FY00 ANNUAL REPORT
OF
ACCOMPLISHMENTS & RESULTS
UNIVERSITY OF NEVADA COOPERATIVE EXTENSION (UNCE)
&
NEVADA AGRICULTURAL EXPERIMENT STATION (NAES)

28 February 2001

FY 2000 Annual Report of Accomplishments and Results

A. PLANNED PROGRAMS

Goal 1: An Agricultural System That Is Highly Competitive In The Global Economy

Overview: Our Plan of Work (POW) goals are to increase the overall quality and health of Nevada livestock through research and outreach, to understand the quality of plants through basic research and to evaluate and promote improved marketing of Nevada products.

University of Nevada researchers and Cooperative Extension faculty have conducted research projects and outreach programs directed at improving the competitiveness of Nevada's agriculture. By evaluating the protein composition in early and late stages of growth of alfalfa and measuring ruminal degradation, our scientists are developing new, more effective livestock supplemental feeding strategies that should make ranchers more economically viable and decrease ammonia production, a clear environmental benefit. In addition, the competitiveness of the Nevada sheep industry will be enhanced by an experimental cross breeding program conducted by Nevada scientists that significantly improves the quality and value of wool and increases the value for the lamb crop. These two projects will certainly improve the competitiveness of animal production in Nevada.

Our scientists have developed methods for identifying EBA in cattle herds in Nevada. The identified molecular probes for identifying the cattle infected with disease. Infectivity trials have established the potential for developing a vaccine that would have an economic advantage to Nevada cattlemen and improve the health of Nevada's cattle.

Nevada researchers are developing a more sophisticated GIS database for Great Basin Rangelands with the plan of utilizing the data collected to impact range decisions.

Nevada scientists have genetically engineered an experimental crop to produce increasing concentrations of vitamin E. The next step is to transfer that technology to an agricultural crop. This would provide enhanced nutrition to our consumers.

University of Nevada Cooperative Extension (UNCE) education programs have focused on diversified/alternative crops, weed management/control, risk management and animal production efficiency. UNCE campus and field faculty are part of many NAES research projects in these subjects, and have made extensive use of research findings. As noted in some of the key themes, the dissemination of research information via UNCE educational programs has had an impact on producer's practices and profits.

UNCE's work in the area of invasive species has had a significant impact at the state and local level. Awareness has been raised to such a level that the state has provided special funding for weed programs, including education, and a state weed plan has been developed with the input of all state and federal agencies in Nevada. Extension has received consider notice in the media for its work in making the "war on weeds" real to the people in the state.

Federal and State Funding by Plan of Work Goals

	Goal	Federal $	State $	County	Total $	FTE
Nevada Agricultural Experiment Station	**I**	**352,237**	**1,749,682**		**2,101,919**	**29.00**
University of Nevada Cooperative Extension	**I**	**251,115**	**1,039,585**	**1,011,778**	**2,302,478**	**32.54**

Key Theme – Animal Production Efficiency

a. University of Nevada researchers first determined the effects of the stage of growth (i.e., young shoot vs. old stalks) on the compositional characteristics of crude protein in alfalfa hay. Simultaneously, ruminal degradation of crude proteins and fibers were calculated using samples collected from dietary controlled cattle. Our investigations are now directed towards ascertaining the ruminal metabolic responses (i.e., degradation of alfalfa hay protein and synthesis of bacterial protein) to different sources of supplemental energy (e.g., grains and by-products with fermentable fibers) in vitro by using the dual flow continuous culture fermenter system, a.k.a. "artificial stomach". This information will provide us with a superior source of crude protein. In the near future, we plan to determine ruminal metabolic responses to supplementing alfalfa hay with different levels of energy (i.e., the superior sources) in the continuous culture fermenters, giving us the optimum levels for supplementing. And finally, develop and examine strategies for energy supplementation (i.e., feeding the superior sources at the optimum levels) of alfalfa hay in vivo with growing beef cattle.

b. IMPACT: This research has both economic and environmental implications. The supplementation strategies developed here will help beef producers as well as dairy producers throughout Nevada and any state that grows alfalfa as forage. By increasing efficiency of digestions, protein supplementation is significantly reduced, resulting in lower feed cost to the rancher. Expected savings are approximately 25% of total cost. A by-product of increased efficiency of digestion in cattle and sheep is decreased amounts of ammonia excreted during defecation. Nitrogen, the main component of ammonia, is one of the limiting factors in algal blooms. By reducing nitrogen inputs to Nevada's water resources, factors like clarity and oxygen content are not impacted as heavily by grazing ruminants

c. Source of Funds: Hatch
NAES State Funds

d. Scope of Impact: State Specific

Key Theme – Animal Production Efficiency

a. In order to improve wool production, Rambouillet ewes were crossed with pure Merino rams imported from Australia. Over the past 10 years crosses and back-crosses between mixed lambs and pure Merino rams has resulted in approximately 50% of the 1000 ewe flock are approaching purebred Australian Merino status, a known high quality wool producing breed. 41 Australian Medium Wooled Merino X Rambouillet ram lambs were used to evaluate the effect of the breeding program on carcass measurement, closely trimmed primal cut percentages, chemical analysis of rib chop and wool production traits. Lambs were slaughtered at 32 kg, 45 kg, or 54 kg. Carcass measurements were not significantly ($P>.1000$) affected at any slaughter weight with the exception of flank streaking score ($P=.0186$) at 54 kg. Closely trimmed primal cut percentages were not significantly ($P>.1000$) affected by the program at 45 kg. At 54 kg the program significantly enhanced percent shank, rib and breast and kidney ($P=.0035$, .0485, .0006, respectively). Chemical composition of rib chops were not significantly ($P>.3000$) altered by the program. Clean wool produced and fiber diameter were significantly ($P=.0121$, and .0240, respectively) improved by the breeding program.

b. IMPACT: By taking advantage of the breeding program being developed on University of Nevada's research ranches producers are able to add value to their sheep production system. Evidence of the effectiveness of this research program is clear. By improving genetic stocks, University of Nevada's Merino X Rambouillet hybrid flocks are producing a 90% cleaner wool than the national average and a 15% improvement over indigenous Australian flocks. Lamb production has also improved significantly through our breeding program. Ewes are averaging 25% more pounds of lamb per ewe over the western U.S. average and almost double the pounds of lamb per ewe when compared to Australian Merino flocks. To improve the quality of sheep production nationally, the first annual ram sale hosted buyers from five states, with over 200 producers, researchers, and educators visiting the research ranch in 1999. All of the results generated through these breeding trials will be published via the WWW in the near future, allowing producer not in attendance the chance to learn more about what is going on at the University of Nevada research facilities.

c. Source of Funds: Hatch
NAES State Funds

d. Scope of Impact: State Specific

Key Theme – Animal Health

a. Although the organism which causes EBA has not been identified, it's been known for 40 years that the disease is carried by ticks (Ornithodorus coriaceus), and that cows get their infections from tick bites. Researchers at the University of Nevada have been studying ways to identify infected cows, and to understand the regional risks of ranches developing EBA in their herds. Over several summers, investigators trapped 50 sites throughout Nevada and California using dry ice-baited traps. They also recovered numerous aborted fetuses, out of which 80% resulted from EBA. The fetuses have enlarged cervical lymph nodes, enlarged liver, fluids in the peritoneal cavity and small hemorrhages on the tongue, gums and around the eyes. The majority of fetuses came from counties in which ticks had been collected. During the past year work has focused on two objectives: isolating the organism within the tick that causes EBA and developing molecular DNA probes that identify live cattle infected with the disease. Using molecular techniques to identify infected ticks, investigators have learned that between 2 and 5% of all animals collected were positive for EBA. The latest infectivity trials have revealed that 1st year heifers have an 80% chance of aborting their fetus, while cows removed from exposure for more than one year have a 40% chance of aborting. However, cattle once exposed to EBA within the last year are nearly 100% immune to infection. This evidence indicates that cattle develop immunity with exposure to EBA, but must remain in contact to stay resistant.

b. IMPACT: Ticks testing positive were collected in northern and western Nevada counties, as far south as Lyon County. No ticks were collected in any of the southern, central, or eastern counties of Nevada. It appears that EBA is now making its way into the drier regions of eastern California, south central Oregon and southwestern Idaho. Collaboration with University of California-Davis scientists has led to the development of a new molecular probe which allows researchers to determine if the organism which causes EBA is present in fetal tissues of cattle and ticks - not all ticks carry the EBA organism; however, the carrier tick is found in all counties of California. The economic loss to western cattle ranchers due to EBA is only growing. With many ranchers complaining that losing 80% of their heifers' calves could potentially cripple their operations. The development of a cost-effective vaccine is of the highest priority. In the coming year, researchers at the University of Nevada, Reno hope to synthetically construct the infectious agent in EBA leading to commercial production of a reasonably priced vaccine

c. Source of Funds: Hatch
NAES State Funds

d. Scope of Impact: State Specific

Key Theme – Diversified/Alternative Agriculture

a. In collaborative management, Cooperative Extension and the Agricultural Experiment Station revamped the Newlands site in Fallon as an applied research site and a community recreational area. Researchers study alternative crops such as bermudagrass, switchgrass and hybrid cottonwood poplar trees while children play a soccer game on turfgrass, helping test the crop's durability.

b. IMPACT: Farmers now have a source to turn to for information on new and alternative crops, and local families have a new park to enjoy outdoor sports and games. In 1999, researchers planted a crop of 300 hybrid cottonwood poplar trees to test their possibility as an alternative crop. In 18 months of growth, the trees are thriving and have grown to heights of more than 20 feet. Researchers are especially interested in the poplar trees since they can serve as flood guards and windbreakers for farmers and ranchers as well. Studies are continuing to determine the economic feasibility of the hybrid trees.

c. Source of Funds: Smith-Lever & State Matching Funds
NAES State Funds

d. Scope of Impact: State Specific

Key Theme – Diversified/Alternative Agriculture

a. In 1998, the Agricultural Experiment Station and Cooperative Extension researchers began studying the possibility of growing wine grapes in northern Nevada. Researchers planted 12 varieties of grapes at the Valley Road Research Center in Reno, Nevada. Researchers tested the grapes for hardiness, growth, fruit yield and quality of wine. Winter freezes, late spring frosts and hungry birds combined to produce early setbacks to the project. Still researchers were able to determine that four of the 12 varieties, Semillon, Chardonnay, White Riesling and Limberger, were suitable to Nevada's climate. Researchers have also experimented with applying less water to the grapes in each season of growth. In their most recent year of growth, the grapes received 80 percent less water than the season before and thrived. In fact, the overall vine quality improved with less watering.

b. IMPACT: Researchers find that certain wine grape varieties can successfully grow with only .25 acre-feet of water per acre each season. This is a dramatic savings of water when compared to the 3.5 acre-feet of water per acre needed to maintain alfalfa crops in the area. The water savings will have a strong impact on a dry state such as Nevada and have the potential of saving money for farmers. The grapes, themselves, could be a viable alternative crop for farmers looking to diversify their fields.

c. Source of Funds: Hatch
Smith-Lever & State Matching Funds
NAES State Funds

d. Scope of Impact: Multi-State Research Project W-130 (AZ, CA, CO, FL, GA, IN, MD, MI, MN, NV, OR, SC, UT, WA, WV, WI) AND Integrated Research & Extension

Key Theme – GIS/GPS

a. This research focused on understanding changes in mosaics of ecosystems by quantitatively measuring patch size, landscape fragmentation and landscape dynamics. Analysis of relationships between landscape features (fire scars, mined sites, heavily grazed areas, plant communities, transportation corridors, riparian zones, crops, and urban industrial development) were based on a consideration of spatial analysis. Spatial indices were used to relate pattern to biological characteristics of ecosystems. Unique approaches included the use of a digital based airborne multi-spectral video system coupled with Landsat Thematic Mapper data and evaluation of landscape pattern based on scale variation considerations.

   The objectives were to define and quantify landscape mosaics and patch dynamics for selected western Great Basin rangeland areas, and to establish a GIS database and develop quantitative methods for monitoring and analyzing landscape pattern and its changes in relation to the structure and function of ecosystems. One effort used image-processing procedures to improve polygon accuracy. We used a decorrelated equalized contrast histogram stretch and three forms of vegetation indices and a multiple linear discriminate analysis spectral classifier. Polygons associated with sites with different levels of desertification or increasing aridity were separated using a multiple linear regression analysis followed by an ordination to separate the polygons associated with low plant cover. Vegetation type, landscape similarity index and average patch fractal dimension were found to be highly related. Changes in vegetation and landscape structures from 1984 to 1996 were described using GIS and multivector subsampling of polygons. Low seral vegetation increased in extent substantially and mean patch size increased in the southeast vector. Both study objectives were successfully carried out.

b. IMPACT: Resource managers need to be able to use resource maps to aid in decision making. However, map accuracy must be quantified to ensure the validity of decisions, and field-based resource managers need to be able to access and manipulate the geographic information system (GIS) databases without being GIS specialists. Multi-scale sampling techniques will allow accurate assessment of species richness (biodiversity) models as results are extrapolated across scales from local to regional (the link to coarse-scale GAP Analysis). This research can be used by resource managers of most U.S. DOI land units and will be an essential linkage to large-scale inventory and monitoring programs (GAP Analysis, the Environmental Protection Agency's Environmental Monitoring and Assessment Program, etc.) whose data are not at a scale useful to local land managers.

c. Source of Funds: Hatch
   NAES State Funds

d. Scope of Impact: State Specific

Key Theme – Invasive Species

a. Tall whitetop is a non-native weed that has already invaded thousands of acres of Nevada's lands and waterways. This noxious weed may look like a delicate, harmless flower, but it is threatening water quality, wildlife habitat, recreational activities and the economic stability of ranchers and farmers. If it is not contained now, it will cause major environmental damage and economic losses, crowding out all other vegetation and becoming increasingly difficult to eradicate.

   As part of a statewide two-year initiative, a public education and action campaign was launched throughout Nevada. The goal was to teach residents how to identify, control and prevent the further

spread of tall whitetop. A smattering of the activities conducted included the following: a newspaper supplement was developed and inserted into 20 newspapers; a more detailed fact sheet was written, printed and distributed; television and radio Public Service Announcements were developed and distributed; poster displays and educational bookmarks were distributed to nurseries and home supply stores; billboards were designed and displayed, a nine-minute video was produced and workshops, training sessions and demonstration projects were held in weed-infested areas.

b. IMPACT: Reports from Lake Tahoe indicate that more than 80 percent of identified tall whitetop infestations have been controlled. All known infestations in Carson City have been treated. Douglas County went from 25 to 150 confirmed tall whitetop invaded acres during the campaign period. Statewide, callers reported more than 100 new tall whitetop locations.

Sue Donaldson, Cooperative Extension water quality specialist, reported an increase from about 3-5 tall whitetop inquiries per week to about 30 per week after the newspaper insert and other media started hitting.

UNCE initiated and organized the Nevada Weed Management Association. Now operating under the Nevada Division of Agriculture, this effort has spawned a very active invasive noxious weed management program for land managers across the state.

To provide better information for noxious weed management decisions, a natural resource GIS effort combines all available natural resource information to help in solving a number of natural resource issues. Noxious weed infestations are being mapped and digitized for easy sharing. Updates are scheduled annually. Weed management efforts have been developed and coordinated between landowners and land managers..

c. Source of Funds: Smith-Lever & State Matching Funds
Special State Funding from Legislature

d. Scope of Impact: State Specific

Key Theme – Plant Genomics

a. University plant biologists cloned a gene in the tiny Arabidopsis thaliana, a mustard plant that boosts the production of vitamin E in the plant's seed oil. Their genetic engineering of the gene gamma-TMT in the plant seeds elevates the most useful form of the vitamin, alpha-tocopherol, ninefold. Researchers and students pioneered a genetic process in the Nevada lab, which begins with the experimental plant Arabidopsis, jumps to an even simpler bacteria for testing, and then engineers the whole package back into the developing plants. The computer-based technology, called "nutritional genomics," took six years to culminate in a genetically altered plant. In the past year, three additional genes have been isolated from Cyanobacterium Synechocystis and Arabidopsis that contribute to vitamin E's biosynthetic pathway in plant oils.

b. IMPACT: With this latest discovery, scientists are more than halfway to the 150 IU level, which lowers the risk of cardiovascular disease. The next step is to transfer the technology to an agricultural product, such as soybean oil, and increase the most useful vitamin E levels in vegetable oils, the major source of the vitamin in U.S. diets. With transgenic soybeans, the daily RDA could be reached by 2 teaspoons of soybean oil; about a half-cup of the genetically engineered soybean oil would provide the 150 IUs. In 10 years, enough vitamin E-rich soybean fields should be available to have salad dressings on store shelves that are fortified with vitamin E. Anecdotal Impact: "It's estimated that 40 percent of all untimely deaths

can be avoided by diet modification," said Dean DellaPenna. "The genetic engineering we're doing has real potential to benefit people, and this makes me feel good."

c. Source of Funds: Hatch
USDA – Competitive Research Grants Office
NAES State Funds

d. Scope of Impact: State Specific

Key Theme – Plant Genomics

a. The Common Ice Plant (Mesembryanthemum crystallinum), is an annual. Due to its capacity to change metabolic strategies from C3-photosynthesis to Crassulacean Acid Metabolism (CAM), this succulent adapts well to low and freezing temperatures (to an astounding 10 degrees below zero Centigrade), withstands seawater concentrations in rooting soil, and is extremely drought-tolerant.

   Compared to common plants (e.g., corn, maple trees, spider plants), no genetic model exists for CAM plants. To overcome this deficiency, University of Nevada laboratories have initiated a large-scale genetic screening to isolate the Ice Plant's mutants defective in CAM or that are salinity or drought stress tolerance. Since Ice Plant is not a mandatory CAM plant, this pathway should not be essential for normal growth and development of the plant. However, CAM may be essential for long-term survival and reproductive success of the plant under the prolonged conditions of salinity or drought stress encountered in its native habitat. Thus far, more than 20,000 plants have been screened and many putative CAM deficient mutants have been isolated.

b. IMPACT: Our research identifies and characterizes key structural and regulatory components of this important photosynthetic adaptation. Large-scale sequencing efforts and expression profiling using biotechnological techniques like micro-arrays are providing a rich source of sequence information for identifying novel genes or gene family members and expression patterns peculiar to CAM plants.

   If these promising but preliminary results can be replicated and expanded upon, the unique CAM mechanisms of desert succulents could open up new routes for engineering crops that are better able to cope with the harsh environments of semi-arid and arid regions that must be pressed into agricultural service in order to feed the world's exploding population.

c. Source of Funds: Hatch
   National Science Foundation
   NAES State Funds

d. Scope of Impact: State Specific

Key Theme – Plant Germplasm

a. Scientists at the University of Nevada have verified that first generation hybrids between Andean and Mesoamerican races of P. vulgaris grow much slower than either parent (inbreds). Severely reduced leaf growth, yellowed leaves, root system deterioration and increased adventitious roots characterize hybrids. Hybrids showed increased root and leaf growth after exogenous applications of an essential plant hormone (cytokinin). In almost all comparisons, First generation plants contained lower concentrations of endogenous ZR than their parental counterparts (Mesoamerican, P. vulgaris x. Redkloud; Andean, P. vulgaris x Batt). Interestingly, cytokinins were allocated differently between roots, stems and leaves within parents and first generation plants. Taken together, growth acceleration of the 'weak' hybrids by exogenous cytokinins coupled with decreased endogenous concentration suggests that a deficiency of endogenous cytokinin limits the growth of first generation hybrids and may be a causal agent for HW in beans. It is possible, therefore that one of the barriers to hybridization between Andean and Mesoamerican landraces is related to hormone metabolism or allocation. The work indicates that cytokinins may play an important role in the growth responses of first generation hybrids. The growth acceleration of weakened hybrids by exogenous applications of cytokinins provides evidence that cytokinins are involved. This conclusion is further substantiated by estimations of endogenous levels of

cytokinins by immunoassay. Follow-up work is planned to further investigate barriers to hybridization between the Andean and Mesoamerican landraces of bean.

b. IMPACT: Beans are an important worldwide crop forming a fundamental food source, as well as significantly contributing to the economy of underdeveloped countries. The eventual goal of this project is to identify regions in the bean genome that regulate hybrid weakness. This year, investigators hope to develop molecular markers to understand genes responsible cytokinins. To do this we must understand the subtleties of plant hybridization. Future experiments based on this information will provide plant growers/breeders with an important new understanding of root/shoot relationships which will lead to increased crop yield. Second it will give molecular biologists necessary information for studying plant development and to more effectively use wild germplasm for crop improvement.

c. Source of Funds: Hatch
NAES State Funds

d. Scope of Impact: Multi-State Research Project W-150 (CA, CO, CT, GA, IA, ME, MA, MI, MN, MT, NV, NH, NM, NY, ND, OH, OR, PA, SC, TN, UT, WA, WV, WY)

Key Theme – Rangeland/Pasture Management

a. While it is standard practice to delay grazing on all burned areas for several years, there is no definitive proof that this is necessary. Depending on the burn intensity, plant growth can be rapid in a short period after a fire and the grazing deferment may not be as necessary as BLM doctrine prescribes. Seeding as rehabilitation process is a logical conclusion. However because of the large areas affected, and different burn intensities, 100% seeding coverage may not be necessary. Nature has a large capacity to rejuvenate itself. In areas less susceptible to cheatgrass infestation, or where dust problems do not occur, seeding may neither necessary nor desirable. This project investigates the results of seeding and not seeding and subsequent timing of grazing, in a variety of ecological settings.

The study area is a fire impacted BLM permit site. The affected area was divided into 4 large blocks for multiple research purposes. Each of the pastures had similar representatives of vegetation, soils, topography, riparian areas, fire intensity, precipitation zones, and historical wildlife and livestock use. The major design components are seeded and unseeded areas and grazed and ungrazed areas. The grazing treatments were implemented in year one preceding the fire. Stocking rate were designed to achieve 50 percent utilization. Approximately 200 AUMs were used, although this number fluctuated to match the forage produced due to rainfall and growing conditions. Varying the number of cattle and the time they are allowed to graze were used to achieve the 50 percent utilization rates. Representatives from UNR and BLM worked together to collect the monitoring data to ensure useful data for both parties. Animal (weight change, body condition score change -for both cows and calves in cow/calf pairs), vegetation (primary productivity, plant density, plant cover, species composition), and economic performance (cost return analysis, comparison impact analysis, firm to community level impacts) criteria are being used to evaluate the relative success of the treatments. These criteria will provide the basic information to answer some of the questions concerning timing of grazing and fire rehabilitation procedures, as well as suggest future areas of research.

b. IMPACT: Unprecedented wildland fires have had major impacts on vegetation systems throughout the Great Basin. Nursing northeastern Nevada, as well as other burned states, back to ecological health will be a monumental task requiring ongoing commitment from the public, land users and governments as well as long-term funding. However, to accept the status quo of “No Grazing for 3 Years” without

proper scientific proof, could potentially bankrupt many ranchers dependant on BLM grazing permits. This research is providing a guideline that allows ranchers and governmental official to maximize resources while minimizing reseeding cost. Naturally, to do nothing leaves a large portion of the West prone to devastating wildfires, but to hamper ranching productions while applying blanket strategies across vast areas of the West may not be in the best interest of all concerned.

c. Source of Funds: USDA/CSREES
NAES State Funds

d. Scope of Impact: State Specific

Key Theme – Risk Management

a. Cooperative Extension developed a yearlong Risk Management program that teaches futures and options techniques to ranchers. Ranchers negotiate futures and options through the CME to avoid the ups and downs of industry prices. The hands-on class involves participation in monthly marketing meetings, futures and options exercises and a consigned cattle experiment. After negotiating several trading exercises, ranchers consign some of their cattle to group ownership and compete for real. The 2000 class of 48 participants consigned 160 cattle to the program. They made and implemented decisions as a group and shared in the rewards. A feedlot tour in the summer gave the participants a chance to view their collective finished product.

b. IMPACT: Class participants learn how to avoid the pitfalls of the market and save their ranches. Participants who have implemented futures and options management on their ranches have experienced an average net income of an additional $18,000 per year as a result of the program. One participant saved $70,000 through Risk Management techniques.

c. Source of Funds: Smith-Lever & State Matching Funds

d. Scope of Impact: State Specific, Integrated Research & Extension

Goal 2: Safe And Secure Food And Fiber System

Overview: Our POW goal is to conduct research and outreach programming to prevent food borne illness in Nevada. To this end, Nevada research and Cooperative Extension faculty are involved in identifying and measuring the food-borne pathogens shed by cull beef and dairy cattle. This research has alerted us to a growing number of new toxic strains of bacteria in Nevada's beef cattle. By understanding pre-harvest shedding of pathogens, new management schemes to eliminate the introduction of pathogens will be developed and thereby help protect Nevada's food supply.

The data from Nevada research has been incorporated into the Nevada Beef Quality Assurance Program as well as the Hazard Analysis and Critical Point (HACCP) management program to improve consumer confidence in Nevada's beef industry.

UNCE faculty have used this research in a variety of educational programs for producers. UNCE faculty were instrumental working with the Nevada Cattleman's Association to introduce and teach education programs related to the Beef Quality Assurance Program to help improved food safety. Food safety is also a part of all nutrition and food preparation training conducted by UNCE under Goal 3.

Federal and State Funding by Plan of Work Goals

Goal	Federal $	State $	County	Total $	FTE

Nevada Agricultural Experiment Station	**II**	**81,778**	**249,696**		**331,474**	**3.00**
University of Nevada Cooperative Extension	**II**	**45,882**	**189,946**	**184,866**	**420,694**	**6.03**

Key Theme – Food Safety

a. Researchers at the University of Nevada are striving to identify and measure food-borne pathogens shed by cull beef and dairy cattle. Our examinations of local cattle suggest that approximately 10% of Nevada's range fed cattle are host to these toxic pathogens. This research has also alerted us to growing number of new toxic strains of bacteria in Nevada's beef cattle. Our next step is to determine how grazing, forage type, water source, protein and concentrate feeding, antimicrobial feed additives, mineral supplements and environmental conditions affect the survival of these toxic bacteria. The results of this investigation will give researchers a better understanding of the interaction between pre-harvest feeding strategies and will enable them to develop new management practices that improve the health and well being of consumers.

b. IMPACT: Food safety and quality are primary concerns for everyone involved in food production, processing, and preparation - all along the path from farm to consumer. By determining how much any given pathogen is being shed pre-harvest, we can implement measures to insure consumer confidence in Nevada's beef industry.

c. Source of Funds: Hatch
NAES State Funds

d. Scope of Impact: State Specific

Key Theme – Food Safety

a. Ranchers need a way to assure consumers of the high quality and safety of their product and bring beef back to the dinner table.

The Nevada Beef Quality Assurance (BQA) Educational Program was introduced to Nevada ranchers in 2000. BQA programs teach cattle producers in all 50 states about animal genetics, cattle handling, feed purchasing, record keeping, testing and other procedures to produce beef without residue of animal health products or pesticides. BQA programs were created 10 years ago by the National Cattlemen's Beef Association with a goal of producing quality beef that maximizes consumer confidence in the product. Participating cattlemen work closely with veterinarians, scientists and other specialists to keep cattle healthy. BQA safety requirements exceed standards established by the federal government, and most graduates of the program produce safer, better quality beef after completion. Three levels of classes are taught through BQA and each completed level increases the producer's knowledge of safety and quality. The first Nevada BQA program was taught by Cooperative Extension beef specialists and veterinarians.

b. IMPACT: Thirty cattle producers attended the first level one Nevada BQA program in 2000. All 30 participants completed the class and received a certificate for their completion. The lessons they were taught will directly affect the wholesomeness and safety of their beef products and the eating satisfaction of the eventual consumers. Increased consumer satisfaction will lead to increased consumer confidence in beef products and in turn, increased demand.

c. Source of Funds: Smith-Lever & State Matching Funds

d. Scope of Impact: State Specific

Key Theme – Foodborne Pathogen Protection

a. To improve our understanding of the fate of C. parvum eggs from agricultural runoff, Nevada Cooperative Extension and University of Nevada researchers are examining how well various computer models predict the survival of oocysts under controlled laboratory conditions. Their goal is to quantify the ability of C. parvum eggs to survive and use the results to assess the real risk from animal agriculture and wildland runoff. We have now completed the field/lab work on a first order population decay model of oocyst infectivity. These results indicate that through the natural cycle of freeze/thawing experienced in northern Nevada, oocysts suffer a 99% mortality rate. The first order model is now being used to develop a model of population decay that looks at the effects of low soil moisture and high temperatures. Preliminary results indicate that temperatures have a very important effect on oocysts. For example, as a conservative estimate, if oocysts are exposed to about 70F for a month about 90% of the starting number will be lost.

b. IMPACT: Generally, outbreaks across the U.S. of C. parvum are attributable to water treatment facility deficiencies during peak influxes. Development of mathematical models that enable water utility personnel and recreational water managers to prepare for peak influxes of C. parvum will have both economic and public health benefits. By predicting C. parvum's peak influxes into water supplies, facility managers can schedule maintenance of filtration systems pre- or post peak influxes insuring the public against unwanted outbreaks. Managers can also assess the risks posed to swimmers and boaters during periods of high runoff by utilizing the models created during this project.

c. Source of Funds: Hatch
NAES State Funds

d. Scope of Impact: State Specific

Key Theme – HACCP

a. The objective of this study was to assess the prevalence of verotoxin-producing Escherichia coli (VTEC) in culled beef cows (Angus, Hereford, or their crossbreds) at the time of shipping to slaughter (between the months of September 1999 and January 2000). Fecal samples were rectally collected from 82 culled cows (8 to 12 year-old) representing eight Nevada ranches with average herd size of 600 beef cows, of which 10 to 20% are culled annually. The cows grazed meadow regrowth of rangeland forages (i.e., crested wheat grass, brome grass, and tall fescue). Initial isolates were selected using classical microbiological methods based on sorbitol fermentation and 4-methylumbelliferyl- (3-D-glucuronide (MUG) properties. Toxicity of the isolates was determined by performing verocytotoxicity tests. Cytotoxic isolates were detected in fecal samples from eight cows (one cow in each of two ranches; three cows in each of two ranches). Eighteen cytotoxic isolates were further characterized with the API identification system to clarify sorbitol fermentation. Five cytotoxic isolates matched the classical identification of 0157:117 (sorbitol negative; MUG negative) and four isolates were sorbitol negative but MUG positive. The remaining nine isolates were confirmed as sorbitol positive, one isolate was MUG negative, and eight were MUG positive. The VTEC prevalence rate ranged from 0 (4 ranches) to

30% (1 ranch). These results demonstrate that the number of VTEC-positive cows differs within a herd and the cytotoxic isolates are of different characteristics. This suggests the importance of screening beef cattle for VTEC instead of limiting assays to 0157:117. By expanding the detection methods, chances of detecting E. coli are increased and possible on farm management practices that minimize the risk of beef contamination can be implemented. These practices should improve the safety of beef entering the food chain.

b. IMPACT: Food safety and quality are primary concerns for everyone involved in food production, processing, and preparation - all along the path from farm to consumer. By determining how much any given pathogen is being shed pre-harvest, we can implement measures to insure consumer confidence in Nevada's beef industry. The data obtained through this project has been incorporated into the Nevada Beef Quality Assurance program. Management programs throughout the Nevada are being developed based on the epidemiological information. The Hazard Analysis and Critical Control Point (HACCP) management programs has also integrated these findings into their protocols to minimize shedding of food safety pathogens from cull beef cattle in Nevada.

c. Source of Funds: Hatch
NAES State Funds

d. Scope of Impact: State Specific

Goal 3: Healthy, Well Nourished Population

Overview: Our POW goal is to conduct research to better understand healthy life style habits, and educational programs that focuses on healthy life style habits. To this end, Nevada faculty have conducted a Nevada Behavioral Risk Factor Survey to identify causes of risk for coronary heart disease (CHD). This is part of the larger Health at Work program designed to improve Nevada employees' skills to reduce their risk for CHD. As a result of those programs, a significant improvement in Nevada's understanding of their CHD risk occurred, and participants reduced their intake of fat and increased their physical activity. These lifestyle changes are directly related to improved health and well being.

Nevada scientists have evaluated workplace levels of environmental tobacco smoke (ETS) and demonstrated that anti-oxidant supplementation is beneficial in protecting ETS induced DNA damage.

Nevada scientists have identified three factors limiting youth's intake of calcium; an essential mineral for normal bone formation during the early years and prevention of osteoporosis during the later years. The factors include taste, cost and culture. The next phase will be to conduct education programs for early intervention to prevent osteoporosis in high-risk groups of people.

A variety of UNCE educational programs aimed at improving health and nutrition have been undertaken using research information. Educational programs have addressed nutrition, smoking, diabetes. These programs also target a range of people – minorities, seniors and youth. One note worthy education program is a diabetes prevention program targeted at Hispanics, Native Americans and African Americans. The "Chefs For Kids" program has reached over 10,000 students in the past 10 years with nutrition and food preparation education. Evaluations have shown that youth participating in the "Chefs for Kids" program has improved their learning and practices concerning food and nutrition.

Federal and State Funding by Plan of Work Goals

	Goal	Federal $	State $	County	Total $	FTE
Nevada Agricultural Experiment Station	**III**	**117,107**	**415,965**		**533,072**	**9.00**
University of Nevada Cooperative Extension	**III**	**110,209**	**456,253**	**444,050**	**1,010,512**	**16.03**

Key Theme – Human Health

a. In Nevada, more than 60 percent of hospital costs are attributable to negative lifestyle choices, including those that increase the risk of coronary heart disease (CHD) — the leading cause of death in the state. Nevada's Behavioral Risk Factor Survey showed that citizens are at high risk for CHD because of sedentary lifestyle (48 percent), cigarette smoking (30 percent), obesity (22 percent), high blood pressure (21 percent) and elevated cholesterol (20 percent), second highest in the U.S. Nationally, despite educational efforts, seven million Americans are affected by CHD, and 26 million workdays are lost annually due to the disease. Investigators at the University of Nevada armed with employee assessments collected over the past two years that included behavioral, physiological and psychological measures, developed an educational program specifically for the worksite. The goal of the program, entitled "Health at Work" (HAW), is to provide employees with skills necessary to reduce their risk for coronary heart disease. HAW uses a lesson-based approach taught by dietitians, exercise physiologists and social workers to promote healthful food choices, physical activity and stress management practices. Some of these include meal planning and preparation, eating away from home, principals of physical fitness, avoiding exercise-related injuries, progressive muscle relaxation and the importance of social support.

b. IMPACT: Significant improvement resulted among participants in their perceived ability to reduce their CHD risk. Nearly 90 percent of participating employees better understood their CHD risk. The classes and counseling resulted in significant reduction in dietary fat intake, and they were more physically active. More than 80 percent of participants said the program improved their ability to maintain healthy lifestyle changes. Anecdotal Impact: "This program probably saved my life!" said Charlyn Nishuichi, 45, accounts payable clerk in the No. Las Vegas Cashman store. Her blood pressure — which soared over 200 — was brought under control by referral to a doctor and medication. "I went from 250 to 195 pounds, eat a low-fat diet and exercise five days a week," said Chuck Denshire, 46-year-old service supervisor in Cashman's Sparks outlet. "It changed my life."

c. Source of Funds: Hatch
NAES State Funds
Smith-Lever & State Matching Funds

d. Scope of Impact: State Specific

Key Theme – Human Health

a. The experimental objectives of this project are twofold. One, to test whether short-term exposure to environmental tobacco smoke (ETS) results in oxidative DNA damage to mouse heart, liver or lung tissues. Secondly, to determine whether employees working in a smoking environment experience greater oxidative damage than employees working in a smoke-free environment

The first objective was to test whether short-term exposure to environmental tobacco smoke (ETS) resulted in oxidative DNA damage (formation of 8-hydroxy-2'-deoxyguanosine) to mouse heart, liver or lung tissues. The results from these studies showed that short-term exposure to ETS cause oxidative damage to nuclear DNA in lung, heart, and liver tissues of mice. Multiple exposures to the 30-minute ETS regime resulted in even greater oxidative DNA damage. This DNA damage has been identified in the etiology of a number of chronic diseases and is consistent with the number of chronic diseases associated with exposure to ETS. The second aim of this project was to test whether non-smokers exposed to ETS in the workplace had greater oxidative stress/damage than those non-smokers not exposed to ETS in the workplace and whether antioxidant supplementation could reduce any increased oxidative stress. Other criteria for inclusion in the study included not living with a smoker and not taking vitamin supplements. The non-smokers, workplace ETS exposed group, were subsequently supplemented with an over the counter antioxidant complex for 60 days and tests done to see whether this could reduce their oxidative stress/damage. Each of the two groups consisted of 37 individuals, men and women in approximately equal numbers. Two blood draws were conducted within 12 hours of the individual last work shift and analyzed for various markers of oxidative stress and ETS exposure. The results of these studies showed that the group exposed to ETS in the workplace did indeed have greater exposure to ETS (blood cotinine levels). This group also had increased antioxidant enzyme activities which suggest increased oxidative stress. Most significant however was the increase in oxidative DNA

damage in the ETS exposed group in comparison to the non-exposed group. 8-hydroxy-2'-deoxyguanosine levels were 63% greater in the exposed group, thereby demonstrating a significant increase in oxidative DNA damage in this group. The ETS-exposed group was then provided with a 60-day supply of an antioxidant formula consisting of 3,000 mg of b-carotene, 60 mg of vitamin C, 30 I.U. of a-tocopherol, 40 mg of zinc, 40 mg of selenium and 2 mg of copper. After the 60-day supplementation, blood samplers were again drawn and the results were compared with the pre-supplementation values. A 62 % decrease in oxidative DNA damage was observed after supplementation. Lipid peroxidation as well as antioxidant enzyme activities were decrease as well. These results demonstrate that the use of antioxidant supplementation can help to lower at least some of the oxidative damage caused by exposure to ETS.

b. IMPACT: Environmental tobacco smoke (ETS) is an important indoor air pollutant that has been associated with increased risk of cancer and coronary heart disease. This is the first study to look at the effect of ETS exposure in the workplace and to provide evidence that antioxidant supplementation may be beneficial. Our research showed that employee exposed to ETS had a 63% increase in DNA damage over they non-exposed counterparts. Supplementation of antioxidant vitamins did prove to provide some measure of safeguard against ETS. Those who took the supplement saw a 62% decrease in DNA damage.

c. Source of Funds: Hatch
NAES State Funds

d. Scope of Impact: State Specific

Key Theme – Human Health

a. More than 25 percent of the 80,000 new Clark County residents each year are senior citizens. The majority of all elderly residents in Clark County are relative newcomers, arriving within the last 10 years, and many of them lack the traditional support structures associated with work and family.

Community-based educational programming was needed to provide the tools to meet the quality of life needs of Southern Nevada seniors, especially those needs that relate to an independent lifestyle. Educational programs needed to extend independence by enhancing coping skills.

The Seniors CAN educational program was created in Clark County to meet these needs. The Seniors CAN program is a community-based educational program for older adults taught in community centers in urban and rural Clark County. The program is designed to enhance mental acuteness, self-esteem and wellness, thus improving their quality of life. The curriculum includes fifteen lessons on nutrition, personal safety, food safety, finances, health and productivity. Topics selected to be most useful for quality and control of life include strategies to cut costs of food and general living expenses, the importance of a healthy diet and hydration and techniques to reduce accidents, short-term illnesses, crime victimization and consumer fraud. Program participants also receive information on local, state and federal programs and the importance of productivity through volunteer work or employment.

Participants meet once a week for 16 weeks to discuss information that will enhance their knowledge, cognitive skills and ability to maintain independence. The program also aims to improve participants' quality of life by decreasing loneliness and perceived stress.

b. IMPACT: In the first two years of the program, older adults attended more than 1,500 teaching hours. Fifty-two students completed the entire four-month program. The audience included students from diverse ethnic and economic backgrounds. Preliminary data shows a trend toward decreased loneliness and an increased sense of skills among participants. Male students showed a marked reduction in both stress and loneliness. A number of participants reported exercising more and being more aware of what they eat and how it affects their health.

One student who was particularly influenced by the class on hydration said, "I'm a water drinking machine now." Many participants reported looking forward to meeting days and reported planning their schedules around the classes. Another student reported that the information conveyed in the program had "jarred me out of my comfort zone" and opened a new world of information. Many participants reported that the information gave them "more control of their lives."

c. Source of Funds: Smith-Lever & State Matching Funds
County Grant Funds

d. Scope of Impact: State Specific

Key Theme – Human Health

a. Cooperative Extension developed An Ounce of Prevention, a diabetes prevention program targeting Hispanics, African Americans and Native Americans who are at an increased risk for developing the disease. Lessons in both English and Spanish help clients learn how to reduce their risk of diabetes by increasing physical activity and adopting healthy eating habits. More than 600 Las Vegas residents have completed the program. Additionally, this program was expanded through a train-the-trainer component. Community health representatives from Native American communities and volunteers from health committees from African American churches have been trained to deliver this program in their own communities.

b. IMPACT: Evaluation indicates that the diabetes program resulted in both knowledge gain and behavior change among participants. Recognition of factors that contribute to the development of diabetes was increased and a heightened awareness of lifestyle factors related to risk reduction (i.e. physical activity and energy intake) was documented. Participants increased their physical activity through walking and using stairs more often. They decreased their dietary fat intake by modifying food preparation techniques. By helping prevent diabetes in 600 clients, a medical savings of more than $4.4 million was achieved. Finally, a total of 32 individuals have been trained to deliver the program.

c. Source of Funds: Smith-Lever & State Matching Funds

d. Scope of Impact: State Specific

Key Theme – Human Nutrition

a. The principle goals of this project were to identify the most salient motivators and barriers influencing the consumption of calcium rich foods among adolescents; assess knowledge and attitudes toward calcium rich foods among adolescents; assess calcium intake among adolescents; and determine variation in motivators & barriers, attitudes & knowledge & consumption of calcium rich foods across age, gender & select ethnic groups.

Investigators at the University of Nevada have completed Phase I (qualitative data collection) of the project. Phase I centered on focus group analyses and summary analysis grids for all Nevada focus groups. Focus groups consisted of Caucasians, Asians and Hispanic youth ages 11-12 & 16-17 year of age. These were forwarded to the next participating station for verification. The summary grids of all participating stations were then compared to create the master analysis grid for all focus groups. Then all focus group results from all participating states were compiled.

Phase II (quantitative data collection) is now underway. This phase utilizes surveys & food frequency data collection methods.

b. IMPACT: Osteoporosis costs the nation over $10 billion annually -- more than congestive heart failure or asthma. If the population continues to increase at its current rate, the costs of hip fractures alone are estimated to reach $62 billion by the year 2020 (based on 5% annual inflation). It is estimated that the next ten years will bring 5.2 million osteoporosis-related fractures to white women over the age of 44, costing at least 45 billion dollars. It is imperative that programs be established that motivate adolescent women to increase their calcium intake to offset the staggering estimates in the foreseeable future.

Initial findings indicated that three factors contribute to our youth's calcium intake or lack there of: Taste - in school environments, milk is not served at temperatures deemed refreshing. Cost - when choosing between a pint of milk verses a quart of soda, economics prompt soda. Culture - children model their parents and many adults no longer drink milk. The prevention of age related osteoporosis begins in youth with lifelong habits of exercise, proper nutrition and abstinence from tobacco. With the information gathered from this project even the most severely affected group of patients, those who are genetically predestined to osteoporosis, can be taught early intervention measures to help resist the consequences of the disease.

c. Source of Funds: Hatch
NAES State Funds

d. Scope of Impact: State Specific

Key Theme – Human Nutrition

a. Research has shown that if school-age children—particularly those from families with incomes at or below poverty level—get a healthy jump-start on nutrition, their cognitive and physical development will be on course for life, and they will be at lower risk for developing chronic conditions such as heart disease, cancer and diabetes later in life.

Cooperative Extension collaborated with the Fraternity of Executive Chefs of Las Vegas and developed Chefs for Kids, a nutrition education curriculum that was implemented in four "high-need" schools. Every week, educators teach first- and second-grade students about where food comes from, how to create a healthy meal and how to establish good eating habits. Students also learn about healthy food combinations and how to choose foods that provide the greatest overall benefits. The chefs spend 300 hours yearly preparing much-needed breakfasts for the students with food donated by local restaurants and markets. A video curriculum has been developed to expand the program to potentially all the elementary schools in the district through the use of instructional television (ITV). A yearly fundraiser raises money and resources for the program

b. IMPACT: Now in its eleventh year, the Chefs for Kids program has reached more than 10,500 students. An evaluation was completed with 194 fourth and fifth grade students. Of the 194 students, 91 participated in the program and 103 did not. The evaluation showed that, three years after completing the course, participating students retained information learned. Sixty-five percent of participating students correctly categorized foods by food groups with no errors. Only 39 percent of non-participating students could place all foods with no errors. When compared with students who had never received the Chefs for Kids program, basic food knowledge was greater in the participants than in non-participants. Forty percent of participating students could classify a tomato as a fruit compared with only 25 percent of the non-participating students. Of that 25 percent, only half the students could explain that the classification as a fruit was due to the presence of seeds. Over 90 percent of the participating students could identify the presence of seeds as a classification factor. Forty-five percent of participating students mentioned stronger bones and teeth in connection with calcium intake. Only 30 percent of non-participating students could identify the connection.

   The "Adventures with Chefs for Kids" video curriculum won a silver medal for "Outstanding Program of Excellence" from Epsilon Sigma Phi National Honorary Extension Fraternity.

   One child explained the connection between food and physical activity, stating, "Food gives you energy, exercise burns it up." Another child commented, "Nutrition is a healthy thing for your brain because it helps your brain focus on things."

c. Source of Funds: Smith-Lever & State Matching Funds

d. Scope of Impact: State Specific

Key Theme – Human Nutrition

a. The Nevada Nutrition Network (NNN) is a statewide coalition of public and private partners established in 1996 to create, implement and evaluate a nutrition program/campaign that reflects the principles of social marketing for food stamp recipients and/or those eligible for food stamps in Nevada. As a team, the NNN developed a school curriculum for science classes, media activities and an extensive evaluation plan to address the issue of calcium intake among 11 to 14-year-old children.

   The program was launched in January 2000 with classroom instruction implementation and a media campaign in two middle schools. Special events to reinforce curriculum concepts were held at both schools. Furthermore, a calcium-fortified orange juice taste-testing event was conducted at one school to determine the acceptance of this type of juice in the target audience.

b. IMPACT: Of the 543 middle school students who completed the pre- and post-test, grade distribution was as follows: 6^{th} grade, 36 percent; 7^{th} grade, 32 percent and 8^{th} grade, 31 percent. Fifty-one percent of the students were female. Changes in responses from pre- to post-tests suggest that the program was successful in enhancing knowledge of food sources of calcium and the importance of eating calcium-rich foods and minimum calcium requirements. For example, participants were asked to provide the number of milligrams of calcium they needed in a day. On the pretest, no one answered the question correctly. However, 35 percent (n=193) answered correctly on the post-test. Since this was not a question of simple recognition and recall, this represents a significant positive finding. Intake of calcium-rich foods did increase among the sixth grade students, but there was no change in the calcium intake of the seventh and eighth grade students.

   Questions about radio ads, print media (billboards, bus stop shelters and posters), a scavenger hunt, taste-testing events, science lessons and promotional prizes were included in the post-test. The results suggest that exposure and participation were relatively high. Forty-four percent of students reported hearing radio ads, 58 percent saw billboards, shelters or posters, 26 percent participated in the scavenger hunt, 70 percent participated in the tasting event, 89 percent took part in the science lessons and 32 percent received a promotional prize.

   The orange juice taste-testing event was attended by 293 students. Each student sampled orange juice with and without calcium fortification. For three parameters evaluated (color, taste and texture), the calcium fortified juice received a significantly higher rating than the non-fortified juice. This information will be used to support a change in purchasing standards for the school district so that calcium fortified orange juice will be allowed for distribution.

In summary, this program reached a high proportion of the target audience. It resulted in positive changes in participants' knowledge about calcium requirements and food sources of calcium; and participants' attitudes toward the importance of calcium. With respect to food choices, the participants' responses at the post-test suggest that students were more often choosing select target foods. Lastly, the students who indicated a high level of knowledge about food sources of calcium had a significantly higher intake of the target foods.

c. Source of Funds: Smith-Lever & State Matching Funds
USDA Food Stamp Program funds

d. Scope of Impact: State Specific

Key Theme – Medicinal Plants

a. To undertake an appropriate educational program for consumers of herbal preparations, the University of Nevada's investigator found it necessary to describe herb use among a representative sample of Nevada seniors (60 + years of age) and young adults (20 to 30 years of age). Using the descriptive data on herb use, investigators develop a demographic profile of a typical herb user/non-user in order to predict herb use. A total of 296 adults were surveyed regarding herbal supplement use, reasons for use, and general health status. The total sample was divided into two age cohorts older and younger. The older cohort had a mean age of 74, N=169. The younger cohort had a mean age of 22 years, N = 127. Herbal supplements were used by 38% of the younger cohort and 32% of the older cohort. There were no significant differences in herbal supplement use and beliefs in relation to age. The most common herbal supplements used were echinachea, St. John's Wort, gingko biloba, kava kava, and saw palmetto. Reasons for use, for both age cohorts, included ' to boost the immune system,' 'for colds,' 'for depression,' and 'to prevent sickness.' Friends and family were the most frequent influence on the decision to use an herbal supplement. There was a portion of each age cohort, 8% of the older and 5% of the younger, that incorrectly identified a supplement they were using as an herbal supplement - e.g. glucosamine. At present, investigators are collecting additional data and developing an educational program based upon survey results to improve consumer's understanding of herbal preparation and subsequently their decision to use/not use such preparations.

b. IMPACT: Data indicate that some education on the appropriate use and identification of herbal supplements is needed by the populace at large. Given the usage rate of 32% in the older cohort who indicated a significant number of prescription medications, the self-prescribed use of herbal preparations may pose unwanted drug-drug interactions.
With herb supplements commanding a business share estimated at $1.5 billion in 1999 and growing at an estimated 15% per year. And, with one in three individuals having chronic diseases, turning to herbs as an alternative to traditional medicine guidelines are desperately needed. That is not to say, the efficacy and in some cases the safety of these preparations is wanting. But, reducing the numbers of individuals who make inappropriate and/or harmful herb supplement decisions, the project contributes to the need to make Americans healthier.

c. Source of Funds: Hatch
NAES State Funds

d. Scope of Impact: State Specific

Goal 4: Greater Harmony Between Agriculture And The Environment

Overview: Through the deliberate incorporation of diverse and often conflicting interests, the POW goals of the community-based decision-making for natural resources include:

- To catalyze decision-making processes that build communities and produce sustainable agreements
- To facilitate the development of innovative collaborations for the conservation and enhancement of natural resources
- To analyze and strategically confront barriers to implementation of community-based decision-making and collaborative utilization models for public lands

Our POW goals for water quality are to conduct research and outreach on surface and ground water protection, public participation in water policy issues and efficient use of water. Our final POW goal involves conducting research on natural resource issues associated with utilization of the Great Basin rangelands.

In support of these goals Nevada scientists are evaluating pesticide degradation in soil and ground water and by quantifying pesticide transportation, and photochemical degradation rates, predicting potential run-off of pesticides and developing strategies to protect the natural resources.

Researchers at UNR have inventoried, mapped and through GIS technology analyzed selected indicators of biodiversity in Nevada. Their findings indicate that feral horses have a negative impact on plant and small animal species biodiversity. Nevada scientists are utilizing biotechnology to evaluate the tui chub genome and to construct a phylogenetic tee to determine fine scale differences in tui chub sub-populations. The long-term environmental benefits will be to conserve aquatic biodiversity in the state.

In order to evaluate perception and value of multiple-use of public lands, Nevada scientists conducted an economic based (willingness to pay to reduce grazing on high sierra ecosystems) analysis. These results indicated while grazing public lands generally is viewed as having a negative impact to recreationalists, only certain trails warranted a willingness for hikers to pay to remove grazing from these areas. The land use perception models developed here are being adopted by regional public land managers to effectively manage the natural resources.

Research on global and climate change conducted by Nevada scientists indicate the elevated atmospheric CO will enhance the dominance of exotic annual grasses in arid regions which has the potential to accelerate the fire cycle, reduce biodiversity and alter ecosystem production and water balance in North American deserts.

Scientists at the Nevada Agricultural Experiment Station are studying the environmental impacts and economic benefits of irrigated pastures. By monitoring the impact of establishing irrigated pastures on wildlife our scientists are developing recommendations for ranchers, resource managers and decision- makers on livestock grazing regimes that minimize the impact on wetland bird populations. Extensive outreach and campus based education programs (regarding wildlife/grazing interaction and the economics of generating additional income from hunting permits) are being delivered at the field lab workshops.

Nevada scientists have developed a cost-effective sulfate reducing bioreactor for the treatment of acid mine drainage. A pilot plant level reactor has demonstrated effective removal of nickel, zinc, copper, iron and sulfate in acid mine waste. The benefit of this will be an enhanced environment.

Nevada scientists are studying how and why large carnivores (bears, mountain lions, and coyotes) interface with our state's expanding urban/suburban area. Since black bears, mountain lions and coyotes are in the news, our scientists are working with USFS and the Nevada Department of Wildlife in developing educational programs to increase public awareness regarding large carnivores in Nevada and particularly the Lake Tahoe Basin.

Given the nature of Nevada, water and wildfire educational programs have been a primary focus of the University of Nevada Cooperative Extension Service (UNCE). In both of these areas, UNCE faculty have made a significant impact and received local and national recognition for their efforts. Educational programs on using treated effluent for watering golf courses in Las Vegas has led to a significant savings in the use of water. Extension's water education programs for small ranchers along the Truckee River have lead to 148 BMPs taking place on 42 properties which have helped stem the cycle of pollution that contaminates the Truckee River.

In the "living with fire" educational program, UNCE faculty have had a significant impact on people's awareness and preparedness for wildfires. This is an integrated research-Extension effort, and has led to statewide cooperation and involvement of Federal, state and local organizations concerned with wildfire prevention and preparedness. Nevada's fire program coordinator (Area Extension Specialist) received one of

only ten Bronze Smokey Bear Awards given annually by the U.S. Forest Service, the Advertising Council and the National Association of State Foresters. The award recognizes "sustained, outstanding, statewide service in wildland fire prevention over a minimum of two years." Extension's demonstration of the use of sheep grazing to reduce fuels in the urban-wildfire interface ("Only Ewes Can Prevent Fires") received positive responses from city homeowners, and demonstrated the feasibility of livestock grazing to reduce fuels where chemical and mechanical and prescribed burning methods are not appropriate. Federal and State agencies are adopting grazing as another tool for reducing fuels to help control wildfires.

Federal and State Funding by Plan of Work Goals

	Goal	Federal $	State $	County	Total $	FTE
Nevada Agricultural Experiment Station	**IV**	**429,614**	**2,542,597**		**2,972,211**	**46.00**
University of Nevada Cooperative Extension	**IV**	**587,892**	**2,433,799**	**2,368,702**	**5,390,393**	**76.51**

Key Theme – Agricultural Waste Management

a. The research examined the rate of photolysis (chemical reactions that are initiated by sunlight) of three pesticides (pentachlorophenol, napropamide and imazaquin) in a variety of soils. The transformation of these chemicals was also examined with respect to the effect of rain or irrigation systems. Surface-applied water will drive the pesticides into the soil, where sunlight reactions do not occur. Movement of these same pesticides under the influence of evaporating water will bring them to the surface where they will again be exposed to sunlight. To test this the soils were exposed to sunlight and artificial light banks, where variables such as temperature, air flow, and length of light exposure could be controlled. The pesticides were either surface applied and watered in, with regular applications of water to simulate rainfall or irrigation; and subjected to periodical dryings. The rates of upward transport and photolysis were then calculated for a variety of environmental conditions (water content, evaporation rate, sunlight intensity, soil characteristics, air temperature and wind speed). This exercise provided a basis for determining the significance of photolysis as a transformation pathway at the air/soil interface.

   Next, new methods were developed to determine photolysis rates of medium weight pesticides in the gas phase. A 14-gallon chamber was designed and constructed which utilized xenon arc irradiation and could be heated to increase the amount of pesticide in the gas phase. The results of these investigations show that: 1) for the compounds examined, gas-phase photolysis rates usually proceed more rapidly than solution or surface photolysis rates, and 2) the observed photolysis rates were not substantially affected by increased temperatures. Use of elevated temperature chambers for photolysis studies under well-controlled conditions appears to be a useful technique for estimating atmospheric photolysis rates for various moderate to low volatility pesticides.

b. IMPACT: It is the opinion of many scientists that the importance of sunlight-induced processes in this surface fraction of soil has been substantially underestimated, particularly for those chemicals that move with evaporating water. Although photolysis (chemical reactions that are initiated by sunlight) occurs only in the top 3/16 inch of soil, chemicals that are transported in water can move to the surface and be exposed to sunlight. For water-soluble compounds, sunlight-induced transformations on soils are likely to be a significant pathway for breakdown of these compounds. Information on rates of transport and subsequent sunlight reactions provides estimates of how long pesticides will last in the field and potential runoff which will assist in efficient usage with minimal impact on our natural resources.

c. Source of Funds: Hatch
   NAES State Funds

d. Scope of Impact: Multi-State Research Project W-45 (AZ, CA, FL, HI, NV, NM, NY, OR, UT, WA)

Key Theme – Biodiversity

a. Researchers at UNR have inventoried, mapped, and analyzed selected indicators of the biodiversity in the middle portion of the Walker River Basin, Nevada. Habitats include Bridgeport, Topaz, and Weber Reservoirs, California and riparian and other natural and semi-natural vegetation in Smith and Mason Valleys, Nevada. Indicator species include small mammals, birds, lizards, amphibians, native fishes, butterflies and their food plants , and dragonflies. This inventory and analysis will enable us eventually to model potential impacts of water redistribution on upstream habitats and on the species using them.

Initial research focused on identifying areas of conservation interest (ACIs). ACIs include areas with high natural levels of species or community richness; areas, streams, or stream reaches with high biotic integrity; centers of local endemism; essential habitats of sensitive species and important recreational species; natural community types that are at risk; migratory stopovers; important habitat linkages; ecologically sensitive areas; existing conservation areas and research sites. While it was possible to identify many ACIs from existing databases, others were identified in meetings with agency biologists and others who have had extensive on-the-ground experience in the Walker River Basin.

Birds and butterflies were selected as surrogates for biodiversity as a whole. Geographic Information System (GIS) coverage were prepared for the entire basin. These coverages included ACIs, roads, towns, and political divisions; land ownership; catchment basins, permanent and intermittent streams, lakes, and reservoirs; vegetation; point locations of sensitive species; and areas of conservation interest (e.g., areas with high natural levels of species or community richness or biotic integrity; centers of local endemism; essential habitats of sensitive species; migratory stopovers; important habitat linkages; ecologically sensitive areas; existing conservation areas, and research sites). Detailed surveys were done at 60 sites on riparian-dependent birds and butterflies, comparing species richness and composition in natural riparian communities with species richness in 'cultural' riparian communities (e.g., vegetation that has developed along irrigation canals and ditches). We found that natural riparian communities were not only richer in species but also contained a higher proportion of specialist, 'non-weedy' species.

During the final year of the project we began to investigate the impacts of feral horses on biodiversity in Great Basin ecosystems. Since we were unable to locate appropriate paired plots in the Walker River Basin, the study moved outside the Basin boundaries. Results indicate that feral horses have considerable impacts on biodiversity; plant diversity and cover and small mammal diversity, among other indicators, are all reduced significantly in areas with horses when compared to horse-free areas.

b. IMPACT: Water previously allocated for agriculture is more in demand for urban growth and maintaining natural resources. Our data indicate that the loss of some irrigation canals and ditches in the basin will not have adverse impacts on biodiversity provided that natural riparian areas are maintained and/or restored. Through the efforts of UNR's scientists, the green light has been given from the scientific community to begin diverting water into the Walker Lake. One interesting side note precipitating out of this research involves the extremely contentious issue of feral horses on public lands in the west. Our research is the only scientific investigation that demonstrates unequivocally that feral horse herds have a significant negative impact on biodiversity in Great Basin ecosystems.

c. Source of Funds: Hatch
NAES State Funds

d. Scope of Impact: State Specific

Key Theme – Drought Prevention and Mitigation

a. Turfgrass represents a significant portion of the urban landscape in cities like Las Vegas, NV, located in the arid southwest. However, attitudes toward turfgrass as a sole landscape cover have been changing. Much of this change has been driven by the cost of municipal water, which has been rising significantly over the last decade. Water pricing has been an effective conservation tool in convincing both homeowners and turfgrass managers to alter their irrigation management and/or to reduce the amount of landscape area irrigated. Although significant reductions in turfgrass area may occur in the residential setting, recreational areas at schools, parks, and golf courses will still be dominated by turfgrass cover for the foreseeable future.

    At the University's Center for Urban Water Conservation in North Las Vegas, researchers and graduate students studied irrigation uniformity by leaching fraction on Monarch tall fescue (turfgrass) irrigated with saline water. Measurements were made on soil samples collected before, during and at the end of the 18month experiment. These measurement included gravimetric water content and chloride content of the soil, meteorological data, canopy temperatures, plant tissue moisture contents and dry weight yield from the experimental plots of turfgrass.

b. IMPACT: The leaching factor and uniformity are two irrigation parameters that managers have the ability to alter. Optimizing these parameters when using poor quality waters can lead to more favorable growing conditions. Scientists say that if mixed wastewater is used just four out of seven days for six months during the summer season, about 40 percent water savings would occur. Although an economic assessment was not preformed, based on current urban water costs in Southwest (as much as $60 per ha cm in Las Vegas, NV), minimizing the leaching factors could lead to substantial water and dollars savings. Valley water experts say this system, if properly managed, will free up good-quality water during hot summer months and save the community money.

c. Source of Funds: Hatch
    NAES State Funds
    Smith-Lever & State Matching Funds

d. Scope of Impact: State Specific

Key Theme – Endangered Species

a. The loss and fragmentation of aquatic habitats in the Great Basin has diminished aquatic biodiversity; new biological forms have also been created because populations isolated through fragmentation have diverged along independent evolutionary trajectories. If we are to make informed decisions regarding water resource management in Nevada, it is critical that we determine the degree of genetic distinctiveness of these populations and the pattern of historical events that led to isolation. This project is designed to examine these issues by surveying the distribution of nuclear genetic variation in the Tui chub (Gila bicolor) among isolated basins throughout Nevada. There are seven described subspecies of Tui chub in the state. Some are protected and restricted to small patches of suitable habitat, such as single springs. Because Tui chubs are widespread and highly mobile, they provide and excellent opportunity to reconstruct the pattern of isolation and faunal exchange among aquatic habitats through the phylogeographic analysis of biological populations.

    The project depends on the use of hypervariable genetic markers to reveal fine-scale genetic differences in Tui chub populations across the Great Basin landscape. During the early stages of the project, investigators at the University of Nevada screened PCR primers for microsatellite loci that have

been developed in other labs for use with other fish species. Unfortunately, this work demonstrated that these primers are not useful for studying Tui chubs. Therefore, investigators began a new subproject that require much time and effort, but yielded a significant scientific contribution. We explored the Tui chub genome ourselves to identify microsatellite loci and develop PCR primers to amplify those loci. At this point we have identified and sequenced about 40 Tui chub microsatellite PCR primers. We are now in the process of analyzing samples collected from across the Great Basin. Once a phylogentic tree is constructed, population genetic studies of other related species will proceed.

b. IMPACT: All individuals in most species are genetically different from each other (which is easy to see in people and puppies). These genetic differences enable species to survive and adapt in response to changing environmental conditions. With limited genetic diversity change becomes more difficult or impossible.

The long-term environmental benefit of this program will be to improve the effectiveness of efforts to conserve aquatic biodiversity in the state by identifying sites with genetically distinctive populations. This sort of information will permit management to maximize the retention of biodiversity within species or genera that have diversified during the last 11,000 years of the Earth's history.

The long-term societal benefit of this program will be an improved chance that Nevada's distinctive aquatic faunas will persist, continuing to provide aesthetics, recreational and economic value to society. While the management of the aquatic resources in this arid state often provides a forum for conflict among groups with different interests, relevant scientific data can reduce speculation and facilitate conflict resolution.

c. Source of Funds: Hatch
NAES State Funds

d. Scope of Impact: State Specific

Key Theme – Forest Resource Management

a. An important issue surrounding the use of U.S. Forest Service lands is the conflict between the needs of the livestock grazing community and recreational/preservationist communities. One of the reasons this conflict is perplexing is that while the cost of grazing permits is known, the value of the public lands to recreationists and preservationists is not. Clearly benefits accrue to both types of users, but the difficulty is quantifying these benefits.

Researchers at the University of Nevada concentrated on the Hoover Wilderness Area, located on the east side of the Sierra Nevada Mountain range. A total of 7136 backcountry hiking permits were analyzed in this study to estimate willingness-to-pay to reduce grazing on several high Sierra ecosystems (e.g., Jeffrey pine, mixed pine, riparian, rocky alpine, etc.) encountered while hiking. From the permits travel distances were calculated from a total of 598 residential zip codes, and number of trails used while visiting. Trail and vegetative characteristics were obtained from USFS.

This study attempted to synthesize the elements necessary to appropriately treat multiple site travel cost models when measured as trip counts. It also utilized the incomplete demand system specification for dealing with consumer choice theory. The multinomial Dirichlet Model was then employed to value each ecosystem. Like the grazing, the value of the ecosystems depended on what other characteristics are on the trail.

b. IMPACT: One of the issues facing public land managers is the prioritization of those activities which may simultaneously compete for the same public areas. That is, what are the appropriate levels of

grazing on public lands, especially those that have alternative uses. The results indicated that damages to hikers varies considerably from trail to trail in the wilderness. The differences were primarily driven by the ecosystem type. High country grazing by either sheep or cattle causes much lower damages than competition in riparian areas. Certain trails that cross meadows grazed by sheep had hiker placing a welfare value one order of magnitude greater than the lost revenue to ranchers if they did not graze these meadows.

This research has shown that while grazing public lands generally constitutes a negative impact to recreationalist, only certain trails warranted a statistical significance for a willingness-to-pay by hikers to remove grazing from these areas.

The models developed here are now being adopted by regional public land managers to determine the most productive ways to utilize our natural resources.

c. Source of Funds: Hatch
NAES State Funds

d. Scope of Impact: State Specific

Key Theme – Global Change and Climate Change

a. A University of Nevada researcher is conducting a joint project with the Desert Research Institute and the University of Nevada, Las Vegas to improve our understanding of how desert ecosystem will respond to increase atmospheric CO2 levels. To examine the response of a desert ecosystem to elevated CO2, the three groups established the Nevada Desert FACE (free-air CO2 enrichment) Facility in southern Nevada. Measurement we obtained from aboveground production during a two year growing season while continuously maintaining the atmospheric CO2 at 30% greater than normal. The cumulative increase in biomass was significantly higher (roughly double) in elevated CO2 treatments than control treatments. This investigation also found that above ground production and seed rain of Red Brome (an exotic, invader species) increased threefold over that of native annuals in elevated CO2 treatments.

b. IMPACT: The problem with increased atmospheric CO2 lies in the fact that not all plants can compete for resources equally. The data indicates that exotic grasses like Red Brome will quickly invade places like the Mojave and Sonoran desert, converting a desert ecosystem into grasslands driving out the presently dominant desert shrubs. Thus, creating similar fire hazards to those of northern Nevada and the Great Basin, with the invasion of cheatgrass. Consequently, elevated CO2 might enhance the long-term success and dominance of exotic annual grasses in arid regions. This shift in species composition, driven by global change, has the potential to accelerate the fire cycle, reduce biodiversity and alter ecosystem primary production, nutrient dynamics and landscape water balance in the deserts of western North America.

c. Source of Funds: Hatch
NAES State Funds

d. Scope of Impact: State Specific

Key Theme – Hazardous Material

a. Researchers at the University of Nevada, Reno determined mercury concentrations and discharge at sampling points three times a year during Spring runoff, during base flow and in the late summer early fall when flows should be lowest. These data were then used to assess the mercury being transported to the Carson River by the Upper Carson watershed. Next, research teams assessed the form of the mercury being transported by determining if the mercury is dissolved or particulate bound, and at a few sites whether methyl mercury was present and measured total mercury concentration in sediments at all water sampling sites as well as methyl mercury at select sites. To determine organic contamination aquatic insects from Poison and Upper Mountaineer Creek were collected. Sample sites were selected that allowed investigators to assess the impact associated with natural enrichment of mercury versus anthropogenic enrichment of mercury.

   This project demonstrated that watershed areas naturally enriched in mercury can have mercury concentrations that approach the California Ecological Health Criteria and concentrations similar acid mine drainage. This study also demonstrated that macro-invertebrate body burdens of mercury are primarily methyl mercury and natural enrichment of mercury in an area can lead to elevated body burdens.

b. IMPACT: This project provided a database of mercury concentrations and speciation for the Upper East Fork of the Carson River, Nevada watershed. Data collected at the University of Nevada identifies the source of the elevated mercury concentrations measured in the Upper Carson River, providing a means of assessing if the mercury concentrations in the watershed can be reduced or mitigated with remediation actives proposed for the Leviathan mine (a federally designated Super-Fund site). A second database was devised to provide guidelines from which the contribution of mercury by the disturbed Leviathan mine site relative to that from naturally mercury-enriched areas in the watershed may be better constrained. The project has also helped with determination of mercury concentrations in the Carson River prior to the Comstock mining era.

   From the social standpoint this project is providing a framework for assessing the potential impact of mercury on the Washoe Tribe who have the closest downstream community on the Carson River above Carson City at Dresslerville, Nevada.

c. Source of Funds: Hatch
   USGS
   NAES State Funds

d. Scope of Impact: State Specific

Key Theme – Integrated Pest Management

a. University of Nevada researchers have determined that certain pheromones (chemical signals used in insect signaling) can be used as a biological control tool to safe guard our forest. The insect devastation of the trees begins when several bark beetles attack a drought weakened tree and begin to emit a blend of aggregation pheromone molecules that lures other beetles of both sexes to the tree. The subsequent gallery construction and feeding activities of large numbers of beetles generally results in the death of the tree due to deterioration of the nutritive tissue below the bark surface. Molecular studies have resulted in the cloning of a key regulatory enzyme in the production of aggregate pheromones with a number of other regulatory enzymes partially cloned. These enzymes are potential targets for disruption of the pheromone biosynthetic pathway, which may provide the means for a reduction in beetle infestations and subsequent forest death and fires.

Researchers have make extracts from 10,000 larval brains plus corpora cardiaca of tobacco hawkmoths (Manduca Sexta), and tested the ability of these extracts to stimulate fluid reabsorption by the hindgut. The factors extracted from the brain were then purified by HPLC. Once pure, the factors were analyzed for their primary sequence synthetic samples were made. The biological properties of these synthetic samples are now being tested in the laboratory to determine practical applications of proteins.

Another avenue of promising research has scientist at UNR investigating other categories of pheromone produced by bark beetle predators for potential use in directing predators to beetle-infested trees.

b. IMPACT: In order to produce safe, effective, long term, and environmentally benign methods of managing pest populations the University of Nevada is developing alternative strategies for manipulating and disrupting aspects of bark beetle's biology. Without these new approaches to controlling the destruction of our conifer forest, economic losses, either due to increased numbers of forest fires or lost timber revenues, and the aesthetic beauty of Lake Tahoe and it's surrounding areas will be forfeited.

c. Source of Funds: Hatch
National Science Foundation
NAES State Funds

d. Scope of Impact: Multi-State Research Project W-191 (AZ, CA, CO, HI, ID, IN, MT, NV, NM, UT, WA, WY)

Key Theme – Land Uses

a. This project is exploring the economic benefits of irrigated pastures to livestock and to the operator, especially via hunting; and the added benefit of associating irrigated pastures in the vicinity of wetlands. The relationships among soil type, land form, and grazing regime to forage production and cattle weight gain, and to wildlife populations (both birds and mammals), are being explored on nine 10-acre irrigated pastures at the NAES managed Great Basin wetland research site. Results will form the basis for related economic models detailing costs/benefits of this type of operation. Extensive outreach and education programs accompany the project, bringing private and public land managers, educators, students and conservationists to the site for an annual Field Day and Workshop.

b. IMPACT: Throughout the country, ranching operations are initiating diversified management programs that involve development of non-traditional income. At the same time, developers face federal legislation calling for no net loss of wetlands. Constructed wetlands on private lands can yield income from multiple sources - as mitigation sites for wetland degradation elsewhere, and as waterfowl hunting sites. Diversified management programs involving irrigated pastures too may yield financial benefits - through supplemental feed and through augmentation of local and potentially hunted wildlife populations - especially waterfowl. By monitoring the impact of irrigated pastures on wildlife, our scientists are drafting recommendations for ranchers, resource management and government officials in how best to establish alternative incomes.

c. Source of Funds: USDA/CSREES
NAES State Funds

d. Scope of Impact: State Specific

Key Theme – Natural Resource Management

a. A collaborative team of university, agency, state and county representatives and local stakeholders - ranchers, environmentalists, interested citizens - were assembled to develop a consensus and prioritized district restoration management plan. The primary objective of this project is to build upon the coalition that developed the White Pine County Elk Management Plan, to develop model restoration projects and habitat management plans that include both wildlife and livestock. The Ely BLM District would serve as a model, through this process, for the Great Basin Restoration Initiative.

   The project has been renamed as the Eastern Nevada Landscape Restoration Program. The Eastern Nevada Landscape Coalition is being organized as a 501 3c non-profit organization to provide leadership to project planning and implementation. Approximately 25 key members have been identified. The "Executive Committee", which may include up to 7 critical members, will include 3 ex-officio members: the College of Agriculture, Biotechnology, and Natural Resources (CABNR) Arid Rangeland Initiative as coordinator of research and education; the Rocky Mountain Elk Foundation (RMEF) as coordinator of community partnerships; and the Ely District BLM as coordinator of project implementation. The RMEF is committed to raising $200,000 by January 1, 2001 to support the administration of the Coalition for the first 18 months.

   The US Department of Interior's budget currently includes approximately $14 million for the Great Basin Restoration Initiative and it appears that at least $8 million will come to Nevada. The Nevada State BLM office has committed at least 50 % of these funds to the Ely District due to our advance project planning at the community level.

   The BLM is working with Senator Reid's office to establish a 10-year budget commitment for the Great Basin Restoration Initiative of $20 million/year. The CABNR and RMEF are working with the BLM on this effort. At least 8% of the funds would be committed to research and education programs.

   The RMEF and the Arid Rangeland Initiative will continue to work toward developing a major grant proposal for cooperative research and education programs on habitat management.

b. IMPACT: The Eastern Nevada Landscape Restoration Program holds no hidden agendas. This is not about kicking livestock off public lands, or closing public lands. All interested parties need to work towards common visions such as clean air, wildlife habitat, and opportunities for rural areas to diversify their economies. It is about achieving healthy natural resources and sustainable economies. Last year about two million acres burned in the western states. We all need to take a proactive approach to stop the spread of noxious weeds, especially exotic annual species such as cheatgrass. The spread of pinyon juniper is also impacting rangeland health. Through the collaborative efforts organized by way of this project, decisions are being made that work for the good of all, not just those with a vested interest.

c. Source of Funds: USDA/CSREES
   NAES State Funds
   Smith-Lever & State Matching Funds

d. Scope of Impact: State Specific

Key Theme – Nutrient Management

a. The objectives of this research were to 1) measure the cycling rates of nutrients in forests of eastern Sierra Nevada, 2) use a Nutrient Cycling Model to simulate the effects of various influences (fire, or increased pollutant inputs) on these forests, and 3) compare model results with data from burned sites and sites with very high pollutant loads. Results from studies so far have shown that snowbush (Ceanothus velutinus) enhances soil fertility without any side effects and that forests of the eastern Sierra Nevada naturally have very different amounts of available nitrogen and phosphorus. University of Nevada's researcher Dale Johnson believes that the differences in N and P are due to tree species, elevation, and soil type. This hypothesis was tested by sampling additional forests to complete the species/elevation/soils matrix and by analyzing the phosphorus retention capacity of the soils. The Nutrient Cycling model has been calibrated for the Jeffrey pine stand and the effects of climate change (both precipitation and temperature) were simulated. The effects of fire (both wildfire and prescribed) were simulated with a spreadsheet model and compared to field data.

During the course of this project, the University achieved progress on many fronts. First, investigators have characterized the nutrient cycles in forests of the eastern Sierra Nevada, and found that 1) nitrogen, sulfur and hydrogen ion fluxes are very low but base cation fluxes are very high; 2) soils and litter from sites in the eastern Sierra Nevada have very high rates of nitrogen immobilization compared to soils from more humid forests; 3) patterns of nutrient release during snowmelt differ substantially from other snow-dominated systems; 4) phosphorus availability varies by over a hundred fold among various soils of this region, depending on parent material and the degree of soil weathering; and 5) fire and post-fire nitrogen fixation exceed nitrogen deposition and leaching by over a 1000 fold.

b. IMPACT: The results of these studies can be used to asses the effects of climate change, fire, and atmospheric deposition on forests of Little Valley, Nevada and, by extrapolation, to the eastern Sierra Nevada mountains. By accumulating background data on soils and vegetation nutrient status UNR investigators are providing valuable links in the puzzle to assessing the effects of many other environmental changes on these forest ecosystems including effects on soils, forest nutrition, and water quality.

c. Source of Funds: Hatch
NAES State Funds

d. Scope of Impact: State Specific

Key Theme – Water Quality

a. The project studied the effects of spatial variability of soil properties and management practices (logging, development and clearing) on ground water in the Lake Tahoe Basin. Specifically, measurements of ground water discharge quantity and quality were made in Lake Tahoe using seepage meters and piezometers adjacent to the Incline Creek watershed which is heavily developed. Ground water discharge and chemistry data were used to develop an integrated model of watershed response to both seasonality and degree of development. An integrated landscape scale hydrologic model will also developed for both watersheds using the ground water discharge data collected over several years.

Results from the seepage meters and peizometers showed that ground water discharge from around the shoreline directly into Lake Tahoe represented less than 1% (8-24 acre-ft/yr) of the total discharge (stream flow) from Incline Creek watershed. Ground water discharge was observed to decline significantly with distance from shore, with the majority of discharge occurring in the first 30 meters from shore. No seasonal trend in discharge was observed. Of significant finding however is the estimation of nutrient loading from this rather small amount of measured ground water discharge to the

lake. Using nutrient data collected from ground water wells in the Incline Creek watershed along with stream flow and nutrient data, our data suggests that between 3 and 45% of the annual inorganic nitrogen lost from the watershed is due to ground water discharge. Further refinement of the estimate, using additional well chemistry data suggests that approximately 14% of the total inorganic nitrogen supplied to Lake Tahoe from the Incline Creek Watershed comes from direct ground water discharge. Phosphorous loading from the ground water was an insignificant component, due to the limited mobility of phosphorous compounds in aquifer material.

While further research is needed, the principal objective of this study was accomplished and clearly shows that ground water is a significant component of the nitrogen budget of Incline Creek Watershed and most probably to all of the watersheds surrounding Lake Tahoe.

b. IMPACT: At the present rate of clarity loss (12-18 inches per year), Lake Tahoe's clarity is severely jeopardized. If measure are not taken to control nutrient influx in our generation, future generations will look forward to a lake green with algae, rather than the spectacular blue clarity we take for granted today. Research was conducted at Lake Tahoe to directly measure the amount of nutrients entering the lake from subsurface ground water. Results indicated that while the surface streams of Incline Village, Nevada make up more than 99% of the total water reaching the lake from the Incline Village area, ground water discharged directly into the lake accounts for approximately 14% of yearly loading of nitrogen to the lake. These results point out that ground water protection, particularly reducing ground water pollution from fertilizers and other nitrogen sources will be important to improve the quality and clarity of Lake Tahoe.

c. Source of Funds: Hatch
NAES State Funds

d. Scope of Impact: Multi-State Research Project W-188 (AZ, CA, FL, IA, MN, MT, NM, OH, OR, WI, UT)

Key Theme – Water Quality

a. Industry, labor, government, and environmentalists agree on one issue: that acid mine drainage is the number one environmental problem facing the mining industry. Acid mine drainage occurs when sulphide-bearing minerals in rock are exposed to air and water, changing the sulphide sulfur to sulfuric acid. This acid can dissolve heavy metals found in waste rock and tailings such as lead, zinc, copper, arsenic, selenium, mercury, and cadmium, into ground and surface water. Acid mine drainage and heavy metals pollution can poison ground and drinking water. It can also destroy aquatic life and habitat.

For the completed project, University of Nevada scientists have developed a sulfate reducing bioreactor for use as treatment systems for acid mine drainage, utilizing inexpensive alcohols (methanol, ethanol and ethylene glycol) as carbon sources that can be dripped into bioreactors. Renovation of the existing bioreactor consisted of installing a synthetic liners to reduce infiltration, retrofitting the reactor with larger diameter pipes to prevent clogging and improve flow distribution, and installing a flow control devices to improve hydraulic control of the system. To date, investigators have demonstrated that each of these alcohols can serve as a carbon source for sulfate reduction in laboratory studies. A pilot scale bioreactor at the Leviathan Mine, nickel, zinc and copper have been effectively removed from an acidic stream and iron and sulfate concentrations have been substantially decreased in the effluent..

b. IMPACT: This bioreactor has been demonstrated to effectively treat a major source of water pollution from acid mine drainage in the western United States. At a cost of about two dollars per day to treat

roughly 6000 gallons of water (the maximum flow from Leviathan Mine), owners could effective treat this facility for the next thousand years and still not have spent as much as some lime treated facilities, the previously least expensive method. Other major benefits of this procedure is that bioreactors can be sized to handle a variety of waster water flow rates; and, it is a continuous feed process where lime treatments are applied repeatedly as lime is lost to seasonal runoffs.

c. Source of Funds: National Science Foundation
NAES State Funds

d. Scope of Impact: State Specific

Key Theme – Water Quality

a. The Las Vegas Valley is one of the fastest growing areas in the nation with nearly 1,000 new residents each week and more than six million tourists per year. The area is also one of the driest in the nation, and over-irrigation of urban landscapes is occurring. If the trend continues, Las Vegas could run out of water by 2010. The issue received national attention with the Mandalay Bay's foundation problems and the water recycling at the Mirage Hotel.

Cooperative Extension specialists aim to find "new water" by investigating the uses of a shallow saline aquifer near the strip and by teaching golf course and park managers to use treated sewage effluent instead of freshwater for the maintenance of plant life. The shallow aquifer under the Las Vegas surface, associated with the hotel problems, is estimated at more than 100,000-acre feet. Researchers have discovered that the water can be used as a supplemental source during peak demand times. The water has a salt content two to eight times higher than the Colorado River, but it can be successfully used on certain turfgrasses if managed properly. Researchers have also found that using treated wastewater on large turfgrass vegetation conserves the limited freshwater supply for human consumption. Cooperative Extension specialists offer a series of seminars for landscape professionals on how to best use poor quality water

b. IMPACT: The water classes are the first to be taught in the Las Vegas area. Nine Las Vegas golf courses are now involved in a research project on the use of treated effluent. Researchers have developed a rating system of plants that golf course and park managers can use when applying wastewater to prevent damaging vegetation that does not react well to high levels of salt. By using the wastewater on a cyclic irrigation system during peak demand months, researchers have been able to conserve as much as two-acre feet of water per year and free up as many as 60 days in which freshwater would not be needed for these applications, all without loss in vegetation color, health or durability. If aquifer water and other wastewater are used properly in just four out of every seven days for the summer season, 40 percent of freshwater can be saved.

c. Source of Funds: Hatch
Smith-Lever & State Matching Funds
NAES State Funds

d. Scope of Impact: State Specific

Key Theme – Water Quality

a. The number of small ranches in northwest Nevada has grown exponentially in the past decade. With the increase in small acreage ranches comes an increase in water pollution in nearby rivers and streams. Many small ranchers are not familiar with the proper irrigation and sewage treatment methods that can prevent water systems from becoming polluted. Many ranches contain contaminated well water and leaking septic tanks.

For six years, Cooperative Extension has taught small ranch managers in southern Washoe County about practices that can help reduce non-source water pollution on their land. The Small Ranch Water Quality Program has increased small ranch managers' water pollution knowledge as the number of small ranches in the area increases. To combat the problems, educators teach traditional classes, publish a monthly newsletter and the *Small Ranch Manual*, provide one-on-one site visits and do free drinking water analyses. They provide homeowners with information to allow them to make informed choices about their use of water, waste removal and other agricultural practices. UNCE is also heading an effort by eight western states to develop a teaching curriculum aimed at small acreage audiences. A major restoration project along Steamboat Creek involving stabilization started in 2000.

b. IMPACT: This program has helped stem the cycle of pollution that contaminates the Truckee River. Forty-three site visits were made to assist landowners in the implementation of Best Management Practices (BMPs). A survey of residents revealed 148 BMPs have taken place on 42 properties. The program newsletter was awarded the 1999 AT&T Communication Award for the nation's best newsletter by the National Association of County Agricultural Agents. The newsletter can be viewed at: www.extension.unr.edu/waterqualnews/water_quality_news.html.

"Sue's been very helpful," said Greg Thibodeaux, an eight-year resident of Old Washoe Estates, about Cooperative Extension water specialist Sue Donaldson. "She's taught me how to maintain my well, conserve water and control weeds. I read her newsletter through and through. When all of us do these things, just think of what we're doing for the ecology and the entire area."

c. Source of Funds: Smith-Lever & State Matching Funds

d. Scope of Impact: State Specific

Key Theme – Wetlands Restoration and Protection

a. Researchers at the University of Nevada investigated the degree to which water birds use flooded fields and whether the method of flooding affects their use. The goals were two-fold. First. they evaluated how Californian rice fields might be managed during winter to maximize their potential as surrogate wetlands. In addition, investigators used the fact that rice fields are an excellent experimental system (e.g. many treatments and replicates were available, fields were uniform. etc.) to examine ideas of broader significance to wetland bird management. Specifically, they tested the hypotheses that densities of individual bird species differ between: (1) fields that are flooded by rice growers and those that are not; (2) flooded fields that receive different straw management treatments; and (3) fields that are flooded to different water depths. In addition, researchers compared bird densities during two winters with extremely different weather conditions to see whether increased rainfall affected bird use.

b. IMPACT: Intentionally flooded rice fields received significantly greater use by 24 of 31 species studied. We found no differences in the densities of most species in flooded fields that received different straw manipulations to improve decomposition rates. Exceptions included several small shorebirds which occurred at highest densities in fields where straw was incorporated into the soil. Water depth

affected the occurrence of species, but was not a major factor determining the abundance of individual species. Depths of 15-20 cm resulted in frequent use by the greatest number of species.

This study shows that flooding rice fields increased suitable habitat for most, but not all, species studied. However, those species that occurred at lower numbers are generally some of the commonest birds occurring in the Sacramento Valley; in contrast, those that occur at higher densities are species that have undergone the most significant declines in the region as a result of wetland destruction.

Worldwide, aquatic ecosystems are being destroyed and altered at an increasing rate. In the continental United States, more than half of all wetlands have been lost in the last two centuries, primarily through draining for agriculture. Declines in waterfowl populations, and the growing recognition of the biological and economic value of wetlands, have led to increasing concern about these losses in North America. This concern has resulted in the creation of a variety of programs to protect extant wetlands, primarily through acquisition by government agencies and nonprofit conservation groups. While these efforts have preserved numerous sites and enabled restoration at others, they have not prevented a net loss of wetland habitat nor continued declines of wildlife populations.

Reversing these trends therefore will probably require providing suitable wetland habitats on privately owned land. Successful development of such strategies is contingent on land management practices that maximize benefits for wildlife in ways compatible with the primary use of private lands.

c. Source of Funds: National Science Foundation
NAES State Funds

d. Scope of Impact: State Specific

Key Theme – Wildfire Science and Management

a. This research project implemented a method of incorporating stated and revealed preference data to measure changes in recreation use and economic value of recreation for unburned, recently burned and recovered areas in National Forests in the Rocky and Sierra Nevada Mountains. Researchers then evaluated the consistency of responses to actual forest conditions resulting from fire versus intended behavior conditional on depiction of fire effect. Finally, investigators developed a methodology to utilize the relationships developed in this analysis to evaluate the impacts of fire on use and benefits in areas of the intermountain west that are not part of the specific areas studied under this cooperative agreement.

b. IMPACT: This project was interested in estimating the impacts of fire on resources and the resulting economic consequences - a difficult problem for fire managers. Part of the problem is due to the multiple and often vaguely defined output of the forest, in addition to the traditional expectation of the right to enjoy many services of the forest at negligible or no cost. The fire manager's problem is also complicated by the fact that the effect of fires on the production stream of many goods and services from the forests and the current fire planning tools depends on the value of all resources affected by fire.

   The results of this study are providing valuation information to the USDA Forest Service and US DOI agencies for their use in budget requests and finding decisions regarding fire prevention and suppression efforts for public lands in the Rocky and Sierra Nevada Mountains. This study also provided estimates of how actual forest specific visitation changes over time due to fire and how the value of forest based recreation is affected by catastrophic fire and by prescribed burning. This information has now been integrated into the formal fire management planning models such as National Fire Management System (NFMAS) and FIREPRO used by the USDA Forest Service and US DOI agencies.

c. Source of Funds: Hatch
   NAES State Funds

d. Scope of Impact: State Specific

Key Theme – Wildfire Science and Management

a. “Living with Fire” is a comprehensive, multiagency project aimed at teaching homeowners how to live more safely in the high wildfire-hazard environment of the eastern Sierra Nevada mountains. This education and research collaboration is enhanced by the Sierra Front Wildfire Cooperators, a group of 12 Nevada and California firefighting agencies. The collaborators came together to help communities prepare for dangerous wildfires. In 1999 alone, fire consumed nearly two million acres of Nevada’s rangelands. In 2000, an additional 600,000 acres went up in smoke. It’s merely a matter of time before the forests and adjacent communities burn.

   The collaborators are fighting wildfire on two fronts: prefire activities that improve the survivability of people and homes; and a study on the use of prescribed burns to manage fuel reduction and improve forest health. In 1999, the newspaper supplement, *Living with Fire: A Guide for the Homeowner*, was reprinted and inserted into Nevada newspapers totaling 100,000 circulation. The document can be viewed at www.extension.unr.edu/FIRE/FrontPage.html. The Fire Forum, Nevada’s first statewide conference on wildfire, was chaired by a U.S. Senator. On the research side, pre- and post-data were collected on the use of prescribed burns to manage fuel reduction and improve forest health. Specialists

have developed 72 wildfire-rating maps on various vegetation types covering 3,200 square miles for use by homeowners, developers and firefighters for wildfire protection. Specialists have made recommendations for defensible space distance and vegetation management to homeowners, and educators trained landscapers and neighborhood groups on fire-resistant materials and techniques. During 2000, the program components carried out in the eastern Sierra Front included the following: three television and radio public service announcements that were produced and distributed, billboards were produced and posted, five television news interviews were conducted, four 30-minute radio news programs were recorded and aired on 19 radio stations and the popular *Living With Fire* publication was reprinted and reinserted into area newspapers

b. IMPACT: The *Living with Fire* publication was so successful that more than 270,000 copies were printed by 18 other agencies and groups in 12 states. More than one million copies of *Living With Fire* have been distributed. A major outcome of the Fire Forum was the development of the Nevada Fire Safe Council with representatives from 23 private and governmental agencies. This non-profit group will work on solutions to reduce loss of lives and property from the threat of fire in Nevada's local communities. Nevada's fire program coordinator (Area Extension Specialist) received one of only ten Bronze Smokey Bear Awards given annually by the U.S. Forest Service, the Advertising Council and the National Association of State Foresters. The award recognizes "sustained, outstanding, statewide service in wildland fire prevention over a minimum of two years."

"This is one of the best documents I've found that illustrates wildfire hazards and mitigation options and techniques," a veteran Colorado wildfire safety coordinator said of the *Living with Fire* tabloid. An Oregon homeowner said, "Your information might just be the catalyst to galvanize people into taking action."

c. Source of Funds: Hatch
Smith-Lever & State Matching Funds
NAES State Funds

d. Scope of Impact: Integrated Research and Extension
Multi-State (NV & CA)

Key Theme – Wildfire Science and Management

a. In collaboration with other agencies, Cooperative Extension and the Experiment Station conducted a project to evaluate the effectiveness and practicality of controlled sheep grazing. The sheep were brought in to create a fuel break along the urban-wildland interface of Carson City, Nevada on C-Hill, an area known for its propensity to burn. Three hundred and fifty ewes grazed a 200-foot wide, 2.5-mile long corridor divided into 20 mini-pastures for one month in the spring and fall.

b. IMPACT: The sheep reduced the amount of wildfire fuel from 700 to 2,000 pounds per acre, depending upon the treatment. In addition, 71 to 83 percent of fine fuels, which burn easily, was removed; the height of fine fuels was cut reducing the length of flames during fires; and cheatgrass was trampled, also reducing the fire hazard. Nearly 90 percent of adjacent homeowners supported the project and preferred the sheep to other methods of creating fuel breaks. The results indicate that controlled sheep grazing is an effective and acceptable tool to create fuel breaks along the urban-wildland interface. The "ewes" story received national media coverage including a story by Paul Harvey, an article by nationally syndicated columnist Baxter Black, articles in numerous major newspapers and more than 19 stories in

local newspapers. The sheep grazing project will be expanded to other areas in western Nevada under a separate program.

U.S. Senator Richard Bryan was quoted in a *Reno Gazette-Journal* article saying, "Your sheep are getting national attention." An editorial in the same newspaper stated, "These are the kinds of innovative ideas that will help us better manage our area."

c. Source of Funds: Smith-Lever & State Matching Funds
NAES State Funds

d. Scope of Impact: State Specific, Integrated Research and Extension

Key Theme – Wildfire Science and Management

a. Residents in Douglas County, Nevada always knew their homes were in danger of being destroyed by wildfires, but didn't always know how they could help prevent the destruction. Homeowners were looking for a way they could stop the fires from destroying their homes. By eliminating excess vegetation around a home, its survivability during a wildfire increases. Few homeowners are quick to rid this vegetation though. Most don't know what to remove, how to remove it or where to dump it.

Cooperative Extension educators developed Compost Your Combustibles in 1999 to address these obstacles in Douglas County. Partnerships were formed with local fire districts, governmental agencies, refuse companies and composters. The program teaches property owners about defensible space practices and vegetation management at free neighborhood workshops, provides free disposal or vegetation at several convenient drop-off locations and transports the vegetation to an operation that recycles it to make compost. The goal of the program is to eliminate excess vegetation around homes and to stop homeowners from burning the vegetation and creating new hazards to the environment. In 2000, educational direct-mail pieces were developed and mailed to 2,700 residents in targeted high hazard areas. Two workshops were also held to educate local residents on what to remove and how to remove it.

b. IMPACT: In the program's first year, 560 tons of plant materials were disposed of and recycled through the program. That's 560 tons of material that wasn't dumped or burned. One year later, 664 tons of potential fire fuels were removed and recycled. Burning produces smoke, releases pollutants into the air and poses additional fire hazards. Local fire departments were happy to report a dramatic reduction in burn permit requests since the programs start. An educator working on the program said, "We had so much material dropped off, it was difficult to keep up with demand."

c. Source of Funds: Smith-Lever & State Matching Funds

d. Scope of Impact: State Specific

Key Theme – Wildlife Management

a. To provide a basis for understanding how and why carnivores interact at the wildland-urban interface, several key questions are being addressed. To what extent do carnivore densities become limited at urban areas because of increased mortality? If mortality is high at urban interfaces, is suitable (urban) habitat unsaturated, such that removing "urban" individuals is merely replaced by other dispersers? Can models based on source-sink dynamics be applied from wildland to urban settings? If so, which

individuals disperse to urban areas, and how do home range sizes differ between urban and wildland regions? What is the effect of different food resources on carnivore densities and life histories?

To date 32 black bears and two mountain lions have been collared. In addition, data have been collected on a total of less than 50 bears at the urban wildland interface. During the past year, collars have been placed on individuals at the urban-wildland interface and on wildland individuals that are being used as a control group. Collared individuals are tracked using telemetry both from the ground and via fixed-wing aircraft on a weekly basis. Currently, investigators are examining and collecting data on black bear dens including their locations and various physical characteristics associated with the dens. Cubs of females are being examined to assess mortality rates over the past year and reproductive rates for females giving birth during the current winter. Mortality and home range data are currently being analyzed. Data are also being collected from various entities on past and current levels of large carnivore conflicts, which involves the loss of livestock and pets and/or other property damage. Mountain lions are currently being captured and coyote trapping will begin in the next few weeks. The research has involved a cooperative effort with the Nevada Division of Wildlife (NDOW) as they are assisting in the capturing of individuals and by supplying various equipment and personnel. The research has also involved other entities including, but not limited to, the USFS, local police and sheriff offices, and various county and city entities.

b. IMPACT: As urban sprawl continues in Nevada, the number of conflicts between humans and large carnivores will continue to increase. Black bears, mountain lions, and coyotes already capture the public's imagination and interest in the state of Nevada. For example, there have been over 20 local newspaper stories, nine television reports, and numerous radio news programs covering black bears and mountain lions and this study on the wildland-urban interface. In addition many of these articles covering this project and large carnivores in Nevada have been distributed over the Associated Press and are known to have appeared in papers in Oregon, Texas, and Maryland. Investigators are also becoming involved with the USFS and the Nevada Dept. of Wildlife in establishing a program on educating the public about large carnivores in Nevada and the Tahoe Basin. Instructors have given several education programs in the region and are continuing to set more dates to give programs in the coming year.

   This study resulted in data and management guidelines that potentially minimize conflicts between humans and large carnivores in Nevada. Results from this study are now being reviewed by a number of western states that also deal with large carnivores.

c. Source of Funds: Hatch
   NAES State Funds

d. Scope of Impact: State Specific

Goal 5: Enhanced Economic Opportunity And Quality Of Life For Americans

Overview: Our POW goals in rural economic development include conducting research and subsequent education for decision-makers on changing economic dynamics for their communities, developing leadership opportunities for community decision-makers, establishing and evaluating innovative decision-making models and extending research results in educational programs to stakeholders.

In the area of youth and family development our POW goals include educating parents regarding quality childcare, conducting research and outreach on youth at risk, and conducting research and outreach learning on literacy.

In response to these goals, Nevada scientists and educators have developed a "cow cost" beef cattle model that predicts animal response and profit potential to evaluate alternative breeding and management programs. The cow cost model is available to our stakeholders through the Internet and is currently being employed by over 100 producers as well as lending institutions including the federally based Farm Credit System. This model allows users to evaluate a multitude of economic situations to more effectively improve ranch efficiency and economic viability.

Nevada faculty have designed a Managing Natural Resource Disputes program designed to educate citizens, decision makers and resource managers regarding collaborative processes and their role in managing disputes over use of natural resources. As a result, our stakeholders are gaining the social skills to facilitate disputes over usage of our public lands.

Nevada scientists have developed time series models to assess viability of regional gaming markets and the implication of rural economic growth. These models will be useful in determining the economic impact of expanded gaming activities on rural development in Nevada and Native American gaming in Nevada.

University of Nevada faculty have administered the Child Caregiver Guidance Survey to child care providers and then they evaluated the quality of child care. They have established a database to enable caregivers, educators and other stakeholders a mechanism to evaluate the quality of childcare in Nevada.

UNCE faculty used the above research and other information in developing the "Caring 4 Kids" training for caregivers. This is a series of training modules including videos, self-study guides and tests. The modules are free and available at 47 Nevada public libraries and Cooperative Extension offices. UNCE faculty have also developed a 50 page guide to help youth workers and volunteers recognize and report child abuse. The book is also available on the web. Social-service agencies, district attorneys and health care providers throughout Nevada, other states and other countries have adapted the program to train their employees to be on the lookout for signs of child abuse.

UNCE's Project MAGIC (Making a Group and Individual Commitment) educational program was designed to teach at risk teens the skills necessary to become productive members of society. The program received the 1997 National Award for Excellence at the National Rural Institute on Alcohol and Drug Abuse and from the Center for Substance Abuse Treatment. A decline in per capita incarceration was observed in those counties where MAGIC was implemented, and among youth participating. Project MAGIC has been adapted from rural to urban counties, and to Reservations.

The Healthy Families Nevada (HFN) and the Nuevas Familias were developed to help new parents get their children off to a healthy start. Doctors, nurses and social workers refer expectant mothers to the program. Interested participants can have a volunteer visit them as often as once a week. In addition to sharing valuable parenting knowledge with the young mothers, the volunteers support the mothers by listening to their problems and offering solutions. Nuevas Familias is to reach vulnerable, Hispanic, first-time parents and provide culturally appropriate parenting support and education. As of 2000, 757 families have benefited from the HFN program. The staff worked with 58 first-time mothers and taught 33 group classes with 669 participants. The rate of abuse and neglect toward the children of participants has decreased. Only three percent of mothers in HFN had substantiated reports of child abuse in a one-year period, compared with 12 percent of young mothers statewide. In addition, most mothers enrolled in HFN complete their education, and fewer are unemployed than mothers not enrolled in the program.

Nevada scientists have developed and tested a theoretical model of factors influencing children's functioning following divorce. The model evaluates the importance of various factors in the ability of the child to function

following divorce. This project provides practitioners with a method to review the implication of their intervention activities. The long-term result should be improved intervention strategies for children and adults in divorced families.

Nevada scientists have utilized a national level model to evaluate the economic impact of rock climbing as a tourist attraction in Nevada. Results from this survey will permit decision-makers and land managers to better manage the public lands for a diversity of activities.

Federal and State Funding by Plan of Work Goals

	Goal	Federal $	State $	County	Total $	FTE
Nevada Agricultural Experiment Station	**V**	**183,240**	**912,132**		**1,095,372**	**9.00**
University of Nevada Cooperative Extension	**V**	**305,750**	**1,265,766**	**1,231,911**	**2,803,427**	**44.46**

Key Theme – Agricultural Financial Management

a. Researchers at the University of Nevada have developed a beef cattle model "CowCost" that predicts animal response and profit potential for alternative breeding programs based on varying management systems. Simultaneously, predictions are being verified with actual ranch production data. A sheep model is now completed with data from cooperating ranches that addresses costs and returns with low input systems compared to increasing levels of inputs. Investigators are also incorporating variables into three additional models that include: alternative marketing programs, retained ownership, production systems to meet both producer and consumer needs, strategic alliances, proactive natural resource management strategies, analysis of consumer markets, and dietary needs preferences along with grazing behavior of elk, mule deer, beef cattle and sheep on various ecosystems to evaluate environmental stability. All four models are available for download via http://www.ag.unr.edu/vetmed in a self-contained applications that requires minimal computer skills to install and run.

b. IMPACT: The first computer program "CowCost" was completed in 1999 and has been released in a multitude of venues. It is available free for download on the Internet and is being used by over 100 producers as well as several lending institutions including the federally based Farm Credit System. On the educational front, Penn State is training students in their Beef Production courses in using the CowCost software. Three additional models "Feedlot Projections", "Grassfat" and "OverWintering" are now also available for download. These ancillary models demonstrate how livestock grazing can be managed in harmony with other public land uses such as wildlife and fisheries habitat and how livestock grazing can be used as a range improvement tool.

   By developing computerized, dynamic mathematical models for ranchers we are providing tools that allows users to simulate a multitude of economic situations. Beef cattle and sheep production models are focused specifically towards western ranches with seasonal public lands grazing. A number of production options evaluate profitability to the producer, their impact on or contribution to an industry structure to improve efficiency beyond the ranch in the production, processing and marketing sectors, while meeting consumer needs for quality and consistency of product.

c. Source of Funds: Hatch
   NAES State Funds

d. Scope of Impact: Multi-State Research Project W-192 (AZ, NV, NM, OR, UT, WA, WY)

Key Theme – Children, Youth and Families At Risk

a. Project MAGIC (Making a Group and Individual Commitment) is designed for teens just entering the juvenile justice system or juveniles with low-incident rates. The program teaches the necessary skills to get them out of the system and become productive members of society. Each year, 100 participants in

three rural counties meet in small groups during 10-week sessions to learn communication and conflict resolution techniques. Pre- and post-tests of 500 students who have participated in the program have been completed. Portfolios completed by the students were analyzed. A one-year follow-up study of graduates was published. The program was also adapted to the Las Vegas urban environment where 2,500 youth encounter probation each month, and to three Native American reservations.

b. IMPACT: Project MAGIC was awarded a $100,000 grant to aid Native American youth who were members of the Owyhee tribe of Nevada. The grant was part of $8 million given by the U.S. Justice Department in 2000 to prevent and control youth violence and substance abuse among Native American youth. Juvenile crime rates were increasing on Owyhee reservation lands prior to the grant and several youths have already been referred to the program.

Significant improvement resulted among the court-ordered juvenile offenders in the areas of decision-making, conflict resolution, goal setting and communication. Follow-up interviews of juvenile offenders one year after graduation from the program indicate that youth are implementing strategies learned in the program to help them avoid trouble with the law.

Parents participated in a self-paced educational component as well. Ninety-five percent of the parents of juvenile offenders took part in educational meetings taught by a parent educator. They reported significant gains in their parenting knowledge.

In a comparison of the per capita incarceration rate of two counties that participated in the program and one county that did not, there is a notable rapid decline in per capita incarceration in the counties where MAGIC is implemented.

The program received the 1997 National Award for Excellence at the National Rural Institute on Alcohol and Drug Abuse from the Center for Substance Abuse Treatment, U.S. Department of Health and Human Services.

Sixteen youth between the ages of 13-17 have attended a pilot Project MAGIC program on the Owyhee reservation. Fifty percent of the students graduated successfully and demonstrated increases in the ability to use skills learned through program. Three more students are expected to graduate from the program soon.

One 16 year old was referred to Project MAGIC after appearing in Elko juvenile court on drinking-related charges. Three weeks into the program, she became a leader. By her fourth week, she landed a job and when she graduated, she had her sights set on college and a career in photography.

A 17-year-old participant from Las Vegas said, “Sometimes I feel like doing something bad, but I think about that place (incarceration) and I don’t want to go back…I’ve been thinking about the consequences…I’m not doing drugs and people respect me for that.”

c. Source of Funds: Hatch
Smith-Lever & State Matching Funds
USDA-CSREES Children, Youth & Families At Risk

d. Scope of Impact: State Specific

Key Theme – Child Care/Dependent Care

a. This study examined what types of guidance techniques are used in child care programs, the reasoning of caregivers in selecting and using these techniques, and other factors that might affect caregivers' use of guidance techniques. To gather this information, groups of child care givers were brought together to discuss their use of guidance. In addition, sixteen of these providers were videotaped in their classrooms

and later watched segments of the videotape with the researcher. They were then asked to recall their process of making decisions related to discipline. Subsequently, information from the groups and videotape responses were used to develop a questionnaire, the Child Caregiver Guidance Survey (CCGS) which were then given to 150 child care providers from across the US and Greece. Results form the CCGS suggest that while caregiver training varied widely, from high school graduates to advanced degrees in early child development, the likelihood of taking advantage of different techniques varied positively with degree of formal training.

b. IMPACT: There is no one right way to attend to the needs of our children. An approach that is successful in one situation may not work in another. Also, different children respond in different ways to guidance methods. What UNR researchers have found is that successful caregivers use a variety of approaches to deal with the diversity of behavioral situations and adapt these according to the child. Through this research investigators are establishing a database that will enable caregivers, educators, state and county regulators, along with private interest groups a means to assess the strengths and weakness of a given caregiver.

c. Source of Funds: Hatch
NAES State Funds

d. Scope of Impact: State Specific

Key Theme – Child Care/Dependent Care

a. Cooperative Extension youth specialists created Caring 4 Kids, a new system of training caregivers. Caring 4 Kids is a series of training modules including videos, self-study guides and tests. The modules are free and available at 47 Nevada public libraries and Cooperative Extension offices. They are also available at the University of Nevada, Reno Human Development and Family Studies Department and county childcare licensing offices. Interested childcare providers can check out the modules, read the self-study guide and watch a video at their own convenience. The study guide can be downloaded from the Caring 4 Kids website at www.nce.unr.edu/caring4kids/caring4kids. A module on cognitive development is currently available and approved for three hours of childcare training. A second module will be released in March 2001.

b. IMPACT: Childcare providers now have an easy way to complete childcare training. The modules are free, can be completed at anytime and count toward childcare training hours required by the state. The modules have been so successful at many libraries that the circulation departments are requesting extra copies to keep up with demand. The training is beneficial not only to new and entry-level caregivers, but to veteran caregivers, parents and teachers, as well.

c. Source of Funds: Smith-Lever & State Matching Funds
U.S. Maternal and Child Health Bureau

d. Scope of Impact: State Specific

Key Theme – Children, Youth, and Families at Risk

a. The objectives of the study are to develop and pilot test a theoretical model of factors that influence children's functioning following divorce. The model addresses contextual and family process variables in the child's post-divorce environment that will be used to predict both positive and negative outcomes for children from single-mother and single-father families.

The theory will be tested using data from two studies: The National Survey if Families and Households (NSFH) and NAES 948. The first study provides somewhat limited information about a large, nationally representative sample of single-parent families and the second provides very detailed information about 60 single-parent families. The larger study will be used to test the model in a general way, using structural equation modeling. The smaller study will then be used to develop portions of the model in more detail using regression and discriminate analyses.

This study addresses the limitations of earlier studies by developing and testing a theory that can be used to predict both positive and negative effects on children's adjustment following divorce. The theory will be tested using data from two studies: The NSFH and Nevada Agricultural Experiment Station project 948. The first study provides somewhat limited information about a large number of single-parent families and the second provides very detailed information about 60 single-parent families. The large study will be used to test the theory in a general way, using a sophisticated statistical technique. The smaller study will then be used to develop the theory in more detail. This research will help professionals develop programs that more specifically target the needs of single-parent families. It will also help single parents identify the special challenges they face and will show them how they can develop and use their strengths to better meet their children's needs.

b. IMPACT: The overall results of these studies suggest that while children from divorced families may, on the average, experience more difficulties than children in intact families, there are more similarities than differences. The most important question is not whether children from divorced families are having difficulties, but what particular factors cause these differences. Current evidence suggests that the loss of parents, economic difficulties, stress, parental adjustment and competence, and interparental conflict all contribute at least to some degree to the difficulties of children. These results provide practitioners interested in designing interventions for children and adults in divorcing families with a method of reviewing the implications of their actions.

c. Source of Funds: Hatch
NAES State Funds

d. Scope of Impact: State Specific

Key Theme – Children, Youth, and Families at Risk

a. Cooperative Extension youth specialists created a guide to help youth workers and volunteers recognize and report suspected child abuse. "Child Abuse Recognition and Reporting" is a 50-page self-study guide that introduces workers to the many facets of child abuse. The guide helps youth workers learn the potential indicators of child abuse, how to respond to a disclosure from a child and where and how to report their suspicions to authorities. Each chapter features a comprehensive quiz at the end that allows youth workers to monitor their retention of information. The book is available for purchase for $5 or can be downloaded for free off the Internet at http://www.extension.unr.edu/StudyGuide/SSGfrontcov.html.

b. IMPACT: Youth workers who are more informed about child abuse are able to provide safer and more secure environments for the children they help. The guide, itself, is an effective learning tool because

users must answer questions to ensure they understand and are retaining the material. The web-based self-study guide allows workers to study at their own pace and monitor their progress. The guide was first created for volunteers working in Cooperative Extension programs like 4-H, but its success has made it popular with other industries, as well. Social-service agencies, district attorneys and health care providers throughout Nevada, other states and other countries have adapted the program to train their employees to be on the lookout for signs of child abuse.

c. Source of Funds: Smith-Lever & State Matching Funds

d. Scope of Impact: State Specific

Key Theme – Community Development

a. Often referred to as bedroom communities, Laughlin, Nevada and Bullhead City, Arizona are actually separate communities in different states divided by the Colorado River. Governmentally, the towns operate independently, but economically and socially, they are very dependent upon each other.

In order to help the two communities better interact, a Cooperative Extension economist facilitated round-table meetings of political leaders, key business executives and social agencies from both communities. He helped them with a six-step strategic-planning process and taught them research methods to measure the economic and social linkages and how to interpret the technical information. He organized a 14-member advisory committee with equal members from both communities. He conducted training workshops and led the planning process. The key issues identified were economic linkage, tourism development and childcare. Community-wide presentations were then delivered via public-access television and newspaper articles.

b. IMPACT: To increase economic linkages, the two communities worked together to develop and implement a "shop-at-home" campaign including media ads, t-shirts, buttons and signs. Tests indicate that during the promotion, participating businesses experienced an increase in sales anywhere from 1 to 20 percent. Two dozen new businesses have opened in the area since the communities started working together. To boost tourism, community leaders sought funding for Highway 40 which links the communities to southern California. It appears that Nevada is willing to contribute $15 million of the needed $40 million; additional funding is being sought from California and the federal government. In addition, a proposal to the Clark County Commissioners for a youth and child-care facility in Laughlin was successful to the tune of $2 million. Cooperative Extension is assisting the community with the design and operation of the much-needed community asset.

A Bullhead City newspaper editorialized, "By focusing the two communities on common goals like shopping locally, we are now beginning to address some of the issues important to the economic and social well-being of the area."

"This program was an opportunity for civic leaders and citizens on both sides of the river to discover the facts together," said the director of the Laughlin Chamber of Commerce.

c. Source of Funds: Smith-Lever
Western Rural Development Center

d. Scope of Impact: Multistate Extension – AZ & NV

Key Theme – Community Development

a. Eureka County, situated in central Nevada with a population of 1,500, is susceptible to traditional boom-or-bust economic conditions. Mining and agriculture provide the tax base for this rural community, but in recent years both gold and livestock prices have been fluctuating. Current and past needs assessments show an increasing awareness of the need to move toward a more diversified economy.

The Eureka Board of County Commissioners asked the local Cooperative Extension educator to help develop an entity that would assist the county in developing and diversifying the economy. The educator researched state and federal laws, developed bylaws, recruited directors and helped establish a new entity, the Community Development Corporation (CDC). The CDC's mission is to develop and finance economic diversity within the rural community without sacrificing social and traditional values. The CDC also aims to stop the constant flow of in-and-out migration in the county.

b. IMPACT: On behalf of the CDC, the Cooperative Extension educator prepared and submitted a grant application for $1,000,000 for use as revolving loan funds for economic development and diversity. The county commissioners not only approved the corporation's mission, by-laws and board of directors, but it also granted the requested funds to stimulate economic development. Businesses seeking financial support have a lending institution within the county they can work with to secure at least partial funding. Cooperative Extension also brought in support from the University of Nevada's College of Business Administration and the Nevada Small Business Development Center. This allows for more collaboration in programming, research and education, while at the same time addressing the needs of a small, isolated rural community. CDC began accepting, evaluating and funding viable economic projects in 2000. Soon after the CDC began accepting projects, Eureka was marketed as a site for a $325 million power plant.

c. Source of Funds: Smith-Lever & State Matching Funds

d. Scope of Impact: State Specific

Key Theme – Conflict Management

a. Managing Natural Resource Disputes is a program designed to educate citizen groups, elected officials, governmental resource managers and others about collaborative processes and how they may or may not be used to manage resource disputes. It offers field training and enrichment materials to support and expand upon concepts taught in the field. Supporting materials for the program are based on a comprehensive literature review, field research, and experiential knowledge drawn from the authors' previous work with collaborative processes in resource disputes. The support materials feature a fact sheet series and a bulletin. The fact sheet series, Managing Natural Resource Disputes, includes:

Introduction to the Collaborative Process: Managing Natural Resource Disputes
Pre-negotiation: Managing Natural Resource Disputes
Negotiations: Managing Natural Resource Disputes
Post Negotiations: Managing Natural Resource Disputes
Focus on "How": Managing Natural Resource Disputes
Focus on "What": Managing Natural Resource Disputes

b. IMPACT: Diverse, independent individuals make up the majority of the rural population of the state. Resource disputes generally had inadequate participation and a decided lack of communication among the various participants because of this lack of participation. The process tended to be mostly "top-down" agency driven to fulfill the perceived needs of the agencies involved. There were obvious biological and ecological problems on the horizon. People and interests did not know how to work together. Rural Nevada was in a crisis. With the debut of field classes and support materials, the long-awaited demand for education about collaborative processes involving resource disputes is reaching the people. Members of National Association of Counties, governmental resource agencies, private resource managers, and resource educators are now gaining the social skills necessary to become a good facilitator while staying abreast of the issues pertinent to all concerned.

c. Source of Funds: USDA/CSREES
Smith-Lever & State Matching Funds
NAES State Funds

d. Scope of Impact: State Specific

Key Theme – Impact of Change on Rural Communities

a. This project had as its goal the development of time series models which can assess the future viability of these regional gaming markets and consequently implications for rural economic growth and development.

Work continues on formulating and estimating stochastic trend models of regional gaming activity. Using annual data for regional markets and indicators of gaming activities across the nation, tests of non-stationarity and co-integration indicated that while relevant variables are non-stationary there does not appear to exist any co-integration either between pairs or among these variables. This is not a surprising result in light of the differential rates of growth observed both geographically and across gaming destinations such as casinos, reservations, and river boats. Stochastic trend models which allow external gaming levels to impact regional gaming markets have been estimated. Extensions were also made to multivariate models to assess the level of interdependencies among gaming markets.

Generally it was found that the larger the gaming market the more it was affected by the growth in reservation gaming. For the more rural markets, such as Elko, NV, it appears that local conditions tend to dominate gaming growth. Thus tourism development may be warranted even in the face of increased external competition. Another finding was that there were differential effects associated with the type of gaming activity. Reservation gaming was uniformly found to depress gaming growth in the various Nevada markets, but riverboat and non-casino gaming was generally found to be complementary to Nevada gaming. This result suggests that the Nevada market may be severely impacted by the recent loosening of restrictions on reservation gaming in California.

b. IMPACT: Nevada's smaller gaming markets typically have pronounced impacts on the rural communities in which they are located. The business activity they generate and the leisure activities they provide both affect their communities and ultimately provide some local government tax revenues. Over the last several years the growth of gross gaming revenues has slowed or stopped in numerous communities throughout the state. Numerous rural communities such as Wendover, Pahrump, Mesquite, and Ely, Nevada as well as other less rural communities such as Elko and Laughlin, Nevada will likely be impacted by expanded gaming activities which will likely occur in California, Oregon and Utah over the next five to ten years. Even gaming venues in Washoe County and Stateline, NV may feel the affects of intra-state competition as the Las Vegas Strip continues to develop.

Efforts at rural development both in Nevada and states with either riverboat or Indian gaming must take into account the spread of gaming competition. This work quantifies many of the measures which may be helpful for economic developers in calculating the effects of gaming in their region.

c. Source of Funds: Hatch
NAES State Funds

d. Scope of Impact: State Specific

Key Theme – Literacy

a. Family Storyteller is a literacy program aimed at encouraging and training parents to play a vital role in the literacy development of their children. The program, developed by Cooperative Extension, KNPB-TV, Washoe County Libraries and the Washoe County School District, creates an opportunity for parents and young children to interact around literacy and language activities.

Family Storyteller is a series of workshops targeting families at risk for low literacy and related problems. The program has been conducted at 41 different sites in Nevada with 500 families participating. While Family Storyteller helps all families, it is specifically designed for parents with limited language skills and limited children's literature at home. The workshops include a 10-minute video viewing, book-reading techniques, practice time for reading to children and other literacy activities.

b. IMPACT: Overall, 234 families have participated in at least one workshop. The success of Family Storyteller is evaluated by seven new assessment techniques designed to measure the quality of parent skills in reading to children, changes in frequency of parent- child reading and child engagement in the reading process. These techniques require few reading and writing skills to complete. Researchers also conducted pre- and post-interviews with parents and children in their homes. Results indicate that all parents rated the major component of the workshops either a 4 or 5 on a scale from 1 to 5 with 5 being extremely satisfied. Pre- and post-assessments revealed significant increases in the amount of time parents read with their children, their enjoyment of reading with their children and their use of 14 parenting reading techniques. Children had significant gains in their enjoyment of reading with parents and their understanding of print concepts.

   One workshop participant said, "Family Storyteller is one of the better programs I have attended." Another participant said, "What a wonderful way to teach parents the importance of reading to your child and the road to literacy." One satisfied mother said, "I can help my child learn to read and develop language and listening skills so she can do very, very good at school."

c. Source of Funds: Smith-Lever & State Matching Funds

d. Scope of Impact: State Specific

Key Theme – Parenting

a. Cooperative Extension started Healthy Families Nevada (HFN), a voluntary home visitor system for new parents to help their children get off to a healthy start. HFN promotes positive parenting and child health and development, thereby preventing child abuse and other poor childhood outcomes. Volunteers teach childcare and development, family communication, home safety, nutrition and money management to young mothers. Doctors, nurses and social workers refer expectant mothers to the program. Interested participants can have a volunteer visit them as often as once a week. In addition to sharing valuable parenting knowledge with the young mothers, the volunteers support the mothers by listening to their problems and offering solutions.

   Hospitals and Infant Support Districts referring first-time parents to the HFN program report there is a large number of non-English speaking parents who are experiencing multiple problems in addition to the isolation caused by language barriers. Nuevas Familias was developed to help Hispanic parents handle the problems of early parenting. The purpose of Nuevas Familias is to reach vulnerable, Hispanic, first-time parents and provide culturally appropriate parenting support and education.

b. IMPACT: As of 2000, 757 families have benefited from the HFN program. The staff worked with 58 first-time mothers and taught 33 group classes with 669 participants. The rate of abuse and neglect toward the children of participants has decreased. Only three percent of mothers in HFN had substantiated reports of child abuse in a one-year period, compared with 12 percent of young mothers statewide. In addition, most mothers enrolled in HFN complete their education, and fewer are unemployed than mothers not enrolled in the program.

Evaluations of Nuevas Familias show initial improvements in parents voicing positive feelings toward their children and decreases in abuse and violence toward their children.

One 18-year-old was a single mother living in North Las Vegas when she joined the HFN program. Her daughter's temper tantrums used to drive her up the wall and she often resorted to spanking the child to make her stop crying. With the help of a home visitor, she learned to take a time out. "Instead of spanking my baby, I put her in bed and let her cry for a while," she said. She finished school and received her GED. She trained to be a medical assistant and has aspirations of becoming a nurse once her daughter starts school

c. Source of Funds: Smith-Lever & State Matching Funds

d. Scope of Impact: State Specific

Key Theme – Tourism

a. University of Nevada's investigators in conjunction with those elsewhere, determined whether the USFS proposed policy constitutes a major regulatory change. Specifically, test the hypothesis that the non-market values for the loss of climbing access in wilderness areas are less than $100 million annually. To implement the modeling strategy, this study uses original survey data on trip-taking behavior for 597 U.S. climbers; the data account for 12,952 trips to 60 nationally dispersed climbing areas.

   In this study, a national-level repeated nested random utility model is developed and used to simultaneously predict demand for climbing and site choice using a multiple decision process. First, the decision process is structured to repeatedly capture a climber's decision to take a climbing trip during the season of interest. Second, if a climber chooses to take a climbing trip, she then selects a climbing region. Regional nesting is useful because it allows for greater flexibility in modeling substitution among climbing sites. Finally, after deciding a region, a climber selects a site. The model results show that this nesting structure is appropriate to characterize the when and where to take an outdoor rock climbing trip.

   By simulating the removal of sites from the climber's choices of places to climb, the model predicts economic change associated with loss in climbing access national sites. The welfare amounts indicate that climbers highly value climbing in wilderness areas. One estimate of economic losses to climbers associated with the loss in climbing access to USFS wilderness areas is near $100 million. The magnitude of these losses suggests that the USFS proposal to ban access meets the definition of a major regulatory change. Further a scope analysis reveals that the economic losses to climbers increase significantly with increasing reductions in climbers' choices of sites. Thus, if the USFS proposal to ban access has any precedent-setting impact on other federal and state agencies, then losses to climbers would grow substantially.

b. IMPACT: This research makes several contributions. First, while many studies have estimated recreation demand, this is the first study to apply the repeated nested random utility model to estimate demand for rock climbing and to predict the national economic losses associated with loss in climbing site access. Most existing recreational demand studies evaluate regional demand for regional sites. Since climbing alternatives are scarce relative to other activities (i.e., require very specific topographical conditions), and since climbers may live in areas not conducive to climbing, a regional study is not appropriate. Third, given the growing concerns over rock climbing impact on public lands, the results from this study may provide useful input to public land agencies attempting to balance climbing with other uses of public lands. Finally, by implementing better management plans that allow outdoor recreation in conjunction with protection of wilderness areas, the public will gain access to resources

that otherwise may be deemed off-limits to climbers. Policies that flow from these results may change usage patterns for generations to come.

c. Source of Funds: Hatch
NAES State Funds

d. Scope of Impact: Multi-State Research Project W-133 (AZ, CA, CO, CT, GA, IA, ME, MA, MI, MN, MT, NV, NH, NM, NY, ND, OH, OR, PA, SC, TN, UT, WA, WV, WY)

Key Theme – Youth Development/4-H

a. Funding was obtained to conduct after school programs at seven high-risk elementary schools that serve 235 low-income and homeless youth. The children received help with their homework and participated in other activities including reading and educational games. They also received an after school snack. In addition, 400 children participated in the Summer Discovery program at three sites during 2000. The youth were taught work and social skills and were encouraged to build on their academic skills in reading, math and science.

b. IMPACT: Data collected indicates the programs have significantly improved reading grades of kindergarten through second-graders in the program and social skills have increased in all grade levels of participants.

c. Source of Funds: Smith-Lever & State Matching Funds

d. Scope of Impact: State Specific

Key Theme – Youth Development/4-H

a. The "Mini-Society" program is designed to introduce children 9-12 to the concepts of an entrepreneurial market system and allows them to design the perfect market driven society. In this society they learn to recognize the entrepreneurial opportunities, assess the risks involved and bring the goods to market, thereby profiting from the opportunities. The Mini-Society program also integrates the study of entrepreneurship with other subjects such as language arts, mathematics, science, social studies, critical thinking, problem solving, practical arts and cooperative thinking. It is an ideal learning experience for youth in the urban Las Vegas environment. This program was done in collaboration with the City of Las Vegas Parks and Recreation Department.

b. IMPACT: There were a total of 74 students involved in the program this past summer. The following results are from the evaluation:
   - 85% would take the class again
   - 71% learned how to do a business plan
   - 77% reported they learned how to run a business
   - 60% of the participants reported they would think about running a business when they were older

c. Source of Funds: Smith-Lever & State Matching Funds

d. Scope of Impact: State Specific

B. Stakeholder Input Process

In 2000, UNCE established a statewide Advisory Committee that represents a diverse cross section of stakeholders from both rural and urban communities, including minorities. This committee will provide broad guidance on UNCE programming and policies, and serve as a sounding board for setting program priorities.

In addition to establishing a statewide Advisory Committee, UNCE administration has initiated a series of statewide "community stakeholder meetings." In addition to the general public, "key community stakeholders" from each individual community/county are invited to participate in an open meeting with all of UNCE administration (Dean/Director, Assistant Director, Area Directors, Fiscal Officer, Communications Specialist, AA/EEOC Officer). At this meeting, comments, suggestions and issues/concerns are solicited from participants. The focus is on issues/concerns as they relate to UNCE programs and the University of Nevada overall. This past year, six such meetings were held, and four more are scheduled for March of 2001. This information is being used for developing both local and statewide programming.

Within their first year of being hired, UNCE funded campus based faculty are expected to conduct a formal needs assessment in order to identify critical issues in their subject matter area. For Extension Educators, a very broad, community-based assessment is expected. For Area Specialists, a broad, issue-based assessment is expected. State Extension Specialists are charged with compiling local needs assessments and adding statewide data and impacts. Indeed, one of the criteria for annual performance evaluation is effective assessment of need. Following the initial needs assessment, faculty are required to continually assess need and periodically conduct a needs assessment in a similar manner as expected of newly hired faculty. As a result, all of UNCE's major educational programs are the result of formal needs assessments. The data collected by UNCE is also used as the basis for broad Nevada Agricultural Experiment Station research priorities.

The Director of the NAES has traveled throughout the state and conducted a series of townhall meetings with various stakeholder groups. This stakeholder input has resulted in the development of a new initiative for the Nevada Agricultural Experiment Station, Nevada's Arid Rangeland Initiative. In addition, the College of Agriculture and the Nevada Agricultural Experiment Station has an expanded broadly based Citizens Advisory Committee to obtain stakeholder input from a wide spectrum of our stakeholders.

Stakeholder groups have been formed for establishing research priorities for the Agricultural Experiment Station field laboratories. The most recent meeting resulted in our establishing a research project on the feasibility and practice of growing native seed grasses at the Newlands Field Laboratory. The Director of the Nevada Agricultural Experiment Station is scheduling visitations to each county commission meeting in the State to obtain input regarding the NAES research program. Each county commission visitation is coordinated through extension community based faculty.

Finally, during the peer review process for new NAES Hatch, Multi-state, McIntyre-Stennis and Animal Health projects and Arid Rangelands Initiative, stakeholders have been included (where appropriate) on the peer-review team. This committee makes the final recommendations regarding project approval and funding to the Department Chair who then forwards the recommendations to the Director for final approval and funding allocations.

The specific methodology used in assessing needs varies, but it uniformly consists of formally obtaining direct input from people. This data is juxtaposed against secondary data to validate the critical nature of the issues named by people. Additionally, collaboration with other agencies and organizations with similar goals and serving similar populations is an expectation for all programs. It is not uncommon for focus groups to be used to obtain a very in-depth understanding of the issue and the population affected.

C. PROGRAM REVIEW PROCESS

There have been no significant changes in the program review process since the last 5-Year Plan of Work.

D. EVALUATION OF THE SUCCESS OF MULTI AND JOINT ACTIVITIES

University of Nevada Cooperative Extension (UNCE) and the Nevada Agricultural Experiment Station (NAES) have worked successfully to build multistate, multi-institutional and multidisciplinary activities, and joint research and extension activities which address critical issues of strategic importance as well as those identified by stakeholders. All activities/programs of UNCE and NAES match needs/issues identified in the stakeholder input process. Additionally, these activities/programs also address needs common to under-served/under-represented populations of the state, as well as activities/programs specific to the needs of these audiences.

Integrated and multistate programs have generally realized the outcomes/impacts expected as of this date. Since they are in different stages of development, not all programs have reached the stage where full impacts/accomplishments may be expected. The multi-state research program and Western Coordinating Committee projects and programs are administered through the RCIC process and WAAESD and each project is reviewed by RCIC (which is represented by Extension and Research) for progress during the course of the project/program and at project termination. The reviews are documented and housed at the executive director's office in the western region. All current projects are progressing well.

Both UNCE and NAES have a long history of integrated and multistate programs/activities. However, the emphasis from CSREES on planning for integrated and multistate programs has served to more sharply focus attention on these types of program opportunities. Integrated and multistate programming is increasingly the result of more proactive processes, and has helped to identify ways for cooperation even outside of specific programs. For example, UNCE has negotiated an arrangement with Utah State University Extension for their Dairy Specialists to provide dairy programming in Nevada.

In addition to the successes listed in the accomplishment section for each integrated project/program, we have extended a new approach to encourage an improved integration between the NAES and UNCE. We have created a joint funding mechanism between extension and research and have submitted a request for proposals (RFP) for integrated activities. The intent of this Request for Proposals is to facilitate and support joint research-Extension programming between UNCE and NAES to benefit the people of Nevada. We are soliciting proposals for small one-year projects/programs to stimulate combined research and Extension activities between UNCE and NAES. These grants may be used to 1) help initiate or facilitate start up of a new integrated project/program; 2) enhance an existing project in new ways; 3) plan for future projects; 4) secure future project support from other sources; 5) build awareness or 6) provide "one time" funding for a new or expanded piece of a larger on-going project. Proposed projects must include a partnership/collaboration between campus-based NAES faculty, from the College of Agriculture, Biotechnology & Natural Resources (CABNR), and community based Extension faculty. Proposals should also address issues important to our stakeholders.

E. MULTISTATE EXTENSION ACTIVITIES

See Appendix "A" for Multistate Extension Activities with brief statements on the progress to date of each planned multistate Extension program or activity. This reported is generated from a database and formatted consistent with Form CSREES-REPT (2/00), Supplement to the Annual Report of Accomplishments and Results.

F. INTEGRATED RESEARCH AND EXTENSION ACTIVITIES

See Appendix "B" for Integrated Extension Activities with brief statements on the progress to date of each planned multistate Extension program or activity. This reported is generated from a database and formatted consistent with Form CSREES-REPT (2/00), Supplement to the Annual Report of Accomplishments and Results.

See Appendix "C" for Integrated Activities of the Nevada Agricultural Experiment Station (Form CSREES-REPT (2/00), Supplement to the Annual Report of Accomplishments and Results).

Appendix A – University of Nevada Cooperative Extension
Multi-State Extension Activity

ogram	2000	2001	2002	2003	2004	Statement of Progress
nd National	3,793.93	3,922.73	4,040.41	4,161.63	4,286.48	Through participation in Regional and Natio activities, Nevada 4-H members and adult vo have opportunities to broaden their exposure educational programs, geographic locations, people and various cultures.
nning	8,497.54	8,937.57	9,205.70	9,481.87	9,766.33	Working to measure the impact of volunteer cooperation with area youth specialist and Co Education faculty. Work Force Preparation - with school to Careers program and county s counselors. Designed and facilitated needs as Lovelock and Fallon Tribal Communities in collaboration with New Frontier Drug Preve Center.
tural Resources	11,981.06	12,384.50	12,756.04	13,138.72	13,532.88	I researched, developed, marketed, taught an three 16-hour Introductory Soils courses for County School District youth and 13 one-hou youth from other counties. I researched, adap organized, taught and evaluated a forth-hour course utilizing my revised soils manual (SP also organized and planned curriculum based current and pending manuals for three 8-hou Trainer Range classes for volunteer and FFA statewide.
r Gardener Program	2,915.45	3,000.04	3,090.04	3,182.74	3,278.22	Teach formal classes in Turfgrass manageme landscape design twice a year in four locatio northern Nevada as part of the University of Master Gardener program curriculum. Provi seminars to residents and Master Gardeners o irrigation and soils.

ogram	2000	2001	2002	2003	2004	Statement of Progress
ssurance	14,275.94	14,853.38	15,298.99	15,757.95	16,230.69	A beef production program to insure the cons receives a safe and consistent product as wel enchase profit potential for ranchers.
cling And Educational	2,623.73	2,643.40	2,722.71	2,804.39	2,888.52	To determine the likelihood of acceptance of biosolids as form of agricultural fertilization.
Vatershed Education	2,503.42	2,522.20	2,597.86	2,675.80	2,756.07	Watershed integration to unite the watershed along the Carson River in a common vision, one voice and work synergistically for the reg benefit.
date	1,896.97	1,961.37	2,020.21	2,080.81	2,143.24	A team of Extension livestock specialists kee ranchers up-to-date with the latest beef-produ research, information and technology in this one-day seminar. Their focus is to improve th profitability and sustainability of agriculture
ecognition And	3,275.64	3,394.28	3,496.11	3,600.99	3,709.02	Nevada Cooperative Extension is known for to help people report suspected cases of chil maltreatment. Professionals train youth staff volunteers, administrators, child caregivers, to recognize and report. Extension has a pub curriculum for group presentation and a self- for individual instruction. Two versions of th self-study guide are available on the web; ind from across the country and some foreign cou have accessed the guide.
(Western Extension	12,842.74	13,277.73	13,676.06	14,086.34	14,508.93	Actively participate on the California, Orego Nevada, and Utah extension agent livestock p marketing and animal health question and ans resource e-mail system. Lead author on the C reference book which has 10,000 books in cir

ogram	2000	2001	2002	2003	2004	Statement of Progress
anagement of s in Walker River Education and Public	8,662.09	8,962.24	9,231.11	9,508.04	9,793.28	A GIS database was originated to educate sta and form partnerships in the Walker River Ba Dayton Valley about the location and spread Whitetop. Research initiatives will use the G project rate of expansion.
	5,356.17	5,521.78	5,687.43	5,858.05	6,033.80	A multi-state training program (three days), i one day of college student competition, and t industry training with the emphasis s on susta urban horticulture, pesticide safety and stewa water protection and conservation.
Weed Control	2,887.36	2,987.41	3,077.04	3,169.35	3,264.43	Economic benefits and costs of weed control considered and examined. Information is pre Annual Weed School and Hay Updates.
ee Shop	7,134.85	7,376.52	7,597.81	7,825.75	8,060.52	Extension has taken the traditional Ag produ coffee-shop cattle discussions into cyberspac Internet e-mail service allows livestock produ chat online with Extension specialists and otl producers. To subscribe to the free service, e <majodomo@unr.edu>
Education	4,391.02	4,423.95	4,556.67	4,693.37	4,834.17	Extension educators bring public issues educ understand current local fiscal laws and poten to county fiscal balances from changes in loc and national economy.

ogram	2000	2001	2002	2003	2004	Statement of Progress
operative Ecosystem	10,667.11	10,935.26	11,263.32	11,601.22	11,949.26	The GB-CESU is a University and Federal A partnership plus other stakeholder cooperato universities, 6 federal agencies, 10 cooperato the UNR College of Agriculture, Biotechnol Natural Resources as the host institution. Th College of Cooperative Extension will coord GB-CESU education programs. The federal work the university partners and cooperators mobilize and coordinate resources for researc education programs in the Great Basin. I wa coordinator and author of UNR's successful p be the Host Institution.
d Poplar Trees In	1,672.24	1,716.14	1,767.63	1,820.66	1,875.28	The hybrid poplar tree thrives in the high Ore and Churchill valley. With the cooperation o landowner, Extension has begun a field trial County to evaluate the possibility of growing as a profitable commodity in Nevada. The i results have been presented in newspaper art radio interview. Discussions with responder that over 5000 trees will be planted in 2001.
	1,385.06	5,581.80	5,749.25	5,921.72	6,099.35	Horticulture education of the residents of the newspaper articles, television and radio prog
face Water Quality In gh Increased The Clean Water Act	5,774.72	5,974.83	6,154.07	6,338.69	6,528.86	This program targets production level farms ranches. Its goal is to educate producers abo Water Act non-point source pollution provis how to comply with these standards.
rest Health ram	7,858.63	8,011.65	8,252.00	8,499.56	8,754.55	Extension specialists serve as experts and fac the Forest Health Consensus Group, a gather diverse agencies and citizens. The group obta Tahoe Regional Planning Agency ordinance the cutting of 30-inch trees — possibly the fi kind in the nation.

ogram	2000	2001	2002	2003	2004	Statement of Progress
Bullhead City d Economic	4,698.25	4,921.64	5,069.29	5,221.37	5,378.01	Overall, the major impact of my Community Development program has been cumulative three-year period. Significant measurable im include: (1) improved local spending impact community educational efforts, $0.52 local s leakage in 1999 improved to $0.49 local sper leakage in2000. (2) Several local businesses adjusted their operations to meet local consu (I.e. selection, merchandizing, advertising. (Approximately two dozen new business have created. (4) A local child care facility has op serve both communities. Initially, Clark cou designated $1.5 million for this facility, but a enterprise has been built since.
ng and Showing	3,793.93	3,922.73	4,040.41	4,161.63	4,286.48	This workshop addressed current methods an information pertaining to preparing and exhil livestock. The workshop also emphasized et animal quality assurance and ethical decision
e	92.34	372.12	383.28	394.78	406.62	Program to reduce the risk and increase the su of communities located at the wildland - urb and vulnerable to violent wildfire events.
re/Nevada Fire Forum	38,126.78	39,541.64	40,727.88	41,949.72	43,208.21	To save homes, lives and natural resources, e joined forces with the Sierra Front Wildfire C (Nevada and California fire agencies). Specia defensible-space practices to homeowners an professionals. They published a free manual, With Fire," available at Extension offices and stations. Currently, the Living with Fire publ being used in eleven states and over one mill have been printed.
ural Resource Disputes	5,774.72	5,974.83	6,154.07	6,338.69	6,528.86	An extension bulletin provides the basis for e citizens about the need and variety of technic manage natural resource disputes.

ogram	2000	2001	2002	2003	2004	Statement of Progress
rnatives For Cull	2,140.46	2,212.95	2,279.34	2,347.72	2,418.16	Extension professionals teach cattlemen by s marketing alternatives of cull cows which inc profit.
ers	369.35	1,488.48	1,533.13	1,579.12	1,626.49	The Master Gardener Program is a horticultu program to meet the needs of home gardener consumers. Volunteers, who are trained to e public, take part in wildlife preservation proj participate in wilderness restoration projects, questions from the public. The program esta sense of community spirit, accomplishment a intellectual stimulation while encouraging w water resources through conservation.
Livestock Show and	9,484.83	9,806.83	10,101.04	10,404.07	10,716.19	The Nevada Junior Livestock Show ahs been Nevada youth programs for 61 years. The pu the Nevada Junior Livestock Show and the N State Horse Show is to provide an opportuni and FFA members to exhibit their livestock a projects before the public, thus promoting an the incentive for achieving excellence in live production skills and practices. Such achieve participation in shows encourages sportsman leadership, citizenship and responsibility of order in the members.
cator Training	16,880.55	17,289.38	17,808.07	18,342.31	18,892.58	Extension trains pesticide applicators
ducation On Tobacco	7,871.18	7,930.21	8,168.12	8,413.16	8,665.55	Educates the public, primarily decision-make coalitions about issues affecting the control o as well as the "Best Practices" that should be
nd Risk Management	1,426.97	1,475.30	1,519.56	1,565.15	1,612.10	Teach retained ownership and return feedlot performance on producers cattle to base gene improvement. Also teach producers how to l downside market movement through the use and options.

ogram	2000	2001	2002	2003	2004	Statement of Progress
Violence Among	13,357.51	13,724.24	14,135.96	14,560.04	14,996.84	This joint AES/Extension project seeks to de protective factors associated with youth viol well as keys to help prevent school and comm violence related to youth. Data collection is p at school sites in five Western states, and the information has been used to inform school b with prevention program planning efforts, as data for educational and prevention evaluati
nities And Public West: Impacts And	1,756.41	1,769.58	1,822.67	1,877.35	1,933.67	Extension educators bring public issues educ public to assist in developing trade-offs betw economic impacts and different public lands management scenarios.
rogram	12,627.89	13,192.98	13,588.77	13,996.43	14,416.33	More than 2,000 south-valley property owne Truckee Meadows have participated in a neighbor-to-neighbor network to prevent cor from flowing into the Truckee. After worksh distribution of a “Small Ranch Manual,” prop owners reported implementing “best manage practices,” such as cleaning up pastures and p septic tanks. Water sampling in one ditch rev drop in dangerous phosphorus levels. Partici eight western states, led by Nevada, are deve curriculum for small acreage programs.
p Irrigation	12,746.31	13,406.36	13,808.55	14,222.81	14,649.49	Subsurface drip irrigation boosts alfalfa prod
riculture	10,667.11	10,935.26	11,263.32	11,601.22	11,949.26	Serve as member of SARE WCC 34 Regiona coordinating committee, and member of regi review and planning committees. Nevada St Coordinator. Presented an invited paper at th 2000 Conference , Portland, OR, titled "Role Grazing in Vegetation Management".

ogram	2000	2001	2002	2003	2004	Statement of Progress
pe Guide	9,881.29	10,218.81	10,525.37	10,841.13	11,166.37	To encourage landowners to adopt environmentally-friendly landscape practices joined with other agencies to publish a comp Tahoe Landscape Guide. They'll introduce t workshops and tours.
Weed Initiative	25,335.44	26,199.67	26,985.66	27,795.23	28,629.08	The Tall Whitetop Weed Initiative is a legisl funded public-education and action campaig and eradicate this noxious weed. A multidis team of CE specialists, in convert with other and volunteers have targeted eight "hot spots education and demonstration projects are in p
ute Management ation	1,732.42	1,792.45	1,846.22	1,901.61	1,958.66	Teaching through example is used to educate about how to constructively manage natural disputes.
Partners	12,389.24	12,770.66	13,153.78	13,548.39	13,954.85	Team nutrition targets school food practices
rain Labeling Project	2,677.61	2,744.73	2,827.07	2,911.88	2,999.24	More than 1,000 volunteers have stenciled st "No Dumping — Drains to River" (or lake) i Truckee Meadows and Tahoe Basin.
Basin Water roject	5,774.72	5,974.83	6,154.07	6,338.69	6,528.86	Walker River Basin irrigators explore the pot certain cultural practices to conserve water a water quality. Extension works to identify th voluntary conservation measures that benefit basin.
Water Bank Project	2,634.61	2,654.37	2,734.00	2,816.02	2,900.50	Extension educators bring a public-issues edu approach to solving natural-resource conflict basin. They study the economic impact of wa and survey the willingness of water-rights h participate in this type of voluntary exchange

ogram	2000	2001	2002	2003	2004	Statement of Progress
ation, Competition Western Irrigated	4,941.02	4,978.08	5,127.42	5,281.25	5,439.68	Economics of water conservation and on-farr efficiency improvements are being develope
	327,576.63	343,686.92	353,997.52	364,617.43	375,555.93	

Appendix B – University of Nevada Cooperative Extension Integrated Activity

ogram	2000	2001	2002	2003	2004	Statement of Progress
Study	1,109.99	1,149.49	1,183.97	1,219.49	1,256.08	The various activities of this study have been undertaken to provide e of the benefits of the 4-H program in selected counties and to recomm changes to existing programming.
ural Resources	7,939.26	8,206.60	8,452.80	8,706.38	8,967.57	I researched, developed, marketed, taught and evaluated three 16-hou Introductory Soils courses for Lincoln County School District youth a one-hour class for youth from other counties. I researched, adapted, d taught and evaluated a forth-hour Basic Soils course utilizing my rev manual (SP00-04). We also organized and planned curriculum based current and pending manuals for three 8-hour Train the Trainer Rang for volunteer and FFA leaders statewide.
vention m)	2,396.53	2,476.84	2,551.15	2,627.68	2,706.51	Extension nutritionists motivate people at risk for diabetes to make li modifications and stave off the disease. "An Ounce of Prevention" ta minority families — people at risk for diabetes.
surance	9,459.96	9,842.60	10,137.88	10,442.02	10,755.28	A beef production program to insure the consumer receives a safe an consistent product as well and enchase profit potential for ranchers.

ogram	2000	2001	2002	2003	2004	Statement of Progress
ling And ect	1,738.61	1,751.65	1,804.20	1,858.33	1,914.08	To determine the likelihood of acceptance of recycled biosolids as fo agricultural fertilization.
l Safety	1,774.32	1,818.79	1,873.36	1,929.56	1,987.45	It's a case of too much water when floods gallop through Buckbrush causing property damage and threatening lives in fast-growing Dougl Extension mobilizes neighborhood coalitions to explore flood-contro alternatives and keep their homes safe from flooding.
tion (Child	4,507.00	4,665.49	4,805.45	4,949.61	5,098.10	Nevada ranks 47th in the nation in the quality of child care, and Exte would like to improve this figure. People who work with children, if p trained, can help put a halt to child abuse. Specialists have educated r 4,000 caregivers. They've received a grant to develop a child-care fac rating system.
ate	7,884.63	8,093.38	8,336.18	8,586.26	8,843.85	A team of Extension livestock specialists keeps western ranchers up- with the latest beef-production research, information and technology annual one-day seminar. Their focus is to improve the profitability an sustainability of agriculture enterprises.
Elk Plan	1,898.45	1,964.64	2,023.58	2,084.29	2,146.82	Facilitator for public scooping meeting.

ogram	2000	2001	2002	2003	2004	Statement of Progress
outh Services	18,499.90	19,158.14	19,732.89	20,324.87	20,934.62	This project seeks to provide needs assessment data and to better und youth perspectives about the various programs, policies, and facilities Clark County Youth Services offer. This study also seeks to identify youth use to stay out of trouble when they transition back into their fa and communities and help develop new programming that will help t transition.
Western s)	8,510.25	8,798.49	9,062.45	9,334.32	9,614.35	Actively participate on the California, Oregon, Idaho, Nevada, and U extension agent livestock production, marketing and animal health qu and answer resource e-mail system. Lead author on the C.O.I.N. refe book which has 10,000 books in circulation.
on of Wastes for ss Production ustration	13,602.93	13,704.96	14,116.10	14,539.59	14,975.77	Promote good stewardship of Nevada's natural resources, enhance qu life and profitability of animal agriculture and promote agricultural diversification.
ners for Better	2,349.98	2,540.85	2,617.07	2,695.58	2,776.45	The activities of this coalition serve to reduce health disparities in the African-American community of Las Vegas through education, rese collaboration.
ng Program	2,333.79	2,392.85	2,464.64	2,538.58	2,614.74	An interconnected set of three programs (Novas Program for Youth, Conscience Parenting I and II, and Dahn Hale for Youth and Parents) people expand the boundaries of their lives, learning ore about their energy fields, health and prevention of problems.

ogram	2000	2001	2002	2003	2004	Statement of Progress
nagement of in Walker GIS, Education vement	5,739.94	5,938.83	6,117.00	6,300.51	6,489.53	A GIS database was originated to educate stakeholders and form par the Walker River Basin and in Dayton Valley about the location and Tall Whitetop. Research initiatives will use the GIS data to project ra expansion.
eduction	11,366.83	11,742.99	12,095.28	12,458.14	12,831.88	The goal f this social marketing effort is to enhance awareness of dia among the Latino community in Las Vegas.
opment	3,198.25	3,305.36	3,404.52	3,506.65	3,611.85	Eureka County, NV is a in a boom or bust economy. As an attempt t diversify this economy, Cooperative Extension worked to create a rev loan committee to provide venture capital for the development of nev existing businesses. This committee is a not-for-profit organization k Community Development Corporation or CDC. It has $1,033,000 in and in 2000 created three full time jobs and over 1000 man hours of a labor in a small rural community.
Veed Control	1,913.31	1,979.61	2,039.00	2,100.17	2,163.18	Economic benefits and costs of weed control are considered and exa Information is presented in Annual Weed School and Hay Updates.
e Shop	4,727.91	4,888.05	5,034.69	5,185.73	5,341.31	Extension has taken the traditional Ag producer coffee-shop cattle di into cyberspace. A new Internet e-mail service allows livestock produ chat online with Extension specialists and other producers. To subscr free service, e-mail: <majodomo@unr.edu>

ogram	2000	2001	2002	2003	2004	Statement of Progress
ral Resource oblem Solving	1,898.45	1,964.64	2,023.58	2,084.29	2,146.82	Ely District Bureau of Land Management, White Pine and Lincoln C Commissioners.
er	11,751.33	12,130.38	12,494.29	12,869.12	13,255.19	Nevada Cooperative Extension is known for its program to help peop suspected cases of child abuse and neglect. Professionals train youth volunteers, administrators, child caregivers, crisis line staffers and fi They've published a curriculum and self-study guide and are develop long-distance program.
ducation	2,909.71	2,931.53	3,019.48	3,110.07	3,203.37	Extension educators bring public issues education to understand curr fiscal laws and potential impacts to county fiscal balances from chang local, state and national economy.
and Soul	356.14	367.12	378.14	389.48	401.17	The goal of this program is to decrease risk for chronic disease throu educational programs on food preparation. The target audience (African-Americans) are reached through faith communities in Las V
ent And tation	1,108.11	1,137.20	1,171.32	1,206.46	1,242.65	This grant-funded project is testing the efficiency of sheep to control weeds and increase seeding success of native and adapted plant speci project was implanted in the Spring of 2000 in cooperation with USD Nevada Division of Forestry, a private landowner, and Cooperative E personnel. Data collection will begin in 2001.

ogram	2000	2001	2002	2003	2004	Statement of Progress
files Of	326.00	334.68	344.72	355.06	365.71	Extension and the Nevada Division of Agriculture want to determine potential of natural weed-control organisms. They're evaluating five species which have been released into various noxious weed infestati
perative es Unit	7,068.57	7,246.26	7,463.65	7,687.55	7,918.18	The GB-CESU is a University and Federal Agency partnership plus stakeholder cooperators (8 universities, 6 federal agencies, 10 cooper that has the UNR College of Agriculture, Biotechnology and Natural as the host institution. The UNR College of Cooperative Extension w coordinate GB-CESU education programs. The federal agencies will university partners and cooperators to mobilize and coordinate resour research and education programs in the Great Basin. I was the coordi author of UNR's successful proposal to be the Host Institution.
Poplar Trees	4,306.36	4,442.56	4,575.84	4,713.11	4,854.50	The hybrid poplar tree thrives in the high Oregon desert and Churchi With the cooperation of a private landowner, Extension has begun a f in Eureka County to evaluate the possibility of growing these trees as profitable commodity in Nevada. The initial results have been preser newspaper articles and a radio interview. Discussions with responder that over 5000 trees will be planted in 2001.
	356.14	367.12	378.14	389.48	401.17	"Health at Work" is a work site health promotion program designed employees reduce their risk of heart disease through diet, physical ac stress management.

ogram	2000	2001	2002	2003	2004	Statement of Progress
s Nevada	16,809.38	17,454.94	17,978.59	18,517.94	19,073.48	"Healthy Families Nevada" receives referrals from the county health department, hospitals, clinics and school counselors. The only intensi long-term parenting education program in Clark County, it sends paraprofessionals into homes to help new moms. The program promo positive parenting and child health and development, helping to preve abuse and other poor childhood outcomes.
ion Alfalfa Hay	2,770.28	2,843.01	2,928.30	3,016.15	3,106.63	This project is evaluating center pivot irrigation efficiency using an a weather station, soil sensors and neutron probe technology to evaluat irrigation efficiency. The purpose is to improve irrigation effectivene conserve water while producing alfalfa. The project is in cooperation private agricultural producer.
ce Water la Through eness Of The	3,826.63	3,959.22	4,078.00	4,200.34	4,326.35	This program targets production level farms and ranches. Its goal is producers about the Clean Water Act non-point source pollution pro and how to comply with these standards.
rch, Education ompetitive 406 Water e,	759.38	785.86	809.43	833.71	858.73	Panel, Washington, D.C.
st Health am	3,548.63	3,637.59	3,746.72	3,859.12	3,974.89	Extension specialists serve as experts and facilitators in the Forest H Consensus Group, a gathering of diverse agencies and citizens. The g obtained a Tahoe Regional Planning Agency ordinance prohibiting th of 30-inch trees — possibly the first of its kind in the nation. UNR researchers were not directly involved in 2000. UC and USF researchers were involved.

ogram	2000	2001	2002	2003	2004	Statement of Progress
ullhead City l Economic	3,113.30	3,261.33	3,359.17	3,459.94	3,563.74	Overall, the major impact of my Community Economic Developmen program has been cumulative over a three-year period. Significant m impacts include: (1) improved local spending impacts through comm educational efforts, $0.52 local spending leakage in 1999 improved to local spending leakage in 2000. (2) Several local businesses have adj operations to meet local consumer needs (I.e. selection, merchandizin advertising. (3) Approximately two dozen new business have been c A local child care facility has opened to serve both communities. Ini Clark county designated $1.5 million for this facility, but a private en has been built since.
Community evelopment	3,113.30	3,261.33	3,359.17	3,459.94	3,563.74	Through the direction of the local Economic Development organizati strategy being considered is the bottling of Natural Artesian Bottled W be sold to the growing Las Vegas market. The real impact of this analysis has been that Lincoln County has determined that a bottled water facility may be an economic develop opportunity that has the potential to create jobs, incomes and a tax ba However, potential investor into this project, a minimum of $750,000 a moderate facility upwards to $4 million for a larger volume facility explored. Also recently I recently received two additional requests fr Nevada communities, Gabbs and Fallon, to consider conducting an ec feasibility analysis and local education program for new potential bev operations. These requests have the potential for additional grant fun secondary personal impact as a direct result from this analysis is spec recognition by the U.S. Department of Commerce (granting agency).
	4,424.10	4,581.96	4,719.42	4,861.01	5,006.84	Extension is well-known for its “Little Lives” newsletter series, whic new parents follow their baby’s first three years of physical, social an language development. The publications are available in English and

ogra m	2000	2001	2002	2003	2004	Statement of Progress
	61.19	246.59	253.98	261.60	269.45	Program to reduce the risk and increase the survivability of communi located at the wildland - urban interface and vulnerable to violent wil events.
/Nevada Fire	25,264.73	26,202.29	26,988.36	27,798.01	28,631.95	To save homes, lives and natural resources, educators joined forces v Sierra Front Wildfire Cooperators (Nevada and California fire agenci Specialists teach defensible-space practices to homeowners and lands professionals. They published a free manual, “Living With Fire,” ava Extension offices and fire stations. Currently, the Living with Fire pu is being used in eleven states and over one million copies have been p
al Resource	3,826.63	3,959.22	4,078.00	4,200.34	4,326.35	An extension bulletin provides the basis for educating citizens about and variety of techniques used to manage natural resource disputes.
natives For	1,418.37	1,466.42	1,510.41	1,555.72	1,602.39	Extension professionals teach cattlemen by showing marketing alter cull cows which increase profit.
s	165.00	664.95	684.90	705.45	726.61	The Master Gardener Program is a horticulture training program to n needs of home gardeners and consumers. Volunteers, who are traine educate the public, take part in wildlife preservation projects, particip wilderness restoration projects, and answer questions from the public program establishes a sense of community spirit, accomplishment an intellectual stimulation while encouraging wise use of our water reso through conservation.

ogram	2000	2001	2002	2003	2004	Statement of Progress
al In Nevada	326.00	334.68	344.72	355.06	365.71	A private farm is cooperating with Extension to determine the possib growing various mint varieties as alternative crops in Eureka County.
n a Education p Project)	11,719.12	12,130.61	12,494.53	12,869.36	13,255.45	Food stamp recipients learn to make healthy choices
	5,042.81	5,236.48	5,393.58	5,555.38	5,722.04	The Hispanic component of Healthy Families Nevada, a new progra brings parenting education to non-English speaking parents.
Prevent	3,634.59	3,757.43	3,870.16	3,986.26	4,105.85	This pilot project explores the use of sheep to create and maintain a f in the fire-prone C-Hill area of western Carson City. Sheep have bee successfully to carve out firebreaks in other states. In 2000, the proje expanded to demonstrate the effectiveness of sheep in creating greens trampling seeds and suppressing competitive weeds.
ival And	1,434.11	1,471.88	1,516.04	1,561.52	1,608.36	Mint oil could make a effective alternative crop
ator Training	11,185.91	11,456.82	11,800.53	12,154.54	12,519.18	Extension trains pesticide applicators

ogram	2000	2001	2002	2003	2004	Statement of Progress
	14,841.29	15,222.74	15,679.42	16,149.80	16,634.29	Project MAGIC (Making a Group and Individual Commitment) has b successful in rural and urban communities in keeping first-time juven offenders from reoffending. Hundreds of youth have participated in th program that gives them the skills to get out of the system and becom productive citizens. Follow-up interviews of graduates indicate they' able to cope with challenging situations without going back to destruc behavior.
eeder	1,949.81	2,003.92	2,064.03	2,125.95	2,189.73	With the help of the Bureau of Land Management, Extension is dete the feasibility of using an air seeder on rangelands. If successful, seed and other costs can be reduced, allowing more rehabilitation efforts.
ctivity	6,845.94	7,028.20	7,239.04	7,456.21	7,679.90	Focused on noxious weed management and revegetation. At total of participants were taught in 13 presentations to diverse audiences. A v weed control group was established, with the group's leader winning a award in recognition. Implemented research/demonstration projects biological control of weeds with livestock. Program cooperators incl Nevada Department of Agriculture, BLM, USFS, NRCS and Conser Districts.
Systems For Operations	319.83	330.54	340.45	350.67	361.19	Extension livestock specialists work with ranchers one-on-one to ens record-keeping systems match their operations. Systems range from e that carry a cow's history to complete computer programs.
For Irrigating es	1,738.61	1,751.65	1,804.20	1,858.33	1,914.08	Golf course and park managers are taught how to properly use efflue and other sources of poor-quality irrigation water in their landscapes.

ogram	2000	2001	2002	2003	2004	Statement of Progress
olence Among	8,851.36	9,094.37	9,367.21	9,648.22	9,937.67	This joint AES/Extension project seeks to determine the protective fa associated with youth violence, as well as keys to help prevent schoo community violence related to youth. Data collection is proceeding a sites in five Western states, and the information has been used to info school boards, help with prevention program planning efforts, as base for educational and prevention evaluation efforts.
ties And Public est: Impacts s	1,163.88	1,172.61	1,207.79	1,244.03	1,281.35	Extension educators bring public issues education to the public to ass developing trade-offs between economic impacts and different public management scenarios.
ogram	8,367.88	8,742.34	9,004.61	9,274.74	9,552.99	More than 2,000 south-valley property owners in the Truckee Meado participated in a neighbor-to-neighbor network to prevent contamina flowing into the Truckee. After workshops and distribution of a "Sma Manual," property owners reported implementing "best management practices," such as cleaning up pastures and pumping septic tanks. W sampling in one ditch revealed a drop in dangerous phosphorus level Participants from eight western states, led by Nevada, are developing curriculum for small acreage programs.
Irrigation	8,446.35	8,883.73	9,150.24	9,424.75	9,707.49	Subsurface drip irrigation boosts alfalfa production

ogram	2000	2001	2002	2003	2004	Statement of Progress
culture	7,068.57	7,246.26	7,463.65	7,687.55	7,918.18	Serve as member of SARE WCC 34 Regional coordinating committe member of regional project review and planning committees. Nevada SARE Coordinator. Presented an invited paper at the SARE 2000 Co , Portland, OR, titled "Role of Sheep Grazing in Vegetation Managem
cational upport Locally e Water ams In	2,884.20	2,905.83	2,993.01	3,082.80	3,175.28	This program is delivering technical information to system operators water supply systems. The program uses remote video conferencing present monthly technical sessions for operators to help them maintai upgrade their operator certification. The program researches water su operators in rural communities throughout the state and meets an urg for training created by new federal requirements for water treatment p operation.
eed Initiative	16,788.55	17,361.22	17,882.06	18,418.52	18,971.08	The Tall Whitetop Weed Initiative is a legislatively funded public-ed and action campaign to control and eradicate this noxious weed. A multidisciplinary team of CE specialists, in convert with other agenci volunteers have targeted eight "hot spots" where education and demo projects are in progress.
e Management ation	1,147.99	1,187.77	1,223.40	1,260.10	1,297.91	Teaching through example is used to educate citizens about how to constructively manage natural resource disputes.
Partners	8,209.74	8,462.49	8,716.36	8,977.85	9,247.19	The goal of this program is to enhance the nutritional health of stude improving the school environment through the activities of volunteer nutrition professionals.

ogram	2000	2001	2002	2003	2004	Statement of Progress
unity and opment	1,556.65	1,630.66	1,679.58	1,729.97	1,781.87	To better prepare for the boom and bust cycles, the Town of Tonopal identified the need to organize and develop a downtown revitalizatio will build a stronger and more economically stable community. The community is working towards implementation of several beautifica projects including new modern town signs when entering Tonopah, trees on main street, additional downtown parking for oversized vehi retail leakage study, and various remodeling of store fronts.
ain Labeling	1,774.32	1,818.79	1,873.36	1,929.56	1,987.45	More than 1,000 volunteers have stenciled storm drains "No Dumpin Drains to River" (or lake) in the Truckee Meadows and Tahoe Basin.
sin Water oject	3,826.63	3,959.22	4,078.00	4,200.34	4,326.35	Walker River Basin irrigators explore the potential for certain cultura practices to conserve water and improve water quality. Extension wo identify those voluntary conservation measures that benefit the entire
ater Bank	1,745.83	1,758.92	1,811.69	1,866.04	1,922.02	Extension educators bring a public-issues education approach to solv natural-resource conflicts in the basin. They study the economic impa water banking and survey the willingness of water-rights holders to p in this type of voluntary exchange.
rass Varieties	1,108.11	1,137.20	1,171.32	1,206.46	1,242.65	Extension specialists test the adaptability of 12 perennial warm-seas pasture grass varieties at the Newlands Research Center. The grasses adapted to western Nevada, may increase forage production and the g season for area producers. The trial will continue for several more ye

ogram	2000	2001	2002	2003	2004	Statement of Progress
ion, Quality In d Agriculture	3,274.17	3,298.73	3,397.69	3,499.62	3,604.61	Economics of water conservation and on-farm efficiency improveme being developed.
d Grand	**Grand**	**Grand**				
	345,385.82	357,050.91	367,762.44	378,795.31	390,159.18	

ment of Agriculture

Cooperative State Research, Education, and Extension Service
Supplement to the Annual Report of Accomplishments and Results
Multistate Extension Activities and Integrated Activities
(Attach Brief Summaries)

X C

Nevada Agricultural Experiment Station

a

___ Multistate Extension Activities
_x_ Integrated Activities (Hatch Act Funds)
___ Integrated Activities (Smith-Lever Act Funds)

	Actual Expenditures				
hed Program/Activity	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
dSchedule					

David G. Thawley
Director

02/28/01
Date

ES-REPT (2/00)

GRICULTURAL EXPERIMENT STATION					
NT TO FORM CSREES-PLAN(2/00)					
D ACTIVITIES (HATCH ACT FUNDS)					
LANNED PROGRAM/ACTIVITY	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
age and protection of horticultural species	12,680	48,001	48,000	36,000	
dies in plants, insects, infectious pathogens and					
es	0	47,156	41,000	30,750	
and victims: Delineating resiliency associated with peer-					
dolescent violence	12,655	12,965	0	0	
on of child maltreatment in Nevada	19,733	15,221	0	0	
uality of child care in Nevada	0	11,423	8,567	0	
ol environment to reduce obesity risk among middle school					
in Nevada	16,188	16,646	12,485	0	
age and protection of fruit and nut crops	12,641	0	0	0	
mic development: Alternatives in the new competitive					
nent	28,000	7,671	5,753	0	
rvation, competition and quality in western irrigated					
re	14,883	28,993	21,745	0	
unities and public lands in the west: Impacts and					
ves	10,581	9,300	9,300	6,975	
aracterization and quantification of flow and transport					
in soil	21,166	0	0	0	
apping and channel changes by post drought riparian					
on	13,451	27,241	20,431	0	
e effects of environmental stresses on oocysts of					
oridiumn parvum	23,248	25,028	25,028	18,771	
tilization of the shallow saline aquifer in Clark County	22,788	18,140	13,605	0	
nagement in the Tahoe Basin forests: Forest health,					
uctivity and water quality	0	34,147	34,000	25,500	
anagement strategies to increase lean lamb and wool					
on efficiency	32,129	14,712	0	0	
ical model to predict profit potential and needed decision					
nputs for various management and breeding programs on					
anges	17,200	7,993	0	0	
unities and public lands in the West: Impacts and					
ves	0	9,858	7,394	0	
trogen utilization in alfalfa hay by ruminants	35,027	4,257	4,300	3,225	
ojects to be approved in years 2001-2004			50,000	179,000	300,000

	292,370	**338,752**	**301,607**	**300,221**	**300,000**