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 - June 30, 2016

The first half of the year has been dominated by Zika virus preparedness activities. The administrative and mosquito control group worked together and with other departments to create a Zika response plan. Our staff has been anticipating what will be needed in order to respond effectively and many of the supplies have been purchased. New factsheets, informational brochures, and door hangers have been created to communicate the importance of source reduction and the risks associated with travel to Zika endemic areas.

Aggressive outreach campaigns that included door-to-door education and clean-up campaigns have been conducted. Employees of NOMTRCB have worked together to maximize the response. We received notice of the first travel case in March and has continued throughout the summer. New Orleans is at risk of local, 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.

Respectfully submitted,

Claudia Riegel

Director
Mosquito and Termite Control Board

OPERATIONS AND FACILITIES

CLAUDIA RIEGEL, Ph.D.

Employees

Vacancies opened due to retirements in 2015 and new projects were secured that allowed for personnel to be hired.

Shaun Broadley (see Termite Division report) began in February. He has been assigned to the Termite Division but has quickly adapted to department and has quickly learned about mosquito control and regularly assisted that division.

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

Mr. LJ Kabel is scheduled to retire in spring of 2017. Mr. Joe Robert was hired in May to apprentice under LJ and assist with facility maintenance and operations. Joe has extensive experience 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 have moved 80% of the operations to the new facility. Much of the warehouses at Hayne Blvd. have been cleaned, repaired and renovated. He took the reigns while LJ went on an extended vacation in June.

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 had their spring recertification at the building in March. Approximately 100 pest control professionals attended the training.

A full building natural gas generator has been ordered by Homeland Security for the Administration building. This will power the building in the event of an emergency or power outage. The building was deigned with all the wiring needed, so installation should be straight forward. The generator is projected to be installed in late August.

Warehouses

Operations are slowly being transferred to the new warehouses on Hayne Blvd. However, we are still operating from the middleshop and the backshop but these facilities will eventually need to be demolished. LJ Kabel and Joe Robert have repaired the roof of the new building, built a mechanic shop and storage room/office, installed a Biosafety trailer and all the plumbing and repairs needed. They have painted the facility and much more. They also maintain 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 effected by the heat.

Operations

Dr. Janet McAllister from the Centers for Disease Control 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 NOMTRCB will be implementing this year.

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 added content to make it more comprehensive.

Cooperative Projects

Rodent Bait Efficacy trials

This spring and summer, 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.

Tulane University

This summer completed the second year of trapping rodents with Tulane University. The project is better defining the distribution of rodent species in New Orleans. The project has another two more years until completion. More than 1,500 rodents have been trapped.

Zika virus preparedness

Planning

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.

Planning with State Department of Health officials as well as Centers for Disease Control entomologists, university professors, city departments, and other mosquito control districts began early in January through spring.

A Mosquito Control Preparedness workshop was held on April 18. More than people from the area attended. In addition, Sarah Michaels (Entomologist 1/Mosquito Supervisor) and I conducted numerous webinars, gave presentations to several target groups, and we conducted many interviews for television and print. There has been much interest on the preparedness of New Orleans for Zika virus. We have continued with the outreach throughout the season.

New outreach materials were created for distribution in New Orleans. The fact sheets, door hangers (Fig. 1) etc. was created to target our residents and visitors.

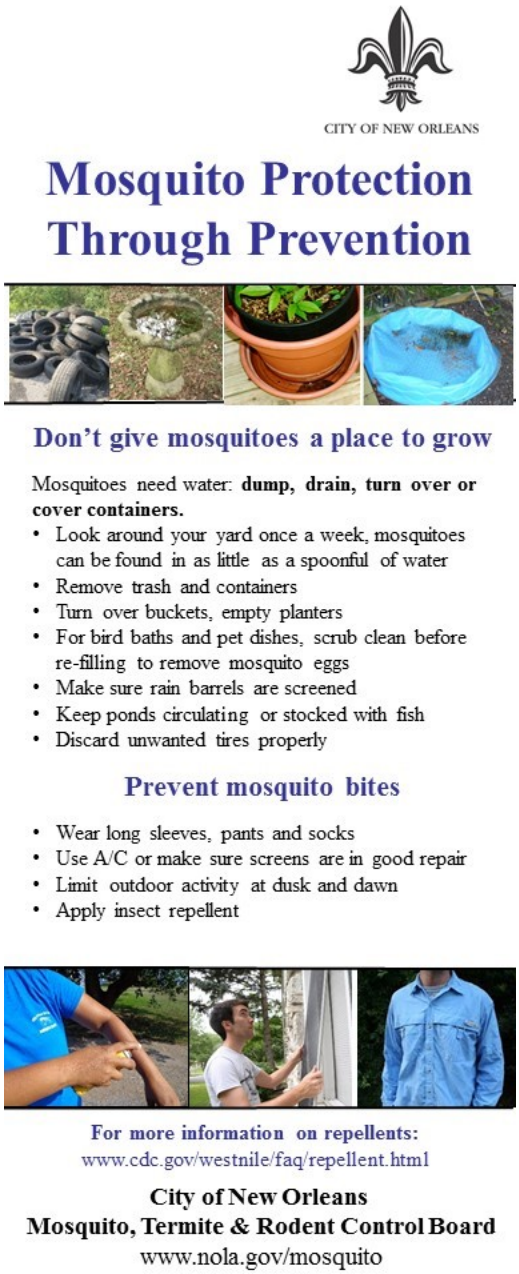


Figure 1. Front of the mosquito doorhanger used for outreach and yard inspections.

Figure 2. Outreach conducted by NOMTCB in Orleans Parish during the first half of the year.

NOMTCB has conducted a tremendous amount of door-to-door outreach (Fig. 2). 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 tourist.

It is expected as the summer progresses that regular outreach events will be conducted. The use of volunteers greatly assists our program and maximized the number of households we reach.

More details of mosquito control activities are listed in the Mosquito Control section of this report.

MOSQUITO FIELD OPERATIONS

SARAH MICHAELS

Zika virus

This year's activity has been dominated by the rapidly evolving global pandemic of Zika virus. So much information about the virus, its transmission, and effects have been learned and so many questions still remain. NOMTRCB prepared a Zika Virus Response Plan for the City of New Orleans, with the New Orleans Health Department, outlining preparedness activities and response to human infections. The plan has been made public through the City's website and was announced in a Press Conference by the Mayor on March 10th.

Zika is a mosquito-borne virus that is primarily transmitted to people through the bite of an infected *Aedes* mosquito vector. It is in the family Flaviviridae which also includes chikungunya, dengue, and yellow fever viruses. Zika was first isolated in Uganda in 1947 and caused sporadic human cases in Africa and Southern Asia from the 1950s to 2000s. In 2007, an outbreak occurred on Yap Island of Micronesia which later spread to surrounding Pacific Islands in 2013-2014.

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 spread rapidly in the Americas. 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. No local transmission of Zika virus by an infected mosquito has been confirmed in the continental United States, but transmission has occurred through sexual contact with individuals who acquired the infection while traveling. Through June 2016, there were 691 travel cases in the continental U.S., 11 cases of sexual transmission and 1,259 locally transmitted cases in Puerto Rico. In Louisiana, there were seven confirmed travel cases, three of which reside in New Orleans.

One out of five people infected may develop symptoms and the disease is 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 were conclusively linked to birth defects including microcephaly. There is no vaccine or specific treatment for Zika virus, just supportive care is recommended.

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.

Primary vectors include *Aedes aegypti* (yellow fever mosquito) (Fig. 3) and *Aedes albopictus* (Asian tiger mosquito) (Fig. 4). These mosquitoes lay eggs singly along the waterline inside water-holding containers and have the ability to survive without water for several months. It is important to eliminate containers that produce mosquitoes and educate homeowners where breeding is found. Since mosquito breeding can occur in something as small as a capful of water, it is essential to locate water-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 bar-

Figure 3. *Aedes aegypti* (yellow fever mosquito) has a characteristic black and white pattern with a lyre-shaped marking on the dorsal (top) part of its abdomen.

Figure 4. *Aedes albopictus* mosquito with its characteristic black and white pattern with a stripe along the dorsal (top) part of its abdomen.

rels, 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 two weeks.

Aedes aegypti originated in Africa and was likely introduced through shipping in water storage vessels. A resident of New Orleans for centuries, the species is responsible for the yellow fever epidemics, the last in 1905. 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. 3). 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.

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 silvery-white stripe on the dorsal side of the thorax (Fig. 4). This mosquito prefers vegetation and is found mostly outdoors. *Ae. albopictus* are better larval competitors 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 Nile, dengue, chikungunya and Zika viruses. Given its wide host selection, it may be less often implicated in arbovirus transmission.

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), (Fig. 5). 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.

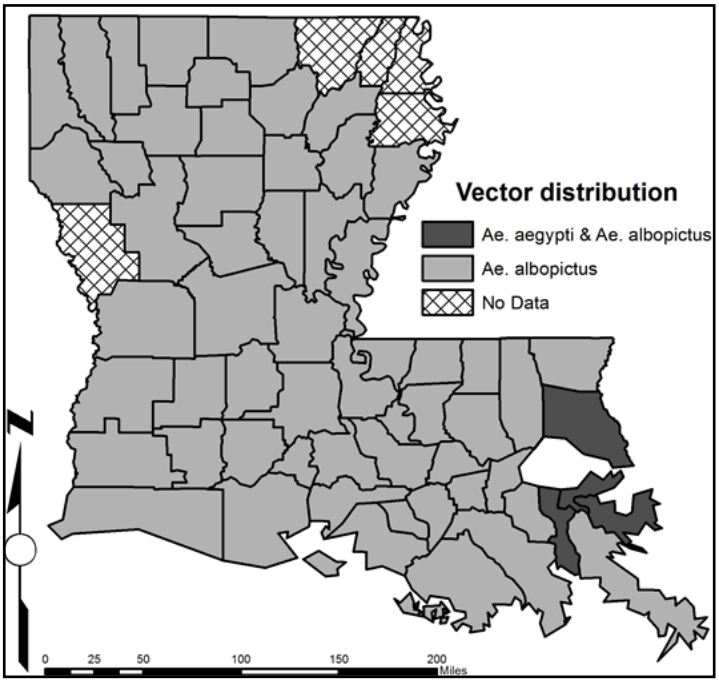


Figure 5. State-wide presence of *Aedes aegypti* and *Ae. albopictus* mosquito species in a 2014 survey (K. A. Caillouët, unpublished data).

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 become infectious and bite another person. This means that travel patterns, temperature, population density and exposure are all very important for transmission to occur. A new study published in PLOS Currents: Outbreaks (Monaghan 2016) used meteorological models and travel patterns to analyze the risk of Zika transmission in 50 U.S. cities. Much of the Southeast, including major cities in Florida, Atlanta, GA and New Orleans are considered high risk during the warmer months (July-September) (Fig. 6).

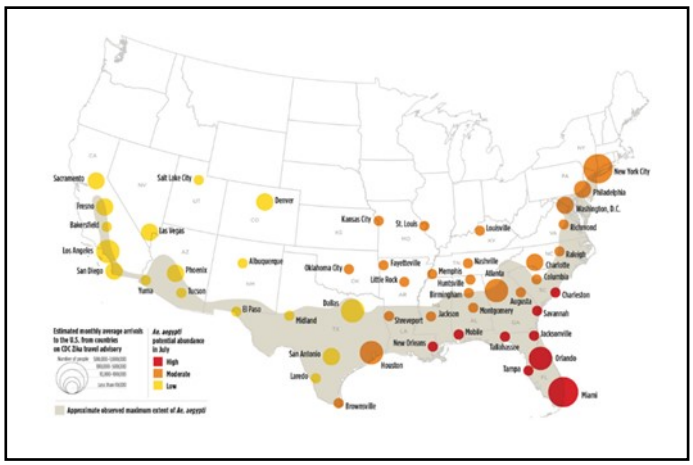


Figure 6. The estimated monthly average arrivals into the United States from countries on CDC travel advisory

These vector species can be active during the day, but are largely crepuscular (active in the twilight hours of dawn and dusk). NOMTRCB 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.

Mosquito Academy

In April, NOMTRCB & LMCA co-hosted the 4th Annual Mosquito Academy. This year's speakers included Dr. Janet McAllister from the CDC who has been working on the National Zika Response. Dr. Kevin Calliouet from St Tammany Parish Mosquito Abatement District and Dr. Kristen Healy from Louisiana State University also supported the Academy by discussing new technologies in mosquito control and public education strategies. This program is designed to offer hands-on training to students from a variety of backgrounds, in mosquito biology, identification, control, and resistance monitoring. This year, Operation Blessing International, an agency that assisted NOMTRCB with the placement of fish in swimming pools after Hurricane Katrina, sent eight staff members placed throughout Central and South America. These staff members are part of Zika response programs in a number of countries.

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 in continuous surveillance of nuisance and vector mosquitoes. Gravid trap collection resumed for the season in April. A total of 994 pools of *Culex quinquefasciatus* were submitted to the Louisiana Animal Disease Diagnostic Laboratory at Louisiana State University for arbovirus testing through the end of June 2016. None of these pools tested positive for West Nile virus, St. Louis encephalitis, or Eastern Equine encephalitis.

A citywide mosquito surveillance program was also initiated for *Aedes* species using the Biogents BG Sentinel® (BGS) (Fig. 7). As with *Culex*, *Aedes* adult mosquito surveillance involves the collection,

Figure 7. Brendan Carter sets up a BGS-2 trap in Hollygrove as part of increased surveillance of *Aedes aegypti* and *Ae. albopictus*, city-wide.

identification and pooling of adult mosquitoes for virus testing. In April, entomologists determined a sampling framework and resumed adult collections, which will likely continue until the winter months. Areas of the city with high numbers of *Aedes* mosquitoes and dense human population are potential hotspots for Zika virus transmission. In response to human case reports, additional adult mosquito collections using CO2-baited CDC light traps, Nasci and Prokopac aspirator vegetation sampling is also performed. Additional *Aedes* population monitoring methods including ovitraps - plastic cups lined with seed germination paper to collect eggs and container assessments – collecting larvae and pupae from the field, and calculation of infestation indices (Breteau, container, pupal) is also utilized.

NOMTRCB has a history of research and operational use of biological control agents including *Gambusia* (mosquito fish) (Fig. 8), copepods (small crustaceans) (Fig. 9) 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

Figure 8. Outreach and container assessments in the Bywater area identified common mosquito breeding sites such as a non-circulating pond. The addition of small fish such as *Gambusia* species (mosquito fish), can control mosquito production at these sites.

likely involve the experimental releases of biological control species in areas at higher risk such as those with frequent illegal waste tire dumping (Fig. 10), prolonged tire storage or high numbers of containers (Fig. 11) positive for mosquitoes (Fig. 12). Copepods are small (0.5 -1.5 mm) crustaceans found naturally

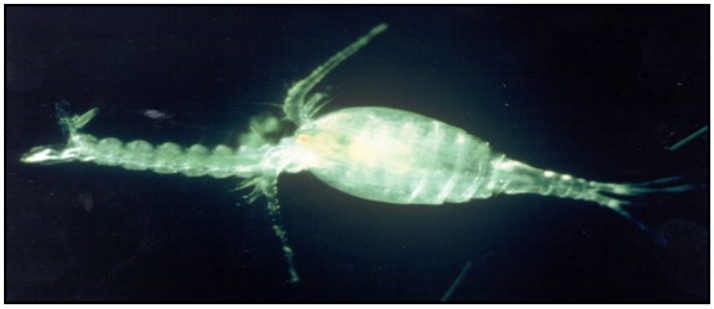


Figure 9. Permanent water-holding containers which cannot be removed or are used for long-term water storage can be managed through the application of copepods, small crustaceans which consume 1st instar mosquito larvae, as pictured above.

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.

Figure 10. Waste tires illegally dumped along a road in New Orleans East. Tires can hold water and create a protected breeding site. Illegal dumping also occurs often in vacant lots within neighborhoods creating a source of mosquito breeding in communities. Clean-up efforts focus on locating and proper removal of tires.

Additionally, in response to Zika travel cases, property inspections, educational campaigns through the use of door hangers and source reduction (Fig. 13) will be conducted. Properties within the target area with code violations will be identified and the information will be given to NOHD, Code Enforcement,

Figure 11. Outreach and container assessments in the Bywater area identify common container habitats for *Aedes aegypti* and Ae. *albopictus* such as this cooler. Coolers are often left outside and fill with water even when lids are closed. Containers should be emptied and turned over to remove mosquito habitat.

Figure 12. A close-up view of an *Aedes aegypti* collected in the cooler pictured above.

Figure 13. Intern Karl looks for mosquito larvae in a planter full of water during an outreach event in the French Quarter.

and the Sanitation Department. Vector surveillance, biological control, larviciding (Fig. 14), and adulticiding will be conducted as needed. The details of the case (viremia, time since onset of symptoms) will dictate the intensity of the response and efforts will be sustained for 45 days. This is a time-consuming effort but is important in reducing the possibility of local transmission.

Figure 14. A non-functioning fountain treated with a granular larvicide containing Bti (*Bacillus thuringiensis israelensis*) to prevent mosquito breeding.

The number of service requests in 2016 have been high, many residents are now concerned about Zika and standing water near their homes. Though June 2016, 273 service requests were submitted (Fig. 15). In all of 2015, 399 requests for mosquito service were submitted, lower than the 517 requests in 2014 and other, recent previous years (2012 – 575, 2013 – 414).

The first ground ULV treatments occurred in March in response to high numbers of *Cx. quinquefasciatus* in gravid trap collections. In 2016, 48 zones were treated using ground ULV Fyfanon®, malathion, (Cheminova) (and 6 aerial missions were flown using Dibrom®, naled, (AMVAC) were completed. The high temperatures and frequent rains will definitely impact an already active season.

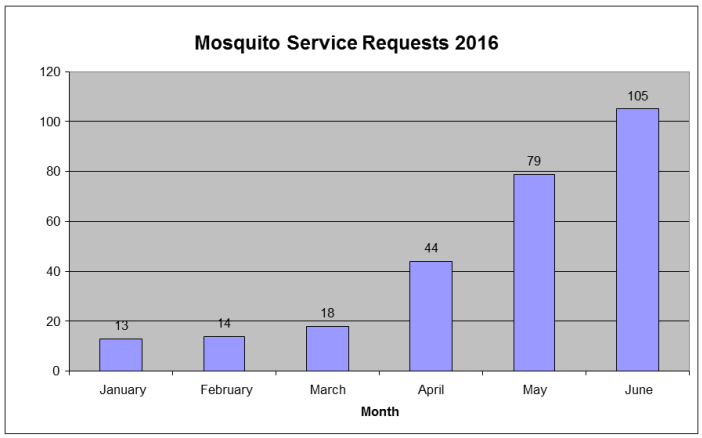


Figure 15. The total number of mosquito service requests from January through June, 2016.

Aviation

As we entered 2016, the yearly, end of season maintenance 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.

References

Monaghan, AJ et al. 2016. On the Seasonal Occurrence and Abundance of the Zika Virus Vector Mosquito Aedes Aegypti in the Contiguous United States. http://currents.plos.org/outbreaks/article/on-the-seasonal-occurrence-and-abundance-of-the-zika-virus-vector-mosquito-aedes-aegypti-in-the-contiguous-united-states/

VECTOR/RODENT CONTROL

JOYCE BROWN

Service Requests

From January 1 through June 30, 2016, NOMTRCB received 321 rodent complaints by e-mails and calls to the office (Table 1). All service requests were followed up with inspections and treatments as required. Of the 321 rodent complaints, 38 residences had evidence of rodent activity. A total of 70 burrows were observed. The properties were treated and re-inspected until the burrows were no longer active.

Table 1. Rodent service requests from January through June, 2016

Month	No. Inspections	No. Re-inspections	Total
January	31	2	33
February	37	3	40
March	37	6	43
April	58	10	68
May	3	9	72
June	89	8	97

Residential Inspections

NOMTRCB inspectors continued to visit several homes where residents were complaining about mice, raccoons, opossums, rats, and other unwanted pest that are entering their homes. NOMTRCB inspectors educated and provided fact sheets on how to pest proof homes to residents.

French Quarter: Storm Drain Treatment

Our organization treated 462 storm drains in January using 591 Maki bait blocks per label directions. Cracks, holes, and burrows in the side walks were recorded and treated. On June 15, we treated 266 storm drains in the French Quarter using 1,596 bait blocks (Weather Blox). Fewer drains required treatment this year because of the reduced rodent activity observed in the area.

Seminars:

NOMTRCB inspectors continue to participate and attend monthly seminars, training, and workshops. These seminars enhance the knowledge and experience of the inspectors and all who attend. Several speakers from different City departments and speakers from other states come in to talk on several subjects. NOMTRCB inspectors are responsible for attending all seminars, CAO Policy meetings, LDAF recertifications, HAZWOPER recertifications, and general staff meetings.

311

NOMTRCB inspectors continue to work with 311 on all phone calls and transferred service requests sent by email. These service requests are recorded and issued to an inspector where they are addressed promptly and control measures implemented.

Special Assignments:

Bed Bugs

On February 12-13 we inspected and treated Code Enforcement offices for bed bugs. Inspectors also have added Bienville Triangle to the list of sites to be treated for rodents.

Margaret Place/Underpass

We continue to inspect and treat the burrows and storm drains at Margaret Place and under the overpass located at Camp and Clio Streets to St. Charles Avenue (Fig. 16).

Figure 16. Under the overpass located at Camp and Clio Streets where we treat for rodents.

PHOTOGRAPHY, TERMITE INSPECTIONS AND TREATMENTS, BUILDING MAINTENACE AND SOURCE REDUCTION

ED FREYTAG

Photography

Mr. Jack Leonard (Pest Control Specialist 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 for testing 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. 17).

Figure 17. Phil Smith testing trail camera in front of the rodent bait station.

College students visiting New Orleans, and organized by the NOLA Tree Project, volunteered their time during spring break to help prepare the soil beds and plant bushes and trees in front of the main administrative building (Figs. 18 and 19). Mosquito, Termite and Rodent division personnel, as well as mechanic and maintenance crews all pitched in with shovels and rakes to beautify the landscaping. The decorative plants and trees, as well as the mulch and planting soil, were purchased locally.

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

Figure 18. Volunteer college students assisted in preparing beds and planting ornamental shrubs and trees at the main administrative office bldg.

Figure 19. NOMTRCB personnel working on preparing the beds for the ornamental shrubs.

Flowable Cockroach Bait. Kimberly provided low-resolution sample pictures as guidelines. 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 "stacks" to provide a 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 of Operation Blessing 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 Bill is pushing is the use of the copepods as a means of reducing breeding in "pilas," or concrete water basin used for collecting rainwater. . These basins allow a family to practice basic hygiene, wash dishes, and maintain an adequate amount of water to weather common temporary water shortages. Unfortunately, the pilas also provide a breeding opportunity for *Ae. aegypti* mosquitoes.

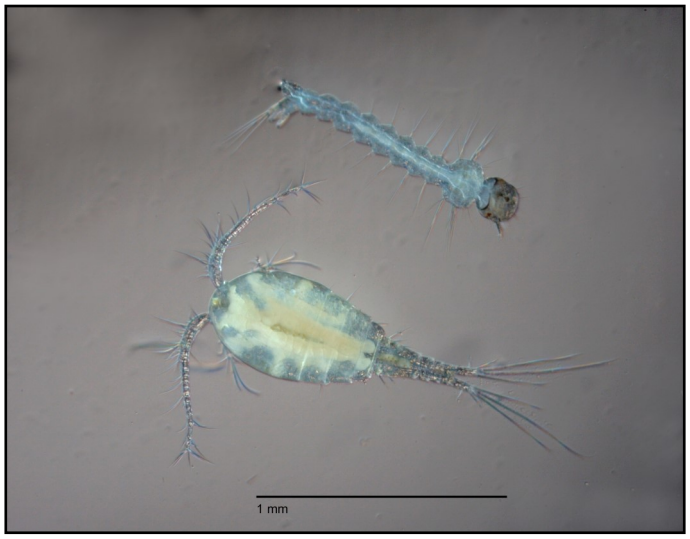


Figure 20. Copepod adult next to a first instar *Ae. aegypti* larva. Approximately 1.5 mm in length.

The copepod is a very efficient predator of first instar mosquito larvae (Fig.20). Many attempts were made to capture the copepod adult attacking a mosquito larva, but so far a good take has not been possible due to the small size and difficulty in focusing the lens on both subjects. Mr. Horan was also interested in the *Toxorhynchites*, or cannibal mosquito

Figure 21. *Toxorhynchites* larvae preying on an *Ae. aegypti* mosquito larva.

(Fig. 21). Obtaining a high quality image and video of the cannibal mosquito was much easier than the copepod, as they always seem to be hungry and readily accept a mosquito larva as food. Small narrow containers were constructed with microscope glass slides and cover slips to be able to contain both larvae in close quarters to facilitate taking a picture .

Infrared (IR) Inspections

A total of 12 infrared inspections have been conducted up to June. Seven of the structures were inspected for Billiot Pest Control, two structures were inspected for Southern Pest Control in Mississippi, and three structures were inspected for the homeowner. Three buildings were located in Mississippi, which were referrals from Red Pest Solutions. There is no one conducting this type of termite inspections in Mississippi or Alabama so I have advertised our services during my presentations at recertification meetings in Mobile and other locations. In order to travel outside the state, a series of travel forms have to be approved by the Director and approved by the Deputy Mayor/CAO. All travel expenses are paid for by the homeowner or pest control company.

Inspections and Other Treatments

We conducted an inspection of the Code Enforcement offices located at 1340 Poydras Avenue downtown and found an office chair infested with bed bugs. 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 dust made from silica get that removes the waxes and oils from the exoskeleton and causes desicca-

Figure 22. Joyce Brown and Timmy Madere filling the hand dusters with CimeXa.

tion (Fig. 22). Head nets, face masks and gloves were donned during the treatment to prevent possible respirator issues.

The 9th, 11th, and 12th floors were also treated as a precaution to prevent re-infestation. The 9th and 10th floors were occupied by city employees, but the 11th floor was unoccupied and the 12th floor was where the janitorial crew stored their cleaning equipment. I gave several talks to the city employees in 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 also 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 main office at Parks and Parkway called complaining of ants bothering them in 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 but eventually the ants were eliminated.

Maintenance

Mr. LJ Kabel (Pest Control Specialist 3) and Mr. Joe Robert (Plant Maintenance Supervisor), the new maintenance replacement for LJ, continued improvements on the new warehouse located on Hayne Blvd. The office for Mr. Firmin Maurice (Auto Mechanic 2) had to be completely remodeled due to termite damage and incorrect building practices from the previous owner (this is the automotive shop). 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. 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 repairable. Mr. Kabel divided the space so that the malathion could be stored under AC cooling due to label restrictions. The bathroom is also getting a complete makeover so that a shower can be installed which is required when working with chemicals.

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 Mr. Kabel and Mr. Robert because a relay failed and burned a wire lead causing failure. All three buildings were primed and painted on the outside.

The Biosafety lab required new sewage, plumbing and electrical lines to be run underground. The mechanical room floor was gutted due to water damage which caused extensive rotting and wouldn't

support any equipment. It has been prepared for repairs and a subcontractor will be hired for the installation of a finished floor. This floor is a special floor in that the baseboard is part of the finished flooring and has to be installed by professionals.

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 talk 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.

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. Mr. Eric Guidry (Pest Control Specialist 1) also attended to assist manning a booth we set up to demonstrate our ability to conduct wood preservative studies in the field and in the laboratory with Formosan termites. After the meeting we rented 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 new species (Fig. 23). 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. 24). We did manage to tear apart a tree termite nest, *Nasutitermes* sp., and were able to collect two physogastric queens (Fig. 25).

Figure 23. Eric Guidry collecting insects attracted to a white sheet using a sodium light.

Figure 24. A typical street scene in the mountains in Puerto Rico.

Figure 25. 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! Mr. Broadley (Fig. 26) 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 NOMTRCB, Mr. Broadley 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 26. Mr. 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

NOMTRCB 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 Dr. Joe DeMark (Dow AgroSciences), Drs. 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 conducting laboratory bioassays 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

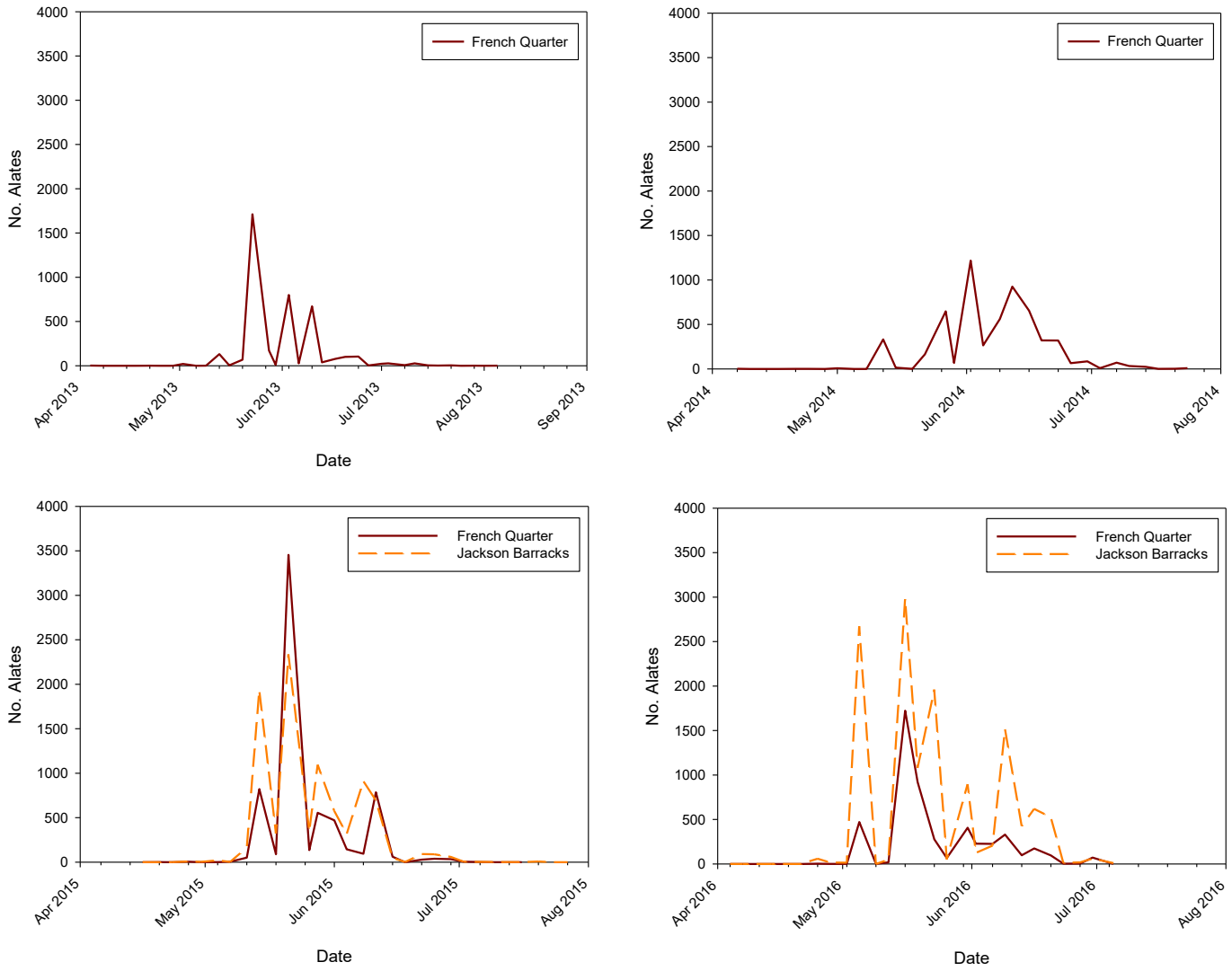
We have continued to monitor Formosan subterranean termite alates, or swarmers, in the French Quarter and at Jackson Barracks during this year's swarm season. Every year, typically from April through June, winged reproductive termites take

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 3), Mr. Eric Guidry (Pest Control Specialist 1), Mr. Shaun Broadly (Pest Control Inspector 2), 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 27.

Figure 27. Total alates collected on all glue boards at each site from 2013—2016.



Protecting Properties and Trees

We are still continuing to protect historically significant and city-owned properties by installing and servicing Sentricon® Recruit HD Always Active bait around structures and trees. Mr. Barry Lyons (Pest Control Specialist 1) and Mr. Steve Ollar (Pest Control Inspector 2), with the assistance of Mr. Shaun Broadly (Pest Control Inspector 2), 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 NOMTRCB 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,

Table 2. Termite inspections of protected properties from January through June, 2016.

Site	Location	Month Inspected	Observations
Historic trees	City Park	January—May	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	Evidence of termites feeding on bait, though no live termites were observed.
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 Ave.	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	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.
Dog Park	City Park	June	Evidence of termites feeding on bait, though no live termites were observed.

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.

Extension Services

Termite Academy

Our annual Termite Academy was held from February 23-25 and was extremely well-received by all attendees. Guest speakers for this year's academy included Drs. Phil Koehler (Fig. 28) and Thomas Chouvenc (University of Florida), Mr. Milton Schleismann (Louisiana Department of Agriculture and Forestry), Mr. Ernie Esteve (Billiot Pest Control), Dr. Jason Meyers (BASF), Mr. Ron Landis (Fig. 29) (Terminix New Orleans), and Mr. William Robinson (Train2Build). Members of NOMTRCB 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. L.J. 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.

Figure 28. Dr. Phil Koehler discusses invasive termites during our annual Termite Academy.

Figure 29. Mr. Ron Landis demonstrates how to calibrate spray equipment during the field portion of our annual Termite Academy.

Recertification

Our organization also hosted a structural pest technician recertification course with the Greater New Orleans Pest Control Association on March 17. This one-day course was extremely well-attended. These recertification courses are required annually by the Louisiana Department of Agriculture and Forestry for technicians to be able to apply pesticides.

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 1) is an expert at insect identification and has identified approximately 50 samples brought to us so far this year.

Extension, Technology Transfer and Education

Presentations

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. Structural Fumigation Recertification. New Orleans, LA.

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

Carter, B. February 7, 2016. The Role of Backyard Treatments for Mosquito Control. American Mosquito Control Association, Savannah, GA.

Cloherty, E. February 7, 2016. Training Opportunities for Pest Management Professionals. American Mosquito Control Association, Savannah, GA.

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.

Cottone, C. February 23, 2016. Subterranean and Drywood Termite Biology and Identification. GNOPCA & NOMTRCB Termite Academy, New Orleans, LA.

Madere, T. February 23, 2016. Rodent Biology and Control. Louisiana Department of Agriculture and Forestry Recertification. Kenner, LA.

Cottone, C. February 24, 2016. Baiting Technology. GNOPCA & NOMTRCB 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 & NOMTRCB 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.G. 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 Recertification. New Orleans, LA.

Riegel, C. and C. Cottone. March 17, 2016. Bug Bowl. Louisiana Department of Agriculture and Forestry Recertification. New Orleans, LA.

Madere, T. March 22, 2016. Rodent Biology and Control. Louisiana Department of Agriculture and Forestry Recertification. Alexandria, LA.

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

Michaels, S. April 2, 2016. Water Wise Neighborhood Champions. Global Green. New Orleans, LA.

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.

Cloherty, E. April 12, 2016. Mosquito Control. School IPM Recertification, New Orleans, LA.

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

Smith, P. April 12, 2016. IPM for Dummies. School IPM Recertification, 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.

Riegel, C. April 13, 2016. Vector Control in Emergencies. ETHER Short course, Atlanta, GA.

Michaels, S. April 13, 2016. Zika in the U.S.: What Local Health Departments Need to Know. EEK Conference. National Environmental Health Association. Webinar.

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). LMCA & NOMTRCB Mosquito Academy, New Orleans, LA, USA.

Harrison, C. April 20, 2016. Biological Control. LMCA & NOMTRCB Mosquito Academy, New Orleans, LA, USA.

Michaels, S. April 19 -21, 2016. Bionomics and Identification of Important Species. Mosquito Surveillance. Operational Interventions Following Zika Travel Case. Louisiana Mosquito Control Association and NOMTCB Mosquito Academy. New Orleans, LA.

Carter, B. April 20, 2016. Adulticide Efficacy for Aedes Species. Louisiana Mosquito Control Association and NOMTCB Mosquito Academy. New Orleans, LA.

Riegel, C. Larviciding. Louisiana Mosquito Control Association and NOMTCB Mosquito Academy. New Orleans, LA.

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.

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

Carter, B. April 25-26, 2016. Evaluating Aerial Ultra -low Volume (ULV) Adulticiding Applications for Aedes species Control. Institut Pasteur. Paris, France.

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

Riegel, C. May 2, 2016. Mosquito Control. SE Florida Pest Control Association, Gainesville, FL.

Riegel, C. May 2, 2016. Termite Control, SE 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. Rodent Control in New Orleans, NCUE, Albuquerque, NM.

Riegel, C. Zika Preparedness in New Orleans, NCUE, 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.

Michaels, S and Carter, B. June 17, 2016. Tulane Young Scholars Lecture, Field Collections and Laboratory Identification. NOMTRCB Administration & City Park. New Orleans, LA.

Abstracts

The Use of Copepods as Biological Control for *Aedes aegypti*

Cynthia Harrison, Sarah Michaels, Brendan Carter, Mieu Nyguen, Claudia Riegel and Gerald 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

Brendan Carter, Sarah Michaels, Cynthia Harrison and Claudia 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 mosquito populations and reduce risk of vector-borne disease.

Area-wide Treatment of Formosan Subterranean Termites at Jackson Barracks, New Orleans, LA

Carrie Cottone, Claudia Riegel, and Eric 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.

Publications

S. Michaels. Zika Virus & What PMPs Should Know. Pest Perspectives May/ June 2016. Vol. 4, Ed. 3. http://www.nxtbook.com/naylor/FPMS/FPMS0316/index.php?startid=25#/0

Meetings

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

Carter, B. February 7-11, 2016. 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 & C Harrison. May 17, 2016. Louisiana Mosquito Control Association, Entomologist Round-table Meeting. St. Tammany Parish Mosquito Abatement District. Slidell, LA.

We were fortunate to present four posters on studies and efforts at NOMTRCB at the International Zika Conference at the Institut Pasteur in Paris, France. It was a rare opportunity to learn from world-renown experts in their respective field on this rapidly unfolding disease of international concern.

Outreach Events

Zika Preparedness

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.

NOMTRCB personnel conducted neighborhood outreach campaigns, going door-to-door in targeted neighborhoods, distributing doorhangers and conducting backyard container assessments. In 2015, property inspections in yielded an average of 1.4 water-holding containers per residence, containers were likely to be small and included buckets, coolers, planters & plant saucers, watering cans, dog bowls, plastic barrels and tubs. In November and December 2015, 31.8% of the yards inspected were positive for immature mosquitoes and *Ae. aegypti* was the most commonly collected species (85.9%). These measurements indicate that the mosquito population may be large enough to support virus transmission. It is critical to engage residents and neighborhoods in the removal and elimination of containers. We also conducted inspections at city-owned properties including parks, libraries, police and fire stations, playgrounds and monuments to ensure that these sites were free from mosquito breeding.

Total Community Action
On May 20, 2016 Ms. Cynthia Harrison (Laboratory Specialist 2) and Ms. Joyce Brown (Pest Control Specialist 1) participated in the 2016 Health & Wellness Fair with Total Community Action. We displayed their rodent and mosquito showcase and issued literature and verbally explained to the public about pest proofing and mosquito protection.

Sewerage and Water Board Seminar
On April 15, 2016, we participated in The Environmental Sewerage and Water Board seminar (Fig. 30). NOMTRCB inspectors set up their rodent and mosquito displays, issued literature, and talked to the public about pest and vector management.

Figure 30. Mr. Brenden Carter explains biological control methods to a group of students at the Sewerage and Water Board seminar.

2016 Spring Garden Show
We participated in the 2016 Spring Garden Show from April 2-3 in City Park. NOMTCRB inspectors displayed a showcase of rodents and mosquitoes, educated the public on pest proofing, and preventing mosquitoes from breeding in their yards. Bags of Amdro ant bait were offered to the public at this event. Our organization won First Place in Education Excellence in Sales Division, Best of Show and Second Place in Design Excellence Education Division (Fig. 31).

Magic On The River
On May 8, 2016, Ms. Cynthia Harrison (Laboratory Specialist 2) and Ms. Joyce Brown (Pest Control Specialist 1) participated in The Magic On The River fair. Educational displays of rodents and mosquitoes were set up (Fig. 32). There were 1,450 children and adults who attended the fair.

Figure 31. NOMTRCB won First Place in Education Excellence in Sales Division, Best of Show and Second Place in Design Excellence Education Division at this year's Garden Show in City Park.

Figure 32. Display booth at the Magic on the River fair.

Ella Dolohonde Elementary School
On May 19, 2016, NOMTRCB inspectors set up their display of rodents and mosquitoes for 30 elementary children and educated the children on pest and vector biology.

Xavier Fair

We participated in this year's Xavier Fair by manning educational booths displaying information on mosquitoes and rodents. Several students also participated.

Cub's Corner Field Trip

On June 24, 2016, children from Cub's Corner visited our building. Ms. Joyce Brown (Pest Control Specialist I) gave a presentation on rodents, Mr. Eric Guidry (Pest Control Specialist I) and Dr. Carrie Cottone (Principal Research Entomologist) presented our pinned specimens and live displays of termites and cockroaches. Mr. Brendan Carter (Pest Control Specialist 1) and Ms. Erin Cloherty presented 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.

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

C. Riegel. February 2, 2016. Zika Preparedness. WWL, Channel 4

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

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

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

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

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

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

C. Riegel. If Zika Virus Arrives, New Orleans is Ready, Mayor Says. Times-Picayune/ Nola.com. March 10th, 2016.http://www.nola.com/science/index.ssf/2016/03/zika_virus_louisiana_landrieu.html

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

C. Riegel. March 15, 2016. Mosquito, Climate Change, Zika. Discovery Channel.

C. Riegel. New Orleans at High Risk of Zika Outbreak in Summer, Experts Say. Times-Picayune/ Nola.com. March 16, 2016. http://www.nola.com/education/index.ssf/2016/03/zika_virus_new_orleans.html#incart_river_index

C. Riegel & S. Michaels. Discovery Channel's IMPACT Series. March 22, 2016.

C. Riegel. March 30, 2016. Zika Virus, Green Infrastructure, Preparedness. The Lens

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

S. Michaels & B. Carter. New Orleans Amps Up Mosquito Research To Combat Zika. The Lens/ WWNO. May 4, 2016. http://wwno.org/post/new-orleans-amps-mosquito-research-combat-zika

C. Riegel, May 4, 2016. Zika Preparedness. Health Affairs Journal.

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

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

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

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

Other Outreach Events

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.

Television Show

May 9-12, 2016. Multiple people from the department assisted in filming the program “Rats” with Morgan Spurlock that will air in the fall of 2016.