2011 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.

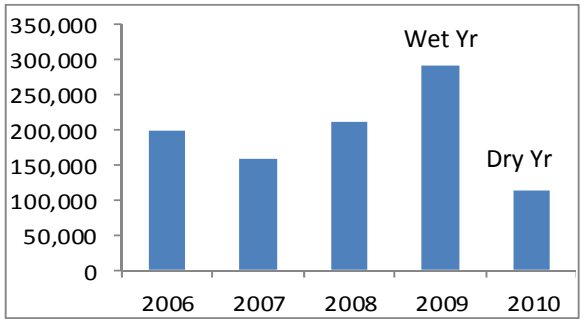
Contribution to Result: The Mosquito and Emerging Mosquito-Borne Disease Prevention and Control Program detects and investigates mosquitoes and viruses in the State. Through surveillance and research, our program alerts citizens about infected mosquitoes and informs them how to reduce their risk of exposure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

Actual SFY 10 Total Program Expenditures: $2,598,260 *State Funding*: $1,237,382 *Federal Funding*: $1,351,484 *Other Funding*: $9,394

Estimated SFY 11 Total Program Expenditures: $2,625,000 *State Funding*: $1,240,000 *Federal Funding*: $1,375,000 *Other Funding*: $10,000

Partners: CT Department of Public Health, local and other state health departments, CT Department of Environmental Protection, CT Department of Agriculture, US Centers for Disease Control and Prevention (CDC), US Department 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.



Total number of mosquitoes tested, 2006-2010. Mosquito populations each year depend, in part, on weather conditions, such as 2009 (wet year) and 2010 (dry year).

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. Our program activities have been successful in the public health response to these viruses, providing an early warning system that has directed targeted intervention strategies, and minimized disease in humans. Over 2 million mosquitoes have been trapped and tested in the past decade. Mosquito activity and risk of disease vary each year with unpredictable weather conditions and, for EEE, some factors that are not yet well understood.

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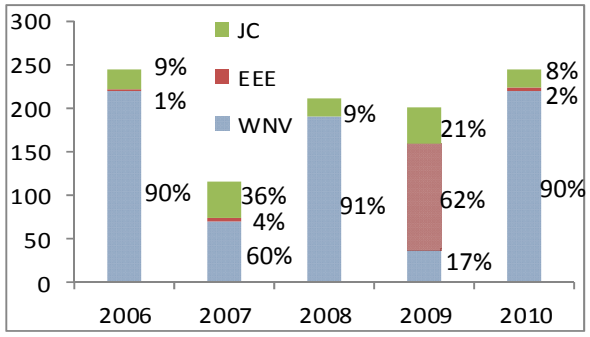
Performance Measure 2: Number of isolates of WN, EEE, and Jamestown Canyon (JC) virus.

Story behind the baseline: We made the first isolation of WN virus in the US in 1999 and have remained on the forefront of efforts to investigate and monitor mosquito-borne viruses throughout the region. 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 overwintering 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.



Number of isolates of WN, EEE, and Jamestown Canyon (JC) virus, 2006-2010. Side numbers are the percentage of isolates for each virus each year.

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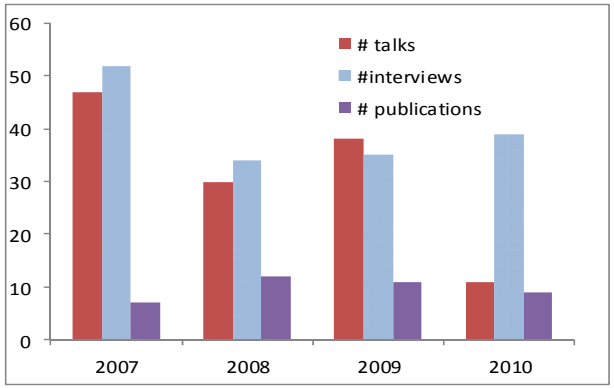
Performance Measure 3: Dissemination of scientific findings to the public and other scientists to increase awareness of mosquitoes and encephalitis viruses.



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 84 scientific articles in 26 different peer-reviewed journals since 1999.

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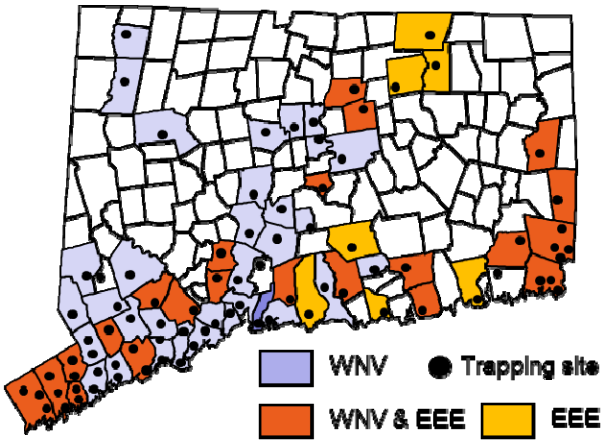
Quality of Life Result: All Connecticut's citizens and their domestic animals are healthy and free from mosquitoes and mosquito-borne diseases.

Performance Measure 1 Continued:



Towns in CT where WN, EEE, or both viruses have been isolated from mosquitoes, 1996-2009 (EEE), 2006-2010 (WNV).

Dryer years favor WN virus activity and wet years favor EEE virus activity. However, heavy rainfall in any given year causes surges in mosquito populations that can impact our ability to test mosquitoes for viruses. Specific geographic localities in the state and time of the season associated with increased risk of human exposure have been identified. Public health officials in these areas know there is potential for virus presence each year and can alert the public and initiate control programs.

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.

Performance Measure 2 Continued:

Our research has been productive in developing and evaluating novel mosquito trapping methods to enhance the early detection of encephalitis viruses and evaluating the efficacy of new biological agents to control mosquitoes. We also have documented the establishment of two invasive, exotic mosquitoes from Asia in CT. Researchers in and outside CT are using newly developed techniques to identify mosquito blood meal sources. However, 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.

Nevertheless, municipalities successfully use our research results to reduce mosquito abundance. For example, our identification of the mosquito *Culex pipiens* as the primary vector for WNV allows targeted treatment of catch basins for mosquito control using biological agents. There were 1,015 isolations of WN, EEE, and Jamestown virus (JC) from mosquitoes during 2006-2010. No human cases of EEE have been diagnosed in CT. There have been 79 confirmed human cases of WNV infections since the introduction of the virus in 1999. The last fatality from WNV was in 2006.

Proposed actions to turn the curve: 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 and control efforts can reduce mosquito abundance.

Performance Measure 3 Continued:

At least 30 CT towns have a mosquito control program or conduct regular mosquito control activities based on the findings of our mosquito and virus surveillance program. Of the 166 persons surveyed, 65 (39%) indicated that they followed state alerts to avoid mosquito bites. This low response rate needs improvement.

Proposed actions to turn the curve: A *Center for Vector Biology & Zoonotic Diseases* at The CT Agricultural Experiment Station (CAES) has been established 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. 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.