

**V(A). Planned Program (Summary)**

**Program # 3**

**1. Name of the Planned Program**

Human and Animal Health

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
722	Zoonotic Diseases and Parasites Affecting Humans			85%	
723	Hazards to Human Health and Safety			15%	
	<b>Total</b>			100%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	10.0	0.0
Actual Paid Professional	0.0	0.0	11.6	0.0
Actual Volunteer	0.0	0.0	11.4	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
0	0	323785	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	1627487	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	673232	0

**V(D). Planned Program (Activity)**

1. Brief description of the Activity

The main research objectives are to determine the chief mosquito vectors of encephalitis viruses, the sources of blood meals in engorged mosquitoes, if biological control agents can control mosquitoes and ticks, and to determine which vertebrate hosts are reservoirs for arthropod-transmitted pathogens. Major advancements continue to be made on all objectives. The expected outputs are designed to benefit federal, state, and local public health officials, physicians, veterinarians, and the general public. State-generated outputs mainly include scientific publications, talks and interviews, identifying and testing ticks for the Lyme disease agent, and numbers of state residents served directly by answering inquiries. For activities, staff members will (1) conduct research on tick and mosquito control and disseminate information on research findings by giving talks and media interviews, (2) analyze ticks and mosquitoes for disease agents, (3) answer public inquiries, and (4) inform public health officials on control methods. All activities strongly emphasize public service and include traditional and non-traditional stakeholders. Two open house events are planned annually on Station properties to allow the public to hear oral presentations on research findings and to offer comments. Results of these activities will lead to specific outcomes, such as more efficient or environmentally sound methods of tick and mosquito control and prevention of human illnesses.

**2. Brief description of the target audience**

Research on human and animal health benefits a broad range of stakeholders. Research findings were directly transferred to scientists via peer-reviewed journals and conferences. The general public was reached and participated in events by means of agricultural fairs, open houses, TV, radio, and newspaper articles. Media reporters frequently requested information for stories. Oral presentations were given to public health officials in meetings and, as requested, to civic groups. Also, state residents were allowed to submit ticks through local health departments for identification and analysis for the Lyme disease agent. Results were reported to public health officials who then informed the residents. General information on tick-related research was also provided. Fact sheets and other information were posted on the CAES website and made available to everyone. Although these communication venues allowed for extensive contacts with the public, special efforts were made to reach underserved and under-represented groups. Information on ticks and mosquitoes was printed in Spanish. A fact sheet on bed bugs was printed in Spanish, Chinese, and French. Displays at agricultural fairs and open houses were designed to interest children as well as adults. There has been ongoing cooperation with the Yale Peabody Museum to provide new information on mosquitoes and ticks to develop science curricula for middle and high school students. The Yale program, funded by a \$1.3 million Science Education Partnership Award and supported by the National Institutes of Health, is expected to impact 18,000 students and hundreds of teachers by 2016. Public participation in agricultural fairs was particularly effective in reaching non-traditional stakeholder groups.

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	3118	88530	329	19006

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

### Patent Applications Submitted

Year: 2012  
Actual: 1

### Patents listed

Patent for bed bug control

## 3. Publications (Standard General Output Measure)

### Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	0	12	12

### V(F). State Defined Outputs

#### Output Target

#### Output #1

##### Output Measure

- Total research papers

Year	Actual
2012	14

#### Output #2

##### Output Measure

- # of talks and interviews

Year	Actual
2012	284

#### Output #3

##### Output Measure

- # of responses to stakeholders' inquiries

Year	Actual
2012	4651

**Output #4**

**Output Measure**

- # of ticks identified or tested

<b>Year</b>	<b>Actual</b>
2012	3240

**Output #5**

**Output Measure**

- # mosquitoes identified and/or tested

<b>Year</b>	<b>Actual</b>
2012	331806

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	# of residents gaining knowledge of ticks, mosquitoes, bed bugs, and mold
2	# of media reporters gaining knowledge of ticks, mosquitoes, bed bugs, and mold

## **Outcome #1**

### **1. Outcome Measures**

# of residents gaining knowledge of ticks, mosquitoes, bed bugs, and mold

### **2. Associated Institution Types**

- 1862 Research

### **3a. Outcome Type:**

Change in Knowledge Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2012	3240

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

In areas where Ixodes scapularis ticks abound, human cases of Lyme disease and other diseases are prevalent. Adults of this tick species prefer white-tailed deer (*Odocoileus virginianus*) as hosts. Increased tick abundance is directly correlated with rising deer populations. Health officials and state residents are concerned about Lyme disease and other tick-associated illnesses.

#### **What has been done**

A hunting program, conducted during the fall, was relied on to reduce deer populations at Mumford Cove in Groton, CT (New London County) during 1995-2008. In the ensuing years, surveys were conducted by state health officials with more than 90% of the permanent state residents in this suburban community to monitor the number of human cases of Lyme disease.

#### **Results**

During the 14-year study, the deer population was reduced by 87% at the study site. The incidence of Lyme disease in humans decreased by 80% and remained low during 2008. Abundance of the nymphal stage of the tick, which is most important in the transmission of the bacterium that causes Lyme disease, was also reduced. Analyses of field data revealed that reducing deer density to 5.1 deer/square kilometer resulted in a statistically significant reduction in human cases of Lyme disease. These results, although preliminary, had impact because they showed that hunting deer might reduce human risk of contracting Lyme disease if the deer herds were reduced to relatively low densities. The long-term benefit is a healthy human population.

### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
722	Zoonotic Diseases and Parasites Affecting Humans

723 Hazards to Human Health and Safety

**Outcome #2**

**1. Outcome Measures**

# of media reporters gaining knowledge of ticks, mosquitoes, bed bugs, and mold

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2012	49

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Reporters frequently sought information on mosquitoes, ticks, human pathogens, and associated diseases and were interested in new information gained from research on the spread of disease organisms in nature and the status of tick and mosquito population densities. West Nile and Eastern Equine Encephalitis (EEE) viruses constitute ongoing threats to human health in several states by causing severe illness or death. Since its introduction into the United States in 1999, West Nile virus has sickened over 35,000 people resulting in over 1,700 deaths. During this reporting period, there were seven human cases of West Nile virus in CT, but no deaths were reported. Public health officials have requested studies on the ecology of mosquitoes and viruses and biological control of mosquitoes.

**What has been done**

There were at least 44 reporters who sought information on mosquitoes and encephalitis viruses. More than 2 million mosquitoes were tested for viruses over 13 years. By interviewing scientists, who were conducting field and laboratory investigations, the reporters gained new knowledge of mosquitoes and the three main viruses (West Nile, Eastern Encephalitis, and Jamestown Canyon) that cause human illnesses. Viruses cultured from mosquitoes were identified by RNA analyses. Results were conveyed to the general public via press releases. Tens of thousands of stakeholders were kept informed of recent research findings and the significance of new scientific advances as they relate to the geographic areas they live in.

**Results**

There were 49 news stories on mosquitoes and viruses. Six reporters wrote multiple articles. Articles written by 40 (91%) of 44 reporters accurately transferred results to stakeholders. Reporters and stakeholders learned *Culex pipiens* is the main carrier of the West Nile virus and that this species is a complex of closely related subspecies of mosquitoes. The media also

learned that the West Nile virus was active in eastern CT and beyond the historical presence of virus in southwestern and south central CT. Stakeholders also learned that biological controls (*Bacillus thuringiensis*, *B. sphaericus*, and *spinosad*) effectively reduced *Culex pipiens* larvae in catch basins (published in the *Journal of the American Mosquito Control Association*). These results had impact because mosquito control programs targeted the most important mosquito species and state residents took precautions to avoid mosquito bites. The long-term benefit is healthy human and domestic animal populations. Science citations = 143 for the mosquito/encephalitis virus research program.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
722	Zoonotic Diseases and Parasites Affecting Humans
723	Hazards to Human Health and Safety

#### V(H). Planned Program (External Factors)

##### External factors which affected outcomes

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

##### Brief Explanation

Grant funds were available to continue the research program, and there were shifts in scientists' work times from state projects to Hatch projects. New state funds were made available to replace federal dollars cut by the Centers for Disease Control and Prevention. There were no delays in re-hiring temporary workers on grant funds. The traps used require technical expertise and the use of dry ice (carbon dioxide attracts mosquitoes). The public would not be able to assist on mosquito collections. There were no changes in public policy, competing priorities, or competing programmatic challenges. There continues to be a hiring freeze on state-supported positions.

#### V(I). Planned Program (Evaluation Studies)

##### Evaluation Results

"During program" and "after only" evaluations were conducted to assess program effectiveness. The treatment of catch basins in areas where West Nile virus is prevalent was successful in reducing *Culex pipiens*. Verbal feedback from municipal officials revealed that the use of *Bacillus* biocontrols were effective in controlling *Culex pipiens* mosquitoes.

##### Key Items of Evaluation

Data were collected mainly by on-site evaluations conducted following talks to civic groups. A survey was conducted to assess changes in behavior regarding prevention of mosquito and tick bites, and there were face-to-face interactions with reporters and other

stakeholders. During this reporting period, there were a total of 298 citations for scientific articles written by 9 scientists on ticks and mosquitoes for the entire planned program.