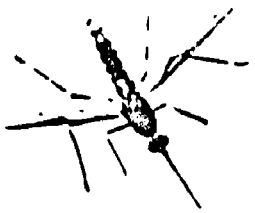


New Jersey Vector Surveillance

New Jersey Agricultural Experiment Station

Mosquito Research and Control

Vol. 5 No. 3 Period: Aug. 5-22, 1980

Introduction

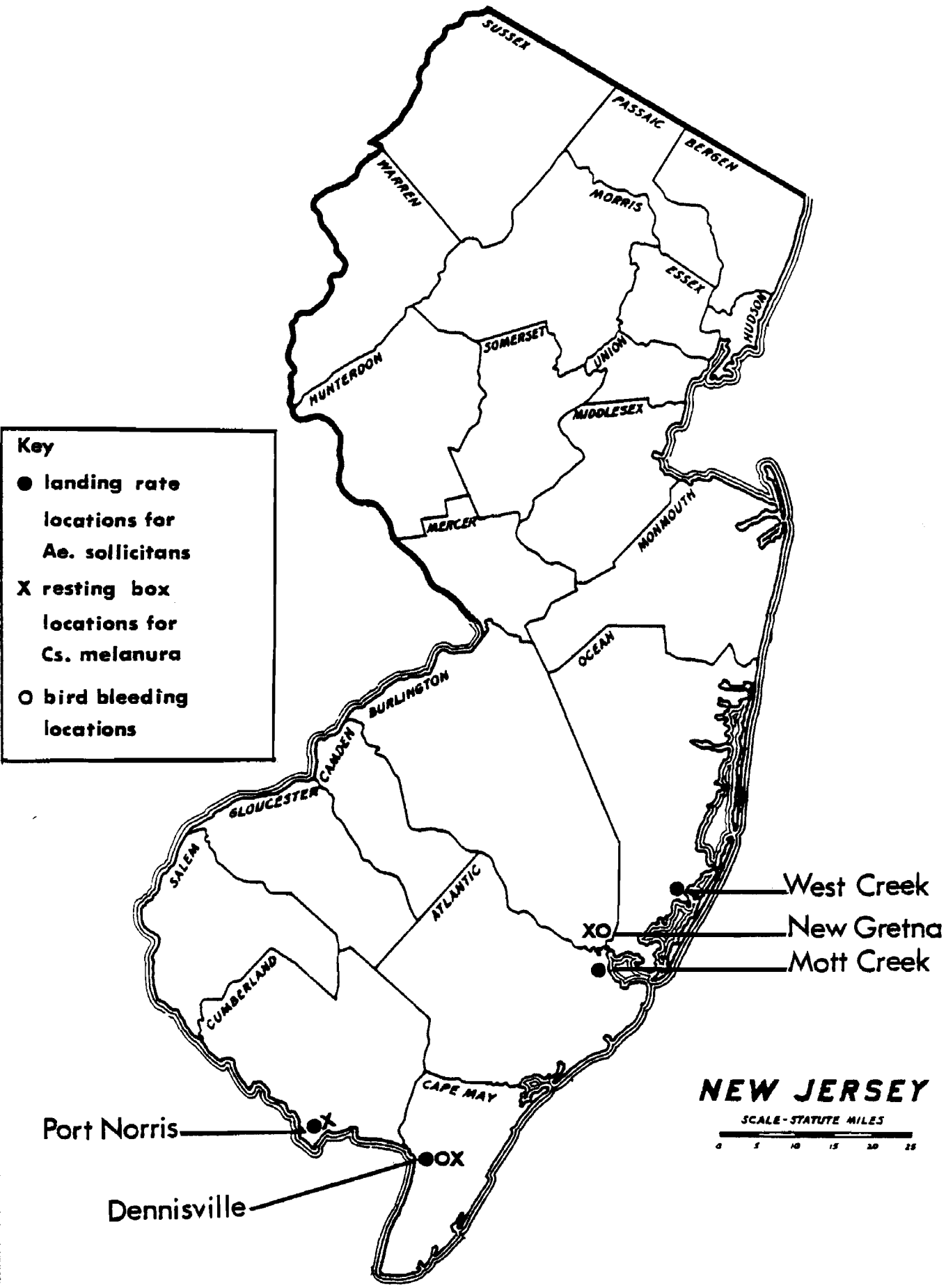
Data gathered by the Vector Surveillance Program indicate that Eastern encephalitis virus (EE) reached epizootic proportions in New Jersey during the first week of August. EE virus has been recovered from Cs. melanura at both of the study sites where the cycle is being monitored. Viremic birds (birds with virus particles in the blood sufficient to infect mosquitoes) have also been captured. No horse cases have been documented at the time of this writing, but equine involvement can probably be expected. The fact that virus has been detected on the Eastern coast of the State as well as the Delaware Bay suggests that the virus is widespread. Under these conditions horse cases usually occur over a wide geographic range. The last brood of Ae. sollicitans emerged just prior to the epizootic and peaked in vector potential during the second week of August at most of the study sites. The brood was not exceedingly large, but the mosquitoes could have made contact with the early stages of the epizootic in some areas. Large numbers of Ae. sollicitans from this brood have been collected and submitted for virus tests. To date, there has been no evidence of "spillover" into the presumed epidemic vector.

Results From the Bird Bleeding Program

Approximately 300 bird bloods have been collected from the study sites where Cs. melanura populations are being monitored. Antibody to both HJ* and EE was common in a number of bird species very early in the year, indicating that birds had been infected during a previous epizootic. By mid June, the first of several fledglings showed antibody titers to both HJ and EE. This was the first evidence that virus was present in the State. (Fledgling birds are strictly local and presumably contracted the infection as nestlings from local mosquitoes in the area).

On August 6 and 7, six juvenile birds were captured with an active viremia. Two were confirmed as EE, 2 were confirmed as HJ and the virus in the remaining two has not yet bet identified. Most bird species only circulate virus particles in the blood for a short period of time (several days), thus a viremia is considered direct evidence of recent infection by the local mosquitoes. EE virus was also recovered from Cs. melanura over the same time span indicating that this mosquito was again functioning as a primary vector in the bird cycle.

*Highlands J Virus (HJ) is now considered to be the acceptable term for the virus that was formerly reported as Western Encephalitis (WE) in this area. WE appears to be limited to states west of the Mississippi River. HJ is common in the east but is considered to be non pathogenic to humans.


Key
● landing rate locations for Ae. sollicitans
X resting box locations for Cs. melanura
O bird bleeding locations
SUSSEX
PASSAIC
BERGEN
WARREN
MORRIS
ESSEX
HUDSON
SOMERSET
UNION
HUNTERDON
MIDDLESEX
MERCER
MONMOUTH
OCEAN
BURLINGTON
CAMDEN
GLOUCESTER
SALEM
ATLANTIC
CUMBERLAND
CAPE MAY
West Creek
XO
New Gretna
Mott Creek
Port Norris
X
OX
Dennisville
NEW JERSEY
SCALE - STATUTE MILES
0 5 10 15 20 25

The Current Status of Cs. melanura Populations

The Cs. melanura populations that are being monitored in New Jersey appear fully capable of sustaining an epizootic in birds at the present time. Resting box collections indicate above average populations at both of the study sites and a large percentage of the collections has been freshly engorged.

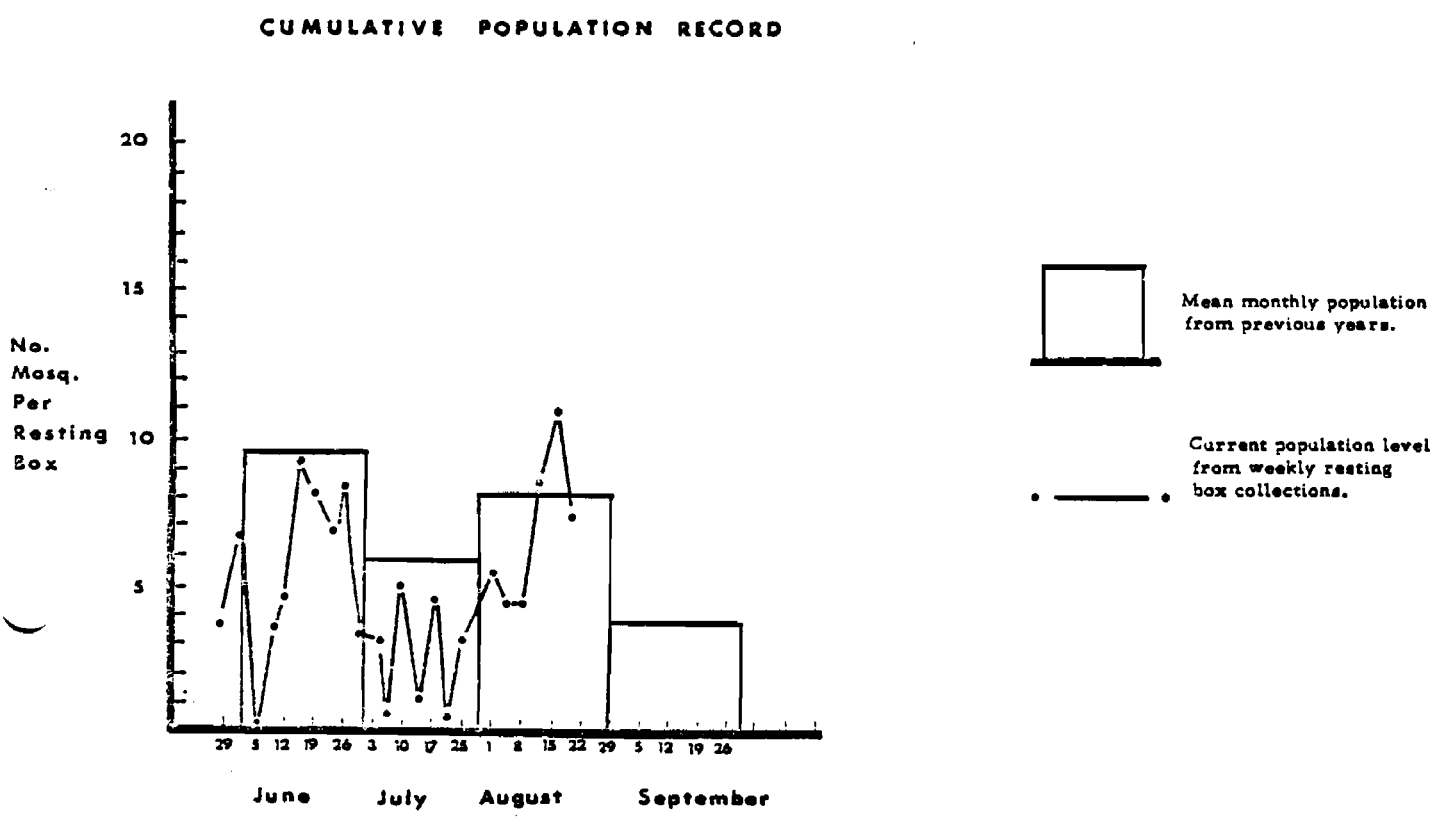


Fig. 1. Culiseta melanura populations at the New Gretna (east coast) study site as measured by resting box collections.

Figure 1 shows that the Cs. melanura at New Gretna (east coast) have recovered from the population decline that they experienced in July and are presently slightly above the average numbers collected at this time of year. EE virus was first recovered from this population on August 7 and on August 11, all of the pools that were tested were positive.

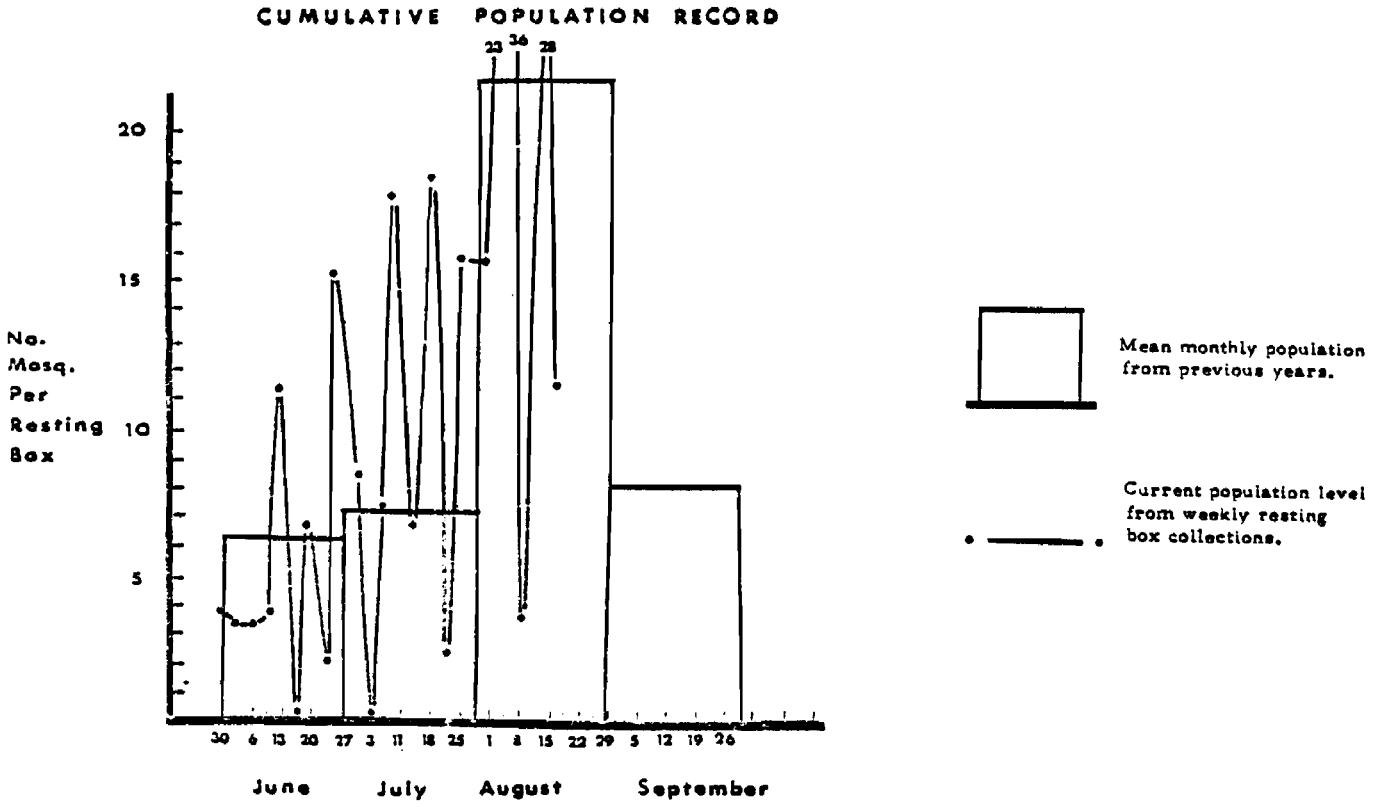


Fig. 2. Culiseta melanura populations at the Dennisville (Delaware Bay coast) study site as measured by resting box collections.

Figure 2 shows that the Cs. melanura at Dennisville are exceedingly high. The mosquitoes appear to be passing through the study site in synchronous waves with peaks of 23, 36 and 28 mosquitoes per box during the first half of August. EE virus was recovered from this population on August 1 and August 5. Results are not yet available for later collection periods; HJ virus has been active since mid July.

The Current Status of Ae. sollicitans Populations

Tidal floodings produced a brood of Ae. sollicitans that emerged from the marshes during the first week of August at most of the study sites. At West Creek, landing rates peaked at 24 mosquitoes per minute on August 7 with a parous rate of 25%. The brood aged synchronously with sporadic landing rates as the mosquitoes acquired their first blood meal. Vector potential peaked at this site on August 18 with landing rates of 19.6 mosquitoes per minute and a 90% parous rate. The epizootic activity in Cs. melanura on the east coast was first detected on August 7 and was intense by August 11. Data indicate that the Ae. sollicitans on the east coast could have made contact with the virus during the early stages of the epizootic and would have transmitted the infection by mid month. Collections made at Mott's Creek in Atlantic County (no accompanying figure) showed a similar pattern with high landing rates and 100% parity on August 18.

Data from Dennisville on the Delaware Bay showed a similar trend with much lower biting populations. Landing rates of 3.5 mosquitoes per minute were recorded on August 5 with a 20% parous rate. Vector potential peaked on August 15 at this site with landing rates of 3.0 mosquitoes per minute and a 95% parous rate. The Dennisville Ae. sollicitans population was monitored directly within the epizootic focus where Cs. melanura were known to be actively transmitting EE virus to birds since August 1. Whether or not the low numbers of Ae. sollicitans would be sufficient to effect "spillover" from birds to mammals cannot be assessed at this time.

The Port Norris population of Ae. sollicitans on the Delaware Bay behaved very differently. Residual mosquitoes from prior emergences dominated the biting population in early August and vector potential remained high throughout the first half of the month. By August 18, parity was still 90+% but landing rates had dropped below 1 mosquito per minute. At the present time (August 22) parity is 100% at all of the sites but landing rates are very low.

Special Studies in 1980

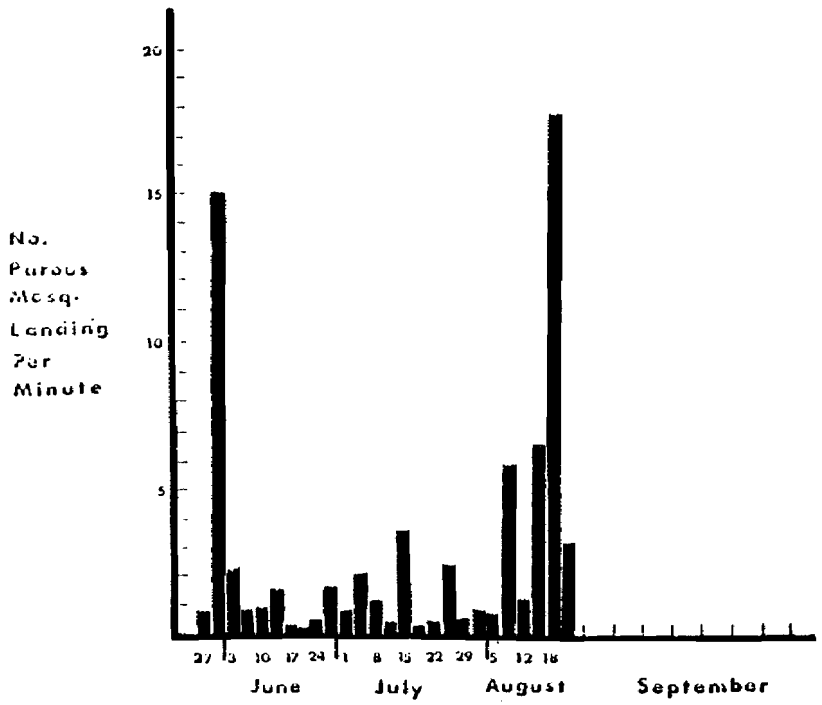
Because of the public health implications posed by the current epizootic and the need for scientific documentation of the events that preceed an outbreak of EE, special activities have been undertaken to gain as much information as possible in 1980. A special study site has been added in Atlantic County to gather information from the critical Atlantic City area. Five county mosquito commissions (Ocean, Burlington, Atlantic, Cape May and Cumberland) are operating special CDC light traps that are baited with dry ice to collect as many Ae. sollicitans as possible for virus assay. The Center for Disease Control in Fort Collins, Colorado has offered to test a portion of the collections at their laboratories using suckling mice as the screening system. The CDC tests together with those regularly provided by the New Jersey State Department of Health should maximize the chances of locating virus in the mosquito presumed to be the major epidemic vector. In 1979, no isolations were made from Ae. sollicitans, but a single human case did occur. By increasing the surveillance effort in 1980, the Program hopes to gain the information needed to clarify the complex epidemiology of EE.

Aedes sollicitans

1980

SITE WEST CREEK
COUNTY OCEAN

CUMULATIVE VECTOR POTENTIAL RECORD



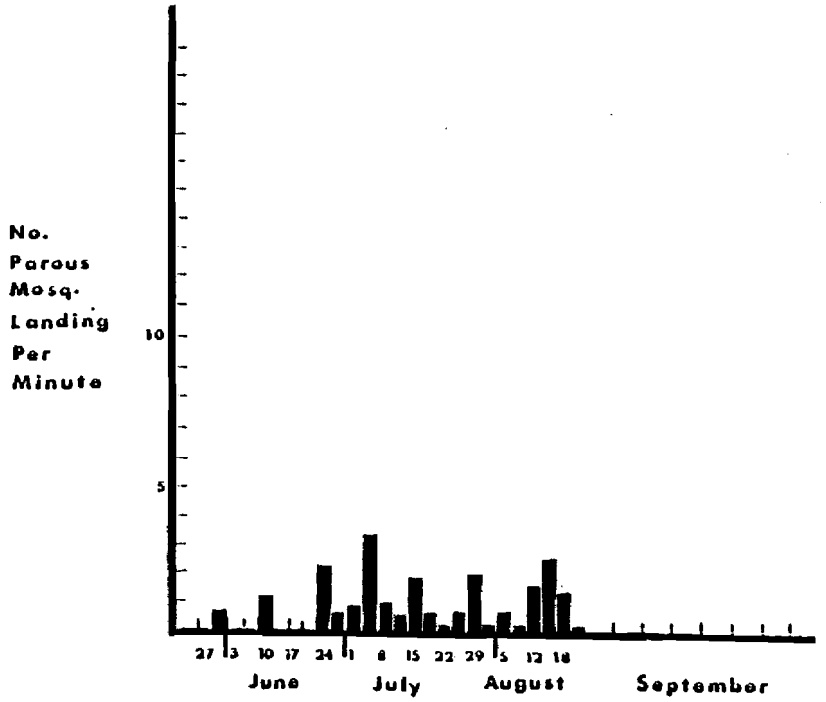
REMARK

Aedes sollicitans

1980

SITE DENNISVILLE
COUNTY CAPE MAY

CUMULATIVE VECTOR POTENTIAL RECORD



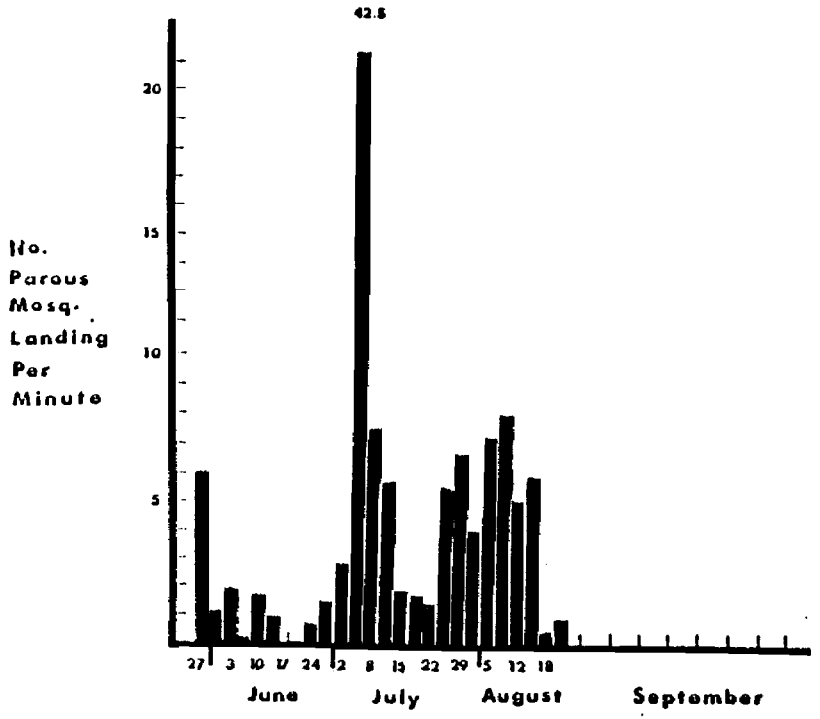
REMARK

Aedes sollicitans

1980

SITE PORT NORRIS
COUNTY CUMBERLAND

CUMULATIVE VECTOR POTENTIAL RECORD



REMARK

List of Personnel

Project Leader:	Wayne J. Crans	
Mosquito Program Acting Director:	Harry D. Brown	
Associate Mosquito Program Staff:	Donald J. Sutherland	Wayne Johnson
	Joseph K. Shisler	John Gamble
	Marc Slaff	Doreen Klingert
	Bunnie Hajek	Linda McCuiston
Cooperating State Health Personnel:	Oscar Ross	Wayne Pizutti
	Ronald Altman	Bernard Taylor
	William Parkin	Joyce Veazey
	Terry Schulze	Walter Gusciora
		Dave Adam
Cooperating State Mosquito Control Commission Personnel:	Kenneth W. Bruder	
	Robert B. Kent	
Cooperating County Mosquito Control Superintendents:	Harry Tillett, Atlantic County	
	Brian Gooley, Burlington County	
	Judy Hansen, Cape May County	
	Patrick Slavin, Cumberland County	
	Tom Candeletti, Ocean County	
	William Fisher, Salem County	

* * * * * * * * * *

Prepared by: Dr. Wayne J. Crans
Mosquito Research and Control
Cook College, Rutgers University
New Jersey Agricultural Experiment Station
New Brunswick, New Jersey 08903

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