

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Sustainable Management of Natural Resources

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	15%		15%	
103	Management of Saline and Sodic Soils and Salinity	5%		5%	
121	Management of Range Resources	30%		30%	
123	Management and Sustainability of Forest Resources	10%		10%	
135	Aquatic and Terrestrial Wildlife	10%		10%	
136	Conservation of Biological Diversity	5%		5%	
405	Drainage and Irrigation Systems and Facilities	10%		10%	
605	Natural Resource and Environmental Economics	15%		15%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	7.3	0.0	14.3	0.0
Actual Paid Professional	5.0	0.0	16.8	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
441161	0	1520332	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
441161	0	1520332	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Water claims in New Mexico's Rio Grande Basin exceed reliable supplies by a factor of at least ten to one. In this basin, demands for irrigation, urban use, the environment, and energy continue to grow, while supplies remain constrained by unsustainable use, drought and impacts of climate change. Policymakers in this basin face the challenge of designing plans for allocating the basin's water supplies efficiently and fairly to support current uses and current environments. Managers also seek resilient institutions that can ensure adequate supplies for future generations. This project addresses those challenges by designing and applying an integrated basin scale framework that accounts for the basin's most important hydrologic, economic, and institutional constraints. Its unique contribution is a quantitative analysis of three policies for addressing long term goals for the basin's reservoirs and aquifers: (1) no sustainability for water stocks, (2) sustaining water stocks, and (3) renewing water stocks. It identifies water use and allocation trajectories that result from each of these three plans. Findings show that it is hydrologically and institutionally feasible to manage the basin's water supplies sustainably. The economic cost of protecting the sustainability of the basin's water stocks can be achieved at 6-11 percent of the basin's average annual total economic value of water over a 20 year time horizon. Our plan is to use the knowledge gained in developing these frameworks to gain insights into cost effective water and agricultural conservation policies in New Mexico and other water stressed regions of the world such as Iraq, Israel, Afghanistan, Ethiopia. We are also looking for lessons from this work that enables New Mexico water leaders to be better informed for the design of more resilient water institutions for the Rio Grande Basin in the face of potential drought and climate change.

Social, economic, and environmental systems can be vulnerable to disruptions in water supplies that are likely to accompany future climate changes. We provided policy makers with assessment of economic methods and measures of climate change damages on U.S. water resources.

A promising look at bi-national co-adaptation was highlighted to illustrate the potential for building regional adaptive capacity. Climate change and growing populations are dual stresses that are particularly challenging to communities along the US/Mexican border where adaptive capacity is limited, infrastructure lacking, and economic resources are scarce. We provided highlights on the climatic changes that are projected, identified key systems and sectors that are vulnerable to climate change, described and summarized the role of adaptation and the development of adaptation strategies.

Assessment of local-scale adaptation and long-run capacity building in acequia communities in Northern New Mexico was provided and is intended to encourage consideration of possible responses of vulnerable communities to current stresses from population growth, changing community composition, and projections of water scarcity that are expected to accompany long-run climatic changes.

The fire models BehavePlus and FlamMap were used to evaluate how reductions in herbaceous fuels and fuel bed depth would be expected to alter fire intensity and behavior, assuming a 60.7 ha TG area. Targeted cattle grazing was able to alter fire behavior most effectively when both fine fuels and stubble height were reduced to levels observed in the Arizona study. Grazing treatments were more effective in grass dominated areas compared to grass/shrub sites, which may require additional or alternative fuel treatments. Fire models projected that flame lengths with moderate fuel moisture conditions would be reduced by over 1.2 m with TG. On grass dominated sites rate of fire spread was reduced by about half except with extremely dry conditions. Cattle grazing treatments shortened the distance traveled by simulated fire by about 1.6 km. Costs of using TG treatments will vary widely depending on the situation of implementation. Grazing treatments along an urban/wild-land urban interface area would likely be more costly but potentially provide large payoffs in reduced fire hazard and fire intensity. Targeted grazing treatments conducted in Arizona and New Mexico were used as the basis for estimating the time, effort and costs required to implement TG treatments along the urban interface and on existing grazing allotments. Cost estimates of using targeted cattle grazing as a fuel reduction method ranged from about \$25/ha to \$250/ha depending on the grazing scenario, assumed labor cost, and desired level of reduction in herbaceous fine fuels. Targeted cattle grazing may be most advantageous when relatively small reductions in fine fuels are desired. If fine fuel reductions of over about 700 kg/ha are desired, holding animals with temporary electric fence would be more cost effective than using low-stress herding and supplement. Targeted cattle grazing can be a feasible alternative to reduce fine fuels in some scenarios because costs are similar to alternative treatments to control fine fuels such as mowing and prescribed fire. The targeted grazing studies will refine and further evaluate the use of low-stress herding and strategic supplement placement as tools to focus cattle grazing without fencing to accomplish specific land management objectives. This research is examining the potential to use cattle for developing fire breaks in forested rangeland. Preliminary results suggest that some cattle ranchers could develop fire breaks in rugged terrain to assist firefighters at a cost similar to other alternatives, such as mowing, that only be applied in gentle terrain. Such a practice could potentially reduce the risk of damage to private property, reduce costs of wild-land firefighting efforts, and provide additional income to cattle ranchers. This practice also has the potential to allow cattle grazing in extensive pastures where part of the area has been burned. Targeting cattle grazing away from burned areas would allow vegetation to recover while allowing livestock use in unburned areas. Part of our research will contribute much-needed understanding of factors that determine whether and when ranchers and other land managers are likely to implement this type of innovative management practice.

Vegetation surveys in the 4 study pastures for herbage production and plant cover were completed in October of 2012. All 4 pastures were stocked with cattle in March 2006. Cattle weights and calf crop information have been collected every year from 2006 through 2012. Results show higher cow and calf weights in lightly stocked pastures than conservatively stocked pastures. Forage production has been higher in lightly than conservatively stocked pastures in most years. Grazing use has averaged 28% in lightly stocked pastures and 39% in conservatively stocked pastures. A model has been developed and published relating long term forage production to precipitation on the steady pastures. This research has the potential to reduce the adverse impacts of livestock grazing on rangeland soils, vegetation and wildlife. Light stocking leaves more residual vegetation for protection of soils, watershed, and wildlife habitat. Light grazing appears to allow forage plants to maximize their productivity and it may be more beneficial than grazing exclusion. Light grazing lowers rancher risks and may increase monetary returns over conservative grazing based on preliminary results. This research has the potential to reduce rancher/environmentalist conflicts by providing better technology to maintain and improve vegetation and wildlife habitat. Increased rancher income could reduce rangeland losses to subdivisions and other development. In previous research from this project, we found conservative grazing was advantageous over moderate grazing in terms of maintaining forage production, drought, reducing rancher risk and providing higher net profits.

Urban landscapes and crop production land in arid New Mexico are dependent on irrigation water supplied by compacted earthen canals and laterals either continuously or intermittently throughout the nine month irrigation season. Equisetum hyemale has been an increasing problem on the canals, using water intended for irrigation and obstructing water flow in irrigation canals. The research will result in new management tools for suppressing Equisetum populations on canals. However, in recent drought years, Equisetum populations have been suppressed by feather finger-grass on many canal banks; these populations have been managed by spraying with low rates of glyphosate. Preliminary data suggests that New Mexico populations of feather finger-grass vary in their response to glyphosate leading to concerns that these populations are evolving resistance to this herbicide. Growers and others rely heavily on glyphosate for their weed management. Identification of weeds that are not controlled by this herbicide will reduce ineffective use of this product and will also reduce the selection pressure that results in either selection for weed species that are not controlled by glyphosate or to species that have evolved resistance to glyphosate. The research on effectiveness of herbicides used in chile pepper will result in better recommendations to growers who are interested in using these products for weed management in this non-competitive crop. Without effective weed management tools, advances in mechanical harvesting will not be realized because weeds will continue to hinder the ability of the harvesters to remove the chile fruit in the field. The work to develop modeling approaches for predicting the presence or counts of root-knot nematodes based on nutsedge counts will result in additional tools for growers to identify problem areas in their fields before the pest complex becomes dominant. Finally, clear and correct identification of the nutsedge species complex present in New Mexico fields is critical to defining the weed problems faced by growers.

As a result of resource manipulation and other ecological research, Agricultural Experiment Station scientist will be better able to sustainably manage our native vertebrate fauna and desert and plains grasslands. The projects will result in recommendations for grazing management that will incorporate measures of native biological diversity and ecological factors that influence diversity. Results from our research on burrowing owl ecology will directly affect the management of the USDA Forest Service Great Plains National Grasslands. Data collected for this project can also help alleviate future entanglements related to the management needs and status of specific species, and will contribute to enhanced wildlife viewing.

Agricultural Experiment Station research is pertinent to the conservation and sustainable use of natural resources. Our large carnivore research will provide valuable information that state game agencies can use to manage their populations. Our work on examining the movements of golden eagles across North America will provide federal and state resource agencies with information necessary to plan renewable energy projects.

In New Mexico, the brown trout is an invasive species in mountain streams that creates problems for the local native cutthroat trout. AES scientists collaborated with European colleagues to learn about factors influencing the hatching success of brown trout so that insights might be gained into the local situation. Results from fish and crustacean projects benefit water management in arid landscapes and help managers foresee possible effects of human interventions on the ecology of aquatic systems. Impacts of the project include a presentation on invasive aquatic species to a local high school audience and a lecture to a university water-issues class on irrigation management strategies to facilitate conservation of native fishes a university class. Broader impacts are associated with publication of research results in international peer-reviewed journals.

Soil salinity and sodium affected soils negatively effects crop production which costs farmers both yield and profit. Additionally, the management of saline and sodic soils requires additional water resources that are in short supply. Soil test results have identified areas of concern within New Mexico where crop production may well be affected without addressing the cause of the problem or changing management practices. While salinity can be managed with leaching irrigations it also leads to nitrate-N leaching below the root zone of the crop and could potentially reach groundwater resources. Funded studies

demonstrated that the use of nitrification inhibitors, on the whole, do not help yield and do not help prevent nitrate-N losses. Rates and timing of N fertilizers offers the most promise in controlling salinity and nitrate movement through the soil profile.

AES researchers evaluated the performance of residential weather-based irrigation controllers that were used to irrigate tall fescue plots (*Festuca arundinacea*) installed in the arid southern Chihuahuan desert. In one experiment, Irritrol Smart Dial, RainBird ET Manager, Aqua Conserve, Hunter ET System, Weathermatic SL1600, and one manual irrigation controller programmed at 80% of historical reference evapotranspiration were tested. Compared to the manual controller, Irritrol and RainBird treatments saved 53% and 34% of irrigation water, respectively. In another experiment, Irritrol Smart Dial and RainBird ET Manager were tested for one year. Although soil moisture content of Irritrol-irrigated turf plots dipped below 50% of available soil water capacity from November 2010 to January 2011, leaf relative water content of turfgrass in both treatments exceeded 85%. The Irritrol controller applied less water than the RainBird, but the ratio of variable to maximal fluorescence averaged 0.78 for both treatments, indicating that the turfgrass was not stressed. This research clearly shows that one weather-based irrigation controller can apply significantly less water than another while maintaining similar quality of turfgrass grown in southern New Mexico. Therefore, weather-based controllers destined for this region must be field tested. For example, 4,269 square feet of cool-season grass in Las Cruces, New Mexico would receive 192,569 and 313,795 gallons per year when irrigated with the Smart Dial and RainBird ET Manager, respectively. However, the quality of the grass would be similar.

Scientists have just completed a prototype internet site that can be used by a farmer to estimate the ET for his crop. The internet site can estimate ET for any of the lower 48 US states and parts of Canada. All that is required from the farmer is crop type, acreage, planting date, and last irrigation date. Testing has been ongoing. Several problems have been identified and corrected. Additional refinement of the internet site is continuing. A spreadsheet program has been developed that will help farmers evaluate and track irrigation pump performance. This program requires that the farmer enter pump operating pressure, pump drawdown, and flow rate to estimate energy costs. These estimated costs can be compared to actual costs so that the farmer can track pump performance and determine if the pumping system is operating properly. If it is determined that the pump has significantly departed from expected performance, measures can be taken to correct the departure. The program is undergoing continued testing to determine if there are any problems that need correction. A simplified canal control gate design has been determined and drawings are being completed for this gate. Two irrigation districts have been selected to construct these gates to try to determine if the drawings and instructions are adequate. An open channel simulation algorithm has been completed to operate in Matlab. The algorithm solves the St. Venant open channel flow equations using a 4 point implicit solving method. This algorithm has been used to test a simplified gate control routines that can be used on numerous canals in the Western United States.

Work on the response of chile pepper and cotton plants to salinity has helped identify some varieties that are more sensitive or tolerant to salts during germination and emergence stages. Selection of salt-tolerant chile pepper varieties will improve local economies by reducing water requirements for irrigation and improve agricultural yields of chile and cotton, both important New Mexico commodities. Research on soil quality continues to impact local and regional agricultural practices and potential remediation of contaminated soils. The work on salinity and contaminants such as arsenic should impact land application practices at wastewater facilities.

Research at the Farmington Agricultural Science Center in northwestern New Mexico has identified microirrigation components that will function adequately under substandard pressure conditions typical of rainwater catchment systems or of tanks hauled to remote sites in trailers or pick-up truck beds, etc. This information can be used to facilitate the selection of suitable components and provide information on flow rates and system efficiencies for use in irrigation scheduling when using these low pressure systems.

Hatch funds were used with other funds to carry out research on acequia system hydrology and socioeconomics, in cooperation with a team of investigators. Sustainability of acequia systems to new stressors is being explored through translating disciplinary understanding into a uniform format of causal loop diagrams to conceptualize the subsystems of the entire acequia-based human-natural system. Four subsystems are identified: hydrology, ecosystem, land use/economics, and sociocultural. Important linkages between subsystems were revealed as well as variables indicating community cohesion (e.g., total irrigated land, intensity of upland grazing, mutualism).

Research by AES scientists led to the integrated development of standard and molecular biology approaches for the monitoring of risks associated with collection and treatment of municipal wastewaters, dairy farming systems, and surface waters. It also allowed expansion of collaborative activities within the university with researchers from the departments of Biology and Engineering and outside the university with researchers from the Universities of California, Kansas, Kentucky and Guelph. The results and developed protocols were directly employed to answer similar relevant questions in subsequent projects targeting algal biofuel systems suggesting their validity and are currently used to develop testable and fundable hypotheses relevant to environmental quality of the Southwest, and thus a range of local stakeholders.

The timing and amount of irrigation water is critical to the optimum production of pecans however, there are few tools available to estimate water use compared to deep percolation below the root zone. The RZWQM2 model was compared to the daily water balance method at two flood-irrigated mature pecan orchards with different soil textures and depths to water table, in the lower Rio Grande Valley near Las Cruces, New Mexico. A spatial variability study was conducted to identify the areas where remediation is needed and suggest sustainable management strategies to reduce the effect of treated saline and sodic wastewater application on soil environment and existing native vegetation based on the spatial variability of soil physical and chemical properties. The project results demonstrate that about 25-37% of water can be lost to deep percolation. The contour maps of soil properties along with their spatial structures can be used in making better future sampling designs and management decisions in the west mesa site irrigated with treated wastewater.

A 4-yr field study evaluated the effects of land-applied, treated, saline-sodic industrial wastewater on a Chihuahuan Desert shrubland. Land application (irrigation) increased soil N, P, and K fertility, but along with increased soil pH, sodicity, and total salinity. Cumulative land deposits of Na, Cl and CaCO₃-equivalent alkalinity reached 27 Mg after 4 yr. An additional 2 Mg of combined vegetation biomass had accumulated on an irrigated plot compared to an adjacent non-irrigated plot. Fruit dry matter of the irrigated shrubs, *Larrea tridentata* and *Prosopis glandulosa*, was increased by up to 15-times above that on the non-irrigated plot, with no increases in total shrub biomass. As sodicity increased on the irrigated plot, the herbaceous *Lepidium alyssoides* became increasingly dominant on the shrub interspaces, while six other herbaceous species declined. This study is the first to report environmental impact of land applying treated industrial wastewater on a Chihuahuan Desert landscape. Adoption of similar land application practices by other New Mexico towns could reduce salinization of the Rio Grande from conventional wastewater treatment plant outflows by 5% to 10% while providing financial benefits through cost-effective wastewater processing.

New Mexico Cooperative Extension continues to increase their volunteer base and work with programs to build strong foundations for positive economic and environmental impacts. Program growth fluctuates yearly depending on the volunteer leadership available. Last year there were increases in water, soil, and agriculture programs. Requests for soil testing and interest in composting and water management are being considered. Ranch and home visits address weeds, grasses, livestock management techniques, feed supplements, urban horticulture and integrated pest management. 4-H played a major role when they took the top wildlife judging team to nationals and placed fifth in the nation. Below are highlights from

several New Mexico county Extension programs and state specialist educational efforts.

Gardening groups continue to utilize Extension faculty and staff at an increasing level. Talks range from local garden club programs to container gardening and site-specific walks and nature hikes. Questions addressed include pest management, diseases, crop rotation, changing climatic conditions, and best gardening skill practices. Agents and specialists provide information in print and online so clientele can share the information with others. Beyond the public appearances and home visits, phone calls, emails, and walk-in questions continue to increase. Agents expand their outreach by training Master Gardeners, providing radio and newspaper talks and columns and referring all less-technical questions to trained staff and Master Gardeners.

Agents and specialists held pesticide applicator trainings providing 5 continuing education credits (CEU) to local and regional agriculture producers. The agent hosted a private applicators pesticide test to certify local producers. Producers appreciated that trainings were held close to their homes; saving on travel expenses. Agents, working with three local pest control companies, monitor pest populations; and make home visits to identify pests that need to be managed.

Last year range management help was in high demand due to lack of rain. Livestock producers received advice on feed, supplements and forage information, and assistance in getting their livestock to market. The agent makes ranch and farm visits throughout the year. The agent works with Farm Services Agency (FSA) and Natural Resources and Conservation Services (NRCS) to assess the grazing losses in counties. Agents provide the information on pasture conditions and stock numbers. Agents work with the New Mexico Livestock Board on a program to educate people about abused horses. One agent wrote 2 newspaper articles explaining the feed intake of horses and the amount of water that is needed for them to live. Five horses were placed in rescues and 2 more fostered out in one county.

Interest in solar energy technologies for farm and ranch operations is growing. In one county the agent trained 60 producers last year resulting in five producers putting solar systems into their operations. This has been a hit with the agent who has a waiting list when he holds a class.

Agents and specialists carried out the second annual youth ranch management camp held at Valles Caldera. Youth who attended the camp began their careers as ranchers. They learned everything from cutting meat to how to collect range forage samples. Youth and instructors learned skills that can be taken back to their counties. Youth gave feedback to instructors at the end of the camp stating how the camp helped them with all aspects of the ranching business.

Lea County hosted a thirteen week Master Gardener's program course. Participation increased 7.5%. Many of the topics are relevant to the county or pertain to questions that have been received throughout the year by the agent. Each year agent receives the assistance of certified MG's in conducting the program. Currently, Lea County has 56 certified gardeners to utilize. They assist in many capacities including landscaping for historical sites, preparation of horticulture judging teams, home and garden competitions at the annual county fair, and assisting the agent on various questions throughout the year. The certified MG's publish a monthly newsletter that is sent throughout the county and to local newspapers and radio stations advertising their availability and support for Lea County and the extension service.

The Master Gardeners of Lea County hosted its 1st Annual Water Wise Conference. This program focused on utilizing water effectively in the Desert Southwest. Four presenters conducted two programs each. The program was received well with hopes of hosting another program next year. Organizers were very pleased with the turn out and excited about the feedback received after the one day program.

The 21st annual Pesticide Applicators Training (Ornamental and Turf Workshop) was held on the campus of New Mexico Jr. College. There were two main areas of interest: individuals seeking the skills and knowledge to obtain an applicators license; and those who have a license and are seeking to gain the

required number of CEU's. The workshop assisted many residents throughout the state. Many municipalities were represented (Hobbs, Lovington, Eunice, Jal, Carlsbad, Artesia, Portales, Roswell, and Clovis).

2. Brief description of the target audience

Target audiences include:ranchers, farmers, urban landscapers, park departments, state and federal agencies, private homeowners, and recreational users of parks, forests, and waters.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2012

Actual: {No Data Entered}

Patents listed

{No Data Entered}

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	3	5	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- The specific output measures will vary according to the specific project being monitored. The development of research procedures and technology, training of students, publishing research papers, and disseminating research results via educational workshops, conferences, and

Extension media are important outputs for the various projects falling under this planned program.

Year	Actual
2012	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	# of trained professionals
2	# of research publications
3	# of Extension publications
4	% of people adopting NMSU recommendations

Outcome #1

1. Outcome Measures

of trained professionals

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
{No Data Entered}

What has been done
{No Data Entered}

Results
{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
103	Management of Saline and Sodic Soils and Salinity
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
135	Aquatic and Terrestrial Wildlife
405	Drainage and Irrigation Systems and Facilities
605	Natural Resource and Environmental Economics

Outcome #2

1. Outcome Measures

of research publications

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	45

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
103	Management of Saline and Sodic Soils and Salinity
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
135	Aquatic and Terrestrial Wildlife
405	Drainage and Irrigation Systems and Facilities
605	Natural Resource and Environmental Economics

Outcome #3

1. Outcome Measures

of Extension publications

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	13

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
103	Management of Saline and Sodic Soils and Salinity
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
135	Aquatic and Terrestrial Wildlife
405	Drainage and Irrigation Systems and Facilities
605	Natural Resource and Environmental Economics

Outcome #4

1. Outcome Measures

% of people adopting NMSU recommendations

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
103	Management of Saline and Sodic Soils and Salinity
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
135	Aquatic and Terrestrial Wildlife
405	Drainage and Irrigation Systems and Facilities
605	Natural Resource and Environmental Economics

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Continuing severe drought in New Mexico hampered research efforts.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The majority of adult program evaluations carried out by New Mexico Extension agents and specialists are pre-post and post-program knowledge gain instruments. The majority of youth (primarily 4-H club) program evaluations are demonstrations of knowledge gained and applied in teaching others, competitive events, and climbing 'youth career ladders'. Rarely, if at any time, does an agent or specialist report that participant knowledge attained/gained was less than satisfactory. One can only assume that knowledge gain survey questions are fairly worded, and that audience participation was not mandatory. The only exception to this is with Master Gardener and Integrated Pest Management qualification exams. But again, participation is initially by application and the desire to learn and apply what is learned.

Key Items of Evaluation

What is interesting to note is that most Extension faculty now use goal setting, program objectives, and evaluation instruments in their program plans (as opposed to 10 years ago, when there was a great degree of resistance). The next step in program evaluation is to assist Extension agents and specialists to develop precision evaluation instruments. On-going training, such as the Western Extension Cohort (Evaluation) Training (WECT), needs to be organizationally supported and participation needs to be encouraged by all Extension faculty.

Also, the American Evaluation Association has an Extension group section and should become a legitimate and heavily encouraged professional Extension association. The Association does more than any other organization to encourage evaluation 'best practices.'