

Quarterly Report 2019



MOSQUITO ABATEMENT

ST. TAMMANY PARISH

From the Director:

It's halftime in our annual battle with mosquitoes and the pathogens they transmit. Unlike a sporting event there is no time for a break. Current surveillance indicators suggest another active *West Nile virus* (WNV) season is upon us. To date, seven pools of mosquitoes out of 2,166 have tested positive for WNV infection. Though this is nearly half of the number collected by this time last year (15 out of 1,914), WNV-infected mosquito pools have been collected across St. Tammany Parish in south Covington, Mandeville, and Pearl River. In June, we were also notified by the Louisiana Department of Health that a horse from Bush was diagnosed with *eastern equine encephalitis virus*. Now is the time to take the steps necessary to minimize your risk of arbovirus infection (see page 7). We take all arbovirus activity seriously and have responded to each report of pathogen activity with all available tools and best industry practices.

Hot, dry weather conducive to the production of our primary WNV vector, the southern house mosquito has settled in. This mosquito is associated with drought conditions and water that receives sewage effluent (see page 6). The dry weather and foul ditches favor the southern house mosquito larvae as their primary predator, mosquitofish, can't survive these polluted conditions. Figure 1 on page 2 shows the dramatic increase in the average number of southern house mosquitoes collected in traps during the second quarter of 2019. Though the average abundance of southern house mosquitoes was lower than the average from the past two years, the seasonal peak of southern house mosquitoes exceeded the average abundance starting in mid-May. Most of the mosquito control efforts in the second quarter focused on controlling this vector species. Adulticide spray trucks completed 446 spray missions treating 377,405 acres, while the airplane completed 20 spray missions covering 421,368 acres.

As reported in May, our evaluation of the cost efficacy of helicopter larvicide applications kept us quite busy preparing for and conducting this assessment in the second quarter. A more complete review of our results to date are presented on page 5. We look forward to evaluating the cost efficacy of helicopter applications of adulticides in the upcoming third quarter.

The second quarter of this year also saw an increased commitment to communication and transparency for our agency. Led by a public outreach effort through traditional and social media, we are reaching more of our residents than ever with targeted risk and prevention messages. Since launching our page in March, we have gained over 500 followers and reached over 120,700 people through our posts. Those posts had a total of 22,435 engagements - meaning likes, comments and shares.

Though the story of 2019 is only half written, our preparation over the past winter and through the first quarter has me confident in our approach and hopeful for a less active season than 2018.



Kevin A. Caillouet, Ph.D., M.S.P.H.
Director

On the cover: Field Biologist Mark Bunch places collection cups in a yard in the Tammany Hills neighborhood during the helicopter evaluation to measure the effectiveness of *Bti* in containers.

Below: Hundreds of mosquito eggs found in a ditch on Sixth Street in Tammany Hills during the evaluation of the first helicopter mission.



How Bad are the Mosquitoes?

Culex quinquefasciatus

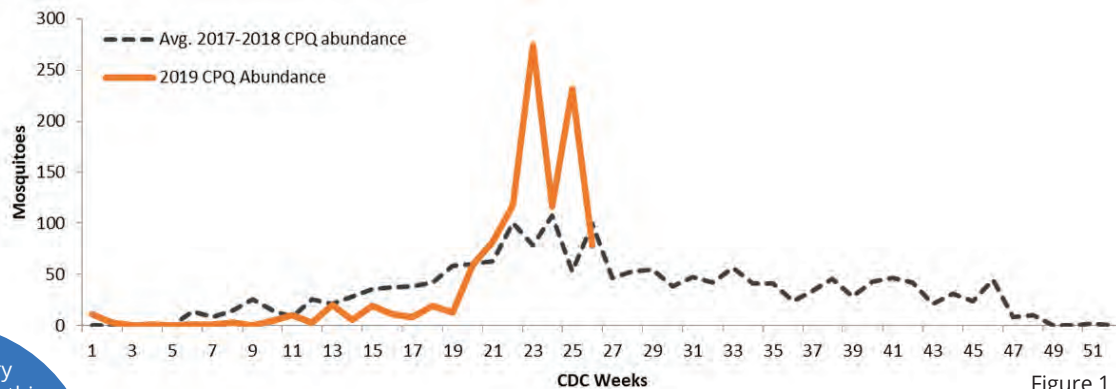
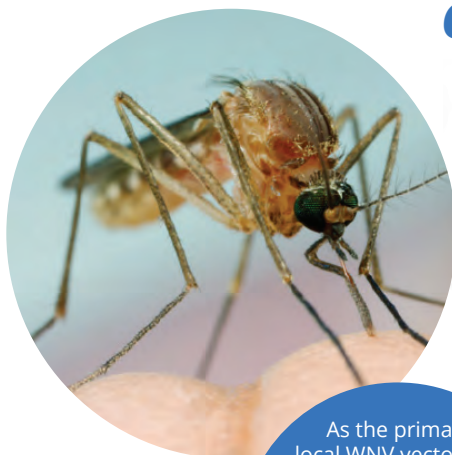


Figure 1

Common name:

The southern house mosquito

As the primary local WNV vector this mosquito primarily bites birds and occasionally bites people. It prefers to lay its eggs in sewage-associated water. As it readily enters structures, it is named the "house" mosquito.



56,290

trapped in Q2

98

average number per trap

Culex salinarius

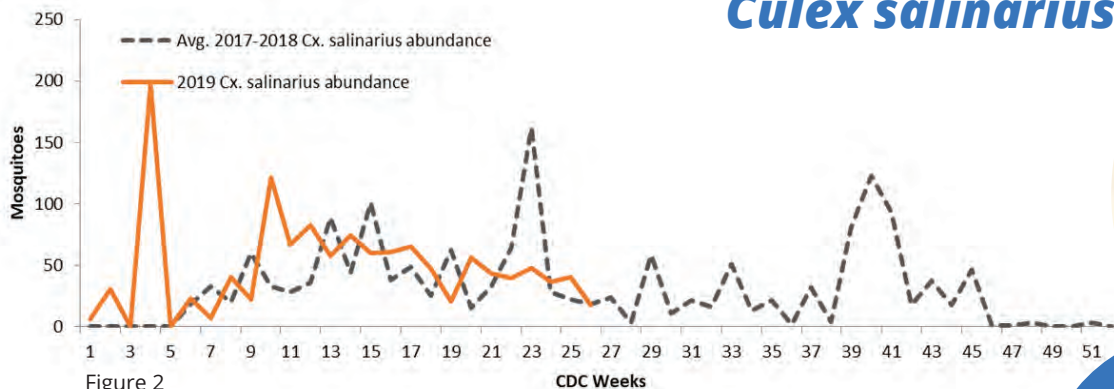


Figure 2



162,865

trapped in Q2

108

average number per trap

A serious pest that is produced in fresh to brackish marshes. It frequently bites large mammals including people and birds. Considered an important secondary WNV vector.

Common name:

The brackish marsh mosquito

Mosquito Abundance for all Species:

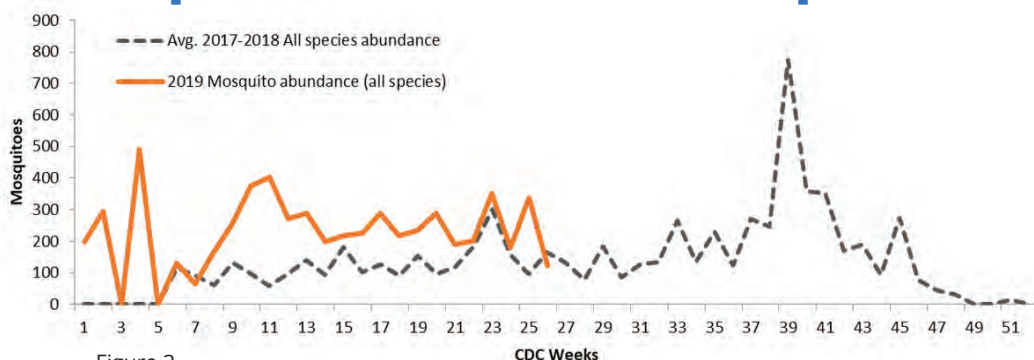


Figure 3

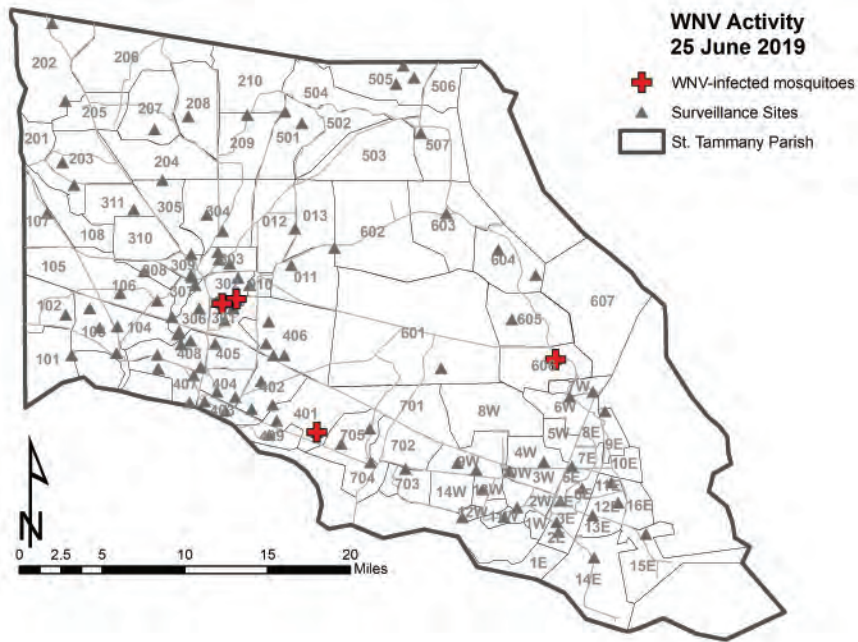


319,933

total mosquitoes trapped in Q2

26

of different species found in Q2



West Nile virus Risk Level

the current risk advisory is:

High

Moderate

Slight

Low

Though the parish-wide WNV risk may be slight, focal areas likely are experiencing elevated risk. Residents are urged to take measures to minimize the risk of contracting WNV by avoiding mosquito bites by applying CDC recommended repellents, ensure sewage systems are operable, and maintain vegetation in roadside ditches.

Arbovirus Surveillance Report

Seven of the 1,443 pools of mosquitoes, tested from specimens collected in the second quarter (Q2) of 2019 (or 2166 for the year-to-date), were positive for *West Nile virus* (WNV) infection. A total of 57,145 mosquitoes were collected and tested for WNV in Q2 across St. Tammany Parish. Adult mosquitoes are collected using a variety of devices and tested in pools (or groups) via RT-PCR, by the Louisiana Arbovirus Disease Diagnostic Laboratory (LADDL) in Baton Rouge. The presence of WNV in mosquitoes indicates a focal risk of WNV infection to people in specific areas of St. Tammany Parish. Six of the WNV-infected mosquito pools consisted of the primary vector, *Culex quinquefasciatus*, and one consisted of the secondary WNV vector, *Cx. salinarius*. Infected mosquito pools were collected beginning on May 21 and throughout June at sites from south Covington, East Mandeville/Lacombe, and Pearl River.

The Louisiana Department of Health has not reported any human cases of *West Nile virus* or any other arbovirus this year-to-date in Louisiana.



In and out of the lab

Elusive *Coquilleltidia*/*Mansonia*

Our Research Assistant, Sydney Johnson (pictured above), spent several months searching the marsh for *Mansonia* and *Coquilleltidia* mosquito larvae. These larvae are particularly challenging to find because they breathe by using a modified air siphon which they attach to the roots of aquatic vegetation. They are able to hide under this thick vegetation and avoid predators as well as our control agents.

In early June, she located these species breeding in aquatic vegetation including water hyacinth, water lettuce, and cattails in the Madisonville area.

These mosquitoes are painful biters and can take the fun out of the many amazing recreational opportunities we have in St. Tammany. Though they are not our primary vectors, they are capable of spreading *West Nile virus* and other mosquito-transmitted diseases. If we can find and treat them in their larval stage, we can kill them before they ever become biting adults.

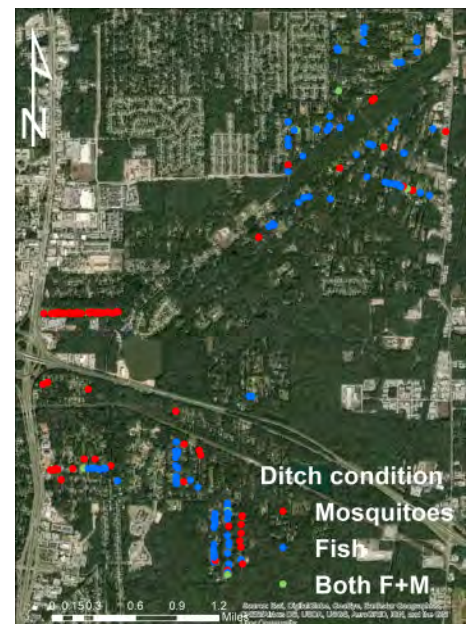
Because these larvae are so elusive, finding them in the roots of aquatic plants was a monumental challenge. Now that we know which local host plants they are using, we can develop a proactive larviciding strategy, as opposed to a reactive adulticiding strategy which we currently rely upon.



Life in Unexpected Places

In collaboration with the Lake Pontchartrain Basin Foundation (LPBF) and the EPA, we are examining the effect of remediating faulty sewage systems on the production of mosquitoes in roadside ditches across St. Tammany. This summer we will be measuring water quality parameters and looking for the presence of mosquitoes and mosquitofish in neighborhoods within the Ponchitolawa Watershed, a river-basin currently receiving remediation from LPBF.

In June, we performed a survey of residences that are eligible to receive sewage remediation within the watershed. Neighborhoods surveyed include: Dove Park, Ozone Park, Ponchitolawa Estates, Slemmer Rd, Thelma Estates, and Red Gap Acres. Throughout the month, our team visited 332 unique properties and observed whether water, fish, and mosquitoes were present or absent at the sewage discharge pipe.



After extensive scouting and mapping of the region throughout May and June, we will begin to collect data in the third quarter. We hope to be able to link remediation efforts with recovering fish populations and subsequently lower mosquito populations.



MOSQUITO LARVA MORTALITY

Helicopters are used widely for mosquito control applications in Florida due to their unique ability to apply larvicides and adulticides in targeted areas. Compared to applications by airplane, which cover much wider areas, helicopter applications can be more economical for expensive control agents such as larvicides. Helicopter applications of public health pesticides (larvicides or adulticides) may also generally be more effective than truck-based applications, because they are not limited by the road network and can provide blanket area coverage.

Given the high density of houses in select neighborhoods that have individual on-site sewage systems and a history of WNV, we assessed the efficacy of helicopter applications of the larvicide *Bacillus thuringiensis israelensis* (*Bti*) to control WNV vectors. The West Nile virus (WNV) vector, *Culex quinquefasciatus*, rears its larvae in 1) backyard containers, 2) roadside ditches, and 3) underground sources, such as septic tanks or drainage pipes.

Helicopter applications of *Bti* were conducted weekly for four weeks from May 21 to June 12, between the hours of 6-10AM.

Larvae in containers

The number of containers with mosquito larvae per house decreased by 71% across the study period --suggesting good control of container-inhabiting mosquitoes.

Larvae in ditches

A 24 hour before/after *Bti* application count of larvae in ditches demonstrated an 63% reduction, suggesting a moderate effect in roadside ditches. A separate large volume bioassay using dilutions of water from sewage-contaminated ditches demonstrated that the efficacy of *Bti* is mitigated by high concentrations of polluted water, but not in lower concentrations. Since *Bti* must be ingested by mosquito larvae to kill them, we hypothesized that high concentrations of other bacterial food sources in sewage-contaminated water limit the dose of *Bti* ingested.

Effect on adult mosquitoes

Despite the demonstrated moderate impacts on larvae in the targeted area, we did not observe any reductions in adult mosquito populations of either *Cx. quinquefasciatus* or *Ae. albopictus*. Adult mosquito abundance remained higher in the treatment neighborhood compared to a control area which did not receive *Bti* across the five-week period sampled. The inability to target larvicide control agents inside underground sewage systems, and the scale of *Cx. quinquefasciatus* emergence in sites with incomplete control efficacy, may contribute to the lack of reduced adult populations.

1



2



3



for mosquito production

Of the 65 mosquito species in Louisiana, one species, *Cx. quinquefasciatus*, prefers to use water sources that are contaminated with human sewage, likely because predators such as mosquitofish cannot survive in these polluted habitats. With more than 65,000 individual on-site sewage treatment systems in St. Tammany, the scale of *Cx. quinquefasciatus* production outstrips the capacity for traditional mosquito control techniques & exacerbates the risk of contracting WNV.

Why do mosquitoes choose sewage-polluted water?

Immature mosquitoes breathe the same atmospheric air as we do – through air siphons as larvae and air trumpets pupae, akin to snorkels. By breathing atmospheric air, mosquitoes survive periods of very low dissolved oxygen in water. By contrast, mosquitofish and other larval predators rely on high dissolved oxygen and cleaner water. Therefore, *Cx. quinquefasciatus* ability to sensitively detect skatole allows them to lay their eggs (up to 300 per event) in a habitat that their primary predator (mosquitofish) cannot survive in.

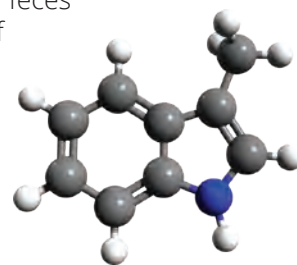
What is Skatole?

Olfactory receptors of female *Cx. quinquefasciatus* mosquitoes are highly sensitive to the chemical skatole, the primary odorant of feces. This mosquito is attracted to lay its eggs in water

that is contaminated with human feces based on the concentrations of skatole¹.

We estimate that >400 linear miles of roadside ditches are contaminated with human sewage, requiring the application of mosquito killing larvicide every five days during the WNV season. A recent survey of underground sewage treatment systems documented that 20% had holes large enough for adult mosquitoes to enter and colonize. Given their fast generation time (less than seven days at 85°F), it is no surprise that the >65,000 homeowner on-site sewage treatment units (half of which release under-treated sewage) produce prodigious numbers of WNV vectors across St. Tammany.

STPMAD is working with partner agencies from St. Tammany Parish Government, the Lake Pontchartrain Basin Foundation, and the Louisiana Department of Health to envision & identify solutions for a healthier environment.



¹Hughes, D. T., Pelletier, J., Luetje, C. W., & Leal, W. S. (2010). Odorant Receptor from the Southern House Mosquito Narrowly Tuned to the Oviposition Attractant Skatole. *Journal of Chemical Ecology*, 36(8), 797–800. <https://doi.org/10.1007/s10886-010-9828-9>

What can Homeowners do to help?

Reduce risk of contracting WNV by making certain your septic system is in proper working order. Here are a few steps you can take to maintain individual on-site sewage system:

- 1) Make sure that the aerator is plugged in and working. You should be able to hear it whirring.
- 2) Have your tank pumped out by a certified operator every 3-5 years, depending on the size of the tank and number of people in your house.
- 3) Make sure your system is mosquito-proof by replacing damaged lids or cracked PVC fittings.
- 4) You should not be able to smell sewage at the roadside ditch. If you can smell it and have tried the above, call a licensed sewage operator.



Second Quarter Operations

20

of aerial spray missions in Q2

421,368



acres treated aerially

3800+

linear miles of septic ditches treated in Q2

309



service requests completed

377,405

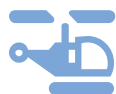
acres treated by ground

446

of spray missions in the second quarter

5

of helicopter spray missions in May and June



1,910

acres treated in Tammany Hills



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ST. TAMMANY PARISH

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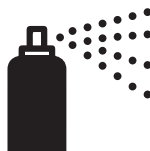
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Protect yourself from contracting *West Nile virus*.



Avoid being outdoors one hour before and after dusk and dawn



Use CDC approved insect repellent containing DEET, picaridin, or oil of lemon eucalyptus



Wear long sleeves and pants



Empty all water-holding containers around home

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