



NEW JERSEY VECTOR SURVEILLANCE

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ABSTRACT: New Jersey experienced an extremely wet Spring this year that produced large populations of snow pool and floodwater mosquitoes. *Culiseta melanura* populations were below average at the beginning of the season but took advantage of the expanded habitat and showed a marked increase during the month of July. Above average populations are most evident at inland sites where Red Maple swamps provide the majority of breeding habitat for this species. Virus isolation data are not yet available but the size of the vector populations suggest that conditions are favorable for virus amplification and potential epizootic transmission.

INTRODUCTION

The New Jersey Vector Surveillance Program is entering its 14th year of providing information on mosquitoes and arbovirus activity in the state under the direct support of the New Jersey State Mosquito Control Commission. The original charge was to make information on the status of eastern equine encephalitis virus (EEE) available to the mosquito control community during the summer season. Over the years, the program has expanded by including new sites for virus monitoring efforts, a computer analysis of the field collected data base and weekly summary reports to supplement the monthly New Jersey Vector Surveillance report.

This year's monitoring effort will be similar to that followed last year with emphasis on the epidemiological events that take place at inland foci as well as those that take place on the coast. The New Jersey State Department of Health will again provide virus isolation attempts on the specimens collected this year.

METHODOLOGY OF THE SURVEILLANCE EFFORT

Culiseta melanura will be used as the main indicator of EEE virus. Specimens will be collected weekly from resting boxes that are placed in areas of the state where human and/or equine cases have occurred in the past.

The resting box collection sites for 1989 are mapped in Fig. 1. Brief descriptions of each of the sites follow:

Coastal sites

Bass River, Burlington County - 35 Boxes

The Bass River resting box collection site is located in a dense plantation of Black, Red and White Pine within the Bass River State Forest and serves as the main monitor for the coastal region north of Atlantic City. The study site is bordered by numerous Atlantic White Cedar bogs that produce *Cs. melanura* in large numbers.



Fig. 1. Resting box sites for arbovirus surveillance in 1989.

Green Bank, Burlington County - 35 Boxes

The Green Bank resting box collection site is located in a White Pine plantation within the Green Bank State Forest and serves as a monitor for the Mullica River drainage to the northwest of Atlantic City. Although some Atlantic White Cedar can be found in the area, much of the *Cs. melanura* population emanates from Red Maple habitat. The area was first explored as a study site in 1983. Its location on the border of Atlantic and Burlington Co. provides a useful monitor for both counties.

Ocean City (Corbin City) Atlantic County - 35 Boxes

The Ocean City resting box collection site was selected in 1984 following a human case of EEE from that area. The site serves as a monitor for the Great Egg Harbor drainage to the south of Atlantic City. Although the site monitors virus activity in the Ocean City area of Cape May County,

the resting boxes are actually located just across the county line in Atlantic County. The area encompasses a mixture of Red Maple and Atlantic White Cedar on the border of an extensive brackish marshland. The Atlantic County Mosquito Control Unit makes all of the collections from this series of resting boxes and coordinates with the Vector Surveillance team to assure that the specimens are pooled and processed on schedule.

Dennisville, Cape May County - 50 Boxes

The Dennisville resting box collection site is located in a White Pine plantation within the Belleplain State Forest and serves as a virus monitoring station for the salt hay farming region along Delaware Bay. The study site is located on a peninsula of upland forest that juts out onto the salt marsh. An extensive Atlantic White Cedar swamp borders the entire area and produces the largest *Cs. melanura* populations in the state. The Cape May County Mosquito Control Commission cooperates fully with the study and frequently assists in the collection of specimens. The Dennisville site has been monitored since 1976 and has been a reliable indicator of virus activity for the Delaware Bay region.

Inland sites

Indian Mills, Burlington County - 25 Boxes, 6 CDC Traps

The Indian Mills study site was introduced last year because of the numerous equine cases of EEE in that area of the state during 1987. The study region encompasses a thorough-bred horse farm where several equine deaths were confirmed to EEE. A Ph.D. candidate is conducting his thesis research on the farm to determine the events that lead to equine epizootics. To date, the low populations of *Cs. melanura* populations have been disappointing and the study site may be moved before the season is over.

Hammonton, Atlantic County - 35 Boxes

The Hammonton resting box collection site is located in an extensive Red Maple swamp in Hammonton Township where equine deaths were confirmed to EEE in 1985. Western Atlantic County appears to be unique in that early season equine involvement is often reported before there is any evidence of EEE in *Cs. melanura*. This study site will complement the Indian Mills site in terms of the geographical similarities and differences of virus activity within a belt where equines repeatedly contract EEE.

Centerton, Salem County - 35 Boxes

The Centerton resting box collection site is located in a small White Pine stand within Parvin State Park in northwestern Salem County. The site was established in 1985 as a first attempt to investigate the dynamics of early season virus activity at an inland site. Numerous equine cases have been reported from Salem County over the years and follow-up surveys showed that EEE virus was common in *Cs. melanura* after the equine cases had been confirmed. No data are available on the extent of virus activity at any inland site prior to a major equine epizootic. The area includes a combination of Atlantic White Cedar and Red Maple habitat that is surrounded by rural farm land.

Each of the study sites will be sampled once weekly from early June to late October. Mosquitoes will be frozen on dry ice at the time of collection and transported to the Mosquito Research & Control laboratories for speciation and pooling. Sorting will be conducted on chill tables to maintain living virus. Mosquito pools will be grouped by Species, Site, Date, Physiological Status and Trapping Method. *Cs. melanura* pools will be triturated at Rutgers and tested by ELISA before being sent to the New Jersey Department of Health laboratories for virus isolation attempts by standard protocol.

Results will be entered into a computer data base for collation, MFIR calculations and graphics. Information regarding EEE in horses will be compiled by the New Jersey Department of Agriculture. The results of

equine testing will be coordinated through the New Jersey Department of Health and included in this report in relation to the data obtained from mosquito specimens.

THE CURRENT STATUS OF EEE

New Jersey experienced a very wet spring this year which produced exceptionally large biting populations of snow pool and floodwater nuisance species. The large mosquito populations created media attention and numerous news stories focused on the size of the mosquito populations and the reasons for their existence. *Cs. melanura* populations, however, were lower than average at the beginning of the season and were slow to respond to the available habitat created by the Spring rains. By July, the *Cs. melanura* in most areas of the state did begin to increase particularly at inland areas where Red Maple swamps provide the major breeding habitat. At the present time, *Cs. melanura* are near record levels in many of the study sites that are being monitored.

Figure 2 shows the population levels of *Cs. melanura* for the months of June and July at the Hammonton site in Atlantic County. The data show the reduced numbers that were present early in the season and the dramatic increase that occurred as the season advanced. A similar trend was seen at most of the sites that are being monitored this year. Data suggest that *Cs. melanura* populations are large enough to initiate amplification of EEE if virus is present in the bird population. Unfortunately, the status of EEE is not known at the present time and results will not be available for several weeks.

RESULTS OF VIRUS TESTING

During the months of June and July, 12,793 total specimens were processed for virus isolation attempts (Table 1). Virtually all of the specimens were collected from resting boxes, thus, nuisance *Aedes* are not well represented in the early season sample. Virus isolation data are not yet available for any of the specimens submitted this year. The tests, however, are in progress and the

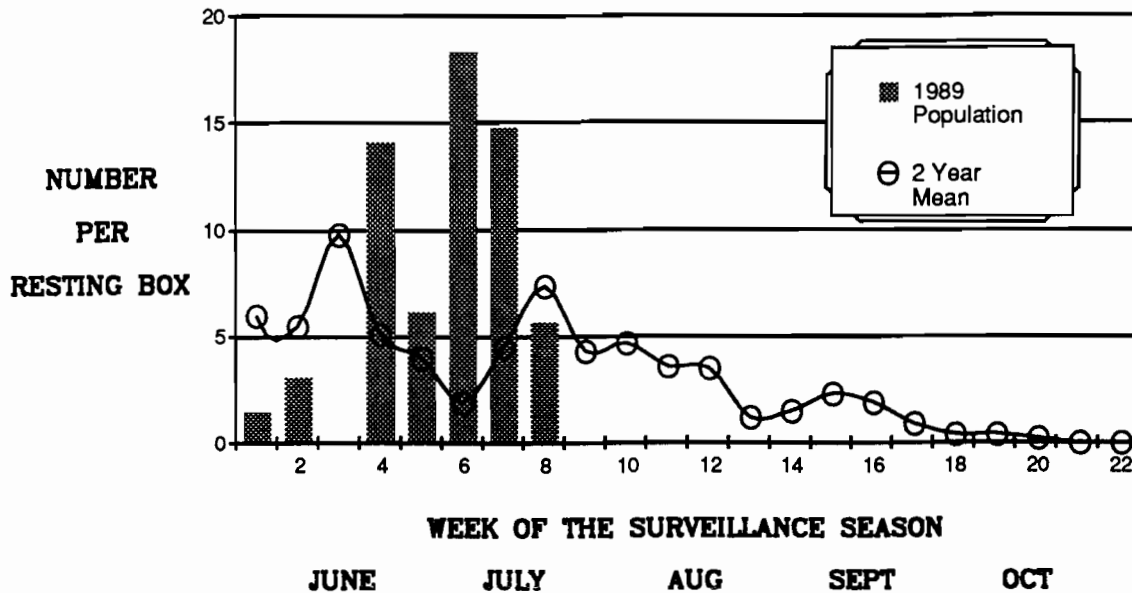


Fig. 2. Resting box populations of *Cs. melanura* at Hammonton in Atlantic County during June and July, 1989.

Table 1. Mosquito species submitted for virus isolation attempts during June and July, 1989.

MOSQUITO SPECIES	TOTAL TESTED	NO. POOLS	POSITIVE POOLS *	
			HJ	EEE
Genus <i>Culiseta</i>				
<i>Cs. melanura</i>	7807	341	0	0
Genus <i>Aedes</i>				
<i>Ae. canadensis</i>	82	17	0	0
<i>Ae. cantator</i>	5	5	0	0
<i>Ae. grossbecki</i>	1	1	0	0
<i>Ae. sollicitans</i>	1	1	0	0
<i>Ae. thibaulti</i>	33	13	0	0
<i>Ae. triseriatus</i>	48	4	0	0
<i>Ae. vexans</i>	11	9	0	0
Genus <i>Anopheles</i>				
<i>An. bradleyi</i>	28	15	0	0
<i>An. punctipennis</i>	55	36	0	0
<i>An. quadrimaculatus</i>	3861	85	0	0
Genus <i>Coquilleidia</i>				
<i>Cq. perturbans</i>	12	8	0	0
Genus <i>Culex</i>				
<i>Cx. pipiens</i>	9	8	0	0
<i>Cx. restuans</i>	615	124	0	0
<i>Cx. salinarius</i>	106	22	0	0
<i>Cx. territans</i>	117	43	0	0
Genus <i>Psorophora</i>				
<i>Ps. ferox</i>	1	1	0	0

* Results from these specimens are not yet available

information should be available in time to assess the potential for late summer epizootic activity.

DISCUSSION

The heavy rains that New Jersey experienced during the months of May and June did not have an immediate impact on *Cs. melanura* populations. The species began the season at lower than average levels and the risk of EEE amplification did not appear to be great. Since that time, however, *Cs. melanura* populations have increased markedly. Data suggest that the species is taking advantage of the expanded habitat that resulted from the earlier floodings, particularly at the inland sites that are being monitored.

Large *Cs. melanura* populations are usually an indication of potential virus amplification and the populations this year are at near record levels for many of the study sites. Data from the next several weeks will assume utmost importance in predicting the possibility of epizootic activity. To date, there has been no evidence of equine involvement in any part of the State.

Data from coastal sites also indicate larger than average populations and the area being watched most closely is the study site that is being monitored near Ocean City. *Cs. melanura* populations have always been low at this study site but EEE virus has been detected on a regular basis, despite the low populations. Figure 3 shows that *Cs. melanura* populations have been increasing steadily in this coastal area and are well above the 4 year mean at the present time. If the trend continues, vector control agencies should be prepared to reduce vector potential in *Aedes sollicitans* populations during the latter part of the season to minimize the risk of potential transmission to humans.

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Prepared by: Dr. Wayne J. Crans
Mosquito Research & Control, Cook College
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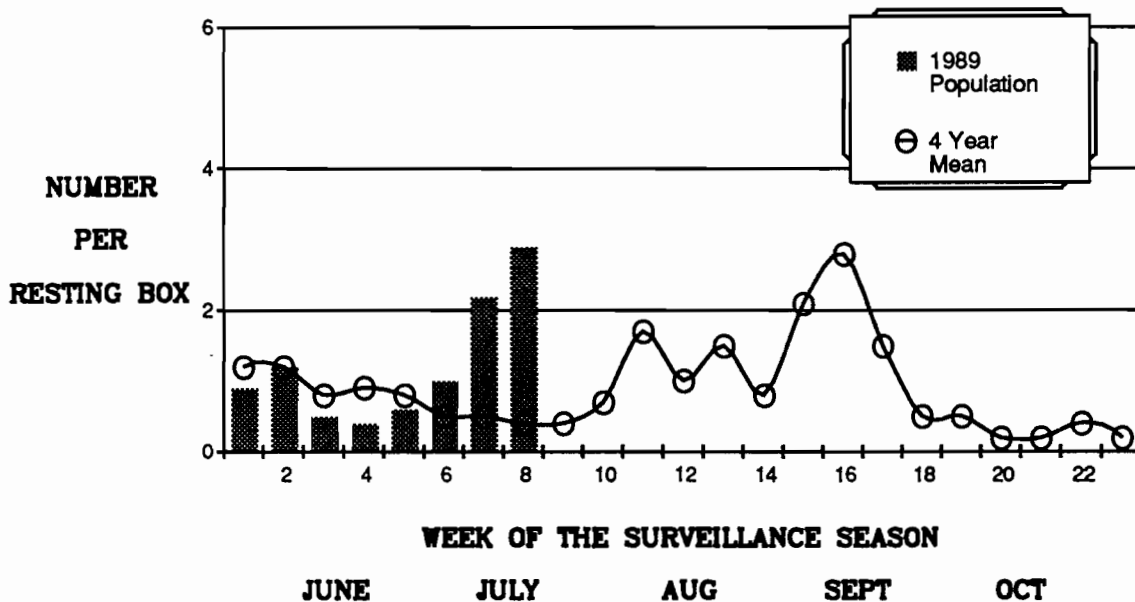


Fig. 3. Resting box populations of *Cs. melanura* at Ocean City (Corbin City site) in Atlantic County during June and July, 1989.