

2009 Arbovirus Surveillance Report

Introduction

During the 2008 collecting season over 66,000 mosquitoes were collected and tested for West Nile virus. Of the 1,012 pools tested, 45 pools were West Nile positive. Hoping to build on the success of the 2008 season, mosquito surveillance was continued utilizing permanent trap sites. In addition to the trapping conducted by the state, two local health departments (Cabell and Ohio counties) set up their own mosquito trapping programs, The public health entomologist and summer interns assisted the counties with mosquito species identification and supplying numbers for pool testing.

Methods

Trapping began on May 19, 2009, conducted by three student interns and the public health entomologist. All five of the sites in Jackson County utilized in 2008 were again used in 2009. These included the Jackson County fair grounds lagoon, the lagoon serving the large mobile home park in Cottageville and the small package plant also serving a mobile home park, also in Cottageville. The sites also included a small sewage lagoon at the Greenhills Country Club, located on the edge of the golf course. The other sewage lagoon was located outside of Ripley and served the Parchment Valley Conference Center.

Some sites previously used in Kanawha County were also used again in 2009. The Lower Falls which suffers from poor drainage was utilized again. With the heavy rains experienced in 2009 many yards in the area remain flooded until August and September. The sewage lagoon located in the Lower Falls area in 2008 was again used as a trapping location. Additional sites located in 2008 and revisited in 2009 included the West Virginia Air National Guard (WVANG) and Capitol High School. In addition to the WVANG site traps were also set at the West Virginia Army National Guard, which adjoins the WVANG base. In addition to the Jackson and Kanawha county sites, several mosquito complaint sites were located in Putnam County. In addition to these sites the two local health departments had numerous collecting locations in each of their counties, with Cabell having 8 sites and Ohio having 11 sites respectively.

Trapping Methods

A combination of CDC gravid traps Reiter-Cummings gravid traps were again utilized in 2009. The Reiter-Cummings Gravid Traps experienced mechanical problems throughout the season, lowering overall catch numbers. For this reason these traps will be removed from trapping procedure during the 2010 surveillance season.

Specimen Handling

All mosquitoes collected daily were returned to the lab in the nets in which they were collected. All collecting nets were then placed in a minus 80 Celsius freezer to kill the mosquitoes. After all mosquitoes were dead, all samples from a single

trapping area were placed in a large six inch Petri dish. Mosquitoes were sorted into two groups: *Culex* and non-*Culex* mosquitoes. All non-*Culex* mosquitoes were discarded or saved as teaching specimens. All *Culex* mosquitoes (regardless of species) were pooled into groups of 100 mosquitoes (unless the catches were small then 25 to 50 mosquitoes were used). The pool groups of mosquitoes were placed in 2 ml Sarstedt micro tubes with two copper or glass BBs. The switch to glass BBs was made during the season, due to the difficulty of procuring copper BBs with state purchasing. With the glass beads additional time was needed for grinding the mosquitoes, about 10 minutes. A buffer solution was added to the micro tubes and then the tubes were placed on a mixer mill for four minutes. With the addition of the buffer solution and the action of the BBs, the mosquitoes were ground into slurry on the mixer mill. The resulting material was centrifuged and extracted. Using RTPCR the sample was analyzed for WNV and Saint Louis encephalitis. In addition to the *Culex* mosquitoes, both local health departments submitted pools of *Ochlerotatus/Aedes* mosquitoes for virus testing. Specimen handling for these mosquitoes was the same procedure as the utilized for *Culex* mosquitoes.

Results and Discussion

Between May 19 and October 22, a total of 54,267 mosquitoes were collected at 34 sites. The majority of mosquitoes collected belonged to the genus *Culex*. However, *Ochlerotatus triseriatus*, *Oc. japonicus*, *Stegomyia albopicta* and *Aedes vexans* were also collected and tested. A total of 854 pools of mosquitoes were submitted for virus testing, of these 140 pools were positive for WNV. The highest numbers of mosquitoes were collected in June (**Chart 1**). Typically mosquito numbers peak in July. In the past minimum infection rates (MIR) were calculated for each week when a positive pool was collected at a site. The minimum infection rate is calculated: $(\text{number of positive pools} / \text{total specimens tested}) \times 1000$. The MIR uses the assumption that a positive pool contains only one infected mosquito. This season MLEs (most likelihood estimates) were calculated for the sites. MLEs take in the bias of mosquito pools of varying sizes. MLE are calculated using a statistical program used with Microsoft Excel. However, like MIR there are short comings to MLE. When all pools are positive for a site, likelihood estimates do not exist. MIRs are used to determine when control practices should be put in place to prevent cases of human or animal disease. The cut-off for Infection Rate (IR) is 4.5 to 4.9; anything above these values, then control practices should be put in place.

Collections from Cabell County produced 7,910 mosquitoes for the season. A total of 127 pools were submitted for virus testing; fifteen were positive for WNV. The highest infection rate was *Culex spp.* collected from the Lesage lagoon with an infection rate of 71.43 (**Chart 2**). These mosquitoes were collected using a CDC gravid trap. Other notable infection rates included two groups of non-*Culex* mosquitoes. *Ochlerotatus triseriatus* collected from Cabell Midland High during the week of 29-31 July had an infection rate of 28.07 (**Chart 3**). These mosquitoes were collected using a carbon dioxide trap. A pool of *Oc. triseriatus*

collected by carbon dioxide trap from the Madison Avenue landfill had an infection rate of 3.34.

Collections from Ohio County (**Chart 4**) produced 3,896 mosquitoes for the season. A total of 122 pools were submitted for virus testing, 21 pools were positive for WNV. The highest infection rate for *Culex* mosquitoes was 50.98 from the Longview Acres site. Four pools of *Ochlerotatus japonicus* tested positive for WNV (**Chart 5**), however since they were single pools from different sites an infection rate could not be calculated.

The collections for the Kanawha County sites produced 28,588 mosquitoes over the season (**Chart 6**). A total of 405 pools were submitted for virus testing, 66 pools tested positive for WNV. Over half of the mosquitoes collected in Kanawha County (15,600) were collected at the Lower Falls area. Thirty nine of the positive pools were from the Lower Falls area (**Chart 7**). The highest infection rate for the Lower Falls area was 14.37, collected the week of August 4-7. The Lower Falls area of St. Albans floods due to poor drainage covers an area of several blocks. Two pools of *Ochlerotatus triseriatus* tested positive for WNV, however since they were single pools from different weeks an infection rate could not be calculated.

The collections from Jackson County sites produced 13,227 mosquitoes over the season (**Chart 8**). A total of 166 pools were submitted for virus testing, 29 pools tested positive for WNV. The greatest number of positive pools was collected during the weeks of August 4 to 6 and September 9 and 10. During the week of August 4 to 6, the fairgrounds lagoon had an IR of 45.93. This was the highest infection rate in Jackson County for the season.

STRENGTHS AND LIMITATIONS

Several problems limited the ability to trap large numbers of mosquitoes during the 2009 season. Foremost was the weather, many days there were torrential rains following the set-up of trapping location. The heavy rains severely limited mosquito flight times. Also effecting catch sizes were the constant failures of the Reiter-Cummings gravid traps. These traps will be eliminated during the 2010 collecting season. Vehicles maintenance issues also limited collections. However the collections from Cabell and Ohio County health departments greatly supplemented state efforts, and demonstrated that local health departments can add to state efforts.

CONCLUSIONS

Animal surveillance is conducted to find the disease in nature before there is spill-over into the human population. When positive pools are located the local health department will be notified. If sewage package plants are involved the permit holder should be contacted. Many of these facilities are not maintained after installation. The facility may require pumping. Permit holders should also be contacted following the finding of positive mosquito pools from sewage

lagoons. Vegetation should be cut around the lagoon, taking care that it does not fall into the water, adding additional organic matter. Lagoons can also be aerated to make them less habitable by mosquitoes. Lastly lagoons can be treated with *Bacillus sphaericus*. *B. sphaericus* is a restricted product and can only be applied by a pest control operator licensed by the West Virginia Department of Agriculture. If the permit holder will not work with the local health department, local health can contact the regional West Virginia Department of Environmental Protection (WVDEP) for assistance. WVDEP regulates all water that comes from sewage treatment facilities. Public education should also be initiated.

The general public should be made aware of the findings of positive pools. Information given to the public should include information on the proper use of repellents, eliminating breeding locations and making the home bug tight. Finally an alert should go to physicians alerting to watch for patients who show symptoms of arboviral infection.

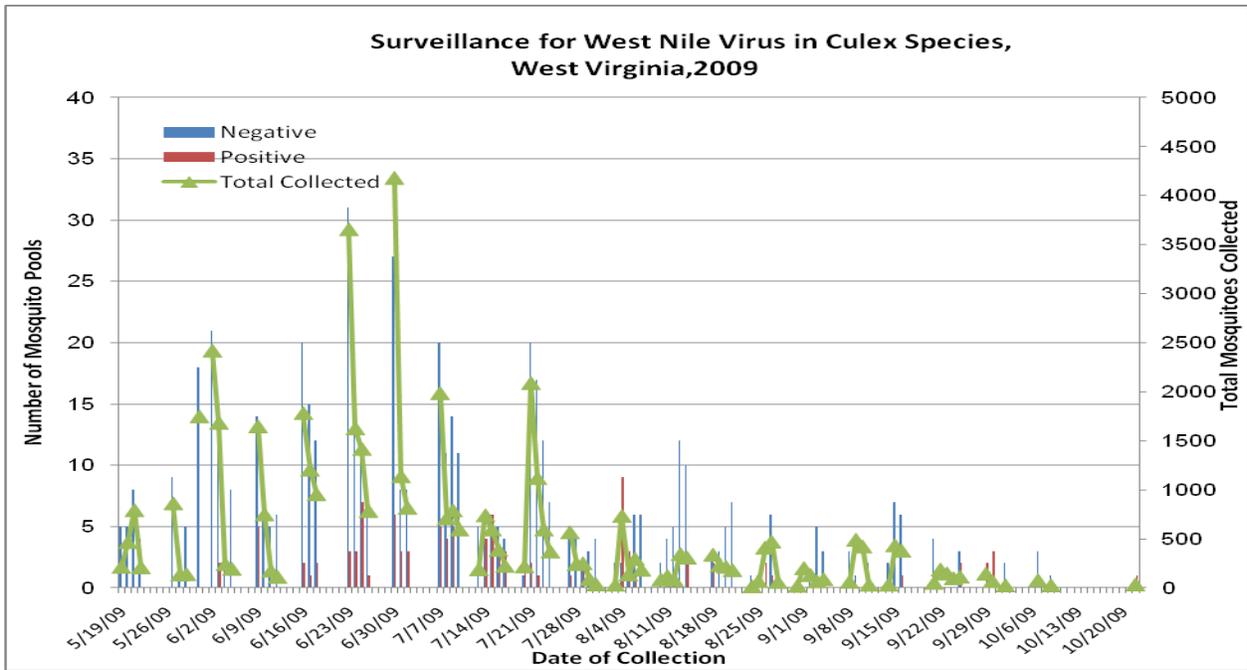


Chart 1: Total Culex Mosquito Collection for West Virginia in 2009

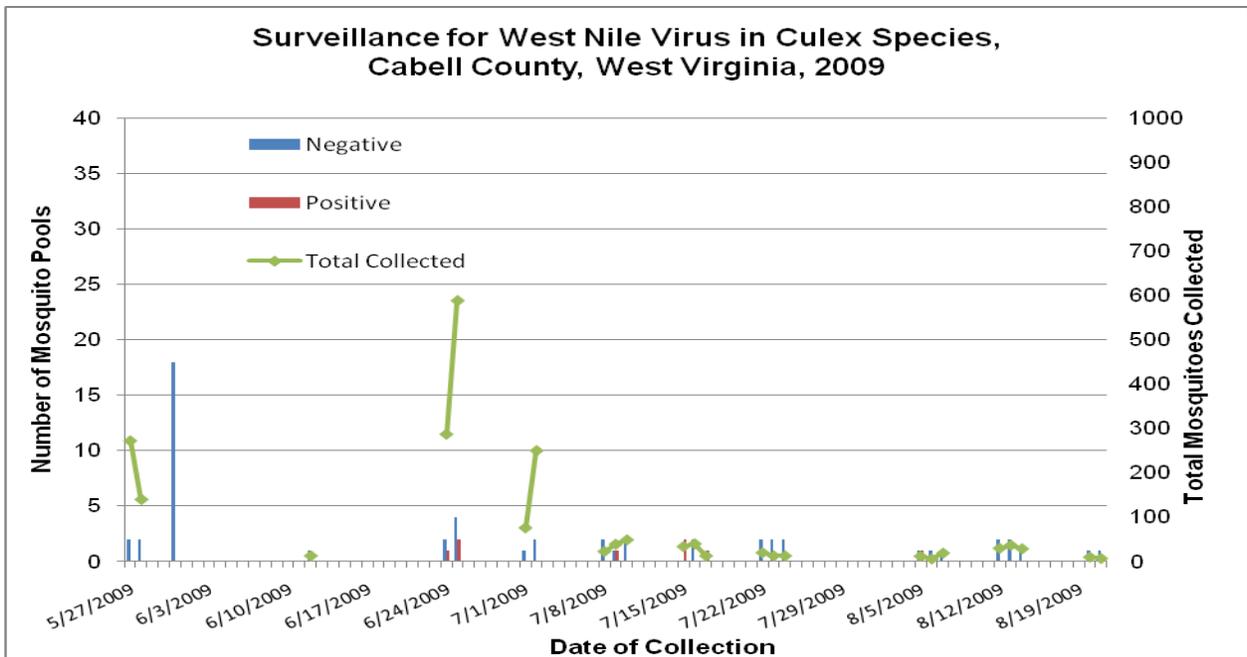


Chart 2: Total Culex Mosquito Collection for Cabell County in 2009

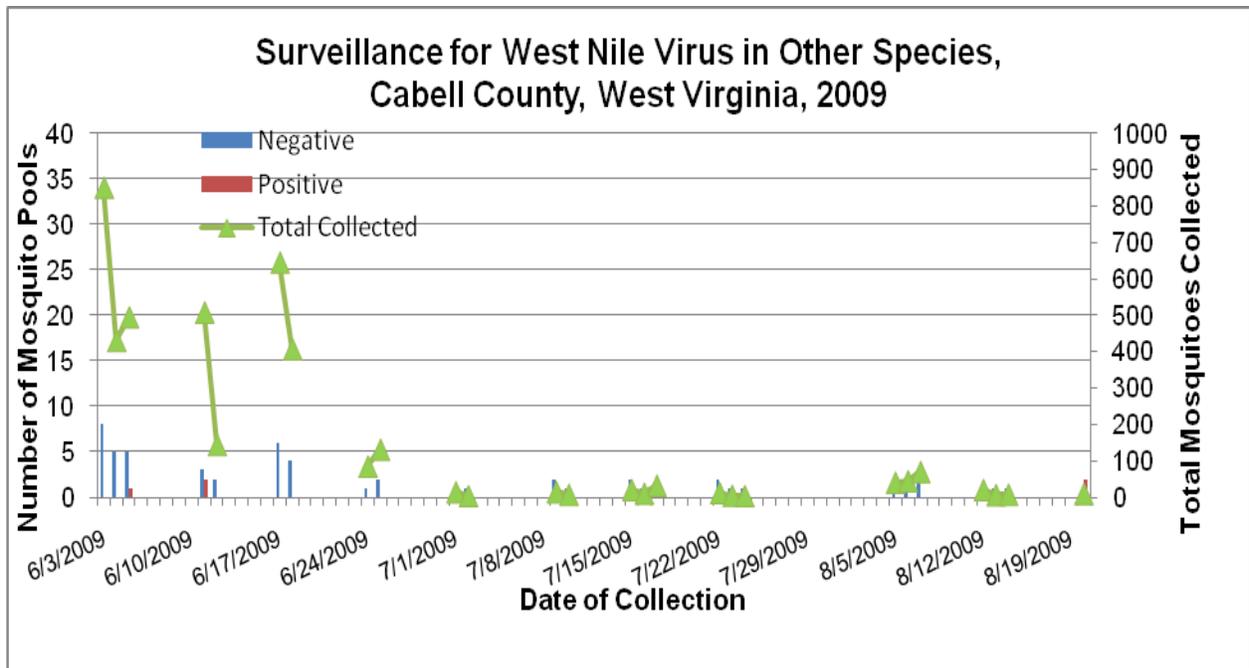


Chart 3: Total Mosquito Collection (Other Species) for Cabell County in 2009

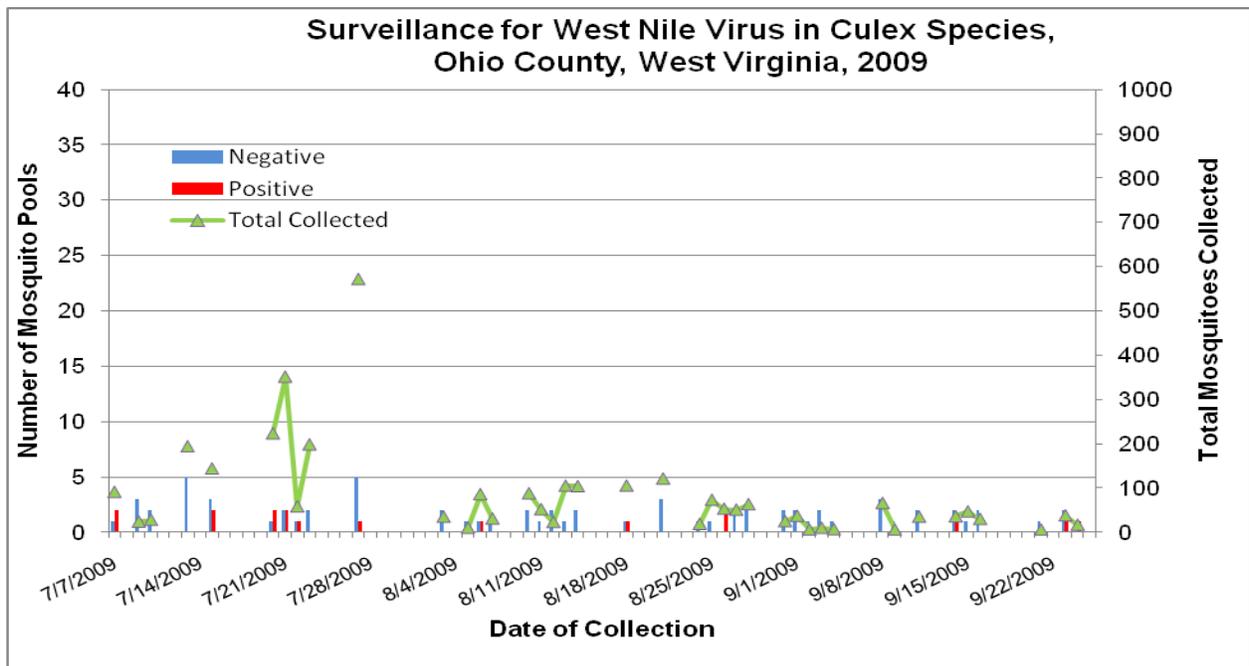


Chart 4: Total Culex Mosquito Collection for Ohio County in 2009

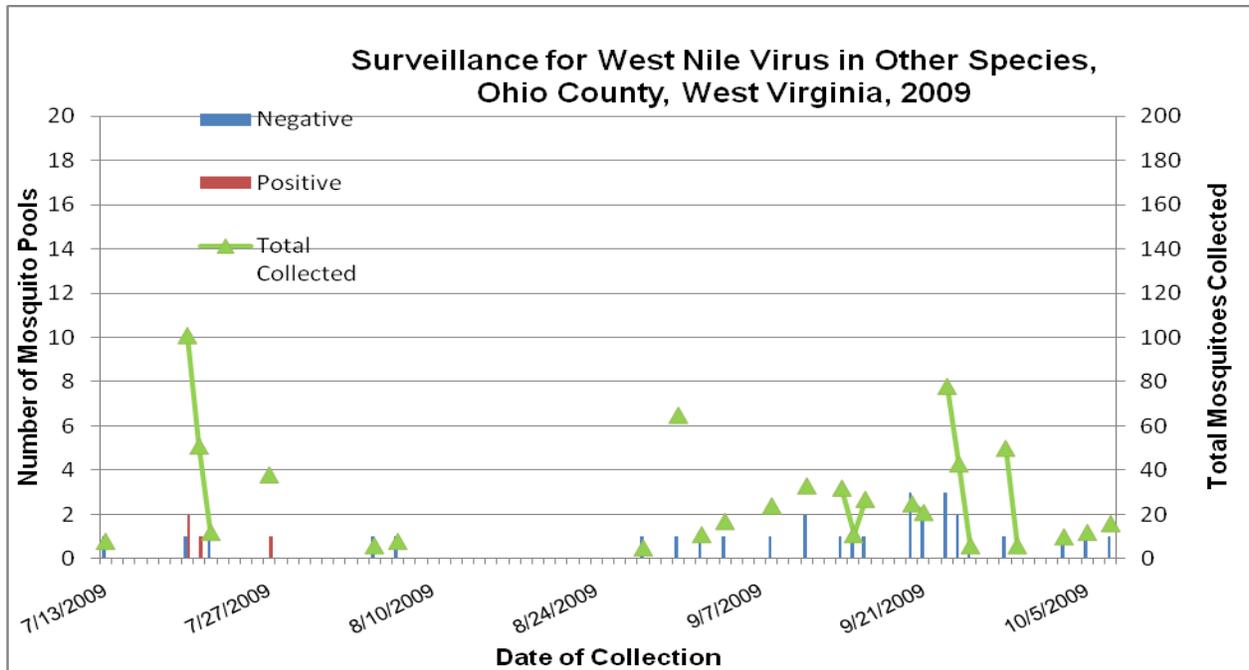


Chart 5: Total Mosquito (Other Species) Collection for Ohio County in 2009

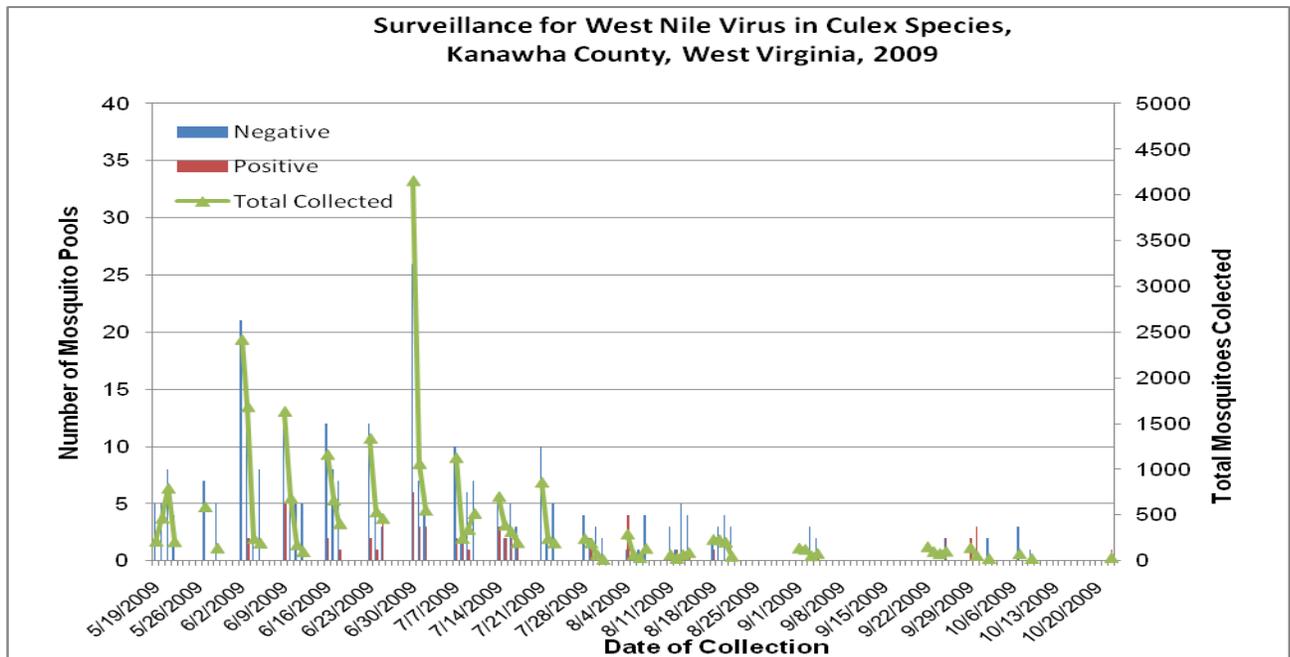


Chart 6: Total Culex Mosquito Collection for Kanawha in 2009

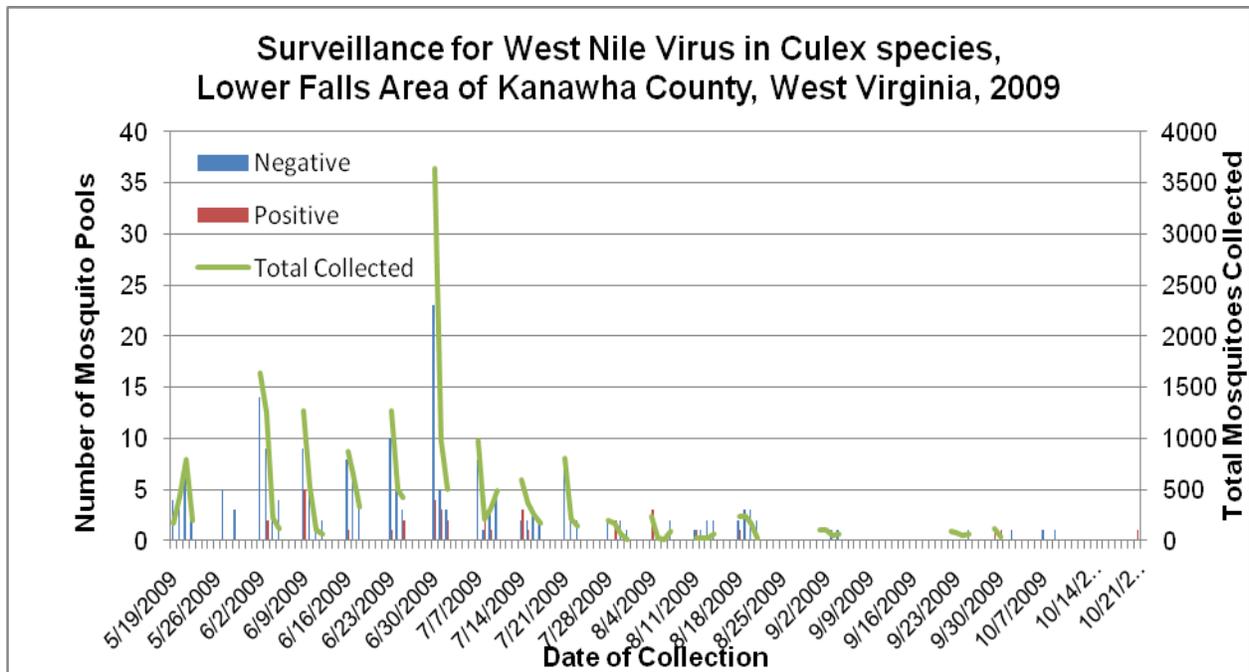


Chart 7: Total Culex Mosquito Collection for Lower Falls (Kanawha County) in 2009

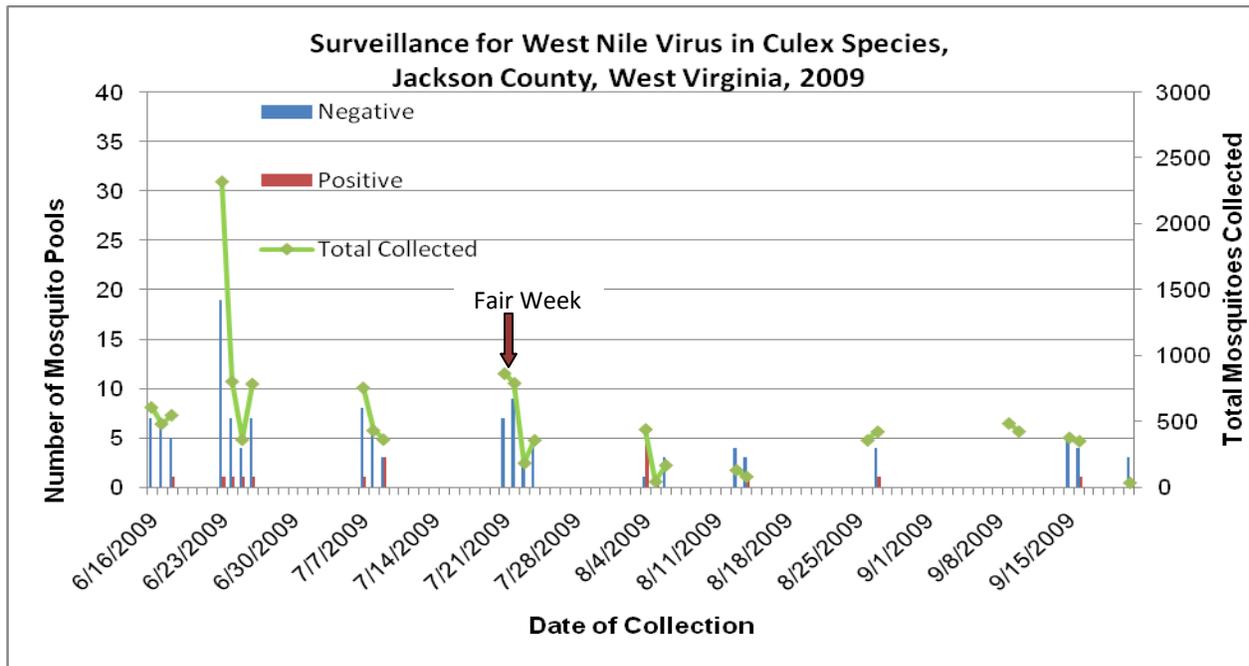


Chart 8: Total Culex Mosquito Collection for Jackson County in 2009