2012 Program Report Card: Prevention and Control of Emerging Mosquito-Borne Diseases (The Connecticut Agricultural Experiment Station)

Quality of Life Result: All Connecticut's citizens and their domestic animals are healthy and free from mosquitoes and mosquito-borne diseases.

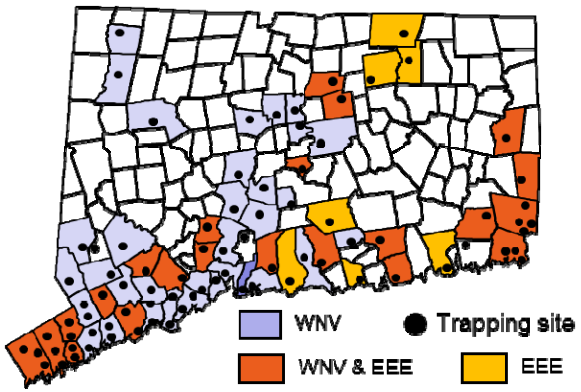
Contribution to Result: The Mosquito and Emerging Mosquito-Borne Disease Prevention and Control Program detects and investigates mosquitoes and viruses in the State. Through surveillance and research, our program alerts citizens about infected mosquitoes and informs them how to reduce their risk of exposure to mosquito bites and disease.

Actual SFY 11 Total Program Expenditures: $1,534,498 — *State Funding*: $713,270 — *Federal Funding*: $812,300 — *Other Funding*: $8,928

Estimated SFY 12 Total Program Expenditures: $1,445,000 — *State Funding*: $785,000 — *Federal Funding*: $650,000 — *Other Funding*: $10,000

Partners: CT Dept. of Public Health, local and other state health departments, CT Dept. of Energy & Environmental Protection, CT Dept. of Agriculture, US Centers for Disease Control and Prevention (CDC), US Dept. of Agriculture (USDA), university scientists, pest control operators, US Navy (Groton, CT)

Performance Measure 1: Total number of mosquitoes tested for West Nile (WN), Eastern Equine Encephalitis (EEE) and other viruses.



Towns in CT where WN, EEE, or both viruses have been isolated from mosquitoes, 1996-2011.

Story behind the baseline: WN and EEE viruses constitute annual threats to human and equine health. The human fatality rate for EEE is about 30%. Those who survive can have long-term neurological disorders. Over 2 million mosquitoes have been trapped and tested in the past decade with 331,806 mosquitoes trapped and tested in 2011. Specific geographic localities in the state and time of the season associated with increased risk of human exposure have been identified. Our program activities have been successful in providing an early warning system that has directed targeted intervention strategies, and minimized disease in humans. Municipalities successfully use our survey and research results to reduce mosquito abundance.

Trend: ▲ Yes

Performance Measure 2: Number of isolates of WN, EEE, and Jamestown Canyon (JC) virus.

Story behind the baseline: We made the first isolation of WN virus in the US in 1999. Our research on 50 mosquito species has succeeded in elucidating the natural history of WN virus in the Northeast; evaluating the competence of mosquitoes to transmit and serve as over-wintering hosts; identifying the feeding behavior of mosquito vectors of encephalitis viruses; isolating other viruses that cause human disease, including one not previously recognized in CT; and developing more sensitive and rapid molecular diagnostic techniques to identify viruses. There were 1,234 isolations of WN, EEE, and JC viruses from mosquitoes during 2006-2011. No human cases of EEE have been diagnosed in CT. There have been 89 confirmed human cases of WNV infections since the introduction of the virus in 1999.

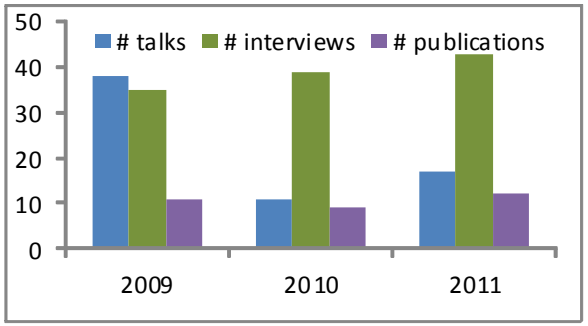
Number (%) of isolates of WN, EEE, and JC virus, 2009-2011.

Year	WNV	EEE	JC
2009	35 (17)	123 (62)	43 (21)
2010	220 (90)	4 (2)	20 (8)
2011	163 (75)	3 (1)	53 (24)

We have also developed and evaluated novel mosquito trapping methods and the efficacy of new biological agents to control mosquitoes to enhance our ability to monitor for and help prevent human disease.

Trend: ◄► Flat/No trend

Performance Measure 3: Dissemination of scientific findings to the public and other scientists to increase awareness of mosquitoes and encephalitis viruses.



Story behind the baseline: Results obtained from our research and surveillance activities have successfully impacted local and scientific communities by increasing knowledge of mosquitoes and encephalitis viruses, reducing the economic burden from mosquito-related illnesses, and by preventing human disease. Our publication, *Identification Guide to the Mosquitoes of CT*, is used by mosquito control and public health officials throughout the eastern US. Our programs have resulted in the publication of 96 scientific articles in 32 different peer-reviewed journals since 1999. At least 30 CT towns have a mosquito control program or conduct regular mosquito control activities based on our mosquito and virus surveillance program and other research findings. Of 52 persons surveyed in 2010, 46% indicated that they followed state alerts to avoid mosquito bites. This low response rate has improved.

Trend: ▲ Yes

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Proposed actions to turn the curve: A comprehensive surveillance program complemented with science-based mosquito control and a timely outreach network are planned to protect the public. Training programs will be conducted, and there will be increased trapping of mosquitoes to meet added requirements of mosquito virus activity during years of heavy rainfall. There will be increased efforts to secure more federal funding from our partners to help supplement costs of virus testing programs when mosquito populations are high.

New research has been initiated to examine the impact of global climate change on the most important mosquitoes and viruses. With the cooperation of the CDC or other partners, we will improve our programs to identify and respond to newly introduced exotic encephalitis viruses by obtaining reference RNA material of foreign viruses likely to enter the state so that a correct identification can be made in the future. Control efforts will reduce mosquito abundance. The lack of reference RNA from exotic viruses is an obstacle for identifying a new pathogen introduced into the state and initiating appropriate control measures. State bond funding ($500,000) has been approved to build a laboratory at our Griswold Research Center, which will allow CAES to study the natural history of the EEE virus. Where the virus overwinters and why virus activity fluctuates so dramatically from year to year is unknown.

A *Center for Vector Biology & Zoonotic Diseases* exists at The CT Agricultural Experiment Station (CAES) to enhance state awareness of mosquitoes and viruses. In collaboration with the CT Department of Public Health, there will be increased efforts to educate local public health officials, private mosquito control operators and the public on the risks of mosquito bites and how to prevent illnesses. Surveillance and research results have been given to the Yale Peabody Museum to include in student education programs. Mosquitoes and mosquito surveillance data were used in a special Yale Peabody exhibit.

In a partnership with state and local health departments, we will collect data to determine if citizens are following state alerts on preventing mosquito bites. New research and surveillance findings will be made available on an improved CAES website, including timely mosquito/virus surveillance results and scientific advancements.

Data Development Agenda: The impact of the program on the prevention and control of emerging mosquito-borne diseases is measured, in part, by our success in monitoring the state for mosquito and virus activity, providing appropriate warnings of risk for encephalitis virus infection, and research that provides a better understanding of the natural history of these viruses in the Northeast.

In addition to data obtained through the surveillance program, we are obtaining data on prevention activities by CT towns and public health departments, and the response of the public to alerts to avoid mosquito bites. At least 30 CT towns have a mosquito control program or conduct regular mosquito control activities. State residents will be asked in pilot surveys if they take precautions against mosquito bites. It is difficult to know how many cases of WNV were prevented by these activities, but the last fatality was in 2006. There have been no documented human cases of EEE in CT, although cases have been reported in surrounding states. Prevalence of human cases will be annually determined by the CT Dept. of Public Health. The U.S. CDC has worked to obtain data on the relative impact of these programs nationally on the reduction of mosquito-borne disease with limited success.