NEW ORLEANS MOSQUITO & TERMITE CONTROL BOARD

2016 ANNUAL REPORT

Aedes aegypti

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DIRECTOR'S REPORT

Report on the activities of the
City of New Orleans Mosquito, Termite, and
Rodent Control Board from January 1 - December 31, 2016

Having an established mosquito control program with secure funding is important to having the ability to be prepared and to respond to mosquito-borne diseases that threaten the city, parish or county. Since 1964 when Mosquito Control was started in New Orleans, many disease outbreaks have occurred. Knowledgeable and experienced employees with the resolve to be proactive and aggressive in implementing best practices have reduced the risk of disease transmission to our residents and visitors. It is imperative for districts to look ahead and implement the appropriate surveillance and have the infrastructure to best execute control strategies.

The entire year was dominated by Zika virus preparedness and mosquito control activities. NOMTCB worked with other agencies to create a Zika response plan for Orleans Parish. Our staff anticipated what would be needed to best respond effectively for travel cases and if mosquito borne transmission were to occur. Supplies and equipment were purchased and the CAO supplemented our budget in the third quarter which allowed us to hire new inspectors and purchase equipment. New factsheets, informational brochures, and door hangers were created to communicate the importance of source reduction and the risks associated with travel to Zika endemic areas.

Aggressive outreach campaigns including door-to-door education and clean-up campaigns were conducted. Two press conferences were held by the Mayor to communicate a unified message to the public. Employees of NOMTCB worked together to maximize the response, particularly to travel cases. We received notice of the first travel case in March and Orleans Parish had 13 confirmed travel cases by the end of the year.

New Orleans is at risk of mosquito-borne transmission since we have the vector mosquitoes in abundance, high density of people in many areas of the city, and travelers (local and visitors) that can return viremic. In 2016, the dedication of our staff and supplemental funding allowed our program to take major steps towards being prepared to respond to travel and mosquito-borne cases as well as be proactive to reduce the risk in order to project the health of our citizens and visitors.

Respectfully submitted,

Claudia Riegel

Claudia Riegel, Ph.D.
Director

OPERATIONS AND FACILITIES

CLAUDIA RIEGEL, Ph.D.

Employees

Vacancies opened due to retirements in 2015 and securing of new projects, as well as the Mayor and CAO providing supplemental funding in 2016 that allowed for personnel to be hired. In February, Shaun Broadley (see Termite Division report) was hired. He has been assigned to the Termite Division but has quickly adapted to the department and has quickly learned about mosquito control and regularly assisted that division.

Tatiana Barre was hired part-time while attending Tulane University to earn a Master's of Public Health. She was an intern in 2014 and we are privileged to have her in our department assisting the rodent control group conducting research projects and efficacy trials.

Figure 1. Ms. Andra McClue assists in preparing cups for a mosquito bioassay.

Andra McClue (Fig. 1) worked with us as an intern in 2016 and stayed part-time to help Cynthia Harrison (Pest Control Specialist 3/Entomologist 1) at the Biolab. She was in the final year of her studies at Dillard University. Duties included rearing, maintaining copepod colonies, laboratory cleaning and much more. She will stay employed part-time in 2017 to assist with the laboratory.

Mr. LJ Kabel (Pest Control Specialist 3) is scheduled to retire in spring of 2017. Mr. Joe Robert (Fig. 2) (Pest Control Inspector 2) was hired in May to apprentice under LJ and assist with facility maintenance and operations. Joe has extensive experience

Figure 2. Mr. Joseph Robert assisted the rodent group in preparing a stand for a game camera used in a rodenticide efficacy trial.

with plumbing, carpentry, landscaping and has a tremendous work ethic. Joe has a wonderful personality and has seamlessly integrated into the NOMTCB family. Working with LJ, they have accomplished so much at the new warehouse and moved most of the operations to the new warehouse complex. The moving process has taken a long time since it was conducted all by our employees and we had to sort, surplus, and/or discard items that had been there for over 25 years. The date to turn over the keys to the Levee Board is January 30, 2017.

Mayor Mitchell Landrieu and CAO, Andy Kopplin, provided additional funding to alleviate the financial burden of the activities related to control of *Aedes aegypti* and Zika virus preparedness that was incurred in 2016 (Fig. 3). A one-time supplement of $500,000 was added to our budget in summer. The funding allowed for six temporary Pest Control Inspectors to be hired for the remainder for the year and to purchase insecticides, equipment, and supplies that we needed. Even with the supplement, personal services were over budget at the end of the year, and the new CAO, Jeffery Hebert, assumed those expenses allowing the inspectors and staff to work extra hours and remain employed to allow our department to do all that could be done to mitigate the 13 travel cases and field validation trials and outreach which was needed to lower the risk of local, mosquito borne Zika virus transmission.

Figure 3. Two press conferences were held in 2016. The budget supplement was announced in the second press conference in summer.

During the 2017 budget process, $249,000 was added to NOMTCB's annual operating budget for the 2017 fiscal year. The entire amount was added to personnel in order to retain five of the Pest Control Inspectors dedicated to mosquito control operations.

Interns

In 2016, 19 Job One interns worked with NOMTCB. Job one funds the salaries of the students and the department ensures they have the work based on the restrictions of the program. Four were college students and the others were high school students. For many of the younger interns, this was their first job. With so many students, it was a challenge to keep organized. However, Jennifer Hamilton (Pest Control Specialist 2) worked with our staff to assign them to projects in order to keep them busy and help with our work load.

All four Job One college students were very helpful, but one student in particular, Brianna Despenza, was a very talented artist and helped us produce flyers, door hangers, and other mosquito and rodent related educational materials (Fig. 4). She worked directly with our staff and designed New Orleans-specific documents that were used throughout our operation.

We also provided four NOMTCB-funded internships for students. Sam Baker, Andrea McClue, Adeline Williams, and Kallin Zehren were recipients of the positions. The students were from Tulane University and Dillard University and most

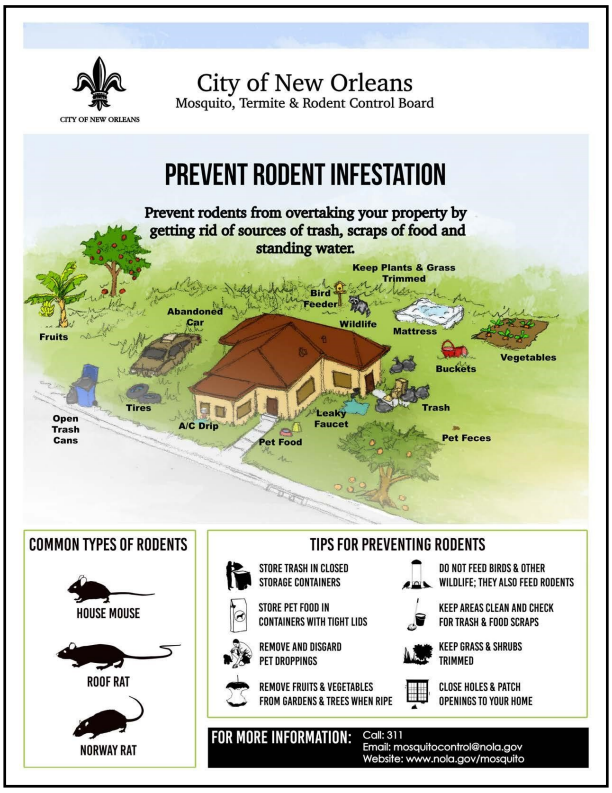


Figure 4. Brianna Despenza, Job One intern, designed New Orleans-specific educational materials that have been incorporated into our operations.

Figure 5. Summer volunteer Dr. Tamer Ahmed, interns Sam Baker, Kallin Zehren, and Job One intern Kayla prepare mosquito cages for a study.

had experience working with mosquitoes (Fig. 5). The interns are critical in providing the manpower needed to keep up with the additional workload of summer.

Facilities

Administration building

The training room in the new building continues to be used by a variety of City of New Orleans departments and other organizations. Perry Ponseti (Pest

Control Specialist 2) has done an excellent job coordinating the events. The Greater New Orleans Pest Control Association has their spring and fall recertifications at the building. Approximately 100 pest control professionals attended the training in the spring and 70 in the fall. Our building continues to host over 6,000 people a year in a variety of meetings across City of New Orleans departments and affiliations.

A huge thank you is in order to Aaron Miller, Director of the City of New Orleans Homeland Security, and Dev Jani, Deputy Director, for providing a natural gas generator that will provide power to the entire Administration building (Fig. 6). The generator will provide power to the building in the event of an emergency or power outage. The building was designed with all the wiring needed to facilitate installation. The installation process started in August and has been a slow process but is expected to be complete by summer 2017.

Figure 6. A generator purchased by The New Orleans Homeland Security was delivered on December 16, 2016.

Moisture intrusion was noticed at the Administration building shortly after moving into the building. Initially, the moisture problems were at the at the main staircase and front wall. The contractor, Woodward Design Build, was called and they inspected the building. Temporary fixes were made; however, the problems still persist.

In 2016, I was pleased to again work with Connie Uddo, Director of the NOLA Tree Project. After Hurricane Katrina we worked with her to identify abandoned swimming pools in the Lakeview area. After all these years she assisted us with purchasing trees and plants at wholesale prices as well as finding volunteers to help plant trees and plants on the property. Dr. Michael Carroll (Director Emeritus and Botanist by training) selected trees that could be planted to create a teaching area on the property adjacent to the Administration building. Trees native to Louisiana were planted with the hope that Ben Franklin High School as well as the University of New Orleans could utilize the space. It is amazing how fast the trees have grown in a year. We were fortunate in that we had plenty of rainfall after planting so no trees were lost and all have began to grow. As funds allow, we want to install a walkway, label all the trees with permanent signs with the common and scientific names of trees, and install benches that can be used by the residents of the area.

Figure 7. A butterfly garden and a variety of flowering plants and trees were installed with help of the NOLA Tree Project, volunteers and NOMTCB staff.

The landscaping installed included numerous flowering plants as well as fruit trees. Flowering plants used to attract butterflies were installed in the front of the building.

Warehouses and Hanger

Operations were slowly transferred to the new warehouses located at 5617 Hayne Blvd. However, until December of 2016, we were still operating from the Middleshop and the Backshop as well as the new location. NOMTCB employees conducted 100% of the move. All but a few items were moved by the end of December.

Prior to the move, LJ Kabel and Joe Robert repaired the roof of the new building, built a mechanic shop, renovated the storage rooms and office, installed a Biosafety trailer, and all the plumbing

and repairs needed. They painted the facility and much more. The amount of work was daunting and most all the work was done by NOMTCB employees. In addition to all the renovations, LJ and Joe maintained the Biolab, Hanger, and Administration building.

The new warehouses have less space than the facilities on the Lakefront, so three large containers were purchased to store additional items on site. This is a great solution to store rodent traps, bait stations, and other items that are not affected by the heat.

After several years, Mr. Ed Bordes (Director Emeritus) was able to negotiate a lease for the Hanger on the Lakefront Airport with executive members and staff of the Non-Flood Protection Asset Management Authority. The lease is for 20 years and three 10 year terms for renewal for a total of 50 years. The annual fee will be exchanged for pest control services on the Lakefront Airport. In addition, $75,000 in back rent will be paid in services, primarily termite treatment. The property has a variety of pests including red imported fire ants, rodents, termites, and more that are causing damage to the property or are a nuisance.

Execution of the Hanger lease was a major achievement and has allowed NOMTCB to stay at the site and for the renovation process to start. The Hanger was damaged by high tide (~11 feet) caused by Hurricane Katrina and substantial damage was done to the building. The building was assessed several times and the renovation plans were completed and shelved for nearly four years due to the absence of a lease. Finally, the lease was executed and renovation planning is anticipated in the first quarter of 2017.

NOMTCB is also grateful to Mr. Gerry Gillen at the Flood Assets Protection Management Authority for allowing our department to operate from the Franklin Avenue facility for six years.

Operations

Website

After many years, NOMTCB finally has a website. Jack Leonard (retired, Pest Control Specialist 3) has taken control of the website and updated and added many documents. He has been working with our staff to make the website easier to navigate and more comprehensive.

New features such as videos of seminars, factsheets and stock photographs have been added. The website is continuously updated and we actively refer people to the site.

Flooding

In August 2016, prolonged rainfall in Louisiana caused severe flooding. FEMA designated 20 parishes as federal disaster areas. Livingston Parish did not have a mosquito control district in 2016. A few years earlier, their residents did not renew funding that supported mosquito control. Coordinating with Kyle Moppert, Louisiana Department of Health's Medical Entomologist, NOMTCB provided assistance to Livingston Parish by adulticiding using spray trucks. Multiple spray missions were conducted and most populated areas of the parish were treated. FMC corporation donated the Fyfanon (malathion) that was used to conduct the treatment. We thank Dr. Dina Richman and FMC Corporation for their generosity.

Zika virus preparedness

Operations were dominated by *Aedes aegypti* and *Aedes albopictus* management and Zika virus preparedness activities. Planning for mosquito control activities began in January of 2016. However, since 2014 when chikungunya travel cases were identified, our department began purchasing additional supplies to prepare for *Aedes* spp.-driven diseases.

The mosquito operations section provides a timeline and details of the activities in 2016. Being prepared requires planning and looking ahead, years in advance in some cases. We have an exceptional staff and everyone brings different expertise to the table. In 2014, chikungunya travel cases provided a real "wake up" for our department. For many years, *Aedes albopictus* and *Aedes aegypti* were treated as nuisance mosquitoes. We did not receive notices of dengue travel cases from the Louisiana Department of Health, nor did we have any other *Ae. albopictus* or *Ae. aegypti* driven diseases.

In 2015 and 2016, with the explosion of Zika virus cases in South and Central America and the Caribbe-

an, New Orleans Mosquito and Termite Control Board, New Orleans Department of Health, and the Louisiana Department of Health made aggressive strides to educate and prepare the residents of New Orleans. We worked with a variety of cooperators the entire year and made every effort to have the equipment and knowledge to aggressively manage high risk areas as well as around Zika travel cases.

Dr. Janet McAllister from the Centers for Disease Control and Prevention visited our facility in March during the Mosquito Control Academy. She spent several days with our mosquito control division. We discussed activities in mosquito control and reviewed the 2015 season and discussed Zika virus preparedness for the 2016 season. Dr. McAllister has a tremendous amount of experience in the field of mosquito control and travels throughout the United States and internationally. We are always continuing to use and implement best practices for all that we do and she had a few suggestions that NOMTCB implemented in 2016.

At the beginning of 2016, NOMTCB did not have the capacity to conduct area-wide larviciding. Obtaining this capacity was a priority. With the supplemental funding, we were able to purchase a Buffalo Turbine (Fig. 8A) and Dynafog LV8 unit (Fig. 8B). A field application was conducted in the fall of 2016 (Fig. 9). The droplets were too large and the configuration for deposition was not suitable for effective control.

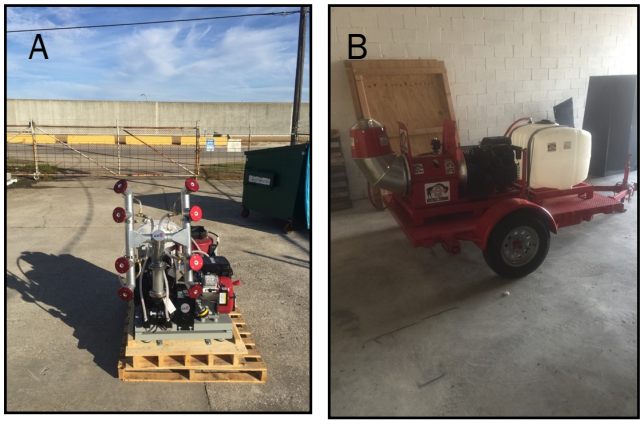


Figure 8. Supplemental funding purchased a Buffalo Turbine (A) and LV8 (B) .

Figure 9. First field trial to assess larvicide deposition of the off the shelf configuration of the Buffalo Turbine.. Arrows indicate collection cups placed at 20' intervals for 100'.

Ed Foster, Aviation Supervisor, worked on the project to find nozzles and calibrate the Buffalo Turbine and LV8. Ed has done a phenomenal job looking at the needs and fitting off-the-shelf parts to retrofit the machines for our needs. His ingenuity and knowledge has given us the ability to have the capacity of area-wide larviciding. A field trial is planned in the spring of 2017.

Miami

In October, Princeton King (Pest Control Specialist 1), Dr. Kevin Caillouet (Assistant Director of St. Tammany Mosquito Abatement District) and I traveled to Miami for a meeting with Miami-Dade County Mosquito Control (Fig. 10). We had the

Figure 10. Left to Right: Kevin Caillouet (St. Tammany MAD) Janet McAllister (CDC), Waste Management Director, Chalmers Vasquez (Miami-Dade), Princeton King (NOMTCB), Claudia Riegel (NOMTCB) and Imelda Moise (University of Miami) at the Miami-Dade County Mosquito Abatement office.

opportunity to meet with their executive staff as well as employees of Clarke Mosquito Control (contractor for Miami-Dade County) in a separate meeting to better understand what was done to combat *Aedes aegypti* and Zika virus local transmission. Princeton King and Kevin Caillouet also traveled to Key West to meet with their mosquito control district to tour their facility and learn more about their aerial larviciding program. The meetings were valuable and provided an opportunity to discuss what tactics were successful, to look at equipment that was implemented in the response, and learn about what challenges the program faced in 2016.

Outreach

Outreach events to the public and industry professionals occurred almost every week. Mosquito outreach is physically taxing work. In some cases, the outreach was around Zika virus travel cases and in other areas it was in areas considered to be high risk. High risk areas included areas with abundant *Aedes aegypti*, dense human populations, and in areas with high number of tourists.

Walking from door-to-door, entering yards, and conducting source reduction is difficult and tedious. When possible, we utilized volunteer groups to sweep neighborhoods to place door hangers on properties and turn over containers in front yards. In July, we again worked with the NOLA Tree Project to obtain 700 volunteers (Fig. 11). In three days, large areas were inspected, cleaned, and door hangers distributed. We are incredibly grateful to all the volunteers that spent the day with us working hard and making a difference.

Figure 11. Volunteers from the Lutheran church. Each person dedicated one day of service to projects across New Orleans.

Cooperative Projects

Rodent Bait Efficacy trials

This year, numerous rodenticide bait efficacy trials were conducted. These projects have a very specific protocol and are time and labor intensive. Numerous house mouse, Norway rat and roof rat sites were identified and used for these trials. Philip L. Smith (Pest Control Inspector 4), and Friederike Bauder (Pest Control Inspector 3), have done and exceptional job with these projects.

The projects required precision and many hours of dedication. Timmy Madere (Pest Control Specialist 1), began using game cameras two years ago to track and better understand rodents and their behavior (Fig. 12). We modified the use of these cameras in efficacy protocols to determine pre– and post-treatment activity (Fig. 13). In addition, a new scale was designed to evaluate rodent track marks on sand. The use of the cameras to replace traditional trapping and the use of a 0–10 scale (Fig. 14) instead of a 0-4 scale will be formally evaluated in spring/summer of 2017.

Figure 12. A Norway rat, *Rattus norvegicus,* in view on top of the bait station filled with Detex (Bell Laboratories, Madison, WI) during the pre-trial survey period of a bait efficacy trial.

Figure 13. Game cameras were used to quantify rodent activity in rodenticide efficacy trials.

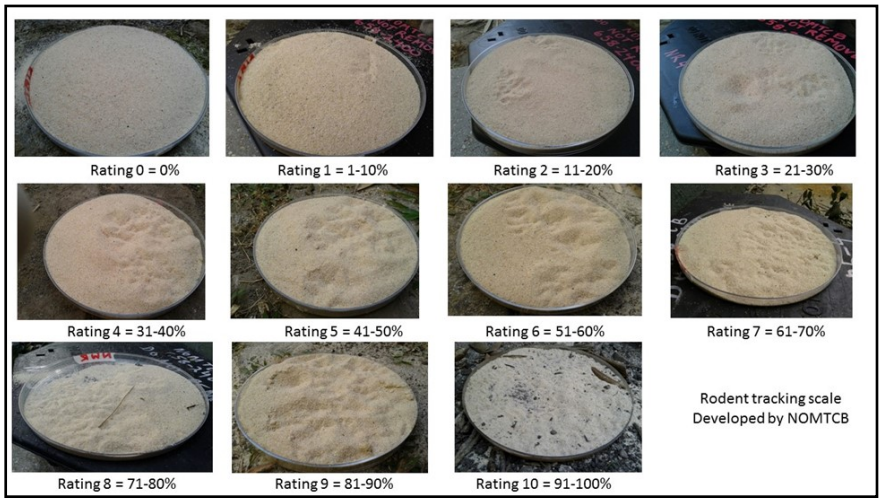


Figure 14. Rodent tracking scale developed by Friederike Bauder, Philip L. Smith and Claudia Riegel. This scoring method was incorporated into efficacy trials in order to be more precise with rodent activity at a site.

Tulane University

This summer completed the third year of trapping rodents with Tulane University. The project is to better define the distribution of rodent species in New Orleans. Each year consisted of two trapping seasons, one in summer and one in winter. The study focused on ten neighborhoods spread out across the city which were then divided into 96 individual trapping sites. Each site would be trapped for one week using 30 live catch cage traps baited with peanut butter and bacon bits on card board. A total of 1,583 rodents were caught over the course of the study and each rodent was necropsied and tested for diseases. Winter trapping in 2016 and 2017 will be the last trapping season of the project. The project will focus on processing the samples and better understanding the genetic profile of the rodents and the pathogens they carry.

Friederike Bauder, Tatiana Barre, and Timmy Madere conducted the trapping for this project in collaboration with Dr. Mike Blum's team at Tulane University.

Figure 15. Tatiana Barre collects a live catch cage trap from the field after successfully trapping a rat for the Tulane University rodent trapping project.

MOSQUITO FIELD OPERATIONS

SARAH MICHAELS, BRENDAN CARTER, AND PRINCETON KING

Zika virus

The attention remained on Zika virus outreach, surveillance and travel case response throughout 2016. Zika is a mosquito-borne virus that is primarily transmitted to people through the bite of an infected *Aedes aegypti* mosquito vector. Similar to dengue and yellow fever viruses, humans are the primary reservoir host and returning infected travelers create a risk of transmission where and when the mosquito vectors are abundant.

The Zika virus remains in the blood for about a week following infection; only 20% of people infected develop symptoms that are generally mild. However, neurological, auto-immune complications (including Guillain-Barré Syndrome) and fatalities have been reported. In April 2016, Zika virus infections among pregnant women was conclusively linked to a wide range of birth defects including microcephaly. Right now there is no vaccine or specific treatment for Zika virus, but clinical trials have begun.

Zika virus alerts began in May 2015; the Pan American Health Organization issued an alert regarding the first confirmed Zika virus infection in Brazil. Local transmission of the virus has continued to spread geographically. The CDC has issued travel alerts (Level 2 – Practice Enhanced Precautions) for people traveling to countries where Zika virus epidemics are occurring and suggests that pregnant women should avoid travel to those areas. The CDC recommends that travelers protect themselves from mosquito bites and take precautions against sexual transmission. It takes approximately 10 days from the time a female mosquito bites a Zika-infected individual until the mosquito is infectious and can transmit the virus. This is referred to as the extrinsic incubation period. It is expected that the mosquito would remain infectious through the remainder of its life span.

Local transmission of Zika virus by an infected mosquito has been confirmed Texas and Florida, but the majority of infections reported in the U.S. were acquired while traveling to epidemic regions. According to the CDC through the end of 2016, there have been 5,238 travel cases reported in the continental U.S., 46 cases of sexual transmission, and 28 congenital infections. Locally transmitted cases have been reported in the U.S. territories - 36,426, mainly in Puerto Rico and in the continental U.S., 217 cases in Florida and 6 in Texas. In Louisiana, the Louisiana Department of Health has reported 39 confirmed travel cases, more than half of which resided in the Greater New Orleans area (13 Orleans, 6 Jefferson and 3 St. Tammany Parishes).

The New Orleans Health Department worked with NOMTCB to develop a Zika Virus Response Plan for the City of New Orleans. It outlines preparedness activities and response activities to human infections. The plan was made public through the City's website and was announced in a Press Conference by the Mayor on March 10th. Following the confirmation of local transmission in Florida, a second press conference was held on August 3rd, urging residents to eliminate mosquito habitats around their homes and take precautions while traveling.

Meteorological and travel patterns modeling demonstrates much of the Southeast, including New Orleans, is considered at high risk for the potential transmission for Zika during the warmer months of July-September (Monaghan 2016). Local mosquito populations can vary widely, and the actual risk of transmission in an area depends on the number of returning infected travelers, the chance that the infected person will be exposed to mosquitoes and that the mosquito will live long enough to become infectious and bite another person. This means that travel patterns, temperature, population density and exposure are all very important for transmission to occur.

The primary Zika virus vector mosquito, *Aedes aegypti* (yellow fever mosquito) and potential vector *Aedes albopictus* (Asian tiger mosquito) utilize container habitats in residential areas. These mosquitoes lay eggs singly along the waterline inside water-holding containers which have the ability to survive without water for several months. It is important to eliminate containers that produce mosquitoes and educate homeowners where they are found. Since mosquito development can be completed in something as small as a capful of water, it is essential to locate wa-

Figure 16. *Aedes aegypti* (yellow fever mosquito) has a characteristic black and white pattern with a lyre-shaped marking on the dorsal (top) part of its thorax. This species is the primary vector of Zika virus. Picture taken by Ed Freytag.

ter-holding containers, and remove or empty and turn over. This includes items like discarded tires, buckets, coolers, plant saucers and children's toys. This should be done weekly as mosquitoes can develop from egg to adult during this time in warmer months. Containers that cannot be removed such as pet dishes, bird baths and rain barrels, should be scrubbed to remove eggs. This is critical to the success of a source reduction campaign and if not managed, the mosquito population can rebound in as little as 2 weeks.

In Louisiana, *Aedes albopictus* is widespread and *Ae. aegypti* is limited to the greater New Orleans area (Orleans, Jefferson, St. Bernard and isolated populations in St. Tammany Parishes). In New Orleans, *Ae. aegypti* is abundant in highly-populated urban areas and *Ae. albopictus* is more likely to be found in suburban, rural and vegetated urban habitats like large parks. Based on 2011 and 2013 ovitrap collections, *Ae. aegypti* predominates in areas of Mid-City, Bywater and parts of Uptown such as Broadmoor. *Aedes albopictus* is predominant along the Lakefront, New Orleans East and on the West Bank outside of Algiers Point. These vector species can be active during the day, but are largely crepuscular (active in the twilight hours of dawn and dusk). NOMTCB encourages residents to wear protective clothing (e.g., long pants and long-sleeve shirts), use EPA-approved, effective mosquito repellants, ensure windows and doors have screens in good repair, and to consider using air conditioning rather than keeping the doors and windows open.

The adult *Ae. aegypti* mosquito is recognizable by its black and white coloration and characteristic silvery-white lyre-shaped pattern on the dorsal side of the thorax (Fig. 16). It is closely associated with humans and their dwellings. The eggs of this species are very desiccation resistant and can survive hot, dry environments in urban areas. *Ae. aegypti* is typically found outdoors, but can also be found resting inside dwellings. *Ae. aegypti* has a preference for feeding on humans. In New Orleans, this species overwinters as an adult and can be found year-round when temperatures are warm enough. *Aedes aegypti* mosquitoes have a high vectorial capacity (the effectiveness of virus transmission in nature) for dengue, chikungunya, Zika and yellow fever viruses (pers. comm. Dr. Dawn Wesson).

Aedes albopictus was introduced into the U.S. through scrap tires from Northern Asia in the late 1980s. *Ae. albopictus* has displaced *Ae. aegypti* throughout the Southern U.S., however its geographic range extends further north into states such as New Jersey. This small black and white mosquito has a characteristic single, silvery-white stripe on the dorsal side of the thorax (Fig. 17). This mosquito prefers vegetation and is found mostly outdoors. *Aedes albopictus* is a better larval competitor and adapted to using lower-nutrient, natural resource environments. It is an aggressive biter with a variety of hosts, including humans, domestic, and wild animals. In New Orleans, this species overwinters as eggs and is less abundant in winter months when day length is shorter. This species is also competent vector of West

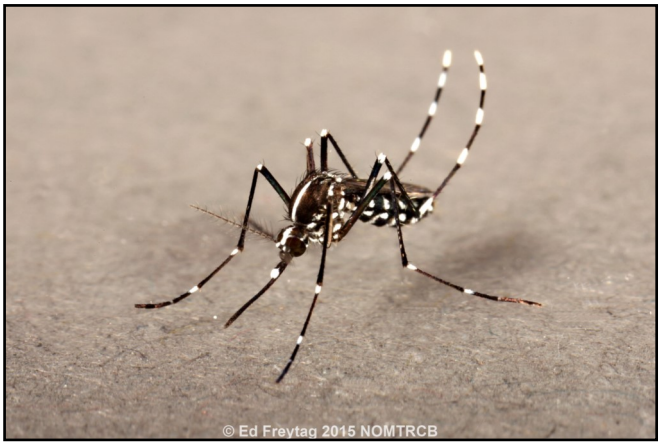


Figure 17. *Aedes albopictus* (Asian tiger mosquito) has a characteristic black and white pattern with a single stripe on the dorsal (top) part of its thorax. This species is the primary vector of Zika virus. Picture taken by Ed Freytag.

Nile, dengue, chikungunya and Zika viruses. Given its wide host selection, it may be less often implicated in arbovirus transmission.

Zika virus Outreach and Education

Because of the demand for information on Zika virus and management of these vector species, NOMTCB staff have presented numerous seminars and webinars to the pest control professionals, environmental health specialists and other public health practitioners, locally and nationally. Topics included were general information about mosquito biology and identification, yard inspections, resistance management, best practices for pesticide applications, and mosquito control emergency response preparedness. Staff have also attended neighborhood events to distribute educational materials and give demonstrations of mosquito biology and control. The full list of events can be found in the Extension, Technology, Transfer and Education section.

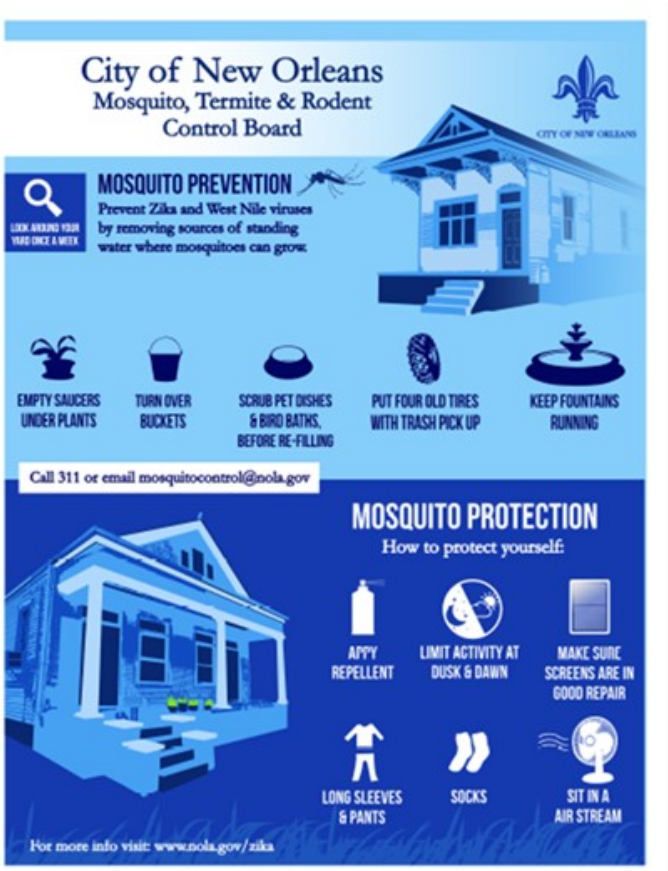


Figure 18. Additional mosquito and Zika prevention materials developed specifically for New Orleans. This flyer was distributed at outreach events and also at City libraries and recreation centers.

Additional outreach materials were produced based on container assessment data of the types of habitats frequently found in residential yards in New Orleans (Fig. 18). A flyer was also mailed citywide in Sewerage & Water Board bills in the month of July (Fig. 19).

NOMTCB personnel began the season conducting inspections at city-owned properties including parks, libraries, police and fire stations, and playgrounds to ensure that these sites were free from mosquito habitats. Following those activities, neighborhood outreach campaigns began in areas with abundant mosquito vector populations. This involved the use of assistance from the New Orleans Health Department (Fig. 20) and volunteers going door-to-door in targeted neighborhoods, distributing doorhangers, and conducting backyard container assessments. It is critical to engage residents and neighborhoods in the removal

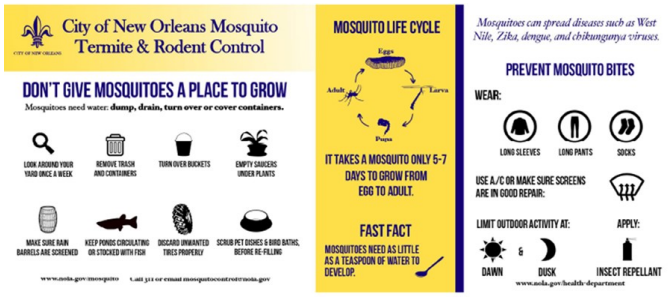


Figure 19. An insert for Sewerage and Water Board mailing with mosquito prevention message.

Figure 20. Michael Murphy, New Orleans Health Department, enters data in an app designed by the City GIS department and collaborators for collecting inspection data from neighborhood outreach, June 2016.

and elimination of containers. We experimented with the development and testing of a GIS-based app for rapid data collection (Fig. 21).

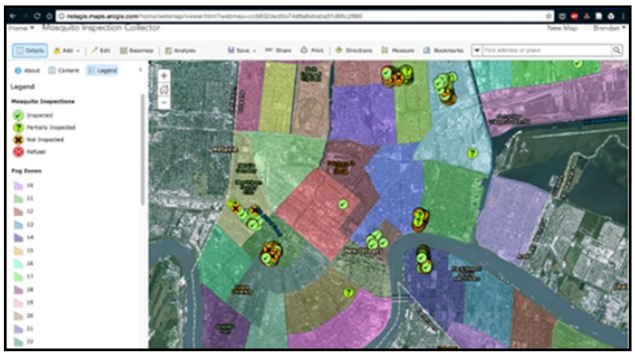


Figure 21. Sample desktop display of inspection and outreach data collected using the app.

This program involved development with the City's GIS department and an outside company which produced a dashboard where outreach activities could be viewed, and easy-to-complete forms which could be entered on a smart phone (Fig. 22). The data has been helpful in understanding the frequency and type of container habitats observed (Fig. 23). Around 2,500 properties were recorded in the app and 556 yard inspections. Of the yards inspected, 368 had at least one water-holding container and in 45.6% (171 yards) immature mosquitoes were observed during the inspection (Fig. 24). Approximately 60% of the time, these containers were simply emptied (Fig. 25).

Figure 22. Sample screen display from outreach data collection app.

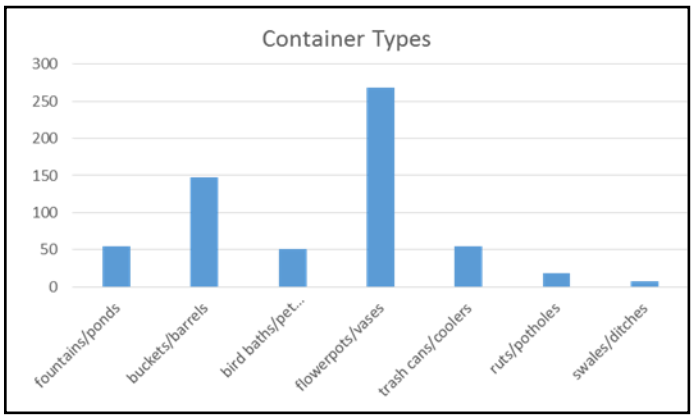


Figure 23. Container type data collected by using app June-November 2016.

Figure 24. Inspection in Bywater of a backyard with numerous containers, November 2016. The most frequently found water-holding containers are associated with plants, like planters and plant saucers.

Figure 25. A volunteer assists with outreach activities Uptown and empties a bird bath filled with water, September 2016.

We found it helpful to have outreach kits containing larvicides in various formulations that could be easily distributed during these events (Fig. 26). Licensed pesticide applicators applied larvicides to containers that could not be removed or emptied (Fig. 27).

Figure 26. Rapid response kits put together to assist with outreach activities. Kits contained various larvicide formulations with appropriate labeling, work and latex gloves, and door-hangers.

Figure 27. Erin Cloherty adds larvicide to a non-circulating fountain, Uptown, September 2016.

We also experimented with the application of copepods to permenant water-holding habitats so larvicide re-application was not required (Fig. 28). We also required staff and volunteers to be easily identifiable as working with mosquito control by wearing vests marked with our logo – this gave us a clear, unified presence in the neighborhood and lead to high participation rates.

Figure 28. Cynthia Harrison adds copepods to an unattended & broken drain Uptown, September 2016.

Following outreach events, we also performed sweeps to remove waste tires which were illegally dumped. Many of these events occurred during the early evening or on weekends when we were able to connect with more homeowners (Fig. 29). We are thankful to a very dedicated group of volunteers and employees who made these events possible.

Large volunteer groups also assisted City employees with the clean-up of City-owned cemeteries (Fig. 30) , as these areas have numerous container habitats, removing trash and debris and filling remaining containers with sand removed abundant habitats (Fig. 31).

Mosquito Surveillance & Control

Most community-based mosquito control districts use an integrated pest (or mosquito) management program which utilizes surveillance, public education, source reduction, larvicides and biological control, and reserves the use of adulticides where and when needed most. The basis of this program is continuous surveillance of nuisance and vector mosquitoes.

Gravid trap collection resumed for the season in April. A total of 2,016 pools of *Cx. quinquefasciatus*

Fig. 29. Outreach conducted (areas within outlined areas) throughout New Orleans, 2016.

Figure 30. Shaun Broadley assists with cemetery clean-up activities, July 2016.

Figure 31. Volunteers fill in cemetery urns with sand, July 2016.

were submitted to the Louisiana Animal Disease Diagnostic Laboratory at Louisiana State University for arbovirus testing. One of these pools tested positive for West Nile virus, but none for St. Louis encephalitis or Eastern Equine encephalitis. A single human case was reported close to the positive mosquito pool in the same month.

A citywide mosquito surveillance program was also initiated for *Aedes* species using the Biogents BG Sentinel® (BGS). As with *Culex*, *Aedes* adult mosquito surveillance involves the collection, identification and pooling of adult mosquitoes for virus testing. In April, entomologists determined a sampling framework and resumed adult collections, which

continued until December. Areas of the city with high numbers of *Aedes* mosquitoes and dense human population are potential hotspots for Zika virus transmission and BGS surveillance focused in these areas. As Zika virus travel cases were reported, additional surveillance was performed in the immediate area for 45 days following the case date of onset of disease using BGS traps and collection of larvae and pupae collection from the field.

Additionally in response to Zika travel cases, property inspections, educational campaigns through the use of door hangers and source reduction was also conducted. Properties within the target area with code violations were identified and the information given to NOHD, Code Enforcement, and Department of Sanitation. Vector surveillance, biological control, larviciding, area-wide adulticiding and yard treatments were conducted as needed for the duration of the 45 day follow-up time period as suggested by CDC. This was a time-consuming and intense effort but is important in reducing the possibility of local transmission.

NOMTCB has a history of research and operational use of biological control agents including *Gambusia* (mosquito fish), copepods (small crustaceans) and *Toxorhynchites* (cannibal mosquitoes). In February, we began to increase the production of these at our Biological Control Laboratory in New Orleans East. Sustained control efforts will likely involve the experimental releases of biological control species in areas of higher risk such as those with frequent illegal waste tire dumping, prolonged tire storage or high number of containers positive for immature mosquitoes. Copepods are small (0.5 -1.5 mm) crustaceans found naturally in marine and fresh water habitats. *Mesocyclops longisetus* and *Macrocyclops albidus* are aggressive species which can consume first and second instar mosquito larvae (>40 larvae/ day). Successful control of *Ae. albopictus* and *Ae. aegypti* larvae has been achieved through the addition of copepods in containers such as tire, barrels and cisterns. Copepods have a varied diet allowing them to survive once mosquito larvae have been depleted and can tolerate dry periods.

The number of service requests in 2016 have been high, as many residents are now concerned about Zika and standing water near their homes. The peak of service requests were in August following the Mayor's press conference, yet this is typically not the peak of mosquito activity (Figs. 32-33). In 2016, 721 service requests were submitted, much higher than in the 399 received in 2015, and 517 requests in 2014 (2012 – 575, 2013 – 414). Many of these requests required an inspection and we have been fortunate to be able to hire additional staff to address this increased work load.

No local transmission of Zika virus was reported in Louisiana in 2016, continuing efforts and collaborations with city departments, state agencies and neighboring mosquito control districts will support the infrastructure needed to maintain the level of urgency needed to deal with this new threat and others in the years to come.

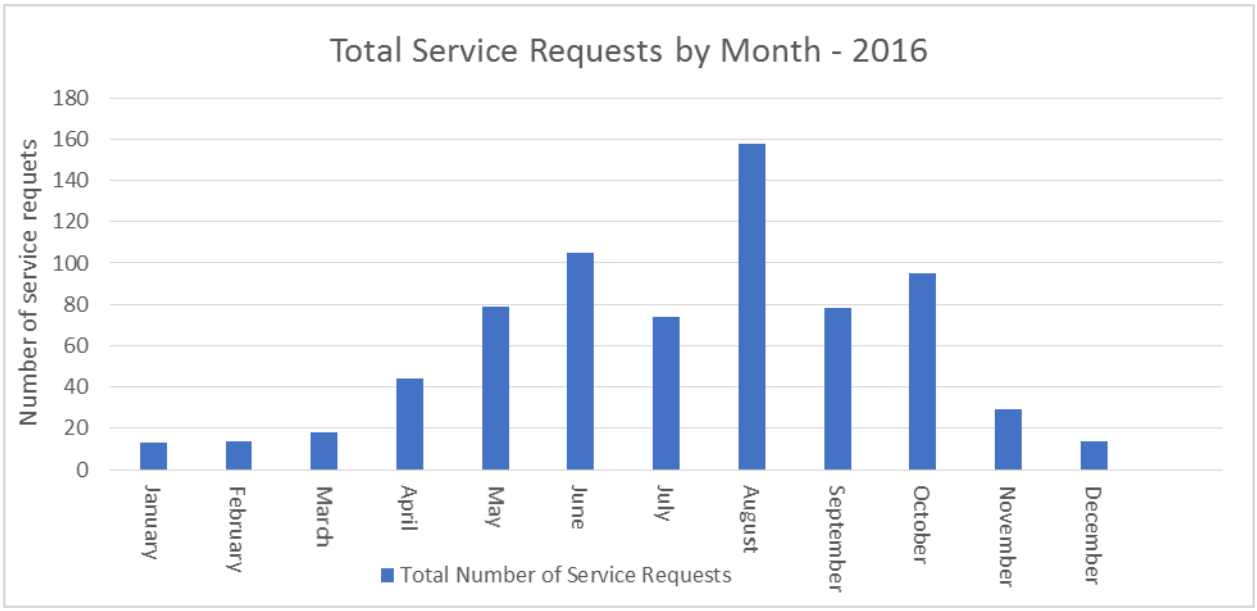


Fig. 32. Mosquito service requests received in 2016.

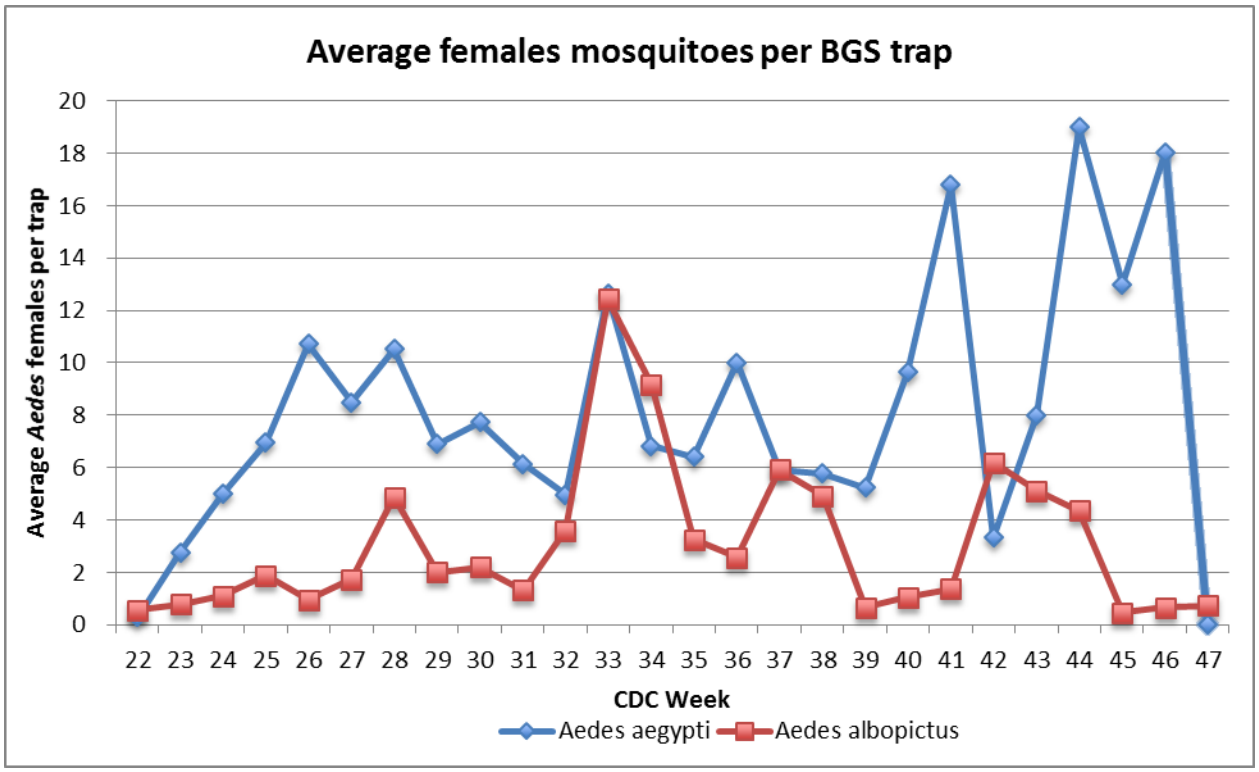


Fig. 33. BG Sentinel trap data for *Aedes aegypti* and *Aedes albopictus* collected from June-August 2016.

AVIATION
ED FOSTER

As we entered 2016, the end of season maintenance from the prior year was completed on our aircraft and equipment. We also renewed our aerial spraying permit with the FAA. February found us conducting training and validation flights in preparation for the upcoming season.

In March, we attended annual aircraft mechanic recertification in Lafayette, LA. This two day event consisted of classroom briefing sessions from aircraft manufacturers, industry experts and the FAA.

We completed our first spray flight of the year in early April and continued these through June. Fortunately, there were no significant tropical storms, or hurricanes that would have required an evacuation of the airplane this season.

Our never ending search for parts to support the aircraft and spray system resulted in a rare find and a great cost savings. An unused set of aircraft mounted pesticide tanks and many associated spray system parts (Fig. 34) were located in the African nation of Uganda.

Figure 34. Micronair spray tanks purchased in 2016 from an African company.

The parts came with an interesting history. The African nation of Botswana purchased a Britten Norman Islander aircraft similar to ours with an optional spray system. When the aircraft was delivered in 1987, the spray system was removed and never used. The aircraft was utilized in a transport rather than a spraying role. The tanks and parts remained in storage and were transferred to each new owner as the aircraft was sold.

Needless to say, the procurement effort was a challenge, so after some lengthy negotiations and a few miracles from the Director and staff, the parts found a new home in our hangar. These items are a fantastic addition to our spares and were obtained at a fraction of the cost of the same parts if procured through the manufacturer. We'll keep scouring the universe in hopes of additional finds.

As the mosquito season wound down and we entered the cooler months, we began the effort of modifying the recently purchased Buffalo Turbine CSM/3 Sprayer (Fig. 35). This is part of our effort to incorporate a wide area larviciding capability.

Figure 35. A Buffalo Turbine CSM/3 factory configuration was purchased in 2016.

The Buffalo Turbine is designed as an agricultural sprayer, primarily used in orchards and as such requires modification for use in mosquito control. These modified machines were used extensively last year in States having Zika virus outbreaks and in other areas as a preventative control measure.

RODENT CONTROL AND WILDLIFE SPECIAL PROJECTS

JOYCE BROWN, ANGELO ANDERSON , FRIEDERIKE BAUDER, ERIN CLOHERTY, TIMMY MADERE, AND PHILIP L. SMITH

Service Requests

From January 1 through December 31, 2016 the NOMTCB staff received 658 rodent service requests by e-mails or calls to our home office and 311 (Table 1). All service requests were inspected and rodent activity was treated as needed. It is the job of the trained technician to positively identify the presence of rodents and what methods of treatment were needed, if any.

Of the 658 rodent complaints, 74 properties had visible rodent activity and a total of 174 active burrows were observed and treated. Each site was re-inspected at least once or until the burrows were no longer active. Active burrows generally will have kick-out signs around the burrow entrance, fresh tracks, or in the case of a sidewalk burrow, a hole in the building structure usually revealing rub marks. Many of the requests for service were based on old rodent droppings and later dropped due to lack of fresh signs. There are several examples of this that directly reflect this pattern. See Table 1 for information of rodent service requests by month.

Table 1. Rodent service requests in 2016 by month

Month	Inspection	Number of Re-inspections	Total property visits
January	31	2	33
February	37	3	40
March	37	6	43
April	58	10	68
May	63	9	72
June	89	8	97
July	66	6	71
August	63	12	75
September	56	2	58
October	64	10	74
November	42	3	45
December	52	3	55
Total	658	74	732

Residential Inspections

NOMTCB inspectors continued to accept wildlife and residential rodent complaints. The inspectors helped educate the residents by providing fact sheets, explaining how to pest proof their residences, and the importance of general trash management inside and outside their property. We do not have an official wildlife program, but we make every effort to spend time with the caller to provide them important information they can use to eliminate the problem.

Every wild animal, rodent, and pest needs a food source, water, and harborage. We explain to the residents the same things we teach our inspectors. By removing at least two of these three necessities, you will generally alleviate the pest issues. In addition, exclusion is an Integrated Pest Management practice that eliminates the rodent and wildlife problems in a space without the use of pesticides. By simply closing entry points into your home or access to food, the problem can be eliminated.

Home owners will often use over-the-counter rodenticides without properly following the label and expose non target species and children to the product. This is often a total disregard to basic safety precautions when using these products.

Education is key to changing behavior. Rodent fact sheets were distributed with the goal of providing the homeowners a guideline to rodent control in and around their home, the importance of safety while eliminating the rodent's food sources, and the importance of excluding rodent entry points in and around their homes. These methods of pest control will often achieve the same results as using rodenticides.

French Quarter: Storm Drains Treatment

Treating storm drains in the French Quarter is a year -round rodent baiting job. NOMTCB inspectors prepared over 500 rodent block units that were hung using a wire inside every storm drain located on the interior blocks of Burgundy, Esplanade, Decatur and Canal Street. Mr. Jimmy Jessie (Pest Control Inspec-

tor) prepared the bait blocks in order to assist in efficient deployment in the field by inspectors (Figs. 36-37). This preparation allows for easy installation and data collecting.

Figure 36. Jimmy Jesse prepares drain bait for the French Quarter treatment.

Figure 37. Jimmy Jesse packs wagon for storm drain treatment.

Norway rats use storm drains (Fig. 38) to hide and move under ground. Because of the confined location, non-target species are not exposed. This is a safe, easy and effective way of treating high traffic

Figure 38. Storm drain in the French Quarter used by Norway rats to move under ground.

areas. Our treatment days are planned a week or two before big events like Mardi Gras, holiday seasons, or special events like the French Quarter Fest. The January treatment date, for example, was chosen because of Mardi Gras. The considerable increase in food availability can often cause a population explosion amongst rodents. NOMTCB pest inspectors treated 462 storm drains in January.

On June 15, 2016, rodent inspectors and interns treated 266 storm drains in the French Quarter. Several areas of the French Quarter were blocked off, not allowing our inspectors access to the storm drains. Later that year we regained access before Halloween. On October 20, 2016, we treated 352 storm drains.

Rodenticides used by our department are labeled for use in storm drains or sewers. Different types of rodenticides call for different amounts when drain baiting. This information is always specified on the label and varies from product to product depending on the active ingredient and amount required for a lethal dose. This is why we always preach to our inspectors, “The label is the law.” We are also routinely rotating baits. Changing active ingredients in our rodenticides helps prevent resistance.

Many pest control operators do not conduct this type of treatment and we often receive calls for assistance in front of their accounts. We appreciate the partnership and are happy to work with private industry.

While storm drain baiting, burrow systems and sidewalk burrows were also located and treated. Our inspectors are trained to always be on the lookout for burrows, rub marks, tracks, and excess garbage.

Green space locations, like Latrobe Park, need monthly inspections and are treated as needed. This type of treatment however, requires a different method (Fig. 39). It is called deep burrow baiting and involves inserting pellet bait directly into the rodent colony. Placing a tube into the burrow while pouring pellet bait deep into the hole safely places the bait directly into the rodent's home.

Figure 39. Angelo Anderson treats the myriad of active burrows using the deep burrow baiting technique.

Special Assignments

Margaret Place/Underpass

Inspectors have continued inspecting and treating the burrows and storm drains at Margaret Place and under the overpass located at Camp St. and Clio St. to St. Charles Ave. (Fig. 40). Under and around the overpass have become an area of very high rodent pressure and a direct result of the homeless that have moved into this area (Fig.41).

The abundance of trash in these areas has given the rodents an available food source and has severely hampered our efforts. If the food sources are not removed, the rodenticide treatments will have a limited effect. It has also presented some safety issues for our staff as well as issues when using rodenticides in close proximity to people. Due to potential exposure, some areas were not eligible for rodenticide treatments. Our staff was offered tetanus, hepatitis A and B vaccinations in 2016. In addition, training was provided by EMS, NOHD and the police department on how to best handle hazards while working in these areas.

Consequently, much of the green space in these areas have signs of rodent habitation and burrows. The

Figure 40. Margaret Place is at the beginning of Camp St. and directly across the street from the underpass that has a homeless encampment.

Figure 41. The underpass across from Margaret Place Park is a location that people congregated and has caused unique challenges for control of rodents.

new addition to The Mission (homeless shelter) should help this ongoing problem. We will continue our efforts despite this difficult situation.

City Properties

We had a very busy year for the Special Projects division. Our group continued to work on various rodent based studies for the pest control industry, as well as addressing numerous on-going and new rodent issues throughout the city. New techniques and strategies in rodent control were implemented at sites such as Lafayette Square and the French Market in order to better deal with the rodent issues of these areas of high tourist traffic.

In order to better understand and address the rodent issues of the city, night shifts have been added to the

schedules of our staff. These night shifts are voluntary and can range in activities from running snap traps in places where it would be unsafe, unsightly, and/or unsuccessful during the day; to inspecting buildings to locate the points of entry for rodents; to determining primary food and water sources. Quarterly night trapping was added to the treatment regiment at Lafayette Square in order to keep the rodent numbers down while avoiding the dangers traps might pose to the numerous dogs that are walked in the park during the day. A total of 311 Norway rats were caught by night trapping at Lafayette Square over the course of the year. The addition of this night trapping to the regular schedule of burrow baiting and also a newly added bait station run has helped to significantly reduce the rodent population.

Night trapping was also used to combat the rodent issue at City Hall. Night trapping was combined with the technique of prebaiting traps for rodents. This method conditions the rodents to trust the snap traps as a safe food source, rather than an instrument of impending doom. Over a four week period, 100 snap traps were placed out on Mondays, baited, and not set. On Tuesdays, the traps were rebaited as needed and still left unset. On Wednesdays, the traps were rebaited and then set. On Thursdays, the dead rodents were removed, the traps rebaited, and then set. On Fridays, the dead rodents and traps would be removed for the weekend. This was done to prevent any fly issues from arising due to the presence of dead rodents in traps. In the first week, 84 rats were caught. In the second week, 61 rats were caught. In the third week, 46 rats were caught. In the fourth week, 31 rats were caught. This technique of prebaiting rodent traps will continue to be used at City Hall as well as other sites with high rodent populations .

Night shifts in the French Market have led to changes in the frequency and location of our bait station placements/runs. These shifts have also allowed our staff to witness numerous incidents in which restaurant owners in the open air market were leaving food out for the homeless at night only to have the rats get to it first. Scouting areas and observing rodent behaviors at night has allowed for us to become more efficient and successful in our efforts to reduce the rodent populations in these areas and will continue to be utilized in 2017.

Figure 42. Raccoons are a commonly found in an urban areas.

Raccoons

For the last two years, Erin Cloherty (Pest Control Specialist 1) has been trapping raccoons as part of an on-going research study with Louisiana State University's Health Science's Epidemiology Department. Raccoons have been trapped in Orleans Parish and are being tested for the prevalence of *Baylisascaris procyonis* (roundworm) and other zoonotic diseases. A total of 75 raccoons are needed for the project.

Raccoons (Fig. 42) can carry various zoonotic diseases including: rabies, mosquito-borne diseases (*Dirofilaria immitis,* heartworm), tick-borne diseases (*Babesia* and *Rickettsia*), Chagas disease (*Trypanosoma cruzi*) and raccoon roundworm (*Baylisascaris procyonis*).

Baylisascaris procyonis is considered by the Centers for Disease Control and Prevention as an important emerging zoonotic disease in the United States and a public health concern especially for metropolitan areas where raccoons are living in close proximity to humans. Children are at a higher risk as they play in the soil where raccoons defecate (Fig. 43). The roundworm eggs are found in raccoon feces. It causes the infection when ingested. The eggs hatch and the larvae migrate to the brain and eyes.

Typically, a *Baylisascaris procyonis* infection results in fatal disease or severe sequelae. In the US, there have been about 30 diagnosed human Baylisascaris encephalitis cases, including a four year old boy from New Orleans in 2007.

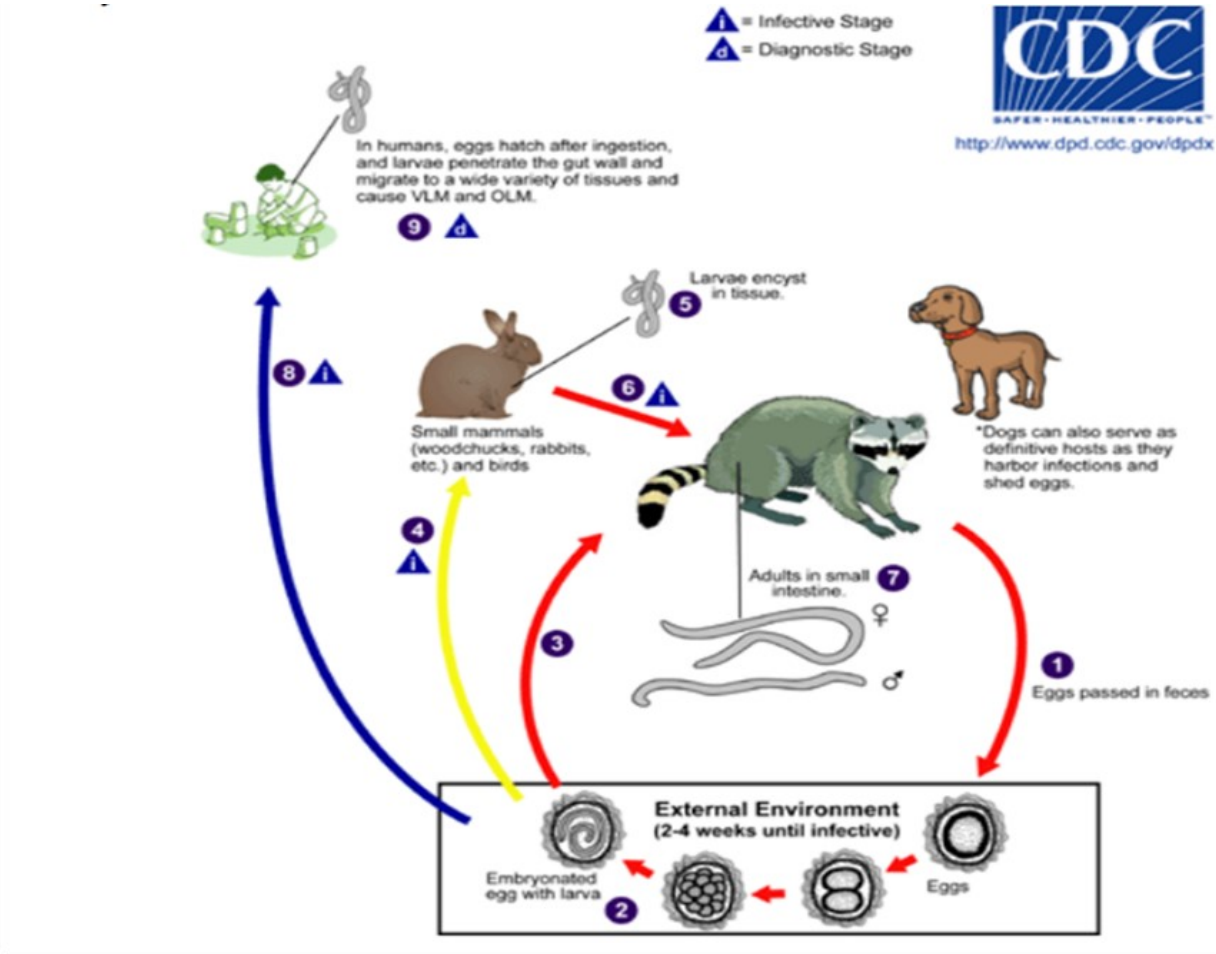


Figure 43. Life cycle of *Baylisascaris procyonis,* Centers for Disease Control and Prevention.

So far we have trapped over 63 raccoons in Orleans Parish. Fourteen have had adult roundworm. Giving a *Baylisascaris procyonis* prevalence of 22.2% in the New Orleans raccoon population.

Fecal matter will be examined for the *Baylisascaris* eggs by microscopy. We hope to complete this testing by the end of 2017.

Rodenticide efficacy trials

NOMTCB continues to conduct field research as part of agreements made with collaborators in the private industry. In 2016, we have seen an influx in rodenticide projects. Friederike Bauder, Philip L. Smith Timmy Madere, and Claudia Riegel worked on variety of projects with Dr. Joe DeMark (Dow AgroSciences) Dr. Kyle Jordan, (BASF), Ted Bruesch, (Liphatech Inc.) and Simone Jeans (Bell Labs). The projects ranged in complexity and some spanned more than one year.

School Integrated Pest Management

Three schools are serviced by NOMTCB. Philip L. Smith is in charge of these accounts. In 2012, we received a grant from the EPA to conduct integrated pest management at three schools in New Orleans. At the conclusion of this project, three schools chose to continue to have our team service pest control account at the schools. The three schools are Mildred Osborne, Arise Academy, and the New Orleans Military and Maritime Academy. Each year a spring and fall broadcast treatment for red imported fire ants is conducted around the schools, along with monthly pest monitoring that continues throughout the year (Fig. 44). The use of pest monitors provides an

Figure 44. Philip Smith checks pest monitors in the schools each month.

Figure 45. Regular and thorough cleaning of the schools are an important part of an IPM program.

indicator of pests before they become problems throughout the building.

After several years of biannual deep cleaning (Fig 45), fall and spring ant treatments, annual termite monitoring, monthly pest monitoring, and daily trash removal the schools do not have pest problems. IPM practices have proven to be a very effective method for managing pests.

When treatments have been implemented, our monitoring system has proven invaluable for the technician when treating pest. Identification and location of the problem has determined our course of action with great success. An integrated pest management approach greatly reduces the children's exposure to pesticides while effectively eliminating the problem.

PHOTOGRAPHY, TERMITE INSPECTIONS AND TREATMENTS, AND BUILDING MAINTENANCE

ED FREYTAG

Photography

Jack Leonard (Retired, Pest Control Inspector 3) spent countless hours pouring over thousands upon thousands of trail camera pictures counting the number of times a rat was either near or in the bait station. Several rat studies were conducted with industry to test bait formulations and also rat detecting devices inside the bait stations. Trail cameras were placed next to the bait stations to capture the rats approaching and entering the stations. The trail cameras use infra red and motion detection technology to capture pictures during the day and at night (Fig.46).

Figure 46. Philip L. Smith testing trail camera in front of the rodent bait station.

Kimberly Gilbert, Communications Professional & Specialty Solutions for BASF, requested high resolution photographs of the crystallization of Phantom II pressurized insecticide for technical brochure purposes, and also of the Avert DF Dry Flowable Cockroach Bait. Low-resolution sample pictures were provided as guidelines for the type of photographs they needed for the advertising campaign.

The Phantom crystals proved to be a challenge for two reasons: 1) the label does not specify to shake the can prior to use even though the active ingredient appears to settle at the bottom of the can, and 2) working at 1x, 3x and 5x life size, the crystals required at least 35 individual images to stack into a single focused image of the individual crystals. The lighting with flash was also tricky since the material was sprayed on a glass microscope slide and shot on a dark background, causing the crystals to glow if overexposed. The Avert DF material was easier to photograph but still required a lot of manipulation to get the exposure and focus just right. An invoice was sent to BASF to cover the expenses (approximately 20 hours of actual photography) .

The Zika virus transmitted by *Aedes aegypti* mosquito has created a renewed interest in biological control agents. Bill Horan, President of Operation Blessing International, has visited our facility several times this year for mosquito control training and even brought personnel from Honduras to the Mosquito Academy in the spring. One of the things Mr. Horan is pushing is the use biological control agents such as copepods, turtles and fish for control of mosquito larvae. NOMTCB has the experience rearing and using these biological agents. In Honduras, water-holding containers are common due to an irregular source of city water. A large number of water vessels and wells known as pilas or concrete water basins are used for collecting rainwater. These containers and basins allow a family to practice basic hygiene, wash dishes, and maintain an adequate amount of water to weather common temporary water shortages. Unfortunately, they all provide ideal locations for the proliferation of *Ae. aegypti* mosquitoes.

The copepod is a very efficient predator of first instar mosquito larvae (Fig. 47). Several videos of the copepod attacking a first instar mosquito larva were shot for Bill to use in his control campaign (per his request). It was extremely difficult to shoot the action of attacking and feeding on the mosquito larva due to the small size and darting speed of the copepod. In order to minimize the swimming area of the copepod, I used a 1/8 inch “o” ring glued on a microscope with silicone caulk. The copepod was dropped inside the “o” ring with a fine eye dropper and then the 1st instar larvae was added while the camera was rolling. Several copepods were used before a feeding sequence was filmed, and I found out that it was necessary to starve the copepods for several days prior to

filming. Bill was also interested in the *Toxorhynchites*, or cannibal, mosquito (Fig. 48). Obtaining a high quality image and video of the cannibal mosquito was much easier than with the copepods, as they always seem to be hungry and readily accept a mosquito larva as food. Small narrow "aquariums" were constructed with microscope glass slides and cover slips where both the *Tox*. and the *Ae. aegypti* larvae could be dropped but were restricted in a very narrow area.

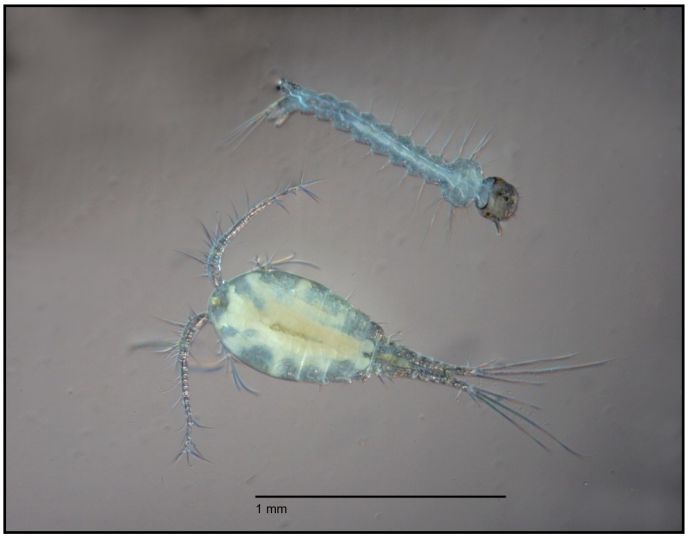


Figure 47. Copepod adult next to a first instar *Ae. aegypti* larva. Approximately 1.5 mm in length.

Figure 48. *Toxorhynchites* larvae preying on an *Ae. aegypti* mosquito larva.

Infrared (IR) Inspections

A total of 17 infrared inspections were conducted in 2016. Seven of the structures were inspected for Bilfiot Pest Control, two structures were inspected for Southern Pest Control in Mississippi, seven structures were inspected for homeowners, and one structure was inspected for DA Exterminating. Four buildings were located in Mississippi which were referrals from Red Pest Solutions. Since there is no one conducting this type of termite inspection in Mississippi or Alabama, I have advertised our services during presentations at recertification meetings in Mobile and other locations to get more pest control companies interested in our inspections. In order to facilitate estimating the cost of a whole house termite inspection with the infrared camera and the specialized detection tools that we use, the pricing is based on square footage of the structure rather than pricing it by the hour. This way is easier to quote a price for the service.

In order to travel outside the state, a series of travel forms have to be approved by the Director and the Deputy Mayor/CAO. All travel expenses are paid for by the homeowner or pest control company.

Pest Inspections and Other Treatments

We received many calls throughout the year directly from homeowners, other city departments or through the 311 service for assistance with insect and rodent pests. We also receive calls for assistance with wild animals, but we do not have a funded program to be able to set traps and remove pests such as raccoons, opossums, snakes and other critters. These requests are handled by phone and we provide information and suggestions on how to avoid attracting them to the property. Most residents are extremely disappointed that we cannot assist them, as they feel that the city should be responsible for wild animals in their property.

Bed Bugs

We conducted a bed bug inspection of the Code Enforcement offices located at 1340 Poydras Avenue downtown and found an office chair infested with bed bugs (it was apparently brought into the office by one of the inspectors). The chair was treated and removed from the premises. Sticky traps were placed under the desks to monitor the bedbugs. After several weeks the monitors were re-inspected and only a few bed bugs were found around the cubicle with the infested chair. Because bed bugs tend to move around, the whole 10th floor had to be treated with CimeXa, a fine insecticidal dust made from silica get

that removes the waxes and oils from the exoskeleton and causes desiccation. Appropriate PPE such as head nets, face masks and gloves were donned during the treatment to prevent possible respiratory issues (Fig. 49).

The 9th, 11th, and 12th floors were also treated as a precaution to prevent re-infestations. The 9th and 10th floor were occupied by city employees, but the 11th floor was unoccupied and the 12th floor was where the janitorial crew stored their cleaning equipment. Bed bug biology and control PowerPoint presentations were given to the city employees on the different floors of the building to inform them as to what to expect from the treatments and how to prepare computers and other equipment for fumigation.

All the Code Enforcement vehicles were treated as well as some personal vehicles. A U-Haul truck was rented to transport office equipment to the Terminix site in Metairie for fumigation over the weekend. This bed bug infestation was the first one of its kind for our department, and it forced us to write new policies for treatment and prevention of bed bugs in city offices.

The Director of NOMTCB worked with Code Enforcement's senior leadership as well as Risk Assessment and the Legal Department to establish a plan of action. This was the first event of widespread bed bugs in a city building.

Ants

The main office at Parks and Parkway called complaining of ants bothering them on the second floor. An inspection revealed that crazy ants were on the premises. The perimeter of the building was treated with Termidor and the offices where the ants were active were treated with Advion ant bait. The outside infestation was controlled within a week, but the interior infestation persisted for a few weeks and eventually the ants were eliminated. The office across from the main office also reported ants in the building. An inspection revealed that crazy ants were outside the building, as well as fire ants, and were entering the offices through the front door. Both infestations were controlled with granular and gel baits (Extinguish Plus for the fire ants and Advion gel for the crazy ants).

Figure 49. Joyce Brown and Timmy Madere filling the hand dusters with the product CimeXa.

The Greek Orthodox church located next to Bayou St. John requested our assistance with a crazy ant infestation on their premises. We conducted an inspection and found the church completely infested with crazy ants, but only on the outside of the building. The director of the church requested our assistance in determining the best approach for treatment, and the pest control company contacted us also. After consulting with the regional Louisiana Department of Agriculture regulator, it was decided that the use of Taurus SC would be injected in the slab to try to reach the nesting sites.

Federal City park was treated for fire ants in preparation for the Algiers Fall Festival. Extinguish Plus granules were used to conduct the treatment for red imported fire ants. The bait needs a couple of weeks to be effective and we were not given enough notice so we had to retreat the mounds by injecting one gallon of Talstar solution (1 oz per gallon). Prior to treatment the field was inspected and all active mounds were marked with a pink fluorescent marker flag. After each mound was treated the flag was removed to avoid retreatment. Over 125 mounds were treated in this fashion, and no fire ants were active during the festival.

Termites

A call was received from a homeowner in Woodland Drive in Algiers, requesting assistance in determining if the live oaks in the neutral ground were infested with termites and to try to save them. We found at least nine out of 14 trees visibly infested with Formosan subterranean termites, and will either treat them as part of a research study, or treat them in the future to prevent further damage. We were also informed by the homeowner that most of the apartments along the avenue next to the trees had become infested and suffered damage from Formosan subterranean termites at some point in the past. The trees may be the main source of re-infestation to these properties and treating the trees will probably eliminate the termite problems in the homeowners apartments. It is important that properties maintain an active termite control contract with a licensed pest control company.

Maintenance

The NOLA Tree Project provided college students visiting New Orleans during spring break who volunteered their time to help prepare the soil beds and plant bushes and trees in front of the main administrative building (Fig. 50). Mosquito, Termite and Rodent division personnel, as well as the mechanic and maintenance crews all pitched in with shovels and rakes to beautify the landscaping (Fig. 51). The decorative plants and trees, as well as the mulch and planting soil, were purchased locally.

The Biocontrol laboratory in New Orleans East has had a leaky roof since Hurricane Katrina. Holes were poked on the metal roof by a metal antennae as it was buffeted by the strong winds. Most of the leaks are over the laboratory area where the Audubon Zoo maintains the exotic insects and also in the mosquito laboratory where Cynthia Harrison (Entomologist 1) conducts susceptibility trials. The metal roof was sanded and the holes covered with silicone sealant and then patched with a special roofing sealant. This is a temporary fix as the roof will eventually have to be replaced. The AC had to be upgraded as well. A flow switch had to be ordered because it was old and was not functioning properly. The AC unit had to be shut down for several weeks while the new part arrived. The gate leading to the parking lot had lots of overgrown trees and saplings that prevented the gate from fully closing and had to be trimmed or removed. Closing the gate is necessary when the facility is shut down and evacuated during a hurricane.

The Level 3 Biosafety laboratory (BSL 3) located in the new warehouse facility on Hayne Blvd. (Fig. 52) required new sewage, plumbing and electrical lines to be run underground in order to be functional. The mechanical room floor was gutted due to water damage which caused extensive rotting and could not support any equipment. A subcontractor was hired for the installation of a finished floor. This is a special floor in that the baseboard is part of the finished flooring and has to be installed by professionals. The maintenance crew had to oversee the repairs which lasted well over a week. The remaining item is to have the filtration and computer systems inspected in order to have the building recommissioned to BSL 3

Figure 50. Volunteer college students assist in preparing beds and planting ornamental shrubs and trees at the main administrative office building.

Figure 51. NOMTCB personnel working on preparing the beds for the ornamental shrubs.

Figure 52. New warehouse complex located on Hayne Blvd.

status. Significant funding will be required to complete the next step.

LJ Kabel (Pest Control Specialist 3) and Joseph Robert (Pest Control Inspector 2), the new facilities maintenance replacement for LJ, initiated several improvements on the new warehouse located on Hayne Blvd. Not all of the improvements were finished and some had to be put on hold as more projects come down the pipeline. The office for Firmin Maurice (Automotive Mechanic 2) had to be completely remodeled due to termite damage (Fig. 53) and incorrect building practices from the previous owner. The restroom was also remodeled with new fixtures. A new auto lift was installed, which included running new air lines and electrical wires for outlets and lights. All the walls were primed and two top coats of paint were applied (Fig. 54). The floor was painted with an epoxy paint which is resistant to oils and damage.

The chemical storage building in front of the automotive shop was also extensively repaired, remodeled and repainted. A new three-ton AC unit was installed with new duct work because the old one was not serviceable. LJ divided the space so that the malathion could be stored with AC cooling as per label restrictions. The bathroom also needed a complete makeover so that a shower can be installed. This is a safety requirement since personnel are working with pesticides and could accidentally spill some on their clothes or skin. The shower and toilet are functional but the walls will be finished and painted in the future as time allow.

Figure 53. Termite damage above the mechanic's office that had to be repaired prior to renovations.

Figure 54. LJ Kabel applying a coat of primer paint to the walls of the automotive maintenance shop.

A second warehouse alongside the automotive shop was finally acquired and it also required major improvements and renovations. A dividing wall located in the back of the shop was taken down to open it up for more parking space to store the mosquito spray trucks. A wall was installed on the back half of one of the offices to support the ceiling joists which were termite infested in the past and caused extensive damage. The air conditioning unit was repaired in-house by LJ and Joseph because a relay failed and burned a wire lead causing failure. All three buildings were primed and painted on the outside. A chain wall fence was also removed to have vehicular access between the two buildings. Concrete was poured as needed in several areas of the parking area to prevent accidents and damage to vehicles and personnel. A new heavy duty halogen light was installed on the utility post to illuminate the parking area and the front of the building. Heavy equipment and trucks are parked in the yard and the light will improve safety and help deter possible theft or vandalism at night.

Storage units (three steel shipping containers) were purchased to provide additional storage area for equipment and materials. Custom made wooden shelving was designed in-house and installed to make more efficient use of the storage units.

The Levee Board set a January 31, 2017 date to relinquish the property where the NOMTCB warehouses are located. The property and buildings were mostly cleaned and items moved. A last push to complete the move will be conducted in January.

All the equipment from property was inspected and sorted, and what was damaged and antiquated or unusable was thrown in the dumpsters. Some equipment was separated, inventoried and removed by the surplus department. The rest of the equipment, materials and vehicles was moved to the new warehouse location on Hayne Blvd. This created a new storage problem at the new location which took the rest of the year to sort out. There is still lots of work to do but at least it is operational.

Presentations and Meetings

I was invited by the Environmental Protection Agency (EPA) to talk in St. Croix, US Virgin Islands, and in San Juan, Puerto Rico on the reduced use of pesticides. The events took place from March 30th to April 7th as a free one-day conference to the public. My presentation at both locations was on the reduction of pesticides in the home. In St. Croix I spoke in English to an audience of about 75 participants, and in San Juan I gave the talk in Spanish to an audience of over 100 attendees. Claudia Gutierrez, Senior Advisor, EPA, Office of the Regional Administrator in New York, and Judith Enck, Regional Administrator Environmental Protection Agency, organized the conferences. Everywhere on the island the cone nose termite nests and trails were easily spotted on the trees alongside the roads (Fig. 55).

I presented the results of a two-year study conducted in the Lower Coast Algiers with Copper Care Wood Preservatives, Inc. at the 112th American Wood Protection Association Annual Meeting in San Juan, Puerto Rico in May. Eric Guidry (Pest Control Specialist 1) also attended to assist manning a booth we set up to demonstrate our capacity to conduct wood preservative studies in the field and in the laboratory with Formosan termites. After the meeting we rented

Figure 55. Cone head termite nest (*Nasutitermes* sp.) in a sea grape tree in St. Croix.

a car and visited many sites on the island to collect insects to add to our teaching collection. We set up a sodium vapor light at night on two separate locations and were able to collect many species (Fig. 56). One of the challenges of collecting insects on the island of Puerto Rico is the limited availability of places alongside the road to park the car. Many of the roads in the mountains barely have enough room for one car and the houses are built right next to the roads (Fig. 57). We did manage to tear apart a tree termite nest (Fig. 58), *Nasutitermes* sp., and were able to collect two physogastric queens.

Figure 56. Eric Guidry collecting insects attracted to a white sheet illuminated by a sodium light.

Figure 57. A typical road scene in the mountains in Puerto Rico.

Figure 58. Eric Guidry collecting tree termites from an arboreal nest.

TERMITE CONTROL DIVISION
CARRIE COTTONE, Ph.D.

This year, we are excited to welcome Mr. Shaun Broadley (Pest Control Inspector 2) to our team! Shaun (Fig. 59) began employment with us in February, and has been a great asset to our organization. He has previous experience working as a team member of a production team at Mardi Gras Production, Inc. He has served in the Louisiana Army National Guard, has previous experience as a security officer, professional diver, and boarding officer. Since beginning his employment at NOMTCB, Shaun has become well versed in conducting termite inspections, checking in-ground stations at all our city, commercial, and research sites, installing new sites, and assisting with laboratory bioassays. He has even showed his "hidden talent" for creating computer animation and has created educational videos for outreach and extension.

Figure 59. Shaun Broadley checks one of our collection buckets for termites to be used in a laboratory bioassay.

The following are the proposed goals of our Termite Control Division for 2016:

1. Gain knowledge of termite biology through research projects
2. Protect properties and trees from termite damage
3. Provide high-quality services
4. Continue extension services

The following pages detail how we are achieving these goals.

Termite Research Projects

Industry-Supported Research

NOMTCB continues to conduct field research and laboratory bioassays as part of agreements made with collaborators in the private industry and from universities. This year, we are continuing studies with Drs. Joe DeMark (Dow AgroSciences), Bob Davis, Kyle Jordan, and James Austin (BASF), Mr. Bill Abbott (Copper Care), Mr. Glenn Larkin (Michigan Technological University), and Mr. Chris Barber (Timber Products Inspection). We have also initiated some new projects this year, collaborating with FMC and Polyguard in conjunction with Dr. Phil Koehler (University of Florida).

These projects include both laboratory bioassays and field trials. Laboratory bioassays were performed to determine whether termites can penetrate through a commercial moisture barrier used to protect wood in new construction. Field trials being conducted test the efficacy of new bait and liquid termiticide formulations against subterranean termites. We are able to verify the efficacy of the tested products by monitoring termite activity and comparing the DNA of termites present before treatment to that of termites that reinfest the treated area. This allows us to determine whether termites present after treatment belong to a colony that survived treatment or originated from a neighboring colony that was not exposed to treatment. Studies are also being conducted in the field to test novel wood treatments against termite attack.

Mr. Barry Yokum (Entomologist 1) continues to do an excellent job of managing multiple field research sites for cooperators from Dow AgroSciences and BASF. Mr. Timmy Madere (Pest Control Specialist 1) has done a fantastic job coordinating all the field research for Timber Products Inspection and Michigan Technological University.

Alate Trapping

We have continued to monitor Formosan subterranean termite alates, or swarmers, in the French Quarter and at Jackson Barracks during this year's swarm season. Every year, typically from April through June,

winged reproductive termites take flight after dusk. They can be seen each spring flying in close proximity to the street lights to which they are attracted. These termites will pair, mate, and seek a location in which to start a new colony. In the past, the USDA SRRC conducted their own alate trapping in the French Quarter as part of Operation Full Stop. Because funding for Operation Full Stop ceased in 2012, it has been extremely important for us to continue to monitor termites in the French Quarter, as many historic buildings may now be unprotected against termite damage.

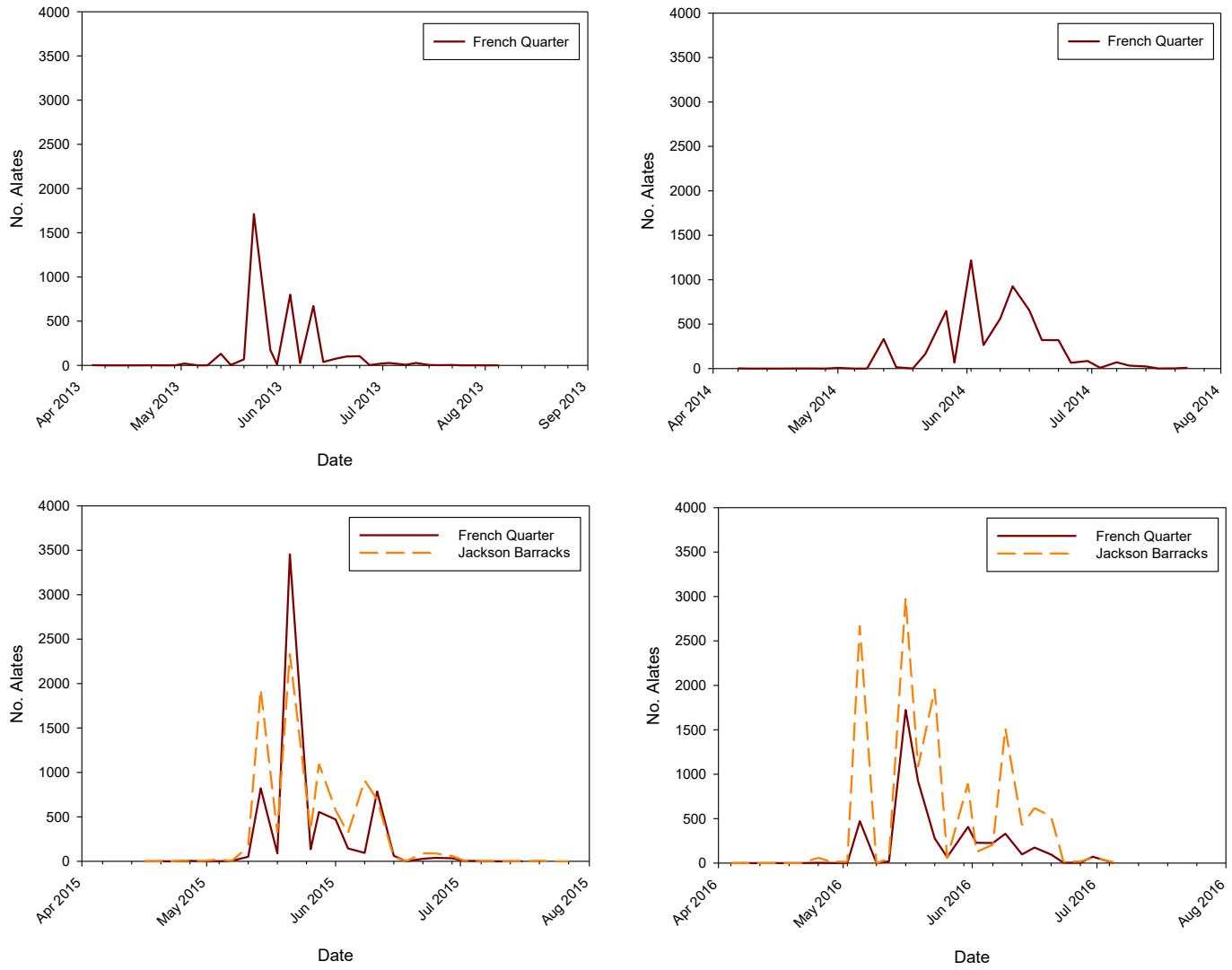
Monitoring the alates at Jackson Barracks for the past year has allowed us to measure the relative termite pressure in the area, especially since we have installed Sentricon® bait stations around the majority of buildings on post. High numbers of swarmers in a baited area can indicate a threat of termites coming in from untreated neighboring areas.

Alate traps consist of glue boards mounted on clipboards and encased by a wire cage to prevent birds from becoming stuck to the traps while attempting to feed on termites. Mr. Frank DiGiovanni (Pest Control Inspector 4), Mr. Eric Guidry (Pest Control Specialist 1), Mr. Shaun Broadly, Mr. Steve Ollar (Pest Control Inspector 2), and Mr. Barry Lyons (Pest Control Specialist 1) installed 35 traps in the French Quarter and 15 traps at Jackson Barracks. They changed the glue boards twice a week, identify alates on the traps, and collect data. A summary of our alate trap data can be seen in Figure 60.

Protecting Properties and Trees

We are still continuing to protect historically signifi-

Figure 60. Total number of alates collected on all glue boards at each site from 2013—2016.



cant and city-owned properties by installing and servicing Sentricon® Recruit HD Always Active bait around structures and trees. Barry Lyons and Steve Ollar, with the assistance of Shaun Broadly, have been doing an excellent job at managing these sites. Servicing each site involves checking every in-ground bait station, evaluating it for current termite activity and looking for evidence of feeding and replacing the baits when necessary. These sites are maintained throughout the year, though the actual inspections are conducted on an annual basis. Table 2 is a summary of all inspections that our group has completed so far this year.

This year, our group has installed termite bait stations at several new commercial sites. These include NORD properties, the Local History Building in Gretna as part of an intergovernmental agreement between NOMTCB and Jefferson Parish, and trees located in Crescent Park. Because these are commercial sites, we are receiving funding to cover the cost of supplies and labor.

Providing High-Quality Services

PestPac Reporting

All data collected from inspecting in-ground bait stations located at city facilities, historic sites, and commercial sites is logged and stored within the software, PestPac. This system also keeps track of whether sites are inspected on time and if all stations at each site are serviced during each inspection interval. Currently, none of our sites are past due and all site checks are complete.

Table 2. Termite inspections of protected properties during 2016 (continued on next page).

Site	Location	Month Inspected	Observations
Historic trees	City Park	January—September	Live termites observed feeding on bait at one tree. Other trees showed evidence of termites feeding on bait though no live termites were present.
Jackson Barracks	6400 St. Claude Ave.	January—May	Live termites feeding on bait in two separate locations of the Barracks. Other areas showed evidence of termites feeding on bait though no live termites were present.
Federal City	2500 General Meyer Ave.	January—June	Evidence of termites feeding on bait, though no live termites were observed.
Parks & Parkways	2829 Gentilly Blvd.	January	Evidence of termites feeding on bait, though no live termites were observed.
Scout Island	City Park	January	Evidence of termites feeding on bait, though no live termites were observed.
Decatur Fire Station	317 Decatur St.	January	No termite activity detected.
Fire Station #18	778 Harrison Ave.	March	Evidence of termites feeding on bait, though no live termites were observed.
Algiers Point Library	725 Pelican Ave.	March	No termite activity detected.
Latter Library	5120 St. Charles Ave.	March	Evidence of termites feeding on bait, though no live termites were observed.
New Orleans Court	2700 Tulane	April	Live termites observed feeding on bait.
Storyland	City Park	April	Live termites observed; additional above-ground station installed.
Parker's Café	City Park	April	Evidence of termites feeding on bait, though no live termites were observed.
City Hall	1300 Perdido St.	May	Evidence of termites feeding on bait, though no live termites were observed.
Civil District Court	421 Loyola Ave.	May	Evidence of termites feeding on bait, though no live termites were observed.
Fire station #7	1441 St. Peter St.	May	Evidence of termites feeding on bait, though no live termites were observed.
City Park Tennis Center	City Park	May	Live termites observed feeding on bait.
City Park Administration	City Park	May	Live termites observed feeding on bait.
NOMMA	425 O'Bannon St.	May	Live termites observed feeding on bait.
Joe Brown Gymnasium	5601 Read Blvd.	May	Live termites observed feeding on bait.
HDLC	830 Julia St.	June	No termite activity detected.
Vieux Carré	516 Chartres St.	June	Evidence of termites feeding on bait, though no live termites were observed.
Bella Luna	914 N. Peters St.	June	Evidence of termites feeding on bait, though no live termites were observed.
Madam John's Legacy	623 Dumaine St.	June	Evidence of termites feeding on bait, though no live termites were observed.
Lower Pontalba	500 St. Ann St.	June	Evidence of termites feeding on bait, though no live termites were observed.
Sewerage & Water Board Building C	1107 Pacific Ave.	June	Live termites observed feeding on bait.

Table 2 (continued). Termite inspections of protected properties during 2016.

Site	Location	Month Inspected	Observations
Dog Park	City Park	June	Evidence of termites feeding on bait, though no live termites were observed.
NORD Administration	5420 Franklin Ave.	July	Live termites observed feeding on bait.
Perseverance Hall	901 N. Rampart St.	July	Evidence of termites feeding on bait, though no live termites were observed.
Nix Library	1401 Carrollton Ave.	July	Evidence of termites feeding on bait, though no live termites were observed.
Cabildo	701 Chartres St.	August	Evidence of termites feeding on bait, though no live termites were observed.
Presbytere	751 Chartres St.	August	Evidence of termites feeding on bait, though no live termites were observed.
Upper Pontalba	500 St. Peters St.	August	Evidence of termites feeding on bait, though no live termites were observed.
Rosa Keller Library	4300 S. Broad St.	August	Evidence of termites feeding on bait, though no live termites were observed.
Marconi Meadows	City Park	August	Evidence of termites feeding on bait, though no live termites were observed.
Catering Building	City Park	August	Evidence of termites feeding on bait, though no live termites were observed.
Jackson Square	601 Decatur St.	September	Evidence of termites feeding on bait, though no live termites were observed.
Algiers Regional Library	3014 Holiday Dr.	September	Live termites observed feeding on bait.
Stage Storage	City Park	September	No termite activity detected
Flea Market	1235 N. Peters St.	September	No termite activity detected.
French Market Red Building	1235 N. Peters St.	September	Evidence of termites feeding on bait, though no live termites were observed.
Parks & Parkways Administration	2829 Gentilly Blvd.	October	Evidence of termites feeding on bait, though no live termites were observed.
Algiers Fire Station #20	425 Opelusas Ave.	October	Evidence of termites feeding on bait, though no live termites were observed.
Algiers Courthouse	225 Morgan St.	October	Evidence of termites feeding on bait, though no live termites were observed.
Stern Tennis Center	4025 S. Saratoga St.	October	Evidence of termites feeding on bait, though no live termites were observed.
New Orleans East Regional Library	5641 Read Blvd.	November	Evidence of termites feeding on bait, though no live termites were observed.
Municipal Academy	401 City Park Ave.	November	Evidence of termites feeding on bait, though no live termites were observed.
Gallier Hall	545 St. Charles Ave.	November	Evidence of termites feeding on bait, though no live termites were observed.
Norman Meyer Library	30001 Gentilly Blvd.	November	Evidence of termites feeding on bait, though no live termites were observed.
Train Depot	City Park	December	Evidence of termites feeding on bait, though no live termites were observed.
Robert Smith Library	6301 Canal Blvd.	December	Evidence of termites feeding on bait, though no live termites were observed.
Mildred Osborne School	6701 Curran Blvd.	December	Evidence of termites feeding on bait, though no live termites were observed.

Extension Services

Termite Academy

Our annual Termite Academy was held from February 23-25, 2016 and was extremely well-received by all attendees. Guest speakers for this year's academy included Drs. Phil Koehler and Thomas Chouvenc (University of Florida), Mr. Milton Schleishmann (Louisiana Department of Agriculture and Forestry), Mr. Ernie Esteve (Billiot Pest Control), Dr. Jason Meyers (BASF), Mr. Ron Landis (Terminex New Orleans), and Mr. William Robinson (Train2Build). Members of NOMTCB presenting at the academy included Dr. Carrie Cottone, Mr. Eric Guidry, Mr. Ed Freytag, and Dr. Claudia Riegel. Mr. Perry Ponseti, Mr. Steve Ollar, Mr. LJ Kabel, Mr. Timmy Madere and Mr. Barry Lyons did an excellent job organizing the outdoor hands-on portion of the academy and food preparation. Mr. Eric Guidry did a fantastic job setting up the laboratory insect identification portion, and Ms. Jennifer Hamilton and Ms. Soloma Condall did a great job organizing all the learning material and registration for the academy.

Insect Identification

One of the services we provide is to identify insects brought to us by members of the pest control industry as well as members of the general public. Mr. Eric Guidry (Pest Control Specialist I) is an expert at insect identification and has identified approximately 150 samples brought to us this year.

Extension, Technology Transfer and Education

Presentations

Freytag, E. January 16, 2016. Bed bug biology and control. Tulane University, Dr. Dawn Wesson's graduate Medical Entomology class. New Orleans, LA.

Freytag, E. and J. Leonard. January 20, 2016. Termite inspections using infrared. Mississippi Pest Control Association Annual Meeting. Ocean Springs, MS.

Michaels, S. January 26, 2016. New Orleans Mosquito Control Board. Tulane University, Dr. Dawn Wesson's graduate Medical Entomology class. New Orleans, LA.

Cottone, C. January 28, 2016. Stored product pests. GNOPCA Structural Fumigation Recertification. New Orleans, LA.

Riegel, C. January 28, 2016. Fumigation. Structural Fumigation Recertification. New Orleans, LA.

Freytag, E. February 5, 2016. Bed bug biology and control. Education and training talk to personnel of the 10th floor of 1340 Poydras Ave. New Orleans, LA.

Cloherty, E. February 7, 2016. Training opportunities for pest management professionals. American Mosquito Control Association. Savannah, GA.

Freytag, E. February 11, 2016. Bed bug biology and control. Education and training talk to personnel of the 9th floor of 1340 Poydras Ave. New Orleans, LA

Riegel, C. February 7, 2016. Mosquito control. South Carolina Pest Control Association. Greenville, SC.

Riegel, C. February 7, 2016. The Formosan subterranean termite. South Carolina Pest Control Association. Greenville, SC.

Michaels, S. February 16, 2016. Evaluation of knowledge, attitudes and practices among residents and healthcare providers for prevention and diagnosis of mosquito-borne viruses in New Orleans, Louisiana. Tulane University, Interdisciplinary Innovative Programs Hub (I2PH). New Orleans, LA.

Michaels, S. February 17, 2016. Zika virus: how it effects pest control operators. Greater New Orleans Pest Control Association. New Orleans, LA.

Cottone, C. February 23, 2016. Subterranean and drywood termite biology and identification. GNOPCA & NOMTCB Termite Academy. New Orleans, LA.

Freytag, E. February 23, 2017. Inspections and inspection tools. GNOPCA & NOMTCB Termite Academy. New Orleans, LA.

Madere, T. February 23, 2016. Rodent biology and control. Louisiana Department of Agriculture and Forestry Technician Recertification. Kenner, LA.

Cottone, C. February 24, 2016. Baiting technology. GNOPCA & NOMTCB Termite Academy. New Orleans, LA.

Freytag, E. February 24, 2017. Tree treatments. GNOPCA & NOMTCB Termite Academy. New Orleans, LA.

Freytag, E., P. Ponsetti, T. Madere, and M. Schleismann. Post-construction treatments. February 24, 2016. GNOPCA & NOMTCB Termite Academy. New Orleans, LA.

Michaels, S. February 24, 2016. Zika coordinating meeting. Department of Homeland Security, City Hall. New Orleans, LA.

Cottone, C. February 25, 2016. The Label. GNOPCA & NOMTCB Termite Academy. New Orleans, LA.

Riegel, C. March 1, 2016. Termite control. New York Pest Control Association. Long Island, NY.

Michaels, S. March 3, 2016. Preventing Zika in the U.S.: What environmental health and pest management professionals need to know. National Environmental Health Association. Webinar.

Guidry, E. March 16, 2016. An overview of insects. St. Paul's Episcopal School. New Orleans, LA.

Madere, T. March 17, 2016. Rodent biology and control. Louisiana Department of Agriculture and Forestry Technician Recertification. New Orleans, LA.

Madere, T. March 22, 2016. Rodent biology and control. Louisiana Department of Agriculture and Forestry Technician Recertification. Alexandria, LA.

Madere, T. March 22, 2016. Roaches 101. Louisiana Department of Agriculture and Forestry Technician Recertification. Alexandria, LA.

Riegel, C. and C. Cottone. March 22, 2016. Bug Bowl. Louisiana Department of Agriculture and Forestry Recertification. New Orleans, LA.

Cloherty, E. April 2016. Mosquito control. GNOPCA Technician Recertification, New Orleans, LA.

Michaels, S. April 2, 2016. Water wise neighborhood champions. Global Green. New Orleans, LA.

Freytag, E. April 5, 2016. Reducing use of pesticides in homes. Reducing pesticides in the US Virgin Islands conference. St. Croix, US Virgin Islands.

Freytag, E. April 6, 2016. Reducing use of pesticides in homes. Reducing pesticides in Puerto Rico conference. Hato Rey, Puerto Rico.

Michaels, S. April 7, 2016. Evaluation of knowledge, attitudes and practices among residents for the prevention of mosquito-borne viruses in New Orleans, Louisiana. Tulane Research Days Poster Presentation. New Orleans, LA.

Freytag, E. April 12, 2016. Termite biology and control. NOMTCB Pesticide Applicators Training, Category 7B and 7D, structural pest control technician recertification. NOMTCB, New Orleans, LA.

Michaels, S. April 12, 2016. Zika in the U.S.: What public health professionals need to know. City of New Orleans Emergency Medical Services. New Orleans, LA.

Madere, T. April 12, 2016. Roof rats. Food Protection Alliance Webinar.

Smith, P. April 12, 2016. IPM for dummies. GNOPCA Structural Pest Recertification. New Orleans, LA.

Riegel, C. April 12, 2016. School IPM. School IPM Recertification, New Orleans, LA.

Michaels, S. April 13, 2016. Zika in the U.S.: What local health departments need to know. EEK Conference. National Environmental Health Association. Webinar.

Riegel, C. April 13, 2016. Vector control in emergencies. ETHER Short course, Atlanta, GA.

Michaels, S. April 15, 2016. Evaluation of knowledge, attitudes and practices among residents for the prevention of mosquito-borne viruses in New Orleans, Louisiana. Delta Omega Society Poster Presentation. New Orleans, LA.

Michaels, S. April 18, 2016. Operational interventions following an arbovirus case. Mosquito Control Planning and Response for Zika Virus. NOMTCB Administration. New Orleans, LA.

Harrison, C. April 19, 2016. Microscope instruction and identification laboratory (adults). NOMTCB & LMCA Mosquito Academy, New Orleans, LA.

Michaels, S. April 19, 2016. Bionomics and identification of important species. NOMTCB & LMCS Mosquito Academy. New Orleans, LA.

Michaels, S. April 19, 2016. Mosquito surveillance. NOMTCB & LMCA Mosquito Academy. New Orleans, LA.

Carter, B. April 20, 2016. Adulticide efficacy for *Aedes* Species. NOMTCB & LMCA Mosquito Academy. New Orleans, LA.

Harrison, C. April 20, 2016. Biological control. NOMTCB & LMCA Mosquito Academy, New Orleans, LA.

Michaels, S. April 21, 2016. Operational interventions following Zika travel case. NOMTCB & LMCA Mosquito Academy. New Orleans, LA.

Carter, B. April 25-26, 2016. Evaluating aerial ultra-low volume (ULV) adulticiding applications for Aedes species control. Institut Pasteur. Paris, France.

Harrison, C. April 25-26, 2016. The Use of Copepods as Biological Control for Aedes aegypti. Institute Zika Summit. Institut Pasteur. Paris, France.

Michaels, S. April 25-26, 2016. Surveillance and container assessments in residential environments for the prevention of mosquito-borne viruses New Orleans, Louisiana. Institute Zika Summit. Institut Pasteur. Paris, France.

Riegel, C. April 25-26, 2016. Zika preparedness in New Orleans. Institute Zika Summit. Institut Pasteur. Paris, France.

Freytag, E. Termite biology and control. April 28, 2015. GNOPCA Structural Pest Technician Recertification. New Orleans, LA.

Freytag, E., T. Madere, and W. Abbott. May 2, 2016. Copper foil-polyethylene laminate termite barrier. 112th AWPA Annual Meeting. San Juan, Puerto Rico.

Riegel, C. May 3, 2016. Backyard mosquito control. Southeast Florida Pest Control Association, Gainesville, FL.

Riegel, C. May 3, 2016. Formosan subterranean termites. Southeast Florida Pest Control Association, Gainesville, FL.

Michaels, S and B. Carter. May 6, 2016. New Orleans Mosquito Control Board. Barataria BugBlitz. Jean Lafitte National Historical Park and Preserve, Marerro, LA.

Madere, T. May 18, 2016. Rodent control in food processing facilities. Louisiana Department of Agriculture and Forestry Recertification. Alexandria, LA.

Guidry, E.G. May 20, 2016. General Entomology. St. Andrew the Apostle School. New Orleans, LA.

DeMark, J. (Dow AgroSciences), B. Yokum, and N. Spomer. May 22, 2016. Field trials with *Coptotermes formosanus* Shiraki in New Orleans: Performance of Recruit® AG Flex Pack™ station and determination of colony foraging distance. Albuquerque, NM.

Riegel, C. and C. Scherrer. May 24, 2016. Backyard treatments using a residual treatment. National Conference of Urban Entomology, Albuquerque, NM.

Riegel, C. May 24, 2016. Zika Panel. National Conference of Urban Entomology. Albuquerque, NM.

Riegel, C. May 24, 2017. An integrated approach to commensal rodent management in New Orleans. National Conference of Urban Entomology. Albuquerque, NM.

Cloherty, E. June 7, 2016. Mosquito Control. Lafourche Parish Annual Custodial Meeting. Thibodaux, LA.

Smith, P. June 7, 2016. IPM for dummies. Lafourche Parish Annual Custodial Meeting. Thibodaux, LA.

Riegel, C. June 14, 2016. Mosquito control preparedness. National Environmental Health Association. San Antonio, TX.

Michaels, S and B. Carter. June 17, 2016. Tulane Young Scholars lecture, field collections and laboratory identification. NOMTCB Administration & City Park. New Orleans, LA.

Riegel, C., P. Koehler, and W. Horan. June 20, 2016. USAID grant pitch. Washington DC.

Michaels, S. June 29, 2016. The role of the PMP in the Zika virus fight. Greater New Orleans Pest Control Association Recertification. New Orleans, LA.

Michaels, S. June 29, 2016. Zika virus in the United States: vector control considerations. American Public Health Association (APHA) Webinar.

Michaels, S. August 9, 2016. New Orleans Mosquito Control Zika virus response. NOMTCB Board Meeting.

Michaels, S and C. Riegel. August 11, 2016. New Orleans Mosquito Control Zika virus response. Zika Conference & Panel Discussion, University Emergency Managers. Tulane School of Medicine.

Riegel, C. August 18, 2016. Backyard mosquito control. New Jersey Pest Control Association. New Brunswick, NJ.

Michaels, S. September 8, 2016. New Orleans Mosquito Control Board Zika virus response. Jackson Barracks. New Orleans, LA.

Freytag, E. September 9, 2016. Pest control technology. Ja-Roy Exterminating-Univar Licensee and technician recertification. Covington, LA.

Freytag, E. September 15, 2016. Termite inspection and control in New Orleans. SIPM Training. New Orleans, La.

Michaels, S. September 20 & 22, 2016. Mosquito biology and control, and field session in Carrollton Cemetery. Dr. Dawn Wesson's Medical Entomology class, Tulane University. New Orleans, LA.

Cottone, C., C. Riegel, and E. Guidry. September 30, 2016. Area-wide treatment of Formosan subterranean termites at Jackson Barracks, New Orleans, LA. Entomological Society of America, International Congress of Entomology. Orlando, FL.

Riegel, C. October 11, 2016. Rodent biology and control. GNOPCA & NOMTCB Pest Control Academy. New Orleans, LA.

Riegel, C. and M. Frye. October 11, 2016. Pathogens and ectoparasites of Norway rats in NYC and New Orleans. GNOPCA & NOMTCB Pest Control Academy. New Orleans, LA.

Riegel, C. and M. Frye. October 13, 2016. The label and its components. GNOPCA & NOMTCB Pest Control Academy. New Orleans, LA.

Freytag, E. October 20, 2016. Subterranean termite biology, identification and control. GNOPCA technician workshop. New Orleans, LA.

S. Michaels and S. Babcock. October 26, 2016. Mobilizing effective vector control efforts to reduce Zika virus vector abundance in urban neighborhoods. American Association of Code Enforcement. Kenner, LA.

Riegel, C. October 26, 2016. Zika virus preparedness. Geography Department, University of Miami. Coral Gables, FL.

Freytag, E. November 12, 2016. Termite inspections using infrared technology and other tools. Gregory Pest Solutions Annual Conference. Greenville, SC.

Williams, A., B. Carter, S. Michaels, S. Baker, K. Zehren, and C. Riegel. November 15, 2016. Characterizing *Aedes* populations in high-risk communities in New Orleans, LA. American Society of Tropical Medicine & Hygiene. Atlanta, GA.

Freytag, E. December 7, 2016. Mosquito biology and control directed towards preventing disease transmission. Missouri Pest Control Association and Kansas Pest Control Association Annual Conference & Exposition. Riverside, MO.

Freytag, E. December 7, 2016. Termites, biology and new research– Part 1. Missouri Pest Control Association and Kansas Pest Control Association Annual Conference & Exposition. Riverside, MO.

Freytag, E. December 7, 2016. Termites, biology and control– Part 2. Missouri Pest Control Association and Kansas Pest Control Association Annual Conference & Exposition. Riverside, MO.

Michaels, S., S. Babcock, B. Carter, P. King, C. Harrison, and C. Riegel. December 7, 2016. Implementing outreach and education activities in response to Zika virus. Louisiana Mosquito Control Association Annual Meeting. Baton Rouge, LA.

Carter, B., A. Williams, S. Baker, K. Zehren, C. Harrison, P. King, S. Michaels, and C. Riegel. December 7, 2016. Surveillance for Zika virus vectors in New Orleans, LA. Louisiana Mosquito Control Association Annual Meeting. Baton Rouge, LA.

Harrison, C., H. Romero, J. Umana, X. Caballero, G. Marten, W. Horan, and C. Riegel. December 7, 2016. Establishing a biological control program in Monte Verde, Honduras. Louisiana Mosquito Control Association Annual Meeting. Baton Rouge, LA.

Riegel, C., S. Michaels, B. Carter, P. King. December 7, 2016. Zika virus preparedness in New Orleans. Louisiana Pest Control Association Annual Meeting. Baton Rouge, LA.

Thongsripong, P., S. Michaels, S. Jameson, and D. Wesson. December 7, 2016. Distribution and oviposition intensity of Zika virus vectors *Aedes aegypti* and *Aedes albopictus* in the Greater New Orleans region. Louisiana Mosquito Control Association Annual Meeting. Baton Rouge, LA.

Ward, M.J., P. Thongsripong, S. Michaels, and D. Wesson. December 7, 2016. Vector competence of New Orleans *Aedes aegypti* mosquitoes for Zika virus: a preliminary report. Louisiana Mosquito Control Association Annual Meeting. Baton Rouge, LA.

Freytag, E. December 8, 2016. Spray foam insulation and EIFS. Missouri Pest Control Association and Kansas Pest Control Association Annual Conference & Exposition. Riverside, MO.

Freytag, E. December 8, 2016. Thermography. Missouri Pest Control Association and Kansas Pest Control Association Annual Conference & Exposition. Riverside, MO.

Abstracts

The Use of Copepods as Biological Control for *Aedes aegypti*
Harrison, C., S. Michaels, B. Carter, M. Nyguen, C. Riegel and G. Martin

Cyclopoid copepods are tiny crustaceans which consume smaller aquatic animals including first instar *Aedes aegypti* and *Ae. albopictus* mosquito larvae. Copepod species vary widely in their capacity to consume mosquito larvae. One cyclopoid species, *Mesocyclops longisetus*, has been proven to be voracious larval predator and survives well in extreme conditions including high temperatures. Mass production of these species is relatively inexpensive, colony maintenance requires minimal labor and copepods can be introduced simply into mosquito breeding sites with a conventional sprayer. Previous studies in New Orleans have demonstrated the capacity of *Macrocyclops albidus* to eliminate *Aedes* larvae in discarded waste tires. Programs in Vietnam and Honduras also demonstrated that the successful elimination of *Ae. aegypti* in water storage containers including drums, vases and tanks and were also socially acceptable to the community. Once introduced, long-term populations can be maintained with only periodic monitoring and replacement if containers dry out or if water is removed. As part of NOMTCB's integrated pest management (IPM) approach to *Aedes* mosquito control copepods offer a biological and sustainable tool in historically difficult to manage containers.

Evaluating Aerial Ultra-low Volume (ULV) Adulticiding Applications for *Aedes* spp. Control
Carter, B., S. Michaels, C. Harrison and C. Riegel

Urban populations of *Aedes aegypti* and *Aedes albopictus*, potential vectors of both chikungunya and Zika viruses, are present in New Orleans, Louisiana in abundance. To control both mosquito species, the City of New Orleans Mosquito and Termite Control Board (NOMTCB) utilizes aerial adulticide missions as an important tool in their integrated pest management (IPM) program. During the summer of 2015, an ultra-low volume (ULV) aerial application of Dibrom® (naled; AMVAC Chemical Corporation, Newport Beach, CA) at 0.5 oz/acre was tested for efficacy against laboratory-reared, field-derived caged *Aedes* mosquitoes. Paired cages were placed in open and sequestered areas, including under raised homes and in dense vegetation, in two urban neighborhoods with high human density and abundant mosquito populations. Aerial applications against caged *Aedes aegypti* in open locations resulted in 90.1-90.7% average mortality and 81.6-97.9% in sequestered locations. *Aedes albopictus* mortality was 73.6%-99.6% in open locations and 66.3%-92.0% in sequestered locations. In addition, Tinopal® fluorescent dye (BASF Corporation, Florham Park, NJ) was mixed with Dibrom® and fluorescent droplets were captured utilizing rotating aerosol droplet samplers (John W. Hock, Gainesville, FL) and Teflon®-coated slides. Droplet analysis was conducted using Dropvision® (Leading Edge Associations, Inc., Fletcher, NC). Fluorescent droplets were present in the treatment areas only. Droplet collections were low, despite high mortality. This work demonstrates that aerial adulticide applications can rapidly reduce *Aedes* populations in outdoor open environments and cryptic sequestered resting sites. However, it is important that insecticide resistance studies are conducted routinely to determine the susceptibility of the mosquito population to the insecticide in use. The NOMTCB will continue to utilize aerial ULV adulticide applications against *Aedes* species in partnership with other intervention strategies including biological control and community involvement to mitigate abundant mos-

quito populations and reduce risk of vector-borne disease.

Surveillance and Container Assessments in Residential Environments for the Prevention of Mosquito-borne Viruses New Orleans, Louisiana.
S. Michaels, B. Carter, C. Harrison, & C. Riegel

The emergence of arboviral epidemics like Zika virus underscore the importance for public health practitioners to understand local transmission potential, including practices of residents and abundance of competent vector populations. Large urban populations of *Aedes aegypti* and *Ae. albopictus*, vectors of Zika virus, are abundant in New Orleans, Louisiana (Fig. 1) and the potential for Zika virus introduction by a viremic individual is of great concern. The New Orleans Mosquito Control Board utilizes an integrated pest management approach to mosquito control including door-to-door educational campaigns, source reduction and adulticide applications. This study assessed the knowledge, attitudes and practices regarding mosquito-borne diseases among New Orleans residents and identified frequent mosquito breeding habitats in residential environments.

Characterizing *Aedes* Populations in High-Risk Communities in New Orleans, LA.
Williams, A.[1,2], B. Carter[1], S. Michaels[1,3], S. Baker[1,3], K. Zehren[1,3], C. Riegel[1]

[1]New Orleans Mosquito, Termite & Rodent Control Board, New Orleans, LA [2]Yale School of Public Health, Epidemiology of Microbial Diseases Department, New Haven, CT [3]Tulane School of Public Health and Tropical Medicine, New Orleans, LA

Due to the local abundance of *Aedes aegypti* and the potential risk for local mosquito-borne transmission of Zika virus, the New Orleans Mosquito, Termite & Rodent Control Board implemented increased *Aedes* surveillance, targeted outreach, source reduction and educational campaigns. Expanded adult surveillance efforts seek to characterize geographic areas at highest risk of *Aedes*-borne virus transmission and provide a better understanding of local *Aedes* population abundance and feeding behaviors.

Aedes mosquitoes were collected by BG-Sentinel traps (BGS) and tested by the Louisiana Animal Disease Diagnostic Laboratory for Zika virus by RT-PCR. Trapping locations were selected based on proximity to: (1) travel-related Zika cases (2) areas with historically abundant *Aedes aegypti* populations (3) ports and areas frequented by tourists. Our findings support the correlation between high *Aedes aegypti* populations and dense human populations, but also that neighborhood abundance can vary within a small geographic area. Additionally, we characterized blood meals of engorged *Aedes aegypti* through PCR. Through August, 820 *Aedes aegypti* females were collected of which 17 were blood engorged, likely because BGS traps target the collection of host-seeking *Aedes.* Previous studies have demonstrated high rates of human feeding for this species; however of the blood-fed *Aedes aegypti* analyzed, the majority (88%) had fed on non-human mammals. These results suggest that blood meal analysis could be an additional tool to better understand the relationship between host abundance and human exposure and the environments that are most at risk for disease transmission.

Area-wide Treatment of Formosan Subterranean Termites at Jackson Barracks, New Orleans, LA.
Cottone, C., C. Riegel, and E. Guidry

The Formosan subterranean termite, *Coptotermes formosanus* Shiraki (Blattodea: Rhinotermitidae), has become a pest of major economic importance New Orleans, Louisiana since its introduction into the city following World War II. This pest causes millions of dollars in damage to buildings and trees of historic significance every year. Recently, New Orleans Mosquito and Termite Control Board began protecting properties located at Jackson Barracks, a military institution within the city. Building inspections were first completed to determine the scope of termite infestations. All detectable termite colonies were delineated using microsatellite genotyping. Baiting technology was employed by installing Sentricon® Recruit HD in-ground stations and Recruit IV AG stations. The relative termite activity was monitored over time by checking the installed bait stations and by collecting alates on sticky traps during the swarm season. Our data show that colonies were eliminated using bait, reducing the overall termite pressure within the Barracks. However, alates are still recovered from sticky traps, indicating that termite colonies within areas surrounding the Barracks are a cause for concern of reinfestations.

Education

Seminars at NOMTCB

NOMTCB employees continued to participate and attend seminars, trainings and workshops given by NOMTCB specialists every third Wednesday of the month from 9:00-10:00am. These seminars enhance the knowledge and experience of the inspectors and all who attend. Guest speakers from all over the country also continue our education in all types of pest control. The rules and regulations of pest control are always changing and is important to keep our staff up to date with this ever changing business. NOMTCB inspectors are responsible for attended all seminars and weekly meetings (CAO Policy meetings, LDAF recertification classes, Hazwoper and OSHA recertification classes and general staffs meetings). In pest control we always tell the staff that "The Label is the Law", unfortunately the label is often changing and these seminars help us remain in compliance.

Outreach

TCA

On May 20, 2016 Cynthia Harrison and Joyce Brown participated in the 2016 Health & Wellness Fair with TCA. Inspectors displayed their rodent and mosquito showcase and issued literature and verbally explained to the public about pest proofing and mosquito protection.

S&WB Seminar

On April 15, 2016 NOMTCB mosquito and rodent inspectors participated in The Environmental S&WB seminar. NOMTCB inspectors set up their rodentsand mosquito display, issued literature and verbally educated the public on rodents and mosquitoes.

Magic On The River

On May 8, 2016 Cynthia Harrison and Joyce Brown participated in the Magic On The River fair. A display of rodents and mosquitoes were set up and ~1,450 children and adults visited our booth. The fair was four days.

Ella Dolhonde Elementary School

On May 19, 2016 NOMTCB inspectors set up their display of rodents and mosquitoes for 30 elementary children, and gave them a brief explanation of safety of how to protect themselves from mosquitoes and rodents.

Lawrence D. Crocker College Prep. School

September 16, 2016 Joyce Brown and Cynthia Harrison put up a display of rodents and mosquitoes and performed a presentation about New Orleans Mosquito, Termite and Rodent Control Board. Questions was asked and answer by the presenters and the students.

2016 Garden Show

NOMTCB inspectors participated in The Garden Show at City Park. Rodent, mosquitoes, general pest, and termite displays were included (Figs. 61-62). NOMTCB won first place in Education Excellence, and first place in Government Agency Division and 2nd place in Design Excellence Education Division Below are pictures of the showcase (Fig. 63).

Figure 61. NOMTCB display of rodents, mosquitoes, termites, and general pest, educational materials.

Fig. 62. Norway and roof rat display used at shows.

Fig 63. NOMTCB won first place in Government Agency Division, and first place in Educational Excellence at the City Park Garden Show.

Xavier Fair

NOMTCB inspectors participated in displaying mosquitoes and rodents; several students were able to assist inspectors for credits, as they listen, learn and explained to other students what the NOMTCB program provides to the public and educating them on mosquitoes and rodents (Fig. 64).

Cub's Corner Field Trip

On June 24, 2016, children from Cub's Corner visited our building. Joyce Brown gave a presentation on rodents, Eric Guidry and Dr. Carrie Cottone presented our pinned specimens and live displays of termites and cockroaches. Brendan Carter and Erin Cloherty showed fish and turtles and biological control of mosquitoes.

Univar Crawfish Boil

On April 7, 2016, Univar held its annual crawfish boil for pest control operators in the area. We were invited to set up a booth display of mosquito biological control and rodent control methods to provide information to pest control personnel.

Fig. 64: Student at the Xavier University Health Fair ask questions about mosquito and rodents.

John Curtis Science Fair

On June 23, 2016, NOMTCB was asked to work with two students from John Curtis Christian High School for a science fair project. Cynthia Harrison met with the two students, Alli Despaux and Christopher Matise, and their teacher, Cathy Boucvalt, on July 7, 2016 to discuss mosquito eradication in green infrastructure in urban areas. The exchange of ideas involved using mosquito fish, *Gambusia affinis*, copepods, *Mesocyclops longisetus*, and red-eared turtles in lab and field settings.

They were asked to collect mosquito eggs and larvae from containers in two areas of the city. The locations were on the Westbank and New Orleans east. The eggs and larvae collected were bought back to the lab to be counted and identified. Students were given ovitrap cups and seed germination paper to complete this study. A science fair was held December 13, 2016, where the two students competed in the Animal Science Division. Cynthia participated as one of the science fair judges. Alli Despaux and Christopher Matise's project came in second place and advanced them to regionals.

Other Outreach

Michaels, S. January 26, 2016. New Orleans Mosquito Control Board. Tulane University, Dr. Dawn Wesson's graduate Medical Entomology class. New Orleans, LA.

Michaels, S. and B. Carter. March 19, 2016. Gentilly Resilience District Town Hall. Arthur Ashe Charter School Gym. New Orleans, LA.

Harrison, C. April 8, 2016. Annual Environment Awareness, International Day. Ben Franklin Elementary School. New Orleans, LA.

Harrison, C and B. Carter. April 15, 2016. Water Week. Lafitte Greenway, New Orleans, LA.
Michaels, S and B. Carter. April 6, 2016. Barataria BugBlitz. Jean Lafitte National Historical Park and Preserve, Marerro, LA.

Michaels, S. May 14, 2016. Bayou Day, Ripple Effect. Bayou St. John, New Orleans, LA.

Harrison, C. May 20, 2016. Total Community Action Community Health Fair. New Orleans, LA.

Harrison, C. May 25, 2016. Mosquito Outreach Bywater. Stallings Recreation Center. New Orleans, LA.

Michaels, S. September 19, 2016. Broadmoor Improvement Association Meeting, Andrew Wilson Charter School. New Orleans, LA.

Michaels, S and B. Carter. September 28, 2016. Zika from every angle: presentation and discussion groups. Tulane Law School, New Orleans, LA.

Michaels, S and B. Carter. October 4, 2016. Broadmoor/ Eatmore. Rosa Keller Library. New Orleans, LA.

Harrison, C. and B. Carter. October 6, 2016. St. Ms. DeFraites class, Andrew's Episcopal School.

Michaels, S. October 18, 2016. New Orleans Mosquito Control, Zika Virus Response. Dr. Dev Jani, Emergency Preparedness class, Tulane University. New Orleans, LA.

Michaels, S. October 24, 2016. Mosquito Control & Zika Virus. Dr. Lorelei Cropley, Public Health & the Environment class, Tulane University. New Orleans, LA.

Michaels, S. November 3, 2016. Mosquito Biology & Control, and Zika Virus Response. Dr. Sunshine VanBeal, Entomology class, Tulane University. New Orleans, LA.

Michaels, S. and C. Harrison. November 18, 2016. Neighborhood Summit. University Medical Center. New Orleans, LA.

Harrison, C. and B. Carter. December 6, 2016. Louisiana Mosquito Control Association, Education Day. St. Aloysius Catholic School, Baton Rouge, LA.

Zika-related Neighborhood Outreach & Inspections

Riegel, C. May 11, 2016. Zika Preparedness: Briefing Convention, Tourism and Hotels on Zika preparedness and outreach efforts.

Door to door. May 25 & June 8, 2016. Bywater/St. Claude area.

Inspection. June 14, 2016. Audubon Zoo, Park & Golf Course.
Door to door. June 15, 2016. French Quarter.

Door to door. June 18, 2016. Algiers Point.

Door to door. June 25, 2016. Hollygrove.

Doorhangers & cemetery clean-up. July 17-19, 2016.

Waste tire removal. July 29, 2016. Hollygrove.

Distribution of printed Zika educational materials & mosquito wipes. August 13, 2016. Libraries & NORDC facilities citywide.

Inspection. August 26, 2016. University of New Orleans campus.

Door to door. September 16, 2016. Uptown/ University area.

Surveys. October 1 & 5, 2016. Mid-City.

Surveys. October 15 & 22, 2016. Uptown.

Waste tire removal. December 2016. Upper and Lower 9th wards.

National Media Coverage
In June 2016, members of our organization and Tulane were interviewed and filmed servicing rodent requests and trapping rodents by the Discovery Channel for a documentary produced by Morgan Spurlock.

Other Media Coverage
Riegel, C. February 2, 2016. Zika preparedness. WWL, Channel 4

Michaels, S. February 13, 2016. New Orleans knows mosquitoes. Undark, Knight Science Journalism. http://undark.org/2016/02/29/new-orleans-knows-mosquito-control/

Riegel, C. February 12, 2016. Prepare for 'Guerrilla Warfare' With Zika-carrying mosquitoes, experts warn. The New York Times. http://www.nytimes.com/2016/02/13/health/prepare-for-guerrilla-warfare-with-zika-carrying-mosquitoes-experts-warn.html?_r=1

Michaels, S. February 16, 2016. Virus becomes a concern for expecting mothers. The Maroon, Loyola University of New Orleans. http://www.loyolamaroon.com/10008031/city/virus-becomes-a-concern-for-expecting-mothers/

Riegel, C. February 16, 2016. Zika and preparedness. Nola.com

Riegel, C. February 24, 2016. Zika planning. NPR

Riegel, C and S. Michaels. February 25, 2016. Washington Post.

Riegel, C. March 10, 2016. If Zika virus arrives, New Orleans is ready, mayor says. Times-Picayune/ Nola.com. http://www.nola.com/science/index.ssf/2016/03/zika_virus_louisiana_landrieu.html

Riegel, C. March 14, 2016. Zika preparedness, USA Today

Riegel, C. March 15, 2016. Mosquito, climate change, Zika. Discovery Channel.

Riegel, C. March 16, 2016. New Orleans at high risk of Zika outbreak in summer, experts say. Times-Picayune/ Nola.com. http://www.nola.com/education/index.ssf/2016/03/zika_virus_new_orleans.html#incart_river_index

Riegel, C and S. Michaels. March 22, 2016. Discovery Channel's IMPACT series.

Riegel, C. March 30, 2016. Zika virus, green infrastructure, preparedness. The Lens

Riegel, C. April 20, 2016. Zika only the latest mosquito-borne threat to New Orleans. Times-Picayune/ Nola.com. http://www.nola.com/health/index.ssf/2016/04/new_orleans_braces_for_zika_vi.html

Michaels, S. and B. Carter. May 4, 2016. New Orleans amps up mosquito research to combat Zika. The Lens/ WWNO. http://wwno.org/post/new-orleans-amps-mosquito-research-combat-zika

Michaels, S., C. Harrison, B. Carter, and P. King. May 10, 2016. NBC Nightly News.

Michaels, S. May 12, 2016. Janet McConnaughey, Associated Press.

Michaels, S. June 24, 2016. How to eliminate and conquer mosquitoes. The Times-Picayune/ Nola.com. http://www.nola.com/homegarden/index.ssf/2016/07/how_to_eliminate_and_conquer_m.html

Michaels, S. June 27, 2016. National Mosquito Control Awareness Week, WWL-TV.

Riegel, C. August 3, 2016. Press conference on Zika with Mayor Landrieu. City Hall.

Michaels, S. October 4, 2016. Tulane Magazine, Living with Water. http://news.tulane.edu/news/living-water

Michaels, S. October 5-7, 2016. PBS Docuseries on Mosquitoes and Citizen Science.

Publications
S. Michaels. 2016. Zika virus and what PMPs should know. Pest Perspectives. Vol. 4, Ed. 3. http://www.nxtbook.com/naylor/FPMS/FPMS0316/index.php?startid=25#/0

Su, N.-Y., E. Guidry, A.J. Mullins, and C. Cottone. 2016. Reinvastion dynamics of subterranean termites (Isoptera: Rhinotermitidae) following the elimination

of all detectable colonies in a large area. Journal of Economic Entomology. 109: 809-814.

Su, N.-Y., E. Guidry, and C. Cottone. 2016. Sustainable management of subterranean termite populations (Isoptera: Rhinotermitidae) in Armstrong Park, New Orleans, with durable baits. Journal of Economic Entomology. 109: 1326-1332.

Meetings

Michaels, S. and B. Carter. Monthly. Municipal Separate Storm Sewer System (MS4) city permit with partner city agencies and Sewerage and Water Board.

Riegel, C. February 7-11, 2016. New City Zika Awareness Meeting, Treme Cultural Center. New Orleans, LA.

Carter, B. American Mosquito Control Association. Savanah, GA.

Michaels, S and B. Carter. February 29, 2016. EPA/ UWFP Water Quality Monitoring Stakeholders Meeting. New Orleans, LA.

Michaels, S. March 5, 2016. Neighborhood Leaders Roundtable: Public Safety. Ashe Cultural Arts Center. New Orleans, LA.

Michaels, S and B. Carter. March 24, 2016. EPA Green Streets and Green Infrastructure Parks Workshop. City Hall. New Orleans, LA.

Harrison, C. April 17, 2016. Operation Blessing Outreach Meeting.

Michaels, S, B. Carter, and C. Harrison. May 17, 2016. Louisiana Mosquito Control Association, Entomologist Round-table Meeting. St. Tammany Parish Mosquito Abatement District. Slidell, LA.

S. Michaels. June 2, 2016. NOLA Youth Works. Job1 Training Center. New Orleans, LA

Michaels, S. and C. Riegel. June 2, 2016. Zika Outreach Coordination. New Orleans Health Department, City Hall. New Orleans, LA.

Michaels, S., B. Carter, and C. Riegel. June 6-7, 2016. Outbreak Survey & App Development. GIS Department. City Hall. New Orleans, LA.

Michaels, S. July 6, 2016. Community Meeting: District A. Lakeview, New Orleans, LA.

Michaels, S. July 6, 2016. Community Meeting: District C. Algiers, New Orleans, LA.

Riegel, C., S. Michaels, C. Harrison, B. Carter, and P. King. September 1, 2016. Metro Area Zika Preparedness and Discussion. NOMTCB Administration building. New Orleans, LA.

Riegel, C., S. Michaels, C. Harrison, and E. Foster. Arboviral Working Group. East Baton Rouge Mosquito and Rodent Control. Baton Rouge, LA.

Cottone, C. and E. Guidry. September 25-30, 2016. Entomological Society of America, International Congress of Entomology. Orlando, FL.