NEW JERSEY STATE MOSQUITO CONTROL COMMISSION

A STATE MOSQUITO SURVEILLANCE PROGRAM FOR NEW JERSEY

FINAL WEEKLY REPORT FOR 2004 – SPECIES SUMMARIES

Prepared by:
Lisa Reed and Wayne Crans
Mosquito Research & Control
Department of Entomology
180 Jones Avenue
New Brunswick, NJ 08901-8536
Tel 732/932-9341
Fax 732/932-9257
E-mail lreed@rci.rutgers.edu

new jersey agricultural experiment station
at Rutgers, The State University of New Jersey

NEW JERSEY STATE SURVEILLANCE

Final Weekly Report for 2004

Including data for the week ending 31 October.

Submitted by Lisa Reed and Wayne Crans
Mosquito Research and Control Unit
Rutgers University, New Brunswick, NJ 08901

Purpose: Data from 84 New Jersey light traps contributed by county mosquito control agencies are used to calculate trends in mosquito populations for species of nuisance or health concerns.

Calculations are based on regional distributions, with emphasis on mosquito habitat and land use. Trends will allow a statewide evaluation of changing mosquito populations, in response to control and/or changes in habitat.

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Figure 1a: Map of ten regions selected for the New Jersey Surveillance Program overlaid with county boarders.

Figure 1b. Trap lat-long locations.

The State Surveillance Program Overview

This program relies on the cooperation and effort of county mosquito control agencies. These agencies use New Jersey light traps to monitor certain nuisance and health-risk mosquito species. Agencies have many years worth of experience in the placement, use, and interpretation of light traps and their data as monitoring mosquito populations is an essential part of an integrated pest management approach. But county agencies are limited to county data, and a landscape-wide view of changing mosquito trends is not available. The purpose of this program is to cover that gap and provide information of nuisance and health-risk mosquito populations on a regional level.

Last year, we anticipated the participation of the last county and this year, Passaic County delivered data. But due to unforeseen circumstances, we did lose participation from another county, and we fully anticipate that they will re-enter participation in the coming year. Most agencies provided data in a timely matter. However, we found that most agencies were at times pressed to get the data to Headlee Labs. Therefore, interpretation of the data is more robust at the previous weeks' report than during the current week. This is not a consideration if people are aware that care must be taken with the interpretation of the most current week's data.

This year's data showed that 42 species were caught in the light traps throughout New Jersey, encompassing nearly 330,000 mosquitoes. Ranges in the number of species trapped per region vary from as few as 18 in the Delaware Bayshore to as high as 31 in the Agricultural and Pinelands regions. The difference between total species caught in New Jersey and the highest number found per region indicate the diversity of species found from one end of the state to the other.

Region	***Number of Traps***	***Number of Species***
Agricultural	6	31
Coastal	9	25
Delaware Bayshore	6	18
Delaware River Basin	4	23
New York Metro	10	24
North Central Rural	8	22
Northwestern Rural	6	20
Philadelphia Metro	6	26
Pinelands	11	31
Suburban	17	30
Total	83	42

Historical data was entered for all regions as a running mean encompassing the previous five years. For some regions, historical data is based on as few as 2 traps. This paucity of data will decrease as the current dataset becomes incorporated into the historical dataset. Historical data is represented by a solid red line, plotted with error bars, against the black bars of the current year's dataset.

Mosquito Species Collected during the 2004 Season

The mosquitoes collected in county operated light traps belong to a series of very different life cycle types as described by Crans (2004) A classification system for mosquito life cycles: life cycle types for mosquitoes of the northeastern United States. *Journal of Vector Ecology*, June: 1-10. We present the seasonal data for species with whom we caught more than 200 individuals in the year.

Univoltine Aedine (*stimulans/canadensis*) Species: Members that belong to this group overwinter as eggs and have a single generation in early spring. The eggs hatch when water temperatures are still quite cold and the adults are usually on the wing during the month of May. In most species, the eggs laid in May and June enter diapause and do not hatch until they are flooded the following year. Some of the members in this group have a generation that reappears in the fall. Most biologists feel that these are eggs that did not hatch during the spring flooding and were left behind as survival insurance. Mosquito species collected in light traps that belong to this group include: *Oc. stimulans, Oc. canadensis, Oc. sticticus & Oc. cinereus*.

Multivoltine Aedine (*vexans*) Species: Members of this group also overwinter as eggs but do not hatch until later in the season when water temperatures rise to ideal levels. These mosquitoes have multiple generations during the summer months that are regulated by flooding patterns. Each period of excessive rainfall produces a major brood. Minor floodings can generate overlapping broods that are usually localized. Mosquito species collected in light traps that belong to this group include: *Ae. vexans, Oc. trivttatus, Ps. ferox, Ps. columbiae, Ps. ciliata*

Multivoltine Aedine (*sollicitans*) Species: Members that belong to this group overwinter as eggs but lay them on tidal marshes where lunar tides provide a method to inundate the eggs. There are multiple generations during the summer months with as many as 2 broods each month from May to October. Rainfall can produce egg hatch which complicates the picture. As a result, biting populations can include mosquitoes of mixed age. Mosquito species collected in light traps that belong to this group include: *Oc. sollicitans & Oc. cantator.*

Multivoltine Aedine (*triseriatus*) Species: These mosquitoes glue their eggs to the sides of containers above the water line and rely on rains to raise the water level and hatch the eggs. Like other Aedines, they overwinter as eggs and reappear each spring when water temperatures begin to rise. Most members of the group are active during the day and are enter light traps in very low numbers. Mosquito species collected in light traps that belong to this group include: *Oc. triseriatus & Oc. japonicus.*

Multivoltine Culex/Anopheline (*quadrimaculatus) Species*: Members that belong to this group have a life cycle strategy that is very similar to the Multivoltine *Culex*. They overwinter as mated females and build their populations over the course of the summer. They are included as a separate group because they represent an entire genus. Mosquito species collected in light traps that belong to this group include: A*n. quadrimaculatus, Cx. territans & Cx. erraticus.*

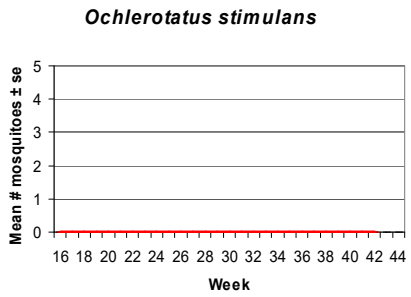
Multivoltine Culex/Anopheline (*salinarius*) Species: Members of this group overwinter as mated females that will lay eggs in a variety of brackish water, showing a wide degree of salt tolerance. Larvae generally reach highest numbers in brackish water and with multiple generations, the populations can build throughout the season. *An. bradleyi* is an example of this type. *note* *Culex salinarius* is grouped with the Culex Complex due to the difficulty in distinguishing this species with *Culex pipiens* and *Culex restuans.*

Multivoltine Culex/Anopheline (*pipiens*) Species: Members that belong to this group overwinter as mated females. Populations in early spring are represented by mosquitoes that survived the winter and the numbers are at relatively low levels. These mosquitoes cannot become active until night time temperatures enter the 60's, thus host seeking and oviposition is delayed until late May or June. The first generation of larvae takes time to develop and populations do not build until mid-summer a t the earliest. As soon as night time temperatures begin to cool down, the mosquitoes mate, seek winter hibernaculae, enter diapause and hibernate. Only the females survive in this group. Males will not appear until the eggs hatch very late the following spring. Mosquito species collected in light traps that belong to this group include: The *Culex* Complex*, An. punctipennis*

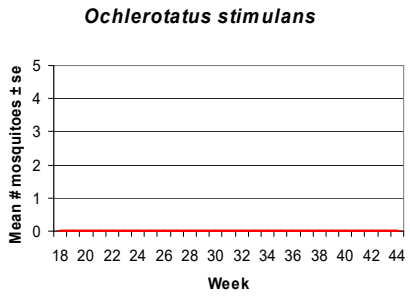
Miscellaneous Group: The members in this group have little in common because each utilizes a unique life cycle strategy. The mosquito species collected in light traps that we have included in the group include: *Cq. perturbans, Cs. melanura & An. walkeri.*

Ochlerotatus stimulans – Univoltine Aedine (*stimulans*) Species

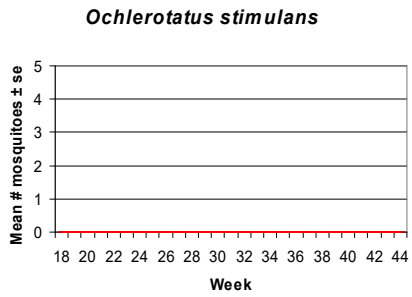
Agricultural



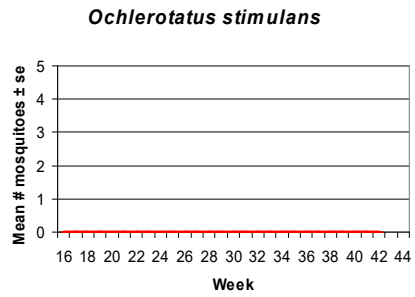
Coastal



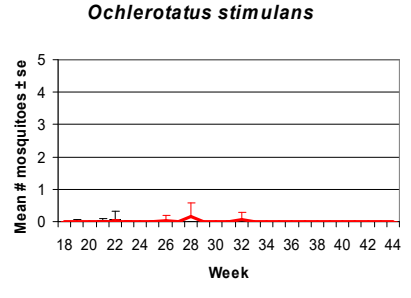
Delaware Bayshore



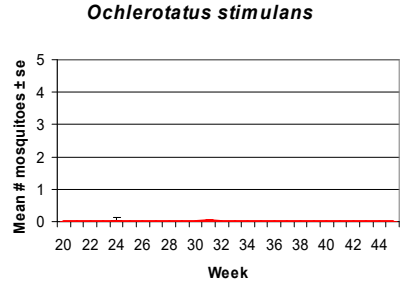
Delaware River Basin



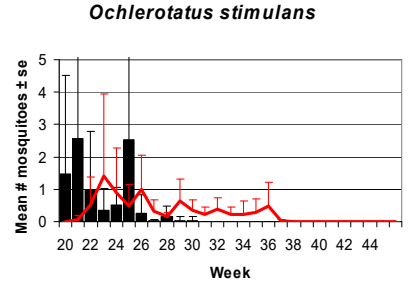
New York Metro



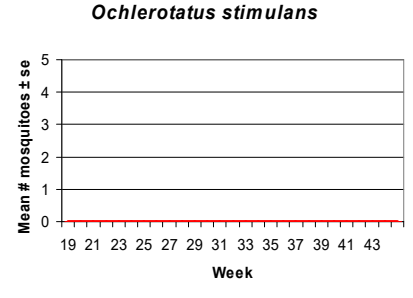
North Central Rural



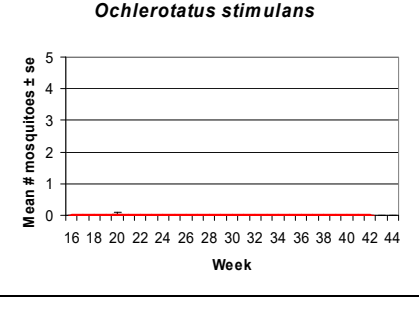
Northwestern Rural



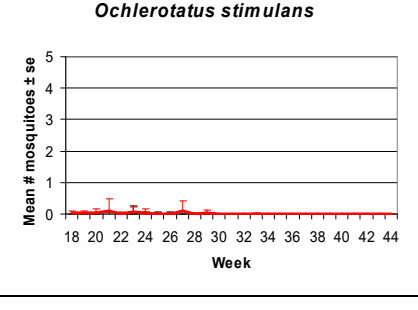
Philadelphia Metro



Pinelands



Suburban Corridor

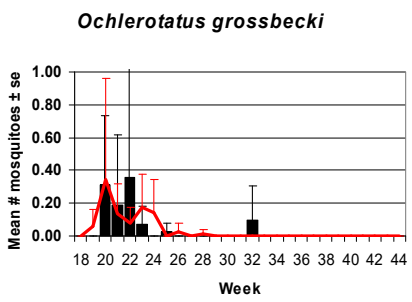


Comments

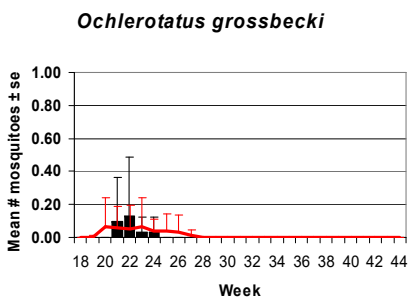
Ochlerotatus stimulans is a snow-pool species that is expected to reach their highest number in northern regions, and this year was no exception. Trends indicate the early emergence of this species and this year's data may be more typical than the limited historical dataset suggests. Populations disappeared earlier than expected, given the long life span of this mosquito.

Ochlerotatus grossbecki – Univoltine Aedine (*stimulans*) Species

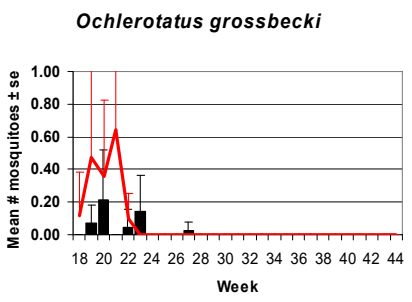
Agricultural



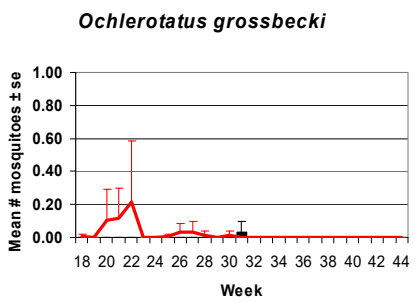
Coastal



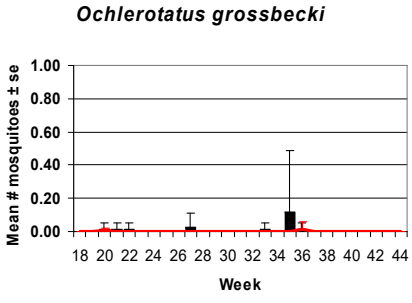
Delaware Bayshore



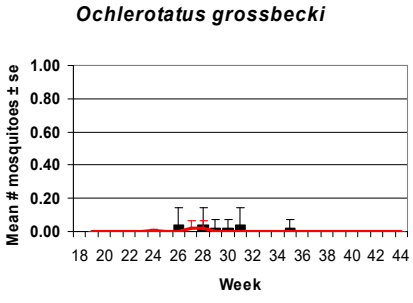
Delaware River Basin



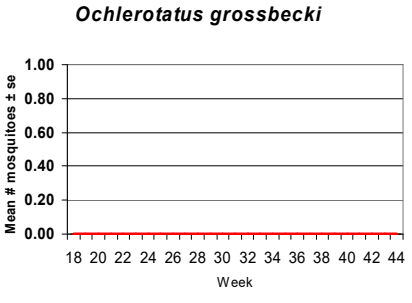
New York Metro



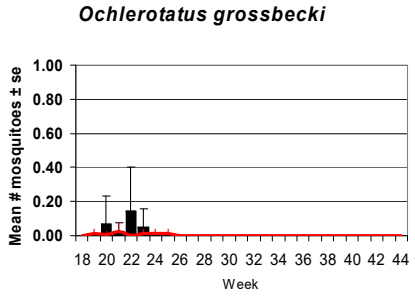
North Central Rural



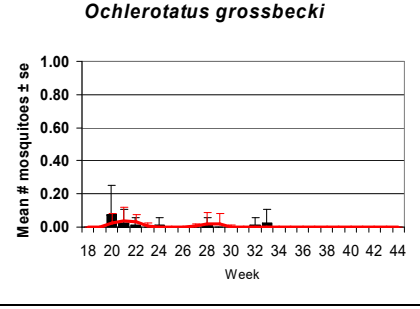
Northwestern Rural



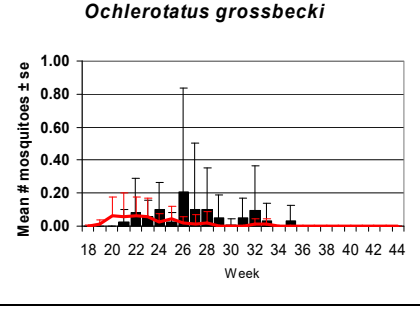
Philadelphia Metro



Pinelands



Suburban Corridor

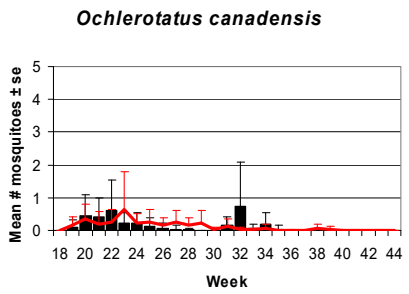


Comments

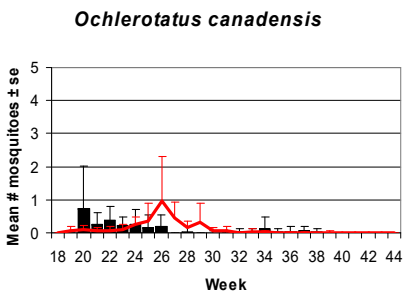
Ochlerotatus grossbecki is primarily a southern New Jersey species, but can typically be found in low levels throughout most of the rest of the state. It is cold-tolerant, hatching from overwintering eggs early in the season. Historic data from the Delaware Bayshore indicate that *Oc. grossbecki* may well be on the wing prior to the start of trapping. As with *Oc. stimulans*, this mosquito is long-lived. Unlike *Oc. stimlans*, *Oc. grossbecki* appears to have persisted longer into the season.

Ochlerotatus canadensis – Univoltine Aedine (*canadensis*) Species

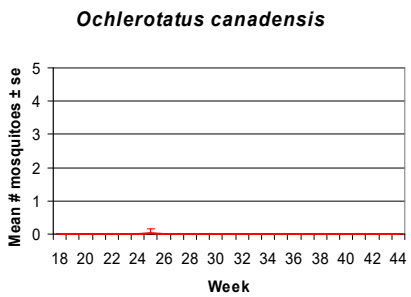
Agricultural



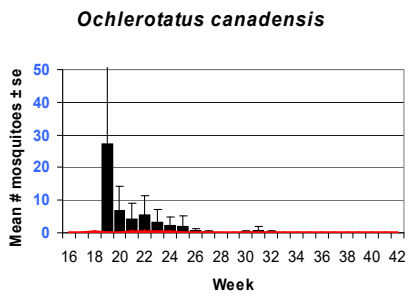
Coastal



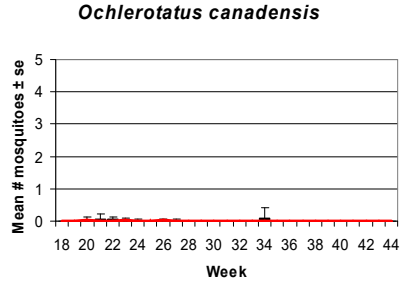
Delaware Bayshore



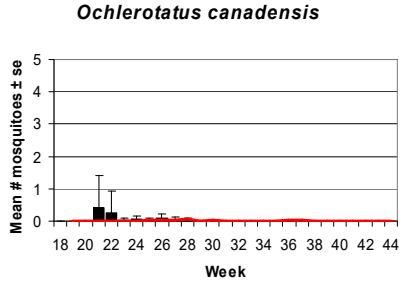
Delaware River Basin



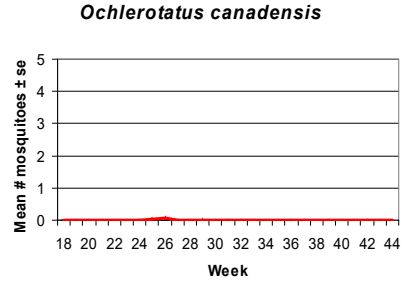
New York Metro



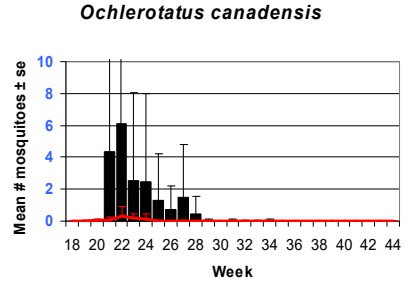
North Central Rural



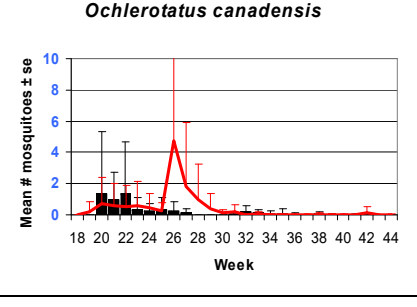
Northwestern Rural



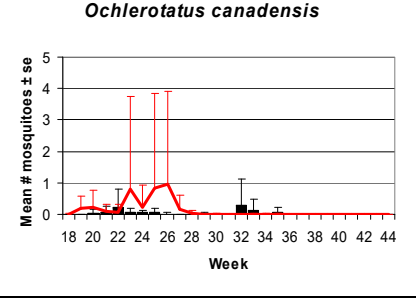
Philadelphia Metro



Pinelands



Suburban Corridor

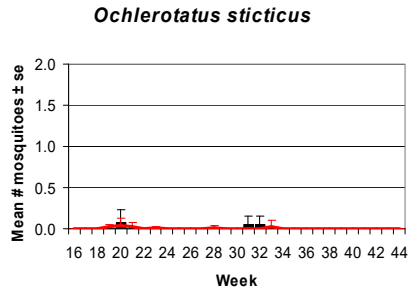


Comments

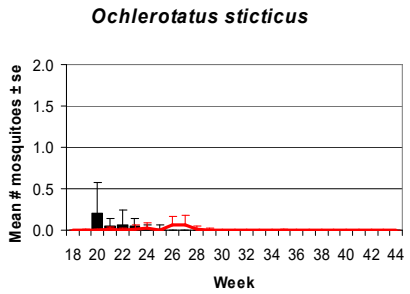
The typical seasonal distribution of *Oc. canadensis* is the emergence of an early-season generation with the possibility of a re-appearance during the fall from eggs that had failed to hatch earlier in the year. Hints of this pattern are seen in the Agricultural, Coastal, Oinelands, and Suburban Regions. However, the greatest numbers appeared in the Delaware River Basin, followed by the Philadelphia Metro Region. These adjacent regions are where major flooding occurred early season and the patterns seen there correlate with this wet spring.

Ochlerotatus sticticus – Univoltine Aedine (*canadensis*) Species

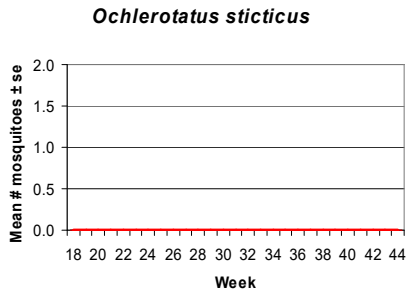
Agricultural



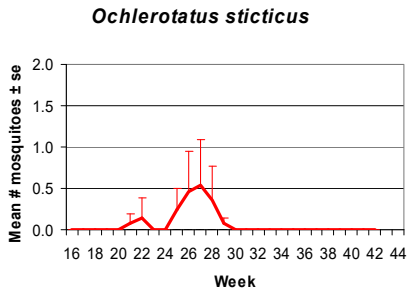
Coastal



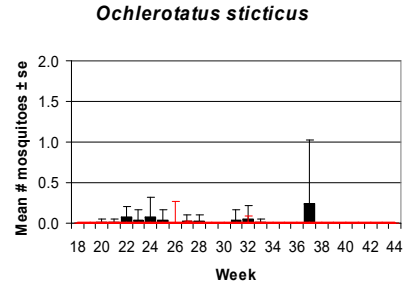
Delaware Bayshore



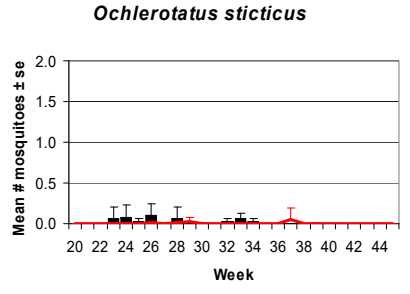
Delaware River Basin



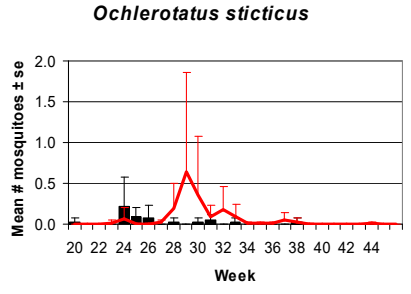
New York Metro



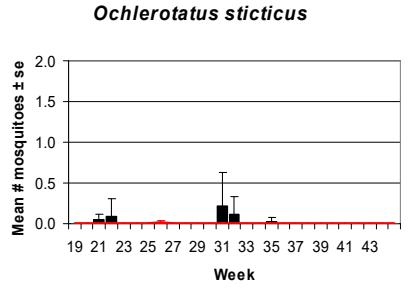
North Central Rural



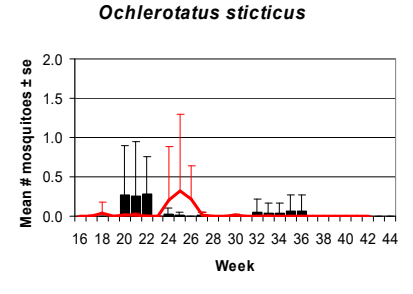
Northwestern Rural



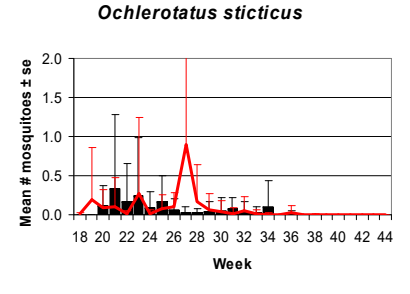
Philadelphia Metro



Pinelands



Suburban Corridor

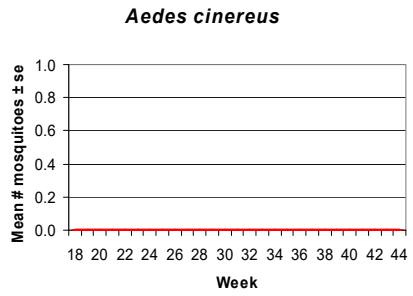


Comments

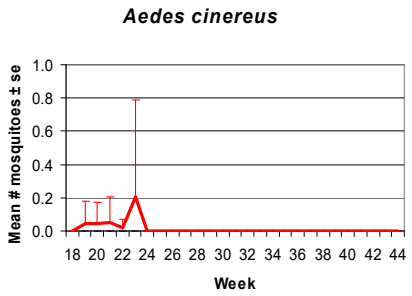
Ochlerotatus sticticus is another early-season floodwater species that may re-appear later under the appropriate conditions. This species often is found in floodplains where habitat shifts from wooded areas adjacent to rivers early in the season to more central locations along the floodplain. The New York Metro, Pinelands and Philadelphia Metro Regions indicate the pattern typical of *Oc. sticticus*. *Oc. sticticus* was absent from both the Delaware-influenced regions. Future trends will become more apparent as the dataset grows.

Aedes cinereus – Univoltine Aedine (*canadensis*) Species

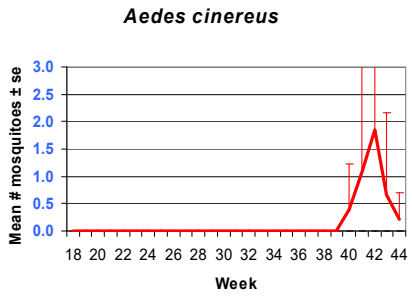
Agricultural



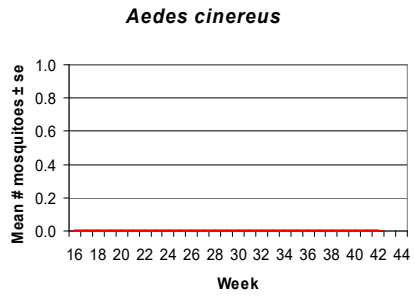
Coastal



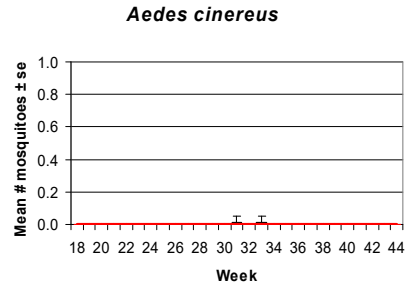
Delaware Bayshore



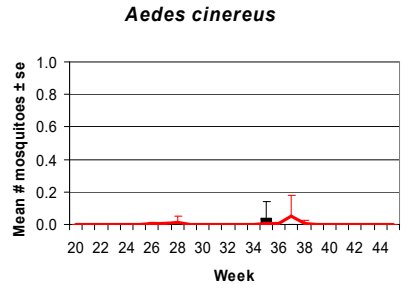
Delaware River Basin



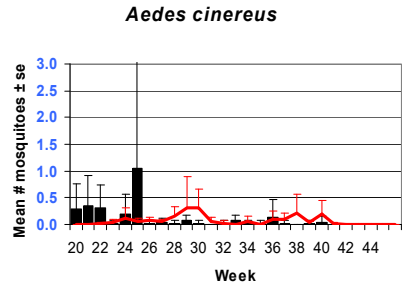
New York Metro



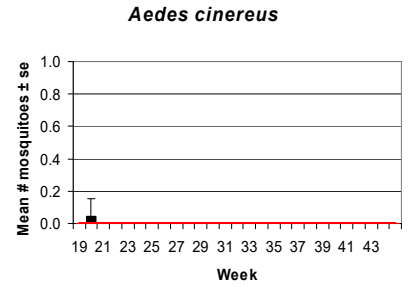
North Central Rural



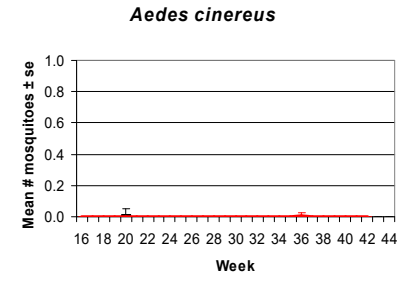
Northwestern Rural



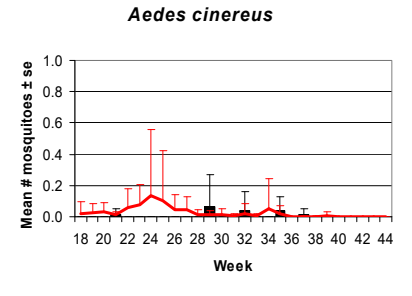
Philadelphia Metro



Pinelands



Suburban Corridor

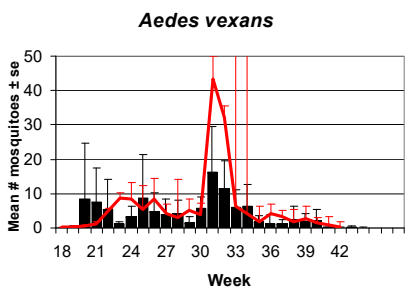


Comments

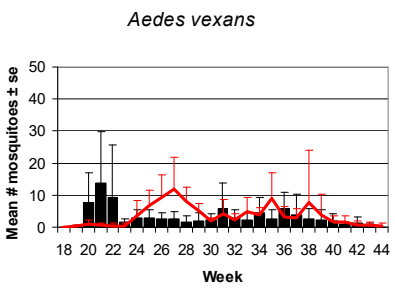
Ae. cinereus is the third of the early-season species that follow the *canadensis* life cycle. As such, we could expect a late-season re-appearance. This species can be found as deceptively small stage 4 larvae in bogs with emergent vegetation. The Northwest Rural region most typifies the pattern of early emergence, with adults being on the wing prior to the beginning of the trapping season. Their numbers persisted through to the end of September (week 40).

Aedes vexans – Multivoltine Aedine (*vexans*) Species

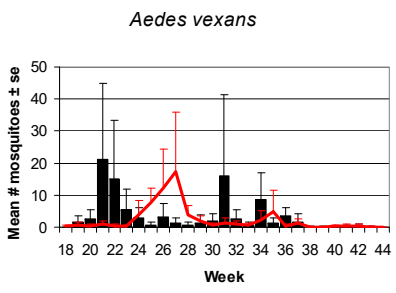
Agricultural



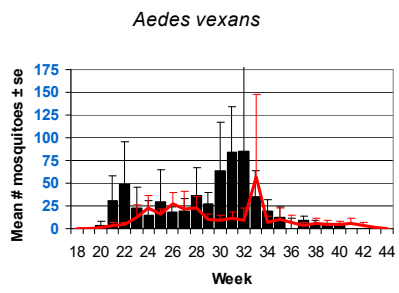
Coastal



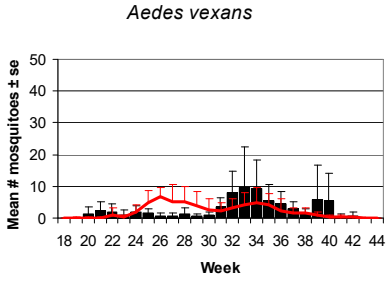
Delaware Bayshore



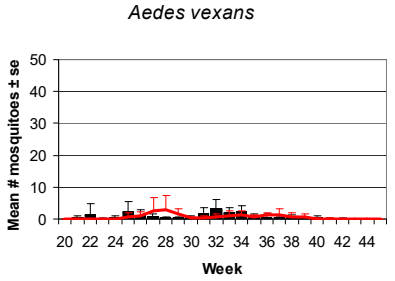
Delaware River Basin



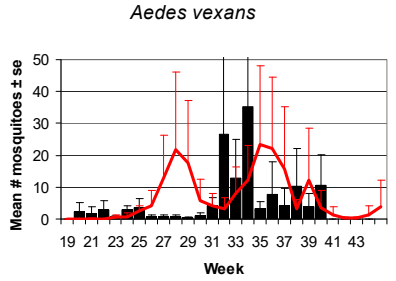
New York Metro



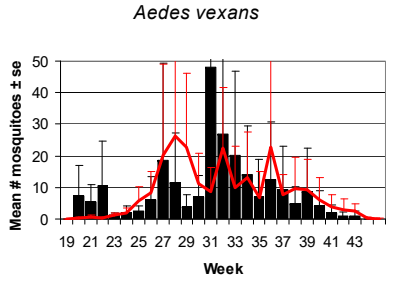
North Central Rural



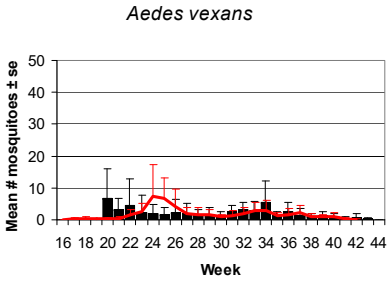
Northwestern Rural



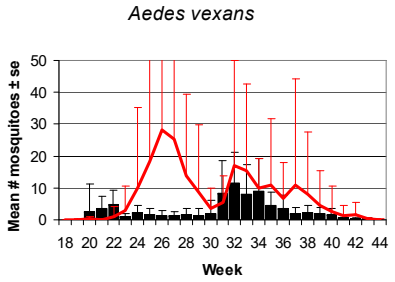
Philadelphia Metro



Pinelands



Suburban Corridor

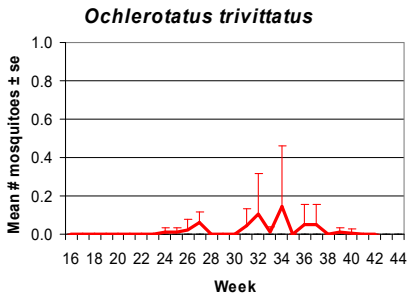


Comments

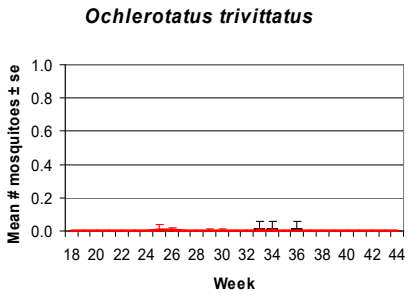
Data from the Agricultural and Philadelphia Metro Regions suggest that *Aedes vexans* had three major broods in 2004. The effects from the abundant rainfall as several hurricanes passed through the Northeast resulted in overlapping emergences with less-definitive peaks characteristic of dry periods. This year's rainfall also shifted the timing of peak population as historic data would seem to be more typical in terms of nuisance presence. Some shifts from historical data might be anticipated (as in the Philadelphia Metro and Northwestern Rural Regions) as indicated by large error bars (suggests locally flooded areas within a region).

Ochlerotatus trivittatus – Multivoltine Aedine (*vexans*) Species

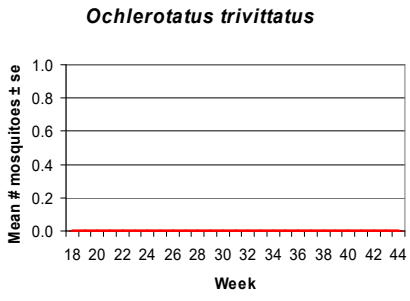
Agricultural



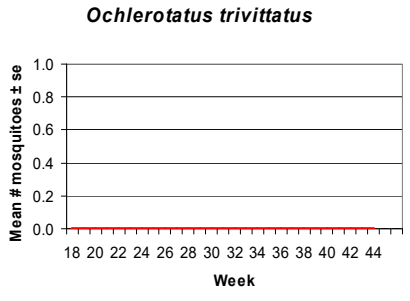
Coastal



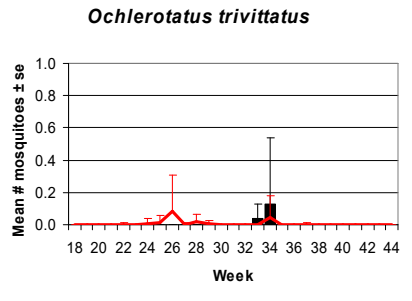
Delaware Bayshore



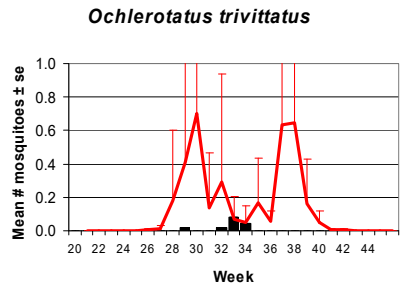
Delaware River Basin



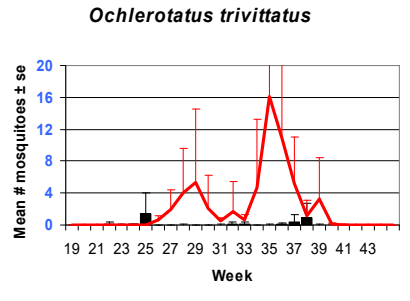
New York Metro



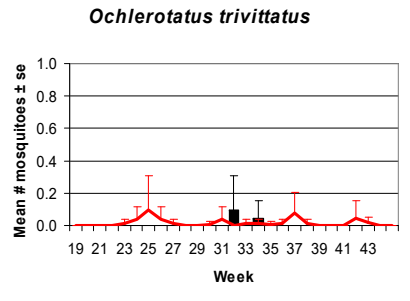
North Central Rural



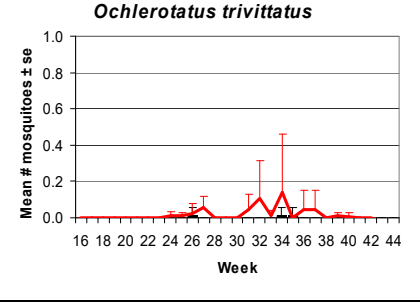
Northwestern Rural



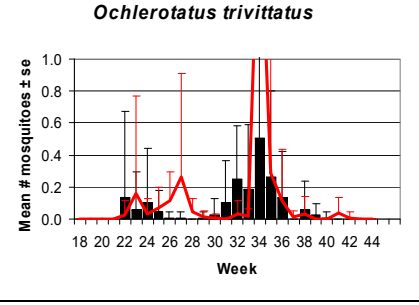
Philadelphia Metro



Pinelands



Suburban Corridor

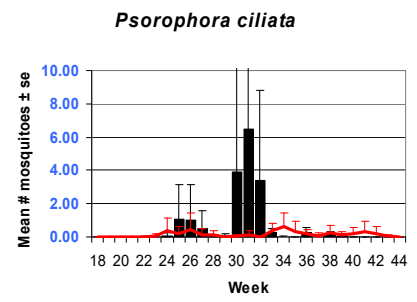


Comments

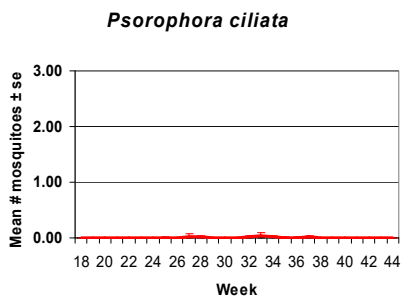
Ochlerotatus trivittatus populations were lower than average this year. Two distinct broods are evident for most of the regions where the species appeared (Suburban Region). Particularly noteworthy is the severely reduced populations in the Northwest Region. Historically populations have been variable, but generally notable.

Psorophora ciliata – Multivoltine Aedine (*vexans*) Species

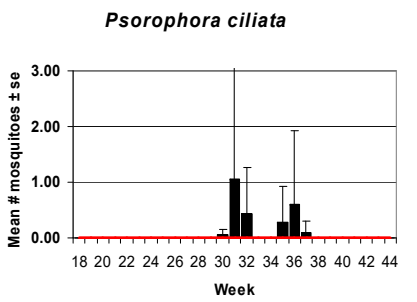
Agricultural



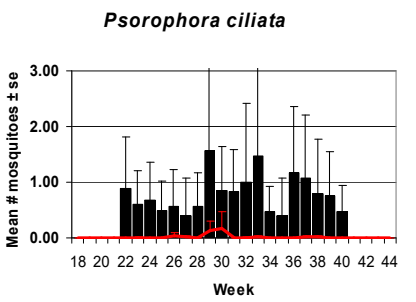
Coastal



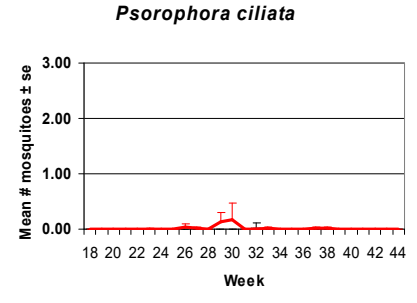
Delaware Bayshore



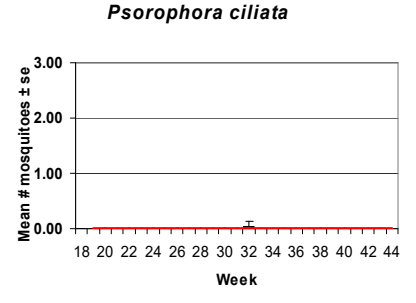
Delaware River Basin



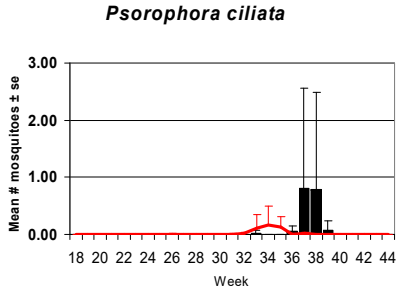
New York Metro



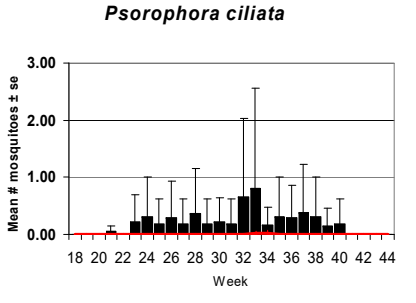
North Central Rural



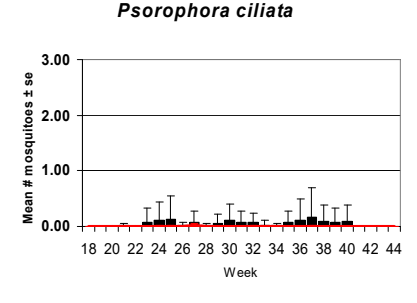
Northwestern Rural



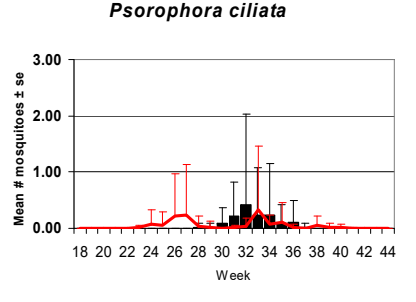
Philadelphia Metro



Pinelands



Suburban Corridor

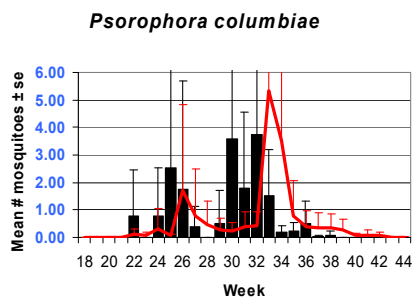


Comments

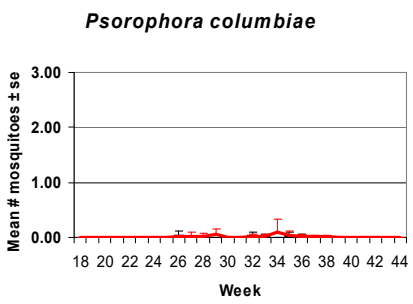
Psorophora ciliata is predacious in the larval stage. It feeds mainly on other fresh floodwater mosquitoes that are found in its habitat. This years population curves mimic those of other *Psorophora* species because the mosquitoes are generated by similar climatic events.

Psorophora columbiae– Multivoltine Aedine (*vexans*) Species

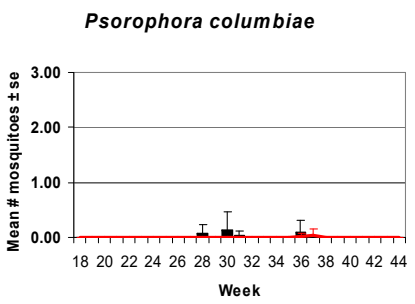
Agricultural



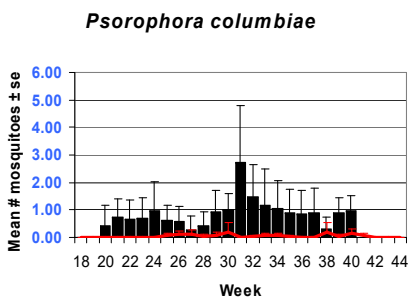
Coastal



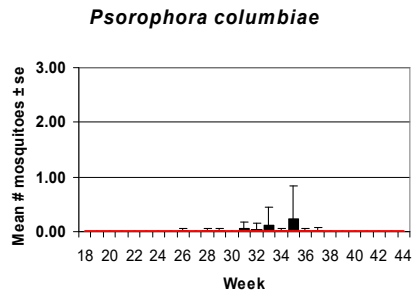
Delaware Bayshore



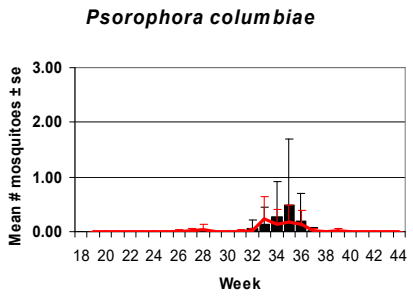
Delaware River Basin



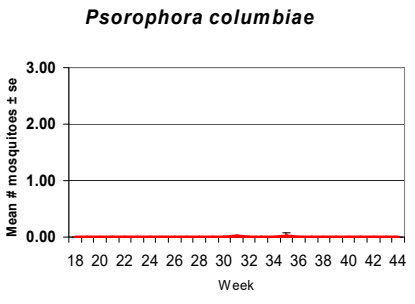
New York Metro



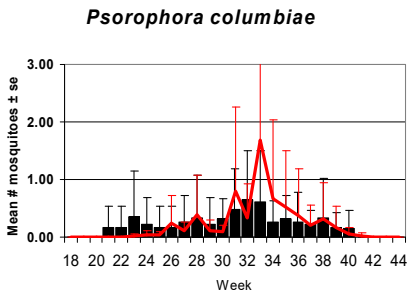
North Central Rural



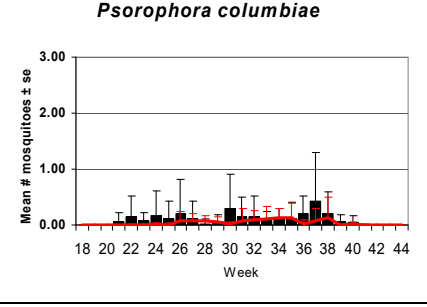
Northwestern Rural



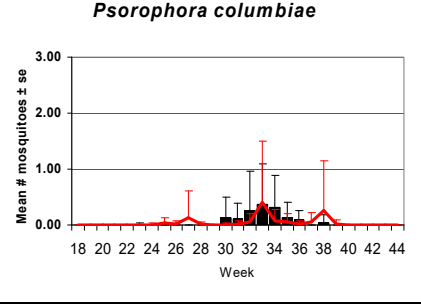
Philadelphia Metro



Pinelands



Suburban Corridor

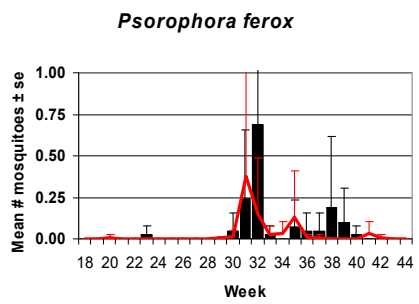


Comments

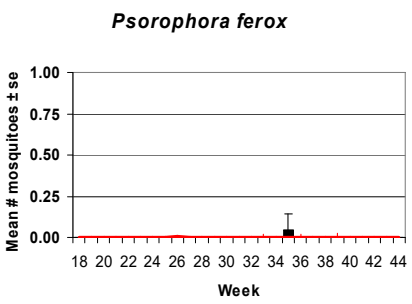
As with *Psorophora ferox* and other vexans types, populations of *Ps. columbiae* appear in response to floodwater events. Unlike *Ps. ferox*, *Ps. columbiae* experienced a substantial brood early in the season and the last emergence in this region was insignificant.

Psorophora ferox – Multivoltine Aedine (*vexans*) Species

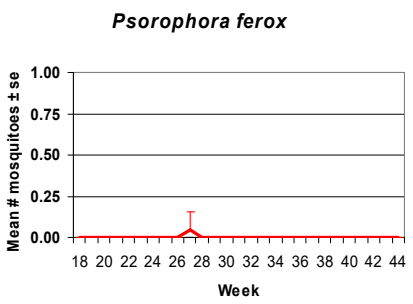
Agricultural



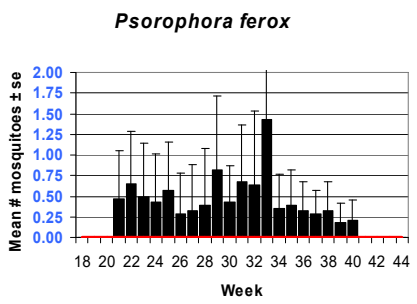
Coastal



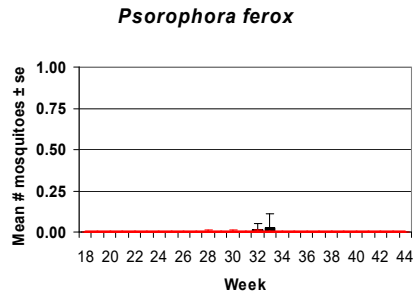
Delaware Bayshore



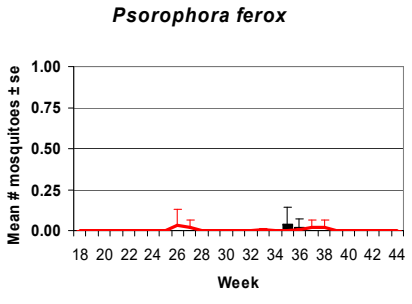
Delaware River Basin



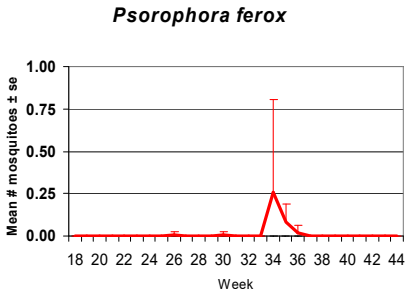
New York Metro



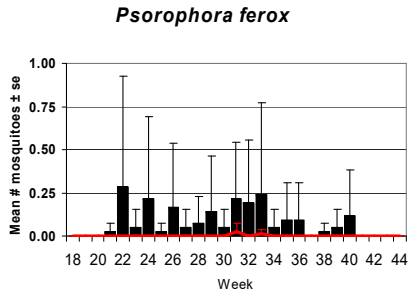
North Central Rural



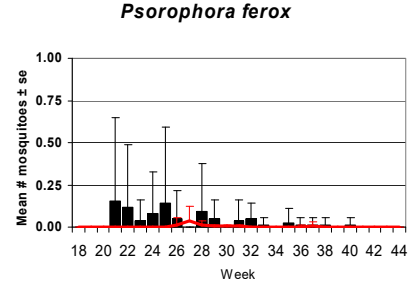
Northwestern Rural



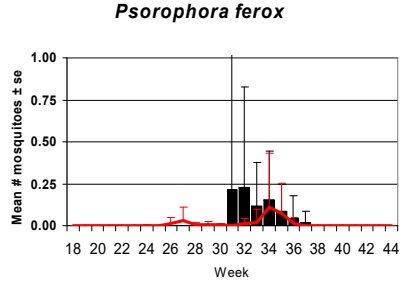
Philadelphia Metro



Pinelands



Suburban Corridor

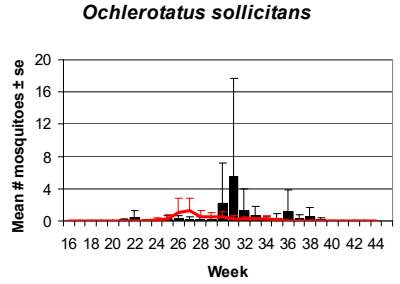


Comments

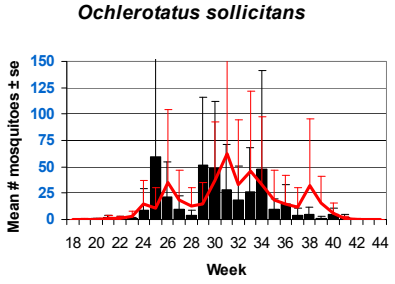
Psorophora populations usually appear as distinct broods in response to floodwater events. The Agricultural Region clearly depicts 3 flooding events, with the 2nd flooding producing the largest biting populations. The overlapping broods seen in the Delaware River Basin and Philadelphia Metro Regions are atypical for this group of mosquitoes as some specimens were present in the light trap collections virtually every week of the season.

Ochlerotatus sollicitans – Multivoltine Aedine (*sollicitans*) Species

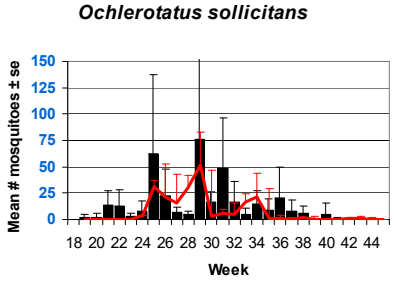
Agricultural



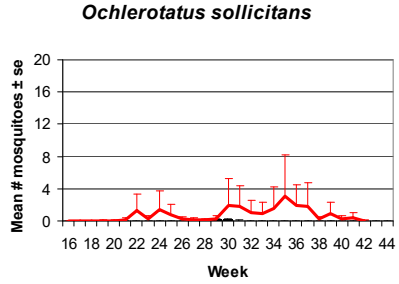
Coastal



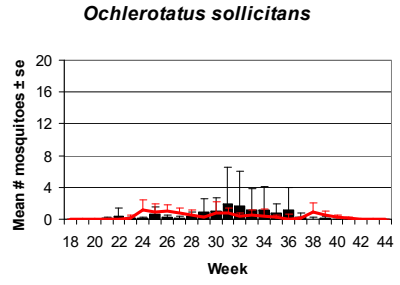
Delaware Bayshore



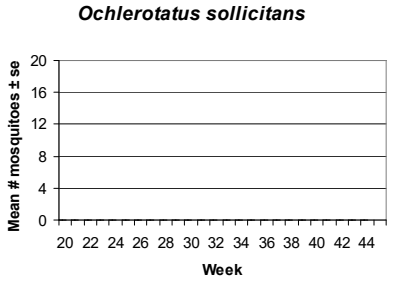
Delaware River Basin



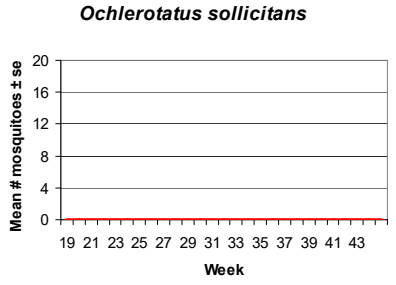
New York Metro



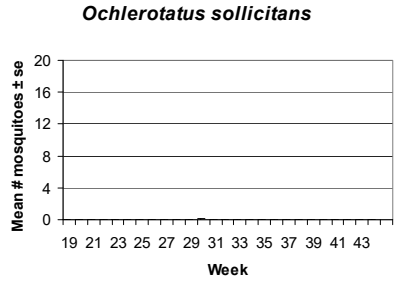
North Central Rural



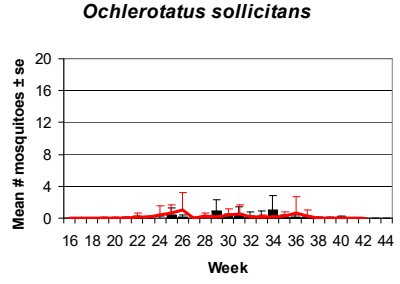
Northwestern Rural



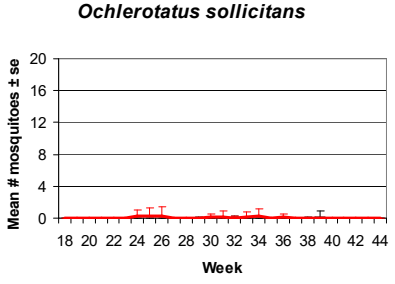
Philadelphia Metro



Pinelands



Suburban Corridor

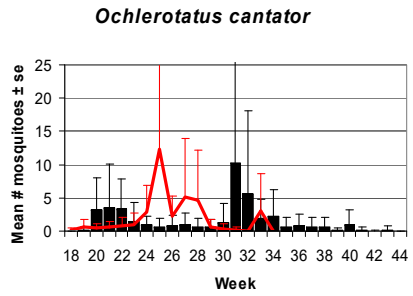


Comments

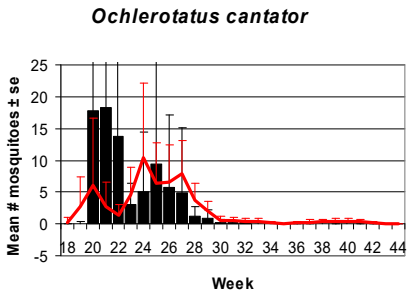
Ochlerotatus sollicitans produced 3 – 4 broods during the 2004 season in the breeding areas of the Coastal and Delaware Bayshore Regions. A strong flyer, *Oc. sollicitans* migrated to Agricultural habitat as well as through the Pinelands. A large migration event occurred at the end of July (Week 31). This species was significantly reduced in the Delaware River Basin as compared to previous years. This same region produced an abundance of *Ae. vexans*, which frequently emanates from dredge spoil activity.

Ochlerotatus cantator – Multivoltine Aedine (*sollicitans*) Species

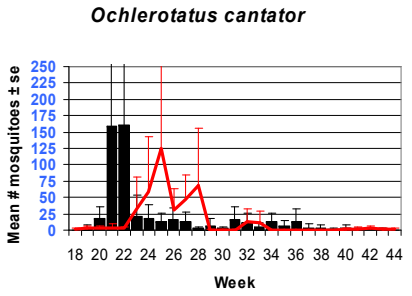
Agricultural



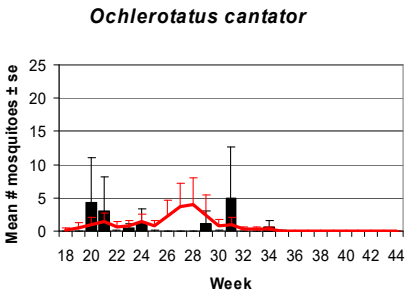
Coastal



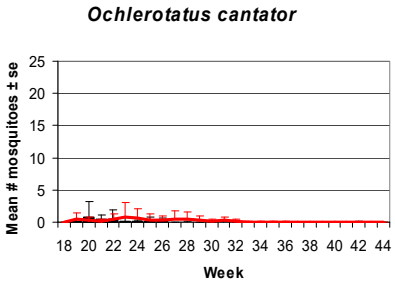
Delaware Bayshore



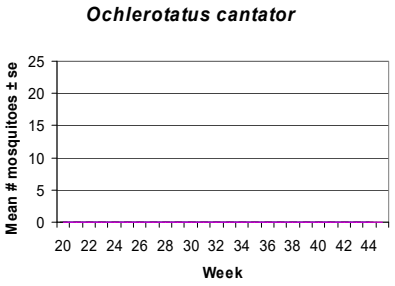
Delaware River Basin



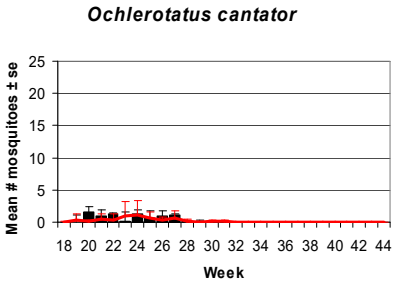
New York Metro



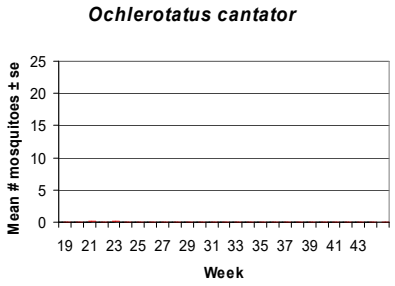
North Central Rural



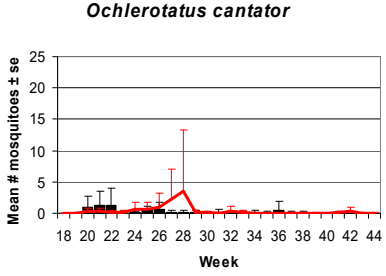
Northwestern Rural



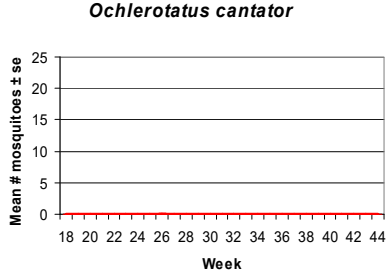
Philadelphia Metro



Pinelands



Suburban Corridor



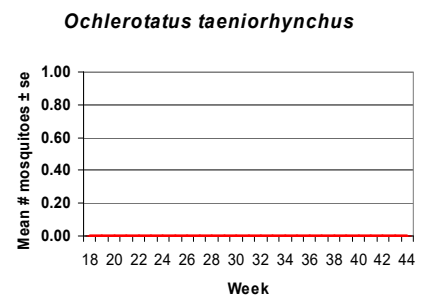
Comments

Ochlerotatus cantator is salt marsh floodwater species that emerges early in the season. Typical population trends can be seen in the Coastal Region, where large broods come off the marsh and then slowly decline through the first half of the season. Unlike historic trends, however, *Oc. sollicitans* appears to have produced broods earlier and in greater numbers than is generally seen for those regions.

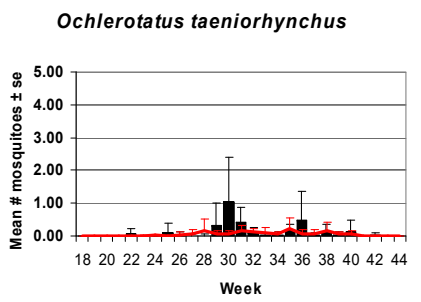
Oc. cantator is not an obligate salt marsh inhabitant, and can be produced from fresh floodwaters, as evidenced by Agricultural, Northwestern, and Pineland populations.

Ochlerotatus taeniorhynchus – Multivoltine Aedine (*sollicitans*) Species

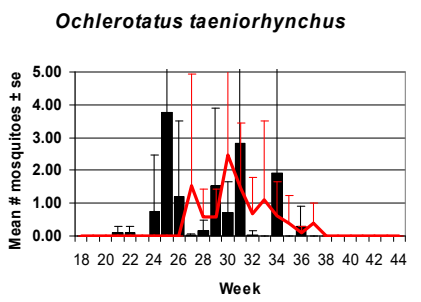
Agricultural



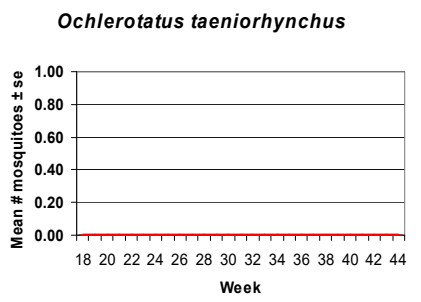
Coastal



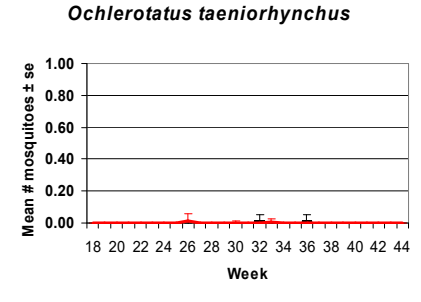
Delaware Bayshore



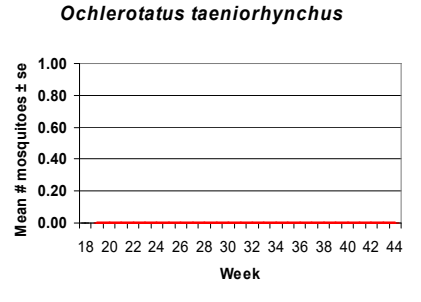
Delaware River Basin



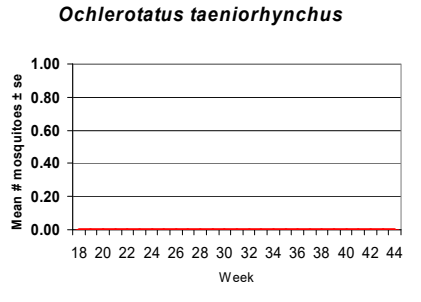
New York Metro



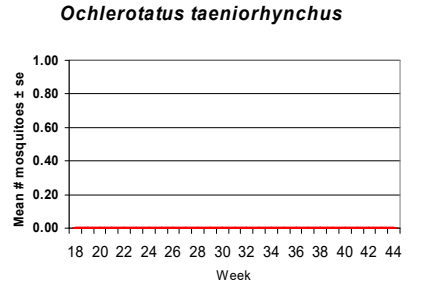
North Central Rural



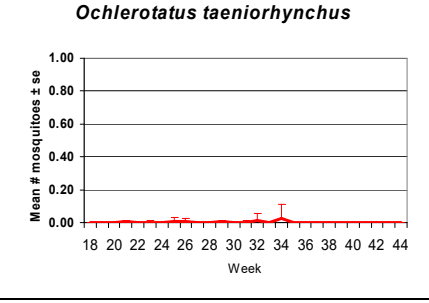
Northwestern Rural



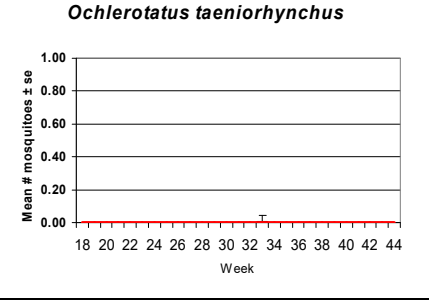
Philadelphia Metro



Pinelands



Suburban Corridor



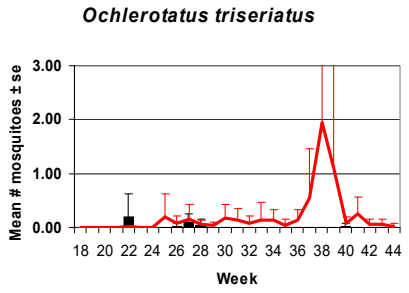
Comments

This aggressive biter is found almost exclusively in the Coastal and Delaware Bayshore Regions despite an ability to breed in habitats ranging from fresh to marine (“euryhaline” or all salt ranges). Although females will fly inland to find suitable bloodmeal hosts, clearly this species lacks the penetration that *Oc. sollicitans* has. Tidal influences are clearly seen in the Delaware Bayshore Region. As with a number of other species, this year’s population peaks appear earlier than historical trends indicate.

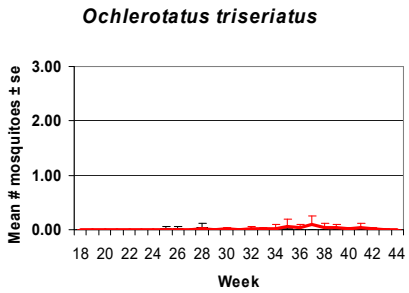
Oc. taeniorhynchus shares habitat with *Oc. sollicitans* and will usually appear in numbers somewhat later in the season. New Jersey is near the northern limit for this species and it attains pest status in more southerly states, where it replaces *Oc. solliticans* as the dominant salt marsh mosquito.

Ochlerotatus triseriatus – Multivoltine Aedine (*triseriatus*) Species

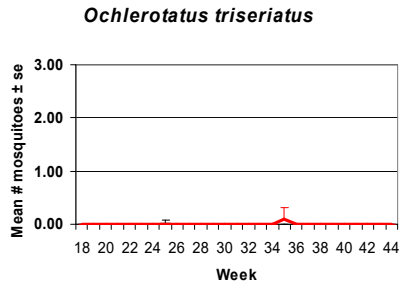
Agricultural



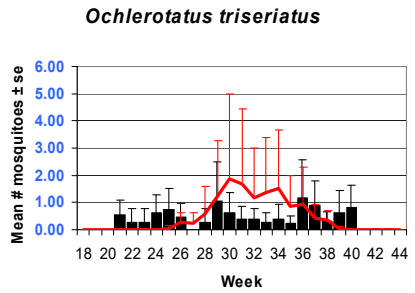
Coastal



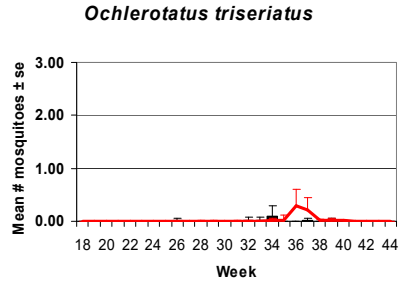
Delaware Bayshore



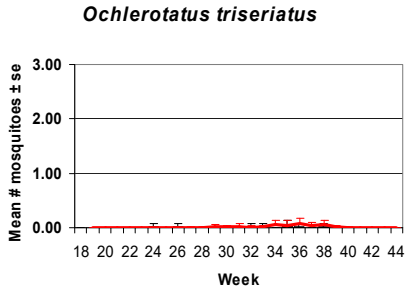
Delaware River Basin



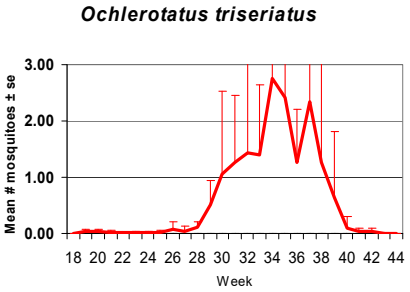
New York Metro



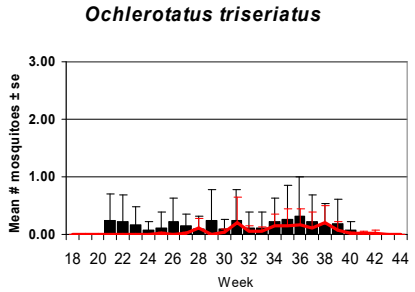
North Central Rural



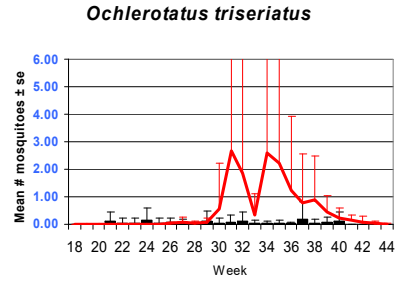
Northwestern Rural



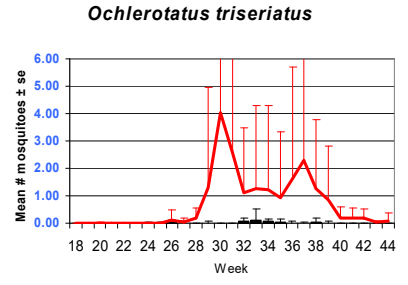
Philadelphia Metro



Pinelands



Suburban Corridor

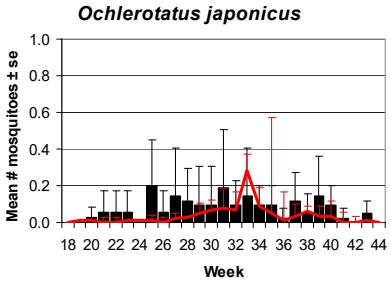


Comments

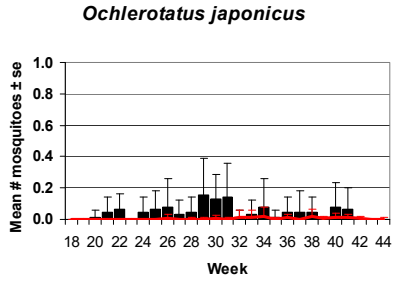
Ochlerotatus triseriatus populations were well below normal trends this year. However, *Oc. triseriatus* is also not normally attracted to light traps and thus population trends may be questionable. It has been a participant in the West Nile cycle every year since 2000. Interestingly, no virus-positive pools were found this year. This may be due to true population depression, and thus this year's light traps may very well reflect reality.

Ochlerotatus japonicus – Multivoltine Aedine (*triseriatus*) Species

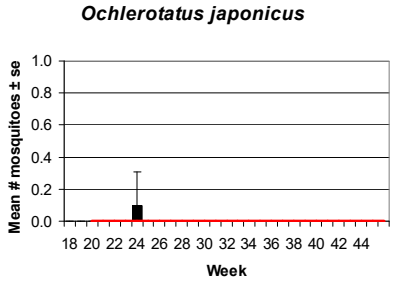
Agricultural



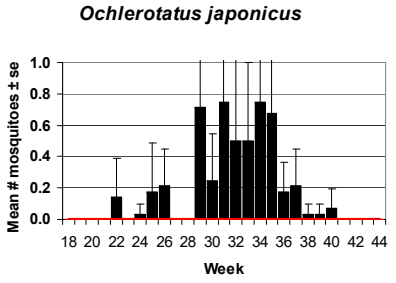
Coastal



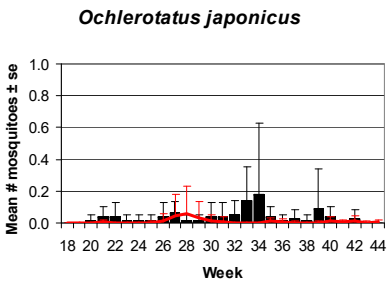
Delaware Bayshore



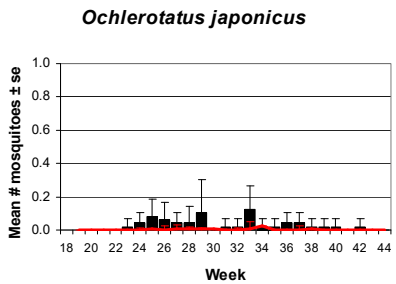
Delaware River Basin



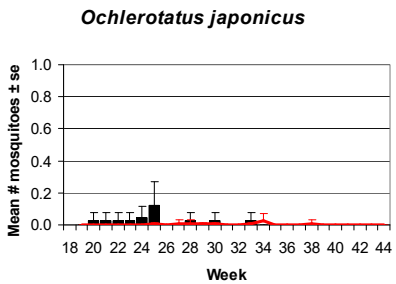
New York Metro



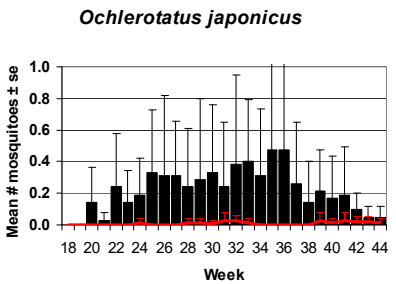
North Central Rural



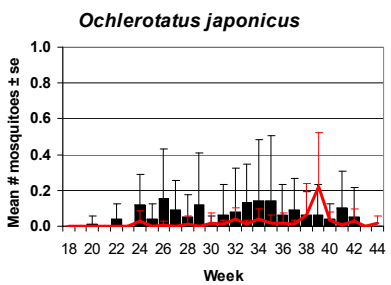
Northwestern Rural



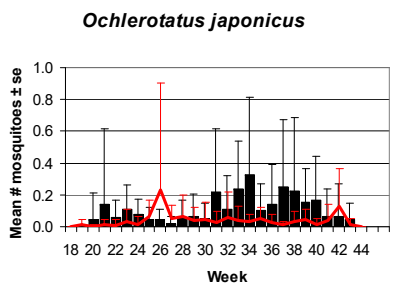
Philadelphia Metro



Pinelands



Suburban Corridor

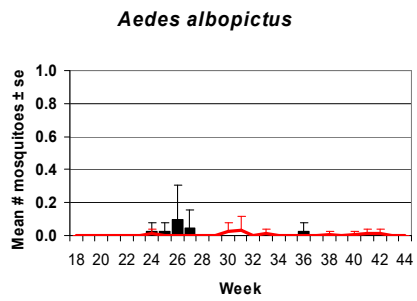


Comments

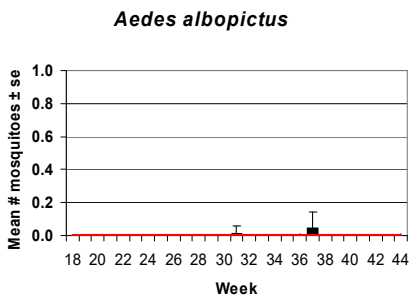
Ochlerotatus japonicus continue to appear in state surveillance light traps despite published reports that this species generally avoids our standard monitoring method. This years' dataset show that *Oc. japonicus* has been present very early in the season throughout the state and continues to enter light traps well into the summer. This dataset demonstrates the value of numerous trap sites to monitor species that occur in low levels.

Aedes albopictus – Multivoltine Aedine (*triseriatus*) Species

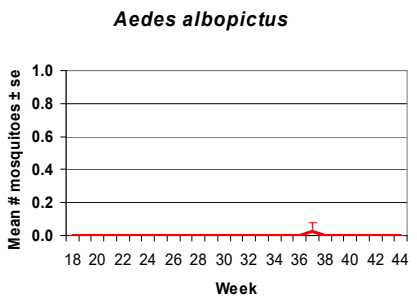
Agricultural



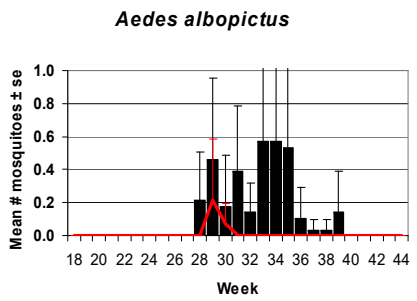
Coastal



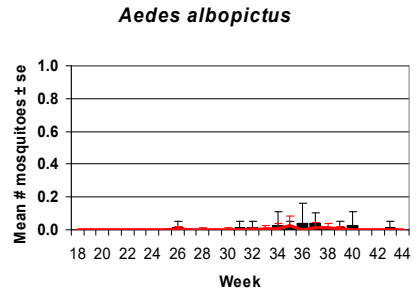
Delaware Bayshore



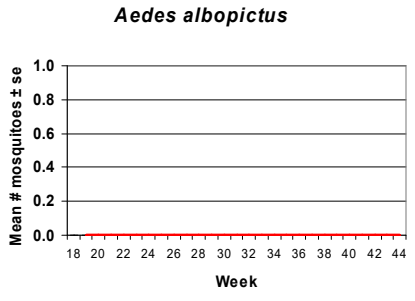
Delaware River Basin



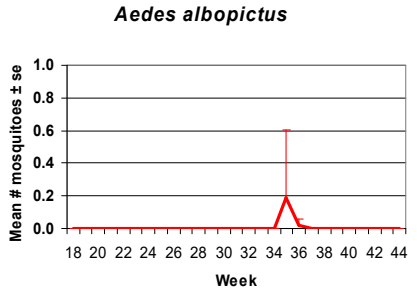
New York Metro



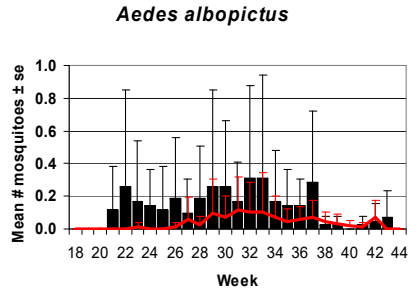
North Central Rural



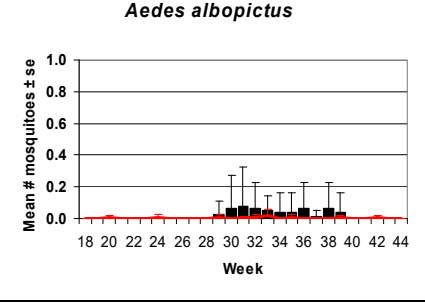
Northwestern Rural



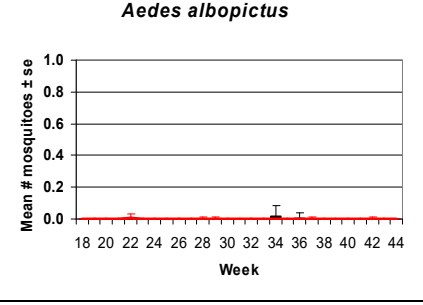
Philadelphia Metro



Pinelands



Suburban Corridor

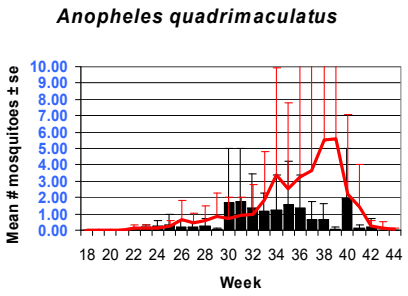


Comments

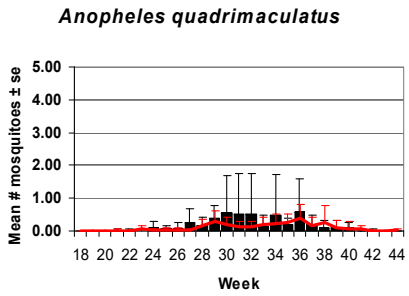
Aedes albopictus is a day-active species that seldom enters light traps. This years dataset indicates that the species is especially numerous in the Delaware River Basin and Philadelphia Metro Regions. Monitoring of this non-native invader should be continued and compared with other trapping techniques.

Anopheles quadrimaculatus – Multivoltine *Culex/Anopheles* (quadrimaculatus) Species

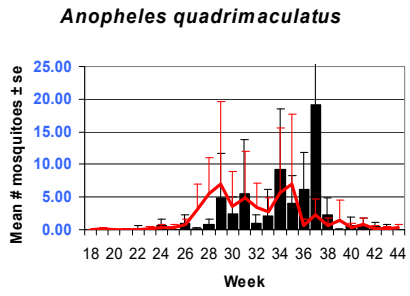
Agricultural



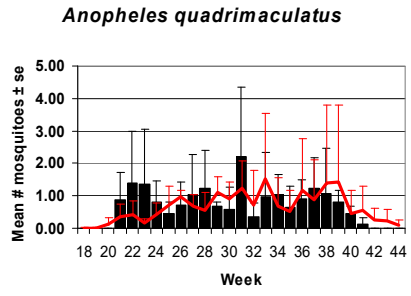
Coastal



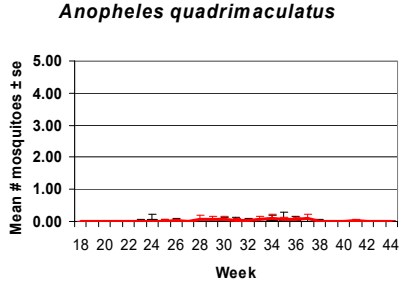
Delaware Bayshore



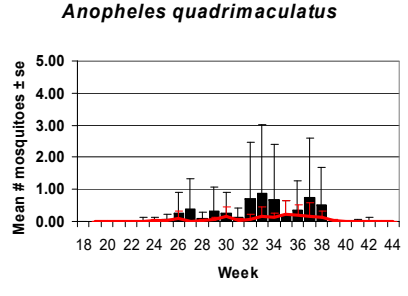
Delaware River Basin



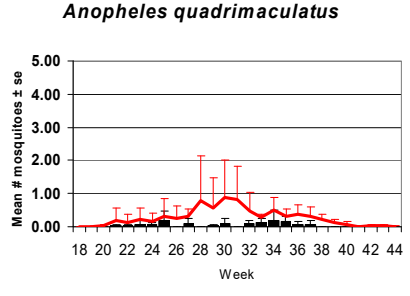
New York Metro



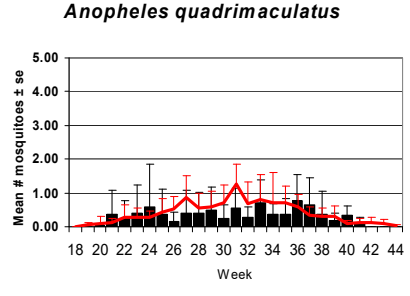
North Central Rural



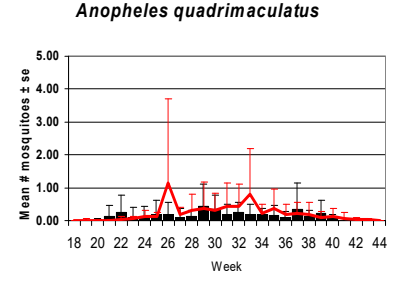
Northwestern Rural



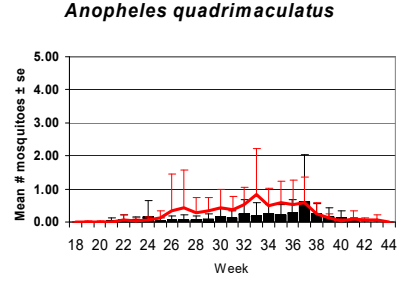
Philadelphia Metro



Pinelands



Suburban Corridor

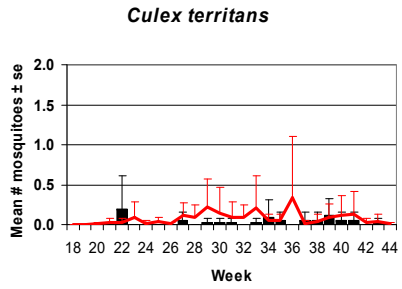


Comments

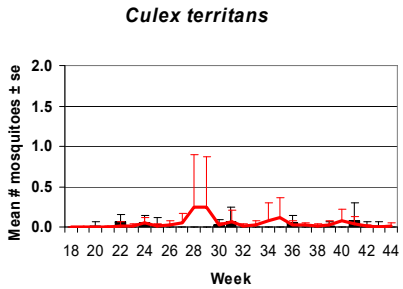
Populations trends for this species mirrored those of *An. punctipennis*, including that of the Delaware River Basin pattern.

Culex territans – Multivoltine *Culex/Anopheles* (*quadrimaculatus*) Species

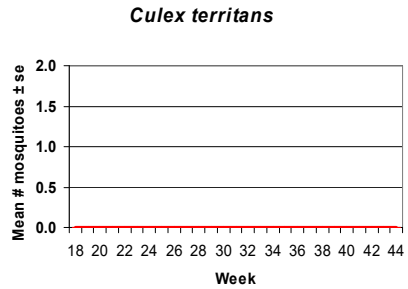
Agricultural



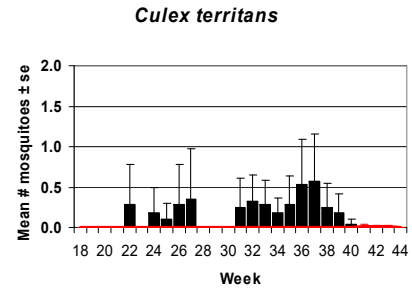
Coastal



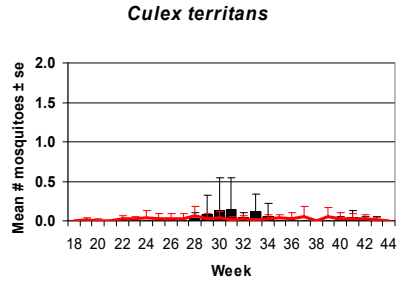
Delaware Bayshore



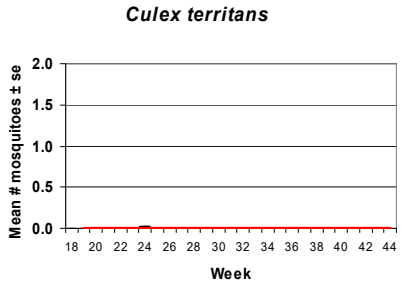
Delaware River Basin



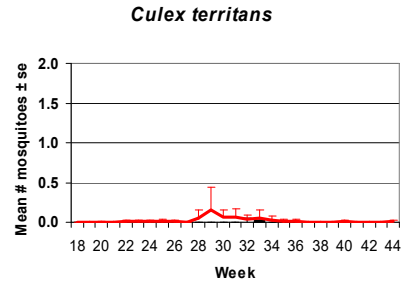
New York Metro



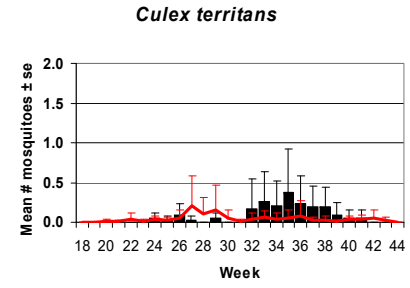
North Central Rural



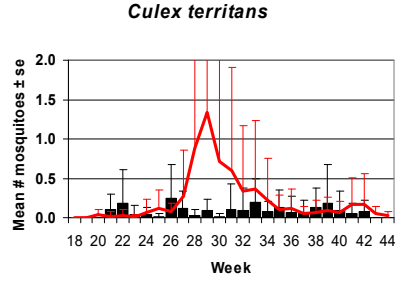
Northwestern Rural



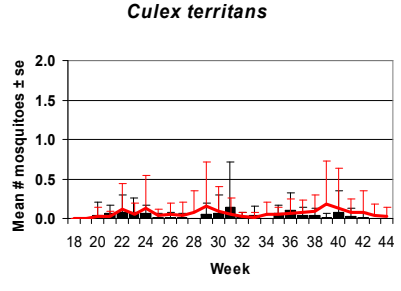
Philadelphia Metro



Pinelands



Suburban Corridor



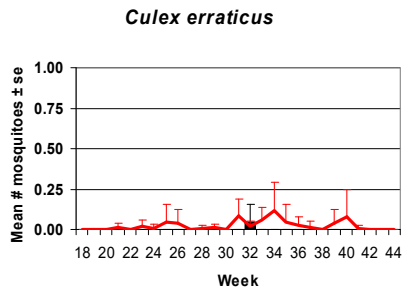
Comments

Culex territans is a specialized frog-feeder and has evolved cold-tolerance that should allow it to be active when early-season frogs come out of hibernation to breed. However, the light trap data might be misleading as it would indicate a late emergence. Earliest trap record this year occurred during week 20, at least 2 weeks after the beginning of the season. However, the first generation likely emerged well prior to when the traps were activated, and the trap activity actually reflects adults from the first generation of larvae.

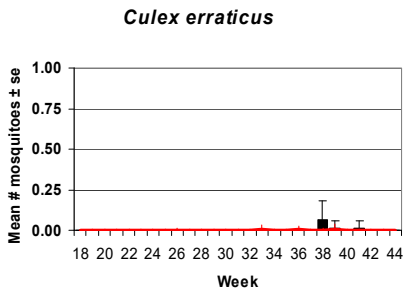
Southern regions, such as the Philadelphia Metro and the Pinelands, show populations to either build throughout the summer or maintain low, consistent levels. High light trap collections indicate an abundance of local mosquitoes as this species does not travel far.

Culex erraticus – Multivoltine *Culex/Anopheles* (*quadrimaculatus*) Species

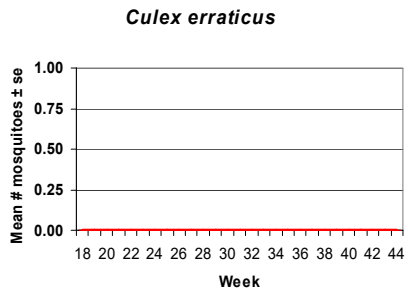
Agricultural



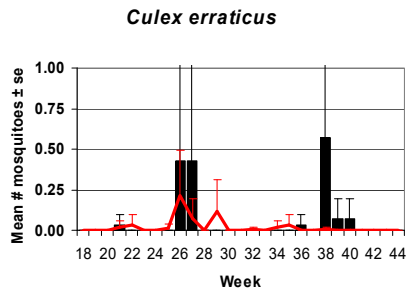
Coastal



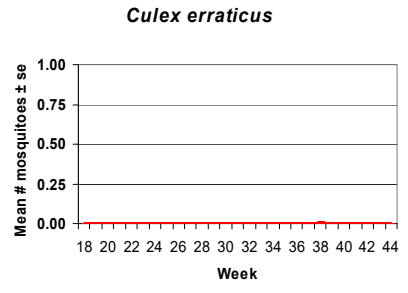
Delaware Bayshore



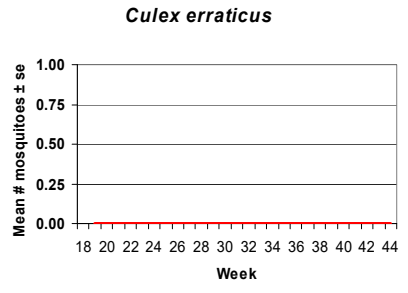
Delaware River Basin



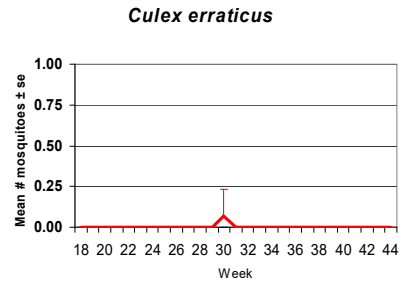
New York Metro



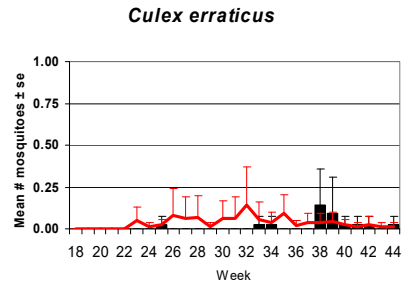
North Central Rural



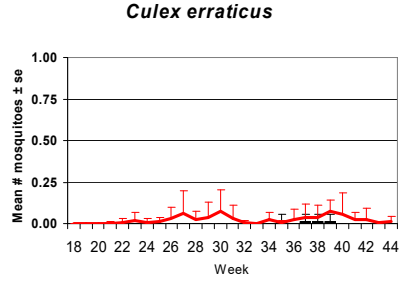
Northwestern Rural



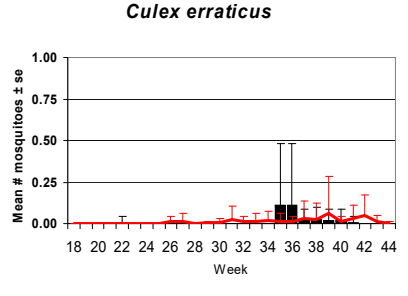
Philadelphia Metro



Pinelands



Suburban Corridor

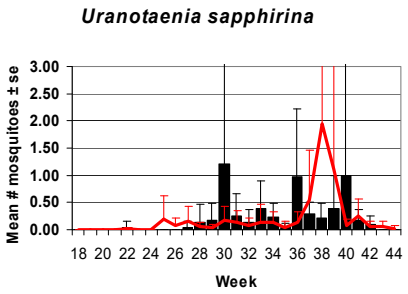


Comments

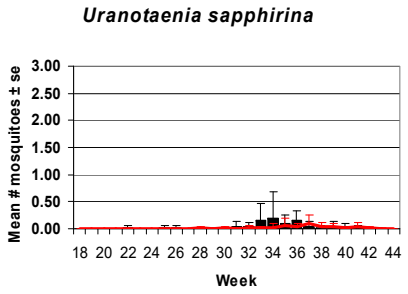
Little is known regarding the biology of this species. New Jersey populations may represent the northern range. While *Cx. erraticus* is not normally found in resting boxes prior to July (Week 27/28), historic light trap data indicate adults during the time more typical of other *Culex* species. This year, *Cx. erraticus* appeared to be less consistent through the season as compared to the previous year. Low numbers that were seen later in the season are typically what is described in the literature for New Jersey *Cx. erraticus* trends.

Uranotaenia sapphirina – Multivoltine Culex/Anopheles (*quadrimaculatus*) Species

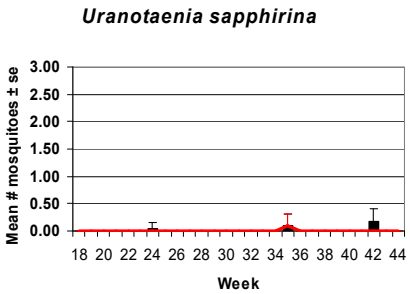
Agricultural



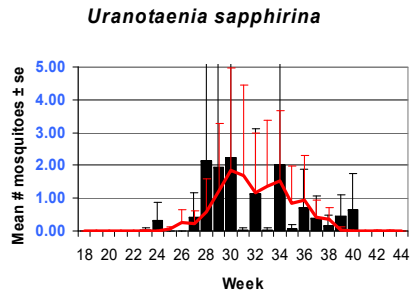
Coastal



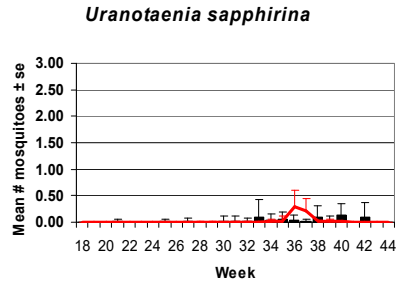
Delaware Bayshore



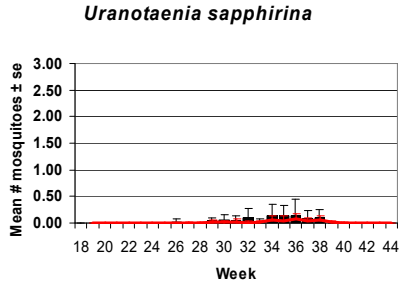
Delaware River Basin



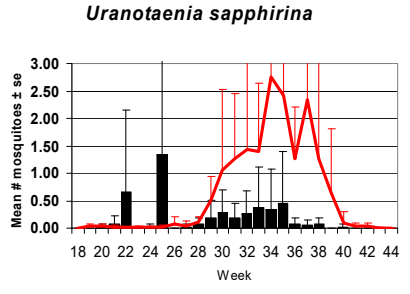
New York Metro



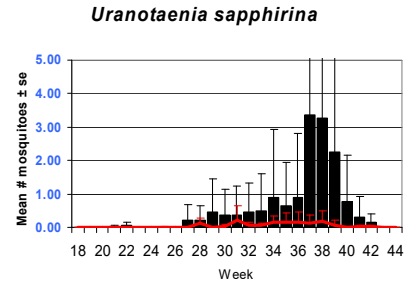
North Central Rural



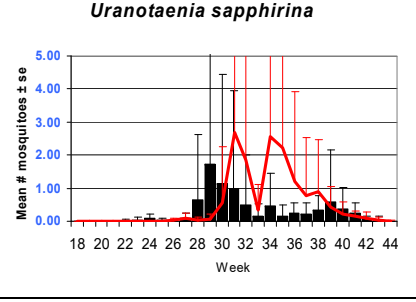
Northwestern Rural



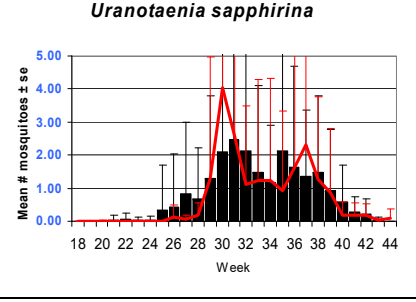
Philadelphia Metro



Pinelands



Suburban Corridor



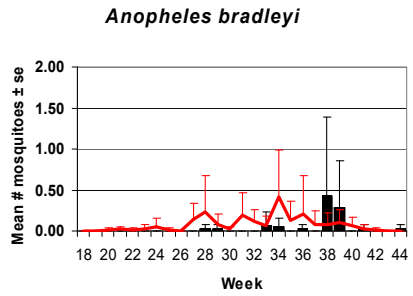
Comments

The Philadelphia Metro Region shows the trend typical of this multivoltine species – low numbers in the spring, building up to the highest populations in the fall, often rising sharply. Light trap records show this species can occur in high numbers during July.

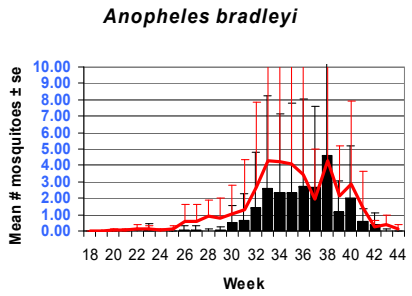
Our knowledge about the biology of this species is limited. Questions remain such as why doesn't this species appear earlier and what mechanism allows them to lag so far behind typical Culex/Anopheline species with which *Ur. sapphirina* share hibernaculae? Further work is needed for this presumably benign species (of which we know so little).

Anopheles bradleyi – Multivoltine *Culex/Anopheles* (*salinarius*) Species

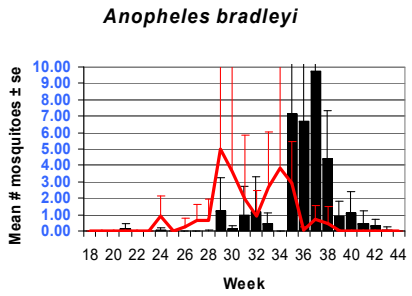
Agricultural



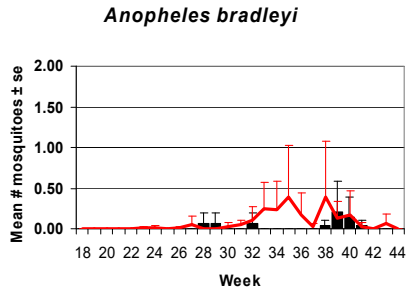
Coastal



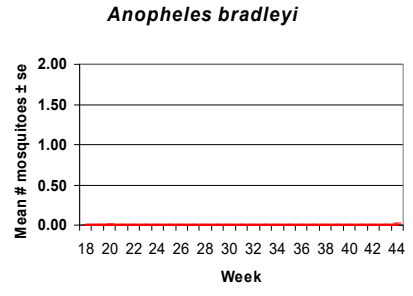
Delaware Bayshore



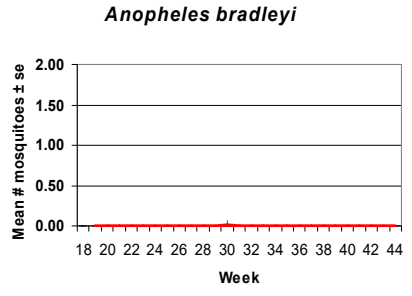
Delaware River Basin



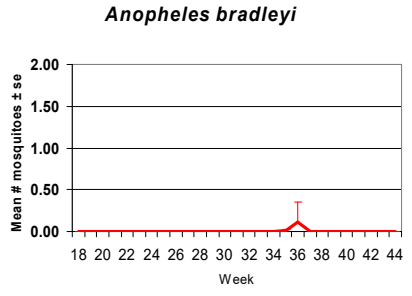
New York Metro



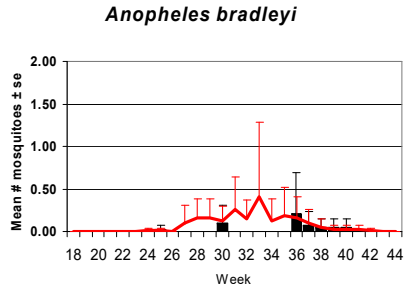
North Central Rural



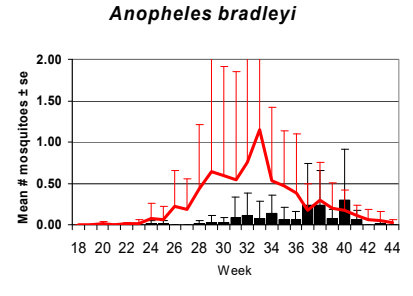
Northwestern Rural



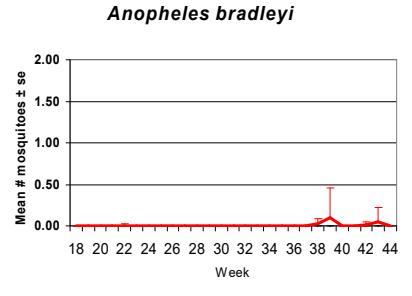
Philadelphia Metro



Pinelands



Suburban Corridor

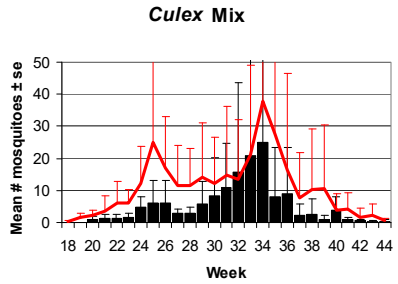


Comments

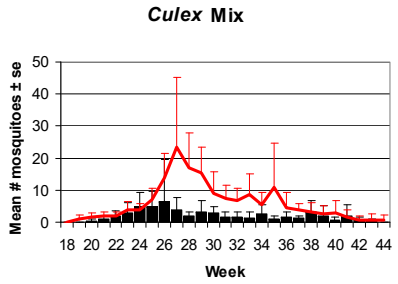
Anopheles bradleyi is a salt marsh anopheline that reaches greatest numbers in brackish habitat along the coast. Like most anophelines that overwinter as mated females, the population builds gradually as the season progresses. This years' dataset clearly shows this trend, particularly in the Coastal and Delaware Bayshore Regions, habitats that are expected to contain the largest populations.

Culex Complex - Multivoltine Culex/Anopheles (*pipiens*) Species

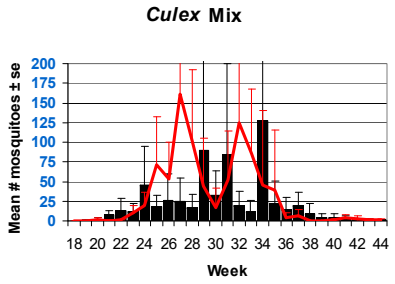
Agricultural



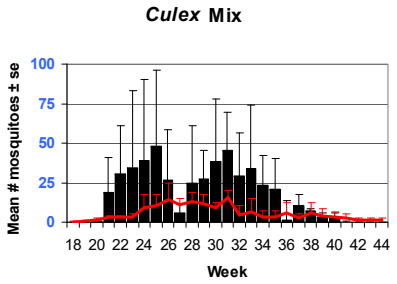
Coastal



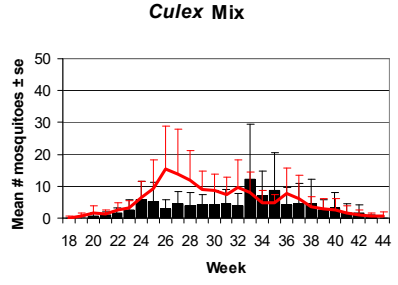
Delaware Bayshore



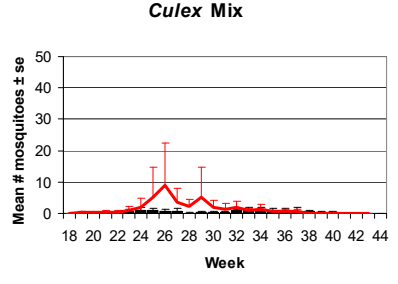
Delaware River Basin



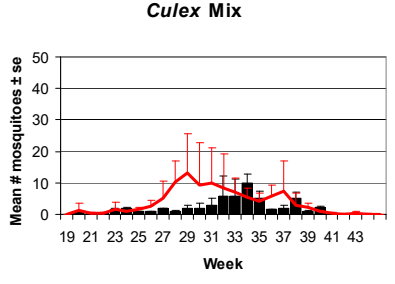
New York Metro



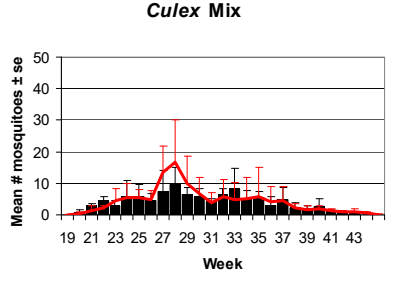
North Central Rural



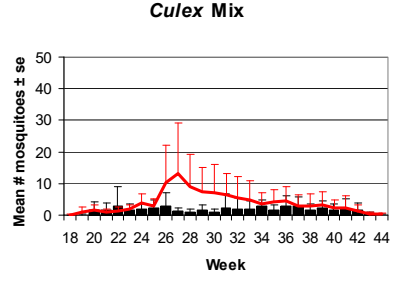
Northwestern Rural



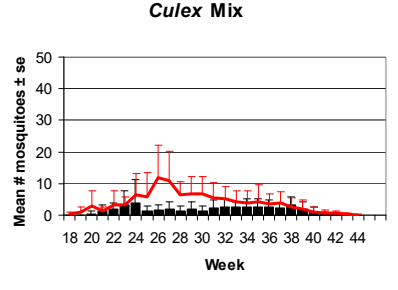
Philadelphia Metro



Pinelands



Suburban Corridor

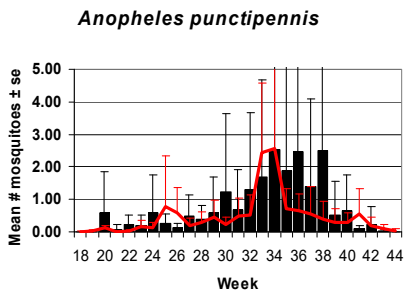


Comments

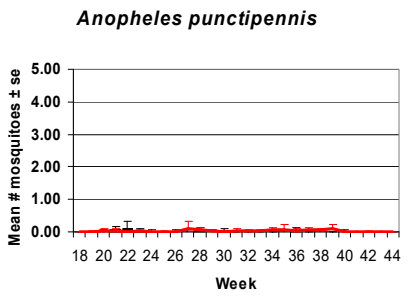
The *Culex* Complex is a mixture of three different species (*Cx. pipiens, Cx. restuans, Cx. salinarius*) that are difficult to identify, and are thus placed into an encompassing group. The Agricultural Region displays the typical trend of *Culex* Complex, with building populations through the summer and a decline as diapause sets in. Apart from the Delaware River Basin, *Culex* populations appear to be lower than typical trends. Populations also appear to have shifted peaks from historic data. As a note, the break in trend seen during week 27 in the Delaware River Basin illustrates the need to understand the dataset. This break was due to a holiday – and thus data from an area with abundant *Culex* was not available. The drop in the mean, plus the smaller error bar indicates that this particular region might be showing the influence of all three species.

Anopheles punctipennis – Multivoltine *Culex/Anopheles* (*pipiens*) Species

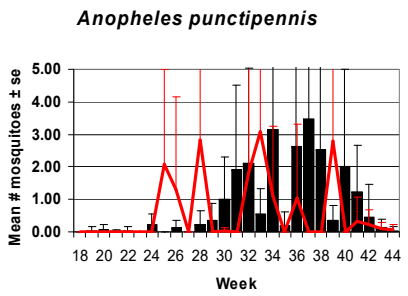
Agricultural



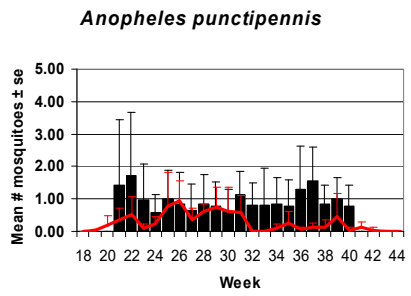
Coastal



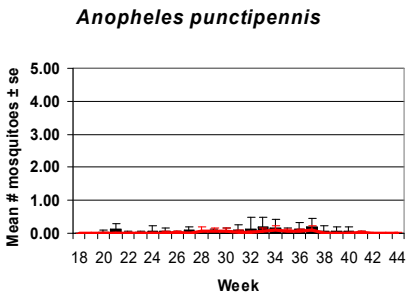
Delaware Bayshore



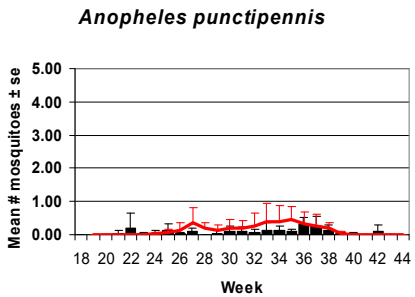
Delaware River Basin



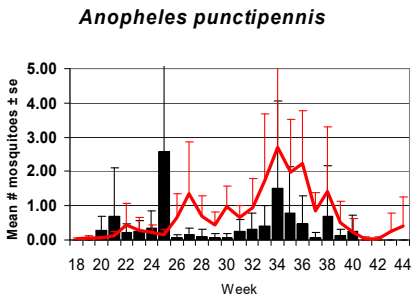
New York Metro



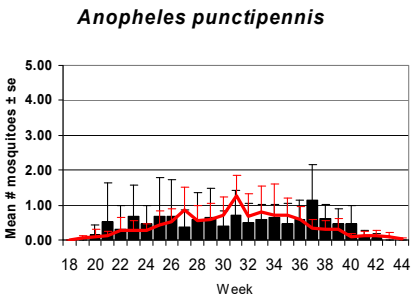
North Central Rural



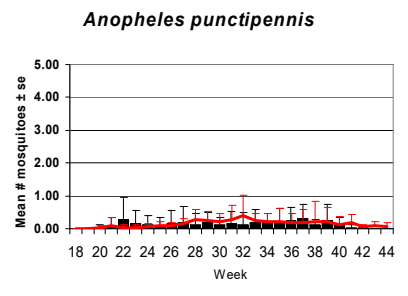
Northwestern Rural



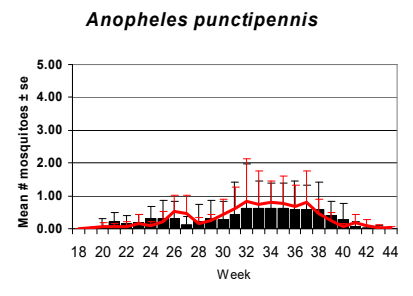
Philadelphia Metro



Pinelands



Suburban Corridor

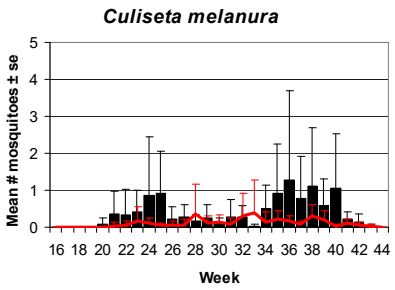


Comments

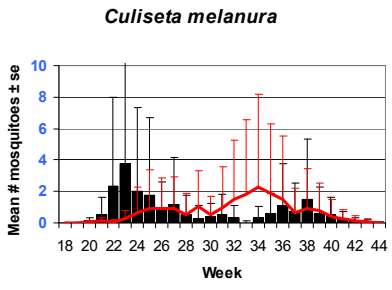
The Agricultural Region for this year's dataset show the trend expected of species that overwinter as mated adult females: a gradual buildup through the season, peak, and eventual die-off as females retreat to hibernaculae. This year, *An. punctipennis* appears to have entered hibernaculae later than *Culex* species. The Delaware River Basin presents a very atypical picture of mosquitoes available during most of the season at a constant rate. This may indicate that some of the traps may have been located near hibernaculae. Light trap data suggests this year's population levels were about normal.

Culiseta melanura – Unique (*melanura*) Species

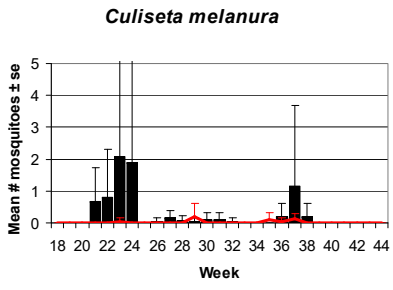
Agricultural



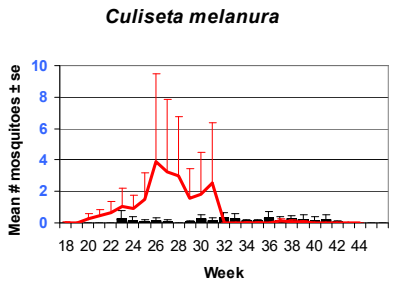
Coastal



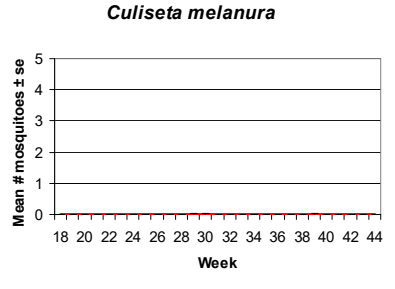
Delaware Bayshore



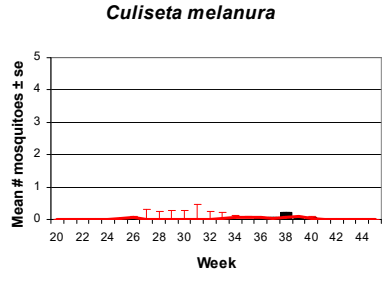
Delaware River Basin



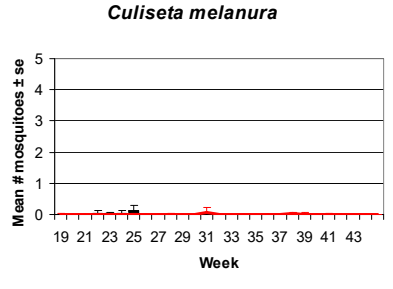
New York Metro



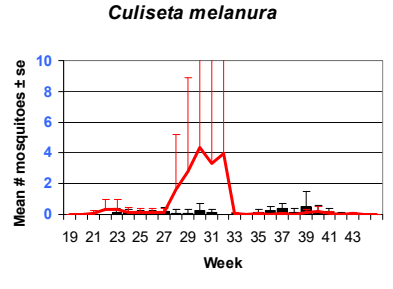
North Central Rural



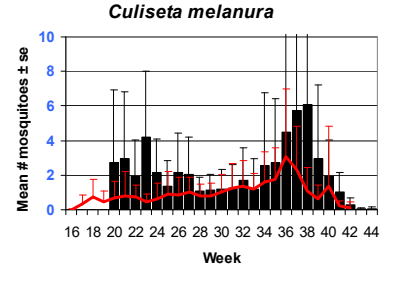
Northwestern Rural



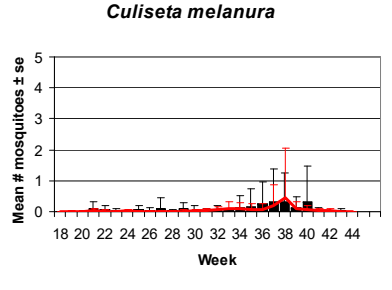
Philadelphia Metro



Pinelands



Suburban Corridor

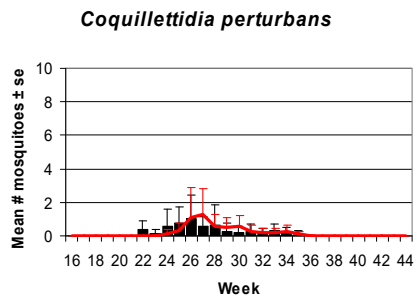


Comments

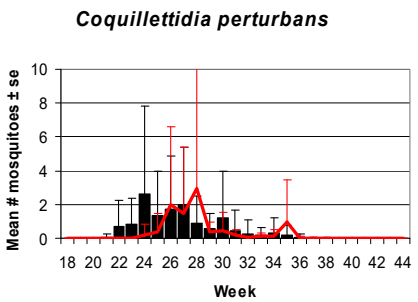
Culiseta melanura populations were higher in the spring than historical trends. There was a noticeable drop in numbers in July (see Agricultural, Coastal, Delaware Bayshore and the Pinelands Regions). This was followed by an increased population late in the season. This pattern is fairly typical of *Cs. melanura*, which generally show increased numbers during the spring and fall.

Coquillettidia perturbans – Monotypic (*perturbans*) Species

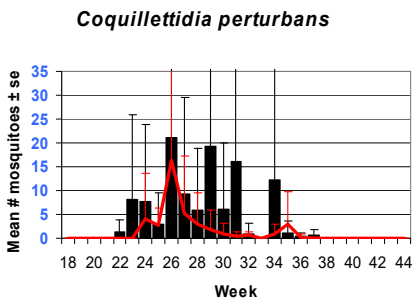
Agricultural



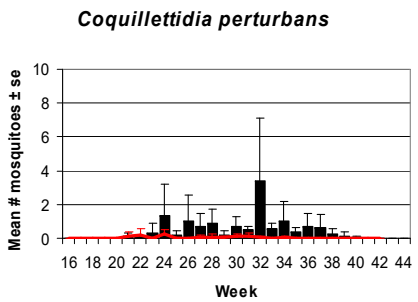
Coastal



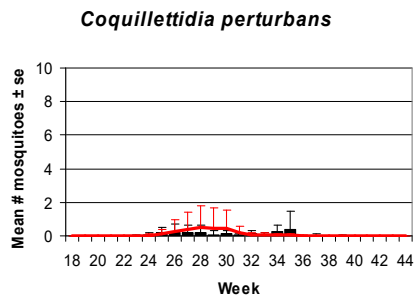
Delaware Bayshore



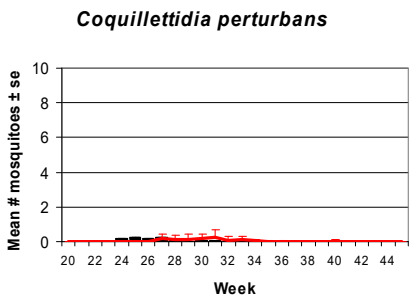
Delaware River Basin



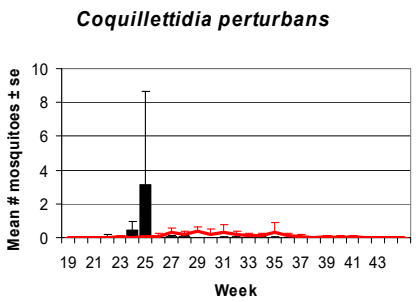
New York Metro



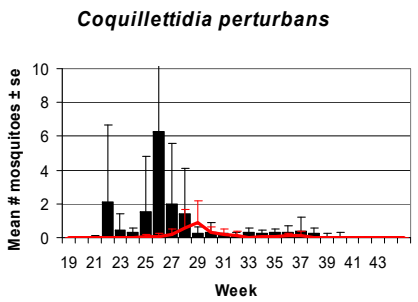
North Central Rural



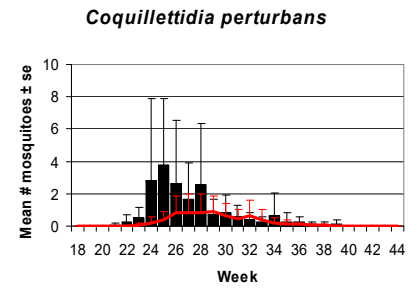
Northwestern Rural



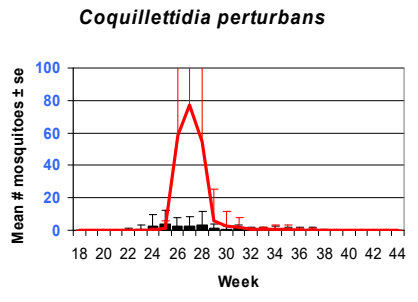
Philadelphia Metro



Pinelands



Suburban Corridor

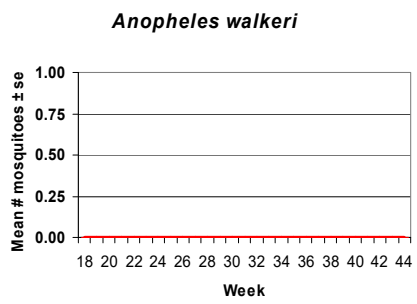


Comments

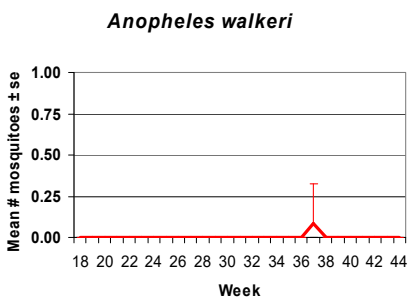
Coquillettidia perturbans is a univoltine species that exhibits a simple extended generation each season. The mosquito overwinters in the larval stage. Each instar emerges as a separate cohort giving the appearance of multiple generations. This year's dataset shows that there is considerable regional variation in the structure of overwintering populations. Evidence for emergence of larvae that overwinter in the 2nd, 3rd, and 4th instars can be seen in most regions. With the exception of the Delaware Bayshore, Delaware River Basin and the Philadelphia Metro Regions, the 4th instar larvae made up the bulk of the overwintering larval form.

Anopheles walkeri – Monotypic (*walkeri*) Species

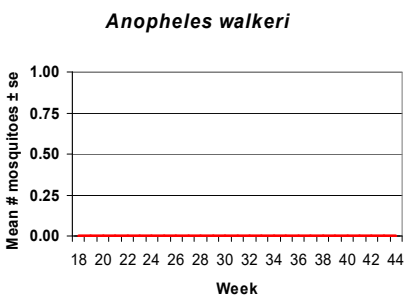
Agricultural



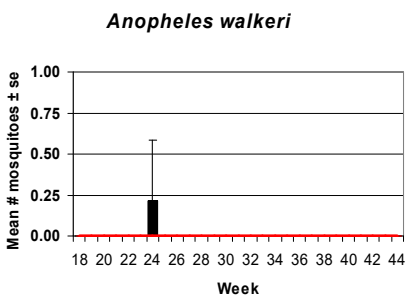
Coastal



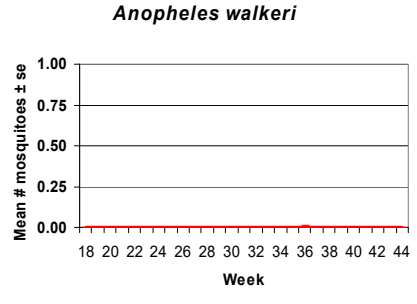
Delaware Bayshore



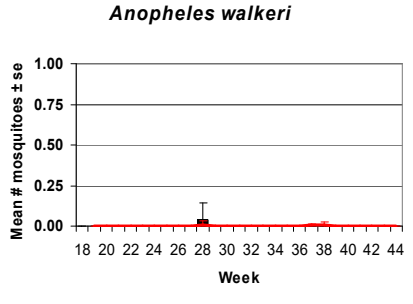
Delaware River Basin



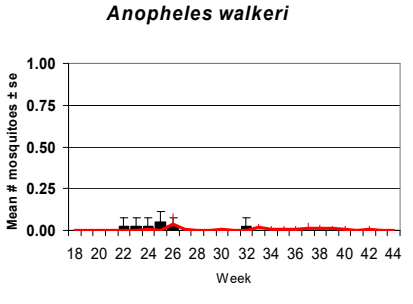
New York Metro



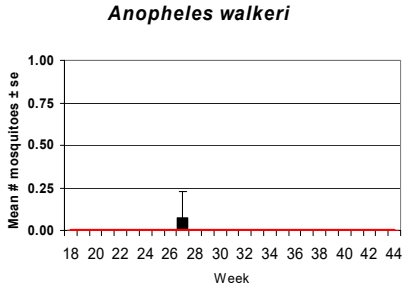
North Central Rural



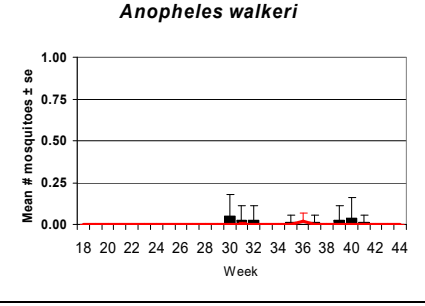
Northwestern Rural



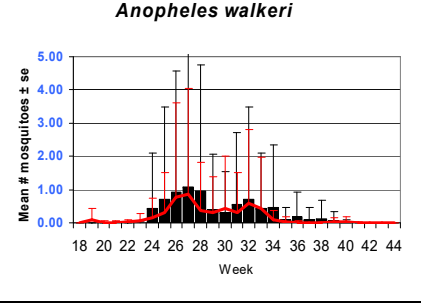
Philadelphia Metro



Pinelands



Suburban Corridor



Comments

Anopheles walkeri is an anopheline that overwinters as a winter-hardy egg. As a result, the species appears earlier in the season than other members in this genus. Light trap records from most regions are too low to provide reliable population data. The dataset from the Suburban Corridor shows a typical population curve.