V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Natural Resources

2. Brief summary about Planned Program

The Natural Resources PRU is focused on how to best manage our landscapes from the perspective of plants, animals, soils, water, and pests. Our goal is to protect these resources through our programming efforts, with special emphasis on native species.

3. Program existence : Mature (More then five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources	0%		10%	
102	Soil, Plant, Water, Nutrient Relationships	20%		10%	
103	Management of Saline and Sodic Soils and Salinity	0%		10%	
111	Conservation and Efficient Use of Water	20%		10%	
112	Watershed Protection and Management	0%		10%	
121	Management of Range Resources	0%		10%	
123	Management and Sustainability of Forest Resources	0%		10%	
132	Weather and Climate	0%		10%	
205	Plant Management Systems	25%		0%	
216	Integrated Pest Management Systems	15%		0%	
307	Animal Management Systems	20%		0%	
403	Waste Disposal, Recycling, and Reuse	0%		10%	
605	Natural Resource and Environmental Economics	0%		10%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Natural Resources cover a wide range of disciplines that are captured below.

Landowners/managers who own/manage one to 100 acres embrace the rural lifestyle but do not necessarily intend to derive income from the property. According to the USDA ERS (Economic Research Service) 2007 census data, 48.5% of Colorado farms are 1-99 acres in size. The number of small farms (1-99 acres in size) has increased by 7.7% since 1997.

The 2007 US Census of Agriculture classifies 36.4% of small farms (1-100 acres) as Residential/Lifestyle properties in which operators report major non-farming occupations. Placing rural agricultural land into the hands of many diverse owners has created a new educational challenge for Extension.

According to the American Farmland Trust, population growth in Colorado is transforming traditional agricultural landscapes into low-density residential development.

Landowners/managers have a significant impact on the conditions of soil, water, plants, animals, and other natural and man-made resources through their cumulative effects. Many of these homesteaders move from cities or other states and do not have the land management knowledge base which traditional agricultural landowners hold. Therefore, the demand for information and technical assistance is immense. Weed control, water use, and grazing management are prime examples of the land management skills which many small acreage landowners seek.

In landscapes where agriculture is prevalent, new technologies are available for better management of inputs such as water, pesticides, and nutrients. With these tools it is possible to reduce the use of inputs with similar, or potentially increase, yield. One of our goals is to introduce these technologies to producers and explain how to use them for a more sustainable and profitable crop production.

Enhancing sustainability of natural and built landscapes using native plant materials and mitigating threats to native ecosystems from alien invasive species have been identified as critical issues of national importance in the West and beyond. Observations of recent climatic changes including higher temperatures, more severe droughts and lower stream flows have resulted in increasing concerns about water availability and invasion of alien weeds (Overpeck et al., 2012).

According to the Colorado Climate Center, statewide average annual precipitation is only 17 inches, with many areas receiving much less. Sustainable landscapes using site-appropriate native plants can reduce the need for water and maintenance. A 2002 study in Colorado Springs compared water use between a traditional landscape and two landscapes developed using sustainable Xeriscape principles. The study found water savings ranging from 22% to 63% after implementing the rules and regulations set forth in the 1998 Colorado Springs Landscape Code and Design Manual.

Additionally, there are a number of trends in home landscapes and gardens which further underscore the need for native plant landscaping. These include: 1) the decrease in the amount of time, money and expertise that many households have to invest in properly planting and maintaining gardens; 2) the increasing cost of water, labor, fertilizers, and chemicals; and 3) the restriction or limiting of water use for garden and landscape purposes. (O'Brien,1996).

Invasive, non-native weeds are a concern in many communities and threaten native ecosystems. Invading alien species in the United States cause major environmental damage and economic losses adding up to almost $120 billion per year. There are approximately 50,000 foreign species in the U.S. and the number is increasing. About 42% of the species on the Threatened or Endangered species lists are at risk primarily because of alien-invasive species (Pimentel et al., 2005).

There is a long-term need for a comprehensive, high quality integrated pest management system encompassing the disciplines of entomology, plant pathology and weed science. A conservative loss

estimate of 5 to 10% production loss due to plant pests could cost Colorado producers in urban and rural settings 50 to 100 million dollars annually. Endemic and invasive pest activity and severity, as well as abiotic stresses, are dynamic and thus demand for pest diagnostics, management education and a systems approach will be ongoing. There is no other agency or organization that can assume the core applied research and outreach IPM program of Bioagricultural Sciences and Pest Management and IPM-disciplinary based extension and research personnel throughout the Colorado State University system.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

· With the proper education, tools, and skills, landowners/managers will become better stewards of their properties. They will enhance the sustainability of their parcels as well as their neighbors.
· They will see themselves as an interrelated system instead of a stand-alone entity, and understand that land is best managed as a collective whole because of the residual benefits received by all involved.
· With the knowledge and tools to maintain and manage their land properly, landowners will save substantial time and money.
· These practices will help maintain, or increase property values; control noxious weed spread; conserve water, land, and air quality; and provide continuity of landscape management.
· Many residents are unfamiliar with our state's local environmental conditions such as water availability, soils and elevation. Residents may find it difficult to select plants such as natives that are suited to these conditions with minimal supplemental irrigation. Economic conditions have also created a strong demand for water-efficient plants such as natives that can save residents money.

2. Ultimate goal(s) of this Program

The Natural Resources Planning & Reporting Unit (PRU) members will work together to develop and implement high quality educational programs and tools to ensure a high quality of life for Colorado citizens.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2015	12.0	0.0	11.0	0.0
2016	12.0	0.0	11.0	0.0
2017	12.0	0.0	11.0	0.0

Year	Extension		Research	
	1862	1890	1862	1890
2018	12.0	0.0	11.0	0.0
2019	12.0	0.0	0.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

- Conduct basic and applied research on environmental and natural resources issues.
- Colorado Master Gardener training and use of trained volunteers to increase capacity
- Colorado Native Plant Masters training and use of trained volunteers to increase capacity

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Education Class ● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations ● Other 1 (Field Days)	● Public Service Announcement ● Newsletters ● Web sites other than eXtension ● Other 1 (Radio spots)

3. Description of targeted audience

Landowners, including small acreage (1-100 acres) and ranchers/farmers in Colorado will be our primary audience. A secondary audience will focus on training volunteers, realtors, and other professionals who in turn will take this information and educate their clientele on Extension's behalf.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
  - Direct Adult Contacts
  - Indirect Adult Contacts
  - Direct Youth Contacts
  - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- 1. Number of group educational events: classes, trainings, workshops, demonstrations, field days, providing content expertise, fairs, shows, booths, other group events.
- 2. Individual Education: one-on-one direct client contacts by site visit, office drop-in, e-mail, telephone, Ask an eXpert, etc.
- 3. Number of meetings convened and/or facilitated; includes strategic participation that contributes to program development.
- 4. Number of kits or similar resources loaned or provided.
- 5. Number of Extension-related research and assessment projects. External funding proposals, including local, state, federal. Release or Column (number submitted)
- 6. Number of peer-reviewed publications including fact sheets, decision tools, curricula, multimedia, etc.
- 7. Number of media releases: indirect contacts through media releases, appearances, newsletters, blog posts, other non-peer reviewed publications, kit development, non-peer reviewed curriculum, PowerPoints or videos.
- 8. Number of online posts: Web posts, hits.

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	NR 1.1) Participants report implementation or intent to implement actions relating to water quality and quantity issues (such as well and septic system management, CO Water Law and regulations, water rights, best irrigation practices, stream quality issues, and/or drought tolerant landscaping.)
2	NR 1.2) Participants report implementation or intent to implement animal/wildlife-related conservation practices (such as improved manure management, livestock emergency preparedness, attracting pollinators, enhancing wildlife habitat, and/or deterring unwanted wildlife).
3	NR 1.3) Participants report implementation or intent to implement soil-related conservation practices (such as soil health, soil fertility, soil testing, erosion control, cover crops, composting, or soil compaction).
4	NR 1.4) Participants report implementation or intent to implement plant-related conservation practices (such as active weed management, pasture management techniques, grass stand establishment, planting windbreaks, planting native plants, and/or active forest management).
5	NR 1.5): Participants improve or intend to improve their practices, decisions and skills in action through timely access to pest management resources and/or pest identification and IPM implementation.
6	NR 1.6) The number of acres reported that are impacted (by weed management, planting natives, fire mitigation, pasture grasses, etc.
7	NR 1.7) Dollars saved by best management practices.
8	NR 1.8) Grant dollars awarded towards work in natural resources.
9	NR 1.9) User fees from programming.
10	Optimizing Colorado Agriculture's Water Footprint

Outcome # 1

1. Outcome Target

NR 1.1) Participants report implementation or intent to implement actions relating to water quality and quantity issues (such as well and septic system management, CO Water Law and regulations, water rights, best irrigation practices, stream quality issues, and/or drought tolerant landscaping.)

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

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

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 2

1. Outcome Target

NR 1.2) Participants report implementation or intent to implement animal/wildlife-related conservation practices (such as improved manure management, livestock emergency preparedness, attracting pollinators, enhancing wildlife habitat, and/or deterring unwanted wildlife).

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 111 - Conservation and Efficient Use of Water
- 307 - Animal Management Systems

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 3

1. Outcome Target

NR 1.3) Participants report implementation or intent to implement soil-related conservation practices (such as soil health, soil fertility, soil testing, erosion control, cover crops, composting, or soil compaction).

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 4

1. Outcome Target

NR 1.4) Participants report implementation or intent to implement plant-related conservation practices (such as active weed management, pasture management techniques, grass stand establishment, planting windbreaks, planting native plants, and/or active forest management).

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 205 - Plant Management Systems

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 5

1. Outcome Target

NR 1.5): Participants improve or intend to improve their practices, decisions and skills in action through timely access to pest management resources and/or pest identification and IPM implementation.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 216 - Integrated Pest Management Systems

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 6

1. Outcome Target

NR 1.6) The number of acres reported that are impacted (by weed management, planting natives, fire mitigation, pasture grasses, etc.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 205 - Plant Management Systems

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 7

1. Outcome Target

NR 1.7) Dollars saved by best management practices.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 111 - Conservation and Efficient Use of Water
- 205 - Plant Management Systems
- 216 - Integrated Pest Management Systems
- 307 - Animal Management Systems

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 8

1. Outcome Target

NR 1.8) Grant dollars awarded towards work in natural resources.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 111 - Conservation and Efficient Use of Water
- 205 - Plant Management Systems
- 216 - Integrated Pest Management Systems
- 307 - Animal Management Systems

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 9

1. Outcome Target

NR 1.9) User fees from programming.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 111 - Conservation and Efficient Use of Water
- 205 - Plant Management Systems
- 216 - Integrated Pest Management Systems
- 307 - Animal Management Systems

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 10

1. Outcome Target

Optimizing Colorado Agriculture's Water Footprint

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 111 - Conservation and Efficient Use of Water
- 112 - Watershed Protection and Management
- 132 - Weather and Climate
- 205 - Plant Management Systems
- 605 - Natural Resource and Environmental Economics

4. Associated Institute Type(s)

- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations

- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Description

Natural Resource Planning & Reporting Unit (PRU) outcomes are dependent on the needs and engagement levels of all landowners. Their needs and level of interest in change can be affected by weather, public policy, economy, and population changes. Also, what benefits one segment may impact another segment.

Weather conditions such as drought, flooding, hail, fires, moisture/temperature trends influencing pathogen and pest life cycles, in addition to abiotic stress effects, which will require short/medium/long term redirection of effort to accommodate program needs for pest diagnostics and management strategies

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

Evaluations are developed using the indicators listed in the State Defined Outcomes section, to survey program participants about program impacts and long term behavioral changes. Some programs will use a pre-post evaluation method while others will focus on post evaluation methods. With the expanded use of "clicker" technology, much more of the evaluation will be occurring in real time. Regarding pest management and water resources, evaluation will be focused on results on the ground and adjustments made according to results.