New Jersey Vector Surveillance

New Jersey Agricultural Experiment Station

Mosquito Research and Control

Vol. 6 No. 4 Period: 1981 Season Summation

Introduction

The 1981 season held considerable potential for widespread encephalitis activity in New Jersey. Highlands J Virus (HJ) appeared at several sites in Cs. melanura very early in July and eastern encephalitis virus (EE) was evident by the middle of the month. Virus isolations from mosquitoes were frequent during the summer months and late season activity was documented well into October.

Although vector populations of Ae. sollicitans, Ae. vexans and Cq. perturbans were high at several critical points during the season, virus activity did not appear to extend beyond avian involvement (e.g. the normal maintenance cycle). No human cases were documented in the coastal strip where virus activity was most intense and no equine cases were reported from any part of the state. For the first time in many years, pheasant outbreaks did not accompany the Cs. melanura involvement.

Analysis of the 1981 field data suggests that a number of factors may have interrelated to help abort the cycle. The data also show that EE virus remains as an integral part of the summer biota in southern New Jersey.

Studies Undertaken During 1981

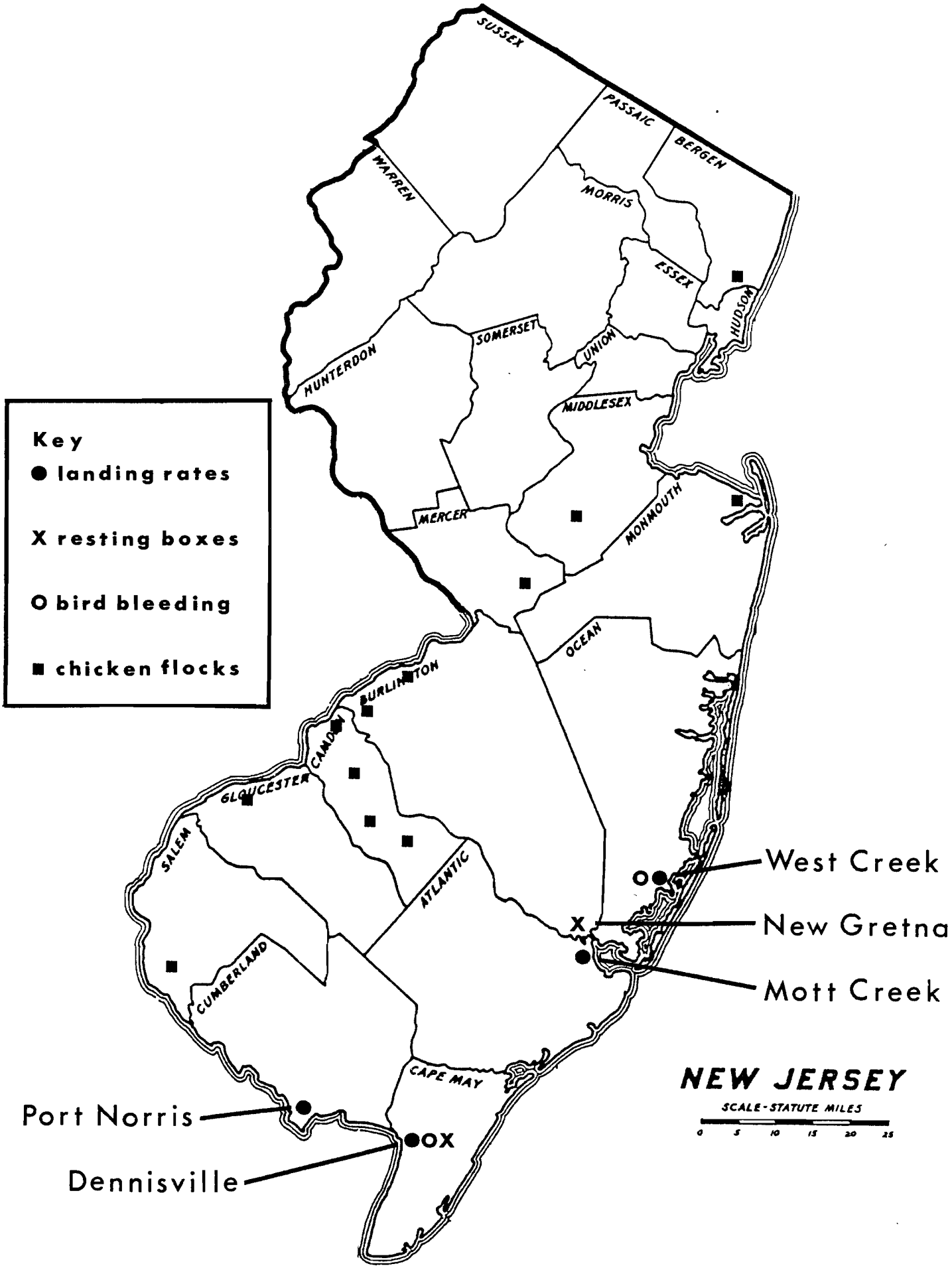
EE investigations were initiated in April with a bird bleeding program to sample the populations as they moved into the study sites to nest in the early spring. Samples were taken at least 3 days each week until late October with collecting teams alternating between West Creek (east coast) and Dennisville (Delaware Bay). All birds were tagged with Fish & Wildlife bands prior to release to gain information on the antibody history of specimens that were bled more than once during the season. The bird bloods (approx. 1100) will be screened for HJ, EE and SLE antibody at Rutgers during the winter months. Cells from each of the samples are being saved for future virus tests pending allocation of funds.

Resting boxes were used to collect Cs. melanura from May to November and CDC traps baited with dry ice were employed to sample early season Aedes, Cq. perturbans and Anopheles spp. Ae. sollicitans populations were monitored twice weekly at 4 sites along the coast to assess vector potential throughout the season. Twelve sentinel chicken flocks were established at inland sites to monitor SLE virus over the course of the summer.

Mosquitoes were tested for EE and HJ virus by the New Jersey State Department of Health and the sentinel chickens were similarly screened for evidence of seroconversion at Trenton. The geographic location of each aspect of the study can be found on the map that accompanies this report.

Cs. melanura Population Trends

The results of the resting box collections at New Gretna and Dennisville are presented in Fig. 1. Data show that the population trends were very different in the 2 sites, a phenomenon that may have affected amplification of virus during the season. Cs. melanura were well below average at both the sites during the early part of the season and the July populations dropped to the lowest level recorded since the exceptionally dry summer of 1977. At New Gretna (eastern coast),


Key
● landing rates
X resting boxes
O bird bleeding
■ chicken flocks
SUSSEX
PASSAIC
BERGEN
WARREN
MORRIS
ESSEX
HUDSON
HUNTERDON
SOMERSET
UNION
MIDDLESEX
MERCER
MONMOUTH
OCEAN
BURLINGTON
CAMDEN
GLOUCESTER
SALEM
ATLANTIC
CUMBERLAND
CAPE MAY
West Creek
New Gretna
Mott Creek
Port Norris
Dennisville
NEW JERSEY
SCALE - STATUTE MILES
0 5 10 15 20 25

the Cs. melanura never did recover and the numbers taken from resting boxes remained well below average all season. At Dennisville (Delaware Bay coast) Cs. melanura increased dramatically in August and the high populations continued well into September. Abnormally cool temperatures suppressed mosquito activity toward the end of September and by October, the populations were again below the levels normally encountered at that time of year.

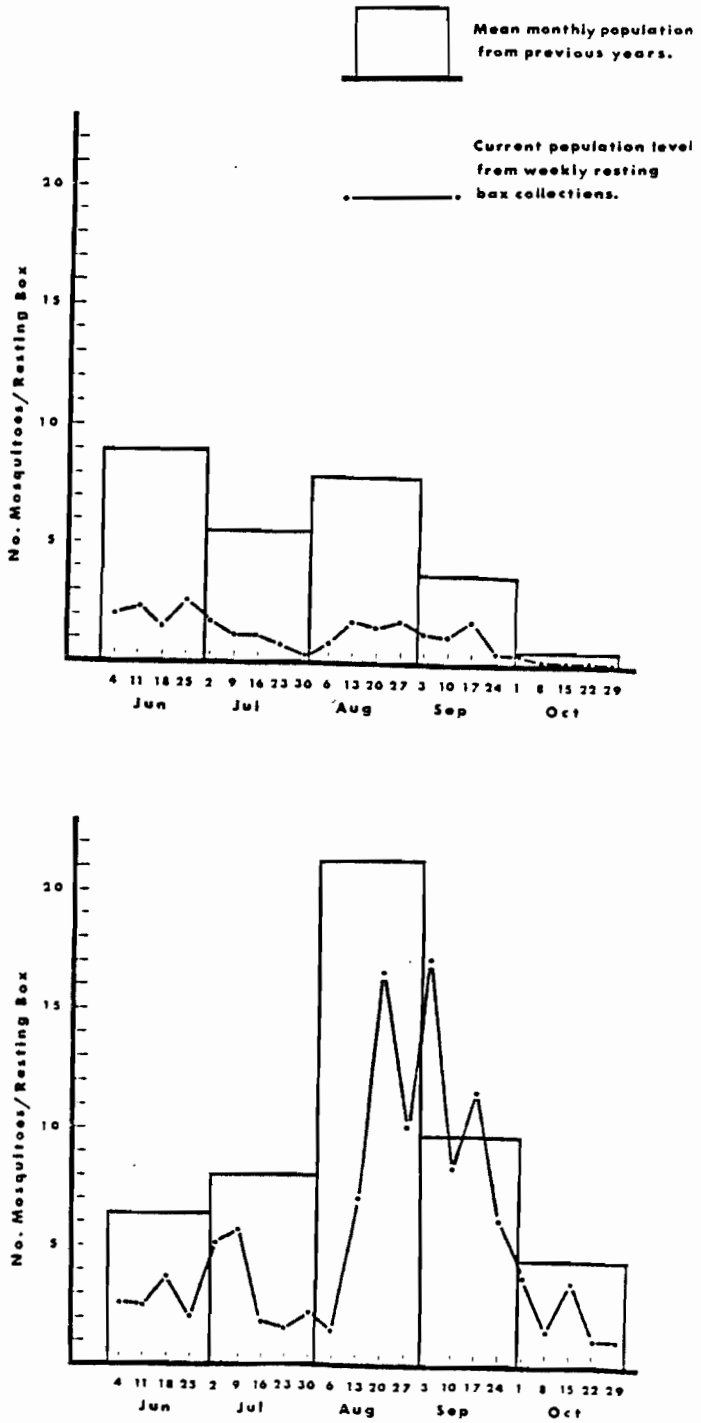


Figure 1. Culiseta melanura populations at the New Gretna (east coast, top graph) and at the Dennisville (west coast, bottom graph) study sites as measured by resting box collections.

The Results of Virus Isolations

Virus was apparently introduced to New Jersey fairly early in the season but the abnormally low Cs. melanura populations at that time did not propagate immediate amplification. This was borne out by State Health collections at Green Bank, an inland site fairly close to New Gretna. Cs. melanura populations were somewhat higher at the Green Bank site and HJ virus was isolated with considerable frequency in June and early July. Amplification of HJ virus at New Gretna and Dennisville did not occur until the Cs. melanura began to increase much later in the season.

Table 1 shows that HJ virus did not peak in Cs. melanura until August at each of the sites that were being monitored. As in previous years, HJ virus appeared first and EE virus followed somewhat later. It is interesting to note that HJ virus was isolated from a pool of Ae. sollicitans at Dennisville during the peak period of amplification at that site. The isolation also corresponded to a vector potential peak for Ae. sollicitans, thus theoretical transfer of an avian virus to a mammalian-feeding vector did take place with the indicator. Since HJ virus is non-pathogenic, the transfer is academic and bears no relation to real human health involvement.

Table 1. Virus isolations from Cs. melanura during 1981.

Month	New Gretna			Dennisville*		
	No. Tested	HJ	EE	No. Tested	HJ	EE
May	30	0	0	105	0	0
June	350	0	0	451	0	0
July	194	0	0	576	1	1
August	353	6	0	2060	6	5
September	196	2	0	1968	4	8
October	15	0	1	191	1	2
Total	1138	8	1	5351	12	16

*One isolation of HJ virus was recovered from Ae. sollicitans in August and 2 EE isolations were made from An. quadrimaculatus in September and October.

EE virus did not appear in any of the samples at New Gretna until October, when Cs. melanura had all but disappeared. The reasons for the apparent lack of EE on the eastern coast of the state are unclear as is the sudden appearance of the virus in that region so late in the season. Cs. melanura were very low throughout the summer at the New Gretna site, but the low populations were fully capable of amplifying HJ virus in that area. Data seem to suggest that EE distribution may have been spotty this year and was not introduced to the New Gretna site until the fall when bird movement was most intense. Antibody analysis of the bird bloods collected along the east cost should show whether EE was actually absent or merely present in very low densities.

On the other hand, EE was active at Dennisville from July to October with a peak period of amplification during early September. Data show that virus isolation rates were highest when Cs. melanura rose above their average fall numbers. In July, 0.17 EE isolations were made for every 100 mosquitoes tested. In August, the rate rose to 0.24. During September, the rate was 0.41 and in early October the number reached 1.05. No EE isolations were made from Ae. sollicitans during this this period but pools of Anopheles quadrimaculatus yielded EE virus on September 4 and October 16.

The Status of Ae. sollicitans

For the second consecutive year, significant populations of Ae. sollictians were documented in the presence of EE virus with no apparent involvement in transmission. At Dennisville, where EE activity was closely monitored, Ae. sollicitans exhibited 3 distinct peaks in vector potential during the amplification period. The first occurred early in August when the vector potential (no. parous mosquitoes landing per minute) reached 30.8. Approximately 300 moquitoes were screened for virus at that time and none contained EE virus. A single pool of 121 specimens did yield HJ which was at the peak of its amplification at that time. EE, though present, was still in the early stages of amplification. A second vector potential peak occurred on September 7 when the parous landing rate rose briefly to 22.1. EE virus was quite apparent in Cs. melanura by that time but the 150 Ae. sollicitans that were screened gave negative results. The third vector potential peak occurred on September 21 when the parous landing rate reached 21.0. Equipment failure prevented large numbers of mosquitoes from being collected but tests were performed on 100 specimens without any evidence of virus.

The basic hypothesis that Ae. sollicitans functions as a major vector to humans has not been reinforced with data to show that the species actually carries virus under field conditions. Human cases, however, have not accompanied epizootics in recent years, thus the absence of virus isolations from Ae. sollicitans could mearly be a reflection of the cycle's abortion for reasons that are not understood at this time.

St. Louis Encephalitis Surveillance in 1981

Twelve sentinel chicken flocks of 10 birds each were established in the counties of Salem, Gloucester, Camden (4 flocks), Burlington (2 flocks), Monmouth, Mercer, Middlesex and Bergen. The Salem and Bergen flocks represented controls in areas that were outside the recognized zone of SLE activity in New Jersey. The remaining flocks were placed in areas that had a high probability of virus activity based on previous cases. Mosquito control superintendents selected the sites, located cooperators and in many cases supplied the pens. The birds were bled from the wing vein every other week from mid-May to October and the bloods were tested for SLE sero-conversion at the State Department of Health in Trenton.

Although SLE activity had been documented by a similar pilot program in 1980, none of the birds sero-converted in 1981. The results were consistant with those of surrounding states; SLE virus was not active in the East during 1981.

List of Personnel

Project Leader:	Wayne J. Crans	
Mosquito Program Acting Director:	Harry D. Brown	
Associate Mosquito Program Staff:	Donald J. Sutherland	Dan Sprenger
	Joseph K. Shisler	Linda McCuiston
	Marc Slaff	Steve Sitrin
	Bunnie Hajek	Steve Racioppe
Cooperating State Health Personnel:	Epid. & Dis. Control	Division of Labs
	David Kirsh	Wayne Pizutti
	Ronald Altman	Bernard Taylor
	William Parkin	Consumer Health
	Terry Schulze	Walter Gusciora
		Dave Adam
Cooperating State Mosquito Control Commission Personnel:	Kenneth W. Bruder	
	Robert B. Kent	
Cooperating County Mosquito Control Superintendents:	Harry Tillet, Atlantic County	
	Brian Gooley, Burlington County	
	Judy Hansen, Cape May County	
	Pat Slavin, Cumberland County	
	Tom Candeletti, Ocean County	
	Bill Fisher, Salem County	

* * * * * *

Prepared by: Dr. Wayne J. Crans
Mosquito Research and Control
New Jersey Agricultural Experiment Station
Cook College, P. O. Box 231
New Brunswick, New Jersey 08903

This research was performed as a part of NJAES Project 40500, supported by the New Jersey Agricultural Experiment Station and the New Jersey State Mosquito Control Commission.