



July 19, 2021 | Week 27 | Volume 1 Issue 1

Welcome to the first edition of the Florida Arboviral Disease Activity Update, from the desk of Dr. Jonathan Day!

It is Clarke's privilege to share Dr. Day's weekly analysis of arbovirus disease activity in Florida with mosquito control professionals across the state. Our shared goal with Dr. Day is to provide timely, actionable data and information that mosquito control programs can use to make operational decisions and protect public health from vector-borne diseases.

Florida Arboviral Transmission in a Historical Context

It is sometimes helpful to compare current arboviral transmission trends to transmission patterns from the recent past. To that end, a comparison of arboviral transmission in Florida during 2020 and the transmission patterns observed so far in 2021 may prove to be informative in forecasting Florida transmission in the second half of 2021.

The 2020 Florida arboviral transmission was unusually active. Were it not for the COVID-19 pandemic, arboviral transmission in Florida during 2020 would have received much more national and international press coverage.

In Florida, four arboviruses account for the greatest human disease risk; dengue viruses (DENV), eastern equine encephalitis virus (EEEV), St. Louis encephalitis virus (SLEV), and West Nile virus (WNV). Table 1 summarizes the transmission of these four viruses during 2020.



July 19, 2021 | Week 27 | Volume 1 Issue 1

Table 1. Summary of 2020 arboviral activity in Florida (as of Week 53, December 31, 2020)			
Virus	Number of positive sentinel chickens	Number of positive horses	Number of positive humans
DENV	DNA*	DNA	71 in two Counties (Miami Dade and Monroe)
EEEV	54 in 14 Counties	22 in 14 Counties	None
SLEV	8 in 7 Counties	DNA	None
WNV	421 in 25 Counties	14 in 11 Counties	86 in 11 Counties
*DNA = Does Not Apply			

An outbreak of locally-acquired dengue virus resulted in 71 confirmed human cases in the upper keys of Monroe County (67 cases) and Miami (4 cases). Transmission of EEEV was also active throughout most of Florida. Twenty-two EEEV-positive equines were reported from 14 Florida counties and 54 EEEV antibody-positive sentinel chickens were reported in 14 Florida counties. There were no human EEE cases reported in Florida during 2020. Transmission of WNV was extremely active throughout most of Florida in 2020. There were 421 WNV antibody-positive sentinel chickens reported in 25 counties, 14 WNV-positive equines in 11 counties, and 86 human WN cases in 11 counties. It appears that St. Louis encephalitis virus is periodically reintroduced into Florida, probably in migrating birds. Because of this, transmission of SLEV has been extremely focal during most transmission seasons since 2000. In 2020, there was little evidence of SLEV transmission in Florida with only eight SLEV antibody-positive sentinel chickens reported from seven Florida counties.

What are the Current Arboviral Transmission Levels in Florida?



July 19, 2021 | Week 27 | Volume 1 Issue 1

Table 2 summarizes the arboviral transmission situation in Florida as of July 3rd, 2021 (Week 26).

Table 2. Summary of 2021 arboviral activity in Florida (as of Week 26, July 3, 2021)			
Virus	Number of positive sentinel chickens	Number of positive horses	Number of positive humans
DENV	DNA*	DNA	None
EEEV	109 in 18 Counties	11 in 10 Counties	None
SLEV	2 in one County (Palm Beach)	DNA	None
WNV	2 in two Counties (Citrus and Manatee)	None	None
*DNA = Does Not Apply			

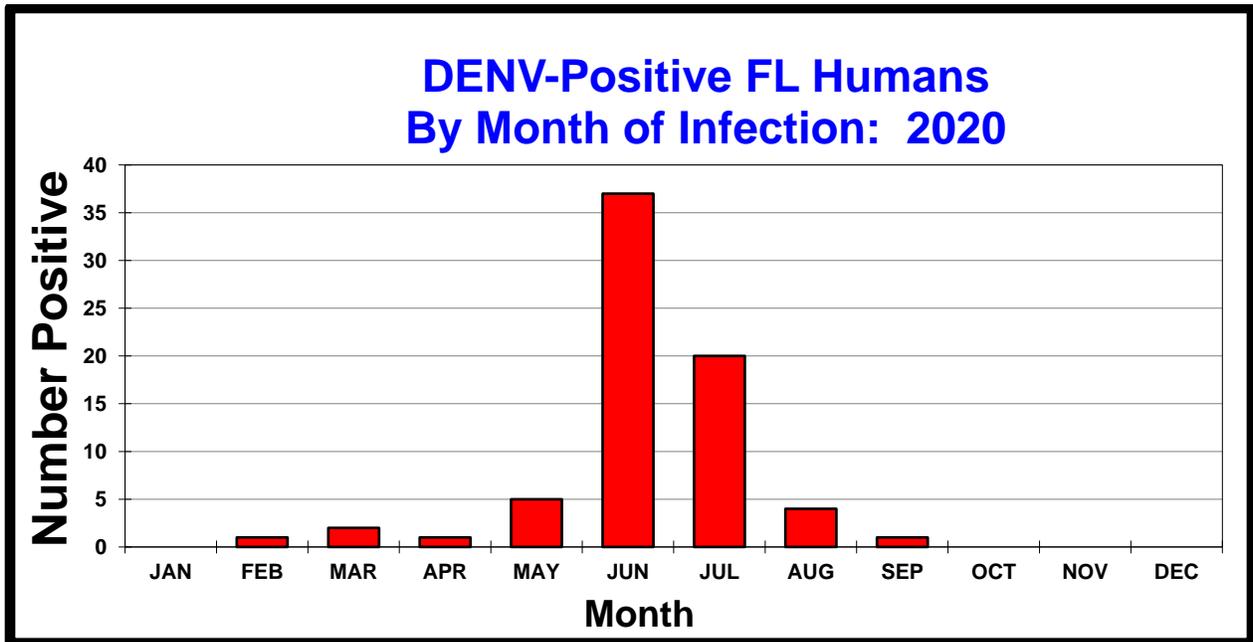
The only arbovirus with significant transmission during the first half of 2021 is EEEV. Each of the four important Florida arboviruses will be discussed in detail below.

Dengue Virus Activity in 2021

At least four serotypes of dengue virus are known to infect humans. Usually, only one or two serotypes circulate in an area at any given time. It appears that DENV I was circulating in the 2020 south Florida outbreak. As of Week 26, there is no evidence of DENV circulation in Florida. It is helpful to review the temporal pattern of DENV transmission in south Florida during 2020.



July 19, 2021 | Week 27 | Volume 1 Issue 1



There was evidence of DENV transmission to humans as early as February, 2020. A likely scenario for this outbreak is that DENV was introduced into south Florida, probably through an infected human who contacted adult *Aedes aegypti* female mosquitoes and initiated a local DENV transmission cycle that steadily built throughout the summer months. If this is how local DENV transmission cycles are initiated, there is little evidence so far in 2021 to suggest that DENV is currently cycling in south Florida.

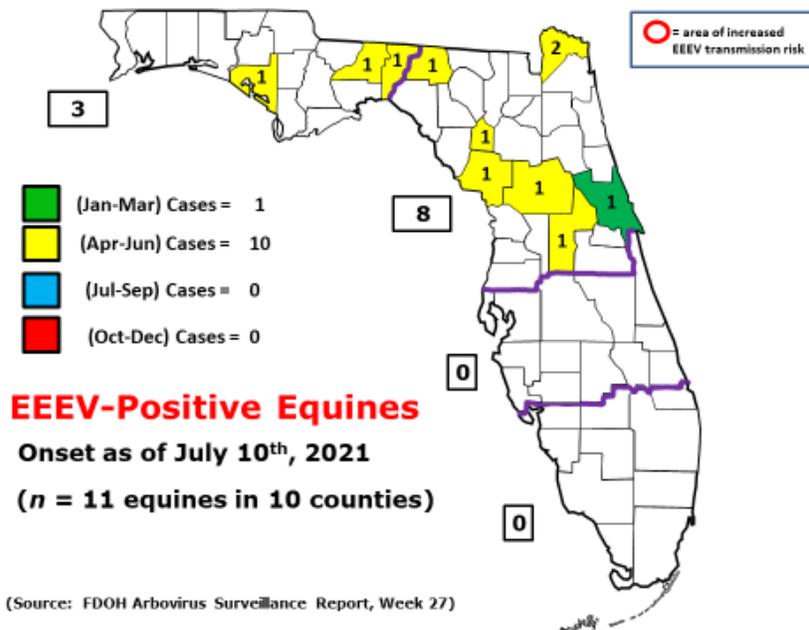
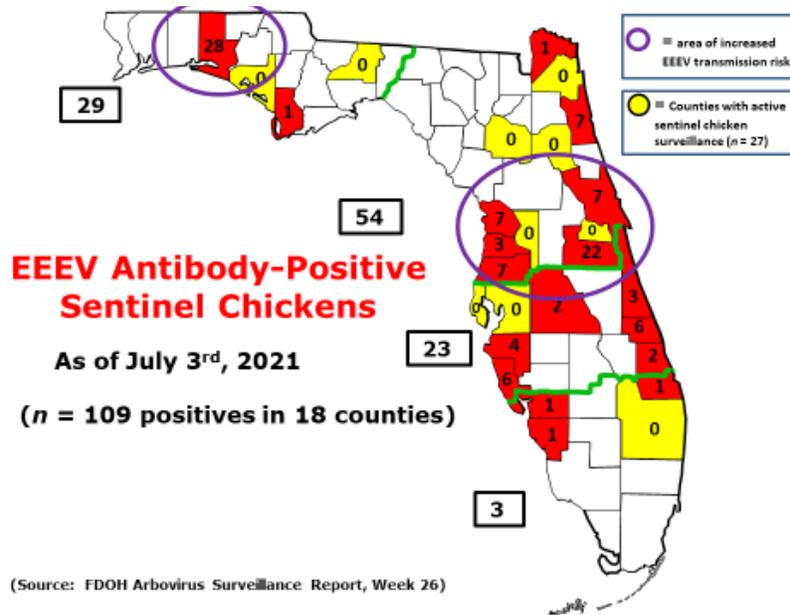
Eastern Equine Encephalitis Virus Activity in Florida During 2021

Of the four arboviruses of public health concern in Florida, EEEV has been the most active so far during 2021. Sentinel chickens and horses have provided early warning that EEEV has been amplified and is being transmitted in Florida.

FLORIDA DISEASE ACTIVITY UPDATE

FROM THE DESK OF DR. DAY

July 19, 2021 | Week 27 | Volume 1 Issue 1





July 19, 2021 | Week 27 | Volume 1 Issue 1

Sentinel chickens (top Figure) indicate that there are currently two EEEV foci in Florida, one in the central Panhandle and one in northern half of the Florida Peninsula. Transmission of EEEV to Florida equines (bottom Figure) confirm the transmission patterns suggested by sentinel chicken surveillance. Transmission of EEEV to equines and humans usually peaks in July and August in Florida.

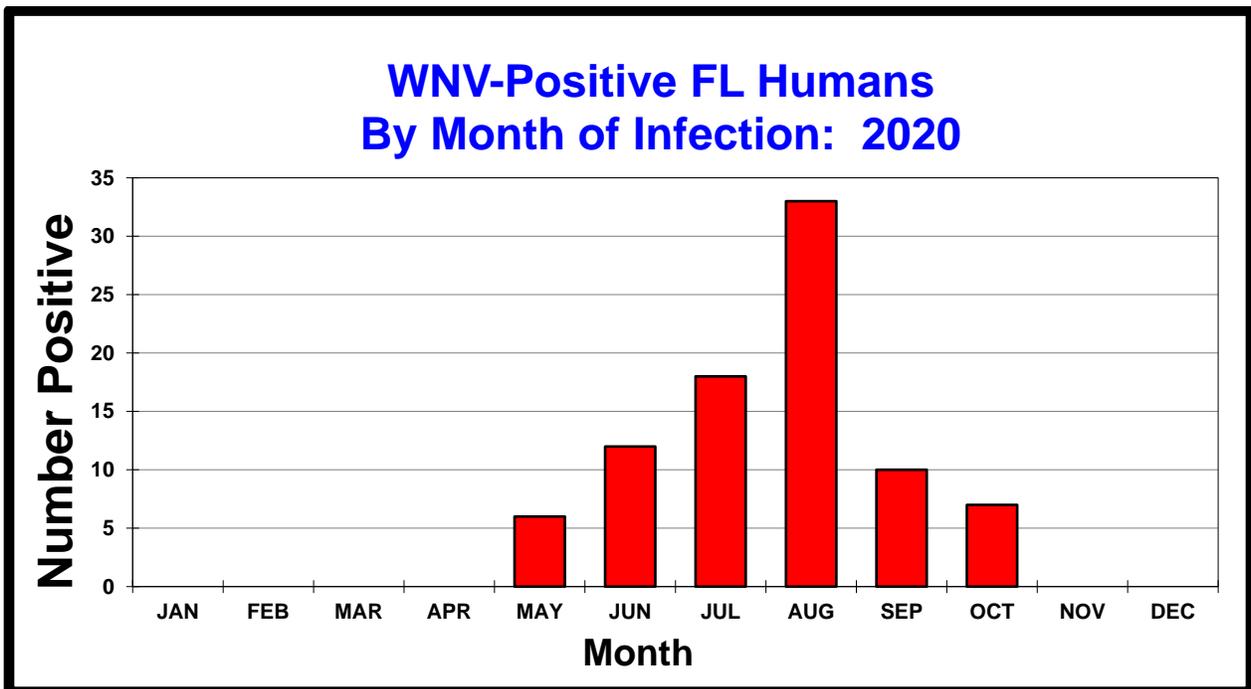
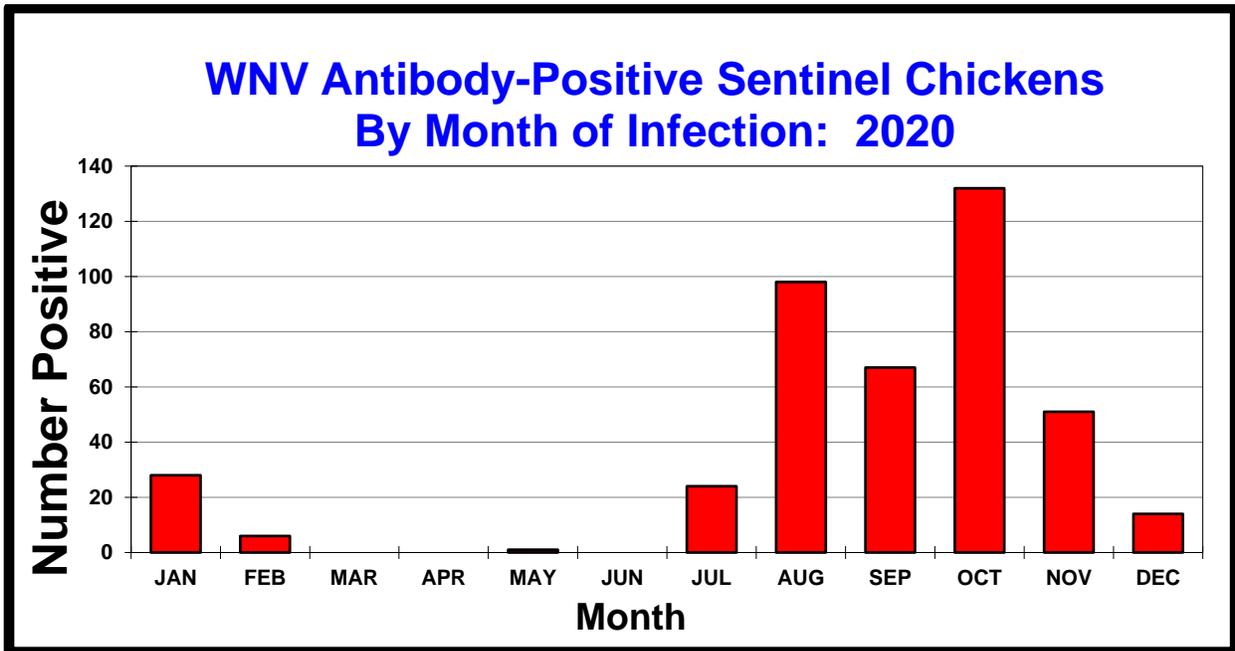
St. Louis Encephalitis Virus Activity in Florida During 2021

There is little evidence of SLEV transmission in Florida so far in 2021. Rainfall/drought cycles during the first half of 2021 have not favored the amplification nor the transmission of SLEV anywhere in the state, but especially in the southern half of the Florida Peninsula where this virus has historically been transmitted. All indications are that extensive focal transmission of SLEV will not occur in Florida during 2021.

West Nile Virus Activity in Florida During 2021

The same environmental conditions (rainfall/drought cycles) that favor SLEV amplification and transmission also favor the amplification and transmission of WNV. With only 2 WNV antibody-positive sentinel chickens reported so far this year, it appears that WNV has not efficiently amplified in Florida in 2021. However, peak WNV transmission tends to be shifted into the second half of the year. Transmission of WNV to sentinel chickens and humans in 2020 shows this shift.

July 19, 2021 | Week 27 | Volume 1 Issue 1





July 19, 2021 | Week 27 | Volume 1 Issue 1

Sentinel chicken serological surveillance was interrupted by a shift in resources in April, May, and June, 2020 resulting from the COVID-19 Pandemic. However, it is clear from the sentinel chicken plot (top Figure) that there was extensive WNV transmission during the second half of 2020. Likewise, the number of human WNV cases by date of onset shows a clear peak in August (bottom Figure).

All indications are that ideal environmental conditions (rainfall, drought, and temperature) for WNV amplification and transmission existed in south Florida during the spring and early summer of 2020. Evidence so far in 2021 suggest that the environmental conditions favoring Flavivirus (SLEV and WNV) amplification and transmission have not existed anywhere in Florida.

Operational Strategies to Consider

As of this report, evidence suggests that the risk of DENV, SLEV, and WNV transmission is currently low throughout Florida. The risk of EEEV transmission in the Florida Panhandle and Central and North Florida is currently moderate and we are entering the traditionally high EEEV transmission period (July and August).

Vector and virus surveillance remains the most important tool vector control agencies have at their disposal. Monitoring arboviral transmission indices (sentinel chickens, positive equines, positive exotics (emus), and positive humans) provide indicators of local transmission, although not in a timely manner. Monitoring mosquito populations, and where and when possible, mosquito population age structure, provides added information about potential transmission risk. Additional vector control efforts in and around sites where virus transmission is ongoing or suspected is another mechanism to mitigate viral transmission.



July 19, 2021 | Week 27 | Volume 1 Issue 1

Acknowledgements

This analysis would not be possible without the tireless efforts of multiple agencies across Florida. At least 27 Florida agencies collect serum samples from sentinel chickens each week and mail them to the Florida Department of Health Tampa Branch Laboratory for analysis and reporting. Data are summarized by researchers at the Florida Department of Health in Tallahassee and reported weekly as the *Florida Arbovirus Surveillance* report. Contributors to this report include: Andrea Morrison, PhD, MSPH, Rebecca Zimler, PhD, MPH, and Danielle Stanek, DVM, Florida Department of Health, Bureau of Epidemiology; Lea Heberlein-Larson, DrPH; Alexis LaCrue, PhD, MS; Maribel Castaneda, and Valerie Mock, BS, Florida Department of Health Bureau of Public Health Laboratories, and Carina Blackmore, DVM, PhD, FDOH Division of Disease Control and Health Protection. And, Dr. Rachel Lacey, Florida Department of Agriculture and Consumer Services, Animal Disease Diagnostic Laboratory in Kissimmee, FL.

About Dr. Day

Jonathan Day, Professor Emeritus of Medical Entomology at the University of Florida, is a national expert on mosquitoes and other blood-feeding arthropods that transmit diseases to humans, domestic animals, and wildlife. In collaboration with other researchers, Dr. Day has developed an effective system for monitoring and predicting epidemics of mosquito-borne diseases.

“The mosquito control decisions we make today affects disease transmission levels tomorrow.”

– DR. DAY