MOSQUITO ABATEMENT

ST. TAMMANY PARISH

Annual Report

2020

Biologists Briana Burkett and Mark Bunch collect traps set over water hyacinth in marsh around Fontainebleau State Park.

From the Director:

On the cover: Water hyacinth research site in the marsh surrounding Fontainebleau State Park.

What did we do in 2020?

In short, we improved our service and managed a historically low West Nile virus (WNV) occurrence despite the unprecedented Coronavirus pandemic and dodging multiple hurricanes. Given our swift action and adherence to safety protocols to our knowledge none of our employees developed COVID-19 on the job. There are no trophies for doing our job, our award is the trust of the public for the taxes they pay for our service. Here are our highlights from this unusual year:

1. Tested and operationalized residual adult mosquito applications in public parks.
2. Operationalized the use of a misting system to achieve backyard applications of larvicides from a vehicle to manage container-inhabiting mosquitoes.
3. Treated 14,002 miles of sewage-influenced roadside ditches for the management of our primary WNV vector.
4. Treated 903,944 acres by truck for adult mosquitoes.
5. Treated 1,026,502 acres by helicopter and airplane for adult mosquitoes.
6. Collected 383,677 mosquitoes in traps throughout St. Tammany Parish.
7. Performed 998 service requests.
8. Established an Emergency Relief Committee to assist our staff and partner agencies throughout the state to cope with hurricanes and other disasters.
9. Initiated disaster planning meetings to focus on imminent threats to our service provision.
10. Assisted with the planning and execution of the Louisiana Mosquito Control Association Annual Meeting and presented five papers at this meeting.
11. Decreased our workplace injury rating by 35%.
12. Added digital signage messaging boards throughout the building to enable greater communication.
13. Published three peer-reviewed scientific articles.

I am proud to stand with our team of dedicated mosquito control professionals to achieve our mission of protecting the health and quality of life of the residents of St. Tammany Parish.

Yours in health,

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

2020 MOSQUITO CONTROL STATS

905,073 acres treated by fixed-wing airplane

903,944 acres treated by ground

121,429 acres treated (adulticide) by helicopter

14,002 miles of ditch treated with larvicide

480 acres treated (larvicide) by helicopter

998 service requests received

ARBOVIRUS REPORT

Seven of the 4,771 pools of mosquitoes (0.15%), tested from specimens collected in 2020, were positive for West Nile virus (WNV) infection. An unusual year, 2020 had an active hurricane season yet a slow start to WNV season. Our first positive WNV pool was detected at week 32 instead of closer to week 26. Adult mosquitoes collected using No Light CO2-baited CDC traps and the occasional CO2-baited CDC Light traps, are tested in pools (or groups) via RT-PCR, by the Louisiana Arbovirus Disease Diagnostic Laboratory (LADDL) in Baton Rouge.

A total of 150,709 mosquitoes were collected and tested for WNV in 2020 across St. Tammany Parish. *Culex quinquefasciatus*, our primary WNV vector, accounted for 40.1 % of mosquitoes submitted for virus testing. Populations of a secondary WNV vector, *Culex salinarius*, consisted of 30.0 % of the mosquitoes collected and tested for WNV.

The Louisiana Department of Health reported a statewide total of 23 human cases of West Nile disease in 2020 with only one of those being an asymptomatic case in St. Tammany.

New Tools to Treat Mosquito Populations

This year we incorporated a new tool, an A1 Mister, into our operational strategy. This tool is a larvicide unit that is capable of treating residential areas where backyard container larviciding is needed. It is very effective in neighborhoods with large numbers of small parcels. When West Nile virus is detected in either a mosquito pool or human, we can deploy this larivicide truck to that site for treatment. This year approximately 300 acres were treated using the A1 Mister.

Another product that was new for 2020 was the use of Defense, a residual pesticide, in our recreational sports facilities. Park treatments for adult mosquitoes has always been a challenge. It is an area where large crowds are gathered under stadium lighting, and normally around a mosquito's peak activity time, which is approximately thirty minutes after sunset. We spray during this window of time when treatments are most effective. However, we cannot treat these parks when they are occupied and therefore miss the prime treatment window.

After testing three residual adulticides in early 2020, beginning in May we used a utility vehicle mounted with a ULV sprayer to treat part of Pelican Park. Many issues, including leaks and small ULV droplets, prevented us from getting consistent results in tests performed with caged *Cx. quinquefasciatus* and treated leaves. In September, we modified a larvicide spray system and mounted it to the back of an ATV. The treatment proved to be effective for up 2-3 weeks (Figure 1). This procedure was later expanded to Fontainebleau State Park and Fritchie Park, and will be continued into 2021. All future treatments will be closely monitored by the lab to prevent the potential buildup of insecticide resistance to residual insecticides.

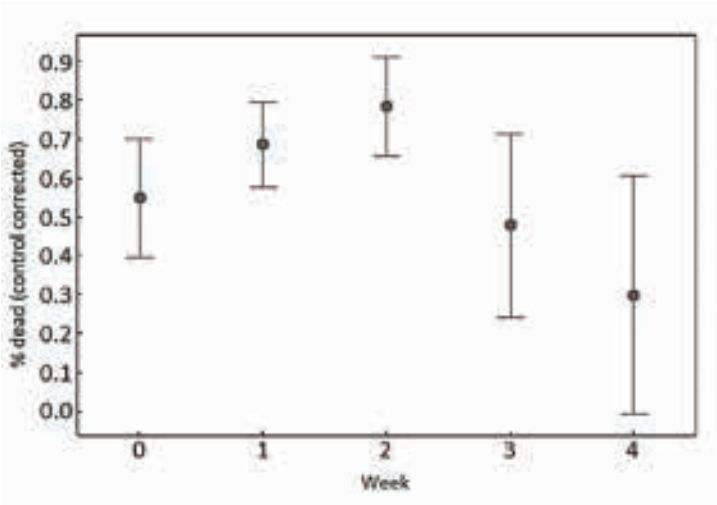


Figure 1. Adult *Cx. quinquefasciatus* mortality when exposed to treated leaves from Pelican Park. Leaves from week 0 were retrieved immediately following treatment; subsequent weeks were taken to monitor breakdown and effects of rain.

Biologist Rob Kiviaho inspects a residential area for mosquito larvae.

Improving Digital Infrastructure

Significant improvements in our digital infrastructure, software, and hardware have allowed us to continue our momentum in creating a modern and efficient workplace. Of note was our migration to a hosted VOIP PBX which, during this time of COVID-19, has allowed for greater flexibility in allowing work from home. Another significant improvement was the upgrade of the computers in the larvicide spray vehicles this, in addition to the spray software, allows for precise efficient delivery of the larvicide spray. We also purchased a large format plotter\printer which affords us the opportunity to print large scale maps of the parish helping us to visualize the data involved in spray decisions, as well as printing some informational posters for internal use.

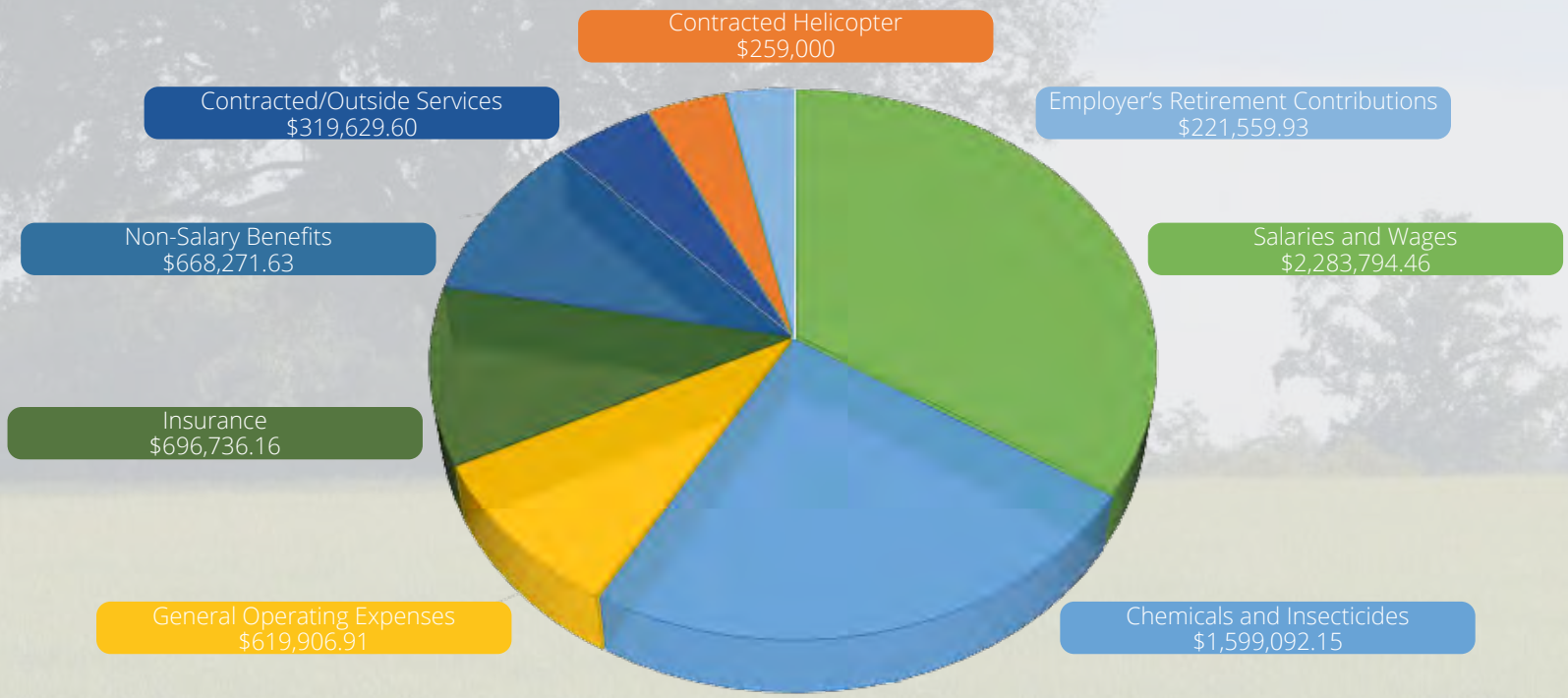
We have also installed digital signage system covering the lobby and garage with three more onsite locations to be installed this year. Digital signage will help keep our employees informed of changes to treatment missions or mosquito surveillance as well as other information that may be of interest to them.

Financial Report

Lower than average mosquito abundance and reduced arbovirus activity has resulted in a third consecutive year of operating expenses that were lower than anticipated. Unanticipated expenses related to COVID-19 mitigation and personnel leave cost Mosquito Abatement a total of $37,300 in 2020.

The Board of Commissioners decided to keep the millage at 3.9 mills for the 2020 collection of revenue for 2021 operating expenses. Operating expenses in 2020 of $6.9 million were $900k lower than total revenue. As a result, we are in the fortunate position of considering lowering the millage for 2021 collections. To view our 2020 Treasurer's Report, visit https://stpmad.org/monthly-reports.

2020 Expenditures

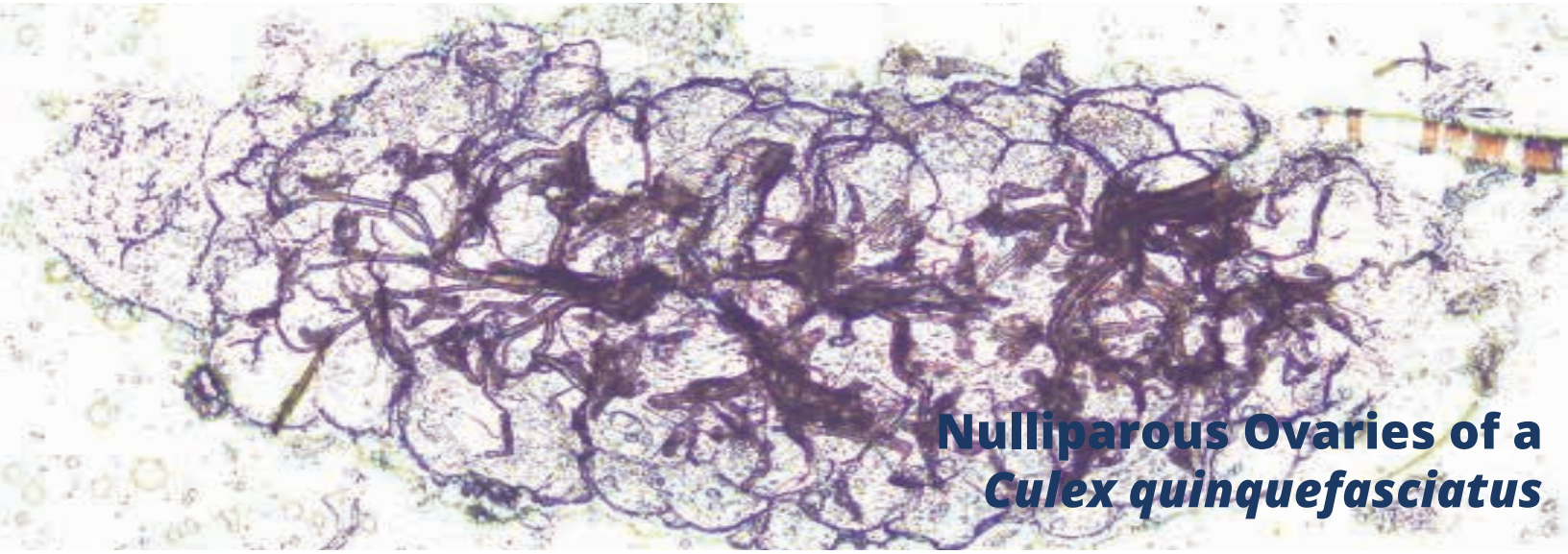


Monitoring Disease Presence in Avian Population

620 blood-fed mosquitoes aspirated

330 birds mist-netted - **216 adults and 113 juvenile**

93 banded individual birds recaptured



Nulliparous Ovaries of a *Culex quinquefasciatus*

Marisol Mosqueda collects traps after a treatment mission to evaluate efficacy of spray treatments.

Adulticide Analysis

We began evaluations of aerial adulticide applications in the fall. Three trials were completed from August through October in Slidell, Lacombe, and Covington. We set insecticide droplet collection devices (spinners) alongside mosquito traps baited with CO2 at sites within and outside of the treatment area. Traps were set nightly for at least two nights before and two nights following treatment, and spinners were set for 4 hours the night of treatment. Data was collected for additional days pre- and post-treatment when possible, although tropical storms prevented complete data collection for two trials, and may have contributed to fluctuations in abundance. **We did not observe a decrease in abundance** for *Cx. quinquefasciatus, Cx. nigripalpus* or *Cx. salinarius* within traps for any trial. However, **we monitored a change from old to young individuals** for *Cx. nigripalpus* and *Cx. salinarius* in two trials. This aging effect was consistent with nuisance *Mansonia* spp. collections, which did show evidence of an abundance drop. Trials in 2021 will coincide with peak *Cx. quinquefasciatus* activity.

Oviposition Overload

During a lull in COVID-19 activity in the early summer, we performed an oviposition trial in our backyards using sewage-polluted water. At three different residences, twelve buckets spaced one meter apart in a 3x4 randomized block were filled with either 0%, 25%, 50% or 100% septic water. Septic water was collected from the Tammany Hills neighborhood, and was sieved to remove mosquito larvae and predators. We counted egg rafts deposited overnight each morning for up to three nights. ***Culex quinquefasciatus* showed a preference for more polluted water** (Figure 2), with only 1 egg ever laid within clean (0% sewage strength) water. In a trial set up in the same manner using different treatments, gravid females did not avoid insecticide treated water (P = 0.538), and no preference was shown with regards to the presence or absence of mosquitofish (P = 0.242) in 100% sewage strength. However, at 50% sewage strength *Cx. quinquefasciatus* appeared able to avoid mosquitofish (P = 0.001).

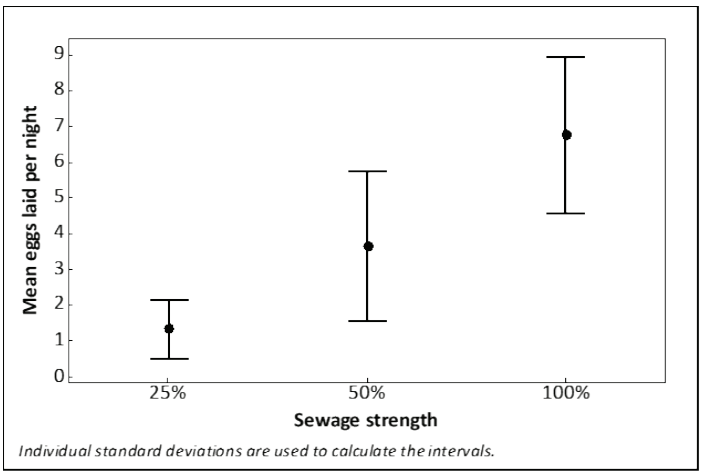


Figure 2. *Culex quinquefasciatus* egg rafts retrieved after one night from a randomized block design field trial.

Lab Manager and Entomologist Nick DeLisi discusses leaf collection process to evaluate efficacy at Pelican Park.

Plant Preference

In 2019, we found that frogbit (Limnobium spongia) was a predictor of both larval *Cx. quinquefasciatus* and fish presence in sewage-polluted ditches. We monitored frogbit and fish presence within Tammany Hills from June through October. Mosquitoes were not sampled due to COVID-19 restrictions, but were observed without sampling on occasion. We found frogbit at 355 sites, of which 146 also had fish present in the ditch. To understand how frogbit influences the mosquito activity, we will introduce plant evaluations into our water quality work in 2021.

Taxonomist Lisa Rowley looks for mosquito presence in ditches throughout Tammany Hills subdivision.

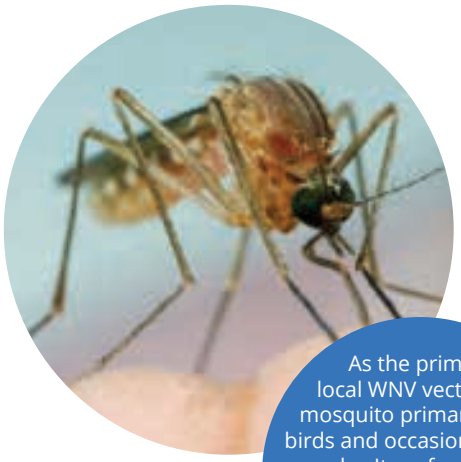
Research Assistant Sydney Johnson measures the number of *Mansonia* spp. larvae found on a single water hyacinth plant.

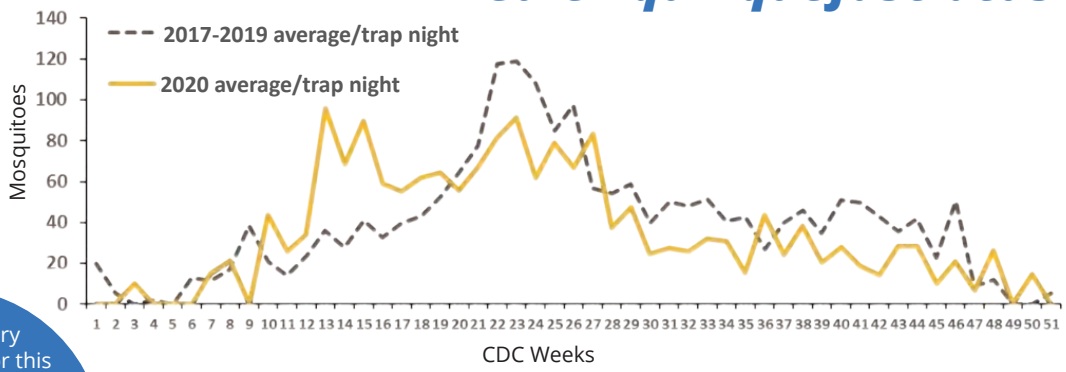
Marsh Mosquitoes

We started a long-term ecological study in March to better locate and control *Mansonia* spp. larvae in the field. Five study sites were selected across southern St. Tammany, and multiple environmental metrics were measured weekly, including larval/adult *Mansonia* spp. abundance, vegetation type/size/depth, and physical/chemical water parameters. Resting box traps were set and retrieved weekly at each site, with blooded mosquitoes stored for future bloodmeal analysis. We measured a positive correlation between larval abundance and water depth, with a preference for water about 2 feet deep. We will continue to explore the habitats these cryptic mosquitoes use in 2021 in order to curb nuisance mosquito abundance.

How Bad are the Mosquitoes?

Culex quinquefasciatus





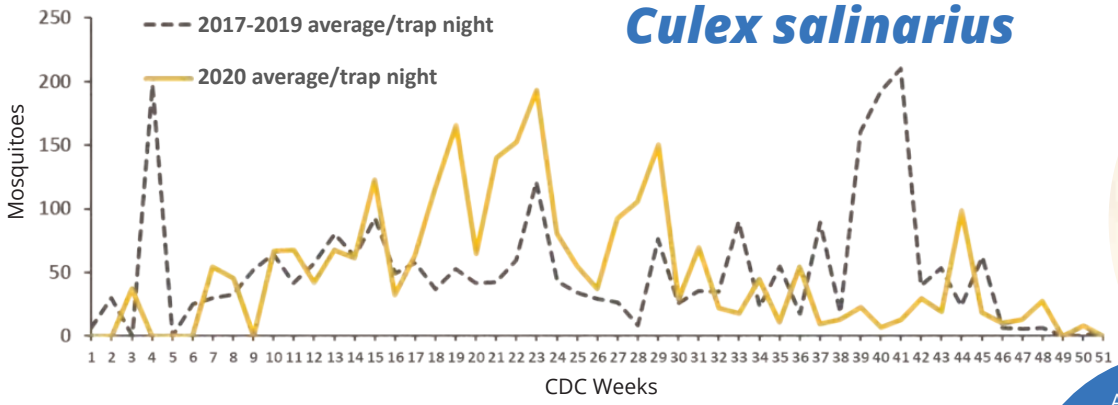
As the primary local WNV vector this mosquito primarily bites birds and occasionally bites people. It prefers to lay its eggs in sewage-associated water. As it readily enters structures, it is named the "house" mosquito.

Common name:
The southern house mosquito

80,555
trapped in 2020

383,677
total mosquitoes trapped in 2020

Culex salinarius



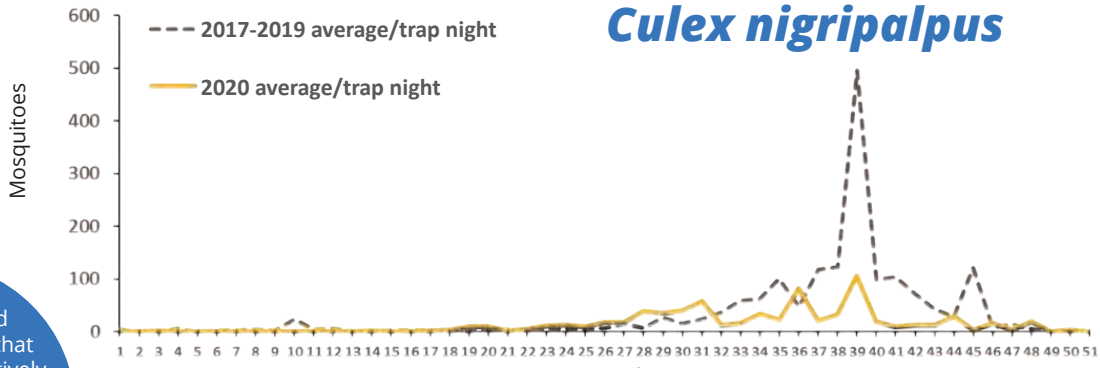
A serious pest that is produced in fresh to brackish marshes. It frequently bites large mammals (including people) and birds. Considered an important secondary WNV vector.

Common name:
The brackish marsh mosquito

41
# of different species found in 2020

97,357
trapped in 2020

Culex nigripalpus



A medium-sized brown mosquito that is produced in relatively clean ground pools and roadside ditches. Abundant in the early fall, *Cx. nigripalpus* is an effective WNV and SLE vector.

Common name:
The Florida SLE mosquito

33,572
trapped in 2020

Other top mosquitoes trapped in 2020:
Culex erraticus - 33,381 total mosquitoes
Mansonia titillans - 31,772 total mosquitoes