

V(A). Planned Program (Summary)

Program # 9

1. Name of the Planned Program

Forestry, Wildlife, and Fishery Systems

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	0%	0%	4%	
123	Management and Sustainability of Forest Resources	75%	75%	28%	
124	Urban Forestry	0%	0%	3%	
125	Agroforestry	10%	10%	0%	
133	Pollution Prevention and Mitigation	0%	0%	5%	
135	Aquatic and Terrestrial Wildlife	10%	10%	21%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%	0%	4%	
206	Basic Plant Biology	0%	0%	3%	
213	Weeds Affecting Plants	0%	0%	2%	
301	Reproductive Performance of Animals	0%	0%	3%	
311	Animal Diseases	0%	0%	2%	
312	External Parasites and Pests of Animals	0%	0%	4%	
605	Natural Resource and Environmental Economics	5%	5%	8%	
721	Insects and Other Pests Affecting Humans	0%	0%	2%	
722	Zoonotic Diseases and Parasites Affecting Humans	0%	0%	3%	
903	Communication, Education, and Information Delivery	0%	0%	8%	
	Total	100%	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	8.0	1.0	24.0	0.0

Actual Paid Professional	14.0	2.0	37.9	0.0
Actual Volunteer	4.0	0.6	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
295097	84055	767459	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1040747	84055	3265344	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
43040	0	2231129	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

UT and TSU Extension partnered with the Tennessee Forestry Association to plan and conduct group meetings to inform forest landowners of issues pertaining to forestry and wildlife. Topics included management and marketing. Volunteers were recruited and trained to present at group meetings, provide information, demonstrate equipment and provide materials for demonstrations. UT and TSU Extension provided education at local, regional and statewide events, such as the Tennessee Forest Festival to inform the general public about forest management issues. Demonstrations were provided for landowners and forestry workers. Extension Agents and Specialists educated attendees at County Forestry Landowners Association. UT and TSU Extension worked closely with private consultants, Tennessee Wildlife Resources Agency employees, Tennessee Division of Forestry and others in forestry related industries to develop and deliver educational programs and activities for professionals and landowners.

UT and TSU Extension continued to make one-on-one contacts with landowners throughout the year and use mass media and newsletters to inform the general public on issues and educational opportunities related to natural resources. Both UT and TSU Extension provided leadership for conducting programs that target limited resource landowners with TSU providing specialist leadership for this effort.

For Tennessee's forestry sector, UT AgResearch continues biological control of Hemlock Woolly Adelgid by known predators and new species and release technologies. We evaluate methods of increasing seedling success, and techniques for improving reforestation. We exploit genetic variation in nursery and field characteristics of native hardwood and coniferous forest tree species. We try novel strategies to address exotic forest tree pests and corresponding forest restoration. We establish collections of woody plants, including species and cultivars, and plants having potential commercial value as forest species or for landscape development, from which materials may be obtained for breeding/propagation.

For wood products manufacturing, we characterize key parameters associated with the formation of durable, high-performance composite materials, and establish new statistical methods to advance

intelligent manufacturing practices. We explore new methods to produce carbon fibers from low-quality raw materials and are developing a process for bonding plastic or polymer to lignocellulosic fibers (using ultrasonic vibration) as a replacement for toxic wood preservatives.

We identify approaches and services to landowners that would enable them to realize a wide range of landownership benefits while fostering stewardship and sustainability of private forest lands in Tennessee. Both qualitative (e.g., personal interviews and focus groups) and quantitative (e.g., survey responses) data are collected and analyzed to better understand landowners understanding of management.

Although manipulative studies of tree seedlings and saplings are cost effective and quick, recent research has shown that they may not allow for valid predictions on mature trees. Therefore, direct experiments on large trees or forested catchments have been developed. Experiments are being conducted on local forest research sites developed by the Department of Energy (DOE). Each are large-scale, multi-year, multi-investigator experiments.

UT AgResearch wildlife and fisheries research evaluates and quantifies the effects of deer on agricultural production and identifies associated land-use patterns and biological and ecological factors that could be used for reducing that impact. We monitor target avian species and relate specific population parameters to factors affecting forest health and sustainability, and develop new forest management prescriptions that promote sustainability. We develop prediction methods and evaluate selected aquatic species in existing and new production systems adapted to Tennessee's climate and geography.

2. Brief description of the target audience

The target audiences for this program were forest landowners, the professionals and volunteers who serve them, as well as those who enjoy the state's wildlife resources.

3. How was eXtension used?

Tennessee is represented by 108 eXtension members in 42 of the 59 approved Communities of Practice (CoP). Tennessee Extension personnel have addressed over 800 Frequently Asked Questions through eXtension. This Forestry, Wildlife, and Fisheries Planned Program was enhanced through the service of:

- one Tennessee Extension personnel on the "Climates, Forests and Woodlands" CoP,
- one Tennessee Extension personnel on the "Extension Wildfire Information Network" CoP,
- one Tennessee Extension personnel on the "Feral Hogs" CoP, and
- one Tennessee Extension personnel on the "Wildlife Damage Management" CoP.

Tennessee Extension personnel shared implementation strategies, outcome measurement, and evaluation protocols with their CoP colleagues.

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	24820	809375	3232	0

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

Patent Applications Submitted

Year: 2012
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	10	36	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Release of Hemlock Woolly Adelgid predators reared in Tennessee (Parkman).

Year	Actual
2012	345000

Output #2

Output Measure

- Number of research-based publications distributed as part of this planned program.

Year	Actual
2012	59232

Output #3

Output Measure

- A significant risk of strength and value loss in railway tie processing was documented. A low-cost, environmentally-benign protective treatment was identified and will be evaluated in the coming months. (Taylor)

Year	Actual
2012	0

Output #4

Output Measure

- We identified high levels of a rarely-studied Lyme-like pathogen *Borrelia miyamotoi* among wild turkeys in Tennessee. Subsequent research by medical labs in Russia and the US has confirmed that this pathogen can cause human disease, and may help explain 'Lyme like' symptoms among humans in Southeastern states. (Hickling)

Year	Actual
2012	0

Output #5

Output Measure

- The completion and approval by USDA APHIS of our Beneficial Insects Containment Laboratory will greatly enhance state, regional, and national biological control efforts directed against invasive pests through the careful evaluation and selection of beneficial insects. This Laboratory, which will foster and enhance cooperative efforts with USDA APHIS, as well as other scientists and agencies throughout the U.S., as well as globally, will expedite and improve our management of invasive species, such as hemlock woolly adelgid, emerald ash borer, marmorated stink bug, kudzu bug, and other pests. (Grant)

Year	Actual
2012	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Forest Landowner Education: Number of landowners who now understand the ecology of forest development and succession (using forest management plans or contacting a professional forester.)
2	Forest Landowner Education: Number of landowners who improved profitability (marketing) of forest ownership.
3	Acres of production of freshwater prawn in Tennessee as an alternative income source (Wilson).
4	Golden-winged warbler conservation strategy for the Cumberland Mountains of Tennessee delivery to FWS. (Buehler)
5	Extension's Tennessee Master Logger Program
6	Biomass Feedstock Availability and Assessment (Hodges)
7	Thousand Cankers Disease on Black Walnut (Grant)

Outcome #1

1. Outcome Measures

Forest Landowner Education: Number of landowners who now understand the ecology of forest development and succession (using forest management plans or contacting a professional forester.)

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	365

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources

Outcome #2

1. Outcome Measures

Forest Landowner Education: Number of landowners who improved profitability (marketing) of forest ownership.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	249

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources

Outcome #3

1. Outcome Measures

Acres of production of freshwater prawn in Tennessee as an alternative income source (Wilson).

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Golden-winged warbler conservation strategy for the Cumberland Mountains of Tennessee delivery to FWS. (Buehler)

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Extension's Tennessee Master Logger Program

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)

Training of loggers in Best Management Practices (BMPs) is necessary to protect water quality during forest harvesting operations. Log bucking is the process of cutting trees into the logs that are fed into sawmills. The bucking decisions greatly impact the value of the logs, lumber and finished products that come from the forest.

What has been done

In 2012, Extension conducted six logger workshops of five days each (basic training) for 92 participants and 19 continuing education logger workshops (8 hours each) for 405 participants.

Results

*92 loggers increased their knowledge on BMPs to protect water quality during harvesting operations. These loggers impact approximately 27,500 acres of forest land consisting of 69 million board feet of timber harvested with an estimated value of \$10 million to landowners on an annual basis.

*The Tennessee Master Logger educational program has reached more than 2,600 loggers since 1983 or about 90% of the state logging workforce.

*405 loggers attended and increased their knowledge about BMPs in a 1-day continuing education course (various subjects).

*16 Log Bucking Optimization training classes have been held over the past three years where 294 Master Loggers have increased their knowledge of the importance of and techniques for improving log value through better bucking. As a result of this training, Tennessee loggers have increased their revenues by an estimated \$1.5 million.

4. Associated Knowledge Areas

KA Code **Knowledge Area**
123 Management and Sustainability of Forest Resources

Outcome #6

1. Outcome Measures

Biomass Feedstock Availability and Assessment (Hodges)

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)

Planners need to assess the quantity, quality, harvesting, and transportation costs of various biomass feedstocks.

What has been done

BioSAT allows users to assess the quantity and quality of multiple feedstocks, as well as assess the resource, harvesting, and transportation costs at multiple sites.

Results

Our bioenergy policy index is not only helpful for new business investors in making siting decisions, but also for state policy makers considering new woody biomass relevant legislation to spur the bioenergy industry. Similarly the state-level assessment of biomass supply provides an assessment of the potential supplies for bioenergy facilities in Tennessee at various production levels.

4. Associated Knowledge Areas

KA Code **Knowledge Area**
123 Management and Sustainability of Forest Resources
125 Agroforestry
605 Natural Resource and Environmental Economics

Outcome #7

1. Outcome Measures

Thousand Cankers Disease on Black Walnut (Grant)

2. Associated Institution Types

- 1862 Research

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)

A new disease threat, thousand cankers disease (insect/pathogen complex), of black walnut was documented in four counties in eastern Tennessee.

What has been done

We initiated studies on the invasive pest, walnut twig beetle, that is responsible for transmitting the thousand cankers disease, we have documented the life history of this pest with data providing information that could be used to manage pest populations on black walnut.

Results

Documented eight potential predators and two parasitoids of WTB, and the consumption rates of three clerid species in choice and no-choice tests. Determined use of imidacloprid has a negative impact on non-target walnut tissue and associated insects due to concentration levels in branch, leaf, core and walnut samples over a two-year period.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources
125	Agroforestry

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

In FY 2012, state appropriations in Tennessee were reduced across the board for all public agencies. For UT Extension, this was a \$2.5 million reduction from FY 2011 to FY 2012 in operating expenditures. Both UT and TSU Extension made programmatic changes to accommodate reductions. These changes included limiting postage, travel and printing.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The UT Department of Forestry, Wildlife and Fisheries conducted a two-year evaluation project to determine if Master Loggers, trained through UT Extension, were implementing Best Management Practices (BMP) on their logging operations. Statewide, 205 logging sites were evaluated in 2011 and 2012 to determine BMP implementation rates and compliance for 43 different factors (n=8815). BMP categories evaluated included haul roads, skid roads, log landings, stream crossings and streamside management zones. The results included:

- A statewide BMP compliance rate of 90% was determined from the study.
- Significant water quality risks from harvesting operations were found on 5 of the 205 (2.5%) of the sampled logging sites. Loggers from four of these five sites were not trained Master Loggers.
- Those loggers who received Master Logger training were more inclined to implement BMPs correctly (94% overall) than those who had not received the training.

Key Items of Evaluation

The UT Department of Forestry, Wildlife and Fisheries conducted a two-year evaluation project to determine if Master Loggers, trained through UT Extension, were implementing Best Management Practices (BMP) on their logging operations. Statewide, 205 logging sites were evaluated in 2011 and 2012 to determine BMP implementation rates and compliance for 43 different factors (n=8815). BMP categories evaluated included haul roads, skid roads, log landings, stream crossings and streamside management zones. The results included:

- A statewide BMP compliance rate of 90% was determined from the study.
- Significant water quality risks from harvesting operations were found on 5 of the 205 (2.5%) of the sampled logging sites. Loggers from four of these five sites were not trained Master Loggers.
 - Those loggers who received Master Logger training were more inclined to implement BMPs correctly (94% overall) than those who had not received the training.