

DEPARTMENT OF PUBLIC HEALTH
Infectious Diseases Division, Epidemiology Program

West Nile Virus Surveillance in Connecticut
Summaries for 2003 and for 1999-2003

During 2003, West Nile virus (WNV) was identified in most of the continental United States, excluding only Washington, Oregon, and Alaska. Infection caused 9858 reported human cases of illness and resulted in 262 deaths. Because WNV can infect a broad range of animal hosts and mosquito vectors, transmission can occur in many different environments. It appears likely that WNV will continue to present a seasonal public health threat in many areas of the United States, including Connecticut.

The State Mosquito Management Program (MMP) monitors statewide activity of WNV and other mosquito-transmitted viruses of public health importance including eastern equine encephalitis (EEE). The MMP is a collaborative effort by The Departments of Public Health (DPH), Environmental Protection (DEP), and Agriculture (DoAg), the Agricultural Experiment Station (CAES), and the University of Connecticut Department of Pathobiology (UConn) in cooperation with local health departments (LHD).

West Nile virus and EEE have complex life cycles in nature that include wild bird reservoirs, mosquito vectors, and the potential for infection of domestic animals and people. To identify the presence of WNV and the intensity of viral transmission, several surveillance systems are used including wild birds, mosquitoes, domestic animals, and people. Laboratory testing of mosquitoes, and specimens from human patients and horses are also tested for EEE.

Connecticut, 2003

West Nile virus (WNV) was again widely distributed in Connecticut. Overall, WNV was confirmed in 141 towns in all eight counties and EEE in 14 towns in four counties (map attached).

Wild Birds

Wild bird surveillance proved to be a sensitive surveillance system for the early detection of WNV especially in the most densely populated areas of the state. Surveillance for WNV in wild birds included the collection of reports of sightings of dead birds, and the testing of some birds specifically for the presence of WNV. Dead crows were reported in 136 towns and WNV was confirmed in crows collected from 128 towns in eight Connecticut counties.

Dead Bird Sightings

Local health departments representing 141 (83%) of the 169 towns in Connecticut participated in the bird mortality surveillance system. Between June 1 and October 18, a total of 7175 dead bird sightings were reported statewide. Towns in Fairfield County sent in 1681 (23%) reports, Hartford County 1753 (24%) reports, and New Haven County 2052 (29%) reports. Crows were

identified in 3995 (56%) reports, other species in 2424 (34%), and species was unknown in 756 (10%). Of the dead crow sightings, 894 (22%) were reported from Fairfield County, 805 (20%) from Hartford County, and 1159 (29%) from New Haven County (Table 1). Statewide, the numbers of dead birds identified as crows increased rapidly in August and peaked during the first week of September (Figure 1).

Dead Bird Testing

To confirm the presence of WNV in birds, a statewide system of testing dead wild birds for WNV infection was offered. Based on experience in Connecticut and other states, emphasis was on testing fresh corvids (crows, jays, ravens) and to a lesser extent grackles and raptors. From June 1 - October 18, a total of 643 birds were submitted for testing. A total of 632 (98%) birds were tested and 524 (83%) were positive for WNV.

In addition to crows, 10 other wild bird species were tested. A total of 6 species comprised of 80 birds tested positive for WNV (Table 2). Of the non-crow species with at least 10 submissions, only blue jays (84%, 74/88) tested positive $\geq 10\%$.

A total of 513 crows were tested and 444 (87%) were positive. Positive crows were collected June 30 through October 5, and the first positive was identified in Tolland County (Columbia). The largest numbers of crows submitted and testing positive were from towns in the most densely populated counties (Table 3). From 84% to 94% of crows found in each county tested positive. Positive crows were identified from 98% (128/131) of towns that submitted at least one crow suitable for testing and 100% (72/72) that submitted at least three.

The percentage of crows testing positive for WNV increased over the summer and was over 85% from early August to Mid-October (Figure 2). Specimens testing positive surpassed 90% per week for most of this period. Once positive crows were found, the percent testing positive increased rapidly over the next month. Considering the high rate of positive findings, additional testing was not generally considered necessary in towns with 3 positive birds. Monitoring of WNV activity in birds at that stage was accomplished through monitoring dead wild bird reports.

Mosquitoes

In 2003, the CAES re-established the network of 91 permanent mosquito-trapping sites in 72 municipalities throughout the state (Figure 3). One-third of the sites were located in southern Fairfield and New Haven counties where the highest numbers of dead crow sightings have been consistently observed and where the highest levels of WNV activity in mosquitoes and humans have been detected in each of the last four years. Some sites, especially in southeastern Connecticut are placed in areas where EEE is most likely to be identified. Mosquito trapping was conducted daily beginning on June 1. Traps were set and attended by CAES staff every 10 days at each site on a regular rotation. Mosquitoes were grouped (pooled) according to species, trapping site, and date of collection. A maximum of 50 female mosquitoes were included in each pool.

A total of 255,334 mosquitoes (15,447 pools) representing 35 species were trapped and tested in 2003. A total of 72 isolations of WNV were made from 12 species (*Culex pipiens*, *Culex restuans*, *Culex salinarius*, *Aedes vexans*, *Aedes cinereus*, *Anopheles walkeri*, *Culiseta melanura*, *Ochlerotatus Canadensis*, *Ochlerotatus trivittatus*, *Ochlerotatus sticticus*, *Psorophora ferox* and *Uranotaenia sapphirina*) collected in 15 towns (Bridgeport, Darien, Easton, East Haven, Greenwich, Hamden, Hartford, Manchester, New Britain, New Haven, Newington, Norwalk, Shelton, Stamford, Stratford). The largest number of isolates was obtained from *Cs. melanura*.

The detection of WNV activity in mosquitoes coincided with the statewide incidence of human cases, dead bird sightings and the number of WNV-positive crows (Figure 4). The first WNV-infected mosquitoes were detected on July 8. A steady number of positive pools were detected from mid-August through September and followed a similar pattern of increase as was recorded for statewide increases in dead bird sightings and number of WNV-positive crows. The number of WNV-isolates from mosquitoes peaked once during the third week of August and again during the third week of September. The majority of human cases occurred during that time period. The last isolations were made from mosquitoes collected on October 15.

Eastern equine encephalitis virus was isolated from 78 pools of mosquitoes that included 14 species. The infected mosquitoes were trapped in 14 towns including Bethany, Fairfield, Ledyard, Lyme, New Canaan, , Newtown, North Stonington, Plainfield, Shelton, Stafford, Stamford, Stonington, Voluntown, and Weston.

Domestic Animals

More than 50,000 horses are stabled in areas throughout Connecticut where exposure to mosquitoes is common and sometimes in close quarters with humans. Veterinarians statewide were contacted regarding the clinical signs of WNV infection in horses and requested to inform the DoAg of any suspicious neurologic cases. The DoAg investigated all potential cases of WNV infection and facilitated the collection of appropriate specimens for WNV- testing at the Connecticut Veterinary Medical Diagnostic Laboratory (CVMDL) at UConn.

In 2003, twelve equine cases of WNV infection were identified in eleven different towns (East Windsor, Glastonbury, Granby, Guilford, Litchfield, New Hartford, New Haven, Somers, South Windsor, Stonington, and Watertown). Onset of clinical signs was August 22 to September 22. In one town it was the only indicator of local WNV activity. Of seven towns with mosquito trap sites, three had a mosquito isolate. Equine cases indicated that WNV was circulating outside the bird-mosquito cycle. The horses were located in towns in which there were no human cases and had clinical onset dates that were similar to most human cases. Of the twelve horses, four recovered and eight were euthanized.

Human Infections

In people, WNV can cause asymptomatic infections or a variety of clinical syndromes that range in severity from the generally self-limiting West Nile fever (WNF) to potentially serious West Nile neuro-invasive disease (WNND). The DPH Laboratory offers free serologic testing of specimens from patients hospitalized with neurologic illness.

During 2003, a total of 183 serum and CSF specimens from 128 persons diagnosed with a neuro-invasive disease when initially reported were tested for WNV by the DPH Laboratory. Of these, 30 (23%) were diagnosed with encephalitis, 20 (16%) with meningoencephalitis, 76 (59%) with aseptic meningitis, and 2 (2%) with Guillian-Barre' syndrome. The patients were residents of all eight counties and included 73 (66%) residents of the three most populous counties including Fairfield (31), Hartford (21), and New Haven (29). The DPH Laboratory also tested specimens from 346 persons who had a variety of other clinical syndromes at the request of physicians.

Seventeen Connecticut residents were confirmed with WNV infection including 12 with WNND and 5 with WNF. Two were likely infected while traveling out of state. Thirteen persons were hospitalized including 12 with WNND. Three outpatients were initially tested at a commercial laboratory and then results were confirmed at the DPH Laboratory. Overall, cases ranged in age from 6 - 85 years (median = 55 years) and included residents of 5 towns in Fairfield County, 3 towns in New Haven County, 3 towns in Middlesex County, 2 towns in Hartford County, 2 towns in New London County and 1 town in each Litchfield and Tolland Counties. Onset of symptoms occurred from July 30 to November 14 and included 7 persons with onset of illness from August 26 to September 10. None of the patients died. A majority of the infected persons or family members reported spending time outdoors around the home taking little or no measures to avoid mosquito bites.

Human cases coincided with statewide increase of positive findings in birds and mosquitoes. At a local level, the first WNV infected crow was found a median of 27 days (range 11 - 105 days) in the town before the onset of illness among people. Three cases resided in towns that did not submit crows for testing. These towns had a neighboring town that had at least one positive bird before the onset of those three cases. Four of the cases residing in Branford (1), Bridgeport (1), Fairfield (1), and Norwalk (1) had ≥ 1 positive mosquito pool trapped in their town prior to their onset of symptoms. Six cases resided in towns (Bethlehem, Colchester, Coventry, Durham, Middletown, and New Fairfield) that did not have permanent trap sites.