

# 2007 West Virginia University Research Plan of Work

## Brief Summary about Plan of Work

The West Virginia Agricultural and Forestry Experiment Station is administered within the Davis College of Agriculture, Forestry and Consumer Sciences at West Virginia University. The College is relatively broad in academic and research discipline areas, including within the College, Divisions of Family and Consumer Sciences (includes programs in Interior Design as well as Textiles and Fashion Merchandising) and Forestry (Forest Resource Management, Wood Science, Parks and Recreation and Wildlife Management) in addition to the more typical Animal and Veterinary Sciences (includes Agriculture, Animal and Veterinary Sciences, Biochemistry, and Human Nutrition and Foods), Plant and Soil Sciences (Agronomy, Horticulture, Basic Sciences), and Resource Management (Environmental and Natural Resource Economics, Agricultural and Extension Education and Landscape Architecture).

The Experiment Station supports approximately 35 FTE research faculty positions distributed across about twice this number of individual scientists. The Station also supports approximately 25 FTE technical positions, 35 clerical and farm/forest worker positions and 40 professional support positions (mostly graduate students). The West Virginia Experiment Station operates seven farms and two forests which support faculty research. Four of the farms (Animal and Veterinary Sciences farms in Morgantown and Reedsville, Horticultural and Agronomy farms in Morgantown) and the University Forest are sufficiently close to the University campus to be used extensively to support academic programs in addition to research. Outlying farms include the Reymann Memorial Farm (beef, sheep, agronomic crops and bull testing station) and Kearneysville Tree Fruit Research Farm (primarily apples and peaches) in northeastern West Virginia; the Willow Bend Farm in the southeast (pasture raised and finished beef cooperative project with ARS); and the Tagart Valley Forest (mostly oak regeneration and disease control research) in east-central West Virginia. All but Tagart Valley Forest serve as extension as well as research centers and, in fact, approximately half the FTE faculty positions at the Kearneysville Farm are Extension appointments.

The focus of research programs in the West Virginia Station over the planning period 2007 – 2011 will be on economic activities for which West Virginia conditions provide some degree of competitive advantage for state producers, or on problems having particular impact on families and communities within the state. Advantages to West Virginia producers/entrepreneurs include proximity to large urban population centers of potential demand for specialty or niche market products; an expanse of exceptional hardwood forests; a topography, soil and climate well suited to the production or forages and/or pasture-reared livestock; a rich history, scenic beauty, abundant wildlife and varied recreational opportunities which are highly attractive to tourists; and extensive water resources well suited to the production of cool and cold water fish for food and recreation. Additionally, there is a clearly recognized need to protect the natural resources which enable many of the economic activities within the state.

The most common problems impacting families and communities in West Virginia include a state population which is decreasing in size and aging as well due to a disproportionate loss of younger citizens; a largely rural population with limited access to health and nutritional information and a consequent tendency towards poorly balanced, calorie-dense diets; and an extreme need for environmentally friendly and sustainable economic development which will provide jobs to replace the many which have been lost in coal and timber harvesting industries.

Research programs of the West Virginia Experiment Station are coordinated with and supported by research programs at West Virginia State University and by educational outreach programs of both West Virginia State and West Virginia University Extension. Supporting research at West Virginia State includes plant genetic work to improve yield, disease resistance and organoleptic properties of pepper, watermelon and greenhouse tomatoes, investigation of procedures to bind water soluble metals and carbon in CO<sub>2</sub>, and determining feasibility of utilizing in fish diets, protein recovered from anaerobic digestion of poultry litter.

Supporting outreach programs are conducted by West Virginia University Extension for all Station research programs except Fundamental Plant and Animal Systems and Wildlife Management. Interactions are extensive and vital to technology transfer and implementation in programs involving production agriculture and forestry, economic development and quality of life in rural communities, human nutrition and health and assuring a safe, high quality food supply.

West Virginia University and West Virginia State University entered into a voluntary agreement in 1997 to create the West Virginia Association of Land-Grant Institutions; a collaboration of the state's two land-grant institutions committed to providing education that would help the citizens of West Virginia improve their lives and communities. More recently (in 2005), triggered by an USDA-CSREES mandate, the two Universities developed a Comprehensive Plan for the State which superseded the former agreement. This plan assures appropriate coordination between the two institutions to avoid duplication of efforts, as it relates to their research and extension programming, and thus an efficient investment of human and financial resources within the State. Program Administrative teams and Directors from both institutions meet annually prior to POW submission to plan for collaboration and avoid duplication.

**Estimated number of professional FTEs/SYs to be budgeted for this plan.**

Year	Extension		Research	
	1862	1890	1862	1890
2007	0.0	0.0	35.4	0.0
2008	0.0	0.0	36.0	0.0
2009	0.0	0.0	36.7	0.0
2010	0.0	0.0	36.8	0.0
2011	0.0	0.0	37.0	0.0

**Merit Review Process****The merit review process that will be employed during the 5-Year Plan of Work cycle**

- Internal University Panel
- Expert Peer Review

**Brief explanation**

A complete description of the merit and peer review process is given at [http://www.caf.wvu.edu/wvafes/policies\\_peer.htm](http://www.caf.wvu.edu/wvafes/policies_peer.htm). In essence, experts in the field of science are selected by the Experiment Station director or designee and asked to judge technical merit, likelihood of achieving objectives, and impact for each potential project. Competitively awarded grants, or contract research requiring peer review for approval are exempt from this additional review process.

**Evaluation of Multis & Joint Activities****1. How will the planned programs address the critical issues of strategic importance, including those identified by the stakeholders?**

A majority of stakeholder input is gathered in conjunction with West Virginia University Extension from attendees at regular meetings of organizations of stakeholders (Farm Bureau, Forestry Association, Grasslands Steering Committee, Organic Research Project, Aquaculture Forum, Beef Cattle Association annual meeting, etc.). Additionally, input is obtained from groups having interest in specific programs within the college - groups such as the Appalachian Hardwood Council, Organic Research Project Steering Committee - and from specifically established advisory bodies such as the Davis College of Agriculture, Forestry and Consumer Sciences Visiting Committee and the West Virginia Agricultural and Forestry Experiment Station Advisory Board.

**2. How will the planned programs address the needs of under-served and under-represented populations of the State(s)?**

Programs in production agriculture and forestry are focused on smaller, family-type operations which are typical in West Virginia. The program in food quality - food safety - human nutrition and health likewise is directed mostly at concerns and situations characteristic of small, less affluent rural populations - those typically underserved. Finally, the program in economic development and quality of life in rural communities is by its nature focused entirely on smaller, rural communities with relatively limited economic opportunities.

**3. How will the planned programs describe the expected outcomes and impacts?**

As they occur over the five-year planning period; primarily as economic output of industries involved, job growth, statistics on health and nutrition of state citizens, etc.

#### 4. How will the planned programs result in improved program effectiveness and/or efficiency?

By providing information, training and technical assistance relevant to concerns of family farms, small businesses, and rural communities. Coordinating our programs with research conducted at West Virginia State University extends the reach of research programs designed to benefit state citizens. Coordinating our programs with educational outreach programs directed by West Virginia State and West Virginia University Extension transfers technology more effectively to the ultimate users.

#### Stakeholder Input

##### 1. Actions taken to seek stakeholder input that encourages their participation (Check all that apply)

- Targeted invitation to traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Survey of traditional stakeholder groups
- Survey specifically with non-traditional groups

##### Brief explanation.

Distribute surveys at annual meetings of traditional and new stakeholder organizations plus solicit input from advisory boards of selected individuals representing a wide range of stakeholders.

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

###### 1. Method to identify individuals and groups

- Use Advisory Committees
- Use Internal Focus Groups
- Use External Focus Groups

##### Brief explanation.

Suggested by representatives from organizations traditionally associated with the College and others with more recent ties to College programs (e.g., organic producers); suggestions from College administrators, faculty, students and alumni.

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

###### 1. Methods for collecting Stakeholder Input

- Meeting with traditional Stakeholder groups
- Survey of traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Meeting specifically with non-traditional groups

##### Brief explanation

Surveys are distributed at annual meetings for numerous organizations having interest in College program areas (related to agriculture, forestry, landscape architecture, interior design, human nutrition, etc.) to provide input. Division Directors, College faculty and advisory committee members are asked regularly and routinely to identify industries, groups or subject matter areas needing representation in the College input stream and for specific individuals to fill these roles.

##### 3. A statement of how the input will be considered

- In the Budget Process
- To Identify Emerging Issues
- Redirect Research Programs
- In the Staff Hiring Process
- In the Action Plans
- To Set Priorities

**Brief explanation.**

Stakeholder input as it relates to the College/Station research portfolio is discussed regularly with College advisory groups and within College administrative groups, particularly when work plans are being prepared or when staffing decisions are pending.

## 1. Name of the Planned Program

Fundamental Plant and Animal Systems

## 2. Program knowledge areas

- 305 Animal Physiological Processes 10 %
- 302 Nutrient Utilization in Animals 15 %
- 206 Basic Plant Biology 15 %
- 301 Reproductive Performance of Animals 25 %
- 201 Plant Genome, Genetics, and Genetic Mechanisms 25 %
- 304 Animal Genome 10 %

## 3. Program existence

- Mature (More than five years)

## 4. Program duration

- Long-Term (More than five years)

## 5. Brief summary about Planned Program

Research involving fundamental systems in animals is to increase our understanding of reproductive, nutritional and general physiological systems and processes. Practical problems impacted will include embryonic mortality in sheep and cattle, limiting amino acids in animal rations, health and disease resistance in poultry.

In plants, program emphasis will vary from determining the function of ubiquitin and other polypeptide tags, to understanding fundamental mechanisms of flower senescence and cold shock adaptation, to combating the impacts of phytophthora and Chestnut blight, to defining and eliminating effects of ergot alkaloids produced by fungi symbiotic with pasture grasses. Related research at West Virginia State University will develop improved varieties of peppers, watermelons and tomatoes while enhancing our fundamental knowledge of genomic function and variation in these plants.

## 6. Situation and priorities

Efficiency in the production of plant and animal products is enhanced by a thorough understanding of the ways in which biological systems interact with environmental conditions, including conditions which define habitat for wildlife, natural settings for recreational activities or alternative schemes for the management of domestic plants and animals. A primary goal of research involving fundamental plant and animal systems at the West Virginia Station will be to support components of production agriculture, forestry and other land-based economic activities which are profitable under West Virginia conditions. Examples of supporting research include basic nutrition and physiology of poultry; genetic mapping and functional genomics for cool water fish species; reproduction and nutrient utilization of pasture raised livestock; basic growth and physiology of forage plant species as well as livestock-forage interactions; physiological processes controlling growth, cold tolerance, flower production, etc. of ornamental plants; mechanisms of disease and pest resistance for organically produced crops; etc.

## 7. Assumptions made for the Program

Natural variation exists in the efficiency of numerous physiological processes which characterize plant and animal species and which affect human preferences. Greater process control and efficiency of production generally result from a more complete understanding of the basic mechanisms which underlie a productive process

## 8. Ultimate goal(s) of this Program

To develop greater understanding of usable variations in fundamental physiological processes of plants and animals which lead to increased returns to industries for which state producers/entrepreneurs have competitive advantage or to improved life quality for West Virginia families and communities.

## 9. Scope of Program

- In-State Research
- Multistate Research

**Inputs for the Program**

**10. Expending formula funds or state-matching funds**

- Yes

**11. Expending other than formula funds or state-matching funds**

- Yes

**12. Expending amount of professional FTE/SYs to be budgeted for this Program**

Year	Extension		Research	
	1862	1890	1862	1890
2007	0.0	0.0	4.2	0.0
2008	0.0	0.0	4.2	0.0
2009	0.0	0.0	4.0	0.0
2010	0.0	0.0	4.0	0.0
2011	0.0	0.0	4.0	0.0

**Outputs for the Program**

**13. Activity (What will be done?)**

Conduct research; publish / present results

**14. Type(s) of methods will be used to reach direct and indirect contacts**

Extension	
Direct Method	Indirect Methods
● {NO DATA ENTERED}	● {NO DATA ENTERED}

**15. Description of targeted audience**

Primarily researchers; professional practioners, regulators, some producers

**16. Standard output measures**

**Target for the number of persons(contacts) to be reached through direct and indirect contact methods**

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2007	0	0	0	0
2008	0	0	0	0
2009	0	0	0	0
2010	0	0	0	0
2011	0	0	0	0

**17. (Standard Research Target) Number of Patents**

Expected Patents	
Year	Target
2007	0
2008	0
2009	0
2010	0
2011	0

**18. Output measures**

**Output Text**

Research presentations

2007 Target: 6  
 2008 Target: 7  
 2009 Target: 8  
 2010 Target: 8  
 2011 Target: 10

**Output Text**

Refereed scientific manuscripts

2007 Target: 4  
 2008 Target: 5  
 2009 Target: 5  
 2010 Target: 6  
 2011 Target: 7

**Outcomes for the Program**

**19. Outcome measures**

**Outcome Text: Awareness created**

**Outcome Text**

Reduced embryonic mortality in cattle and sheep %

**Outcome Type:** Medium

2007 Target: 0  
2008 Target: 0  
2009 Target: 2  
2010 Target: 0  
2011 Target: 3

**Outcome Text**

Increased efficiency of amino acid utilization in ruminants %

**Outcome Type:** Medium

2007 Target: 0  
2008 Target: 2  
2009 Target: 0  
2010 Target: 0  
2011 Target: 4

**Outcome Text**

Identify genes coding for cold shock proteins in plants

**Outcome Type:** Medium

2007 Target: 0  
2008 Target: 0  
2009 Target: 2  
2010 Target: 0  
2011 Target: 1

**Outcome Text**

Identify and map genes affecting flower senescence

**Outcome Type:** Long

2007 Target: 0  
2008 Target: 0  
2009 Target: 0  
2010 Target: 1  
2011 Target: 2

**Outcome Text**

Decrease mortality in poultry production %

**Outcome Type:** Medium

2007 Target: 0  
2008 Target: 0  
2009 Target: 2  
2010 Target: 0  
2011 Target: 3

**Outcome Text**

Develop ergot alkaloid deficient grasses with wild-type vigor

**Outcome Type:** Medium

2007 Target: 0  
2008 Target: 1  
2009 Target: 0  
2010 Target: 1  
2011 Target: 0

**Outcome Text**

Successfully develop and employ hypovirus as a biological control agent for Chestnut blight

**Outcome Type:** Long

2007 Target: 0  
2008 Target: 0  
2009 Target: 0  
2010 Target: 0  
2011 Target: 1

**20. External factors which may affect outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Appropriations changes

**Description**

Reduction in funding for fundamental research could have a significant impact on timing of outcomes

**21. Evaluation studies planned**

- Before-After (before and after program)

**Description**

Existence of technology where none existed previously; as appropriate use of state-wide industry statistics.

**22. Data Collection Methods**

- Sampling
- Observation

**Description**

{NO DATA ENTERED}

## 1. Name of the Planned Program

Production Agriculture

## 2. Program knowledge areas

- 303 Genetic Improvement of Animals 5 %
- 202 Plant Genetic Resources 5 %
- 304 5 %
- 211 Insects, Mites, and Other Arthropods Affecting Plants 15 %
- 212 Pathogens and Nematodes Affecting Plants 10 %
- 205 Plant Management Systems 15 %
- 307 Animal Management Systems 15 %
- 302 Nutrient Utilization in Animals 10 %
- 301 Reproductive Performance of Animals 20 %

## 3. Program existence

- Mature (More than five years)

## 4. Program duration

- Long-Term (More than five years)

## 5. Brief summary about Planned Program

This program includes research supporting both animal and plant production agriculture. The focus in animals will be on production from ruminants (beef and sheep) utilizing forages from pasture as the major input and on optimum nutrient delivery and efficiency for poultry production. Additional research will center on cool water aquaculture, feed efficiency in beef cattle, and environmentally sensitive protection of honey bees from impact of varroa mites. Related research at West Virginia State University will examine the feasibility of utilizing recovered proteins from poultry litter treated in an anaerobic bioreactor as a dietary supplement in fish diets.

Research emphasis in plants will be on the production of forages, tree fruits and ornamentals, as well as organic production of a wide variety of vegetables. Related research at West Virginia State University is evaluating germplasm to develop improved cultivars of peppers, watermelons and tomatoes. Emphasis for peppers and watermelons is to identify germplasm which exhibits enhanced disease or pest resistance and/or will be suitable for developing useful nutraceuticals. Research in tomatoes is focused on the greenhouse tomato industry with objectives to improve organoleptic traits and resistance to insects and diseases.

West Virginia University Extension conducts educational outreach programs to ensure technology transfer to end users in most College research areas in production agriculture. Specific examples include educational programs related to production of cool water fish for food and sport, grasslands management, beef and sheep production and marketing, commercial and individual horticulture and plant pest and pathogen diagnostics.

## 6. Situation and priorities

Most farmers in West Virginia, and in the Northeast US as well, are poorly positioned to compete in commodity markets for fruits, vegetables, field crops and livestock products, due to various combinations of circumstances. Example circumstances include small acreages, difficult terrain, dense population, high land prices and taxes, limited availability and high cost of labor, etc.

To remain viable, West Virginia producers typically must improve efficiency – either by increasing the value of what they produce, by producing at significantly lower cost, or both. Specific strategies include avoiding enterprises which require extensive amounts of mechanical tillage or harvest; reducing costs of major inputs such as feed, labor, and facilities; focusing on higher value products including those with ornamental or recreational uses; increasing real or perceived product value in specialty, niche or out-of-season markets; diversifying product offerings; taking advantage of proximity to markets, etc.

The objective of this research program in the West Virginia Agricultural and Forestry Experiment Station is to generate new knowledge with positive impact on economic activities for which state producers have some degree of competitive advantage. Station research will focus on economic activities meeting one, or more often multiple, circumstances listed above and generally having land as a primary input. Examples include forage production / livestock grazing; poultry production; organically produced vegetables, fruits and/or animal products; production of ornamental plants; and cool water aquaculture for food and

sport fishing.

**7. Assumptions made for the Program**

For the foreseeable future, West Virginia will remain a largely rural state with a need for economic activities which thrive in non-urban settings. Land-based enterprises operate naturally and logically in rural settings; many rural West Virginia citizens own land which can be a valuable input to such enterprises.

**8. Ultimate goal(s) of this Program**

To generate information which will contribute to a diverse and robust rural economy based on responsible and sustainable use of land, water and air.

**9. Scope of Program**

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

**Inputs for the Program**

**10. Expending formula funds or state-matching funds**

- Yes

**11. Expending other than formula funds or state-matching funds**

- Yes

**12. Expending amount of professional FTE/SYs to be budgeted for this Program**

Year	Extension		Research	
	1862	1890	1862	1890
2007	0.0	0.0	10.0	0.0
2008	0.0	0.0	10.0	0.0
2009	0.0	0.0	9.9	0.0
2010	0.0	0.0	9.7	0.0
2011	0.0	0.0	9.5	0.0

**Outputs for the Program**

**13. Activity (What will be done?)**

Conduct research; report results in scientific manuscripts and technical presentations; provide technology to users in popular publications and lay presentations

**14. Type(s) of methods will be used to reach direct and indirect contacts**

Extension	
Direct Method	Indirect Methods
● {NO DATA ENTERED}	● {NO DATA ENTERED}

**15. Description of targeted audience**

Producers, extension specialists, consultants, regulators, policy makers, researchers

**16. Standard output measures**

**Target for the number of persons(contacts) to be reached through direct and indirect contact methods**

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2007	0	0	0	0
2008	0	0	0	0
2009	0	0	0	0
2010	0	0	0	0
2011	0	0	0	0

**17. (Standard Research Target) Number of Patents**

Expected Patents	
Year	Target
2007	0
2008	0
2009	0
2010	0
2011	0

**18. Output measures**

**Output Text**

Research manuscripts

2007 Target: 4  
 2008 Target: 4  
 2009 Target: 6  
 2010 Target: 10  
 2011 Target: 10

**Output Text**

Scientific presentations

2007 Target: 8  
 2008 Target: 8  
 2009 Target: 9  
 2010 Target: 9  
 2011 Target: 12

**Output Text**

Popular articles

2007 Target: 0  
2008 Target: 2  
2009 Target: 3  
2010 Target: 3  
2011 Target: 5

**Output Text**

Producer presentations, workshops, etc.

2007 Target: 0  
2008 Target: 2  
2009 Target: 3  
2010 Target: 3  
2011 Target: 4

**Outcomes for the Program**

**19. Outcome measures**

**Outcome Text: Awareness created**

**Outcome Text**

Growth in state production of beef and lamb %

**Outcome Type:** Medium

2007 Target: 0  
2008 Target: 2  
2009 Target: 2  
2010 Target: 3  
2011 Target: 4

**Outcome Text**

Increase in production/consumption of pasture finished beef %

**Outcome Type:** Medium

2007 Target: 0  
2008 Target: 0  
2009 Target: 0  
2010 Target: 10  
2011 Target: 15

**Outcome Text**

Increase in state aquaculture industry %

**Outcome Type:** Medium

2007 Target: 0  
2008 Target: 0  
2009 Target: 2  
2010 Target: 5  
2011 Target: 5

**Outcome Text**

Increase state production and sales of organically produced vegetables %

**Outcome Type:** Medium

2007 Target: 0

2008 Target: 0

2009 Target: 10

2010 Target: 10

2011 Target: 15

**Outcome Text**

Growth in state's ornamental horticulture industry %

**Outcome Type:** Medium

2007 Target: 0

2008 Target: 4

2009 Target: 4

2010 Target: 8

2011 Target: 10

**Outcome Text**

Develop and market organic control for honey bee mites - adoption %

**Outcome Type:** Short

2007 Target: 10

2008 Target: 10

2009 Target: 15

2010 Target: 15

2011 Target: 20

**20. External factors which may affect outcomes**

- Economy
- Appropriations changes

**Description**

Loss or meaningful reduction in funding could significantly affect timing of outcomes

**21. Evaluation studies planned**

- Before-After (before and after program)
- During (during program)

**Description**

State statistics as appropriate; surveys as needed

**22. Data Collection Methods**

- Sampling
- Mail

**Description**

{NO DATA ENTERED}

## 1. Name of the Planned Program

Production Forestry - Timber Management and Wood Utilization

## 2. Program knowledge areas

- 123 Management and Sustainability of Forest Resources 100 %

## 3. Program existence

- Mature (More than five years)

## 4. Program duration

- Long-Term (More than five years)

## 5. Brief summary about Planned Program

Research to develop optimum procedures for timber (primarily hardwood) management and harvest, increase efficiency of utilization and develop new uses for hardwoods. Timber management research includes specifically the development of models to predict yields, protection of forest resources from insect pests, disease, and invasive species; harvest management for optimum regeneration and re-growth; responding to research needs and concerns of corporate and private owners; and providing economic comparisons among alternative management and harvest methods.

Wood utilization research likewise will be focused on hardwoods with a goal of maximizing hardwood timber to lumber throughput, reducing impact of brown rot fungi; development of non-destructive methods to determine lumber strength and stiffness, expanding uses for Appalachian hardwoods, especially harvest residuals, and devising saw mill systems for moderate sized operations. Additional research will develop systems for use at harvest to optimize bucking; develop new uses for low quality hardwoods, use ground penetrating radar to develop nondestructive scanning methods to identify subsurface defects in hardwood logs, and incorporate cellulose nanocrystals into biopolymer composites to determine the effect on mechanical properties.

West Virginia University Extension conducts educational outreach program to support research in timber management, logging, milling and forest stewardship practices, and wood utilization.

## 6. Situation and priorities

Hardwood forests cover approximately 80% of the state of West Virginia and represent an enormous state resource. Station research in timber production and wood utilization is focused on efficient, environmentally friendly, and sustainable methods of timber management and harvest, protection of our forest resources from insect pests, diseases and invasive species, and the development of value-added wood products and unique, innovative new uses for hardwood lumber. Examples of specific research areas of interest include examination of alternative harvesting methods; predicting lumber yields from measures on standing timber; protecting stands from diseases such as phytophthora, pests like Gypsy Moth and invasive species like Ailanthus; overcoming copper tolerance of brown rot fungi; developing non-destructive methods to evaluate lumber strength and stiffness; designing sawing systems to optimize profitability for small mills, use of logging residues, etc.

## 7. Assumptions made for the Program

Stands of hardwood timber in West Virginia represent a renewable resource which will exist in perpetuity if properly managed.

## 8. Ultimate goal(s) of this Program

To increase efficiency and profitability of forest and timber management; control threats to timber production from insects, diseases, and invasive species; develop innovative uses for hardwood products and structures, and assure industry sustainability.

## 9. Scope of Program

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

**Inputs for the Program**

**10. Expending formula funds or state-matching funds**

- Yes

**11. Expending other than formula funds or state-matching funds**

- Yes

**12. Expending amount of professional FTE/SYs to be budgeted for this Program**

Year	Extension		Research	
	1862	1890	1862	1890
2007	0.0	0.0	5.6	0.0
2008	0.0	0.0	6.0	0.0
2009	0.0	0.0	6.5	0.0
2010	0.0	0.0	6.5	0.0
2011	0.0	0.0	6.5	0.0

**Outputs for the Program**

**13. Activity (What will be done?)**

Conduct research, report results, assist with technology transfer

**14. Type(s) of methods will be used to reach direct and indirect contacts**

Extension	
Direct Method	Indirect Methods
● {NO DATA ENTERED}	● {NO DATA ENTERED}

**15. Description of targeted audience**

Private and corporate commercial producers, managers, consultants, extension educators, regulators, policy makers

**16. Standard output measures**

**Target for the number of persons(contacts) to be reached through direct and indirect contact methods**

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2007	0	0	0	0
2008	0	0	0	0
2009	0	0	0	0
2010	0	0	0	0
2011	0	0	0	0

**17. (Standard Research Target) Number of Patents**

Expected Patents	
Year	Target
2007	0
2008	0
2009	0
2010	0
2011	1

**18. Output measures**

**Output Text**

Refereed, scientific manuscripts

2007 Target: 4  
 2008 Target: 4  
 2009 Target: 5  
 2010 Target: 5  
 2011 Target: 6

**Output Text**

Scientific presentations

2007 Target: 5  
 2008 Target: 6  
 2009 Target: 8  
 2010 Target: 8  
 2011 Target: 9

**Output Text**

Producer workshops & technical assistance

2007 Target: 3  
 2008 Target: 3  
 2009 Target: 5  
 2010 Target: 6  
 2011 Target: 6

## Outcomes for the Program

### 19. Outcome measures

#### Outcome Text: Awareness created

##### Outcome Text

Adoption of BMP management and harvesting procedures %

**Outcome Type:** Medium

2007 Target: 5  
2008 Target: 5  
2009 Target: 10  
2010 Target: 10  
2011 Target: 10

##### Outcome Text

Ability to more accurately predict yields of OSB, Paralam and additional wood species from measures on standing timber - new models

**Outcome Type:** Medium

2007 Target: 0  
2008 Target: 1  
2009 Target: 1  
2010 Target: 0  
2011 Target: 1

##### Outcome Text

Development and adoption of field based, computer assisted systems to aid optimal bucking - use %

**Outcome Type:** Medium

2007 Target: 0  
2008 Target: 5  
2009 Target: 8  
2010 Target: 10  
2011 Target: 15

##### Outcome Text

Process for commercial production of a high quality, oak OSB panels

**Outcome Type:** Long

2007 Target: 0  
2008 Target: 0  
2009 Target: 0  
2010 Target: 0  
2011 Target: 1

##### Outcome Text

Increased use of timber harvest residue. - %

**Outcome Type:** Medium

2007 Target: 0

2008 Target: 0

2009 Target: 10

2010 Target: 10

2011 Target: 10

## 20. External factors which may affect outcomes

- Economy
- Appropriations changes

### Description

Loss or meaningful reduction of funding support could change drastically timing of outcomes

## 21. Evaluation studies planned

- Before-After (before and after program)
- During (during program)

### Description

Measure adoption rates, etc. comparing before and after programs

## 22. Data Collection Methods

- Sampling
- Mail
- On-Site

### Description

State surveys to the extent possible; developed surveys to the extent needed

## 1. Name of the Planned Program

Environmental Quality and Stewardship

## 2. Program knowledge areas

- 605 Natural Resource and Environmental Economics 15 %
- 101 Appraisal of Soil Resources 20 %
- 102 Soil, Plant, Water, Nutrient Relationships 15 %
- 403 Waste Disposal, Recycling, and Reuse 20 %
- 133 Pollution Prevention and Mitigation 30 %

## 3. Program existence

- Mature (More than five years)

## 4. Program duration

- Long-Term (More than five years)

## 5. Brief summary about Planned Program

The majority of research in this program will involve either soil or water quality and will examine the impact of human activity on both. Specific emphasis will be on proper handling of animal wastes, environmentally sensitive management of pests (insects, diseases, nematodes), determining cost and value of programs to prevent and remediate pollution, setting restoration priorities, and minimizing negative impacts from agricultural, forestry and mining activities.

Related research at West Virginia State University will examine the utilization of metal ion complexation technology in the remediation of metal contaminated water and will develop a heterogeneous carbon dioxide reduction photocatalyst. The former will investigate the synthesis of water-soluble multidentate phosphine ligands attached to an insoluble solid support for metal ion removal and will determine the efficiency of removing silver, iron, copper, zinc, lead, cadmium, and manganese from water. West Virginia University Extension conducts related educational outreach programs in sustainable agriculture and forestry, watershed management, pesticide safety and integrated pest management.

## 6. Situation and priorities

Research supporting preservation of West Virginia's soil, water, forest and wildlife resources has high priority in the West Virginia Agricultural and Forestry Experiment Station. Key research themes over the period 2007-2011 will include protecting soil and water quality by developing economically effective and environmentally sustainable management practices for agriculture, forestry and other points of interaction between man and environment. Contamination of soil and eventually ground water with acid drainage from abandoned mines, and from more recent surface mining, is a growing state concern. Most acid mine drainage sites involve complex mixtures of contaminants. Efforts to define the nature and scope of the contamination have used both actual mine drainage sites and simulated drainage situations. Examples of the former include comparing wetlands impacted by the release of metal-laden sediments from acid mine drainage and those not so impacted. Research with simulated mine drainage is measuring, under laboratory conditions, impacts of sulfate, neutralizing cation action and endpoint pH on acid mine drainage neutralization with the goal of designing more efficient acid mine drainage treatment systems. Research to develop environmentally sustainable practices for managing farms and forests is an important component of overall Station goals to position state producers/entrepreneurs to compete more effectively in organic or "green" markets and to preserve West Virginia land, forest, wildlife, soil and water resources for future generations. Example projects include the development of soft chemical and mating disruption programs to minimize insect damage to tree fruit orchards, efforts to document and correct as necessary, impacts on non-target species from efforts to control gypsy moth defoliation of state forest lands, development of TMDL planning and assessment tools, use of composted poultry litter in turfgrass management, and developing methods to objectively assess economic value of environmentally sustainable practices.

## 7. Assumptions made for the Program

Activities conducted without thought to environmental consequences are not sustainable. Research can lead to significant improvement in the sustainability of agricultural and forest industries in West Virginia.

## 8. Ultimate goal(s) of this Program

Make significant contributions to both the environmental sensitivity and profitability of land-based economic activities in West Virginia.

**9. Scope of Program**

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

**Inputs for the Program**

**10. Expending formula funds or state-matching funds**

- Yes

**11. Expending other than formula funds or state-matching funds**

- Yes

**12. Expending amount of professional FTE/SYs to be budgeted for this Program**

Year	Extension		Research	
	1862	1890	1862	1890
2007	0.0	0.0	6.7	0.0
2008	0.0	0.0	6.7	0.0
2009	0.0	0.0	6.7	0.0
2010	0.0	0.0	6.5	0.0
2011	0.0	0.0	6.5	0.0

**Outputs for the Program**

**13. Activity (What will be done?)**

Conduct research; publish/present results

**14. Type(s) of methods will be used to reach direct and indirect contacts**

Extension	
Direct Method	Indirect Methods
● {NO DATA ENTERED}	● {NO DATA ENTERED}

**15. Description of targeted audience**

Commercial producers and foresters, managers, consultants, policy makers, governmental regulators.

**16. Standard output measures**

**Target for the number of persons(contacts) to be reached through direct and indirect contact methods**

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2007	0	0	0	0
2008	0	0	0	0
2009	0	0	0	0
2010	0	0	0	0
2011	0	0	0	0

**17. (Standard Research Target) Number of Patents**

Expected Patents	
Year	Target
2007	0
2008	0
2009	0
2010	0
2011	0

**18. Output measures**

**Output Text**

Refereed, scientific manuscripts

2007 Target: 4  
 2008 Target: 4  
 2009 Target: 5  
 2010 Target: 5  
 2011 Target: 5

**Output Text**

Science-based articles for lay audiences

2007 Target: 4  
 2008 Target: 4  
 2009 Target: 5  
 2010 Target: 5  
 2011 Target: 6

**Output Text**

Presentations of research results

2007 Target: 5  
 2008 Target: 5  
 2009 Target: 8  
 2010 Target: 8  
 2011 Target: 10

## Outcomes for the Program

### 19. Outcome measures

#### Outcome Text: Awareness created

##### Outcome Text

Map Phosphorus Adsorption Capacity for West Virginia soils - %

##### Outcome Type: Long

2007 Target: 10

2008 Target: 20

2009 Target: 30

2010 Target: 40

2011 Target: 50

##### Outcome Text

Knowledge of soil properties (pH, bulk density, electrical conductivity, etc.) required to grow native species on disturbed land - # new species

##### Outcome Type: Long

2007 Target: 0

2008 Target: 2

2009 Target: 2

2010 Target: 3

2011 Target: 3

##### Outcome Text

Increased use of poultry litter in turf grass culture- %

##### Outcome Type: Short

2007 Target: 10

2008 Target: 20

2009 Target: 25

2010 Target: 0

2011 Target: 0

### 20. External factors which may affect outcomes

- Economy
- Appropriations changes

#### Description

Loss or significant reduction in funding would impact timing of outcomes

### 21. Evaluation studies planned

- Before-After (before and after program)

#### Description

State surveys as available; personal surveys as needed

### 22. Data Collection Methods

- Sampling
- Mail

**Description**  
{NO DATA ENTERED}

## 1. Name of the Planned Program

Economic Development and Quality of Life in Rural Communities

## 2. Program knowledge areas

- 806 Youth Development 30 %
- 131 Alternative Uses of Land 15 %
- 605 Natural Resource and Environmental Economics 20 %
- 608 Community Resource Planning and Development 35 %

## 3. Program existence

- Mature (More than five years)

## 4. Program duration

- Long-Term (More than five years)

## 5. Brief summary about Planned Program

The emphasis of research in this program will be on economic development and quality of life issues facing citizens and small businesses in other than large metropolitan areas. Opportunities to develop environmentally sustainable and sensitive activities which are related to tourism and outdoor recreation will be especially important.

Factors will be examined which affect levels of employment, poverty, welfare, and food assistance. Research will characterize patterns of income distribution, land use decisions, and the potential for economic development from recreational and tourism activities. Quality of life issues examined will include education and leadership development, personal appearance and self esteem.

West Virginia University Extension has an extensive number of related educational outreach programs in community resource and economic development. Those involving business development and retention, community design for sustainable economic growth, and forest heritage tourism are most closely related to College research programs.

## 6. Situation and priorities

Stagnant or declining per capita income, population outflow tending toward younger ages, and growing unemployment, are chronic problems in some areas of West Virginia. Research to develop technologies and management systems which promote economic development consequently represents a high priority in the West Virginia Station. Additionally, research which supports improvements in factors which affect quality of life independent of income may be equally important in stemming outflows of human capital.

The predominantly rural character of West Virginia dictates that Station research will focus on economic development and quality of life issues that occur primarily in rural communities having agricultural or forest-based or other land-based economies. During the planning period, the West Virginia Station will focus on research to determine keys to successfully increasing direct consumer sales (retail rather than wholesale) – with integrated, birth to market production methods if necessary; to develop systems of treating water from abandoned mines which allow useage in the production of cool water fish; to institute programs which assist community-based efforts to develop recreation and/or tourism industries which capitalize on local historical, forest or wildlife resources; to construct decision tools which assist in choosing among easement and land use alternatives; to develop methods to evaluate economic feasibility of niche or specialty markets through analysis of risk and profit potential; to formulate and implement procedures which compare alternative courses for economic development in terms of potential profit and degree of risk; to devise models predicting restorative, stress reducing capacity of various nature related recreational activities and assess relationships between interpretation and level of tourism activity.

## 7. Assumptions made for the Program

Opportunities exist to offer controlled and sustainable economic growth to rural communities in ways which will not destroy the essence and character of the communities involved.

## 8. Ultimate goal(s) of this Program

To assist rural West Virginia communities in developing diverse and robust local economies which provide sufficient opportunities for gainful employment while preserving the natural resources and character of each community.

**9. Scope of Program**

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

**Inputs for the Program**

**10. Expending formula funds or state-matching funds**

- Yes

**11. Expending other than formula funds or state-matching funds**

- Yes

**12. Expending amount of professional FTE/SYs to be budgeted for this Program**

Year	Extension		Research	
	1862	1890	1862	1890
2007	0.0	0.0	6.6	0.0
2008	0.0	0.0	6.5	0.0
2009	0.0	0.0	6.1	0.0
2010	0.0	0.0	6.1	0.0
2011	0.0	0.0	6.0	0.0

**Outputs for the Program**

**13. Activity (What will be done?)**

Conduct research; publish results in scientific journals and popular press. Make presentations at scientific, professional and end-user meetings and workshops.

**14. Type(s) of methods will be used to reach direct and indirect contacts**

Extension	
Direct Method	Indirect Methods
● {NO DATA ENTERED}	● {NO DATA ENTERED}

**15. Description of targeted audience**

Community managers, planners, policy makers, consultants, local development committees or groups

**16. Standard output measures**

**Target for the number of persons(contacts) to be reached through direct and indirect contact methods**

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2007	0	0	0	0
2008	0	0	0	0
2009	0	0	0	0
2010	0	0	0	0
2011	0	0	0	0

**17. (Standard Research Target) Number of Patents**

Expected Patents	
Year	Target
2007	0
2008	0
2009	0
2010	0
2011	0

**18. Output measures**

**Output Text**

Refereed research manuscripts

2007 Target: 3  
 2008 Target: 4  
 2009 Target: 4  
 2010 Target: 5  
 2011 Target: 6

**Output Text**

Presentations to colleagues and end-users

2007 Target: 6  
 2008 Target: 6  
 2009 Target: 8  
 2010 Target: 9  
 2011 Target: 10

**Output Text**

Team consultations with community action groups

2007 Target: 2  
 2008 Target: 2  
 2009 Target: 3  
 2010 Target: 3  
 2011 Target: 3

## Outcomes for the Program

### 19. Outcome measures

#### Outcome Text: Awareness created

##### Outcome Text

Expansion of economic activity in targeted state industries: pasture raised beef and sheep, aquaculture, organic vegetables, tourism and outdoor recreational activities; ornamental horticulture, etc. - % growth

##### Outcome Type: Long

2007 Target: 5

2008 Target: 5

2009 Target: 5

2010 Target: 8

2011 Target: 8

##### Outcome Text

Customized designs for enhanced economic development adopted and implemented by state rural communities

##### Outcome Type: Medium

2007 Target: 0

2008 Target: 1

2009 Target: 2

2010 Target: 2

2011 Target: 3

### 20. External factors which may affect outcomes

- Economy
- Appropriations changes

#### Description

Changes in appropriations which reduce or eliminate support for this program could significantly alter the timing of outcomes.

### 21. Evaluation studies planned

- Before-After (before and after program)
- During (during program)

#### Description

State agricultural and forestry statistics are available to monitor selected industries. Efforts to work with economic development in local communities always involve follow-up contacts and visits.

### 22. Data Collection Methods

- Sampling
- Whole population
- Mail
- On-Site
- Structured
- Case Study
- Observation

#### Description

Economic statistics are collected by others. Work with local communities involves in-person, on-phone and by-mail interviews and surveys.

### 1. Name of the Planned Program

Human Nutrition and Health with an Adequate, Safe, and High Quality Food Supply

### 2. Program knowledge areas

- 712 Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins 40 %
- 703 Nutrition Education and Behavior 40 %
- 702 Requirements and Function of Nutrients and Other Food Components 20 %

### 3. Program existence

- Intermediate (One to five years)

### 4. Program duration

- Long-Term (More than five years)

### 5. Brief summary about Planned Program

Research related to human nutrition will determine the impact of diet, nutritional education and dietary intervention on obesity and obesity related conditions (diabetes, elevated cholesterol and plasma lipids, heart attack, stroke, and some cancers); will test the efficacy and safety of alternatives to estrogen replacement therapy for controlling osteoporosis in post-menopausal women; and will develop Omega-3 DHA enhanced diets and educational programs to promote their use.

Research related to an adequate, safe, high quality food supply will focus on processing and cryopreservation of fish and muscle foods, development of methods to more productively use fish processing wastes, and on the use of electron beam treatment to control bacterial growth on foods.

Supporting educational programs directed by West Virginia University Extension include food safety education, family nutrition, dietary planning with diabetes, and cardiac nutrition.

### 6. Situation and priorities

West Virginia is one of the most overweight of US states with both adults and youth impacted. Dietary patterns formed in childhood often persist into adolescence and influence the risk of developing chronic health problems. For example, overweight children and teens are likely to be obese as adults and have greater chance of developing type 2 diabetes, high blood pressure, abnormal blood lipid profiles, and orthopedic problems.

Knowledge regarding relationships among familial factors, dietary patterns and body mass index of young children, will allow us to better address the serious and growing problem of childhood obesity in West Virginia. Planned research will provide information about these relationships in rural, Appalachian children that will allow us to design culturally sensitive, effective outreach and education programs.

State median population age and occurrence of osteopenia or osteoporosis likewise are above the national average in West Virginia. In fact, the National Osteoporosis Foundation estimates that by the year 2020, more than 300,000 women in West Virginia will suffer from osteoporosis unless corrective action is taken. Estrogen replacement therapy has been used successfully to prevent bone loss in postmenopausal women but has several undesirable side effects. Research will be undertaken to examine the efficacy of exercise and treatment with non-steroidal plant estrogens (phytoestrogens) as an alternative to estrogen replacement therapy in preventing bone loss.

Omega-3 polyunsaturated fatty acids, particularly docosahexaenoic acid (DHA) have been shown to reduce cardiovascular disease, inflammatory disorders, autoimmune disorders, Crohn's disease and certain cancers. Additionally, infants born from mothers with high plasma DHA exhibit characteristics that are indicative of greater central nervous system maturity. Research will be undertaken to develop sensory – acceptable methods of fortifying foods with DHA which avoid problems of short chain fatty acid oxidation, and of providing a reliable source of DHA using the heterotrophic marine alga, *Cryptocodinium cohnii*. Planned research also will address problems related to food quality, food safety, and efficiency of food processing. Because fish proteins are especially susceptible to freeze and freeze-thaw cycle induced denaturation, one research focus will be on developing superior (measured by product quality and safety) methods of cryopreservation for fish fillet and restructured fish products. Additionally, research is being instituted to evaluate and develop non-thermal electron beam treatment as a critical control point to minimize microbial contamination, particularly in ground meat products. A recently instituted and related area of research involves developing improved methods for protein and lipid recovery from trout processing by-products.

### 7. Assumptions made for the Program

Dietary modifications can be developed which will significantly improve the health of West Virginia citizens. Research can lead to increased in food quality and safety while increasing efficiency of food processing.

**8. Ultimate goal(s) of this Program**

To provide citizens of West Virginia an abundant, safe, high quality food supply and the information needed to make healthful dietary choices.

**9. Scope of Program**

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

**Inputs for the Program**

**10. Expending formula funds or state-matching funds**

- Yes

**11. Expending other than formula funds or state-matching funds**

- Yes

**12. Expending amount of professional FTE/SYs to be budgeted for this Program**

Year	Extension		Research	
	1862	1890	1862	1890
2007	0.0	0.0	1.3	0.0
2008	0.0	0.0	1.6	0.0
2009	0.0	0.0	2.0	0.0
2010	0.0	0.0	2.5	0.0
2011	0.0	0.0	2.5	0.0

**Outputs for the Program**

**13. Activity (What will be done?)**

Conduct research; publish results in scientific, peer reviewed research journals and popular press; make presentations to colleagues at professional meetings and to end-user meetings and workshops

**14. Type(s) of methods will be used to reach direct and indirect contacts**

Extension	
Direct Method	Indirect Methods
● {NO DATA ENTERED}	● {NO DATA ENTERED}

**15. Description of targeted audience**

Families, dieticians, consultants, policy makers, researchers

**16. Standard output measures**

**Target for the number of persons(contacts) to be reached through direct and indirect contact methods**

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2007	0	0	0	0
2008	0	0	0	0
2009	0	0	0	0
2010	0	0	0	0
2011	0	0	0	0

**17. (Standard Research Target) Number of Patents**

Expected Patents	
Year	Target
2007	0
2008	0
2009	0
2010	0
2011	1

**18. Output measures**

**Output Text**

Refereed journal articles

2007 Target: 0  
 2008 Target: 2  
 2009 Target: 2  
 2010 Target: 3  
 2011 Target: 3

**Output Text**

Presentations at scientific meetings

2007 Target: 2  
 2008 Target: 2  
 2009 Target: 3  
 2010 Target: 3  
 2011 Target: 4

**Output Text**

Workshops and meetings to end-users

2007 Target: 0  
2008 Target: 1  
2009 Target: 1  
2010 Target: 2  
2011 Target: 3

## Outcomes for the Program

### 19. Outcome measures

#### Outcome Text: Awareness created

##### Outcome Text

Reduction in state incidence of obesity -%

**Outcome Type:** Medium

2007 Target: 0  
2008 Target: 3  
2009 Target: 5  
2010 Target: 5  
2011 Target: 5

##### Outcome Text

Reduction in state incidence of osteoporosis and similar disorders - %

**Outcome Type:** Medium

2007 Target: 0  
2008 Target: 3  
2009 Target: 3  
2010 Target: 5  
2011 Target: 5

##### Outcome Text

General understanding of value of electron beam technology for food safety

**Outcome Type:** Medium

2007 Target: 0  
2008 Target: 0  
2009 Target: 0  
2010 Target: 0  
2011 Target: 0

### 20. External factors which may affect outcomes

- Economy
- Appropriations changes

#### Description

Reduced or eliminated funding would significantly impact timing of outcomes.

### 21. Evaluation studies planned

- Before-After (before and after program)
- During (during program)

**Description**

Use of state statistics; generation of additional to augment as necessary

**22. Data Collection Methods**

- Sampling
- Mail

**Description**

{NO DATA ENTERED}

**1. Name of the Planned Program**

Wildlife Management

**2. Program knowledge areas**

- 135 Aquatic and Terrestrial Wildlife 100 %

**3. Program existence**

- Mature (More than five years)

**4. Program duration**

- Long-Term (More than five years)

**5. Brief summary about Planned Program**

Focus in this program is on understanding habitat requirements, and the impact of human activity on wildlife habitat, primarily for fish and song birds. There is a greater than average emphasis on endangered or sensitive species, with some attention given to nuisance species including bear and white tail deer. Impact on wildlife populations from activities associated with agriculture, forestry, mining, flood or river control, etc. is of particular interest. A large majority of the research in this program is supported by non-formula funding.

**6. Situation and priorities**

The expansive hardwood forests which cover much of West Virginia provide extensive habitat for a variety of wildlife species. Wildlife species are extremely important to the economy of West Virginia, and contribute significantly to income from tourism and related activities (hunting, fishing, camping, hiking, etc.). Activities associated with production agriculture, forestry, mining, or even tourism itself, can have extremely negative impacts on wildlife, with resultant severe economic consequences for various sectors of the State economy. Research in the West Virginia Station is directed toward developing in-depth understandings of habitat requirements for various wildlife species to support informed management. Research results also are required to make intelligent decisions when human activities impact wildlife populations in some negative way.

**7. Assumptions made for the Program**

Research will enable intelligent and balanced choices to be made between competing economic interests of state wildlife populations and those of production agriculture, forestry and mining.

**8. Ultimate goal(s) of this Program**

Generate information which allows optimum coexistence between state wildlife populations and profitable and sustainable industries of agriculture, forestry and mining.

**9. Scope of Program**

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

**Inputs for the Program**

**10. Expending formula funds or state-matching funds**

- Yes

**11. Expending other than formula funds or state-matching funds**

- Yes

**12. Expending amount of professional FTE/SYs to be budgeted for this Program**

Year	Extension		Research	
	1862	1890	1862	1890
2007	0.0	0.0	1.0	0.0
2008	0.0	0.0	1.0	0.0
2009	0.0	0.0	1.5	0.0
2010	0.0	0.0	1.5	0.0
2011	0.0	0.0	2.0	0.0

**Outputs for the Program**

**13. Activity (What will be done?)**

Conduct research; publish results in refereed research journals and, as appropriate, in popular press. Make presentation at professional meetings and at end-user workshops and meetings

**14. Type(s) of methods will be used to reach direct and indirect contacts**

Extension	
Direct Method	Indirect Methods
<ul style="list-style-type: none"> <li>{NO DATA ENTERED}</li> </ul>	<ul style="list-style-type: none"> <li>{NO DATA ENTERED}</li> </ul>

**15. Description of targeted audience**

Wildlife managers, regulators, policy makers, researchers.

**16. Standard output measures**

**Target for the number of persons(contacts) to be reached through direct and indirect contact methods**

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2007	0	0	0	0
2008	0	0	0	0
2009	0	0	0	0
2010	0	0	0	0
2011	0	0	0	0

**17. (Standard Research Target) Number of Patents**

Expected Patents	
Year	Target
2007	0
2008	0
2009	0
2010	0
2011	0

**18. Output measures**

**Output Text**

Refereed scientific manuscripts

2007 Target: 2  
 2008 Target: 2  
 2009 Target: 3  
 2010 Target: 4  
 2011 Target: 4

**Output Text**

End user presentations at meetings and workshops

2007 Target: 2  
 2008 Target: 3  
 2009 Target: 3  
 2010 Target: 4  
 2011 Target: 5

**Outcomes for the Program**

**19. Outcome measures**

**Outcome Text: Awareness created**

**Outcome Text**

Sufficient understanding (to allow development of effective management plans) of habitat and other requirements of additional state bird and fish species

**Outcome Type:** Long

2007 Target: 0  
 2008 Target: 1  
 2009 Target: 1  
 2010 Target: 3  
 2011 Target: 3

**Outcome Text**

Documentation of impacts on wildlife from major, recurring activities associated with farming, logging and mining

**Outcome Type:** Long

2007 Target: 0  
2008 Target: 1  
2009 Target: 2  
2010 Target: 3  
2011 Target: 3

**Outcome Text**

Increased populations of threatened species, decreased populations of nuisance species - %

**Outcome Type:** Long

2007 Target: 0  
2008 Target: 5  
2009 Target: 5  
2010 Target: 7  
2011 Target: 7

**20. External factors which may affect outcomes**

- Economy
- Appropriations changes
- Public Policy changes

**Description**

Removal or significant reduction in support for wildlife studies would significantly affect timing of outcomes.

**21. Evaluation studies planned**

- Before-After (before and after program)
- During (during program)

**Description**

Use of state statistics.

**22. Data Collection Methods**

- Sampling
- Mail

**Description**

{NO DATA ENTERED}