NEW JERSEY
DEPARTMENT OF AGRICULTURE

NEW JERSEY VECTOR SURVEILLANCE

VOL. 16 NO. 4 **PERIOD: 1991 SEASON SUMMATION**

ABSTRACT: Drought conditions during the month of July prevented *Culiseta melanura* populations from reaching their full potential in New Jersey during 1991. As a result, EEE amplification did not take place until mid-August and the potential for human involvement remained negligible. Minimum Field Infection Rates (MFIR) remained relatively low in most areas with the exception of very brief peaks in areas where the numbers of mosquitoes tested were extremely low. Six equine cases were reported during the season. All were contracted on the inner coastal plain close to the area where the surveillance data indicated epiornitic activity.

INTRODUCTION

The New Jersey program to monitor eastern equine encephalitis virus (EEE) was forced to make a difficult decision in 1991. Available monies allowed for 1) maintaining the surveillance effort in the areas of the state that have been monitored for many years and eliminating the parity information upon which control decisions are made or 2) keeping the parity information and limiting the number of study sites where virus is monitored.

A poll of the county mosquito control agencies that benefit from the service indicated that expanded virus surveillance was the best option until funding permitted a complete surveillance effort. EEE typically cycles at different levels in the various geographical areas that produce EEE amplification in New Jersey and levels of virus in *Cs. melanura* from coastal areas are rarely indicative of virus activity at inland sites. The concept of virus surveillance on a state-wide basis best suited the needs of the mosquito control agencies that must react quickly to minimize public reaction during periods of equine or human involvement.

The decision to eliminate physiological ageing of *Aedes sollicitans* allowed the program to maintain the current study sites and open a new study site in Camden County where a series of equine cases in 1989 raised numerous unanswered questions. In addition, the Monmouth County Mosquito Control Commission volunteered to submit specimens from the Freehold - Marlboro area to expand the existing virus surveillance network in inland areas. The Ocean County Mosquito Control Commission agreed to similarly submit specimens from Forked River to expand the data from coastal areas and the Atlantic County Mosquito Control Unit volunteered to submit specimens from the Ocean City -

Corbin City area, a chronic area for human involvement. As a result, the New Jersey Vector Surveillance Program monitored 8 locations in New Jersey during 1991 and broadened its service to 3 new counties through cooperative efforts that included the mosquito control agencies, the Experiment Station and the NJ State Mosquito Control Commission.

METHODOLOGY OF THE SURVEILLANCE EFFORT

The epiornitic vector, *Cs. melanura*, was monitored with resting boxes at 8 collection stations in southern New Jersey from late May to late October. The coastal collection stations included: Forked River, a new site in Ocean County where epizootics have been common in pen-raised pheasants over the years; Bass River, an established site in Burlington County to the North of Atlantic City; Corbin City, a site in Atlantic County that monitors the critical Ocean City focus and Dennisville, an established site in Cape May County that has been used to monitor the Delaware Bay region since 1976. The inland sites included: Marlboro, a new site in Monmouth County where equine cases were reported in 1990; Hammonton, a site in Atlantic County that monitors an established focus for equine involvement in the South-central coastal plain; Centerton, a site in Salem County where equine cases are fairly common and Waterford, a new site in Camden County where equine involvement was widespread in 1989.

Collections were made once weekly during the surveillance period. Specimens from resting boxes were immediately frozen on dry ice and transported to the Rutgers University laboratories where they were transferred to an ultra-low temperature freezer and then sorted on a chill table to preserve living virus. *Cs. melanura* was the only species tested for virus in 1991. The specimens were grouped in pools no greater than 50 specimens of similar gonotrophic development. The pools were then re-frozen at -70^{o} C and transported weekly to the N.J. State Health laboratories in Trenton for assay.

Resting box population data were entered into a database system for analysis and graphics and the information was distributed to mosquito control agencies on a weekly basis throughout the encephalitis season. When the results of the virus isolation attempts were known, the information was added to the database and Minimum Field Infection Rates (MFIR) were calculated by a program written in dBase III language.

THE POPULATION DYNAMICS OF *CS. MELANURA* IN 1991

Culiseta melanura populations were well below average at the beginning of the 1991 season and drought conditions during the month of July kept collections well below the long term mean at most sites. Data from the Dennisville site in Cape May County (Fig. 1) give a clear indication of the general trend. The first generation in the Spring was severely stressed by the dry weather in late June and early July and a typical August peak was never reached. Over the previous 14 years, *Cs. melanura* populations averaged 20 mosquitoes per box at the peak of the season. In 1991, the population did not exceed 4 per box on any collection date after the 3rd week of June. A similar trend was observed for most of the study sites where EEE has been monitored on a regular basis. Corbin City remained well below the long term average and Bass River dropped to about the long term average after an early season surge that could have produced record populations in the absence of drought conditions. One notable exception to the general rule was evident at a new study site where data on long-term means were not available. Figure 2 shows that populations of *Cs. melanura* at Waterford, in Camden County, were far above any in the state in the early spring. The drought conditions in July suppressed a potentially dangerous population build-up until August when data from that site indicated a progressive population increase that extended until cool weather brought the cycle to an end. Data from 1991 indicated the possibility for a potentially explosive *Cs. melanura* population in an area of the State where equine cases have been repeatedly

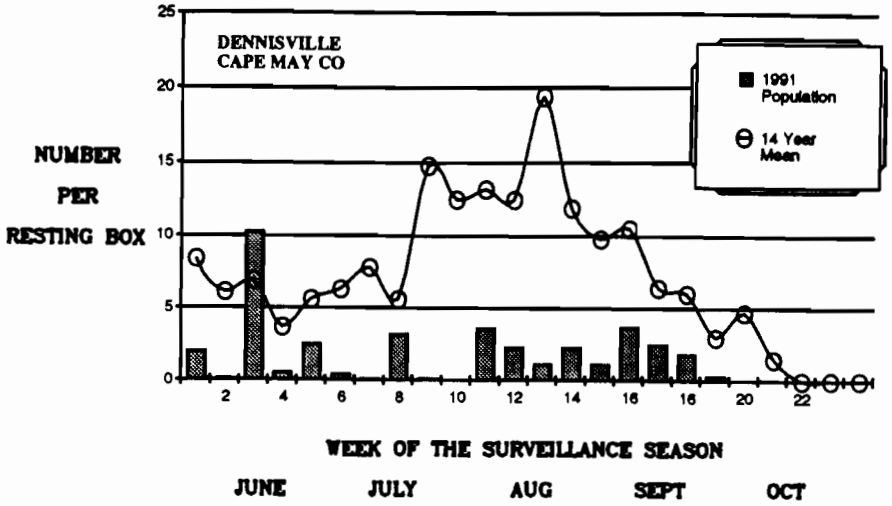

Fig. 1. Resting box populations of *Cs. melanura* at the Dennisville site in Cape May County during 1991.

documented with little epidemiological follow-up. The potential for human involvement in this area poses additional unanswered questions. Human cases of EEE have been reported from a number of residents from Camden Co. over the years but all have had a history of visiting the N.J. shore prior to onset. In fact, most residents of Camden Co. (and other inland areas of southern N.J.) visit the N.J. shore during the Summer months. EEE has been unofficially designated as a disease that is contracted at the N.J. shore since the outbreak of 1959, but equine cases clearly show that the virus cycles at high levels in birds and mosquitoes at inland areas. Considerably more information is needed before we can attribute human cases to the inland cycle, but data from 1991 indicate that inland transmission of EEE to humans is a possibility that may be masked by a coastal resort industry that attracts tourists to the areas where we have concentrated our efforts to monitor EEE.

THE SEASONAL PROGRESSION OF EEE VIRUS IN 1991

A total of 14,705 *Cs. melanura*, representing 613 pools, were tested for Highlands J (HJ) and EEE virus during 1991. A total of 15 HJ and 21 EEE isolations were made during the season.

Table 1 compares the earliest and latest isolation dates for EEE virus from *Cs. melanura* by collection site during the 1991

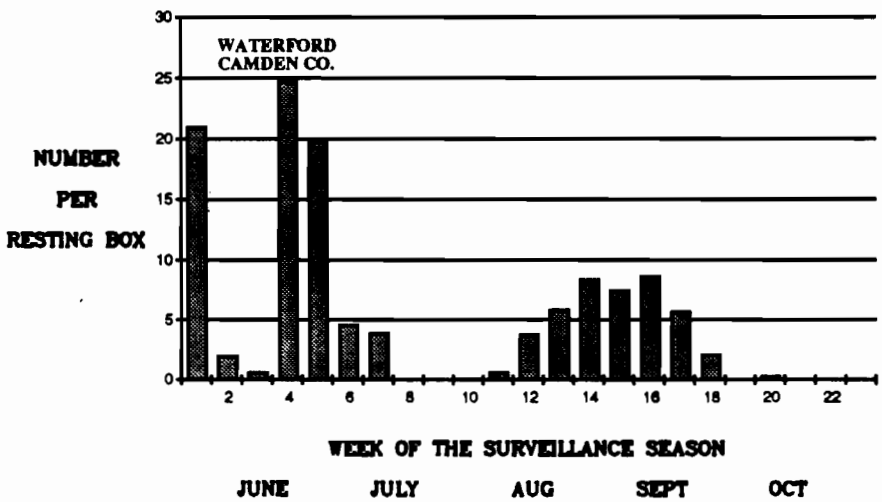

Fig. 2. Resting box populations of *Cs. melanura* at the Waterford site in Camden County during 1991.

Table 1. EEE virus isolations from *Culiseta melanura* in New Jersey during 1991.

LOCATION	POSITIVE POOLS	EARLIEST ISOLATION	LATEST ISOLATION
Coastal Sites			
Forked River	1	Aug. 27	-
Bass River	6	Aug. 20	Sept. 05
Ocean City	0	-	-
Dennisville	4	Aug. 12	Oct. 10
Inland Sites			
Marlboro	2	Sept. 16	Sept. 23
Hammonton	1	Aug. 16	-
Centerton	2	Sept. 06	Sept. 20
Waterford	5	Aug. 26	Oct. 04

season. Data show that EEE did not appear in *Cs. melanura* until mid-August at any of the sites. The first isolation of the season was made from a CDC collection at Dennisville on August 12, followed by single isolations from Hammonton, Bass River, Waterford and Forked River later in the month. EEE was not isolated from *Cs. melanura* at Centerton or Marlboro until September and no isolations were made from specimens at the Ocean City site during the season.

Table 2 lists the MFIR values for each of the sites in 1991. The Forked River, Marlboro and Hammonton sites experienced minimal amplification of EEE with no more than 2 isolations within a relatively restricted time period. Amplification did take place at Bass River, Dennisville and Waterford, however, and detectable virus was present in Cs. melanura at each of those sites as long as mosquitoes were available for testing.

EQUINE CASES OF EEE IN 1990

The first equine case of EEE was confirmed by the New Jersey Department of Agriculture in late August from a 26 year old pony stabled in South Hampton in Burlington Co., approximately 10 mi. north of the Waterford study site. The date of onset preceded the first Waterford isolation by several days. Two additional Burlington Co. equine cases occurred in the same general vicinity during September at a time when

Table 2. Minimum Field Infection Rates (MFIR) for *Culiseta melanura* by month during 1991.

LOCATION	TOTAL TESTED	MFIR VALUE June	July	Aug	Sept	Oct
Coastal Sites						
Forked River	136	0	0	13.33	0	0
Bass River	3846	0	0	2.83	5.79	0
Ocean City	135	0	0	0	0	0
Dennisville	2598	0	0	2.19	2.36	2.75
Inland Sites						
Marlboro	137	0	0	0	24.69	0
Hammonton	1222	0	0	3.23	0	0
Centerton	852	0	0	0	7.35	0
Waterford	3024	0	0	3.77	4.20	14.71

Table 3. Equine cases of EEE in New Jersey during 1991.

ONSET	TOWN	COUNTY	DESCRIPTION	STATUS
Aug 22	South Hampton	Burlington	26 Yr old Pony	PRESUMPTIVE
Aug 24	Carney's Point	Salem	Unknown	CONFIRMED
Sep 05	Pedricktown	Salem	4 Yr old Standardbred	CONFIRMED
Sept 05	Medford	Burlington	Miniature Horse	PRESUMPTIVE
Sept 24	Indian Mills	Burlington	Gelding Thoroughbred	CONFIRMED
Oct 10	Richland	Atlantic	2 1/2 Yr old Arabian	CONFIRMED

virus data from the Waterford site indicated that amplification of EEE was taking place in that region. Two equine cases were reported from Salem Co. at about the time that virus was detected in the *Cs. melanura* in that area. The only other horse case of the 1991 season was reported from Atlantic Co. very late in the season.

ACKNOWLEDGEMENTS[1]

This document is the result of a cooperative effort among the following State and County Agencies: New Jersey State Mosquito Control Commission, New Jersey State Department of Health, Mosquito Research & Control Unit of NJAES, The New Jersey Department of Agriculture, The County Mosquito Control Agencies of Atlantic, Burlington, Cape May, Camden, Cumberland, Gloucester, Ocean, Monmouth, and Salem Counties.

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

New Jersey Agricultural Experiment Station Publication No. R-40500-01-92 supported by the New Jersey State Mosquito Control Commission and State Funds