

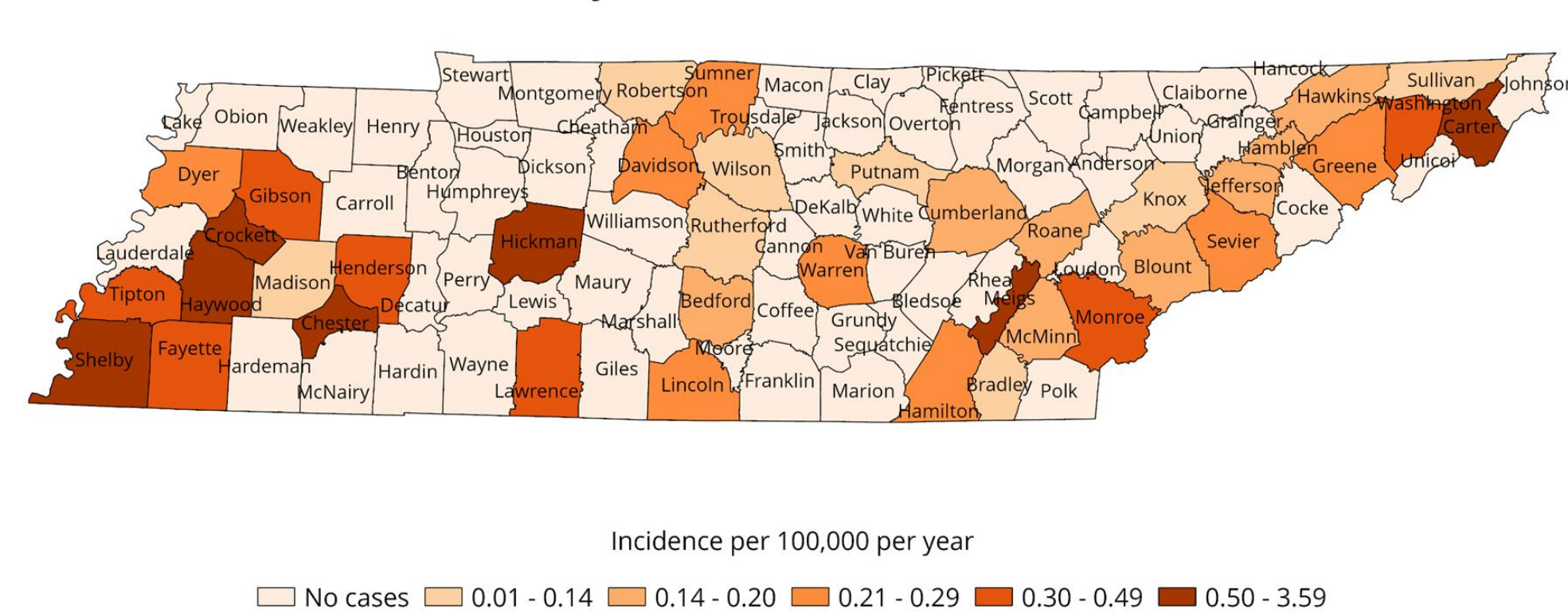
Abstract

West Nile virus (WNV) is the leading agent of mosquito-borne illness in the continental United States.¹ Mosquitoes become infected with WNV by taking a viremic bloodmeal from a previously infected bird. WNV can then be transmitted to humans through the bite of an infected mosquito. Mosquitoes in Tennessee are collected by metro health departments and submitted to the Tennessee Department of Health Vector-Borne Diseases Laboratory for arboviral testing. Mosquitoes are tested for WNV, Saint Louis encephalitis virus (SLEV), and Flanders virus (FLAV). Mosquito surveillance is conducted during the mosquito season typically from May to October. This poster displays the prevalence of human WNV cases in relation to WNV positive mosquito pools and examines the relationship between FLAV and WNV in Shelby County, TN. The results continue to emphasize the trend that FLAV peaks in prevalence before WNV and is an indicator of future WNV positive mosquito pools. These results also highlight that there is an increase in human WNV cases during the months where there is most environmental risk and WNV infection in mosquito pools. Surveillance and testing of mosquitoes helps inform mosquito control and prevention messaging in metropolitan areas of Tennessee.

Background

- Shelby County has one of the highest WNV incidence rates in Tennessee. There are currently no medications or vaccines to treat WNV, so surveillance and control are of high importance.^{1, 2}
- Mosquito surveillance and trapping are conducted weekly in Shelby County during mosquito season (May to October) to determine where larviciding and adulticiding is needed for more effective mosquito control.
- FLAV is detected around 10 weeks prior to WNV in similar locations, which serves as an indicator of sites to target with mosquito reduction efforts.³

West Nile Virus in Tennessee by County Incidence Rate, 2011-2021



Methods

- Shelby County Vector Control used Gravid traps overnight to target the collection of Culex mosquitoes.
- Mosquitoes were pooled up to 50 individuals by species, date collected, trap, sex, and location.
- Mosquito samples were homogenized, and RNA was extracted using a biorobot.
- Samples were tested by qPCR for West Nile virus (WNV), St. Louis encephalitis virus (SLEV), and Flanders virus (FLAV).

Results

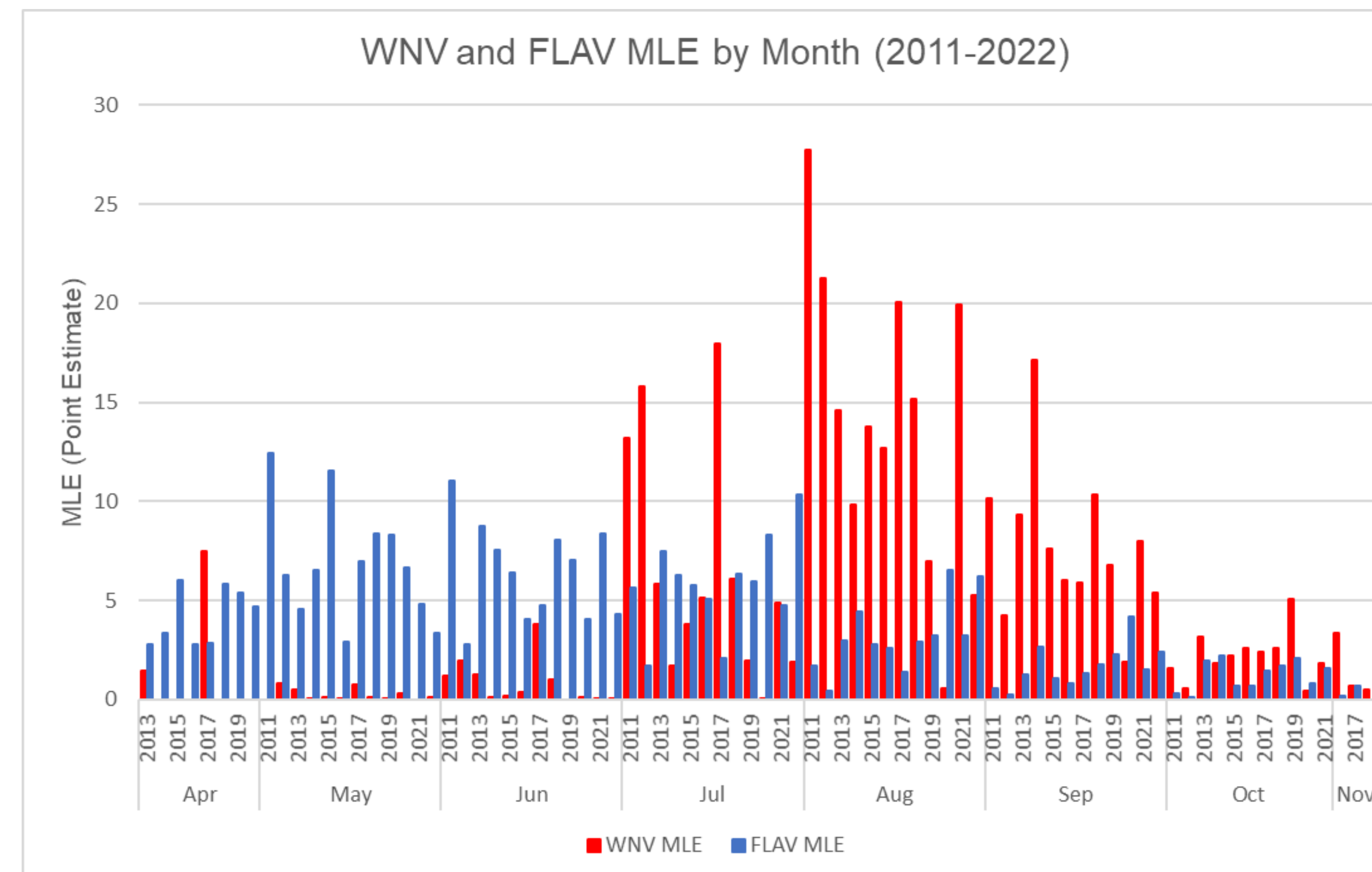


Figure 1: The maximum likelihood estimate (MLE) of West Nile virus (WNV) and Flanders virus (FLAV) seen at each month from 2011-2022. Flanders virus can be seen peaking earlier in the season than West Nile virus.

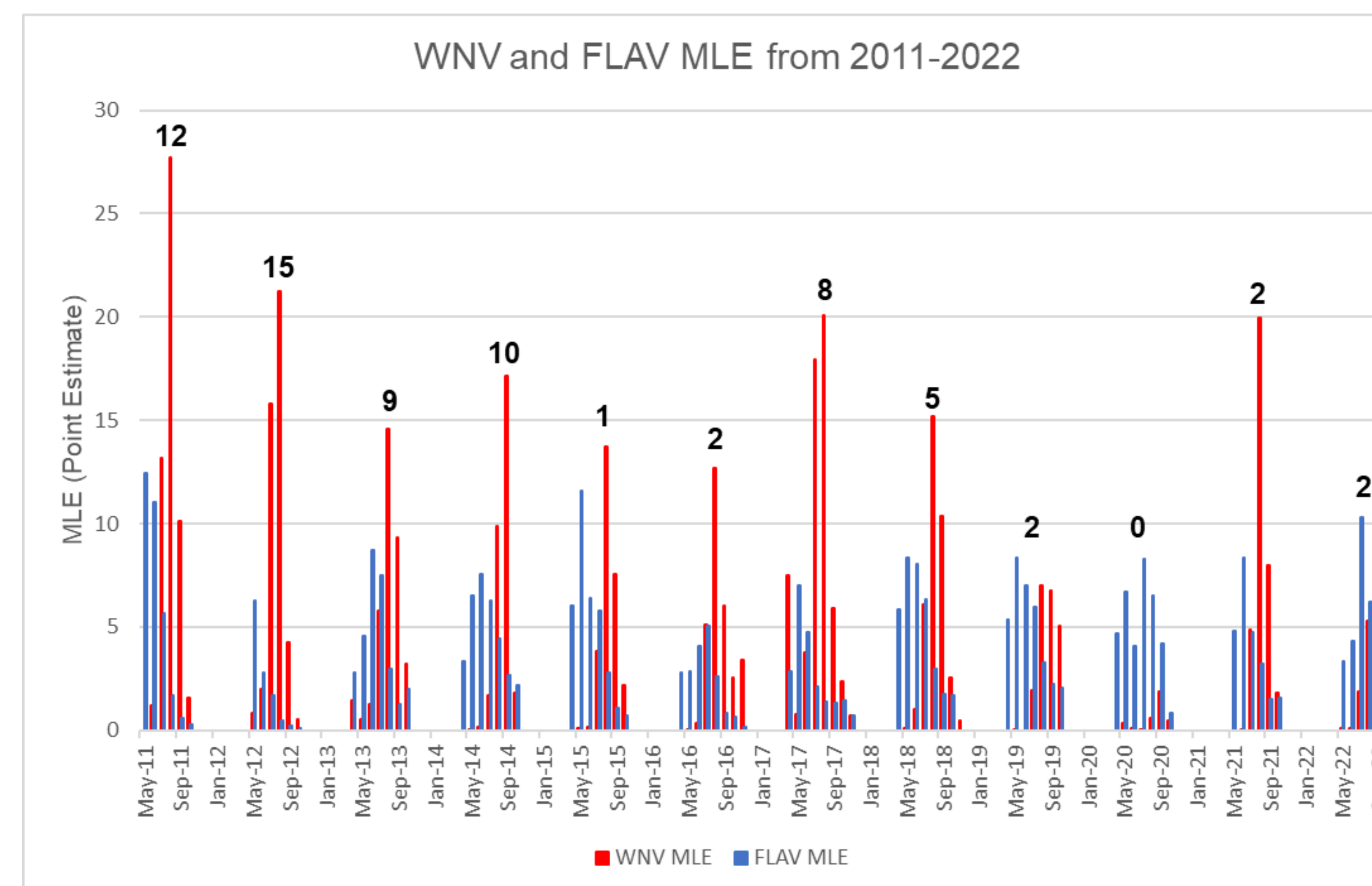


Figure 2: Mosquito testing seasons from 2011-2022 and the corresponding WNV cases in Shelby County. The black numbers above indicate the number of human WNV cases in Shelby County during each season.

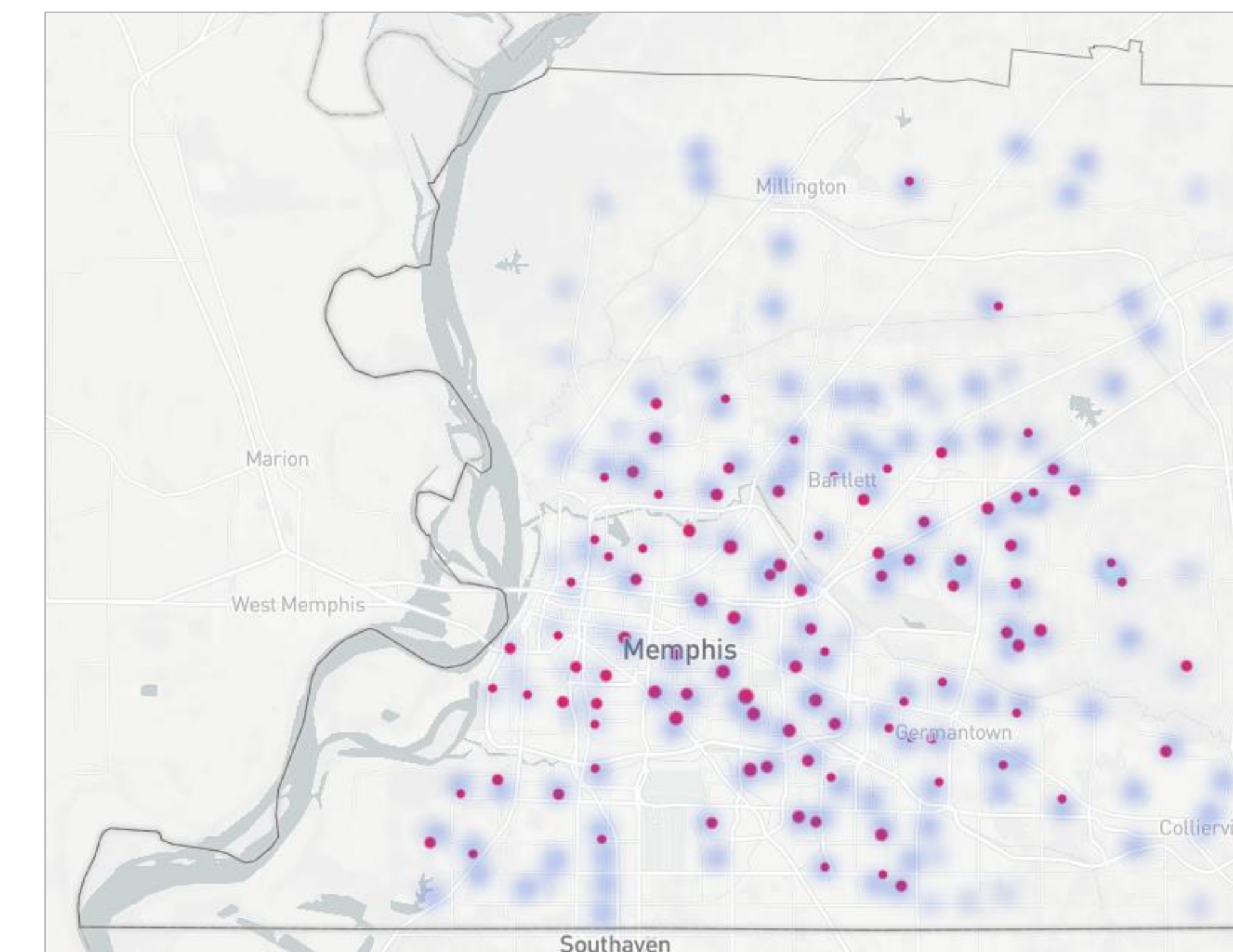


Figure 3: Map of Shelby County locations surveyed for mosquitoes and the WNV positive mosquito pools (in red) from May 2022-September 2022.

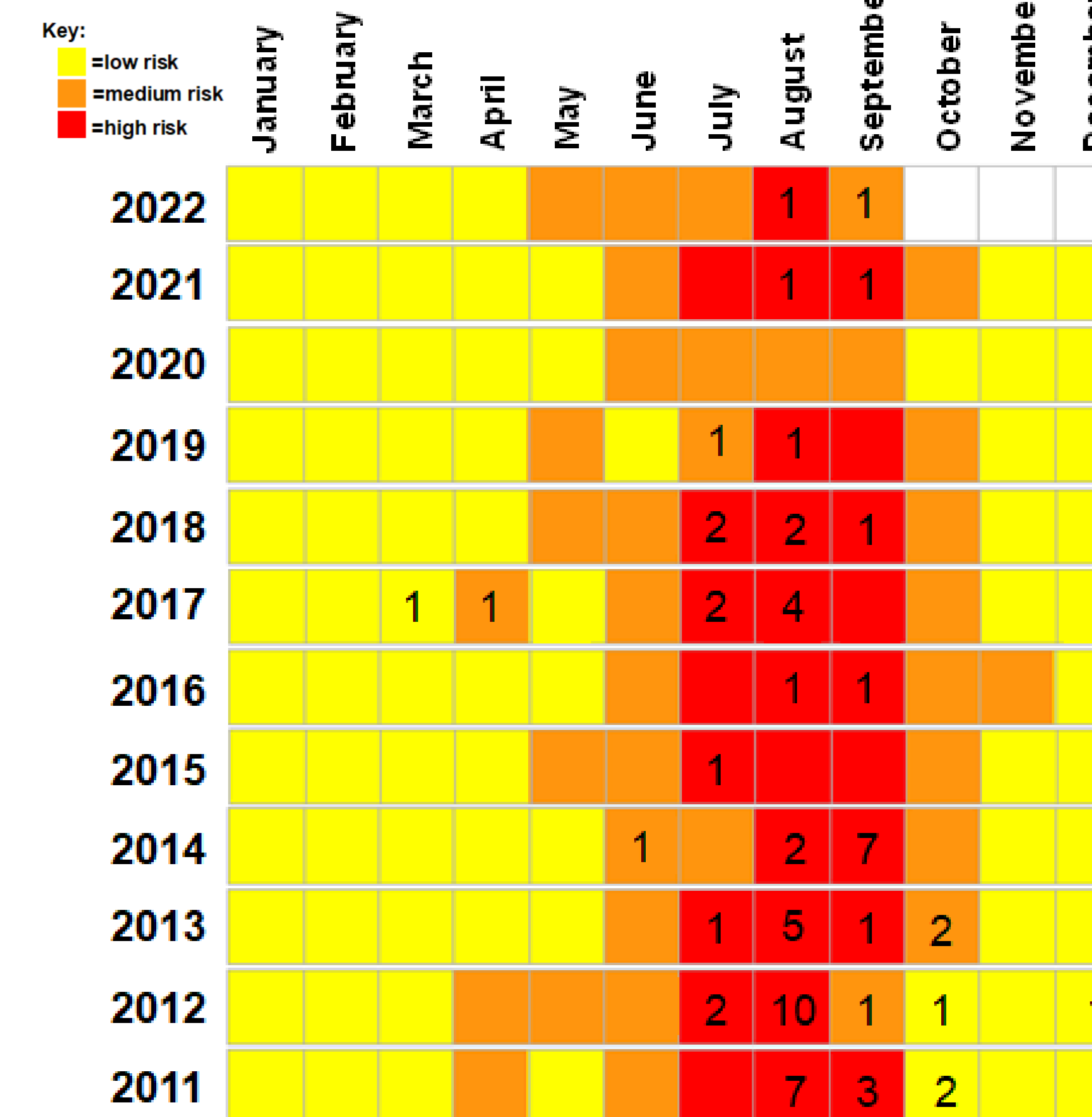


Figure 4: WNV Risk Assessment of mosquitoes in Shelby County calculated by environmental factors and infection rate of mosquito pools.⁴ Risk outside of mosquito testing season was only calculated by environmental factors (temperature and precipitation). The numbers show the number of human WNV cases in Shelby County for that month. Months with high risk contained the most human WNV cases.

Discussion

- Surveillance and testing efforts show that during months when there is a high likelihood of West Nile virus positive mosquito pools, there is a high number of human WNV cases.
- The month of August consistently had the greatest reported WNV MLE and the highest number of human WNV cases.
- In 2020, only a medium risk for WNV was seen throughout the mosquito testing season. This resulted in no human cases being reported that year.
- FLAV consistently peaks in the early months of mosquito season from May-June, before WNV peaks in August-September.
- Adulticiding can only take place based on mosquito data.⁵ In areas where WNV positive mosquito pools are located, spraying is conducted to reduce mosquito numbers and WNV transmission to humans.

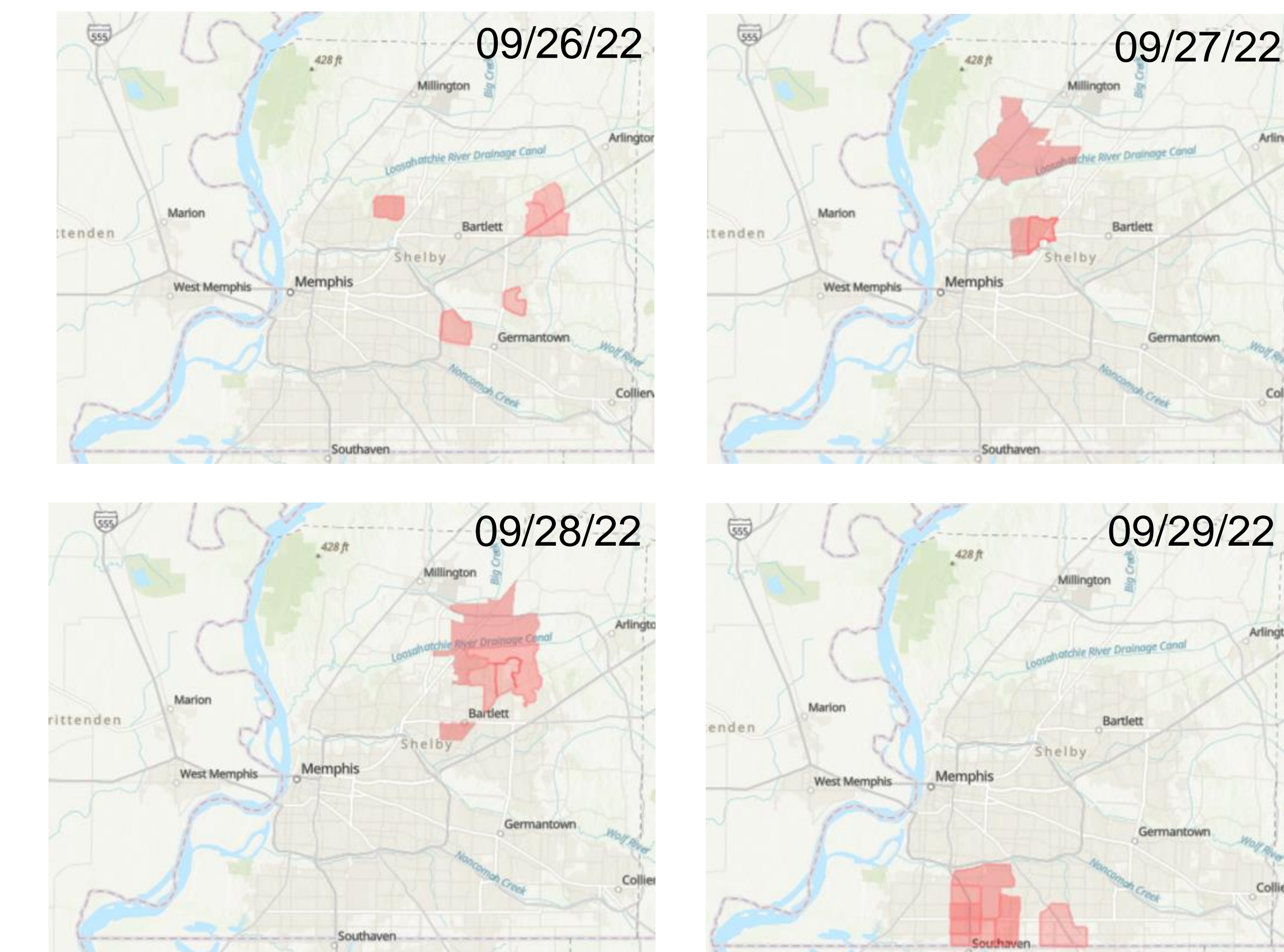


Figure 5: Shelby County locations from September 26-29, 2022 where adulticiding occurred.

Acknowledgements

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