NEW JERSEY MOSQUITO SURVEILLANCE REPORT

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Introduction

The surveillance program and the reports are the result of efforts to satisfy certain questions raised by an environmentally aware public as well as people involved in mosquito control.

Sampling of mosquito populations has been carried out for many years, but not until recently has this information been collated at regular intervals during the mosquito season for the entire state. In 1973, representative light traps located throughout the State were used to assess the mosquito populations at weekly intervals and to justify the control of nuisance mosquitoes.

Historically, the N. J. Agricultural Experiment Station operated light traps throughout the State. When more detailed information was needed, the various county commissions established light trap networks which better suited their surveillance needs. The N. J. Agricultural Experiment Station continues to use light traps for special purposes and in those counties where there is no other surveillance program. It is through the coordinated efforts between the N. J. Agricultural Experiment Station and the county mosquito commissions that the surveillance program and resulting reports are possible. We feel that it is a useful and successful endeavor and that it should be a continuing program.

Procedure

The state was divided into six regions based on general mosquito breeding situations (Fig. 1). These were: A, the northern rural region; B, the Passaic valley; C, the central rural region; D, the urban corridor; E, the coastal plain; and F, the coastal wetlands. Three to 5 light trap stations were chosen as representative sample sites from each county and plotted within the designated regions. Weekly reports were compiled based on the data

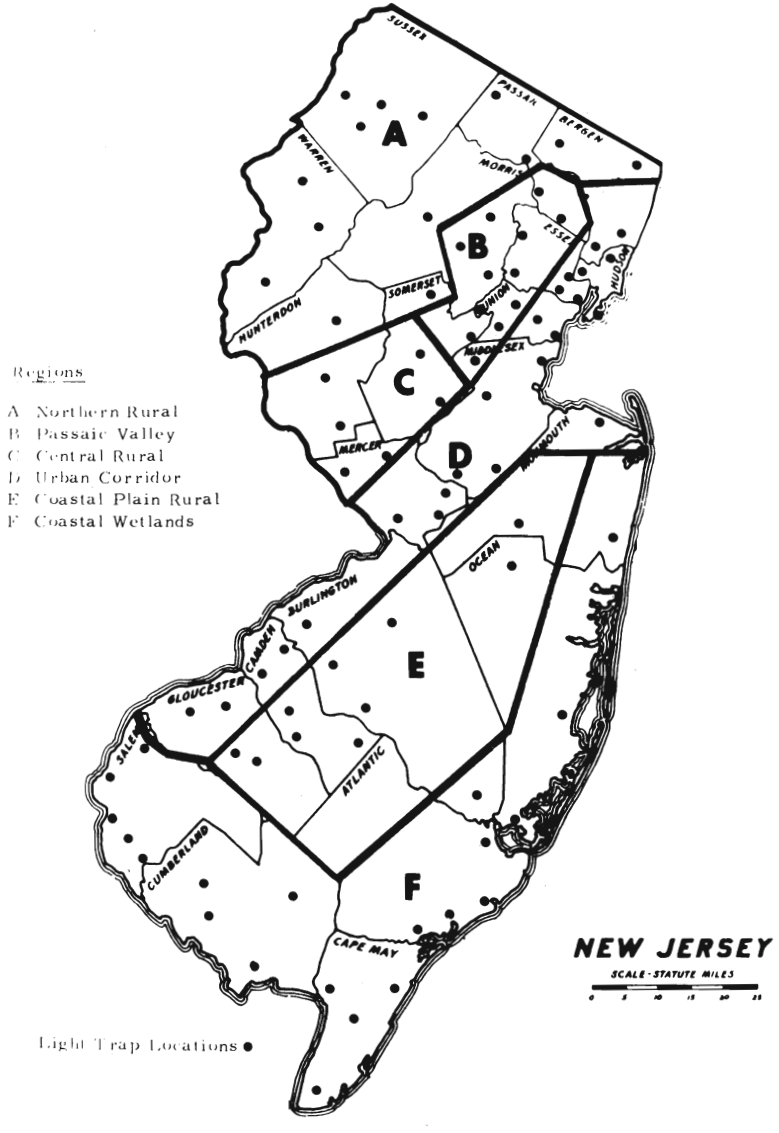

Fig. 1 Map of New Jersey showing the 6 regions used for the surveillance reports.

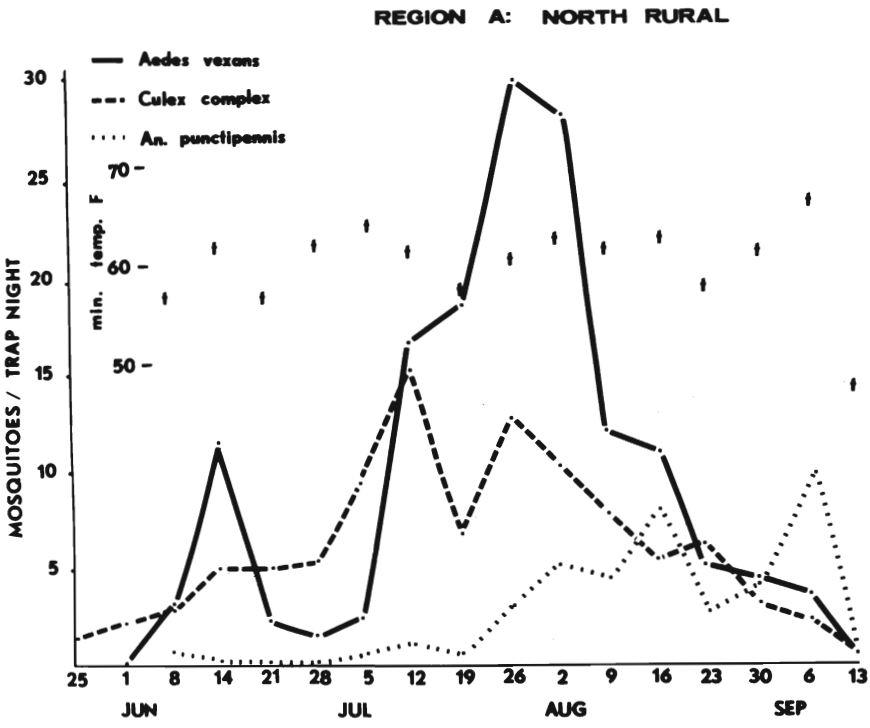

Fig. 2

obtained from the selected light traps. The data was summarized by region, and the mosquito abundance was expressed as average number of mosquitoes per trap night for each 7-day period. Seventeen weekly reports were compiled and distributed for the period May 18 - September 13, 1973.

Results

There were obvious differences between regions regarding species composition and abundance. The northern rural region (Fig. 2) was inhabited principally by *Aedes vexans* for the greater part of the summer. This species had 2 population peaks; one in June and one in July. The population was high enough to be a severe nuisance in certain areas during late July and early August. The *Culex* complex was not abundant and did not constitute a problem. A late population of *Anopheles punctipennis* peaked in September, but that species did not pose a problem.

The Passaic valley (Fig. 3) was overwhelmingly dominated by *Aedes vexans.* This species showed 3 population peaks during the summer; one each in June, July and August. *Aedes vexans* reached the highest level in the state in July when the average nightly trap catch exceeded 60 mosquitoes. The *Culex* complex abundance in this region was very low, never reaching 10 per trap night on the average.

The central rural region (Fig. 4) did not exhibit a mosquito problem from the data obtained. *Aedes vexans* showed 3 population peaks during the summer, none of which reached 15 mosquitoes per trap night on the average. The *Culex* complex was less abundant. *Anopheles punctipennis* was trapped in very low numbers in late July, August and September.

The urban corridor region (Fig. 5) was mostly inhabited by species in the *Culex* complex. Beginning in mid-June, the *Culex* species were dominant throughout the rest of the summer. From late June on, this group remained above 20 mosquitoes per trap night and exceeded 40 per trap night in early August. *Aedes vexans* showed 2 population peaks; the highest occurred in early July and exceeded 23 mosquitoes per trap night. *Aedes sollicitans* occurred in localized situations on the Raritan Bay side and on the Delaware River side of this region.

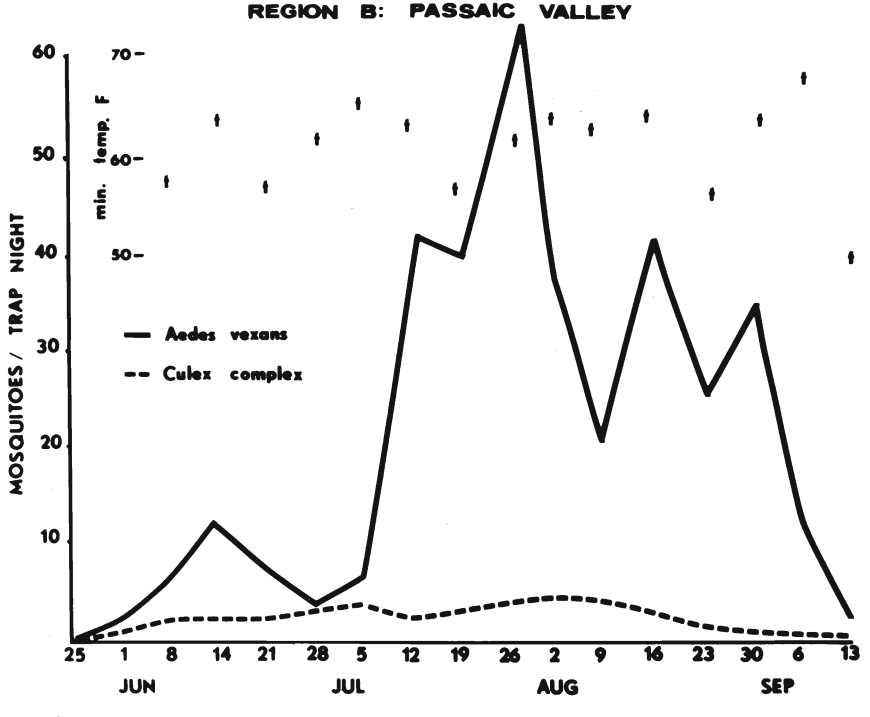

Fig. 3

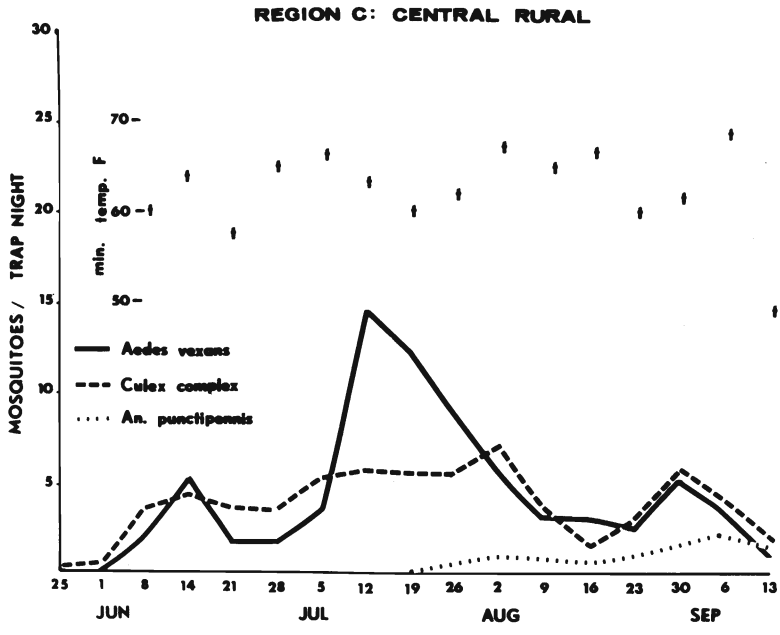
REGION C: CENTRAL RURAL
MOSQUITOES / TRAP NIGHT
min. temp. F
Aedes vexans
Culex complex
An. punctipennis
JUN
JUL
AUG
SEP

Fig. 4

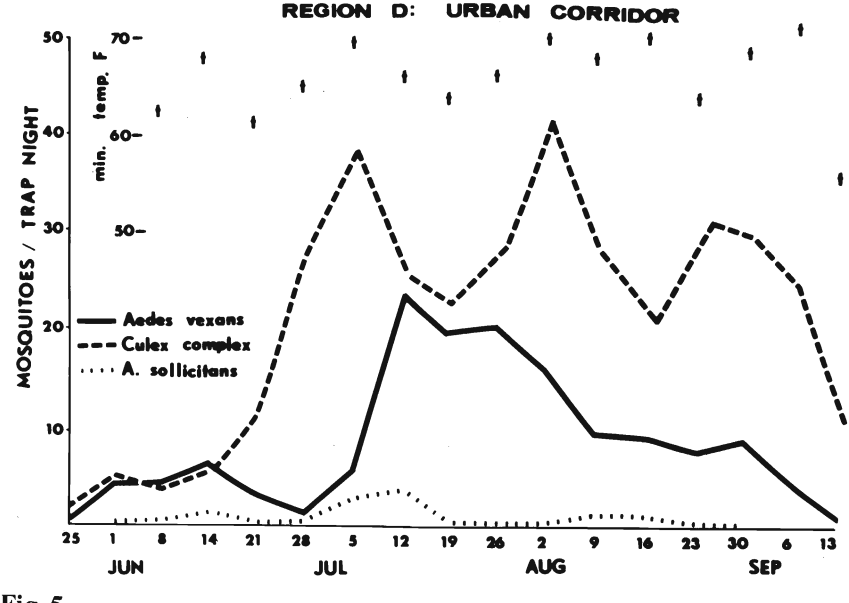
REGION D: URBAN CORRIDOR
MOSQUITOES / TRAP NIGHT
min. temp. F
Aedes vexans
Culex complex
A. sollicitans
JUN
JUL
AUG
SEP

Fig. 5

The coastal plain region (Fig. 6) showed a low mosquito population during most of the summer. No species was definitely dominant; *Aedes vexans* and the *Culex* complex species were the 2 most abundant throughout the region. *Aedes vexans* approached 20 mosquitoes per trap night at a peak in mid-July. The *Culex* complex never reached 10 mosquitoes per trap night on the average. *Mansonia perturbans* was very abundant from a few traps but was not distributed throughout the region. However, the magnitude of abundance of that species in 2 or 3 traps created an inflated average for the region. *Culiseta melanura* was trapped regularly in this region and showed a population peak of more than 4 mosquitoes per trap night on the average in mid-August.

In the coastal wetlands region (Fig. 7) *Culex* complex mosquitoes were most numerous from early June to Mid-September. These were probably *Culex salinarius* for the most part, but identification is not clear for this complex. The *Culex* complex reached a peak of over 150 mosquitoes per trap night on the average in mid-July. This was a reflection on a few traps and is not a representation of the entire region. *Aedes sollicitans* showed 3 major population peaks during the summer; a small early brood in mid-June, a major mid-July brood, and a major brood in early September. The highest population level was nearly 40 mosquitoes per trap night in mid-July.

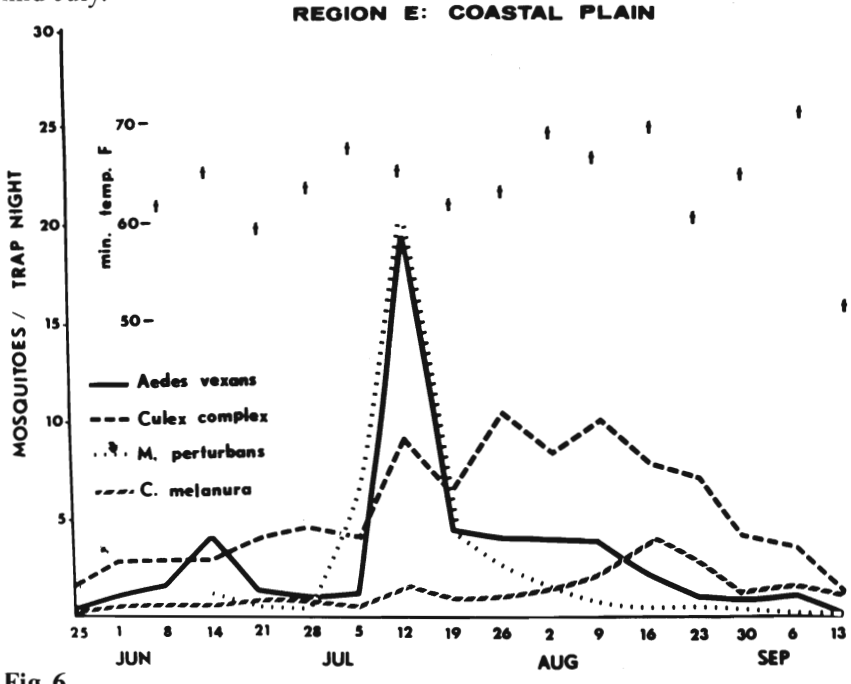

Fig. 6

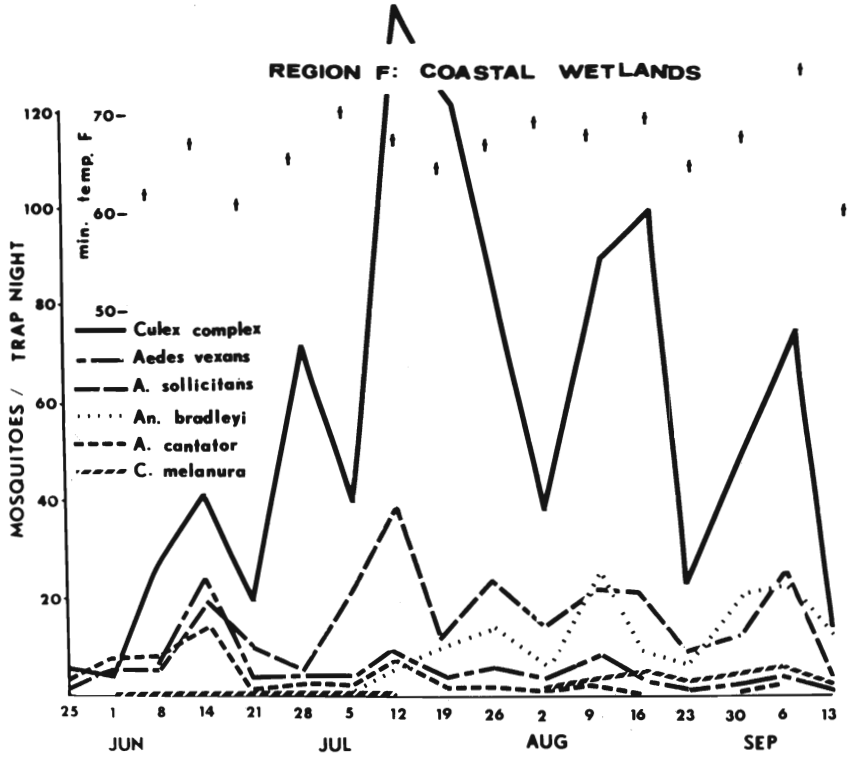

Fig. 7

Other species in this region reached levels which could be considered a nuisance. *Aedes vexans* and *Anopheles bradleyi* exceeded 20 mosquitoes per trap night during parts of the summer. *Culiseta melanura* populations were sampled by certain traps in this region. The population curve very closely followed that of the coastal plain region. *Culiseta melanura* reached a peak of 5 mosquitoes per trap night on the average in mid-August.

Culiseta melanura

The *Culiseta melanura* population received closer attention because of the occurrence of Eastern Equine Encephalitis during the summer of 1973, and particularly because of human involvement. Of the light traps utilized in the Surveillance Project, fourteen were consistent samplers of *Culiseta melanura* in the southern portion of the state.

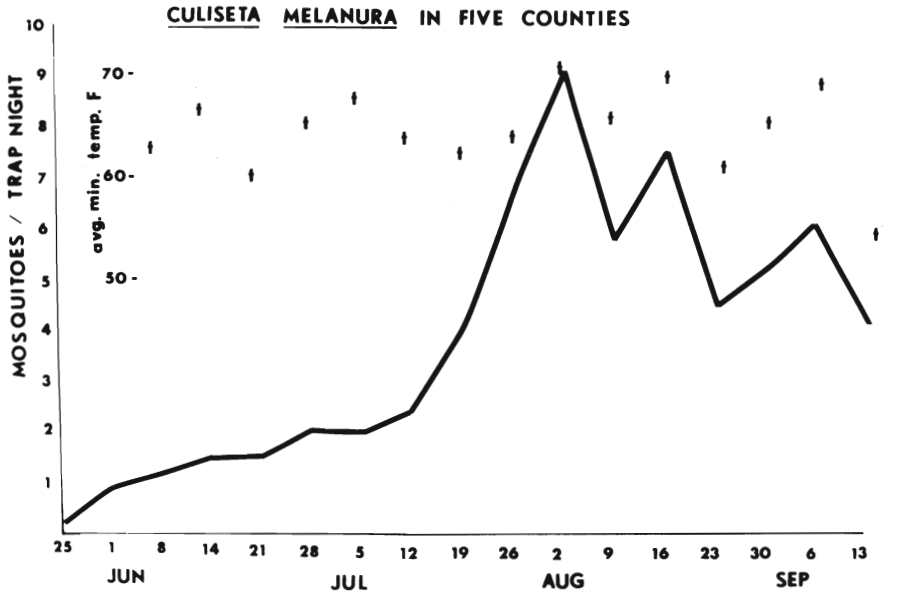

Fig. 8 *Culiseta melanura* **population in 1973 as sampled by 14 light traps in 5 counties.**

The population curve (Fig. 8) indicates that as early as May 25, *Culiseta melanura* were being collected in small numbers. This early population increased until mid-July. But between July 12 and August 2, the population increased more than fourfold and reached a peak of 9 mosquitoes per trap night. The population remained high during the remainder of the summer.

The population level as sampled by light traps is very much affected by temperature. The increases and decreases in the *Culiseta melanura* population curve during August appear to be reflections of increases and decreases in the weekly average minimum temperature.

To determine year-to-year changes in *Culiseta melanura* populations, 2 light traps were chosen which were located at the same sites in 1971 and 1972 as well as 1973 (Fig. 9). Although these 2 traps cannot represent a large area, they do show very clearly that the 1973 population of *Culiseta melanura* in the areas sampled were several times higher than the same areas in preceeding years. An important factor in 1973 was the larger overwintering population as indicated by the number of mosquitoes caught

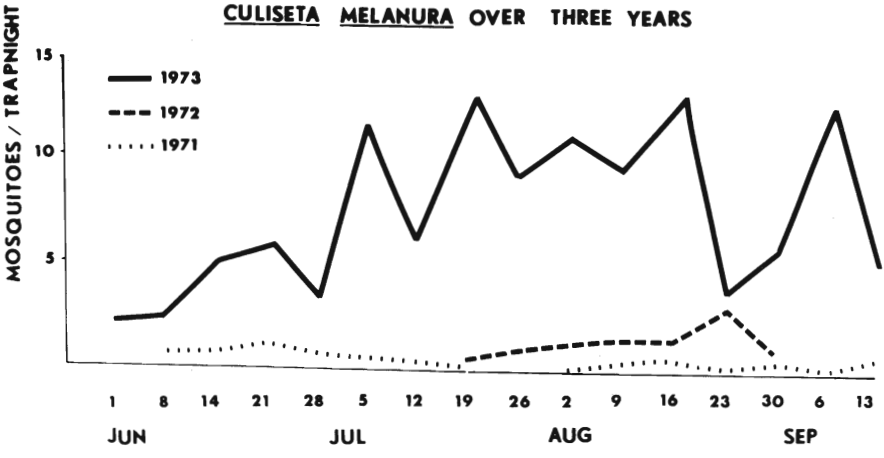

Fig. 9 *Culiseta melanura* **populations samples by 2 light traps at the same locations for 3 years.**

in late May and early June. In 1972, no *Culiseta melanura* were trapped until mid-July. The 1973 population by mid-June had surpassed the 1972 population peak of late August. The *Culiseta melanura* population has increased each year for the 3 years studied. It appears that the increased EEE activity of last season is in part correlated with the greater population of *Culiseta melanura* in 1973.

Surveillance methods compared for different species

A comparison was made between light trap collections and biting count collections in Sussex County during 1973 season (Fig. 10). This was an attempt to better understand light trap data in terms of human annoyance. The area under study was a woodland pool area which breeds *Aedes stimulans* in the early spring and *Aedes vexans, Aedes trivittatus* and *Aedes cinereus* during the remainder of the summer. A light trap was operated approximately 300 yds. from where bite counts and collections were made. The light trap was operated daily from May 20 until September 20, and daytime bite counts and collections were made weekly during the same period.

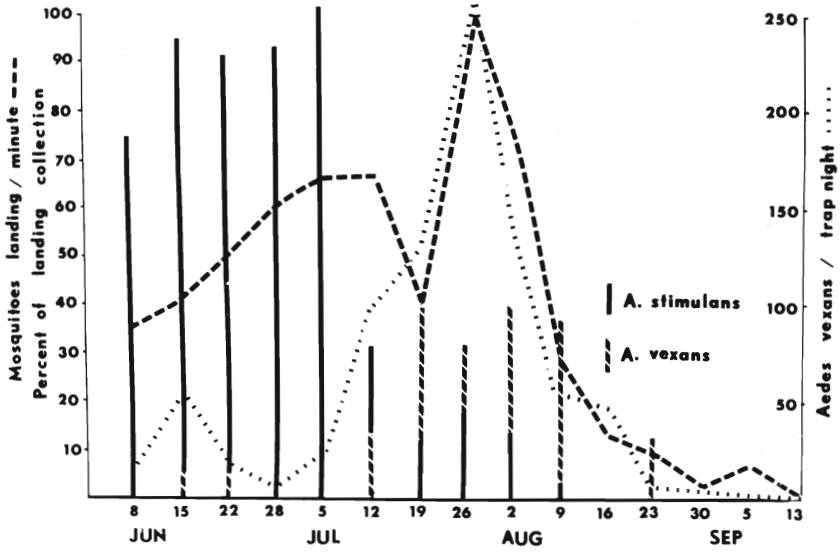

Fig. 10 A comparison of landing count rates and light trap collections for *A. vexans* and *A. stimulans* from Lafayette, New Jersey.

During June and until mid-July, *Aedes stimulans* accounted for over 90% of the biting mosquitoes collected when bite counts were as high as 65 per minute. During the same period, *Aedes stimulans* in the light trap averaged less than 2 mosquitoes per trap night.

During late July, a peak of *Aedes vexans* occurred which was reflected in the light trap collections (250/trap night) as well as the daytime bite count (30/min.). For this species the light trap is a good sampler of the population changes and an indicator of human annoyance.

Other species occurring in the same area which were collected while biting but which were not sampled by the light trap were *Aedes trivittatus* and *Aedes cinereus.*

It is apparent that light trap surveillance is of little value in assessing the degree of mosquito annoyance in areas where *Aedes stimulans, Aedes trivittatus* and *Aedes cinereus* are abundant. Bite counts are of greater value in these situations. Light traps do monitor *Aedes vexans* populations and the data can be interpreted in terms of annoyance.

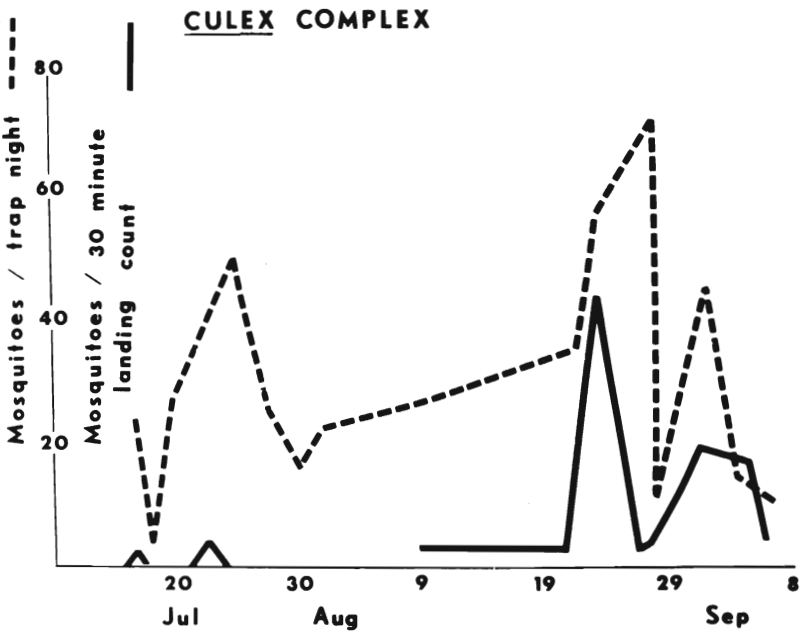

Fig. 11 A comparison of landing count rates and light trap collections for *Culex complex* in Little Ferry, N. J.

Bite counts and light trap collections were compared at several sites in Bergen County during 1973. The data collected from Little Ferry by Herman Ehrenberg is shown in Figures 11 and 12. At this location, bite counts were taken for 30-minute periods during the evening. The bite counts were taken in a wooded area approximately 250 yds. from the light trap.

Here the species which were most abundant were *Aedes vexans, Culex pipiens* complex, and *Culex salinarius.* For *Culex* complex (Fig. 11) the graph indicates that when light trap collections were high, 20 or more per trap night, the bite counts were very low, generally less than 10 mosquitoes/30 minutes. Conversely, for *Aedes vexans* (Fig. 12) when light trap collections were 20 mosquitoes/trap night, bite counts were up to 75 mosquitoes/30 minutes.

Both species are adequately sampled by light traps so that population fluctuations are monitored. The problem is correlating light trap collections with human annoyance. These data indicate that moderately high light trap collections do not reflect a high annoyance for *Culex* complex. However, moderate light trap collections of *Aedex vexans* do represent considerable annoyance.

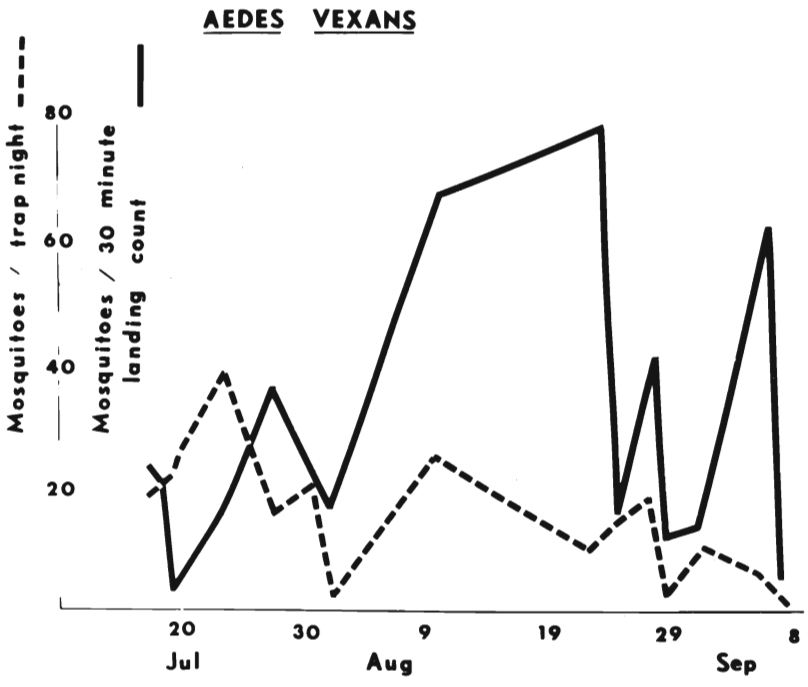

Fig. 12 A comparison of landing count rates and light trap collections for *A. vexans* in Little Ferry, N. J.

SUMMARY

In considering light trap data, the nightly collections must be considered by species and should not be summed together. More work is necessary to determine numerical annoyance limits for the prevalent species in New Jersey.

The surveillance program and the weekly reports will be continued this coming season, essentially the same as last season. The regional breakdown of the State will be modified to better represent the nuisance situation. This program depends on the cooperation of the county commissions in supplying much of the raw data. If this cooperation continues, the program will be successful again this season.