Hospital. As these results indicate this program will support decision-making that promotes access to healthcare and that strengthens local economies.	
51.	**Leadership and Organizational Development**	Government and non-profit organizations need to expand their capacity to create safe and productive communities. The government and non-profit sectors face challenges in addressing new critical issues, developing effective policies, adapting communications strategies, improving volunteer recruitment, using technology effectively, collaborating with community partners, and managing resources efficiently. Capacity building strengthens an organization's ability to fulfill its mission, develop goals, achieve measurable and sustainable results, and have a positive impact on places where people live, work, play, and learn.	Community and Economic Development

		Extension is frequently called upon to help build the capacity of government and non-profit agencies. Extension has worked with numerous agencies to create a framework to respond to community changes and emerging opportunities. Extension also connected non-profits to UNR graduate students to help them with their program evaluation, provide technical assistance, and program evaluation workshops. Extension designed and led strategic planning efforts with the Nevada Native Seed partnership that is comprised of 13 agencies and entities; and with the Great Basin Children's Advocacy Center Board that includes law enforcement detectives, child protection investigators, mental health counselors, school principals, counselors and social workers, medical practitioners, and district attorneys. Leadership development programs inclusive of skill building workshops were developed for the Douglas County Chamber of Commerce Leadership Program and the Washoe County Library Services Leadership team, which includes branch leaders and the administrative team. Additionally, a series of facilitator training workshops were developed for the Nevada Collaborative Conservation Network. The skills and abilities of over 546 adults were improved through these efforts; thereby, improving the capacity of numerous agencies and organizations throughout the state. Furthermore, those that participated in the leadership trainings reported developing confidence, knowledge of their community, county and state, and leadership skills. Additionally, they indicated that the program was effective at building local leaders who will get involved in and have a positive impact on their communities. Participants in the facilitation workshop reported that the workshop addressed their facilitation challenges, provided applicable ideas they will use in future facilitations, and improved their facilitation skills and confidence. These activities play a critical role in strengthening communities.	

52.	**Let's Discover STEM**	Early exposure to STEM (Science, Technology, Engineering and Math)—whether in school or at home—supports children's overall academic growth, develops early critical thinking and reasoning skills, and enhances later interest in STEM study and careers. In Nevada, far too many children are not ready for kindergarten and the vast majority of children reach Grade 4 lacking key science and math skills and knowledge (National Assessment for Educational Progress, 2015). Latino children are particularly at risk for not developing strong STEM skills and attitudes. Nevada Latino 4th graders rated at 12% or above proficiency in both math and science. As adults, Latinos are underrepresented in STEM professions. Researchers and educators have documented the value of creating stronger home-school connections for children's educational growth and success. Involving parents encourages them to take an active role in creating a positive and safe environment at home for exploration and discovery, as well as supporting children's learning at school. The primary purpose of Let's Discover STEM is to increase young, Latino children's interest, knowledge, and engagement in STEM activities, and to encourage and teach Spanish-speaking parents to be positive forces for their children's early STEM learning as they enter and progress through school. The program was implemented in targeted neighborhoods in two urban cities in Nevada (Reno and Las Vegas) that contain several high risk elementary schools. The target audience for this program is Latino children 3-6 years of age and their parents. The program includes a series of 7 workshops. Twenty-eight (28) program series were offered at various locations, including libraries, Title 1 schools, and community centers. 1,872 adults and 1,924 children participated in the program. Parents who participated in the program reported increased confidence teaching STEM skills to their children, belief their children could learn from them, confidence helping their children succeed in school, and	Children, Youth, & Families

		feeling prepared to help their children learn on pre- and post-test measures ($p < .001$ on all outcomes). Parents also reported significant gains in their children's emerging STEM skills (e.g., count 1-20, recognize shapes, compare objects to determine more or less, and measure length, weight, etc.) ($p < .05$ or better on each of the 16 skills). And, parents also reported that they felt the program increased both their own and their child's knowledge and interest in STEM. All items received ratings of 4.80 or higher, on a scale from 1 (very little) to 5 (very much). Written comments included "I learned many topics that are helping me to have a better technique to help my daughter in school.", "I learned that every activity works to prepare my daughter for kindergarten.", "I learned how to support my son to practice more STEM activities.", and "The best thing about the program is to be able to take time with my son and that both of us learn new things". Long term, children will be prepared to succeed in STEM education and their parents will play an active role in fostering their children's STEM education as they enter and progress through school. Additionally, this program has the potential to reduce achievement gaps among Latino and other youth of color prepare the next generation for STEM careers.	
53.	**GEAR UP**	Nevada has one of the lowest college going rates in the United States. This concern prompted the Governor's Office, in partnership with the Nevada System of Higher Education (NSHE), and nine Nevada School Districts to request funding from the U.S. Department of Education to implement GEAR UP throughout the state. The goal of GEAR UP is to change the culture of Nevada schools to provide continual academic support for first generation college-going students throughout their middle and high school years so they are better prepared to enter and succeed in college. The University of Nevada, Reno Extension component of the program is focused on research and evaluation. Results indicate increased	Children, Youth, & Families

		academic performance and preparation for post-secondary education in GEAR UP students; increased rate of high school graduation and participation in post-secondary education for GEAR UP students; increased GEAR UP student and family knowledge of post-secondary education options, preparation, and financing; and creation of a college-going culture in GEAR UP schools. Beyond state activities, UNR Extension partnered with the National Council for Community and Education Partnerships (NCCEP) – the technical and professional development provider for all GEAR UP grantees – to write, review, and revise an online Learning System to be implemented as professional development for the 161 State and Partnership grants throughout the United States and Territories. The Learning System consists of 20 courses, four courses for the five positions typically found in a GEAR UP project: director, evaluator, college access professional, coordinator, and family engagement specialist. In addition to reviewing and revising the courses, UNR Extension wrote the course for the evaluators. Courses will be piloted in the upcoming year and NCCEP is responsible for the evaluation of the Learning System. It is expected that people who receive training will improve the knowledge and skills necessary to successfully implement a GEAR UP grant; improve the skills and abilities to successfully execute their job duties; and apply the knowledge pertaining to education trends, issues, and research impacting post-secondary education access and success.	
54.	**Nevada 4-H Youth Development Program**	Extension 4-H Youth Development learning experiences are based on the principles and practices of positive youth development (PYD). The structured learning, encouragement, and adult mentoring that young people receive through their participation in 4-H plays a vital role in helping them achieve future life success. Youth involved in the 4-H Youth Development Program are more likely to thrive; and thriving youth achieve important developmental outcomes, such as academic	Children, Youth, & Families

		achievement and motivation, social competence, high personal standards, contribution to others, connection with others, and personal responsibility that lead to a successful transition to adulthood. In 2019, the Nevada 4-H Youth Development program reached 65,421 youth, ages 5 to 18 years old, which is a 19.4% increase over a 2-year time frame. There were 4273 trained adult volunteers who worked with the youth throughout the year. All 17 counties in Nevada reported 4-H youth and adult participation. Youth have the opportunity to participate in 4-H programming through club-based, school-based, after school-based, camping-based, and special interest-based programming efforts. In 2018, 6% of the 4-H audience was reached through club-based programming, 40% were reached through special-interest based programming, 3% through camping-based programming (both overnight and day camp opportunities), the reach for school-based programming was 34%, and 17% of the total audience was through after-school based programming. Statewide, Nevada is reaching approximately 14% of the potential youth population (based on 2010 US Census Data). Counties reported working with over 100 different organizations/agencies in partnership to deliver programming to youth across Nevada. The organization/agency who had the most counties reporting a partnership is with the local school district. These partnerships can help support the educational efforts for both academic achievement and college/career readiness, programming during the school day and out-of-school time. Nevada continually ranks in the bottom 5 within the United States for educational standards. In 2018, Nevada ranked last in the Chance for Success, which attempts to measure a state's capacity for helping young people succeed and 50th out of 51 states/District of Columbia in graduation rates (Education Week Research, 2018). This report also showed that only 41.2% of Nevada young adults (ages 18-24) are enrolled in post-secondary education or have a degree.	

		In a statewide assessment of youth participating in Nevada 4-H Youth Development, all youth (grades 4 to 12) were asked about their 4-H experience and the youth who are grades 8 through 12 were asked a series of questions regarding universal life skills. The 4-H experience responses indicate that Nevada 4-H is effectively a safe place for members (essential element – belonging). Of the items with the top 7 means, 5 of them are directly related to elements of belonging. Those feelings of belonging then make it easier to focus on helping others and to pursue activities they enjoy. The older youth did report they felt like they could try new things in 4-H and are willing to try those new things even if they fail because they are supported by others in the program. They also reported finding it easy to speak in front of a group, are comfortable being a leader, and have learned to set goals for themselves, plus can help others achieve their goals. Seventy-seven percent of respondents (grades 8-12) said they wanted to go to college after high school; 9% indicated they wanted to go to trade school; 7% wanted to find a job; 5% selected 'join the military'; and 3% selected 'other'. Of the youth selecting 'go to college' 30% are undecided as to the school they wish to attend; 26% want to attend a school outside of Nevada; 24% want to attend UNR; 13% want to attend Great Basin College; 5% want to attend UNLV; 2% want to attend Western Nevada College; and 1% chose Truckee Meadows Community College. No respondents selected College of Southern Nevada or Nevada State College. As expected, 4-H youth thrive and show improved life skills development and academic achievement and motivation that support a successful transition to adulthood.	

55.	**Youth Program Quality Assurance**	Traditionally youth quality assurance programs were done face-to-face, and the same content was taught to all youth regardless of age or learning ability. Nebraska Extension was the first to make an online quality assurance course, which served as the model for development of a national course. Livestock Specialists from across the Land Grant University system worked with the National Pork Board to develop a content map, curriculum, and evaluation tools for YQCA. All curriculum has been blind peer reviewed by University specialists and industry experts. By having an online course the youth can complete it at their convenience and they can have access to the content as much as they want/need until they understand the concepts. Additionally, the content is delivered in age appropriate modules and requires a passing score on a quiz to receive their completion certificate. YQCA will make quality assurance consistent across the country. It is also very appealing to livestock show managers that require youth complete quality assurance prior to a show. The program is for youth ages 8 to 21 who raise/show a livestock animal that produces a consumable product (beef cattle, dairy cattle, pigs, sheep, goats (meat and dairy), market rabbits, poultry). A total of 300 Nevada youth have completed the certification, and nationally 91,869 youth have completed the third year training materials. Expected results from the program are: 1. Ensure safety and well-being of animals produced by youth for showing and for 4-H and FFA projects. 2. Ensure a safe food supply to consumers. 3. Enhance the future of livestock industry by educating youth on these very important issues so they can become more informed producers, consumers and/or employees in the agriculture and food industry.	Children, Youth, & Families

		4. Maximize the limited development time and budgets of state and national youth program leaders to provide an effective quality assurance program. 5. Offer livestock shows a valid, national quality assurance certification for youth livestock exhibitors.	
38.	**Heart and Shield Family Violence Prevention Program**	Nevada ranks third in the nation for domestic violence (DV) fatalities. In Elko County, 405 DV victimizations occurred in 2017, with a rate of 7.7 per 1,000 persons which is much higher than the national rate of 4.5 per 1,000 persons. The Heart and Shield Family Violence Prevention Program provides Elko County families with resources and skills to strengthen relationships and reduce the risk of future violence. The target audience is parents and their children (ages 0-18) who have been exposed to domestic violence. The ten-week program teaches parents about effective communication, problem-solving, the effects of DV on child development, emotion identification and regulation, positive parenting practices, and building healthy relationships. Children learn about conflict resolution, stress management, bullying prevention, emotion identification and regulation, and building healthy relationships. These skills serve as protective factors for children and parents exposed to DV and may prevent children from becoming perpetrators or victims in future intimate relationships. Twelve Heart and Shield cohorts completed the program. A total of 96 adults and 195 children and youth participated. Faculty and staff observed the following behavioral changes in youth and parents over the course of the program: • Chaotic interactions improved after implementing routines, thereby increasing family functioning and reducing behavior issues.	Children, Youth, & Families

		• Parents remained calm and employed positive guidance when their children exhibited challenging behaviors, helping their children stay on task. • Parents increased awareness and attention to self-care, improving their ability to better care for their children. • Youth's ability to name emotions and describe their feelings about different experiences and generate solutions to solve problems increased during the session. Results of retrospective pre-post surveys indicate that parents gained knowledge in parenting skills and strategies, including the importance of talking with children about family fighting, how to encourage children to talk about family fighting, guidance tips that help children, ideas for fun things to do as a family, importance of helping children name their feelings, ways to be a good listener, ways to strengthen relationships with your children, benefits of being firm, consistent, and kind, and setting rules for children of different ages ($p < .01$). The importance of communication, identifying and regulating emotions, and determining the types of relationships they want to have in the future were reported by parents as most beneficial. Parents listed communication, dealing with conflicts, managing stress, guidance and discipline tips, and community resources as things they learned. One parent commented, "This is an amazing program…that helps families when they've been through bad things. We learned so much from this program. I loved seeing my kids be happy and wanting to come to the program." Youth indicated that they learned how to communicate their feelings with others, using "I" messages and words that open communication, ways to be kind and help others, cope with stress, and manage emotions.	

		Through building these protective factors in youth and adults it is expected that the number of domestic violence incidents will be reduced through breaking the cycle of violence. By reducing DV incidences, adults and children will improve their health and relationships and reduce the tax payer dollars spent on medical and emergency services.	
39.	**Workforce Preparedness for Early Childhood Professionals**	Interactions between young children and caregivers has been shown to be a key component of healthy cognitive and social development. Consistent, high-quality interactions with adults has been linked to executive function skills such as inhibition, working memory and cognitive flexibility (Bernier, Carlson & Whipple, 2010). Therefore, training and coaching early childhood teachers to engage in responsive caregiving and to facilitate interactive learning experiences is essential to young children's growth and development. Workforce preparedness for early childhood professionals is designed to teach professionals workforce skills that are needed to improve the quality of child care in Nevada. This is accomplished through teaching informal education classes to early childhood directors, coaches, trainers and teachers, coaching teachers and directors, facilitating Professional Learning Communities and Communities of Practice and developing research-based publications. Target audience for this effort are early childhood professionals, directors of child care centers, and early childhood coaches and trainers. Classes included: CDA (Child Development Associate) (216 classes); In-person community early childhood training (41); Nevada READY! training for Pre-Kindergarten teachers (22); Opportunity Village Job Development students (17); Early Childhood Trainer Professional Learning Community (8); Leadership Community of Practice for Directors (7); Adult Learning Academy for new trainers (5); Early Childhood Coaching Community of Practice (4); Internal QRIS (Quality Rating	Children, Youth, & Families

		Improvement System) Coaching Academy (4) and Reducing the Risk of Sudden Infant Death Syndrome Train the Trainer (1). The program reached 25,271 adults through direct education and 1,900 through indirect extension methods. Teachers participating in the CDA (Child Development Associate) program demonstrated effective teacher-child interactions in their classrooms and 73 received their CDA credential. An additional 15 preschool teachers were awarded their CDA credential (6 are still pending). Additionally, 19,777 certificates were issued to early childhood professionals completing online training courses, including Recognizing and Reporting Child Abuse & Neglect; Sudden Infant Death Syndrome (SIDS); Signs & Symptoms of Illness with Blood-borne Pathogens; Wellness (Obesity, Nutrition & Physical Activity); Positive Guidance for Young Children; Early Child Development - Birth to Age 3; and Early Child Development Ages 3 to 5. Overall, results from pre- and post-test surveys indicate that as a result of participating in the workforce preparedness programs teachers implemented effective teaching practices in early childhood classrooms, early childhood directors developed and implemented effective leadership skills, and early childhood trainers and coaches implemented effective and engaging strengths-based strategies as they trained and coached early childhood professionals. As a result, it is expected that the quality of child care in Nevada is improved leading to healthy growth and development.	
40.	**Nevada Youth Range Camp**	The bulk of Nevada's youth live in large urban environments, with little exposure to rangelands, forests, or agricultural environments, and the products and services rangelands provide the American public. Limited exposure to these environments suggests that Nevada's youth are increasingly less predisposed to seek education, vocations, or project experiences in the natural resources, particularly on the large isolated rangelands typical of the western United States. Furthermore, there is a shrinking percentage of the population with knowledge about rangeland	Children, Youth, & Families

		resource issues; yet national law, regulation and policy seek public input toward the management of rangeland resources. The Nevada Youth Range Camp provides high school students (ages 14-18 years) with a foundation in the physical and biological sciences that inform us about natural resources and what guides their management. Nevada Youth Range Camp focuses on relationships between people and rangeland. Campers learn about plants, wildlife, water, and soil, for making good decisions about rangeland management and use. They learn skills and explore careers in range and related resource management. The camp challenges youth to explore resource problems and to create logical solutions. The camp is a partnership between the Nevada Section Society for Range Management and the University of Nevada, Reno Extension. Extension faculty develop curriculum and provide instruction at this weeklong camp. For example, this year faculty developed and piloted a Plant Identification Guide and a Land Navigation Curriculum for the students. Thirty youth participated in the camp. At the end of the camp students complete a retrospective pre-post test. An increase in knowledge was documented in all of the educational areas taught. The long-term goal is to develop future leaders with the perspective to understand rangeland relationships. Many former campers manage natural resources for their families, communities, or agencies.	
41.	**Just in Time Parenting**	Today's parents are less likely to attend traditional parenting programs; prefer convenient or self-directed sources of information; are increasingly online; use mobile devices to access the internet; and increasingly use social media. Additionally, research indicates that younger and unmarried parents are more likely to use the internet for parenting information and younger, poorer, and less educated parents	Children, Youth, & Families

		report getting more out of parenting websites than their counterparts. Electronic delivery of newsletters is a cost-effective way to reach parents. Just in Time Parenting (JITP) is a national project of leading land grant universities from across the country that brings high quality, research-based information to parents/caregivers of 0 to 5-year olds, parents-to-be, and professionals working with families. Just In Time Parenting is an electronic, age-paced newsletter that provides research-based information about pregnancy, parenting, child development, health and safety, nutrition and the prevention of childhood obesity, school readiness, and couples relationships timed with the child's age to provide critical information at just the right time for parents. The vision is to reach all parents -- starting prenatally and continuing through early childhood - with the key information that can help their family thrive and support their children as they grow up healthy and ready for success. Although information in JITP is derived from scientific studies, it is written in user-friendly language. Newsletters are currently available in English and Spanish (http://jitp.info). A faculty member of the University of Nevada, Reno Extension served as the evaluation chair of the JITP Advisory Team, created the annual report, managed evaluation systems and data, conducted research projects using JITP data, prepared publications and conference proposals, updated and revised the 12 newsletters, as well as three Spanish prenatal newsletters, promoted newsletters at events and classes, served on the national eXtension JITP Advisory Board, and participated in the corresponding eXtension Community of Practice. JITP reached 650 adults through direct extension methods. An additional, 20,745 adults are newsletter subscribers, 259 from Nevada. The 34,134 JITP website users had 201,303 page views. Users are from all over the world; the five countries with the most users are the United States (83%), United Kingdom (3%), Canada, India, and Australia (1%). The top five states with the most users are Wisconsin, Illinois, California,	

		Minnesota, and Oregon. There are 387 JITP users in Nevada. 59% of JITP website users are JITP newsletter subscribers. Parents/caregivers with children 0-36 months all reported changed parenting practices (e.g., used the parenting tips in taking care of my baby, had more patience, used ideas to protect my child from accidents and injuries, used ideas to guide my child's healthy eating, etc.) and felt more confident in their skills as a parent after reading JITP newsletters. The JITP newsletter was rated "very useful" more frequently than any other source on the list (76%). One user commented: "I find the newsletters to be so helpful in reminding me what is normal development for each age. When I get frustrated by my son's behavior, JITP helps me remember that his job is to learn, push the limits, and explore his world. I always forward the emails to my husband so he can read them as well and we're both on the same page." Another shared: "As a PhD clinical psychologist.. I will tell you that I think JITP does an excellent job of presenting extremely important information to parents, both naive and experienced, in a manner that is easy to accept and to incorporate into a personal approach to parenting. JITP is a fantastic resource for the public." With respect to the website, survey results indicated that 58% of regular users are educators or professionals working with families. Of these educators and professionals, 38% of them visited the JITP website every week, and more than half of them printed JITP newsletters to share with their clients. New users indicated that they expected to find parenting information on various topics (pregnancy info, parenting curriculum, resources for parents, parenting programs, milestone, nutrition information, parenting tips, etc.), more than half reported that they found the information they were looking for on our site, and 65% would be willing to return to our site. It is expected that parents will learn and use the knowledge and skills	

		highlighted in JITP to help their children grow into happy, healthy, well-functioning adults.	
42.	**Little Books and Little Cooks**	For many children, academic difficulties begin before they start school. In a national survey, teachers reported that 35% of kindergarten children were not ready for school. These children struggle from the first day they set foot in school. Poor academic skills in the early years place children at risk, often leading to grade retention, school failure and dropout, delinquency and running away, as well as unemployment and underemployment in adulthood. Children gain critical school readiness skills by engaging in real-life, meaningful activities. Reading increases early literacy, and cooking with parents is one educational activity that can help to increase children's abilities in math, science, reading, language, motor development, and social skills in a meaningful and appealing way. Research also indicates that reading children's books with healthy eating messages encourages children to try new foods and make healthy choices. When children learn healthy eating habits at an early age, they will continue to use these habits throughout their lives. Little Books and Little Cooks is a 7-week early literacy, parenting education, and child health and nutrition program for preschool-age children (3 - 5 years old) and their parents. During the program, children and parents come together to learn about healthy eating and nutrition, gain positive parent-child interaction skills, and practice school readiness skills by reading children's books about healthy eating/nutrition and cooking/eating every week. Each weekly 2-hour session features new topics, a new book about healthy eating, and a new recipe (cooking). Lessons include: MyPlate, cooking with Kids, introducing cultural foods, feeding, hunger and fullness, picky eating, and fruits and vegetables. The program was offered in Nevada's two urban counties, Washoe and Clark County. Bilingual workshops were conducted at at-risk elementary schools, libraries, Head Start sites, and community sites. Faculty and	Children, Youth, & Families

		staff conducted the series of workshops at 51 sites and reached 528 adults and 575 children. A second component of Little Books and Little Cooks consisted of community education activities designed to promote children's healthy eating and physical activity, and create a broader awareness of healthy dietary patterns and healthy eating among families with young children. Activities consisted of: 1) education through community events for families, including family health fairs, school district events, food distribution sites, and immigration events, 2) providing health and nutrition resources (e.g., posters, tip sheets) to schools and community agencies, 3) one-time, one-hour Cooking with Young Children workshops, and 4) the development and launching of a new Facebook and Instagram site. Materials were produced in both English and Spanish. A total of 13,917 people received education through local family-oriented community events and the distribution of informational materials to schools and community agencies. One-hour Cooking with Young Children workshops were delivered at 38 sites, reaching 581 adults and their families. And, 1,455 social media engagements exposed the public to the program and educational information distributed through these mediums. Evaluation of the effectiveness of the seven-week educational workshops indicated that children increased exposure to early literacy and nutrition/cooking activities through parent-child engagement. For example, parents reported reading more books with children about healthy eating and nutrition after the program (32% pre-program to 99% post-program; $t = 10.95$, $p < .001$), with an increase from 1 book pre-program to 7 books post-program ($t = 13.40$, $p < .001$). Parents also reported that they cook more often with their children after attending the program ($t = 8.05$, $p < .001$).	

		Participation in the program also increased parent and children's nutrition knowledge and improved healthy eating habits. For example, parents and children were more likely to eat more fruits ($t = 1.98$, $p < .05$) and vegetables ($t = 3.29$, $p < .01$) after attending the program. And, after attending the program, 71% of parents reported that they use USDA's MyPlate more often to make food choices. Parents also improved their feeding style with their children, including encouraging child's involvement in meal planning and preparation ($t = 5.04$, $p < .001$); not using food as a reward for child behavior ($t = 3.04$, $p < .01$); helping child try new foods ($t = 4.30$, $p < .001$); actively demonstrating healthy eating for child ($t = 3.82$, $p < .001$); allowing child control of their eating behaviors and parent-child feeding interactions ($t = 3.22$, $p < .01$); not pressuring child to consume more food at meals ($t = 5.28$, $p < .001$); and making healthy foods available in the home ($t = 3.46$, $p < .01$). As a result of increased literacy and improved healthy eating habits it is expected that young people will be more prepared to enter school and learn, leading to increased achievement and reduced physical and mental health issues later in life.	
43.	**Family Storyteller**	Children's literacy ability develops rapidly and large individual differences appear during the first five years of life. Literacy is the fundamental skill on which school and future work success are based. Unfortunately, barely one-quarter of Nevada's school age children are reading at or above proficiency, placing Nevada's children at extremely high risk for developing literacy-related problems, such as grade retention, school failure and dropout, delinquency, and unemployment or underemployment. It is estimated that the price tag of illiteracy in America is in the billions as a result of school dropout and grade retention, criminal and incarceration costs, health care costs, low productivity in the workplace, and strains on the welfare system. The	Children, Youth, & Families

		foundation for literacy begins in the years before school and parents can play a big role in helping children develop those skills. In response, the University of Nevada, Reno Extension developed the Family Storyteller Program. Family Storyteller is a suite of family literacy programs for parents, their young children and beginning readers. The primary purpose of the program is to increase the amount and quality of time parents and young children spend together in literacy enriching activities and to enhance school readiness and parent engagement. The Family Storyteller targets those families with infants, preschoolers and beginning readers who may have limited language skills and few children's books at home. The program is based on a family literacy framework that focuses on both children and parents. It includes six weekly sessions during which families learn about the importance of literacy for their children, discuss key parent/child reading techniques, watch a video that models the techniques, practice reading, learn about extender activities that enhance the value of the reading, and receive a free book and materials to complete the extender activities at home. The overall program includes English, Spanish, English Language Learner, Infant/Toddler (English and Spanish), and Native American versions. The Family Storyteller workshops were offered throughout Nevada's urban counties, Clark and Washoe County. Over 400 families participated in the program (403 adults and 478 youth) at a variety of community sites including CCSD Title I schools and family engagement centers, community recreation centers, and libraries. In addition, Extension organized and hosted the 4th annual Kickoff to Kindergarten School Readiness Fair in collaboration with 33 local agencies and organizations. Kickoff to Kindergarten School Readiness Fair is designed to introduce parents and preschoolers to school readiness skills through	

		fun hands-on activities. 13 volunteers helped out with the event that reached 676 people. The Family Storyteller has been extensively evaluated and has shown that children's literacy skills improve, parents and children read together more often, parents use more joint book reading skills, parents and children do more literacy activities at home, and parents improve their confidence in facilitating their children's early literacy development. For example, a pre- and post-test paired sample t-test found a statistically significant increase in the frequency of reading to their child ($t = 3.72$, $p < .001$) and the number of picture books for child's use at home ($t = 2.93$, $p < .01$). Also, on a scale from 1 (poor) to 5 (outstanding), parents rated the workshops high on usefulness ($M = 4.76$) and quality ($M = 4.78$). After completing the program, 99% of parents reported they would recommend the program to their friends and family. Anticipated long-term goals of the program are to enhance school readiness, school and future work success, and reduce the costly burden to society as a result of illiteracy.	
44.	**Fun to Play for Preschoolers**	Play has always been part of learning and growing for young children. Play fosters all areas of children's development: cognitive, physical, social and emotional well-being. An important part of play for young children is play with parents but many time-starved parents have forgotten how to play with their children and do not know how to initiate creative and imaginative activities. Children start building their knowledge about the world long before they reach school; thus the home environment has a strong effect on children's skills. Fun to Play for Preschoolers utilizes a parent/child interactive curriculum offered through a series of eight weekly sessions. Parents are encouraged to enhance their nurturing skills and abilities through age-appropriate play. The lessons introduce families to the joy of play and show parents ideas for fun and healthy activities for their preschoolers	Children, Youth, & Families

		(math, music, science, social-emotional development, health/safety, creative arts and literacy). In addition, the lessons help parents understand Nevada Pre-Kindergarten Standards and teach them how to play with their children to improve their children's pre-kindergarten skills. Fifteen (15) Fun to Play for Preschoolers program series were taught for 150 adults and 181 children. The program was taught at a variety of sites including the Extension office, libraries, CCSD Title I family engagement centers, CCSD Title I schools, family resource center, and community recreation centers. Parents who participated in the program reported knowledge and behavior change. Pre- and post-test results indicate that parents' understanding about pre-k standards increased statistically significant from 5.07 points to 7.66 points ($t = 4.85$, $p < .001$) and parents spent more time playing with their own child (2.93 hours--> 4.5 hours, $t = 2.64$, $p < .05$). Knowledge about pre-k standards increased as well (at pre-test, 73% of parents' answers were correct and at post-test 82% of parents' answers were correct, $t = 4.64$. $p < .001$). Parents commented that "I'm very glad to receive all this knowledge to be able to support my daughter.", "It was a great experience I learned new things in order to help my son to learn new things." All of the parents reported they would recommend this program to their friends and family. Fun to Play for Preschoolers increased the amount of time parents spend with their children on learning and play activities and improved preschoolers' Pre-Kindergarten readiness skills. Anticipated long-term goals of the program are to enhance school readiness, school and future work success, and reduce the costly burden to society as a result of illiteracy.	

45.	**Exploring Safety**	Child abuse and neglect is a critical issue in Nevada, particularly in urban areas. Fifty percent of Nevada's child abuse and neglect victims are children under 5 years old. According to the Child Abuse Prevention and Treatment Act, parenting education is a core prevention service. Parenting education classes can help parents acquire and internalize parenting and problem-solving skills necessary to build a healthy family, and further prevent child abuse and neglect. Exploring Safety is a program designed for parents of children 0-5 to increase their awareness and knowledge of several child safety and welfare issues. Topics covered include Shaken Baby Syndrome, child abuse and awareness, anger management, positive guidance, and body safety. The program includes six weekly sessions. Fifteen (15) Child Safety and Welfare program series were taught for 152 parents/caregivers and 172 children in a group setting. The program sites included partner agencies, CCSD Title I family engagement centers, CCSD Title I schools, libraries, and community recreation centers. Results indicate that after attending the program parents' abilities to manage their own anger ($t = 2.38$, $p < .05$), use positive guidance skills ($t = 4.78$, $p < .001$) and properly respond to children's questions about body safety ($t = 4.64$, $p < .001$) improved significantly. Parents reported increased knowledge of what happens to a baby when it is shaken ($t = 5.03$, $p < .001$); types of child abuse and how to prevent child abuse ($t = 3.39$, $p < .01$); age-appropriate human sexuality development ($t = 5.08$, $p < .001$); and how to teach children to say no to unwanted touches ($t = 2.95$, $p < .01$). All of the families that attended the program would recommend it to others. Additionally, participants commented that, "I would like for more parents to participate and I would like more of these classes.", "I learned a lot in this class like how to discipline and guide my children in a positive way.", and "I liked the topic of the class on how to talk and explain the parts of the body." Expected long-term goals of the	Children, Youth, & Families

		program are to build a healthy family, and further prevent child abuse and neglect.	
46.	**Positive Connections for Parents and Teens**	Although no parent wants to think about tough topics, like teen suicide, teen pregnancy, and teen violence, those issues are real among many of today's teenagers. In 2013, the United States handled 1.1 million juvenile delinquency cases. Suicide is the second leading cause of death for people between the ages of 10 and 24. In 2014, there were 249,078 babies born to women between the ages of 15 and 19. 20% of adolescents live with a mental health condition. It is important for parents to be informed about the issues many teenagers are facing. There are no perfect parents, but parenting can make a difference in teen's lives. Positive Connections for Parents and Teens is a four-week program developed using previous studies about adolescent development and current community needs. Parents/caregivers learn the skills of developing a respectful and cooperative relationship with their teen. Lessons focus on decoding the teen brain, ICYMI, talking teen lingo LOL, stress management, and positive discipline. Twelve (12) Positive Connections for Parents and Teenage program series were provided to 66 families (68 female adults and 16 male adults, 23 female teens and 27 male teens) in a group setting. The program was taught at CCSD Title I schools and a community setting. Results indicate that after completing the program parents reported knowledge, skills and behavior change. For example, 70% of the parents/caregivers rated excellent on understanding their child's development, 54% of the parents/caregivers rated excellent on communicating with their child, 74% of the parents/caregivers rated excellent on understanding more about internet safety, social media and cyberbullying, 64% of the parents/caregivers rated excellent on	Children, Youth, & Families

		managing their stress, 54% of the parents/caregivers rated excellent on helping their child managing stress, 61% of the parents/caregivers rated excellent on resolving conflict with their child, and 67% of the parents/caregivers rated excellent on using positive discipline. Additionally, 100% of parents reported the program's activities helped create more positive parent-child interactions in class and at home; and 98% reported improved relationships with their teen. All of the parents/caregivers indicated that they would recommend this program to other parents. Comments from parents included “The topics are very clear and convincing.”, “Thank you for all that you taught me I learned more about the changes my son is going through.”, “Great program, even for parents with preteens to prepare for future years.” Through improved understanding, communication and healthy parent/child relationships, it is expected that issues such as suicide, pregnancy, and violence will be reduced leading to healthy adolescent and adult development.	