

2017 University of Nevada Combined Research and Extension Annual Report of Accomplishments and Results

Status: Accepted

Date Accepted: 08/17/2018

I. Report Overview

1. Executive Summary

In 2017, **University of Nevada Cooperative Extension** (referred to as "Cooperative Extension" throughout this report) efforts that were partially funded by NIFA reached at least 108,571 adults and 59,651 youth directly; and 2,218,603 or 10,739,174 adults and 225,835 youth indirectly. Included in this report are mostly those programs that were up and running in 2017, rather than programs just getting off the ground, since fledgling programs have little to report so far.

Cooperative Extension contributed to the National Institute for Food and Agriculture's (NIFA) programmatic goals of:

Global Food Security and Hunger efforts reached by Cooperative Extension faculty partially funded by NIFA included 9 programs involving 5 NIFA-funded faculty. Programs included:

1) Grow Your Own, Nevada! provides information to help Nevadans successfully grow their own food. It consists of a series of eight two-hour sessions and covers topics such as vegetable cultivar selection, composting, harvesting and preserving produce. The series is offered twice each year, once in the spring and once in the fall, totaling 16 classes offered in 2017. The goal of the program is to provide individuals, organizations and communities with the information and tools they need to successfully grow food on a small, local scale in Nevada's dry, high-desert climate.

2) Master Gardeners trains local gardeners to provide research-based horticulture information to Nevadans. In Nevada, Master Gardeners provide research-based horticulture information through a variety of activities, such as teaching classes, giving garden tours, staffing booths at community events, and answering questions in person at Extension offices and through email and telephone. Master Gardener volunteers complete an intensive basic horticulture training including 50 to 80 hours of coursework and hands-on training. They then volunteer at least 50 hours to become a certified Master Gardener volunteer. To maintain certification, each year they must complete 30 hours of continuing education and volunteer at least 50 hours. Across Nevada in 2017, Master Gardeners volunteered 44,913 hours, valued at \$1,084,200.

3) Commercial Landscape Horticulture provides training for green industry workers on how to landscape in the Nevada desert. It teaches commercial landscape horticulture industry professionals in Nevada, whose needs vary among counties and between northern and southern Nevada. In 2017, northern Nevada's Green Industry Training had its seventh basic training series of eight classes. Extension also taught eight advanced classes throughout the year for continuing education credits for certification and licensing, including four in English and Spanish. Southern Nevada's Basic Principles of Landscape Management taught 410 commercial clients in 2017, including 71 Spanish-speakers. Extension also trained arborists in New Mexico and worked on a Best Practices for Arborists Program.

4) Urban Integrated Pest Management Program teaches IPM strategies to manage pests efficiently and protect human health and the environment. It seeks to increase awareness and adoption of Integrated Pest Management (IPM) strategies by the public and the green industry to manage pests efficiently while

protecting human health and the environment. Urban IPM training is part of nearly all of Cooperative Extension's horticulture programs. Each program series had at least one IPM class, and individual advanced training classes were offered throughout the year.

5) Rural Integrated Pest Management, IR-4 and Pesticide Safety and Education Program (PSEP) researches and tests pesticides and teaches how to manage pests while protecting human health and the environment. This program researches, and educates agricultural producers and public land managers on, integrated pest management (IPM) strategies that can be used to manage pests efficiently while protecting human health and the environment. The program also conducts workshops and trainings in Nevada under the federally mandated Pesticide Safety Education Program (PSEP), to educate and train the public and pesticide applicators on how to use pesticides safely and effectively. In addition, the program tests pesticides for potential use in producing forages and crops in Nevada and submits requests to the IR-4 Project for federal testing and registration. The IR-4 Project is a USDA Program that works in coordination with the EPA to collect data in support of registration of pesticides effective and safe to use on minor or specialty crops, not generally grown in the U.S. on a large scale. (Nevada also has an urban IPM program, targeting homeowners and green industry workers, reported on a separate Impact Statement.)

6) Alternative Crop Production in Nevada: Teff tests teff as an alfalfa alternate, using less water while returning equal or higher economic returns. The purpose of this program is to evaluate, demonstrate and commercialize crops that use less water and/or offer increased income potential to Nevada agricultural producers and to assist producers who want to grow these crops. Extension conducted trials growing teff in 2002, and has been helping producers in Nevada grow teff since 2003. Extension continues to expand education and assistance to producers who want to grow this alternative crop, and is now researching various teff varieties, as well as helping to identify and get approval for safe, effective pesticides to use on the crop.

7) Alternative Crop Production in Nevada: Alfalfa, Camelina, Tall Fescue and Halophytic Plant Trials researches alternative crops for Nevada producers that are low-water-use with profitable economic returns. The purpose of this program is to evaluate, demonstrate and commercialize crops that use less water and/or offer increased income potential to Nevada agricultural producers and to assist producers who want to grow these crops. Extension, in partnership with faculty from other University of Nevada, Reno colleges, has been conducting trials with alfalfa, camelina (a plant that can be used for biofuel), tall fescue and halophytic plants (plants that grow in high-salinity soils). In 2017, Extension worked with the University's College of Agriculture, Biotechnology and Natural Resources to evaluate several crops adapted to western Nevada, including 19 alfalfa varieties; 10 teff varieties; three camelina varieties; five forage sorghum varieties; two amaranth varieties and one quinoa variety. The team also established and evaluated several mixtures of perennial forage grass and legumes.

8) Soybean Production in Nevada researches soybeans to increase profitability and provide an alternative crop option for local producers. Extension began the Soybean Production in Nevada Program in 2012 to increase the profitability of local farms and provide an alternative crop option that can grow with Nevada's limited water resources. In 2017, Extension used its own curriculum to teach 18 farmers during an all-day education program. Extension also designed and managed a test plot comparing different maturity groups and soybean varieties.

9) Irrigation Efficiency and New Technologies Project tests the most efficient ways to irrigate, including management strategies and new technologies. This program is part of a larger effort to help producers maintain or increase their economic returns during times of drought and other water shortages. The purpose of this program is to help agricultural producers manage irrigation efficiently and research new irrigation technologies for their use. In 2017, Extension partnered with the University of Idaho to teach producers in Nevada's Diamond Valley about and improving irrigation efficiency through irrigation system

planning, irrigation scheduling and new water-efficient technology. Extension also helped five producers apply for grants to install new irrigation technology.

Climate Change, Natural Resource Management and Environmental Science efforts reached by Cooperative Extension faculty partially funded by NIFA included 13 programs involving 9 NIFA-funded faculty. Programs included:

1) Integrated Riparian Management / Creeks and Communities teaches about the physical functioning of riparian areas to effectively manage them for multiple uses. As the most biologically diverse and the most frequently overused part of Nevada rangelands, riparian areas have attracted a great deal of management attention, and sometimes, caused conflict among users. Nevada's interagency and interdisciplinary Creeks and Communities Team that teaches Riparian Proper Functioning Condition Assessment for Integrated Riparian Management has been providing education on management of riparian areas for 19 years, with their concepts leading to acceptance of and incorporation of good management principles in many cases on private and public lands. In 2017, the Creeks and Communities Team taught classes and workshops across the state; wrote and distributed articles and publications; and collaborated with landowners, public land users, and public interest groups and agencies to help steer riparian management plans, policies and work.

2) Range Management School teaches rangeland resource management to local and international land managers, livestock permittees and other land users. It integrates sound science, collaboration and common sense to provide education on managing rangeland resources to public agency land managers, livestock permittees and other land users. Course content emphasizes sustainability and is designed to put ranchers and agency range conservationists on the same page, ensuring not only better forage available for livestock, but also healthy, productive rangelands for wildlife, recreation and other uses. The program has been taught to various audiences in Nevada, Idaho, Morocco and the Republic of Georgia. In 2017, the program's team taught 16 agricultural and natural resource specialists from 11 foreign countries as part of a traveling, 14-day International Rangeland Seminar. The team instructed these program participants for three days at a working ranch in Elko County, Nevada, and also worked on revising and updating the program, building on experience and ongoing research.

3) Nevada Youth Range Camp is a 57-year-old camp that provides natural resources education for youth. It has taught over 1,500 students, and is a week-long camp that provides an opportunity for youth ages 14-18 in Nevada and eastern California to learn about Nevada's desert, mountain rangelands and diverse ecosystems. The courses are taught by University of Nevada Cooperative Extension and resource management professionals from state and federal agencies. In 2017, 20 campers from eight Nevada counties participated.

4) Sage Grouse Conservation helps plan and organize efforts to improve sagebrush ecosystems and increase sage grouse populations throughout Nevada. Since 2001, Cooperative Extension has been assisting local area working groups, or groups of agency representatives, private landowners and other interested parties; to plan and implement conservation efforts to improve sagebrush ecosystems and increase sage grouse populations throughout Nevada.

5) Nevada Naturalist is an environmental education program for adults created to certify education naturalist volunteers to serve in southern Nevada, to educate others and engage in environmental restoration and enhancement projects. The program offers two sessions of instruction created by Extension with experts in each field of study and with advisement and review of program partners. Session One participants complete a minimum of 60 hours of instruction in basic environmental education topics. Session Two is optional and offers more advanced topics. For each session, students are also required to complete a project on an environmental topic of their choice. Upon completion of Session One, participants are certified to engage in community education programs, environmental restoration and

enhancement projects, and other activities. In 2017, 10 students earned certification, 10 students completed advanced training, and Nevada Naturalists volunteered 2,610 hours.

6) Rangeland Resources and Range Management Education Program teaches natural processes and management of Great Basin rangelands. It provides education regarding plant growth, plant response to grazing, ecological site potential, the processes of vegetation change, and the role and effect of fire and other disturbances on Great Basin rangelands. In 2017, Extension faculty helped coordinate the Great Basin Fire Exchange Project, revised the Nevada Rangeland Monitoring Handbook, taught two sagebrush ecology modules at the Nevada Youth Range Camp; and provided input toward vegetation management issues on rangelands throughout Nevada and in southeast Oregon. These efforts were accomplished in 19 meetings, workshops, field days or field tours, and included 13 educational presentations.

7) Eagles and Ag is a multiday celebration that helps people learn about agriculture and the benefits it provides to wildlife and the community. It encourages the conservation and prosperity of ranching in western Nevada, teaches participants about wildlife and the history of agriculture in Carson Valley, and creates an agritourism model that enhances the profitability of local farming and ranching businesses. The four-day 2017 event included a reception, four large Ranch & Eagles tours visiting five ranches, several smaller tours, workshops, a special dinner and a photo contest. Approximately 400 people participated in the event in 2017, with some attending more than one day.

8) Water for the Seasons works with Nevada tribes to study climate resiliency and adaptation for land dependent on snowmelt for water. This is a collaborative research project with the Desert Research Institute and U.S. Geological Survey. The research team is working with a diverse group of local water managers (stakeholders) to assess and simulate 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. The team uses hypothetical climate scenarios and models the effects on stream flows of hypothetical scenarios and adaptation strategies collaboratively developed by the researchers and stakeholders.

9) Living With Fire is a multiagency program coordinated by Extension that teaches Nevadans how to live more safely in high-wildfire-hazard environments. The program began in 1998 and has received multiple regional and national awards, including the Great Basin Fire Mitigation, Education and Prevention Award in 2016. Program activities in 2017 included: developing and distributing educational materials, organizing and conducting community workshops, promoting wildfire-threat-reduction techniques at community events, coordinating Nevada Wildfire Awareness Month, maintaining two comprehensive wildfire-threat-reduction websites targeting Nevada and Lake Tahoe Basin residents, and providing educational programming support for an organization that brings Nevada stakeholders together to create fire adapted communities.

10) Nevada Wildfire Awareness Month is a collaborative month-long effort coordinated by Extension to encourage homeowners to reduce the wildfire threat. It began as a week-long statewide effort in 2005 and expanded in 2014 to include the entire month of May. It's a collaborative effort coordinated by Extension's Living With Fire Program, with participation by program partners including local, state and federal firefighting agencies and many others. Activities are designed to build awareness and encourage homeowners to take action to reduce the wildfire threat. A total of 9,974 people attended one or more of the 189 events in 2017, and marketing efforts extended into all 17 Nevada counties. The program audience includes homeowners living in high-wildfire-threat areas, firefighters who protect those communities, and others who provide services to help them prepare for wildfire.

11) Nevada Flood Awareness Week is multiagency effort to increase awareness of and preparedness for floods in northern Nevada through website, events and presentations. Extension formed a 30-member Flood Awareness Advisory Committee with northern Nevada floodplain and emergency managers in 2013.

In 2014, a 10-person core team on the committee developed NevadaFloods.org and put on northern Nevada's first Flood Awareness Week November 10-15. The chairperson shifted from Extension to the Nevada state floodplain manager in 2015, but Extension remained active with the core team. In 2017, the group organized seven public awareness events. Extension created radio ads that aired on KUNR for five weeks and three half-page ads that appeared in the Reno Gazette-Journal. The newspaper also increased outreach on its website to advertise the week. Also in 2017, the program focused on directing people to the website.

12) Climate Change Education Workshop and Partnership is a multistate Extension Partnership with the Climate Hub that adds climate science information to Extension programming. Cooperative Extension is collaborating with the Southwest Regional Climate Hub of the U.S. Department of Agriculture's Agricultural Research Service and with Cooperative Extensions in Arizona, California, Hawaii, New Mexico and Utah to develop and present curriculum about climate-smart agriculture. In 2016, Extension worked with 15 faculty representing all six states to organize and hold a climate workshop, which had 60 attendees representing all six states. Organizers sent out a follow-up survey in 2017, began distributing a multistate newsletter, and started adding climate science information to existing Extension programs.

13) Southern Nevada Research Center and Orchard Program researches fruits and vegetables that grow well in desert environments and trains backyard and commercial growers. The research center is located in North Las Vegas and contains over 800 fruit trees and grape vines, vegetables and other row crops. The goal of this facility is to research varieties of fruit-producing trees, vines and other plant materials that will grow well in desert environments for both backyard and commercial use. It is also a place where hands-on training/teaching opportunities can be held for homeowners and commercial clientele. The majority of labor is provided by Master Gardeners and other volunteers. In 2017, Extension continued trials with hops, fruit trees and grape vines, and started researching goji berries and tomatoes. Extension also facilitated eight hands-on classes, reaching 160 students, and continued working with volunteers for Master Gardeners, Nevada Naturalists and other Extension horticulture, natural resources, and health and nutrition programs.

Childhood Obesity, Nutrition and Health efforts reached by Cooperative Extension faculty partially funded by NIFA included 2 programs involving 3 NIFA-funded faculty. Programs included:

1) Veggies for Kids and Veggies for Seniors teach children and seniors about healthy eating habits and improves accessibility to fresh fruits and vegetables. Veggies for Kids is an in-school program that teaches youth how to grow vegetables and about nutrition by providing a 10-week series of one-hour lessons in the classroom, a four-day summer institute, and a 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. During the 2016-2017 school year, the program was provided at seven elementary schools in northern Nevada, reaching 808 students, 59 percent being non-Caucasian students.

2) Little Books and Little Cooks is a program for preschool children and their parents to boost healthy eating, literacy, parent-child interaction and school readiness. It is a seven-week program for preschool-age children (3-5 years old) and their parents designed to promote healthy eating, family literacy, parent-child interaction and school readiness skills. 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 and nutrition, and by cooking and eating every week. Each weekly session features a new book about healthy eating and a new recipe.

Food Safety efforts reached by Cooperative Extension faculty partially funded by NIFA included 1 programs involving 2 NIFA-funded faculty. Programs included:

1) Food Preservation and Security teaches U.S. Department of Agriculture food preservation and security guidelines through hands-on training. It is a new program that was initiated the latter part of 2017, after receiving frequent requests for food preservation classes. This year was a pilot program to see how well the program would be received throughout Clark County. Classes were held at the Extension offices in Las Vegas, Logandale and Laughlin. Each of the classes lasted three to four hours and included an introductory PowerPoint presentation, with the majority of the time being spent conducting hands-on training. One of the most emphasized aspects of this program was safety and the importance of following U.S. Department of Agriculture guidelines. All classes were small, with eight to 16 students.

Community and Economic Development efforts reached by Cooperative Extension faculty partially funded by NIFA included 9 programs involving 12 NIFA-funded faculty. Programs included:

1) Lincoln County Workforce Development helps underemployed adults ages 18 and older and at-risk youth ages 17-21 in rural Nevada's Lincoln County gain education, training and sustainable jobs. This includes identifying barriers; building confidence and hope; educating on how to match skills and interests with possible careers, how to plan a career path and how to apply for jobs; tutoring; working with local businesses to develop on-the-job training/employment experiences; and working with the community to develop the economy and jobs.

2) Agriculture Innovation Forum Series provides discussions to offer options and solutions to help small-acreage producers sustain their businesses. It provides practical information and expertise needed for agricultural producers and small-acreage owners to optimize their land-use potential and maintain agricultural open space in Carson Valley. More specifically, the forum series offers options and solutions for surviving as a small agriculture entity. In 2017, a two-hour session covering a new topic was offered once a month for four months during the first part of the year. Approximately 25 people attended each session.

3) Leadership Douglas County teaches adults to focus on critical county issues and builds leadership skills and networking. Participants meet one day a month for 11 months for a class about leadership skill building, networking, focusing on critical community issues and learning about many important aspects of the county.

4) Unmanned Aerial Systems in Rural Nevada teaches youth and adults about STEM, and proper handling and safety of unmanned aerial systems for practical and business uses. To teach youth STEM and technical skills, Extension offered a six-session experiential STEM activity at Nevada's White Pine High School to 12 students. To teach adults proper handling and safety of unmanned aerial systems for practical and business uses, Extension offered a presentation, "The What and Why of Small Unmanned Aerial Systems" in Nevada's Lander County.

5) White Pine Business Education provides classes to help small business owners learn financial management, and assess and find ways to improve customer service. Extension worked with the University's Small Business Development Center to offer two series for business owners. The first series had 17 participants who met weekly for nine weeks March 27 - May 22. Participants learned financial management and completed a business plan. The second series had six participants and met four times June 16 - Sept. 11. Participants learned how to assess their business' customer service and map out strategies to improve it.

6) Herds & Harvest provides educational business production management and mentoring programs and workshops to help Nevada's beginning agricultural producers. It combines a series of workshops on different topics and provides educational business management and mentoring programs to support Nevada beginning agricultural producers, with the goal of increasing their profitability and sustainability.

The program completed its sixth year of existence in December 2017, and is in its third year of a three-year funding cycle. In 2017, 16 workshops were offered, benefitting 392 people, on topics such as business strategies, meat slaughter and processing, hops, small-scale poultry, viticulture, vegetable farming, and social media marketing. In addition, 176 mentoring sessions, including 21 sessions on Indian reservations serving 315 tribal members, were conducted with producers, with 12 new farms participating in the mentoring program. Other producers benefitted from networking with other growers through the program.

7) Nevada Risk Management Education teaches agricultural producers ways to mitigate risks to increase sustainability and availability of local food. It helps producers understand five areas of risks they face in agricultural production and teaches strategies to mitigate those risks in order to increase the probability of economic survival and sustainability of Nevada's farms and ranches. This in turn, also helps to address the problem of Nevada's food deserts, and helps to provide healthy local produce and meat for Nevada citizens. The program teaches commercial, beginning, socially disadvantaged, and transitioning farmers and ranchers in Nevada about current federal crop/livestock and revenue insurance programs available to assist farmers and ranchers and minimize risks they face. In 2017, the project consisted of 11 different programs, including 45 workshops reaching 1,693 producers.

8) Native Waters on Arid Lands is a multistate collaborative program that aims to enhance the climate resiliency of tribal agricultural water resources and food systems. This integrated research and outreach program targets Native American tribes on reservation lands, especially in the West, including some of the nation's most water challenged and economically vulnerable populations. Since the five-year, grant-funded program began in 2015, research and Extension experts from 1862 and 1994 land-grant institutions have partnered 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.

9) Social Media Training teaches social media for businesses, community members, scientists/agriculturalists and Extension professionals. Nevada businesses, community members, Extension professionals and international scientists/agriculturalists expressed a need for social media training. In 2016, Extension began creating and presenting sessions. Presentations were 30 minutes to four hours long. In 2017, 14 presentations were given, and 280 people were trained. The initial series for businesses was completed in 2016, but in 2017, there were six sessions for community members, four sessions for Extension professionals and four sessions for scientists/agriculturalists.

Children, Youth and Family Development efforts reached by Cooperative Extension faculty partially funded by NIFA included 6 programs involving 7 NIFA-funded faculty. Programs included:

1) Keeping Kids Safe: Recognizing, Reporting and Responding to Child Maltreatment Training educates those working with youth or providing child care about how to recognize, respond to and report possible child maltreatment to help protect children and youth, and helps child care providers and those working with youth comply with state regulations. In 2017, a training based on a curriculum developed by Cooperative Extension faculty was delivered four times in Elko County and via interactive video in Humboldt County, and once in Nye County. Clark County offered it online, reaching 1,588 providers, and also trained 36 early childhood trainers to teach it. Program goals are that participants will better understand the four types of child maltreatment; how to recognize maltreatment; how, when, where and what to report when one suspects maltreatment; how to respond when a child discloses abuse; program policies to protect children and staff; and caregivers' responsibilities and rights related to maltreatment.

2) Heart and Shield: Rural Domestic Violence Prevention Program works to promote resiliency, strengthen positive future relationships, and stop the domestic violence cycle. It began in 2009, and then received a five-year CYFAR/NIFA grant in 2013. It has three major components: 1) development of an online training

and a field guide publication for law enforcement on responding to domestic violence that addresses the dynamics of domestic violence from the 911 call to successful prosecution; 2) direct education and noncrisis intervention for children and families experiencing family violence to promote resiliency, strengthen positive future relationships, and stop the cycle of domestic violence; and 3) education of community members and leaders about the impact of domestic violence and creation of a supportive community. In 2017, 39 adults and 72 youth participated in a nine-week series of classes and monthly family activities for survivors, as part of the second component (direct education/intervention). As part of the third component (community education), the program provided 47 community education presentations in 2017.

3) Yerington Paiute Tribe Maternal, Infant, and Early Childhood Home Visiting Program helps develop infrastructure within the Yerington Paiute Tribe to foster healthy, safe and self-sufficient families. The program began in 2014, assisting eight families. Extension partnered with the Tribe to research how teaching parents about traditional cultural practices combined with the national Parents as Teachers curriculum affected parental stress. The program used a case study design to assess change in parental stress and obtain national benchmark data for 15 families through weekly in-home visits, and to get more in-depth data on nine of the families. For 2016-2017, Extension wrote the final report. In 2017, 10 monthly Group Connections meetings were held to discuss health, crib safety, budgeting and more. The program also offered resume services and gave child-safety technician certification and professional development trainings for staff. Parent educators took participants to and from third-party providers for prenatal and well-baby checkup appointments. The program also published in the Tribe's monthly newsletter and took part in community activities.

4) GEAR UP (Gaining Early Awareness and Readiness for Undergraduate Programs) is a federal program that prepares low-income students to have an interest and succeed in STEM and postsecondary education. Cooperative Extension components include: a) Research and Evaluation, and b) STEM Education for Rural Nevada Adolescents. Extension received its third GEAR UP grant in 2013, and since then has done case studies and created, run and expanded STEM education programs for middle-school students in rural Nevada. In 2017, Extension continued to analyze case-study data and report and publish findings. Extension also continued studying the role that relationships play in developing academic self-identity. Data from spring and fall were collected from 46 students in eight of the GEAR UP schools. In addition, Extension institutionalized the robotics programs, passing operations to the schools. Extension also worked with University of Nevada, Reno's College of Engineering to plan and run a weeklong STEM camp for 24 urban and rural students.

5) Family Storyteller boosts the amount and quality of time parents and children spend together reading and enhances school readiness. It began in 1998, and now has English, Spanish, English Language Learner, Infant/Toddler (English and Spanish) and Native American versions. Through six weekly classes, attendees learn the importance of literacy for children; discuss and watch videos of reading techniques; practice reading; learn activities to enhance the reading; and receive children's books and materials to take home. In 2017, efforts focused on the Spanish and English versions of the program. In 2017, in Clark County, 536 adults and 590 children participated in the preschool version; and 79 adults and 81 children participated in the infant/toddler version. In Washoe County, 36 Spanish, six English and four bilingual classes were taught, reaching 85 families, including 81 Spanish- and nine English-speaking adults and 112 Spanish- and 22 English-speaking children.

6) Youth for the Quality Care of Animals is a curriculum that teaches youth to raise quality swine, beef and dairy cattle, sheep, goats, dairy goats, rabbits and poultry. Offered both online and face-to-face, it teaches youth ages 8-21 who raise market animals how to ensure the animals will be wholesome, safe and healthy for consumers. It focuses on animal well-being, food safety and life skills. There are lessons for four age groups: junior, intermediate, senior and young adult.

The **Nevada Agricultural Experiment Station** (referred to as "Experiment Station" throughout this report) contribution to the NIFA 2017 Annual Report will focus on select programs that reflect the unique benefits to a diversity of clientele and stakeholders in Nevada.

Experiment Station and the College of Agriculture, Biotechnology, and Natural Resources are focused on improving the quality of life for all Nevadans through education, research and outreach that support the agricultural enterprise; foster community health and well-being; promote natural resource sustainability; and stimulate statewide economic development.

This past year, the Experiment Station formula-funds grant program 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 state performance metrics is external funds leveraged per dollar of formula funds funding. In 2016-2017, \$2.08M in federal-state appropriations were leveraged by faculty to generate \$5.6M in external fund (a return of \$2.7 for every \$1 invested). Our faculty published 101 peer-review journal articles, trained 105 graduate and 191 undergraduate students, gave 249 presentations, conducted 65 workshops, and developed 5 new germplasm.

Some of this year's research highlights include:

Global Food Security and Hunger

- An experimental vineyard was planted in Southern Nevada using native grape root stock.
- Several lines of Camelina have been developed that should have lower levels of erucic acid and glucosinolates (make the seed meal unpalatable and possibly dangerous to livestock)
- Studies into the molecular controls involved in potato wound healing for improved storage life continue, with several breakthroughs in suberin biosynthesis and suberin regulation.
- Teff accession trial continue, looking into drought tolerance, grain yield and seed color with over 367 unique types tested.
- Lodging issues associated with Teff's stalk height continue by targeting genes involved in regulating plant stature.
- Evaluation of tomato cultivars with the potential to perform well in Nevada arid condition continues. Effects of drought, nitrogen availability and symbiotic fungi were explored with a close eye towards how different tomato genotypes respond.
- Genomic editing tools are being used to increase cellulose content and digestibility in model agricultural significant plants
- In efforts to improve salty, high-desert rangeland into usable farmland, several species of Amaranthus and Quinoa are being testing for salt uptake and tolerance.
- Evaluation of cattle preferences and grazing pressures placed upon improved and alternative forages under irrigated rangeland conditions is moving forward. 37 different hay cultivars are being studied in Nevada's high-desert environment.
- Basic science into how insects' neuro-hormones are expressed under different diets continues, with several neuropeptides being targeted as potential pharmacological susceptible proteins.
- In order to improve nutritional values of beef, research was performed to evaluated omega 3s fortification of beef with a novel marine oil source (krill).

Climate Change, Natural Resource Management and Environmental Science

- Experimentation and monitoring of the only fully instrumented watershed-scale pinyon-juniper

ecosystem continues for its ninth year.

- Post-fire grazing decisions made by land managers were improved through the use of State-and-Transition Models developed and revised by the Experiment Station's range scientists. BLM, ARS, range science professionals and public-land leaseholders in northern Nevada/southeastern Oregon have shown measureable effects on cheatgrass control with moderate spring grazing immediately following fire.
- Cattle and wild horses usage data related to sage grouse preferred brooding habitat continues to still be collected. Preferred habitat vegetation and riparian condition data were also being collected.
- Data on seasonal streams found throughout Nevada that are of high priority to BLM personnel were sampled for the third year post the initial wildfire.
- Research into three different land-uses (wild horses & livestock, only wild horses, and no horses or livestock) on sage grouse demographics entered its fourth year. Through the use of GIS software a multitude of map layers have been assembled that represent many factors import to sage grouse survival.
- Scientist working with desert bighorn sheep, generated a large dataset that provides a detailed view of genetic structure across their translocated range and is helping identify areas of genetic endemism and connectivity.
- Several soils studies were conducted looking into factors influencing carbon sequestering of retired irrigated pastures, methane flux on Nevada's rangelands, and snow-pack runoff.

Sustainable Energy

- Research into Prickly Pear Cactus as a biofuels resource in arid climates continues. A major breakthrough came in the increase of lipid content through genetic modification.
- Prickly Pear Cactus field trials are going into their fourth year with three varieties moving to the top. Information gathered over the first three years included both fresh and dry above-ground vegetative (cladode) biomass, cladode counts, both fresh and dry fruit biomass, and fruit counts.

Childhood Obesity, Nutrition, and Health

- 18 bioactive compounds that act as epigenetic modifiers of cardiovascular diseases were elucidated, with six of the eighteen capable of inhibiting enzymes known to affect enlargement of the heart and thickening of the walls.

Food Safety

- Seven novel bacteriophages were identified that reduce E. coli in ground beef processing by 99%.
- A new project has begun looking at small sections of RNA (microRNA) found in beef and how they might be associated with human diseases and cancer.

Community and Economic Development

- Solar power investment in Nevada is substantial and work has been done evaluating the value of federal tax credits and state property tax credits under different degrees of risk and uncertainty.
- Several studies were conducted on the economic contributions to local communities by regional hospitals.
- Since lithium mining in Nevada is placed into a very broad economic cluster of general mining, work was conducted to better understand how lithium mining will impact Nevada separate from other mined products.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	12.4	{No Data Entered}	8.5	{No Data Entered}
Actual	11.9	0.0	7.0	0.0

II. Merit Review Process

1. The Merit Review Process that was Employed for this year

- Internal University Panel
- External Non-University Panel
- Expert Peer Review

2. Brief Explanation

University of Nevada Cooperative Extension merit review process

Extension's merit review process comprises multiple steps. Annually tenure-track Extension faculty prepare a Role Statement detailing their teaching, research, and service activities for the coming calendar year. Extension faculty review their individual Role Statements with their Area Director and/or Department Chair who ensures the quality and relevance of planned programming efforts effectively address formally identified program goals. Both the Area Director and the Nevada Extension Dean/Director review and approve the plan.

Annually, Extension faculty evaluate their peers' teaching, research and service activities to assess overall performance and program quality. Peers consider the results of formal needs assessments, programs developed in response, and the substance of documented outcomes and impacts in rating peer performance and providing narrative feedback. Area Directors also conduct an annual review of faculty performance and provide narrative feedback. Area Directors then meet individually with faculty to discuss the documented results of the peer review and Area Director's review. The Extension Director also reviews and signs off on the evaluation documents.

Finally, some Extension efforts are a part of the Multi-state Review Committee (MRC) process and are documented, reviewed and approved by the sponsoring regional association. These committees are responsible for the review, evaluation, and recommendation of western multistate programs which may involve research, academic programs, extension, and/or international programs.

Experiment Station's merit review process

Scientific peer review drives the initial selection of research projects that comprise the Experiment Station research portfolio. Experiment Station administration solicits applications from Experiment Station/College of Agriculture scientists in a general call for proposals that identifies annual priority areas. Faculty submit proposals through an in-house, web-based content management system.

Based upon research priority area, expert peer reviewers are assigned by Experiment Station administration to rate proposals based upon merit in the field of research, PI's qualifications, projected outcomes, degree of multi-disciplinary activity, and budget feasibility. The Experiment Station administration concurrently sends proposals to its external advisory board panel representing stakeholder

interests for evaluation and ranking based upon their constituents' inputs.

Tabulated results, comments, recommendations and proposals are then sent to the PI's home department administration for internal review. Departmental recommendations are then send forward to Experiment Station administration. All findings are then compiled by Experiment Station administration and final decisions are made based on the rankings, comments and stakeholder input.

III. Stakeholder Input

1. Actions taken to seek stakeholder input that encouraged their participation

- Use of media to announce public meetings and listening sessions
- Targeted invitation to traditional stakeholder groups
- Targeted invitation to non-traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to non-traditional stakeholder individuals
- Targeted invitation to selected individuals from general public
- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals
- Survey specifically with non-traditional groups
- Survey specifically with non-traditional individuals
- Other (Use of social media; conduct field days at our University field stations)

Brief explanation.

Faculty target traditional and non-traditional stakeholders through email and postal mail invitations to participate in public meetings, focus groups, and individual interviews. Poster announcements are placed in public places frequented by traditional and non-traditional audiences.

Formal needs assessments serve as another means for contacting stakeholders. Faculty continually assess stakeholders' perceived program priorities in order to efficiently allocate resources and to identify and develop partnerships for program implementation and delivery.

Primary data-collection methods include postal mail and internet surveys, focus groups, and individual interviews. Results of Cooperative Extension community needs assessments are published and made available to other university faculty and the broader public via the Extension website (www.unce.unr.edu/publications/assessments).

Frequently, faculty develop partnerships with a variety of stakeholder groups as part of program planning, development, and implementation. These community and organizational partnerships provide an ongoing venue for receiving stakeholder input and feedback for the life of a program.

An advisory board has been established to counsel Experiment Station in matters of research, resident instruction and outreach. The board's qualifications cover a wide spectrum of interest, from local ranchers to federal agencies. Board members are asked to conduct focus groups based upon their home district to ascertain viewpoints and ideas on the needs and deficiencies of their local

region.

2(A). A brief statement of the process that was used by the recipient institution to identify individuals and groups stakeholders and to collect input from them

1. Method to identify individuals and groups

- Use Advisory Committees
- Use Internal Focus Groups
- Use External Focus Groups
- Open Listening Sessions
- Needs Assessments
- Use Surveys
- Other (Informal discussions with key stakeholders)

Brief explanation.

Experiment Station currently has a broadly based advisory board committee that meet and provides input multiple times per year. In addition, we have faculty members that schedule and coordinate meetings throughout the state with the purpose of obtaining direct input to the Experiment Station research portfolio.

Experiment Station's partnership with Cooperative Extension provides assistance and access to stakeholders through joint efforts like the annual Cattlemen's Update - a program designed to bring the researcher to the rancher - and Beginning Famers and Rancher events held throughout the state. With Experiment Station administration abiding by an "open door policy", informal discussions with key stakeholders provides important input into our research programs and resident instruction. Comments are also received through the Experiment Station website.

Cooperative Extension's stakeholder input is routinely used to identify emerging issues, to direct and redirect programs and also in the hiring process. Stakeholders include local elected and appointed officials, community leaders, citizens, under-served groups and individuals, university leadership, university academic departments, and Extension faculty and staff. Therefore, the areas to be emphasized reflect the views of a broad set of stakeholders. Stakeholder input is used to determine the necessary qualifications of those hired and/or to create new positions, as new funding becomes available. Stakeholders also participate in Extension faculty searches. Additionally, stakeholder input is used to help establish program priorities and to acquire necessary funding.

Use of local newspapers and radio, through public-service announcements, encourage stakeholders to participate in public meetings and listening sessions. Extension also sponsored exhibitor booths at annual meetings held by numerous commodity groups and local/state agencies.

Both Experiment Station and Cooperative Extension faculty target traditional and non-traditional stakeholders through email and postal mail invitations to participate in public meetings, focus groups, and individual interviews. Poster announcements are placed in public places frequented by traditional and non-traditional audiences. Formal needs assessments serve as another means for contacting stakeholders. Faculty continually assess stakeholders' perceived program priorities in order to efficiently allocate resources and to identify and develop partnerships for program implementation and delivery.

Cooperative Extension's primary data-collection methods include postal mail and internet surveys,

focus groups, and individual interviews. Results of community needs assessments are published and made available to other university faculty and the broader public via the Nevada Extension website.

Frequently, both Experiment Station and Cooperative Extension faculty develop partnerships with stakeholder groups as part of program planning, development, and implementation. These community and organizational partnerships provide an ongoing venue for receiving stakeholder input and feedback.

2(B). A brief statement of the process that was used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them

1. Methods for collecting Stakeholder Input

- Meeting with traditional Stakeholder groups
- Survey of traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Survey of traditional Stakeholder individuals
- Meeting with the general public (open meeting advertised to all)
- Survey of the general public
- Meeting specifically with non-traditional groups
- Survey specifically with non-traditional groups
- Meeting specifically with non-traditional individuals
- Survey specifically with non-traditional individuals
- Meeting with invited selected individuals from the general public
- Survey of selected individuals from the general public

Brief explanation.

In development and strategic planning of Experiment Station research programs and priorities, input was collected primarily through meetings with stakeholder groups and individuals including concerned citizens, ranchers, agricultural organizations, natural resources professionals and managers, state and federal agency representatives, food industry representatives, and Cooperative Extension administrators, specialists and educators.

Experiment Station will also hold several other public events during the year to gather information from stakeholders. Whenever it is feasible, efforts are made to coordinate relevant activities with extension to avoid duplication. Research project participants obtained direct and indirect stakeholder input through varied avenues. Projects with social science components frequently used questionnaires and surveys. Stakeholder input to some basic science and some applied projects occurred in the form of reviewer inputs to proposals, and from questions, comments and discussions at regional, national and international conferences. Stakeholder input for other projects was collected through comments and questions at workshops and topical meetings for end users.

Cooperative Extension meets frequently with stakeholders throughout the state. This includes formal presentations to county commissions, the Nevada Association of Counties and community groups. It also includes participation as a member in state panels and commissions and executive boards, such as the Nevada Sagebrush Ecosystem Council, the Nevada Governor's Drought Forum, the Nevada Governor's Council on Food Security, and the Food Bank of Northern Nevada. County-based Extension Educators and Nevada Extension administrators meet formally

and informally with county commissioners, and public service groups, such as Rotary Clubs. Extension Educators also conduct formal needs assessments involving survey instruments.

3. A statement of how the input will be considered

- In the Budget Process
- To Identify Emerging Issues
- Redirect Extension Programs
- Redirect Research Programs
- In the Staff Hiring Process
- In the Action Plans
- To Set Priorities
- Other (Strategic planning)

Brief explanation.

The Nevada Agricultural Experiment Station collected information from stakeholders to adjust issue areas that are influencing Experiment Station's future direction. These stakeholder priorities also directly influenced applied research activity, while influencing which departments or areas of expertise get hiring priority. Successful strategic hires enable us to meet existing needs and at the same time reposition for those on the horizon.

Our stakeholders help us see into the future to identify those emerging issues. For example, in the past year the decision to hire faculty focused on remote sensing, plant breeding, and livestock reproduction. Input from Nevada's cattle and sheep industry reinforced this decision, and the industry was represented on the search committee.

Experiment Station used stakeholder input to make more immediate decisions, such as where to invest funding to direct current faculty and their research into emerging issues such as drought tolerant vegetables, alternative biofuel feedstock and sustainable water sources derived from annual snow pack. Stakeholder input was utilized in other activities such as annual budget allocation, providing feedback to the college, departments and faculty, and most importantly, in setting priorities for our Formula Fund research Call for Proposals and deciding how to allocate these funds.

University of Nevada Cooperative Extension used local, regional and state needs assessments to design, deliver and evaluate programs. Cooperative Extension used reports from public meetings and processes, participation on commissions and boards of directors, participation in state and regional conferences to:

- allocate funds from all of Extension's sources
- identify emerging issues to be addressed with new or expanded programs
- redirect Extension programs
- hire staff
- develop action plans and set priorities

Brief Explanation of what you learned from your Stakeholders

The most common direction Experiment Station's stakeholders wanted was expansion of the plant sciences and related agronomy/horticultural disciplines. This input has prompted the Dean and Directors to begin hiring more faculty that specialize in plant science (two positions this past year), along with hydrologist specializing in groundwater irrigation (open search underway).

Cooperative Extension's stakeholder base is deeply divided in how funds are distributed around the state. Large demographic areas in the south (Las Vegas) are concerned that county funds might be misappropriated and used to support activities in the north (Reno, Carson City) and rural areas (geographically 90% of the state). There must be great efforts place on making sure financial transparency is upheld.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
{No Data Entered}	{No Data Entered}	{No Data Entered}	{No Data Entered}

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	1270233	0	1097322	0
Actual Matching	1270233	0	985838	0
Actual All Other	0	0	0	0
Total Actual Expended	2540466	0	2083160	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	328095	0	1395651	0

V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Global Food Security and Hunger
2	Climate Change, Natural Resource Management, and Environmental Science
3	Sustainable Energy
4	Childhood Obesity, Nutrition and Human Health
5	Food Safety
6	Community and Economic Development
7	Children, Youth and Family Development

V(A). Planned Program (Summary)**Program # 1****1. Name of the Planned Program**

Global Food Security and Hunger

 Reporting on this Program**V(B). Program Knowledge Area(s)**

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	2%		31%	
111	Conservation and Efficient Use of Water	17%		0%	
112	Watershed Protection and Management	7%		0%	
121	Management of Range Resources	4%		0%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		7%	
202	Plant Genetic Resources	0%		3%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		9%	
204	Plant Product Quality and Utility (Preharvest)	0%		4%	
205	Plant Management Systems	39%		3%	
206	Basic Plant Biology	2%		19%	
211	Insects, Mites, and Other Arthropods Affecting Plants	12%		9%	
216	Integrated Pest Management Systems	5%		0%	
302	Nutrient Utilization in Animals	0%		2%	
307	Animal Management Systems	0%		3%	
315	Animal Welfare/Well-Being and Protection	4%		0%	
504	Home and Commercial Food Service	0%		1%	
511	New and Improved Non-Food Products and Processes	0%		9%	
723	Hazards to Human Health and Safety	3%		0%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	1%		0%	
902	Administration of Projects and Programs	4%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)**1. Actual amount of FTE/SYs expended this Program**

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	3.5	0.0	3.0	0.0
Actual Paid	3.1	0.0	6.2	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
221504	0	711378	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
221504	0	326890	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The Nevada Agricultural Experiment Station conducted the following research projects to further the goals of NIFA's Global Food Security and Hunger theme:

1. Evaluation of wine grape cultivars and their genotypes for late spring bud break, low water requirements and high salt tolerance.
2. Identifying cell wall composition of forages crops and biofuels feedstock used in Nevada and how this biomass changes due to drought and other environmental stresses.
3. Working towards improving the storage life of potatoes and carrots
4. Determined the relative drought and dehydration tolerance of three Teff species that differ in their ability to withstand prolonged periods of water-deficit stress.
5. Evaluation of tomato root water hydraulics and nitrogen transport in response to stress associated with climate change.
6. Investigating the signaling dynamics of neuropeptides insects to better understand how to disrupt their feeding behaviors.
7. Evaluating changes in nutritional values in hydroponically grown fruits and vegetables.
8. Working towards increasing agricultural production on marginalized saline croplands through the use of quinoa, a salt-tolerant crop.

The University of Nevada Cooperative Extension conducted the following programs to further the goals of NIFA's Global Food Security and Hunger theme:

1. Stockmanship "Low Stress Livestock Handling" workshop were conducted
2. Alternative Crop Production Program continued to evaluate, demonstrate, and commercialize crops that use less water in Nevada
3. Effectiveness assessment were produced for the 3 years of tribal summits addressing climate resiliency of agricultural production on Native American lands

4. The Commercial Landscape Horticulture program provided basic training and continuing education to increase the skill level and professionalism within the commercial landscape horticulture industry in northern Nevada

5. Taught Fundamentals of Horticulture course designed to impart landscape principles for landscape professionals

6. The workshop "Nuts and Bolts of Reinventing Your Landscape" was ran to educate stakeholders in the use of low-water-requiring native plants

7. Tested and demonstrated appropriate IPM methods applicable for weed management in Nevada.

8. Conducted the IPM Instruction Into The Basic Training program for Master Gardeners, Green Industry professionals and the public to decrease pesticide use in urban environments

9. Educational efforts and planning sessions were conducted for Eureka and Pershing Counties, NV on how to control noxious weeds via IPM

10. Trained Master Gardeners candidates in both Northern & Southern Nevada

11. The Agriculture Innovation Forum Series continued offering options and solutions for surviving as a small agriculture entity

12. The Agricultural Heritage program informed the public about Basque and Native American practices

13. Research continues into small-scale orchard production in Southern Nevada

14. The Grow Your Own program continued providing horticultural information to homeowners who desire to become successful backyard food producers in our unique high-desert climate

15. Nevada, implemented the Youth for the Quality Care of Animals Program to create a national quality assurance curriculum.

2. Brief description of the target audience

Experiment Station's target audience included:

The scientific community, agriculture producers, veterinarians, local organizations, backyard hobbyists, as well as students taking classes or participating in research activities, beginning and existing small acreage operators and large-scale crop and livestock (primarily beef/dairy/sheep) producers. USDA agencies and other government entities that conduct work in this area are an audience and frequently a program partner. Additional audiences include agricultural service industries, lenders, and policy makers at the local, state, and federal levels.

University of Nevada Cooperative Extensions audience included:

Homeowners, community gardeners, Master Gardeners, small-scale commercial and backyard producers, traditional large commercial producers, green industry professionals, commercial landscape horticulture industry, including nursery workers and owners, arborists, pesticide applicators, landscapers, irrigation specialists, landscape designers and architects, ranchers, land managers, policymakers, state and federal partners in weed management, beekeepers, resource consultants, agency natural resource specialists, conservation district leaders, mining personnel, Native American tribal members, and the general public.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	23055	1774	5552	490

2. Number of Patent Applications Submitted (Standard Research Output)
Patent Applications Submitted

Year: 2017
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	9	34	43

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Undergraduate Students Involved in Research.

Year	Actual
2017	73

Output #2

Output Measure

- Number of Graduate Students or Post-Doctorates Trained.

Year	Actual
2017	27

Output #3

Output Measure

- Workshops, Demonstrations, and Presentations

Year	Actual
------	--------

2017 198

Output #4

Output Measure

- Abstracts, Books, Book Chapter(s), Proceedings, Research Reports, and Technical Publications

Year	Actual
2017	16

Output #5

Output Measure

- Brochures, Bulletins, Fact Sheets, Newsletter, and Surveys

Year	Actual
2017	3

Output #6

Output Measure

- Manuals and Other Printed Instructional Materials Produced

Year	Actual
2017	1

Output #7

Output Measure

- Digital Media and Web Sites Created or Updated

Year	Actual
2017	8

Output #8

Output Measure

- Leveraged research funds generated.

Year	Actual
2017	2080507

Output #9

Output Measure

- Newly developed databases, models and protocols

Year	Actual
2017	1

Output #10

Output Measure

- Newly developed germplasm

Year	Actual
2017	4

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of clientele who gain knowledge about improved human, plant, and animal management systems for sustainable agriculture.
2	Number of clientele who implement improved human, plant, and animal management systems for sustainable agriculture.
3	Advance research knowledge, both basic and applied, in the areas of production agriculture to existing and emerging industry and consumer demand regarding genetics, biology, seed production, nutrition, and related topics.
4	Urban Integrated Pest Management
5	Soybean Production in Nevada
6	Master Gardeners
7	Irrigation Efficiency and New Technologies
8	Grow Your Own, Nevada!
9	Commercial Landscape Horticulture
10	Alternative Crop Production in Nevada: Alfalfa, Camelina, Tall Fescue and Halophytic Plant Trials
11	Alternative Crop Production in Nevada: Teff
12	Southern Nevada Research Center and Orchard

Outcome #1

1. Outcome Measures

Number of clientele who gain knowledge about improved human, plant, and animal management systems for sustainable agriculture.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	1200

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Maintaining agriculture and open space is a local priority, as it is a major contributor to the rural character and quality of life of Douglas County. Further, small-acreage owners need information to help them sustain their production, businesses and profitability.

What has been done

Cooperative Extension created the Agriculture Innovation Forum Series in 2011 to provide practical information and expertise needed for agricultural producers and small-acreage owners to optimize their land-use potential and maintain agricultural open space in Nevada’s Carson Valley. In 2017, there were four forums that were two hours each. Topics included: plants that attract beneficial pollinators, growing hops, protecting your small farm from wildfire, and creating windbreaks and wildlife habitat. Guest speakers included Cooperative Extension’s Jason Davison and Ed Smith, two Cooperative Extension Master Gardener volunteers, and local professionals. Forums in the series were promoted via media releases, social media and word of mouth.

Results

In 2017, attendance averaged 25 in the four forums offered. The series was measured using post-series evaluations. Of the 13 attendees who responded,

- 6 found the forums extremely informative
- 10 shared what they learned at the forums with friends, neighbors and others
- 5 claimed that what they learned absolutely changed what they will do in the future
- 13 claimed that they now have the know-how to make better use of their land

4. Associated Knowledge Areas

KA Code	Knowledge Area
---------	----------------

102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water

Outcome #2

1. Outcome Measures

Number of clientele who implement improved human, plant, and animal management systems for sustainable agriculture.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	10171

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Nevada agricultural producers, as well as land managers, continue to need research and education on controlling pests, both weeds and insects, on croplands, rangelands and public lands. It is essential they know the most recent, effective, research-based integrated pest management strategies to minimize the use of pesticides. In addition, producers, land managers and pesticide applicators must know how to safely use approved pesticides when necessary to protect the environment and human health. Finally, research and technical assistance is needed to identify and submit for federal approval, pesticides safe for use on Nevada crops and recreational land.

What has been done

Extension's IPM Program continues to study and teach IPM strategies that can minimize chemical controls.

In 2017, the program expanded to target pollinator protection and bedbug management, and provided IPM information related to crop production to over 1,000 people, including to 614 at 11 workshops. Extension also held 21 pesticide applicator trainings reaching 920 people, and four noxious weed workshops reaching 780 people. Topics included newly invading weeds, monitoring and mapping noxious weeds using the Early Detection and Distribution Mapping System, alternatives to pesticides, proper pesticide application, and new pesticides or application techniques.

Extension also presented at the Nevada Weed Management Association, conservation district meetings, Paiute and Shoshone land management meetings, cooperative weed management district meetings, the Tri-county weed meeting and the Elko Noxious Weed Summit.

In Eureka County, Extension did a noxious weed inventory to emphasize the need and provide a basis for determining the success of future efforts.

Results

As part of a long-term program, the IPM Program has documented an increase in stakeholder adoption of IPM practices, and an increased use of alternatives to pesticides or pesticides being used in synergy with other control methods. The target audience has shown an increase in awareness of the resources available for pest identification and of weeds that are newly being established in Nevada. They are also demonstrating an increased ability to solve pest management issues independently. Summaries of five years of surveys of this target audience are being compiled for publication.

- Nearly all of the Pesticide Safety Education Program courses offered were evaluated, with nearly 100 percent of the over 1,050 attendees indicating they planned to implement what they had learned.
- A total of 2,321 PSEP participants actually took one or more of the practice exams and submitted results
- The Pesticide Education Program website had 193,090 hits and 28,506 visitors in 2017
- More than 2,500 publications were distributed at weed meetings, workshops, field days, etc.
- In Eureka County, six property owners treated noxious weeds and committed to annual long-term treatments

On a post- training evaluation for a pesticide application training in Pershing County:

- 9 attendees said the training helped improve the profitability or efficiency of their operation
- 10 attendees rated a 4.28 mean score for their knowledge gained on a scale of 1 (no knowledge gain) to 5 (significant knowledge gain) over four topic areas

4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems

Outcome #3

1. Outcome Measures

Advance research knowledge, both basic and applied, in the areas of production agriculture to existing and emerging industry and consumer demand regarding genetics, biology, seed production, nutrition, and related topics.

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Urban Integrated Pest Management

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	6695

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Data from the National Water Quality Assessment Program published in 2006 revealed that the Truckee River had only one pesticide detected in water samples upstream from Reno-Sparks, but 10 compounds were detected downstream of the two cities, suggesting urban inputs to the pesticide load. Historically, studies have shown that homeowners use as much as 10 times more chemicals per acre on their lawns than farmers use on agricultural land. The goal is to train the green industry, Master Gardener volunteers and others who advise the public in pesticide safety practices to help the public improve their skills in selection, use and disposal of pesticides to minimize pesticide pollution of water.

What has been done

Urban IPM training is part of nearly all Cooperative Extension horticulture programs, including

- Master Gardeners (67 people completed the 50- to 80-hour training in 2017),
- the Commercial Horticulture Program (363 people attended the basic or advanced classes in 2017), and
- the Grow Your Own, Nevada! series of classes (with 972 attendees in 2017).

Since 1998, Cooperative Extension has also offered the IPM-specific Weed Warriors Invasive Weed Training, educating many other weed-control programs, including federal agencies and 30 Cooperative Weed Management Areas in Nevada, including the Truckee Meadows Weed Coordinating Group. In 2017, 59 people attended the two-day Weed Warrior training.

Additional 2017 activities included:

- 36 articles on IPM-related topics published in three northern Nevada newspapers
- 445,000 total website hits from January-November 2017
- 1,152 television public service announcements
- 75 radio public service announcements

Results

2017 Weed Warrior Invasive Weed Training attendees completed pre- and post- tests. Results include:

- 59 (100 percent) were able to identify five more noxious weeds than before the program
- 59 (100 percent) showed a 45 percent increase in knowledge

In addition, the Urban IPM Program completed a retrospective survey in 2017 of participants in the various programs that include IPM education. Of the 754 program attendees who completed the survey:

- 611 selected "identify the pest" as the first step toward solving a landscape pest problem
- 535 read the label before purchasing or using a pesticide
- 264 adjusted the timing of their pesticide use to protect pollinators and beneficial insects

4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems

Outcome #5

1. Outcome Measures

Soybean Production in Nevada

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	39

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Alfalfa hay, alfalfa seed and small grains are the principle crops produced in Nevada's Pershing County. Alfalfa hay remains by far the most important crop in terms of both acres harvested and value of production. Despite an 80 percent reduction in alfalfa seed acreage over the last nine years, it remains in second place, followed by "other hay" production. Small grains are grown as a rotational crop between the establishments of alfalfa crops. However, as Nevada is the driest state in the country, Nevada agricultural producers need to identify profitable low-water-use crops. Having faced a record-breaking drought 2012-2016, surface irrigation water supplies were greatly reduced, and groundwater levels are dropping in many locations. As a result, water

resources are carefully managed and allocated. In Pershing County, the maximum water allotment from the Pershing County Water Conservation District is 3 feet of water per acre per year.

What has been done

To increase the profitability of local farmers, meet the need of a local soybean processing market (Nevada Soy), and provide an alternative crop option that can grow with Nevada's limited water resources, Extension began the Soybean Production in Nevada Program in 2012. Extension conducted research, including partnering with a Pershing County producer in 2017 to design and manage a test plot of three different soybean varieties at three levels of maturity to determine if soybeans would grow in the Pershing County area; which variety would grow best in the area; and if soybeans could be grown profitably. A curriculum was developed, presented and evaluated. It was used as part of an all-day educational program in 2017 to teach producers the recommended practices for growing soybeans in Nevada. There were 18 farmers from Pershing, Churchill and Humboldt Counties at the program in 2017.

Results

Farmers who attended the program in 2017 were asked to rate the amount of knowledge they gained, on a scale of 1 to 5. The average rating in knowledge gained on all topics presented was 4.79. All 18 participants indicated that they would consider growing soybeans on their farming operations from the information provided during this training.

Results of the soybean test plots showed that soybeans may have potential as a crop in Nevada, and further research will be conducted again in 2018. The research showed that an earlier-maturing soybean performed better than the later-maturing varieties. After seeing the test plot results at Soybean Field Day, one farmer plans on planting 50 acres of soybeans. Extension was also contacted by another farmer for help in planting 15-20 acres of organic soybeans in 2018.

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems

Outcome #6

1. Outcome Measures

Master Gardeners

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	50264

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The results of Nevada's Washoe County 2012 Horticulture Needs Assessment identified the following issues: home food production and edible landscaping, diagnosis and management of plant pests (insects, disease, weeds), local food production and urban agriculture, sustainable landscaping practices (including native plant landscaping), and landscape water conservation. In addition, the Mojave Desert's unique conditions require special training. Both the Clark County and Washoe County Cooperative Extension offices receive thousands of phone calls and emails, as well as visits to the office by people requesting assistance, which can easily overwhelm faculty resources.

What has been done

Across Nevada, University of Nevada Cooperative Extension Master Gardeners volunteered 44,913 hours in 2017. Some Master Gardener volunteer activities are consistent throughout the state, including teaching classes, offering garden tours, staffing information booths at community events, and answering questions in person at Extension offices and through email and telephone. In addition, Master Gardeners in each county performed activities and events specific to the county. Master Gardeners also presented for the Southern Utah Green conference.

Results

In 2017: In Washoe County, 32 students completed the coursework required to become Master Gardeners, and six have already completed the volunteer time required to become certified Master Gardeners. The 32 students rated their confidence on topics from 1 (low) to 5 (high) before and after the program, reporting the following average confidence increases:

- 96 percent for native plants in the landscape
- 51 percent for potting media and container gardening
- 42 percent for water efficiency in the landscape
- 46 percent for plant problem diagnosis

In Clark County, one Master Gardener earned second place at the 2017 International Master Gardener Conference in Oregon for her work with milkweeds to promote pollinators in southern Nevada. 35 Master Gardeners were certified and asked to rate their knowledge on topics from 1 (little) to 5 (a lot of) before and after completing the program, reporting the following average knowledge increases:

- 2.8 in fertilizers
- 1.8 in edible landscapes
- 1.2 in how to teach adults
- 2.1 in plant diseases
- 2.0 in weeds
- 2.2 in botany
- 2.2 in soil amendments
- 1.4 in soils
- 1.8 in vegetables
- 1.8 in gardening smarter

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
216	Integrated Pest Management Systems

Outcome #7

1. Outcome Measures

Irrigation Efficiency and New Technologies

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	25

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Nevada agricultural producers faced a record-breaking drought 2012-2016, and demands for water for both urban expansion and environmental uses are increasing. Surface irrigation water has been greatly reduced, and groundwater levels are dropping in many places. Needs assessments identified issues related to water quantity as the highest priority need for Nevada producers. Water is a limiting factor in relation to population growth, economic stability and expansion, and quality of life. In the town of Eureka and in the Diamond Valley, the decline of groundwater is especially problematic. In 2015, the Nevada Division of Water Resources state engineer designated the Diamond Valley Basin as a Critical Management Area (an area where annual groundwater replenishment fails to meet demand), which allows the engineer to restrict water use and require producers make a groundwater conservation plan. Diamond Valley is currently the first and only Critical Management Area in Nevada.

What has been done

In 2017, University of Nevada Cooperative Extension, in partnership with the University of Idaho, held an irrigation workshop to help 25 Diamond Valley irrigators redesign irrigation infrastructure; implement irrigation scheduling; and use advanced irrigation technologies to conserve water and retain production. Extension helped five producers apply for the Nevada Department of Agriculture Drought Initiative Grant to save over 800 acre-feet of water. The funds were used to retrofit Low Elevation Spray Application (LESA) irrigation systems. LESA incorporates upgraded nozzle packages, closer spacing and lowering nozzles in canopy, coupled with soil moisture

meters and software packages. LESA systems reduce water loss by applying water more uniformly and decreasing evaporation loss, and also minimize energy costs by lowering operating pressures. Moisture meters are a critical component of the systems, allowing producers to measure water application and prevent over- or under-watering.

Results

Of the 25 participants in the Diamond Valley irrigation workshop, 13 participants completed an evaluation questionnaire. Their average rating of the usefulness of the workshop was 4 on a scale of 1 (least useful) to 5 (most useful). All 13 respondents indicated that they would implement some portion of the workshop information into their operation.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management

Outcome #8

1. Outcome Measures

Grow Your Own, Nevada!

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	972

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

A major area of program emphasis for Cooperative Extension is to ?improve food security through home and small-scale production.? Many communities (29 out of 487 census tracts) in Nevada are considered food deserts: they have limited access to fresh foods. Many Nevadans desire to grow their own foods to gain access to safe and healthy produce and to become more self-sufficient. A statewide needs assessment published by Extension in 2012 reported home and local food production as a top horticultural need and emerging trend for the state.

What has been done

Grow Your Own, Nevada! offered two eight-class sessions in 2017: one in the spring and one in the fall. Classes were held at the Washoe County Cooperative Extension office and offered via

interactive video at Cooperative Extension offices throughout the state in 13 other counties. Each class was two hours, and topics covered beneficial insects, garden cleanup, cover cropping, canning jams and jellies, hoop houses, raised beds, soil preparation, starting from seeds, tomatoes, edible landscapes, fruit trees, berry growing and pest control. Participants who attended all eight classes in a session received a USB flash drive containing gardening resources. Total attendance including all sessions in 2017 was 972.

Results

In a survey of the fall participants, 356 respondents reported an average of a 63 percent gain in knowledge.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants

Outcome #9

1. Outcome Measures

Commercial Landscape Horticulture

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	1099

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Extension's 2012 statewide Horticulture Situational Analysis and the 2011 Comprehensive Regional Water Management Plan by the Northern Nevada Water Planning Commission cite the need for more professional education in the green industry. Surveys of those working in the green industry showed demand for short seminars, nursery worker training and continuing education opportunities for professional certification, all during the off-season or at noon. Topics deemed important included diagnosing plant problems, plant insects and diseases, plant identification, integrated pest management, weed management, soil fertility and plant nutrition, native plant landscaping, pruning, and pesticide certification/safety training.

In southern Nevada, the University of Nevada, Las Vegas received requests to offer a class on

fundamentals of horticulture. In addition, the rapid growth of the Hispanic population created a need for bilingual training related to landscape maintenance.

What has been done

Northern Nevada's Green Industry Training Program had its seventh basic training series of eight classes for industry workers in 2017, with a total attendance of 40. Topics included plant diseases, weeds, soils, insects, landscapes, turfgrass, integrated pest management, pesticide safety and plant identification. Extension also taught eight advanced classes in 2017, with a total attendance of 323, for continuing education credits for certification and licensing, including four in English and Spanish. Some topics included pesticide safety, integrated pest management, hands-on pruning and planting techniques, and managing trees with limited water.

Southern Nevada's Basic Principles of Landscape Management taught 410 commercial clients in 2017, including 71 Spanish-speakers. Topics included pruning trees, integrated pest management and general landscaping. Extension also trained 25 arborists in New Mexico and worked on a Best Practices for Arborists Program.

Results

In northern Nevada, 40 people attended the Green Industry Training basic training series, with:

- Participants reporting an average increase in knowledge of 51.3 percent.
- 19 of 21 attendees who went on to take the Green Industry Training certification exam receiving a passing score of at least 70 percent.

Of the 25 attendees of the New Mexico arborist training, in a post-workshop survey:

- All participants believed the information presented was useful.
- All participants reported a gain in knowledge.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
206	Basic Plant Biology
211	Insects, Mites, and Other Arthropods Affecting Plants
216	Integrated Pest Management Systems

Outcome #10

1. Outcome Measures

Alternative Crop Production in Nevada: Alfalfa, Camelina, Tall Fescue and Halophytic Plant Trials

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	465

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Nevada agricultural producers often contend with drought, and there are increasing demands for water for both urban expansion and environmental uses. Surface irrigation water supplies have been greatly reduced, and groundwater levels are dropping in many locations. Needs assessments have identified issues related to water quantity as the highest priority need for Nevada agricultural producers. Therefore, there is a need to identify, evaluate and commercialize crops that use less water than traditionally grown forage crops, such as alfalfa, while returning equal or higher economic returns than these forage crops, currently grown on over 90 percent of Nevada farmlands. The establishment of various applied research and demonstration trials is critical to building the knowledge base regarding potential alternative crop production systems in Nevada.

What has been done

In 2017, in partnership with the Nevada Agricultural Experiment Station, Extension tested alfalfa and alternative crops that use less water than alfalfa and other forages. 2017 was the second year evaluating an alfalfa trial, following a 17-variety trial in 2016. Specific 2017 projects included trials assessing:

- camelina varieties and the influence of planting dates, fertilizer treatments and irrigation levels on yields;
- the effects of fertilizer type and rates on tall fescue yields and quality;
- the effects of deficit irrigation levels and fertilizer applications on five forage sorghum varieties;
- yield and quality of several tall fescue and forage legume mixtures;
- two amaranth and one quinoa variety grown in various levels of soil salts; and
- 19 varieties of alfalfa for production.

All trials had four replications. The 2016 and 2017 alfalfa trials were harvested four times. Extension continued its teff research, with those results reported in the Alternative Crop Production: Teff Impact Statement.

Extension also partnered with a Churchill County producer to harvest and clean plots in a 20-acre industrial hemp field using a combine. The results were compared to results from hand-harvested plots to determine economic and production values associated with both techniques.

Results

The data gathered from the research was used to publish three abstracts and a Cooperative Extension special publication. Initial results of some of the research were presented in oral and poster form at the Western Society of Crop Sciences meeting in Parma, Idaho and at the American Society of Agronomy meetings in Tampa, Florida. In addition, the initial results were

presented to over 300 participants at the joint 2017 College of Agriculture, Biotechnology and Natural Resources/Cooperative Extension Field Day.

Once the data has been fully analyzed and published, educational programming will begin in 2018 on the use of these alternative crops.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
205	Plant Management Systems

Outcome #11

1. Outcome Measures

Alternative Crop Production in Nevada: Teff

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	465

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Nevada agricultural producers often contend with drought, and there are increasing demands for water for both urban expansion and environmental uses. Surface irrigation water supplies have been greatly reduced, and groundwater levels are dropping in many locations. Needs assessments have identified issues related to water quantity as the highest priority need for Nevada agricultural producers. Therefore, there is a need to identify, evaluate and commercialize crops that use less water than traditionally grown forage crops, such as alfalfa, while returning equal or higher economic returns than these forage crops, currently grown on over 90 percent of Nevada farmlands. The establishment of various applied research and demonstration trials is critical to building the knowledge base regarding potential alternative crop production systems in Nevada.

What has been done

In 2002, 36 Nevada farmers attended a presentation on growing teff. Davison got one to plant 7

acres the next year. In 2003, 100 acres were planted in Nevada. By 2016, there were 2,000 acres planted, valued at \$1.2 million.

Since 2009, Extension has helped two large producers make and expand a vertically integrated teff production, processing and sales firm. A grant was awarded in 2015 to evaluate 367 teff varieties for drought tolerance and resistance to lodging (when a plant can't support its own weight). The trials were first completed in a greenhouse to identify the best varieties for field-testing. In 2017, in partnership with researchers from Nevada Agricultural Experiment, Extension planted in a field setting 10 teff varieties that had demonstrated the needed tolerance and resistance. These plots were harvested to determine grain yields, biomass and quality. The past few years, Extension has also worked to identify and get approval for effective pesticides to use on teff.

Results

During the 2014, 2015 and 2016 growing seasons, many acres of teff in Nevada suffered devastating attacks from Army cutworms, which reduced grain yields as much as 75 percent. In 2016, Extension personnel helped the Nevada Department of Agriculture submit an emergency pesticide exemption request to the U.S. Environmental Protection Agency for permission to use a teff insecticide to combat the outbreak. Extension completed all application sections related to the need and proposed use patterns, application rates, and cultural practices related to teff grain production. Extension then responded to additional technical questions posed by the EPA following the submission. A one-year exemption was granted in 2016. During 2017, working closely with the Western Region IR-4 program personnel, a petition was submitted to the EPA requesting a supplemental label for the insecticide Prevathon, which was granted. This label allows Prevathon to be used on teff and quinoa fields until the end of 2019. Approximately 75 percent of Nevada teff acreage was treated with Prevathon in 2017. Also in 2017, population studies on adult and larval armyworms in Churchill and Washoe Counties were completed in an attempt to develop an integrated pest management program for the primary insect pest of teff.

The data from the initial teff field trials is currently being analyzed to identify the varieties best exhibiting drought tolerance and resistance to improper growth in a field setting.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
205	Plant Management Systems

Outcome #12

1. Outcome Measures

Southern Nevada Research Center and Orchard

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	700

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Most of the information about backyard and small-scale fruit growing comes from commercial orchard production in nondesert environments. High-quality backyard and small-scale fruit production must be planned and managed differently than traditional large commercial production. Available information about fruit growing for small-scale production in desert environments is very limited.

Urban dwellers have less space for fruit trees, less time to take care of them, and less time to process or preserve large amounts of food. Recent trends in food purchasing by consumers embrace organic or natural production techniques as well as local sources of fresh foods. There is more concern now with "carbon footprints" and global warming due to the long distances that food is transported from "farm to plate." The need for locally produced food products in southern Nevada is shown by the popularity of programs taught at the orchard and with other programs such as "Gardening in Small Spaces."

What has been done

University of Nevada Cooperative Extension and the University of Nevada, Las Vegas established the Southern Nevada Research Center and Demonstration Orchard over 20 years ago to study edible plants that will grow well in desert environments. The orchard team has conducted trials; trained Extension faculty, staff and volunteers; and taught courses for school-age students, and for backyard and commercial producers. In 2017, the orchard had many research projects, including trials with 158 fruit tree varieties, five sweet potato varieties, tomatoes, goji berries and 22 vegetables. Two of the larger projects include the Hops Project, which is in its sixth year and testing eight varieties; and the Table and Wine Grape Project, which is a partnership with University of Nevada, Reno and University of California, Davis, testing 37 grape varieties.

At least 700 people visited the center to get produce or learn. Eight hands-on classes were offered, reaching 160 students.

Results

Overall impact was measured based on the 700 people who visited to purchase produce or learn. Results of the classes are included in the Commercial Horticulture, Master Gardener, Urban Integrated Pest Management, Nevada Naturalist, and Food Preservation and Security Program

impact statements. Other 2017 impacts include:

- Hops varieties were given to breweries for evaluation. Extension published a fact sheet and gave a national presentation
- 5,533+ pounds of produce grown at the Center were sold to the public
- 450+ pounds were donated to charitable groups
- 400+ yards of organic recycled mulch were given to the public for free
- 100+ yards of compost were given to the public for free
- 5 local restaurants use and promote locally grown fruits and vegetables, including those from the Center
- 350+ fruit trees and vines were sold

4. Associated Knowledge Areas

KA Code	Knowledge Area
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
504	Home and Commercial Food Service

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

From the research aspect, flooding of the Reno field lab, due to record setting snowpack, destroyed three experiments completely. The flooding caused an increase in the weed population density in experimental sites due to drifting of weed seeds in the water. Weed infestation in camelina and teff fields were a major problem during the growing season even after herbicide application. Fall armyworm decimated the grain component of all the experimental plots. Due to the unexpected departure of hoop house facilities manager and hire laborer, plant breeding experiments were placed on hold until replacements arrive (spring 2018). Students working on isolating insect genes quite unexpectedly, slowing neuropeptide research. Experiment Station's insect colony (tobacco hornworms) experienced several population crashes.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Total 2017 teff grain production in Nevada's Churchill, Lyon, Mineral and Pershing Counties was 2.6 million pounds, valued at approximately \$1.2 million. About 750 acres of teff were treated with Prevathon (an insecticide approved as part of the IR-4 Project), with no resultant damage to the crop from Army cutworms despite economically damaging cutworm populations. If the insecticide had not been available and applied, damage causing a loss of nearly one million pound would have likely occurred.

In northern Nevada, three of the five major Washoe County nurseries and at least two local major landscaping companies now send their new employees to Northern Nevada's Green Industry Training each year, as do the facilities departments of Truck Meadows Community College and the University of Nevada, Reno.

Since 2011, 5,312 people have been trained in local food production methods, resulting in numerous home gardeners deciding to sell their produce to local farmers markets, two people deciding to start a local food business, and 26 people donating excess produce to local food pantries, not to mention the thousands of homeowners who produced food for their own households' consumption, many sharing with neighbors and friends.

Since 2014, Nevada Cooperative Extension has held 103 workshops, had 10,171 contacts and awarded 184 Continuing Education Credits related to participants of the Rural Integrated Pest Management program.

According to eXtension in 2009, Master Gardeners average helping five community members for each hour of volunteer time. Using this formula, Master Gardeners in just one county in Nevada have assisted 352,550 community members since 2010. Also since 2010, Clark County (Las Vegas) Master Gardeners have had 289,609 face-to-face interactions with community members and have put in 277,803 volunteer hours. The 44,913 volunteer hours are valued at \$1,084,199.82. The value is based on an estimated dollar value for volunteer time in the U.S. of \$24.14 per hour for 2017 (Independent Sector).

Clark County's (Las Vegas) demonstration orchard has produced 5,533+ pounds of produce grown, 450+ pounds were donated to charitable groups, 400+ yards of organic recycled mulch were given to the public for free, 100+ yards of compost were given to the public for free, and 5 local restaurants use and promote the orchard grown fruits and vegetables.

Key Items of Evaluation

Without the intervention of Cooperative Extension's state specialist to use insecticide approved as part of the IR-4 Project, nearly half of the Nevada's teff production would have been lost, valued at approximately \$600,000 in profits.

Clark County's (Las Vegas) demonstration orchard has produced 5,533+ pounds of produce grown, 450+ pounds were donated to charitable groups, 400+ yards of organic recycled mulch were given to the public for free, 100+ yards of compost were given to the public for free, and 5 local restaurants use and promote the orchard grown fruits and vegetables.

V(A). Planned Program (Summary)**Program # 2****1. Name of the Planned Program**

Climate Change, Natural Resource Management, and Environmental Science

 Reporting on this Program**V(B). Program Knowledge Area(s)****1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	0%		16%	
111	Conservation and Efficient Use of Water	4%		0%	
112	Watershed Protection and Management	5%		12%	
121	Management of Range Resources	37%		44%	
122	Management and Control of Forest and Range Fires	16%		0%	
123	Management and Sustainability of Forest Resources	0%		2%	
131	Alternative Uses of Land	2%		0%	
132	Weather and Climate	5%		0%	
133	Pollution Prevention and Mitigation	4%		9%	
134	Outdoor Recreation	2%		0%	
135	Aquatic and Terrestrial Wildlife	1%		5%	
136	Conservation of Biological Diversity	2%		2%	
141	Air Resource Protection and Management	0%		5%	
211	Insects, Mites, and Other Arthropods Affecting Plants	0%		5%	
216	Integrated Pest Management Systems	10%		0%	
315	Animal Welfare/Well-Being and Protection	5%		0%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	3%		0%	
901	Program and Project Design, and Statistics	2%		0%	
903	Communication, Education, and Information Delivery	2%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)**1. Actual amount of FTE/SYs expended this Program**

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	2.5	0.0	3.0	0.0
Actual Paid	4.7	0.0	2.7	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
313311	0	248469	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
313311	0	407200	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Agricultural Experiment Station:

1. Molecular analysis continues on an enzymes (cytochrome P450) used for detoxification of turpentine by bark beetles that are killing pine trees across North America.
2. Data collection and analysis of fall/winter grazing of cattle on invasive weeds at the landscape scale continued across Nevada and Oregon.
3. The application and utility of ecological site descriptions coupled with state-and-transition models were demonstrated in several areas in Northern Nevada and Southeastern Oregon. Additionally, pre- and post-fire vegetation data has been collected to further strengthen the value of management decisions based upon our state-and-transition models.
4. Work continues on the first, fully instrumented watershed scale research effort in Nevada. Plant community responses to pinyon and juniper removal, rainfall inception, groundwater hydrology, effects of slashing woodlands on erosion, and green-up cycles of meadows associated with soil moisture and humidity.
5. Investigation into the neurobiological effects of the most widely used insecticides (neonicotinoids) on bee navigation has begun.
6. Work wrapped up on determining the importance of agricultural systems in semi-arid areas in the global carbon cycle. The team has identify how agricultural activities (irrigation and tilling) contributed toward reducing atmospheric CO2 and soil nitrogen concentrations.
7. The first year of research has begun identifying mechanisms that control arid soils methane biogeochemistry within the Great Basin.
8. Have improved the national drought index to include snow water storage and the unique aspects of sublimation and melting that occur across the Great Basin.
9. Collection of 26 aerosols were analyzed for trace element chemistry providing a means of tracking sources of air pollution coming into the State of Nevada.
10. Studying the effects of wild horses and livestock management on sage grouse habitat, cameras and

field observations were used to record horse and cattle grazing season, duration, utilization and behaviors at riparian meadow in northern Nevada.

11. To better understand the ramification of a two-year moratorium on livestock grazing post a wildfire event, the third year of data collection comparing BLM's Riparian Proper Functioning Condition monitoring guide to the newer more quantitative method Multiple Indicator Monitoring.

12. Wrapping up the study on Nevada's Bighorn Sheep, samples are still being collected from Nevada Department of Wildlife, with new funding sources to analyze samples. A detailed view (database) of the genetic structure of translocated sheep was built, helping identify areas of genetic endemism and connectivity.

Cooperative Extension:

- Eagles and Agriculture, an annual event to educate the public on the value of sustainable agriculture and the environment
- Facilitate local area working groups to plan and implement conservation efforts to improve sage grouse habitat
- Completed update of NV Rangeland Monitoring Handbook and Rancher's Monitoring Guide
- Initiated research with producers to study grazing strategy indices for range quality assurance
- Collaborative resource stewardship where team effort is taught and exercised in developed adaptive rangeland management strategies
- Range Management School integrated science, collaboration and common sense to facilitated mutual understanding between diverse stakeholders
- Rangeland Vegetation Management taught land managers/owners about applications of appropriate management to avoid crossing ecological thresholds
- Weed Management Program focused on teaching weed identification and management, along with revegetation to compete with weeds
- Flood Awareness workshop - media campaign
- Carson river watershed and floodplain education program - media campaign
- Climate change education workshop - developed post-workshop survey
- Enhancing climate resiliency for agricultural production on American Indian lands in the Great Basin
- The Desert Bioscape program taught homeowners and commercial clientele to conserve water and energy, reduce pesticide and chemical fertilizer use, and promote wildlife habitat in a sustainable manner
- Conducted overall program evaluations of the BLM's Joint Fire Science exchange program
- Teaching, research and service efforts were continued, addressing the issue of reducing the wildfire threat to Nevada communities
- Development, implemented and evaluated current supply models that focused on Nevada's snow-fed river systems

2. Brief description of the target audience

Experiment Station's target audience included:

Agricultural producers and ranchers, mining industry representatives, sport hunters, environmentalists, green industry professionals, small acreage owners, general public, federal and state natural resource management agencies, and other resource managers.

Cooperative Extensions target audience included:

County planners and commissioners, the town boards, public officials, public water supply entities, federal agencies, domestic and foreign agency resource management staff and administrators, policy developers, farmers, ranchers, property owners in the floodplain and high-fire-hazard areas, schoolchildren, tourists and the general public

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	17127	107	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2017
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	3	53	56

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Graduate Students or Post-Doctorates Trained

Year	Actual
2017	70

Output #2

Output Measure

- Number of Undergraduate Students Involved in Research

Year	Actual
2017	85

Output #3

Output Measure

- Workshops, Demonstrations, and Presentations

Year	Actual
2017	163

Output #4

Output Measure

- Abstracts, Books, Book Chapter(s), Proceedings, Research Reports, and Technical Publications

Year	Actual
2017	22

Output #5

Output Measure

- Brochures, Bulletins, Fact Sheets, Newsletter, and Surveys

Year	Actual
2017	0

Output #6

Output Measure

- Manuals and Other Printed Instructional Materials Produced

Year	Actual
2017	0

Output #7

Output Measure

- Digital Media and Web Sites Created or Updated

Year	Actual
2017	16

Output #8

Output Measure

- Leveraged research funds generated

Year	Actual
2017	1949183

Output #9

Output Measure

- Newly developed databases, models and protocols

Year	Actual
2017	11

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of individuals who gain knowledge about improved human, plant, and animal management systems that relate to climate change and/or natural resource use.
2	Number of clientele who implement improved human, plant, and animal management systems as related to climate change and/or natural resource use.
3	In conjunction with companion agencies and organizations, advance research in rangeland and forest management and ecology to promote advances in best management practices
4	Reduce ecological losses due to wildfires and invasive weeds that destabilize the health of Nevada's rangelands
5	Meet federal and state needs for research data related to Nevada ecosystems as the demand arises.
6	Advance research knowledge, both basic and applied, in the areas of rangeland and forest management to existing and emerging industry and consumer demand regarding genetics, biology, seed production, nutrition, and related topics.
7	Meet local groups, community, USDA, USDI, and other stakeholder demands for scientific knowledge to inform existing and emerging issues/practices in wildlife including wildlife health, human wildlife use/conflicts, and human to human conflicts related to wildlife and use.
8	Range Management School
9	Nevada Naturalist
10	Living With Fire
11	Nevada Flood Awareness Week
12	Climate Change Education Workshop and Partnership
13	Eagles & Agriculture

Outcome #1

1. Outcome Measures

Number of individuals who gain knowledge about improved human, plant, and animal management systems that relate to climate change and/or natural resource use.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	1000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Inter-governmental Panel on Climate Change reports that the number of areas affected by drought, warming temperatures and earlier snowmelt will likely increase, adversely affecting water availability to meet the demands for agricultural and energy production, in addition to municipal, industrial, recreational and environmental water use.

Management of large-scale river systems in the Western United States has taken on critical importance in the last decades due to increasing and diverse demands for water use, urban population growth, and variable water supplies. 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.

What has been done

Since 2014, Extension, with UNR, Desert Research Institute and the U.S. Geologic Survey, worked with the Water For the Seasons Stakeholder Affiliate Group (12 local water managers who serve as key informants and represent diverse water-use communities that rely on the river system) to study the Truckee-Carson River System's climate resiliency and adaptation for land dependent on snowmelt for water in the Western U.S. The team met semi-annually with the stakeholders to assess local water supply challenges, discuss climate implications for water management and get input on adaptation strategies. The team then used hypothetical scenarios to test stakeholder's current climate adaptation strategies, created models to show how hypothetical climate conditions affect stream flows, and simulated strategies developed by the collaboration between the researchers and stakeholders. Results were presented to stakeholders at biannual workshops. Each year, models and simulations were refined to address the needs of the river stakeholders.

In 2017, there were 12 focus group discussions with stakeholders and two biannual workshops. Extension published two journal articles, two special publications and one annual impact report; and gave seven presentations at national and international professional meetings.

Results

Student, post-doctoral fellows, faculty and local water managers increased their awareness of adaptation options to address water scarcity issues. Workshops provided opportunities to exchange information, establish relationships, build trust in the research process and findings, and support social learning around climate resiliency and adaptation. Workshop evaluations indicate that Stakeholder Affiliate Group members who are strengthening working relationships with project scientists, improving coordination with other stakeholders, and following the project are more likely to continue working with other stakeholders to increase climate resiliency. Members also reported that they now better understand current climate resiliency of the river system, and the impacts of prolonged drought and warming temperatures. As a result, they are improving their respective adaptation planning and water management operations to enhance resilience.

Analyses in 2017 provide evidence supporting the potential benefits of relaxing institutional water management regimes to adapt to a changing climate. Preliminary econometric analyses examining the efficiency of prior appropriation-based water management institutions governing the river system show that more productive or profitable agricultural lands are associated with more senior water rights. Results also show that, when comparing water rights that remain on initial places of use with relocated water rights, relocating water rights improves the efficiency of water allocation where the manner of use (agriculture) remains the same. Thus, analyses show that relocation of place of use can contribute to water allocation efficiency.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
132	Weather and Climate

Outcome #2

1. Outcome Measures

Number of clientele who implement improved human, plant, and animal management systems as related to climate change and/or natural resource use.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	1100

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Many livestock producers, domestic and foreign agency resource management staff and administrators, policy developers, land managers, and other individuals and organizations interested in rangeland resources have insufficient knowledge about the concepts of plant growth, plant response to grazing, ecological site potential, the processes of vegetation change, and the role and effect of fire and other disturbances on Great Basin rangelands. 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 rangeland resource decisions occur at the field office or higher administrative levels; therefore, significant portions of educational components need to be directed toward management efforts that occur at that level.

What has been done

The Great Basin Fire Exchange Project Science Program delivers research-based fire science to land managers. As part of the project in 2017, Cooperative Extension collaborated with several universities and federal agencies to collect and exchange knowledge about fire, fuels and vegetation management through the Great Basin Consortium regional conference, which included a breakout session on the Secretary of the Interior's 2016 Integrated Rangeland Fire Management Strategy Actionable Science Plan. Extension also helped host the Restoration of Sagebrush Ecosystems training and the Great Basin Science Delivery webinar series.

Other 2017 activities included documenting long-term vegetation and habitat change with photos. Extension also revised the Nevada Rangeland Monitoring Handbook and worked with Imlay, Nevada, and Extension educators in Malheur County, Oregon, to expand the effort of fall and winter grazing of cheatgrass to reduce fuels and the risk of catastrophic fire.

These efforts were done in 19 meetings, workshops, field days or field tours, and had 13 educational presentations. Nevada Range Management School and the Nevada Youth Range Camp are also range management programs. Please see separate impact statements for more information.

Results

The Great Basin Fire Exchange Project Science Program's regional conference had over 900 attendees. The webinar series had 248 original viewers and 584 subsequent views of the archived webinars. In a post-project survey completed by 115 respondents:

- 104 said the information would change their approach to fire fuels and vegetation management
- 113 said they can apply what they learned

The collective evidence strongly suggests this project is accomplishing its goal of putting important peer-reviewed science in the hands of land managers. In addition, 747 attendees of the Great Basin Consortium found the Actionable Science Plan topic breakout session moderately to

extremely useful and the number of recipients signed up on the project Listserv increased 10 percent to 668.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
122	Management and Control of Forest and Range Fires

Outcome #3

1. Outcome Measures

In conjunction with companion agencies and organizations, advance research in rangeland and forest management and ecology to promote advances in best management practices

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	620

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

As the most biologically diverse and the most frequently overused component of Nevada rangelands, riparian areas have attracted a great deal of management attention. Different groups, such as ranchers, recreationalists and federal agencies, have varying uses for the areas, which leads to a considerable need for educating and focusing people on proper management to allow the continued diversity of uses while preserving the areas. Generally, if riparian areas function properly, all land users benefit, and this provides a great opportunity for teaching about riparian restoration, including enhancement of water quality, habitat for listed or important species, forage for livestock, and water for agriculture. Repeatedly, riparian management is identified as a top need in natural resource-oriented needs assessments, especially in northern Nevada.

What has been done

The Creeks and Communities Team taught classes and workshops and submitted proposals; wrote articles and publications; worked with landowners, public land users, and public interest groups and agencies.

2017 activities include:

- Taught three two-day Riparian Proper Functioning Condition Assessment for Integrated Riparian

Management courses, reaching 77 students

- Taught a three-day riparian grazing management class, reaching 30 students
- Worked with Environmental Protection Agency scientists from the Las Vegas Office of Research and Development on the use of riparian proper functioning condition assessments
- Continued work on pond and plug meadow restoration projects
- Proposed the use of Riparian Multiple Indicator Monitoring to study the response of riparian areas after wildfire
- Worked with the Shoesole Holistic Management Team to incorporate riparian proper functioning condition concepts into their land management work. Efforts extended to Stewardship Alliance of Northeast Elko.

Results

As a result of Proper Functioning Condition classes in Nevada, the EPA has embraced Proper Functioning Condition as a fundamentally useful tool for improving water quality and has taught Proper Functioning Condition to tribes in California and Arizona and hosted regional Proper Functioning Condition class in Las Vegas.

The work of the Shoesole Holistic Management Team and the work of Carol Evans, BLM Elko fish biologist and active Team member, have been highlighted by several national awards. Proper Functioning Condition concepts are also being integrated into numerous EPA publications and outside publications with lead authorship by EPA personnel with whom Extension collaborates.

?Because of a Creeks and Communities presentation at the National Cowboy Poetry Gathering in Elko, we had a rancher who wanted to change his approach and have both a healthy grazing practice and a healthy riparian area.? ? John McCann, forest hydrologist for the Humboldt-Toiyabe National Forest.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
121	Management of Range Resources
122	Management and Control of Forest and Range Fires
903	Communication, Education, and Information Delivery

Outcome #4

1. Outcome Measures

Reduce ecological losses due to wildfires and invasive weeds that destabilize the health of Nevada's rangelands

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	6982

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The wildfire threat to Nevada communities is significant and increasing, with 768 wildfires burning 1,329,289 acres in 2017. Key to reducing this threat is an aware and proactive public who implement the necessary pre-fire activities, those actions that improve house survivability during wildfire. In Nevada, there is a diverse group of entities who have a role in promoting wildfire awareness and assisting in the adoption of pre-fire activities, including homeowners, firefighting organizations, elected officials, schools, Cooperative Extension, landscape management professionals, community leaders and others. Cooperative Extension’s Living With Fire Program established Nevada Wildfire Awareness Week/Month as a means to expand the education program and launch a coordinated, statewide wildfire awareness campaign each year. The efforts are continued throughout the year.

What has been done

In 2017:

- Eight other states joined Nevada in securing a multi-state proclamation in observance of Wildfire Awareness Month. Living With Fire helped initiate this effort nine years ago
- 189 events or activities were held statewide by Cooperative Extension and partnering organizations
- 9,974 people attended events
- 866,120 indirect contacts were made via newspaper articles, school flyers, social media efforts and other methods of communications
- 23 proclamations were issued, including 17 from Nevada counties, two from municipalities and one from the Nevada League of Cities
- 129 households participated in Junk the Junipers events
- 258 truckloads of ornamental junipers and other flammable material were collected at Junk the Junipers events.
- 149 runners participated in the Nevada Wildfire Fire Awareness Multihour Trail Run, which raised \$4,400 for the Wildland Firefighter Foundation
- Reported in-kind contributions from federal and nonfederal sources totaled \$29,909

Results

Nevada Wildfire Awareness Month with its many events and activities has served as a template for other states to emulate. For example, the South Dakota Wildland Fire Division started a Junk the Juniper event modeled after Nevada’s Wildfire Awareness Month messages and graphics have been shared at no cost with other states over the years for adaptation into their own wildfire

awareness campaigns.

?I have been on the Nevada Wildfire Awareness Month planning committee for several years now, and every year it just seems to keep growing with more partners and more events statewide. I?m not aware of any other state having anything quite like it.? ? Rodd Rummel, Carson City Fire Department

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
122	Management and Control of Forest and Range Fires

Outcome #5

1. Outcome Measures

Meet federal and state needs for research data related to Nevada ecosystems as the demand arises.

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

Advance research knowledge, both basic and applied, in the areas of rangeland and forest management to existing and emerging industry and consumer demand regarding genetics, biology, seed production, nutrition, and related topics.

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Meet local groups, community, USDA, USDI, and other stakeholder demands for scientific knowledge to inform existing and emerging issues/practices in wildlife including wildlife health, human wildlife use/conflicts, and human to human conflicts related to wildlife and use.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	260

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Sage grouse ecosystems are threatened by multiple changing environmental conditions, including Pinyon-Juniper encroachments, wildfire, noxious weed invasion, unmanaged wild horse populations, urbanization, predators and recreational activities. Improvement of sagebrush ecosystem conditions across the Great Basin is critically important to all native species, and all commercial and recreational users. The issue goes beyond avoiding listing of the sage grouse as a threatened or endangered species. The true issue is maintaining multiple uses on public lands and enhancing the health of our sagebrush ecosystems.

What has been done

In 2001, Nevada Gov. Kenny Guinn set up seven local area working groups, or groups of agency representatives, private landowners and other interested parties, to plan and implement local conservation efforts to improve sagebrush ecosystems and increase sage grouse populations. Since then, Cooperative Extension has helped the groups plan and implement such efforts.

In 2017, Extension held two meetings with the Bi-State Local Area Working Group (representing a sage grouse habitat spanning five Nevada counties and three California counties), five with the Lincoln County Local Area Working Group, and five with the North Central Local Area Working Group. Extension also was part of several Executive Oversight Committee meetings with state and federal agency heads, presented the Bi-State model at the Rustici Rangeland Science Symposium at UC Davis, and gave a field tour of sage grouse habitat on the new Walker River State Recreation Area to 30 Bi-State Local Area Working Group members.

Results

Due to Extension's efforts, Intermountain West Joint Ventures offered to fund 75 percent of a position to help create better communication and stronger relationships between tribal entities and agency land managers for the Bi-State Local Area Working Group. All working groups continue to make advances in making their voices heard to have greater influence in bottom-up or grassroots conservation decision-making.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
121	Management of Range Resources
122	Management and Control of Forest and Range Fires
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity

Outcome #8

1. Outcome Measures

Range Management School

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	144

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In Nevada, rangelands administered largely by the Bureau of Land Management and the U.S. Forest Service cover most of the state. Privately owned livestock graze much of this area, and often there is contention about what constitutes good or acceptable grazing management. University of Nevada Cooperative Extension established the Nevada Range Management School in 2005 to improve grazing management on both public and private rangelands, and to reduce conflict on the publicly administered rangelands. Many foreign countries with agriculturally based economies also struggle with application of proper range management strategies.

What has been done

For 12 years, Extension has led an interdisciplinary and interagency effort to teach the Range Management School curriculum, which emphasizes sustainability and is designed to put ranchers and agency range conservationists on the same page, ensuring not only better forage available for livestock, but healthy, productive rangelands for wildlife, recreation and other uses.

In 2017, the program team worked on updating the curriculum and building on past experience and ongoing research. In addition, the team taught foundational Range Management School principles to 16 agricultural and natural resource specialists from 11 foreign countries for three days at an Elko County, Nevada, ranch as part of U.S. Forest Service International Programs 14-day International Rangeland Seminar.

Results

According to feedback collected by the U.S. Forest Service, the 16 participants in the International Rangeland Seminar thought the Range Management Education Portion was the best part of the seminar.

?The participants rated the technical content, presenters, and overall effectiveness of the seminar

highly and we are grateful for your contribution. The evaluation data shows that participants appreciated and derived practical benefit from your presentations at Range School, including discussions of plant physiology, monitoring, and GRI. ? U.S. Forest Service International Programs leader, in a letter.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
136	Conservation of Biological Diversity

Outcome #9

1. Outcome Measures

Nevada Naturalist

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	1668

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

With explosive growth and development, communities in southern Nevada need informed leadership to educate and take action to increase environmental literacy and protection.

What has been done

In 2017, Extension offered two sessions with curriculum created by Extension and experts in each field of study and with full advisement and review of program partners. Session One was in the spring, with 10 students completing the program and becoming certified Nevada Naturalists. Basic environmental education topics were covered, and at least 60 hours of basic environmental education were required for certification. The session had 16 classes and eight labs.

Session Two was in the fall, with 10 students completing the program. This session, which was not required for certification, covered advanced environmental topics. It had 14 classes and seven labs.

All students had to complete a project on an environmental topic of their choice. Nevada Naturalists (students and/or graduates), under the direction of program faculty and staff, also

helped put on activities and events during the year and volunteered for 2,610 hours.

Results

Since 2008, 242 individuals have been certified through the program, and Nevada Naturalists have volunteered over 23,705 hours on environmental projects in southern Nevada. The program has a 90 percent completion rate, and after completing the program, 87 percent of students stated that they have a greater understanding and respect for our natural resources. 67 percent of those who completed Session One took the advanced session. About 86 Nevada Naturalists currently either volunteer or work on environmental issues in southern Nevada.

Some participant responses to open-ended questions include:

- "I plan to use these topics to introduce youth to nature and historical resources."
- "I plan on volunteering and using the information to teach at the school where I currently work."
- "I am open to helping with future Nevada Naturalist classes."
- "I will definitely use the information at work while talking to and engaging with children."

The 2,610 volunteer hours are valued at \$63,005.40. The value is based on an estimated value for volunteer time in the U.S. of \$24.14 per hour for 2016 (Independent Sector)

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
121	Management of Range Resources
122	Management and Control of Forest and Range Fires
123	Management and Sustainability of Forest Resources
131	Alternative Uses of Land

Outcome #10

1. Outcome Measures

Living With Fire

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
-------------	---------------

2017

4219

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

One of Nevada's most pressing natural resource issues is the threat of wildfire to human life and property. During the 1990s, more acres burned in Nevada than in the previous 40 years combined. Much of Nevada is considered a high-wildfire-hazard environment, possessing all the ingredients necessary to support intense, uncontrollable wildfires. And within this environment, are homes, subdivisions and entire communities. Unfortunately, many homeowners are not prepared for their homes to survive wildfire. Research indicates that pre-fire activities performed by the homeowner, such as creating defensible space, removing debris from rain gutters, and screening vents, significantly improve home survivability. Prior to the Living With Fire Program, there was no organized effort to teach Nevadans how to reduce the wildfire threat. Consequently, it was unlikely that they would implement the practices necessary to reduce this threat to their families, properties and communities.

What has been done

Program activities in 2017 included:

- Distributed 18,426 copies of 18 different publications
- There were 19,427 online visits to view 43 different publications and educational tools, including nine to Spanish-language publications
- Granted permission to 13 entities from 10 states to use program materials
- Presented exhibits at 10 events
- Presented The Ember House and Juniper Toss youth activities at 24 events, resulting in 1,653 direct contacts
- Conducted three radio interviews and nine television interviews, plus there were three additional television broadcasts mentioning the program
- Delivered 16 wildfire-threat-reduction presentations to 475 individuals
- Gained new followers on Facebook, now totaling 878 followers located in 10 Nevada counties, eight states and 25 countries
- Collaborated with 220 entities (27 percent increase over 2016)

The Nevada Network of Fire Adapted Communities Membership and Advisory Board met five times and increased membership by 24 percent, for a total of 207, including 172 community members and 35 partner members.

In addition, 12 issues of The Network Pulse electronic newsletter were produced and distributed to 661 active contacts, a 9 percent increase over 2016. The Network also provided assistance to residents in ArrowCreek Homeowners Association, Lakeview, Mound House, Palomino Valley, River Mount Park, Skyland and West Washoe. The Network annual conference had 105 participants from 10 Nevada counties. Of the 58 participants who submitted a post-conference evaluation, 51 indicated that they were going to take some form of action as result of attending the event.

Results

Living With Fire materials have been used in 25 states and 25 countries.

?You should have seen all of the calls I was getting from the incident management teams wanting Living With Fire's ?Be Ember Aware!? handouts. Definitely the most popular handout up here. ?

Jordan Koppen, with the Montana Department of Natural Resources and Conservation, who was assisting incident teams and communities threatened by wildfires throughout the state in summer 2017. Nevada helped by rushing 7,900 copies of the publication to Montana.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
122	Management and Control of Forest and Range Fires
903	Communication, Education, and Information Delivery

Outcome #11

1. Outcome Measures

Nevada Flood Awareness Week

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	120

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Northern Nevada has experienced major destructive floods approximately every 10 years for the past 160 years. The Carson River Watershed Regional Floodplain Management Plan recommends flood outreach education for the general public, including an annual Flood Awareness Week. The former state floodplain manager in the Nevada Division of Water Resources suggested that Cooperative Extension create such a program not just for the Carson Watershed, but also for all northern Nevada communities. The Nevada Division of Emergency Management also backed and funded the efforts to motivate the public to prepare for the inevitable disruptions of major river and flash flood events throughout the state.

What has been done

The team partnered with communities to put on seven Flood Awareness Week events in 2017, including the Douglas County Flood Open House. There were displays and demonstrations, including the Johnson Lane Master Drainage Plan, which Extension and Douglas County created to make community-level recommendations for preventing and fixing flood problems. Over 200 people attended, and KRNV News 4 covered the event.

Extension also created radio ads that aired on KUNR for five weeks and three half-page ads that appeared in the Reno Gazette-Journal. Extension contracted with the newspaper to show an online ad to 400,000 people.

Results

According to Google Analytics, 4,121 separate individuals visited the NevadaFloods.org website Nov. 1 ? 30, 2017, compared to the 1,475 who visited Oct. 1 ? Dec. 1, 2016. Of the 2017 visitors, 94.3 percent were new users. There were 1,274 individuals who visited the site during the 2017 Flood Awareness Week, of which 92.3 percent were new users.

As a result of the Douglas County Flood Open House, 100 attendees were inspired to ask if they lived in a floodplain, and others were inspired to ask about the Johnson Lane Area Drainage Master Plan.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
132	Weather and Climate

Outcome #12

1. Outcome Measures

Climate Change Education Workshop and Partnership

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	80

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The majority of climate scientists predict that Nevada and other Western states will experience more frequent and severe droughts, floods and warming temperatures in the future. As the driest state in the nation, such changes will challenge Nevada’s agriculture production, human health and water supply systems. Citizens, including youth, need to prepare for and adapt to such changes.

What has been done

Cooperative Extension worked with the Southwest Regional Climate Hub of the U.S. Department of Agriculture's Agricultural Research Service and with Extensions in Arizona, California, Hawaii, New Mexico and Utah to create and share curriculum about climate-smart agriculture. In 2016, 15 faculty representing all six states held a three-day discussion-based climate workshop at University of Arizona, and 60 faculty from all six states attended. Attendees received idea sheets to plan how to start adding climate science information back home at the local level.

In 2017, the multistate team distributed a survey to rate the effectiveness of the workshop and determine participants' preferred course of action for the next two years. The team also began sending requested interstate newsletters to participants. Nevada Cooperative Extension added climate science to programming with two "Reinventing Your Landscape" classes in Douglas County - one about shade trees and one about drainage management.

Results

For the multistate workshop survey, 29 participants responded.

- 24 agreed or strongly agreed that the workshop inspired them to incorporate climate science data into existing Extension programs
- 22 indicated making progress on their "idea sheet" plans
- 20 made contact with someone they had met at the workshop
- 26 followed up with readings recommended at the workshop
- 16 looked up other Extension programs that incorporated climate science data

It should be noted that the workshop was a Train-the-Trainer event, so each of the faculty who participated is likely reaching many more with the workshop information. Also as a result of the workshop, University of California Extension created and distributed a survey to all California Extension faculty to learn their interests and needs for incorporating climate science data into their programs.

Nevada Cooperative Extension used a post-class survey for "Reinventing Your Landscape: Shade Trees." There were seven respondents, and they rated questions on a scale of 1 (strongly disagree) to 5 (strongly agree) with the following results:

- 4.83 for the usefulness of the information
- 4.43 for the class being worth their time

After the "Reinventing Your Landscape: Drainage Management" class, three participants asked Cooperative Extension for help with inspecting drainage problems.

"This workshop was the most significant event and partnership I have been a part of in my 10 years of work in climate change." - Climate scientist expert and program participant

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
132	Weather and Climate

Outcome #13

1. Outcome Measures

Eagles & Agriculture

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The face of agriculture in Douglas County is changing, as land is divided and ranches are parceled off. Public understanding of the values agriculture provides our communities is critical to agricultural sustainability.

Although many Douglas County residents enjoy the rural character of the area, many complain about some aspects of it, such as dust, flies, odors and slow-moving farm vehicles. Farmers and ranchers often find themselves defending their industry, and many ranchers are tempted to sell to land developers or prospective homebuyers lured to an attractive valley of green pastures, livestock and wildlife, with the backdrop of the Sierra Nevada. Although the face of agriculture in Douglas County is changing as land is subdivided, public understanding of the value agriculture provides our communities is critical to its sustainability.

What has been done

Eagles & Agriculture is a multiday celebration of agriculture to teach about agriculture and the benefits it provides to wildlife and the community. The program, a collaborative effort that began in 2003, encourages the conservation and prosperity of ranching in western Nevada, teaches participants about wildlife and the history of agriculture in Carson Valley, and creates an agritourism model that enhances the profitability of local farming and ranching businesses.

The four-day 2017 event included an opening reception with live birds, four large Ranch & Eagles tours visiting five ranches, tours of seven other ranches, four smaller 20-passenger bus tours for birders, the 50-passenger bus Owl Prowl tour with a falcon flight demonstration, the Falconer's Dinner with guest speakers and live birds, a photography workshop, a nature hike and a photo contest. Speakers included University of Nevada, Reno Geography Professor Paul Starrs and several falconers with their birds of prey.

In 2017, approximately 400 people participated, with some attending more than one day.

Results

Since 2003, 4,600 participants have been educated through the Eagles & Agriculture Program. The event brings in an estimated \$275,000 in revenue annually to the local economy.

: Impacts of Eagles & Agriculture were measured using an electronic evaluation instrument, with 97 of the 400 participants responding. At least 84 participants, 87 percent of respondents, reported an increase in knowledge:

- 84 (87 percent) indicated gaining a better understanding of Carson Valley agriculture.
- 80 (82 percent) indicated having a greater understanding of the benefits agriculture provides to our society.
- 80 (82 percent) indicated knowing more about the importance of habitat for bird life.
- 83 (86 percent) indicated having a greater appreciation for the role agriculture plays in providing wildlife habitat.

?Most of us eat steak but we don't understand all the processes that happen before we take the first bite. The ranchers helped us understand this and the Senator especially answered all our questions in a way we could understand.? ? Program participant

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
121	Management of Range Resources
132	Weather and Climate
136	Conservation of Biological Diversity

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

Due to record high water levels in spring of 2017, field training exercises in using Multiple Indicator Monitoring methodologies were not possible. A graduate student recruited to work on identifying mechanisms that control arid soils methane failed to pass exams and dropped out of the program. This in turn caused a ten month delay in recruiting a student to continue the project.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Request of additional state-and-transition models by both BLM and NRCS suggest that this tool is valuable.

Managing cheatgrass, and in some cases medusahead, through the use of dormant season grazing has been very successful at a scale of thousands of acres in both Nevada and Oregon where winter-dominated precipitation occurs. Given these successes in management tool advances, there has been recognition that annual invasive grasses must be managed as a permanent component of the Great Basin and adjacent areas.

Since 2003, 4,600 participants have been educated through the Eagles & Agriculture Program. The event brings in an estimated \$275,000 in revenue annually to the local economy.

Living With Fire materials have been used in 25 states and 25 countries. Past program awards include National Wildfire Mitigation Award (2015), W. K. Kellogg Foundation Engagement Awards Exemplary Project (2012), Excellence in Extension National Award Winner (2006), Excellence in Community Assistance National Fire Plan Award (2004), and USDA Honor Award (2002).

Since 2008, 242 individuals have been certified through the program, and Nevada Naturalists have volunteered over 23,705 hours on environmental projects in southern Nevada. The program has a 90 percent completion rate, and after completing the program, 87 percent of students stated that they have a greater understanding and respect for our natural resources. 67 percent of those who completed Session One took the advanced session. About 86 Nevada Naturalists currently either volunteer or work on environmental issues in southern Nevada.

Since 2005, 651 have been trained through Rangeland School workshops and classes, and 78 attendees from 21 different countries have participated in the International Rangeland Seminar. Attendees have attended from Bhutan, Democratic Republic of the Congo, Egypt, Ethiopia, Georgia, India, Jordan, Kenya, Kyrgyzstan, Mexico, Mongolia, Morocco, Nepal, Pakistan, Palestine, Peru, Tajikistan, Tanzania, Timor, Tunisia and Uganda.

Eight states have joined Nevada in securing a multi-state proclamation in observance of Wildfire Awareness Month. Living With Fire helped initiate this effort nine years ago. Since then, 189 events or activities were held statewide by Cooperative Extension and partnering organizations and 9,974 people attended the events.

Key Items of Evaluation

Managing invasive weeds like cheatgrass, and in some cases medusahead, through the use of dormant season grazing has been very successful at a scale of thousands of acres in both Nevada and Oregon where winter-dominated precipitation occurs. Given these successes in management tool advances, there has been recognition that annual invasive grasses must be managed as a permanent component of the Great Basin and adjacent areas.

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Sustainable Energy

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		75%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		25%	
Total		0%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	1.0	0.0
Actual Paid	0.0	0.0	0.4	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	59736	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	60318	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The Nevada Agricultural Experiment Station conducted the following research:

1. Work continues on increasing oil content in prickly pear cactus. Artificially constructed segments of DNS have successfully increased oil content. Thirty percent of the cactus' genome has been sequenced. The team improved transcriptome data prickly pear, including sequencing a developmental gradient of cladodes and fruit using state-of-the-art genomic analysis technology (PacBio Iso-Seq). Investigation into improvements in ethanol yields using Prickly Pear as a carbon source. A soil consortium consisting of bacteria and fungi was analyzed to improve the digestion of the cladodes in order to increase the soluble sugar content for ethanol production.

2. Varietal trials continue in southern Nevada with regards towards Prickly Pear cactus under irrigation schedules. 2018 will mark the fourth year of cultivating multiple species of cactus.

3. Camelina varietal trials continue determining the best natural candidates for Northern Nevada. Genomics work with mutagenic compounds has produced several high-oil plant lines. A several lines of altered camelina have been identified as having lower levels of gumminess. Agronomic data is being collected on these new lines.

2. Brief description of the target audience

The scientific community at national and international scientific meetings, specifically to research scientists and undergraduate and graduate students and post-doctoral researchers conducting research on alternative crops for arid lands. Also included are the general public, energy and chemical industry, and potential producers.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2017

Actual: 1

Patents listed

Cushman, J. C., Lim, S. D., Yim, W. C., "Engineered Crassulacean Acid Metabolism (CAM) Pathways in Plants", Regular, United States.

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Graduate Students or Post-Doctorates Trained

Year	Actual
2017	13

Output #2

Output Measure

- Number of Undergraduate Students Involved in Research

Year	Actual
2017	10

Output #3

Output Measure

- Workshops, Demonstrations, and Presentations

Year	Actual
2017	19

Output #4

Output Measure

- Abstracts, Books, Book Chapter(s), Proceedings, Research Reports, and Technical Publications

Year	Actual
2017	1

Output #5

Output Measure

- Brochures, Bulletins, Fact Sheets, Newsletter, and Surveys

Year	Actual
2017	0

Output #6

Output Measure

- Manuals and Other Printed Instructional Materials Produced

Year	Actual
2017	0

Output #7

Output Measure

- Digital Media and Web Sites Created or Updated

Year	Actual
2017	1

Output #8

Output Measure

- Leveraged research funds generated

Year	Actual
2017	1055500

Output #9

Output Measure

- Newly developed databases, models and protocols

Year	Actual
2017	3

Output #10

Output Measure

- Newly developed germplasm

Year	Actual
2017	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of individuals who gain knowledge about sustainable energy and environmentally responsible lifestyles.
2	Number of individuals who implement practices related to or in support of sustainable energy and environmentally responsible lifestyles and practices.
3	Programs in this area will develop strategies to engage producers, industrial partners, and consumers groups resulting in effective leadership-oriented partnerships.
4	Annually the program will report, in conjunction with industrial partners, non-proprietary research gains made to the consuming public to garner interest in adoption of new products and processes when released.
5	Increased understanding of energy alternatives, resources and project support.

Outcome #1

1. Outcome Measures

Number of individuals who gain knowledge about sustainable energy and environmentally responsible lifestyles.

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Number of individuals who implement practices related to or in support of sustainable energy and environmentally responsible lifestyles and practices.

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Programs in this area will develop strategies to engage producers, industrial partners, and consumers groups resulting in effective leadership-oriented partnerships.

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Annually the program will report, in conjunction with industrial partners, non-proprietary research gains made to the consuming public to garner interest in adoption of new products and processes when released.

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Increased understanding of energy alternatives, resources and project support.

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

No external factors played a part in the past years research into sustainable energy.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Developed a potentially novel transformation method for Prickly Pear Cactus using transcription factors that does not rely on antibiotic selection, but rather the production of embryos in culture. Developed a protocol for producing highly purified Prickly Pear Cactus DNA for use in genomic sequencing.

Developed a protocol for successful transient transformation of Prickly Pear Cactus using biolistic bombardment.

Developed a protocol for successful transient transformation of Prickly Pear Cactus using agro-infiltration.

Several lines of high-oil producing camelina were developed that possess a 1.4-fold increase over normal lines.

Key Items of Evaluation

To facilitate higher yields of both edible and combustible oils, several lines of high-oil producing camelina were developed that possess a 1.4-fold increase over normal lines.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Childhood Obesity, Nutrition and Human Health

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
133	Pollution Prevention and Mitigation	5%		0%	
701	Nutrient Composition of Food	0%		33%	
703	Nutrition Education and Behavior	87%		0%	
722	Zoonotic Diseases and Parasites Affecting Humans	0%		67%	
724	Healthy Lifestyle	8%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	1.1	0.0	0.5	0.0
Actual Paid	0.6	0.0	0.3	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
55665	0	44653	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
55665	0	125021	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The Nevada Agricultural Experiment Station conducted the following research:

1. As part of the SNAP program our nutritional education efforts on reducing sugary drink consumption focused on Nevada highest density of SNAP recipients, the Greater Las Vegas region.
2. Work continues to move forward on dietary inhibition of heart enlargement via three food bioactivities discovered at the University of Nevada.
3. In attempt to create new ways in controlling Lyme disease outbreaks, researchers are developing lines of transgenic ticks that should help in finding mechanisms that will stop the spread of the disease.

The University of Nevada Cooperative Extension conducted the following programs:

1. Little Books and Little Cooks is a seven-week program for preschool-age children and their parents designed to promote healthy eating
2. Veggies for Kids is an in-school program that teaches youth how to grow vegetables and about nutrition by providing a 10-week series of one-hour lessons in the classroom.
3. Veggies for Seniors is an expansion of the Veggies for Kids Program. The program provided fresh fruits and vegetables for Mineral County seniors with disabilities.
4. The Healthy Eating on a Budget SNAPED program was adapted for the rural environment and provided SNAP recipients with nutrition, benefit resource management, and food safety education
5. Nevada Snap-Ed statewide networking and marketing project designed, built and compiled content for a new website
6. A coupon for local foods program was introduced where local residents in need obtained food at the farmer's market.
7. Hosted the Radon Awareness Month providing free test kits to Nevada's community

2. Brief description of the target audience

Experiment Station's target audience included:

Consumers, health care personnel, agency personnel, nutrition support groups, state and county public health and vector control agencies

Cooperative Extensions target audience included:

Children kindergarten through third grade in low-income rural Nevada communities, seniors with disabilities, Children ages 3-5 and their parents, with a focus on lower-income families, ethnically diverse families and children who attend at-risk schools

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	5024	0	7536	0

2. Number of Patent Applications Submitted (Standard Research Output)
Patent Applications Submitted

Year: 2017
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	4	12	16

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Graduate Students or Post-Doctorates Trained

Year	Actual
2017	19

Output #2

Output Measure

- Number of Undergraduate Students Involved in Research

Year	Actual
2017	21

Output #3

Output Measure

- Workshops, Demonstrations, and Presentations

Year	Actual
------	--------

2017 18

Output #4

Output Measure

- Abstracts, Books, Book Chapter(s), Proceedings, Research Reports, and Technical Publications

Year	Actual
2017	3

Output #5

Output Measure

- Brochures, Bulletins, Fact Sheets, Newsletter, and Surveys

Year	Actual
2017	0

Output #6

Output Measure

- Manuals and Other Printed Instructional Materials Produced

Year	Actual
2017	0

Output #7

Output Measure

- Digital Media and Web Sites Created or Updated

Year	Actual
2017	2

Output #8

Output Measure

- Leveraged research funds generated

Year	Actual
2017	346944

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of individuals who gain knowledge about nutrition and health.
2	Number of individuals who implement behaviors to improve health and nutrition.
3	Apply new knowledge to programs at the field level with a goal of significant long term weight loss and overall improvement of health in those who participate.
4	To identify research activities such as new data sources, improved techniques for data analysis, and improved hypotheses for obesity research questions.
5	Little Books and Little Cooks

Outcome #1

1. Outcome Measures

Number of individuals who gain knowledge about nutrition and health.

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Number of individuals who implement behaviors to improve health and nutrition.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	7326

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Children and senior citizens 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. According to the U.S. Census, 24 percent of the Mineral County population is 65 years and older, and 18 percent of the population is under 18. The per capita income in Mineral County is \$22,257. There is limited access to fresh fruits and vegetables with one small supermarket located in the town of Hawthorne. Public programs in Mineral County, such as the Women, Infant, and Children (WIC) and the Senior Farmers Market Nutrition Programs, are provided by the nonprofit Consolidated Agencies for Human Services and the senior center.

What has been done

During the 2016-2017 school year, 808 students participated in the Veggies for Kids Program at 14 elementary school statewide. In addition, six four-day summer institutes were held, incorporating the educational themes of Veggies for Kids. The institutes taught children how to plant, grow and care for their own homegrown vegetables, as well as about eating healthy, drinking water and being physically active. Children planted starter seeds and took their plants home at the end of the week. The Veggies for Kids Program team continued authoring a

kindergarten-grade-level Veggies for Kids curriculum and plan to complete it in 2018. The Veggies for Seniors Program served 102 seniors with disabilities in all townships within Mineral County, which include Mina, Luning, Hawthorne, Walker Lake and Schurz. Seniors had 13 weeks of vegetables, and a turkey or ham for Christmas delivered to their home.

Results

- . Of the 108 students who did pre- and post-tests for Veggies for Kids:
 - 50 more students recognized the MyPlate Picture
 - 70 more students correctly named five food groups
 - 12 more students correctly names six different vegetables
 - 9 more students were willing to sample selected vegetables that they correctly named

The Veggies for Senior program increased access to fresh fruits and vegetables by 36 percent for Mineral County senior citizens. In addition, of the 13 seniors who turned in an evaluation:

- 13 reported their eating habits improved
- 11 reported improved overall diet and health

"Veggies for kids has had an amazing impact on my students' lives. I have heard them discuss healthy choices and portion sizes outside of the 'Veggies for Kids' class time. More importantly, I have witnessed my students making healthy choices for snacks and lunch! I was truly amazed to see my third-graders embrace the 'Veggies for Kids' motto, 'Eat smart, play hard, drink water, not soda.'" Kristina Thran, third-grade teacher for Smith Valley Elementary School.

4. Associated Knowledge Areas

KA Code	Knowledge Area
701	Nutrient Composition of Food
703	Nutrition Education and Behavior
724	Healthy Lifestyle

Outcome #3

1. Outcome Measures

Apply new knowledge to programs at the field level with a goal of significant long term weight loss and overall improvement of health in those who participate.

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

To identify research activities such as new data sources, improved techniques for data analysis, and improved hypotheses for obesity research questions.

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Little Books and Little Cooks

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	360

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

For many children, academic difficulties begin before they start school. In a national survey, teachers reported that 35 percent of kindergarten children were not ready for 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. 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. The Little Books and Little Cooks Program also offers the opportunity to teach parents healthy nutrition and physical activity ideas to prevent childhood obesity.

What has been done

Little Books and Little Cooks, a curriculum developed in 2012, continues to expand to meet needs in Clark, Washoe and Lincoln Counties. The program has two primary components: direct family education and community education. In 2017, six new books and recipes were added, and the curriculum was also used in Wisconsin and Pennsylvania communities. In 2017, for direct family education, a seven-week series was delivered 61 times statewide totaling 424 two-hour workshops, reaching families at at-risk elementary schools, libraries and Head Start sites. Participants included 477 families in Clark and Lincoln Counties, and 165 parents and 172 children in Washoe County. The community education component involves community activities to promote children's healthy eating and physical activity. In 2017, at 58 events throughout the state, program faculty delivered information sheets, handouts, promotional displays, posters and newsletters in English and Spanish, reaching at least 3,912 people.

Results

Program impacts were measured with pre- and post-parent surveys, a pre- and post-observation

checklist, and post-program evaluations.

Of 367 parents who did pre- and-post- tests:

- 327 feel more confident interacting with their child at home
- 360 plan to continue using what they learned in the future
- 341 report their children help prepare food more often
- 327 report their children try new and unfamiliar foods at home more often
- 349 report their children feel more confident about using cooking equipment during cooking

In Clark, of 60 parents completing a follow-up survey three months after the seven-week series:

- 37 eat fruits and vegetables 2-4 times a day
- 58 feel confident interacting with their child during mealtime
- 58 feel confident interacting with their child when playing or during other routines
- 57 knew all the food groups
- 35 eat all food groups each day
- 59 think their child is ready for school
- 37 report their children help prepare food at home several times a week
- 41 report their children eat fruits and vegetables 2-4 times a day
- 46 report their children are more willing to try new and unfamiliar foods at home
- 25 report their children eat food from other cultures several times a week
- 32 report their children eat all food groups each day

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)
- Other (Grant availability)

Brief Explanation

A key member of the Experiment Station's nutrition research faculty did not meet requirements necessary to receive tenure and was not offered an annual contract .

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The Nevada Cooperative Extension:

- Since 2012, the Little Books and Little Cooks has reached 2,628 parents and 2,202

children through 193 program series.

- During the 2016-2017 school year, the Veggies for Kids program visited seven elementary schools in northern Nevada, reaching 808 students, 59 percent being non-Caucasian students
- In 2017, at least 95 seniors with disabilities received vegetables for 13 weeks through the Veggies for Seniors Program.

The Nevada Agricultural Experiment Station:

- The life cycle of ticks known for carrying Lyme disease has been reduced from two years to five months using transgenics.
- Research has shown important epigenetic actions for food bioactives in the regulation of cardiovascular disease. Based on in vitro findings, research is moving forward to address the epigenetic impacts for food bioactives in rodent models of heart disease. Findings generated in vivo, have the potential to drive pilot studies examining diet and dietary supplements on epigenetic regulation in people.

Key Items of Evaluation

- The life cycle of ticks known for carrying Lyme disease has been reduced from two years to five months using transgenics.
- Over 95 household with seniors with disabilities in rural Lincoln County, NV received vegetables for 13 weeks through the Veggies for Seniors Program.

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Food Safety

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
501	New and Improved Food Processing Technologies	100%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	1.0	0.0	0.2	0.0
Actual Paid	0.2	0.0	0.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
3272	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
3272	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The Nevada Agricultural Experiment Station conducted the following research:

- Research into the possibility of microRNA particle transferred between beef cattle and humans who consume them began this year

The University of Nevada Cooperative Extension conducted the following programs:

- Food preservation classes were conducted for residence of the Greater Las Vegas area
- Educate agricultural producers about GAPs and GHPs
- Provide producers educational and extension support for the implementation of HACCP
- Partner with Nevada Department of Agriculture to build awareness of volunteer GAP and GHP certification processes

2. Brief description of the target audience

- Agricultural producers, livestock producers, small acreage operators, and managers/operators of school/community gardens
 - 4-H and FFA youth participating in statewide and local competitive events with market projects
 - Specific individuals or groups who have expressed a need for food safety research and extension information that is to be derived through new research, extracted from on-going research, or is derived from scientific literature
 - Other scientists, scientific groups and political entities.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	113	0	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2017
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Graduate Students or Post-Doctorates Trained

Year	Actual
2017	3

Output #2

Output Measure

- Number of Undergraduate Students Involved in Research

Year	Actual
2017	6

Output #3

Output Measure

- Workshops, Demonstrations, and Presentations

Year	Actual
2017	26

Output #4

Output Measure

- Abstracts, Books, Book Chapter(s), Proceedings, Research Reports, and Technical Publications
Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Brochures, Bulletins, Fact Sheets, Newsletter, and Surveys

Year	Actual
2017	1

Output #6

Output Measure

- Manuals and Other Printed Instructional Materials Produced
Not reporting on this Output for this Annual Report

Output #7

Output Measure

- Digital Media and Web Sites Created or Updated
Not reporting on this Output for this Annual Report

Output #8

Output Measure

- Leveraged research funds generated
Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of individuals who gain knowledge about foodborne illness, farm/ranch food safety, and quality assurance.
2	Number of individuals who implement practices to prevent foodborne illness, which include farm/ranch food safety plans and quality assurance practices.
3	Reduce food borne pathogens in the food supply chain.

Outcome #1

1. Outcome Measures

Number of individuals who gain knowledge about foodborne illness, farm/ranch food safety, and quality assurance.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	113

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Over the past few years, there have been more and more requests for food preservation classes in southern Nevada. In the past, one of Cooperative Extension's environmental horticultural faculty members worked with Utah State Extension to teach classes. These classes took place several days in a row and were well attended. However, the classes were discontinued when the professor conducting the program retired.

What has been done

For the pilot program in 2017, Extension used Utah State Extension's model to teach 26 classes reaching over 113 students. There were 19 classes in Las Vegas, two in Laughlin and five in Logandale. The classes were taught in series, but due to the program being a pilot, the number of classes in each series varied. However, many students took the entire series of classes, regardless of the number. Classes lasted three to four hours and included an introductory PowerPoint presentation, with the majority of the time being spent conducting hands-on training. One of the most emphasized aspects of this program was safety and the importance of following U.S. Department of Agriculture guidelines. All classes were small, with eight to 16 students.

In addition, two volunteers were trained by the instructor on the newest methods from the U.S. Department of Agriculture and certified to help with the classes. They volunteered over 375 hours.

Results

All 113 students took pre- and post- class tests. They also rated questions on a scale of 1 (lowest) to 5 (highest). The average ratings were:

- 4.9 for gaining new knowledge
- 4.9 for gaining new skills
- 4.5 for the overall rating of the classes
- 4.8 for being more interested in a topic after taking the class

The 375 volunteer hours are valued at \$9,052.50. The value is based on an estimated dollar value for volunteer time in the U.S. of \$24.14 per hour for 2016 (Independent Sector).

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies

Outcome #2

1. Outcome Measures

Number of individuals who implement practices to prevent foodborne illness, which include farm/ranch food safety plans and quality assurance practices.

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Reduce food borne pathogens in the food supply chain.

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Other (Grant funding available)

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The 375 volunteer hours are valued at \$9,052.50. The value is based on an estimated dollar value for volunteer time in the U.S. of \$24.14 per hour for 2016 (Independent Sector).

Key Items of Evaluation

The 375 volunteer hours are valued at \$9,052.50. The value is based on an estimated dollar value for volunteer time in the U.S. of \$24.14 per hour for 2016 (Independent Sector).

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Community and Economic Development

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
122	Management and Control of Forest and Range Fires	4%		0%	
131	Alternative Uses of Land	1%		0%	
132	Weather and Climate	8%		0%	
601	Economics of Agricultural Production and Farm Management	0%		25%	
602	Business Management, Finance, and Taxation	12%		0%	
603	Market Economics	4%		0%	
605	Natural Resource and Environmental Economics	27%		0%	
608	Community Resource Planning and Development	2%		25%	
610	Domestic Policy Analysis	0%		50%	
723	Hazards to Human Health and Safety	1%		0%	
802	Human Development and Family Well-Being	6%		0%	
805	Community Institutions and Social Services	1%		0%	
806	Youth Development	2%		0%	
903	Communication, Education, and Information Delivery	32%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	1.3	0.0	0.2	0.0
Actual Paid	2.4	0.0	0.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
220070	0	33086	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
220070	0	66409	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The Nevada Agricultural Experiment Station conducted the following research:

- Given the new lithium battery industry should provide for the creation of a Lithium battery cluster where Nevada lithium mines are playing a significant economic part in the formulation. Lithium mining in Nevada is typically placed into a very broad economic cluster of general mining. Work was conducted to better understand how lithium mining will impact Nevada economically separate from other mined products.
 - Nevada is blessed with 300+ days of clear skies. Solar power investment in Nevada is substantial and work has been done evaluating the value of federal tax credits and state property tax credits under different degrees of risk and uncertainty.
 - Several studies were conducted on regional hospitals economic contributions to local communities

The University of Nevada Cooperative Extension conducted the following programs:

- A reboot of the Carson City, NV fair was organized and managed
- Agricultural Safety Day was conducted in several rural cities throughout western Nevada
- Social media training - Classes taught include: Social media for beginners, social media for parents, social media for Seniors and rural organizations
 - The "Herd & Harvest" educational business production management and mentoring programs and workshops were conducted
 - Individual employment plan program evaluated and prepared rural Nevada adults and youth workforce
 - Local food production program provided a series of education topics (production, post-harvest care, food processing, distribution, marketing and sales, quality control, safety and regulations)
 - The "Nevada Risk Management Targeted States Crop and Livestock Insurance Project" helped producers understand existing and emerging federal crop/livestock and revenue insurance programs in Nevada
 - Leadership trainings for counties agencies and public were held
 - Research was conducted to understand the purpose of higher education's role in fostering a culture of inclusion and diversity
 - A new set of tools were revised to assess how building community collaboration to take action on reducing wildfire threat can be measured as success or failure
 - The Nevada Naturalist program educated and trained adult learners concerned about environmental

issues affected by the impact of explosive growth and development of southern Nevada

- Provided outreach and assistance to tribal producers and members to encourage great use of USDA assistance programs on reservation lands

2. Brief description of the target audience

Target audiences include Nevada Governor's Office and Office of Economic Development, Nevada Association of Counties, Western Nevada Development District, elected and appointed leaders officials, municipal and governmental agencies, business owners, youth leaders, service-learning university students, agricultural producers, land-use planners, economic development professionals, 18+ Underemployed adults and At-risk young adults ages 17-24, Indian Reservation Tribal Council, Tribal Chairman, Tribal Members and Tribal Administrator, individual volunteers, faith-based groups, nonprofits, civic organizations, and the general public

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	4167	0	200	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2017

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	1	1	2

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Graduate Students or Post-Doctorates Trained

Year	Actual
2017	3

Output #2

Output Measure

- Number of Undergraduate Students Involved in Research

Year	Actual
2017	6

Output #3

Output Measure

- Workshops, Demonstrations, and Presentations

Year	Actual
2017	15

Output #4

Output Measure

- Abstracts, Books, Book Chapter(s), Proceedings, Research Reports, and Technical Publications

Year	Actual
2017	8

Output #5

Output Measure

- Brochures, Bulletins, Fact Sheets, Newsletter, and Surveys
Not reporting on this Output for this Annual Report

Output #6

Output Measure

- Manuals and Other Printed Instructional Materials Produced
Not reporting on this Output for this Annual Report

Output #7

Output Measure

- Digital Media and Web Sites Created or Updated

Year	Actual
2017	2

Output #8

Output Measure

- Databases and Models

Year	Actual
2017	0

Output #9

Output Measure

- Leveraged research funds generated

Year	Actual
2017	398480

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of individuals who gain knowledge about community and economic development.
2	Number of individuals who implement knowledge about community and economic development.
3	Stakeholders will have the necessary models that will improve on the forecasting of risk, demand, and prices in various commodity sectors leading to enhanced decision making, increased profits, and reductions in uncertainty.
4	Research finding on valuing environmental resources, e.g. lakes, wetlands, river restoration, and how it applies to stakeholder needs for demonstrated gains in profits, resources sustained, and/or actions mitigated.
5	Biological complexity analyses to understand human-nature interactions at the landscape level that informs human enterprises, leading to demonstrated profitability, environmental protection, and/or improvements in quality of stakeholders' lives.
6	Market and non-market valuation of environmental resources that have often lacked economic justification that meets client needs, and informs individual, group, and government decision making.
7	Lincoln County Nevada Workforce Development
8	Native Waters on Arid Lands: Enhancing Climate Resiliency and Agriculture on American Indian Lands
9	Herds & Harvest
10	Unmanned Aerial Systems in Rural Nevada

Outcome #1

1. Outcome Measures

Number of individuals who gain knowledge about community and economic development.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	326

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Douglas County performed a community needs assessment in 2009 and identified six community priorities including economic vitality; managed growth and development; preservation of natural environment, resources and cultural heritage; reliable, well-maintained infrastructure; community safety; and governance. The county wanted to improve the quality of life in regards to these priorities by developing more informed, knowledgeable and involved leaders for every aspect of the community.

What has been done

Cooperative Extension created Leadership Douglas County in 1996 to help develop community leaders by focusing on Douglas County's leadership needs, history, values, members, strengths and issues. Classes are held one day a month for 11 months and cover topics such as leadership skill building, networking, focusing on critical community issues and learning about many important aspects of the county. In 2017, at least 150 community leaders, business and organization representatives gave presentations throughout the year to 16 enrolled participants. Extension also chaired 10 steering committee meetings preceding the class sessions, facilitated parts of the orientation session and conducted a facilitator training. In addition, Extension gave presentations on Education Day and Agriculture/Water Supply Day and taught the final Reflection/Closure session. Finally, Extension continued improving evaluation methods and summarizing program impacts.

Results

At the end of the program, all 16 students rated on a scale of 1 to 6 how they foresaw their leadership activities changing in the future as a result of the program, with 1 as 'no change, stay the same' through 6 as 'I plan to change a lot.' Students had a median rating of 4.6.

In addition, the students indicated the following medians on a scale of 1 to 5, with 1 as 'strongly

disagree' and 5 as 'strongly agree.'

- 4.0 for "I plan to get more involved in Douglas County issues"
- 4.4 for "I plan to use these skills in my professional work"
- 4.4 for "I plan to use these skills in my personal life"
- 4.3 for "I would consider serving on a community board or service club"
- 4.4 for "I would consider volunteering for a non-profit"

Participant comments include:

- "I initially was more interested in learning about the community (exposure) and less about learning how to be a leader."
- "I saw firsthand how easy it was for someone to become involved in any manner of ways.?"
- "(I was) impressed with the number of local resources available to our residents and the people that make it all happen."

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
603	Market Economics
608	Community Resource Planning and Development

Outcome #2

1. Outcome Measures

Number of individuals who implement knowledge about community and economic development.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	2460

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Historically, Nevada has underused crop and livestock policies offered under the 2014 Farm Bill. Farmers and ranchers face five main areas of risk: legal, marketing, financial, human resources, and production risk. This program helps farmers and ranchers to know what policies and

programs are available to help reduce their risk in each of the five main areas.

What has been done

The Nevada Risk Management Education Program impacts all Nevada counties. The program's team worked with the U.S. Department of Agriculture's Risk Management Agency and insurance agents to create scenarios, advertise, and provide outreach on closing dates and insurance products available in Nevada. Each workshop, depending on the area and audience, combined insurance program information and scenarios with production and marketing information, and all business planning and marketing programs included the use of risk management tools. In 2017, there were 368 attendees at the five Cattlemen's Update meetings, 60 at the Nevada Agriculture Outlook: Managing Ag Risk workshop, 8 at the Business Strategies workshop, 128 at the 11 Tribal Farming Principals Workshops, 77 at the Nevada Cattlemen's Association Livestock Insurance Program, and 35 at the U.S. Department of Agriculture Program Update. There were 367 students in the Risk Management Agency High School Education Program.

Results

For the following four programs, participants indicated increases in knowledge and behavior in post-program evaluations and follow-up reporting:

Cattlemen's Update:

- 114 reported they would save over \$900 because they attended the update
- 177 planned to make changes based on the program
- 236 better understand the rangeland monitoring app
- 294 better understand flexible grazing management for riparian functions/recovery
- 305 better understand current and emerging livestock disease and new feed directives
- 301 better understand efficiency relative to cow size
- 305 better understand the Paternity Student/Cheat Grass Project

Nevada Agriculture Outlook: Managing AG Risk results:

- 43 reported the workshop provided value to their education in running their own business
- 18 planned to make changes to their business

Business Strategies

- 6 reported they would take actions based on what they learned

Tribal Farming Principal Workshops - 11 workshops total:

- 61 learned how to increase their income
- 102 learned about soil health and how it impacts production
- 59 learned how to improve food-safety standards on their farm or ranch
- 59 learned about the U.S. Department of Agriculture programs available
- 117 improved the quality of the vegetables they were growing
- 69 improved their business management skills

Risk Management Agency High School Education: Program impact was measured by a 15-question pre- and post-test questionnaire:

- 135 more students better understood agricultural risk and how it applies in Nevada
- 124 more students better understood the five areas of risk
- 124 more students better understood strategies to reducing risk
- 88 more students better understood the importance of protecting their risk
- 139 more students better understood government programs to address agriculture risk

4. Associated Knowledge Areas

KA Code	Knowledge Area
131	Alternative Uses of Land
132	Weather and Climate
601	Economics of Agricultural Production and Farm Management

Outcome #3

1. Outcome Measures

Stakeholders will have the necessary models that will improve on the forecasting of risk, demand, and prices in various commodity sectors leading to enhanced decision making, increased profits, and reductions in uncertainty.

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Research finding on valuing environmental resources, e.g. lakes, wetlands, river restoration, and how it applies to stakeholder needs for demonstrated gains in profits, resources sustained, and/or actions mitigated.

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Biological complexity analyses to understand human-nature interactions at the landscape level that informs human enterprises, leading to demonstrated profitability, environmental protection, and/or improvements in quality of stakeholders' lives.

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

Market and non-market valuation of environmental resources that have often lacked economic justification that meets client needs, and informs individual, group, and government decision making.

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Lincoln County Nevada Workforce Development

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	1792

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Nevada's Lincoln County has many underemployed residents. In a 2016 survey by the county, residents identified creating more jobs as the top priority. According to the 2015 third-quarter report by the Bureau of Labor Statistics, the county had the lowest average weekly wage in Nevada. Residents have difficulty leaving and living in urban settings due to a lack of skills needed to work and live in those environments. Many underemployed or unemployed residents have barriers to finding jobs in both urban and rural settings, such as being unable to fill out an application, not knowing what jobs fit their interests and skills, lacking confidence, or lacking the knowledge or abilities needed to make a plan or career path. In addition, many young adults ages 17-24 are not advancing academically, are struggling to identify and make career paths, and are not finding sustainable jobs or careers. Finally, the county needs to increase economic development and make more sustainable jobs.

What has been done

The Lincoln County Workforce Development Program helped 31 underemployed or unemployed adults ages 18 and older and 37 at-risk youth ages 17-21 gain education, training and sustainable jobs in 2017. The project held one-on-one consultations with participants to gauge skills, interests, education levels and social barriers. Extension helped adults make education plans based on their needs. Participants learned how to identify a fulfilling career and received on-the-job training and employment counseling. Youth learned how to make and follow career plans. Businesses created work experience positions for participants, and 36 participants received tutoring.

Extension also collaborated with the Lincoln County Regional Development Authority to help with economic development, increase job opportunities, and obtain funding. In addition, Extension worked with the Lincoln Communities Action Team on efforts to increase tourism and use education to build businesses and sustainability.

Results

Extension evaluated progress for both groups in meetings at least every 30 days, and recorded progress in the One Stop Operating System outlined by the U.S. Department of Labor, which measures gains of employment job training and education. Extension charted progress for the at-risk young adults by measuring math and reading improvement, high school diplomas or equivalents earned, employment, and on-the-job training and post-secondary education completed.

Of the 31 adult participants:

- 17 became employed
- 7 completed occupational training
- 10 received on-the-job training

Program participants rated themselves using knowledge surveys before and after completing the program. They rated statements on a scale of 1 to 5, with 1 being "not at all true for me" and 5 being "very true for me." Results of the post-program survey show the following ratings, improvements compared to the pre-program survey:

- 1.22, a 31 percent decrease in "When I get discouraged while making an important decision, I give up trying."
- 2.44, a 20 percent decrease in "I don't believe I can get the education needed for good jobs."
- 3.92, a 41 percent increase in "I believe that I can find a job that I like."
- 4.33, a 15 percent increase in "I know what types of jobs fit my interests, skills and abilities."
- 4.08, a 14 percent increase in "I am worthy and capable of achieving the steps to succeed in a good career."

Some participant responses to "The most important thing I gained from the program..." were:

- I actually am capable of handling and maintaining a job. Before I worried I wouldn't be able to.
- You've got to work hard to succeed in life.
- I gained confidence. I gained new skills working with computers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #8

1. Outcome Measures

Native Waters on Arid Lands: Enhancing Climate Resiliency and Agriculture on American Indian Lands

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	550

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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, 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.

What has been done

Research and Extension experts partnered with tribal communities in 2015 to create the Native Waters on Arid Lands Program 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.

In 2017, the program:

- Held its first Youth Day, teaching 28 tribal youth in the West about agriculture, water resources and changes in climate.
- Held its third Tribal Summit, sharing research with 140 tribal members and learning about their water management successes and struggles.
- Selected nine reservations for case studies and made precipitation and temperature projections to help them with climate planning
- Analyzed and reported data from:
 - 2017 Summit participants to assess tribes' climate data and information needs, and
 - a survey of 2016 First American Land-Grant Consortium (FALCON) Conference participants assessing information needs to boost tribal college teaching, research and outreach to support tribal climate planning.
- Created an online "information management portal" to help with climate planning and continued collecting for climate adaptation information needs research.

Results

In 2017, the Summit had four breakout sessions: economic development, tribal ranching and conservation practices, ground-surface water, and traditional knowledge and ecology. After the sessions, participants rated from 1-5 how much they learned concerning four key learning objectives for each session, with 1 being very little, and 5 being very much.

15 Economic development participants rated their learning:

- 4.27 for positive impacts of water related projects on reservations
- 4.2 for what makes agricultural and/or water related economic projects well suited for reservations
- 4.2 for how tribes have used agricultural and/or water resources to improve their financial or

economic situation

- 4.07 for obstacles that tribes had to overcome to make their water economic development project successful

17 Tribal ranching and conservation practices participants rated their learning:

- 4.59 for conservation practices used on tribal ranching operations
- 4.41 for needs on tribal operations that will increase their viability
- 4.35 for stability of current water availability and quality on tribal ranching operations
- 4.35 for vulnerabilities of tribal ranching operations

17 Ground-surface water participants rated their learning:

- 4.24 for ground and surface water situations on reservations
- 4.06 how tribal water rights are impacted on reservations located in multiple states
- 3.71 for tribal planning efforts for future ground-surface water rights
- 3.71 for how tribes work with different jurisdictions involving water rights and use

15 Traditional knowledge and ecology participants rated their learning:

- 4.47 for how traditional values affect cultural, agricultural, and ecological resiliency
- 4.4 for how traditional values are implemented in farming, and ranching and forest management practices
- 4 for transference or exchange of traditional values among tribal communities
- 3.2 for how can Native Waters on Arid Lands support or facilitate these exchanges

Behavioral impacts are reflected in increases in the number of Tribal Summit participants from 83 in 2015, to 100 in 2016, to 140 in 2017.

4. Associated Knowledge Areas

KA Code	Knowledge Area
132	Weather and Climate
601	Economics of Agricultural Production and Farm Management
605	Natural Resource and Environmental Economics
608	Community Resource Planning and Development

Outcome #9

1. Outcome Measures

Herds & Harvest

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	7501

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Agriculture is the second-largest component of economic stability in Nevada rural communities. At least 95 percent of state land is devoted to farming and ranching, with 4,135 farms.

Most agricultural sales in Nevada include cattle and calf production, followed by hay, other crops, milk and other dairy products, vegetables, melons, potatoes and sweet potatoes. Nevada has seen an increase in specialty crop operations, with the U.S. Census of Agriculture from the USDA National Agriculture Statistics Service reporting at least 1,000 new farms over the past decade. These producers primarily sell through farmers markets, roadside stands, and Community Supported Agriculture projects.

Women, American Indians, Hispanics and operators of more than one race comprise a large portion of the total number of operators. The demographic profile of Nevada's beginning producers characterizes the need in Nevada for a project that reaches socially disadvantaged and limited-resource farmers and ranchers.

What has been done

Since 2011, through the Herds & Harvest Program, Extension has provided workshops and educational business management and mentoring programs to support over 1,000 beginning agricultural producers, targeting individuals identified and/or recruited through the USDA, most of whom qualify as socially disadvantaged and limited-resource beginning farmers and ranchers. In 2017, 16 workshops educated 392 people on topics such as business strategies, winemaking, hops, small-scale poultry, hoop-house farming, social media marketing, and meat processing and quality.

Herds & Harvest mentoring programs also help beginning producers increase their profitability and sustainability through one-on-one and small group networking. In 2017, 176 mentoring sessions were held on topics such as enterprise budgets and production agriculture, including 21 sessions on Indian reservations serving 315 tribal members. Many other producers benefitted from networking with one another through the program.

Results

Program impacts in 2017 were measured via post-program evaluations. Of the 392 program participants, 126 returned evaluations, of which:

- 96 learned how to improve quality in their products
- 94 learned how to add value to the products they produce
- 91 learned how to increase their income
- 73 learned how to increase yields
- 71 learned how to increase farm and ranch income

"As a result of our contacts with [Herds & Harvest], we became connected to the agricultural community, exchanging help, ideas and resources. Our business grew due to these connections and prompted changes in our methods." - Agricultural producer.

4. Associated Knowledge Areas

KA Code	Knowledge Area
131	Alternative Uses of Land
601	Economics of Agricultural Production and Farm Management

Outcome #10

1. Outcome Measures

Unmanned Aerial Systems in Rural Nevada

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	91

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Small unmanned aerial systems, some of which are identified as drones, are providing beneficial services in a variety of fields, including agriculture, mining and communication technologies, and are even aiding in search and rescue efforts. Unmanned aircraft are easy to find above many public events. They are also becoming the tool of choice to get detailed images of large areas at a very reasonable cost. However, even though they are easy to fly and fairly cheap to buy, users still need to learn proper use before using unmanned aerial systems for recreation or business purposes.

In addition, many high school youth in the White Pine School District are not continuing to college, and many are lacking in technical skills. Increasing their interest in STEM, with activities such as experiential learning about unmanned aerial systems, is a way to increase the chances they will want to go on to college, while simultaneously giving them some hands-on training in use of an emerging technology.

What has been done

University of Nevada Cooperative Extension offered "The What and Why of Small Unmanned Aerial Systems" in Nevada's Lander County and a six-class experiential STEM activity at White Pine High School in Nevada's White Pine County.

The Lander program, hosted by the Lander County Convention and Tourism Authority in Battle

Mountain, had 13 participants from Lander and Humboldt counties, including two county commissioners, the president of Lander Radio Control Club, a regional economic development director, a prominent rancher, a mosquito abatement contractor and two law enforcement officers.

For White Pine's program, 12 students built, programmed and flew unmanned aerial vehicles. Students learned principles of flight, solder handling safety and electronics. Additionally, the school's STEM instructor designed physics, engineering and math quizzes and tests for students based on the activity. Two students demonstrated at Ely's Day at the Airport event.

Results

In Lander, the Humboldt County Fair Board requested Extension's involvement in the planning and execution of an unmanned aerial system event at the Tri-County Fair, including a possible competition, information exchange and a Drone 101 session for those unfamiliar with the technology and its capabilities. In addition, plans are being made to offer Federal Aviation Administration certification training. Ten of the 13 attendees responded to a five-question evaluation, rating the program 4.5 out of a 5-point scale, with 5 representing that the attendee really liked the presentation.

In White Pine, the unmanned aerial vehicle program at White Pine High School helped the high school become designated as an Official Nevada Governor's STEM School. In addition, there are plans to expand the program to Steptoe Valley High School and White Pine Middle School.

"I've loved building the drone and am proud of my school, so I was happy to show off what I've learned about the drones." - Collin Young, White Pine High School STEM physics student

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
608	Community Resource Planning and Development
806	Youth Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

In White Pine, Nevada, the Unmanned Aerial Vehicle Program at White Pine High School helped the high school become designated as an Official Nevada Governors STEM School. Two additional county high schools (Lander, Humboldt, NV) are now applying for official designation.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Children, Youth and Family Development

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
703	Nutrition Education and Behavior	3%		0%	
802	Human Development and Family Well-Being	31%		0%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	9%		0%	
806	Youth Development	48%		0%	
903	Communication, Education, and Information Delivery	9%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	3.4	0.0	0.0	0.0
Actual Paid	5.9	0.0	0.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
456411	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
456411	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The University of Nevada Cooperative Extension conducted the following programs:

- A significant portion of this work falls under the 4-H programming area, with traditional 4-H clubs, afterschool programs, summer camps, science camps, military family programs, etc.
- Paiute Tribe Maternal, Infant and Early Childhood Home Visiting Program. Helps develop infrastructure within the Yerington Paiute Tribe to foster healthy, safe and self-sufficient families.
- Continued work on educating communities and intervention training for families experiencing domestic violence
- Continued educating adults on the recognition, reporting of suspicions and responding to the disclosure of child maltreatment
- Progressive Ag safety Day - taught youth and their families how to be more safe in various circumstances, ultimately preventing injury and/or the loss of life
- Youth for the Quality Care of Animals - designed a curriculum map, created content, multimedia pieces were produced or obtained, website built
- Conducted the Summer Sports Bash to introduce youth in grades 1-5 to soccer, football, tennis, basketball, volleyball and track
- Nevada Youth Range Camp provided camping and instructional experiences for high school youth
- Rural Domestic Violence Prevention Program provided training to Nevada law enforcement officers, Native American tribes
- The Gear-Up for STEM program provided opportunities for rural students to learn about robotics
- Project MAGIC training focused on reducing recidivism among juvenile offenders
- Developed and delivered in-service train-the-trainers workshops for child care providers in Nevada and three neighboring states
- Provided the Family Storyteller program (Spanish and English versions) to at at-risk elementary schools (Title 1 with school-wide below grade-level reading scores)
- Provided early literacy, parenting education, and child health and nutrition program for preschool-age children and their parents

2. Brief description of the target audience

University of Nevada Cooperative Extension target audience included:

Child care providers and youth workers, survivors of domestic violence and their children, entry-level juvenile offenders, ages 12-18, leadership teams from rural middle and secondary schools, families with children newborn to age 5, early childhood teachers, preschoolers or beginning readers at risk for developing literacy and language deficits, academic problems, and social difficulties, families who have

children in targeted at-risk schools or live in neighborhoods surrounding those schools, human services providers, nonprofit agencies, tribal families, tribal community, tribal leadership, tribal agencies, state and local agencies, community leaders, and the community at large.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	5024	4346	7536	100

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2017
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	4	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Professional/Invited Presentations

Year	Actual
2017	16

Output #2

Output Measure

- Workshops and Demonstrations

Year	Actual
2017	23

Output #3

Output Measure

- Abstracts, Books, Book Chapter(s), Proceedings, Research Reports, and Technical Publications

Year	Actual
2017	8

Output #4

Output Measure

- Brochures, Bulletins, Fact Sheets, Newsletter, and Surveys

Year	Actual
2017	5

Output #5

Output Measure

- Digital Media and Web Sites Created or Updated

Year	Actual
2017	2

Output #6

Output Measure

- Number of Graduate Students or Post-Doctorates Trained

Year	Actual
2017	2

Output #7

Output Measure

- Leveraged program funds generated

Year	Actual
2017	257041

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of youth, families, and professionals who gain knowledge about positive human and family development.
2	Number of youth, families, and professionals who implement positive human and family development behaviors.
3	Helps develop infrastructure within the Yerington Paiute Tribe to foster healthy, safe and self-sufficient families.
4	Keeping Kids Safe: Recognizing, Reporting and Responding to Child Maltreatment Training
5	Heart & Shield: Rural Domestic Violence Prevention Program
6	Boosting the amount and quality of time parents and children spend together reading and enhances school readiness
7	Gaining Early Awareness and Readiness for Undergraduate Programs
8	Nevada Youth Range Camp

Outcome #1

1. Outcome Measures

Number of youth, families, and professionals who gain knowledge about positive human and family development.

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Number of youth, families, and professionals who implement positive human and family development behaviors.

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Helps develop infrastructure within the Yerington Paiute Tribe to foster healthy, safe and self-sufficient families.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	28

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Yerington Paiute Tribe in Nevada has struggled with a sense of hopelessness due to high levels of drug/alcohol abuse, domestic violence, attempted suicide, juvenile delinquency, child endangerment, unemployment and many families living well below the federal poverty level. The 2011 implementation report states: "The general sense of futility limits community members from accessing services, as well as limiting the compilation of accurate data to assess the real needs of the Tribal community, and demonstrates the critical need for a community outreach educator to advocate on behalf of the women and children, the most vulnerable members of the community, and link them with community based resources to improve their health, safety and welfare."

According to the 2009 Lyon County Community Health Status Report, Native Americans have struggled far more than any other ethnic group/race on issues such as infant mortality rate, low birth weight, premature births and limited prenatal care.

What has been done

The program began in 2014, assisting eight families. Extension partnered with the Tribe to research how teaching parents about traditional cultural practices combined with the national Parents as Teachers curriculum affected parental stress. The program used a case study design to assess change in parental stress and obtain national benchmark data for 15 families through weekly in-home visits, and to get more in-depth data on nine of the families. For 2016-2017, Extension wrote the final report.

In 2017, 10 monthly Group Connections meetings were held to discuss health, crib safety, budgeting and more. The program also offered resume services and gave child-safety technician certification and professional development trainings for staff. Parent educators took participants to and from third-party providers for prenatal and well-baby checkup appointments. The program also published in the Tribe's monthly newsletter and took part in community activities

Results

Through the Parents as Teachers curriculum, the program helped families engage their children in meaningful play and activities that impacted the children's gross and fine motor skills, intellectual/cognitive development, social and emotional development, and language development. In this way, the program involved leaders and tribal members in the shared responsibility to tribal families. In 2017, benchmark data and knowledge and behavior changes for 22 adults and 6 youth were measured using pre- and post-program surveys, ongoing self-report measures, and interviews.

Due to attrition, domestic violence issues and other issues interfering with weekly meetings, results of the curriculum's effect on parental stress were inconclusive; however, tribal members and Extension faculty and staff documented: increases in vaccinations and infant/toddler doctor visits; reduction in child abuse and neglect rates increases in parenting skills; improvement in child developmental benchmarks; increases in cultural engagement

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being
806	Youth Development

Outcome #4

1. Outcome Measures

Keeping Kids Safe: Recognizing, Reporting and Responding to Child Maltreatment Training

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	1588

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Preventing child abuse and neglect was ranked as the second-highest priority in a "Results of a Mailed Survey: Priorities for Elko County" needs assessment published in 2012. Very few resources are available to child care givers and youth workers to help them fully understand their reporting requirements and role in preventing child abuse and neglect. Child care givers, youth workers and volunteers working with children and youth are mandated by state law to complete training on recognizing and reporting suspected child maltreatment within three months of beginning employment, as well as to report suspicions of child abuse.

What has been done

Extension created the Keeping Kids Safe Program to teach those working with youth or providing child care how to recognize, respond to and report possible child maltreatment to protect children and youth, and help child care providers comply with state regulations. Extension developed a training based on the Kids Deserve a Safe Place to Grow: What child care providers can do about child abuse and neglect curriculum in 2005 and has taught it many times.

In 2017, it was taught five times in Elko, Humboldt and Nye counties. Clark County offered it online, reaching 1,588 providers, and also trained 36 early childhood trainers to teach it. Program goals are that participants better understand the four types of child maltreatment; how to recognize maltreatment; how, when, where and what to report when one suspects maltreatment; how to respond when a child discloses abuse; program policies to protect children and staff; and caregivers' responsibilities and rights related to maltreatment.

Results

Program impact in Elko, Humboldt and Nye Counties was measured by pre- and post-test questionnaire. Participants rated statements 1 to 5, with 1 as No Confidence and 5 as Complete Confidence. Post-test scores for the 59 participants in 2017 ranged from 4.49 to 4.98, and gains over the pre-test ranged from 0.28 to 1.50. Results of the post-program survey show the following improvements compared to the pre-program survey: 4.55, a 47 percent increase in confidence in recognizing indicators of child abuse and/or neglect of a child; 4.51, a 54 percent increase in confidence in being able to make a report of suspected child abuse and/or neglect of a child.

Some participants' comments when asked, "How can we improve this training" included: This presenter is awesome! This was one of the best presenters I've seen. Interaction was great. Although the topic of the presentation was no fun, I learned a lot. I was very impressed by your ability to make the presentation not only palatable, but also interesting.

In Clark County, NV, participants must get a 100 percent on the final test to pass the online course, and 1,588 did so in 2017.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being
806	Youth Development

Outcome #5

1. Outcome Measures

Heart & Shield: Rural Domestic Violence Prevention Program

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	111

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Nevada's domestic violence rates are some of the highest in the nation. Needs assessments in Elko and Churchill Counties showed that domestic violence prevention is a high-priority issue. Children living in violent homes have an increased risk for child abuse. Research shows that as children witness violence in the home, they develop attitudes about violence and power in relationships that can be passed on to future generations. Children who witness violence also experience long-lasting problems, such as adult depression, anxiety, trauma-related symptoms, and increased tolerance for and use of violence in relationships.

What has been done

Extension's Heart & Shield: Rural Domestic Violence Prevention Program works to spread awareness and prevent violence in Elko and Churchill Counties in three ways: 1) Law enforcement training. In 2009, Extension worked with law enforcement to create training on optimal law enforcement response to domestic incidents. 2) Community education. Since 2013, Extension educated local agencies, human services providers and other partners about the impact of domestic violence and ways to help survivors. 3) Direct education and noncrisis intervention for surviving families to promote resiliency, strengthen positive future relationships, and stop the violence cycle. Extension developed a curriculum in 2014, and in 2015, offered a

nine-week series and monthly family activities for survivors.

Since 2015, 68 adults and 138 youth completed the third part of the program, including 39 adults and 72 youth in 2017. Extension also gave 47 community education presentations in 2017.

Results

Overall, participating parents recognized that how they respond in the aftermath of violence affected their children's resilience. In addition, participants rated 20 of 27 activities 4 or more, out of 5, in terms of how helpful the activities were. In answers to three open-ended questions after direct education, parents and children indicated improved communication, increased ability to handle frustration and an enhanced understanding of each other.

Program staff noted that families adopted positive routines, and that parents responded more calmly, firmly and kindly to children's challenging behaviors. Leadership skills and attention to personal care also improved.

In addition, many families chose to continue with the monthly activities or to repeat the series. With repeating families, staff observed even greater levels of family cohesiveness and communication, and fewer disagreements between parents and children.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being
806	Youth Development

Outcome #6

1. Outcome Measures

Boosting the amount and quality of time parents and children spend together reading and enhances school readiness

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	274

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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 foundation for literacy begins in the years before school, and parents can play a big role in helping children develop those skills. A 2005 needs assessment confirmed the need for early literacy and school readiness programs that include both parents and children in Nevada.

What has been done

Family Storyteller began in 1998 to enhance the reading time parents and children spend together and boost school readiness and parent engagement. Now it has English, Spanish, English Language Learner, Infant/Toddler (English and Spanish) and Native American versions. At six weekly classes, attendees learn the importance of literacy for children; learn and discuss reading techniques; practice reading; learn activities to enhance reading; and receive children's books and materials to take home. Books were chosen to boost literacy and academic skills.

In 2017, in Clark County:

- 536 adults and 590 children participated in the preschool version; 55 percent were Hispanic.
- 79 adults and 81 children participated in the infant/toddler version; 38 percent were Asian/Pacific Islanders.

In Washoe County,

- 36 Spanish, six English and four bilingual classes were taught, reaching 85 families, including 81 Spanish- and nine English-speaking adults and 112 Spanish- and 22 English-speaking children.

Results

In 2017, Washoe County parents rated their knowledge, skills and confidence to enhance their children's literacy development on a scale from 1 (low) to 5 (high) before and after the workshops.

The knowledge post-program rating was 4.74, up from 3.06 pre-program

The skills post-program rating was 4.71, up from 3.09 pre-program

The confidence post-program rating was 4.74, up from 3.24 pre-program

Clark County parents took knowledge and behavior pre- and post-tests. Of the 142 parents who completed both optional pre- and post-preschool program tests, examples of positive behavior changes include:

115 always had their child sit close when reading

88 always talked about book cover with their child

100 always changed their voice while reading, like soft or loud

94 always asked their child to name or point to something on the page

82 always pointed to words while reading

88 always helped their child learn new words or names for things

85 always asked children questions about the book while reading

74 always helped their child connect things in story to real life

91 always read slowly enough for their child to ask questions and chime in

82, after finishing the book, always asked their child what happened

85 always let their child ask questions as they read

101 said that they read to their child over 10 minutes each day

105 said that they now have over 20 books in their home for their child's use

139 reported they would recommend this program to their friends and family

Of the 17 parents who completed both optional pre- and post-infant/toddler program tests:
16 talked more with their toddler
11 read more with their toddler
14 felt very confident in using the skills they learned in the program to teach their toddler
15 felt very confident in helping their toddler develop a love for learning
14 felt prepared to read with their toddler

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being

Outcome #7

1. Outcome Measures

Gaining Early Awareness and Readiness for Undergraduate Programs

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	24

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Nevada has one of the lowest college attendance rates in the United States with an increasing need for a college-educated workforce, especially those with STEM degrees. Nationally, much is being written about the need for STEM education. One report stated: Some 75 million young people around the world are unemployed, yet most employers say they cannot find enough qualified candidates for entry-level jobs. According to the National Research Council (2011), "The primary drive of the future economy and concomitant creation of jobs will be innovation, largely derived from advances in science and engineering four percent of the nation's workforce is composed of scientists and engineers; this group disproportionately creates jobs for the other 96 percent."

What has been done

Extension received its third GEAR UP grant in 2013, and since then has done case studies and created, run and expanded STEM education programs for middle-school students in rural Nevada. In 2016, Extension helped with Seventh-Grade Clawbot and Eighth-Grade Robotics

Programs, multi-session activities using Carnegie Mellon University curriculum. Extension also authored a 30-session curriculum for a Ninth-Grade Drone Building Program and trained teachers to use it.

In 2017, Extension continued to analyze case-study data and report and publish findings. Extension also continued studying the role that relationships play in developing academic self-identity. Data from spring and fall were collected from 46 students in eight of the GEAR UP schools. In addition, Extension institutionalized the robotics programs, passing operations to the schools. Extension also worked with University of Nevada, Reno's College of Engineering to plan and run a weeklong STEM camp for 24 urban and rural students.

Results

Findings from the three studies (adolescent, perceptions of GEAR UP services, and case study) have been reported in formal reports and journal articles; findings have also been reported to GEAR UP staff in Nevada for program improvement. Pre- and post-tests were not given in the 2016-2017 school year, as the transition occurred early in the school year. 2014-2015 data show increases in the following areas:

- Plans to attend a college/university or tech school in the future
- Belief that attaining a STEM degree is worth the effort
- Thinking that learning STEM is important
- Plans to take STEM courses as part of their college/university or tech school program
- Comfort working on a team
- Comfort working with people different than me

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being
806	Youth Development

Outcome #8

1. Outcome Measures

Nevada Youth Range Camp

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	210

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

A needs assessment performed by Cooperative Extension in 2001 indicated that the public places very high importance on natural resources education for youth. However, most 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. Limited exposure to these environments suggests that Nevada's youth are increasingly less likely to seek education, careers or experiences in natural resources, particularly on rangelands common in the Western U.S. In addition, the number of people with knowledge about rangeland resource issues is declining; yet national law, regulation and policy seek public input toward the management of rangeland resources.

What has been done

Nevada Youth Range Camp was developed in response to and with input from stakeholders, and has been offered for 57 years, teaching over 1,500 students. In 2017, 20 campers from eight Nevada counties were taught using a curriculum emphasizing plant identification; ecology and management of sagebrush, pinyon/juniper, and stream ecosystems; soils; and wildlife habitats. They also learned map and compass use; toured a ranch; did a conservation project; hiked to a Natural Resources and Conservation Service weather station for predicting snowmelt runoff; simulated coordinated resource management and planning; and engaged in other learning and activities, including hiking, volleyball, horseshoes, campfires and photography.

From 2011 to 2016, curricula were revamped and published for the Soils, Stream, Pinyon and Juniper, Simulated Coordinated Resource Management, and Land Navigation lessons. Also in 2017, the Nevada Rangeland and Resources Commission made a video about the camp.

Results

Each year, camp participants submit a written evaluation at the end of the week that specifically asks campers to rate questions from 1 (poor) to 5 (excellent) about each of the instructional modules and the overall camp experience, as well as answer open-ended questions about what knowledge they gained. The written evaluations are read, then given back to the campers. In 2017, all 20 campers indicated gains in knowledge and rated the overall camp experience as 4.1. The average of individual session ratings was 4.56.

Several campers have attended the University of Nevada, Reno's College of Agriculture or other universities in the western United States and pursued careers in natural resources management. Some have gone on to hold positions of leadership in agencies or own or manage ranches. Some report that Range Camp was a life-changing event.

"I really just like the fact when I went out there, that I got to know more about the state I live in, because having grown up here in Reno, some people don't ever leave Fernley, and they don't realize how beautiful this state actually is, and what has to happen to continue to be able to graze on public lands, to hunt on public lands, etc." - Reno financial advisor Mark Elston, range camp student from 1972 to 1974.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Populations changes (immigration, new cultural groupings, etc.)
- Other (Grant funding availability)

Brief Explanation

- There were many Paiute family crises that interfered with intervention, including unemployment, jailing, illness, domestic violence, alcoholism and drug abuse. Tribal leaders also feared losing cultural traditions, which drove program curricular decisions to integrate cultural enhancements into the program.
- GEAR UP targets low-income students around the state, many of whom are undocumented. The political issues surrounding the decision to end the Deferred Action for Childhood Arrivals (DACA) created a large amount of fear and anxiety with the program's students.
- In Elko, NV, the District Attorney put a high priority on any child abuse case, which places prevention programs such as Keeping Kids Safe as a higher priority in the public eye.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

VI. National Outcomes and Indicators

1. NIFA Selected Outcomes and Indicators

Childhood Obesity (Outcome 1, Indicator 1.c)	
0	Number of children and youth who reported eating more of healthy foods.
Climate Change (Outcome 1, Indicator 4)	
0	Number of new crop varieties, animal breeds, and genotypes with climate adaptive traits.
Global Food Security and Hunger (Outcome 1, Indicator 4.a)	
0	Number of participants adopting best practices and technologies resulting in increased yield, reduced inputs, increased efficiency, increased economic return, and/or conservation of resources.
Global Food Security and Hunger (Outcome 2, Indicator 1)	
0	Number of new or improved innovations developed for food enterprises.
Food Safety (Outcome 1, Indicator 1)	
0	Number of viable technologies developed or modified for the detection and
Sustainable Energy (Outcome 3, Indicator 2)	
0	Number of farmers who adopted a dedicated bioenergy crop
Sustainable Energy (Outcome 3, Indicator 4)	
0	Tons of feedstocks delivered.