NEW ORLEANS MOSQUITO & TERMITE CONTROL BOARD

2009 ANNUAL REPORT

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DIRECTOR'S REPORT

Report on the activities of the City of New Orleans Mosquito and Termite Control Board during 2009.

The following staff reports give an overview of the activities of the NOMTCB for the calendar year 2009 as well as the activities for September through December 2009.

Our staffs' motivation, work accomplishments and work ethics continue to astound me. I thought that, 40 years ago, we had had the finest staff and program anywhere (as was also said by many other districts); but it is such a different program now, with so many more obligations and a very different approach to mosquito control, that any contemporary comparison would be unrealistic.

As I write this on a very cold January 5th, 2010, we remain in a FEMA trailer. I am, however, very hopeful that by this time next year we will be in our new 18,000 sq. ft. Administration/Laboratory building. Test pilings have been driven, plans and financing have been finalized, and we have only a few loose ends to tie up.

It is with great regret that I report the passing of Mr. George T. Carmichael, at the age 88 after a very brief illness. He is survived by his wife, Cleo of Knoxville, TN and two daughters and grandchildren.

Mr. C. was our first director in 1964. He was hired by Dr. Rodney C. Jung. He retired in 1986, when, after some measured consideration by him and his newly re-titled director, Ed Bordes, I became assistant director. Mr. Carmichael was a great mentor and prepared his future executive staff members to deal with the nuances of politics, the public and much that lies in between.

Respectfully submitted,

Michael K. Carroll

Michael K. Carroll, Ph.D.
Director

OPERATIONS AND FACILITIES

CLAUDIA RIEGEL, Ph.D.

Assistant Director

Employees

Mr. Joe Riedl retired in January of 2009 (Figure 1). Joe was the chief pilot for the City of New Orleans Mosquito and Termite Control for 18 years. A nationwide search was initiated in 2008 to replace Joe so that we could continue our mosquito aviation program. In January, 85 applicants were narrowed to three candidates. The candidates were brought to New Orleans for interviews. In February 2009 we selected Mr. Benjamin H. Smith. Ben has extensive flying experience in many types of airplanes. In addition, he is an A&P mechanic so he is able to do the maintenance and repairs of the airplane.

Figure 1. Joe Riedl, our chief pilot retired in January, 2009 after many years of service.

Ben hit the ground running in March when he relocated with his wife from Washington state to New Orleans. Ben has spent the majority of his time refurbishing the airplane (Britten-Norman Islander). Ben evacuated the airplane to Slidell this fall because of the risk of high winds from a tropical system. The airplane was brought back safely and is currently being prepared for the 2010 spray season (Figure 2). Ben has been an excellent addition to the NOMTCB family and we are looking forward to working with Ben for years to come.

Figure 2. Ben Smith repairs corrosion on the airplane wing.

Two pest control inspectors resigned from our organization and one pest control inspector transferred to the City of New Orleans Health Department this year. All three vacant positions were filled in 2009.

In the first quarter of the year we hired Frank DiGiovanni to manage our computers and computer networks. In the short time that he has been with us, Frank has been able to relieve Ed Freytag, our senior entomologist, from trouble-shooting computer problems. Ed has now been able to stay focused on operational termite projects. Ed helped Frank transition into the job but he is now completely independent. The turn-around time for computer repair is now much faster which makes our organization much more efficient. In addition, Frank inventoried and organized all of our computer related and electronic items. He has also networked the computers in the middle and backshops. Those buildings are now wireless and everyone has internet access. Trouble-shooting computer problems is ongoing and he has done an excellent job.

The other two positions were filled in December 2009. In 2008 and 2009, Mr. Mark Mitchell was a summer intern with NOMTCB. Mark, a GIS expert, joined our team as a Pest Control Inspector 2 in December. NOMTCB is in the process of converting mosquito and rodent service requests, termite data, and much more in to easy-to-read maps (Figure 3). The goal is to have an interactive, real-time, web-based system handle and review the data collected. He works with all the divisions in our organization and has become knowledgeable in all aspects of our operation.

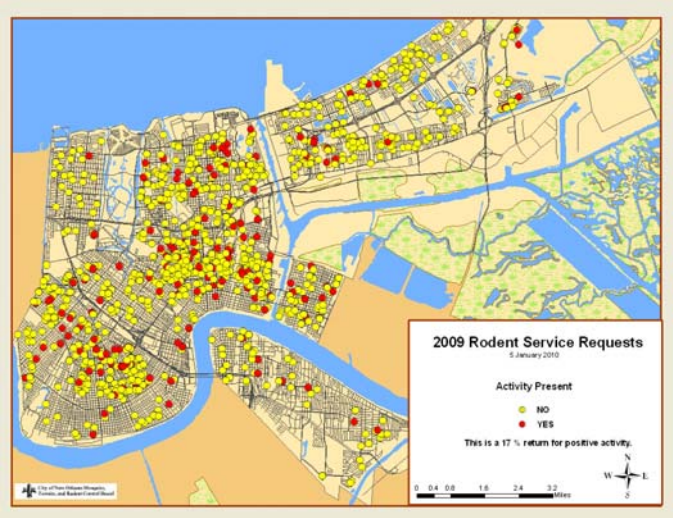

Figure 3. Rodent service requests received in 2009.

Mrs. Rusca Kennedy was also hired as a Pest Control Inspector 2 in December 2009. Since Hurricane Katrina, we have been short one administrative person in the office. Our workload and extramurally funded projects have increased since Katrina. Rusca was hired not only to assist with termite projects, but to also to manage NOMTCB's accounting.

Mr. L.J. Kabel celebrated 30 years with the City of New Orleans (Figure 4). L.J. is currently a Pest Control Specialist III and the City of New Orleans is fortunate to have such a dedicated and hard-working employee. He is in charge of maintaining our facilities, in addition to, source reduction and other pest control duties. We look forward to having L.J. on our team for several more years to come.

Figure 4. L.J. Kabel celebrated 30 years of service with the City of New Orleans.

Each year we anticipate the arrival of the summer interns (Figure 4). The candidates were interviewed for internship positions in March and April. All of the summer interns began in May and we, again, had an excellent group. All 12 positions were filled and they came from many different locations. We hired interns from the University of New Orleans, Tulane University, local high schools and we had several that had worked with us the previous year. These experienced interns require minimal training and provide our staff with highly skilled help. In addition, we make an effort to expand their knowledge in mosquito or pest control. With the assistance of our department, many of our interns find permanent jobs or successfully apply to graduate school.

Figure 5. The 2009 summer interns gather to get recognized for their contribution to the department.

Dr. Waseem Akbar from the Tulane University School of Public Health and Tropical Medicine will be completing his Practicum with NOMTCB December 2009 through May 2010. Dr. Akbar will be focusing on mosquito insecticide resistance testing, mosquito operations and microsatellite DNA analysis. He is incredibly enthusiastic and knowledgeable and we are pleased he will be working with

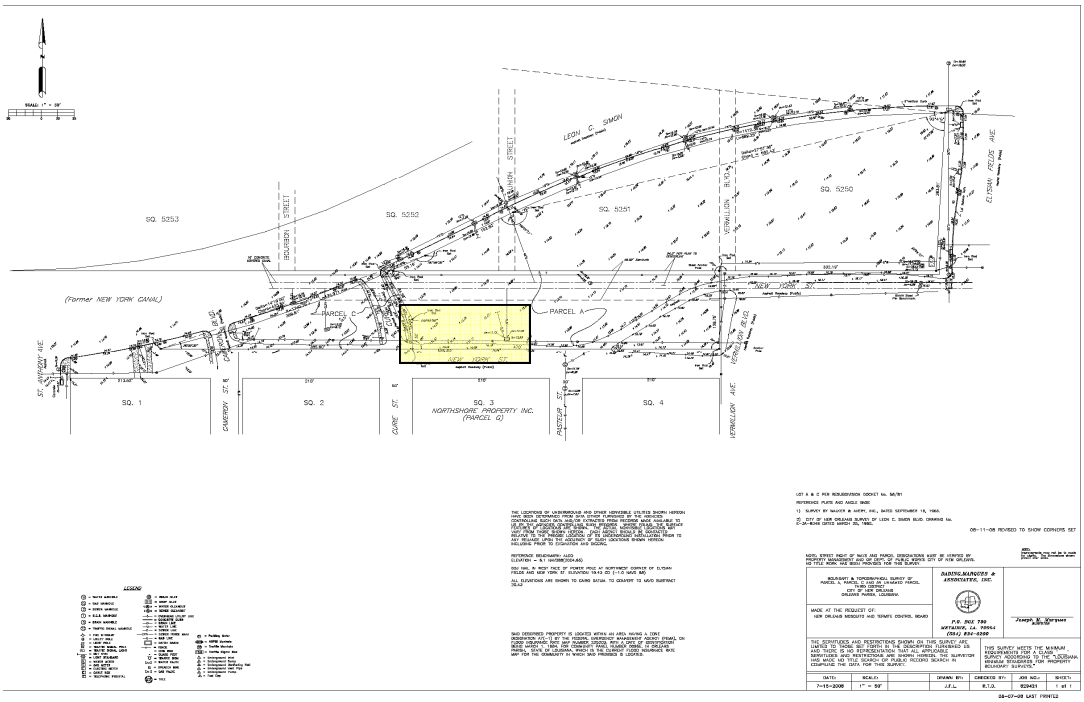

Figure 6. The future site for the new Mosquito and Termite Control Board administration building.

our mosquito control team.

Ms. Carrie Owens, Entomologist 1, successfully completed her written and oral Ph.D. qualifying exams this fall at the University of Florida Department of Entomology and Nematology. I serve on her graduate committee and participated in the examination. She is now a Ph.D. candidate and her expected graduation is in the fall of 2011.

There are many daily activities that need to be completed in order to move our operations forward. A significant portion of my time is spent on personnel, essential operation matters and obtaining extramural funding. Mrs. Sara Ward was instrumental at making sure bills were paid, human resource issues were resolved and employee relations were managed. In addition, Ms. Cindy Krohn was responsible for all service request data entry, management of the concrete cap business, and provided assistance with our extension activities. The office staff answers the phones at the trailer and speaks with residents regarding service requests and pest issues many times a day. In the second quarter of the year, we requested to cancel service with 311. All phones calls are directed to our main number, (504)658-2400.

We had another outstanding year and in large part, it was due to our dedicated staff. Our services have expanded due to extramural funding and the hard work of our employess. Our staff is still working in damaged facilities and in an office trailer, however, they continue to work tirelessly and they are committed to the public safety and well being of the residents of Orleans parish.

Facilities

Lakefront Facilities

We are still working from damaged buildings. Shortage of office space has been a problem since Katrina. Part of our staff is housed in an office trailer at the Levee Board and some staff remain at our offices at the Lakefront facilities. L.J. Kabel and Jimmy Jesse, with the assistance of our inspectors, have rebuilt temporary office space. They have done a tremendous job cleaning the building and constructing new offices in our damaged facilities.

Administration Building

Significant progress has been made towards the construction of a new administration building. The building site was surveyed (Figure 6) and the program for the new building was completed for Design+Build. Many hours a week were spent on pushing the process along. The site was cleaned and the weeds were mowed (Figure 7). The administration building program was opened to potential contractors to bid on the design and construction of the

Figure 7. L.J. Kabel cleans the site for the new administration building.

building. Three finalists were chosen to present their design to the City of New Orleans in May. Woodward Design/Build, LLC was awarded the project. This is the first Design/Build project for the City of New Orleans. The process has been slow and frustrating; however, the funding for the building has been secured and construction will begin in 2010. Our staff has been involved in the process so that each person takes ownership of the project and has a space in the building that is suited for their responsibilities at NOMTCB.

The original exterior and interior design of the building has been adjusted to be more functional and more aesthetically pleasing. Our department received a $338,000 grant from the Centers for Disease Control and the Division of Health and Hospitals specifically for mosquito control. This money, in addition to $240,000 from extramural funding, was applied to our building to cover the costs of the enhancements from the original design. The design of the exterior of the building now compliments the buildings of University of New Orleans and Benjamin Franklin High School campuses located across the street.

Hanger

No progress has been made on permanent repair of our hanger, however, we met with a contractor several times to draw up the plans for the repair and the plans were completed. The plans will be submitted to FEMA in January 2010 for review. During the summer, L.J. Kabel, Jimmy Jesse and others from our staff, closed in the hanger with sheet metal. The hanger had been open for 3.5 years, since Katrina's storm surge tore holes in the walls, and needed to be closed because birds had taken up residence inside and were creating a huge mess. In addition, the hanger was open to adverse weather conditions. We now call the hanger the "chicken coop" due to its appearance. All repairs are temporary and will be removed when permanent repairs are made.

Professional Associations

NEHA

The Centers for Disease Control and the National Environmental Health Association (NEHA) have been working with our department to schedule a workshop in New Orleans. These workshops are targeted to sanitarians, health environmental specialists and pest control operators. NEHA and the CDC fund the workshops and there is no cost to the attendees. Dr. Bobby Corrigan, the nation's most important urban rodentologist, and Dr. Dini Miller are planning to speak at the workshop. The workshop is planned for January 26-28, 2010.

Louisiana Mosquito Control Association (LMCA)

I was elected president of the Louisiana Mosquito Control Association this year. I attended several board meetings and there were several projects which required my attention. A committee has been working together to upgrade the association's website. In addition, I have been involved in changing the newsletter from a paper format to an electronic format. The first electronic newsletter was sent in May. I also participated in the LMCA Workshop in March. A committee, of which I am a member, was formed to restructure the LMCA workshop in 2010.

National Environmental Health Association

The Centers for Disease Control and the National Environmental Health Association (NEHA) invited me to participate in a Workshop in Gallup, New Mexico, March 10-12, 2009. The workshop was for sanitarians and other health professionals that work with the Navaho Nation. The topics I presented included, mosquito biology and control and

rodent biology and control.

I was invited by NEHA and the Centers for Disease Control to participate in a workshop in Atlanta to define the topics needed to be taught in NEHA/ CDC workshops. The target audience for the workshop are environmental health professionals and pest control professionals.

American Mosquito Control Association

The American Mosquito Control Annual meeting was held in New Orleans April 5-9, 2009. Our department played an extensive role in the planning of local arrangements. We were involved in planning The AMCA Field Day and Education Day. In addition, our staff volunteered to work projects, help with registration and much more. All of our mosquito inspectors attended the meeting. It was a great opportunity to interact with people from all over the US and abroad. We won first place for the best booth at the AMCA Field Day. The trophy is currently being displayed at our office trailer.

Greater New Orleans Pest Control Association

Ken Brown and I have been very involved with the Greater New Orleans Pest Control Association. We have taken the lead on the education aspects of the association. The Pest Control Academy (Figure 8) and the Termite Control Academy (Figure 9) were well received. Evaluations were given to the participants and we received excellent comments. I was elected to the GNOPCA Board in October of 2009.

Hurricane Season Preparations

In May, Carrie Owens took an active role in preparing the NOMTCB Biolab facility for the 2009 hurricane season. With the cooperative efforts of Cynthia Harrison and Mieu Nguyen all major laboratory and computer equipment was properly labeled and inventoried in case evacuation was mandated.

Full and current inventories of pesticides and surveillance equipment is maintained at our office trailer. We have collected all of our employee's current contact information and a plan of action is listed in our employee manual.

Figure 8. NOMTCB organized the second Termite Control Academy in 2009.

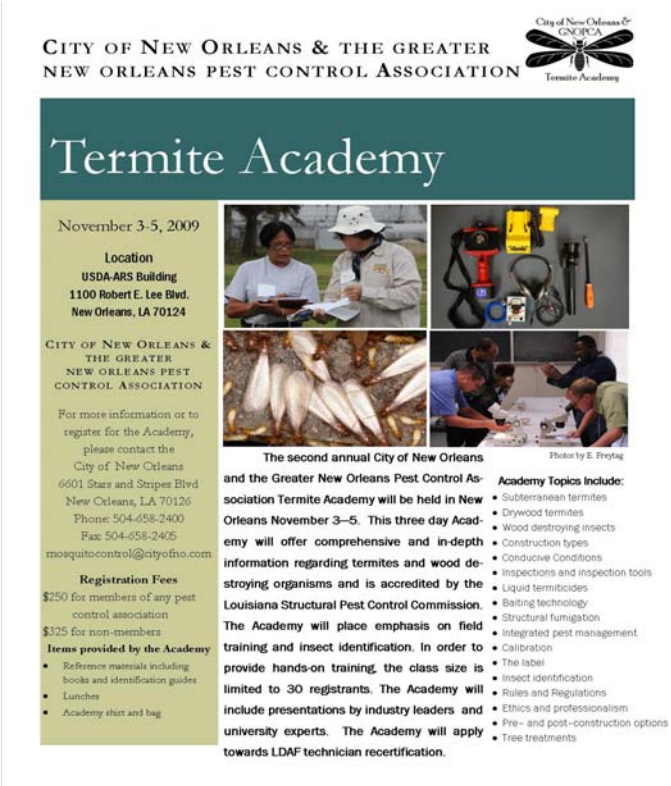

Figure 9. NOMTCB organized the second Pest Control Academy in 2009.

MOSQUITO FIELD OPERATIONS
STEVE SACKETT

New Orleans was fortunate again this year to have relatively low mosquito populations and no reported cases of human arbovirus. Mosquitoes were collected weekly from March 17 through October 27 from 19 gravid trap sites throughout Orleans parish. These samples, called mosquito pools, are sent to Louisiana State University's Veterinary School for arbovirus testing. Mosquitoes positive for West Nile virus were identified from six of those sites (Table 1), but infection rates for mosquitoes remained below the threshold associated with virus transmission to humans (Table 2). A minimum infection rate (MIR) greater than 6 is typically observed in areas where WNV transmission to humans is occurring. Only seven (1.5%) of the 464 pools submitted to the lab were found to be positive for virus.

Table 1 POSITIVE MOSQUITO POOLS

Collection Date	Pool #	Site	Type	Species
7-28-09	275	S. Carrollton Ave.	WNV	Cx.q.
7-28-09	277	St. Claude Ave.	WNV	Cx.q.
8-11-09	314	Morrison Rd.	WNV	Cx.q.
8-18-09	326	Paris Ave.	WNV	Cx.q.
8-18-09	327	Read Blvd.	WNV	Cx.q.
10-20-09	441	Robert E. Lee Blvd.	WNV	Cx.q.
10-27-09	456	St. Claude Ave.	WNV	Cx.q.

Table 2 MINIMUM INFECTION RATE (MIR)

Date of Collection	# Positive Pools	# Mosquitoes Tested	MIR
7-28-09	2	736	2.7
8-11-09	1	658	1.5
8-18-09	2	712	2.8
10-20-09	1	589	1.7
10-27-09	1	881	1.1

MIR = (# positive pools/# mosquitoes tested) x 1000

Fog trucks were again our primary tool for reducing adult mosquito populations as our airplane is still being repaired. We have a cooperative spraying agreement with St. Tammany Parish Mosquito Control and they applied aerial treatments needed to combat salt marsh mosquitoes that were attacking residents of eastern New Orleans. Larviciding and source reduction efforts in targeted areas of the city also played major roles in reducing mosquito populations and the probability of disease transmission. We continued to inspect and treat abandoned swimming pools, but are now finding that a high percentage have been placed back into service, have locked gates, or have been filled with soil. Re-inspections have indicated that mosquitofish have survived in the vast majority of the pools, but some do require additional stocking.

Bottle bioassays have been utilized at our laboratory for several years to monitor insecticide resistance in our mosquito populations. In most cases, the target species placed inside of bottles die soon after being exposed to small amounts of our ground and aerial adulticides. We are now finding that the populations of *Culex quinquefasciatus*, southern house mosquito, (Figure 10) from several sites in New Orleans, are showing tolerance to some of the insecticides used for ground adulticiding, including Scourge® (resmethrin/PBO), Zenivex® (etofenprox), Duet® (sumithrin, prallethrin/PBO), and Permanone® (permethrin). These insecticides are in a class of pesticides called pyrethroids which are the most common over-the-counter insecticides.

Field cage tests, in which mosquitoes are placed in small cages and exposed to insecticide delivered from a fog truck, also seem to indicate that many of our southern house mosquito populations, "quinks," are not as susceptible to our ground adulticides as we previously believed. This scenario is not unique to New Orleans but is being experienced in many other areas of our state and country. The good news is that our quinks are still very susceptible to Dibrom® (naled), which is applied from our airplane. Naled is an organophosphate which has excellent efficacy against our mosquito species. We will continue to test *Cx. quinquefasciatus* populations throughout the city and aggressively seek solutions to the issues of susceptibility.

Figure 10. New Orleans *Culex quinquefasciatus*, the Southern house mosquito, have been showing tolorence towards ground adulticides.

Buck moths

Our annual survey of buck moth caterpillars (Figure 11) this spring indicated that 100% of the trees inspected in our three non-treated areas were positive for the larvae (Table 3). This is only the second time since our survey started in 1995 that we have seen caterpillars in all of our trees and it follows a spike in the number of moths (Figure 12) observed in our pheromone-baited traps. This year caterpillars were observed in many areas of the city that were previously negative for the pests, but their populations are still well below those observed in the late 1980s that defoliated many of our oak trees.

Figure 11. Buck Moth larvae. (*Hemiluca maia)*

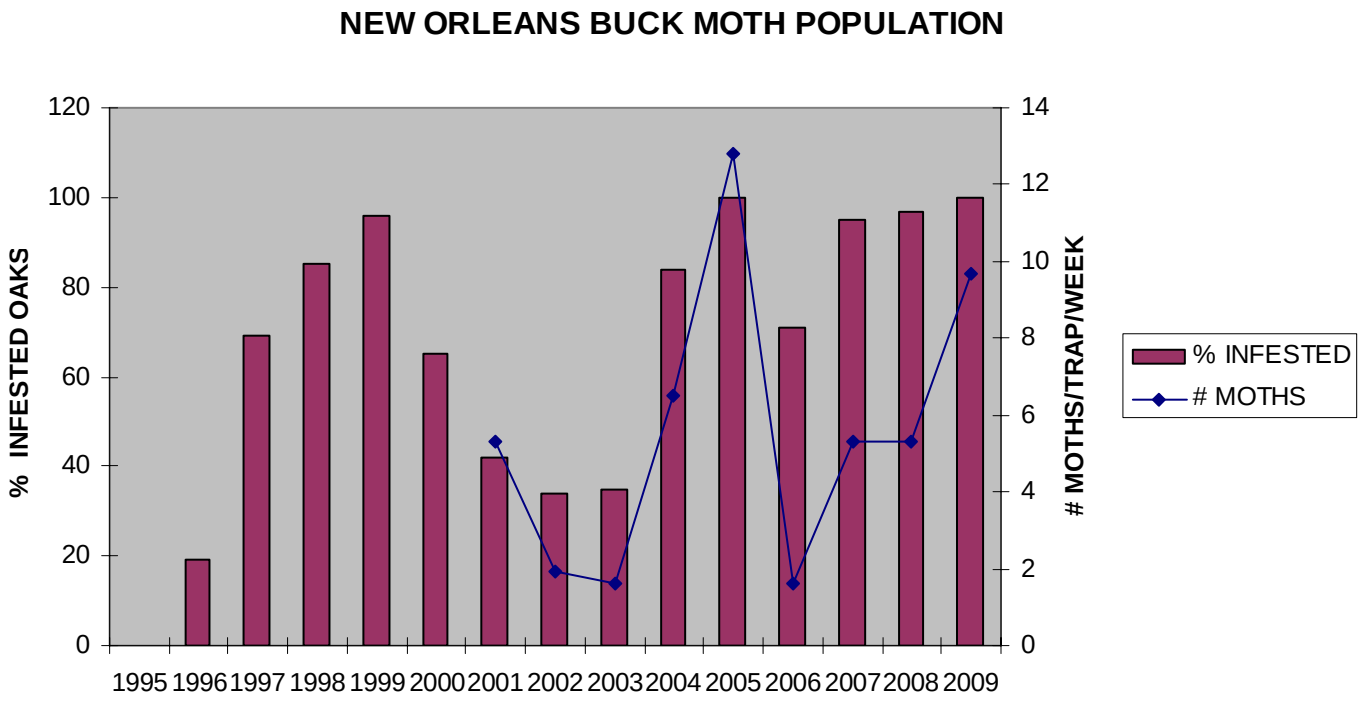

Table 3. 2009 is only the second year that 100% of observed trees have been infested with caterpillars.

Figure 12. Adult male (left) and female (right) buck moths, *Hemiluca maia.*

BIOLOGICAL CONTROL
GREG THOMPSON

Hurricane Katrina drove out the city's population and rendered much of New Orleans uninhabitable. One of the myriad problems left in the wake of the storm was the large number of abandoned swimming pools that, if not treated by mosquito control personnel, would create both a massive mosquito problem and a possible public health crisis (Figure 13). The NOMTCB continues to make progress on the largest mosquito related biological control project ever implemented by locating abandoned swimming pools and controlling mosquito breeding through the introduction of mosquito-eating fish (*Gambusia affinis*).

Figure 13. Swimming pools that are not cared for by their owners pose a possible public health crisis.

Staff had located slightly more than 6,100 pools as of January 1, 2009. This number has grown to 7,215 during 2009 (Figure 14). The sharp increase in total pools, located more than four years after the hurricane, is the result of access to aerial photographs that are superior to those previously available.

Aerial photographs of New Orleans were already being used to locate pools and were of great assistance in locating pools that were not visible from the street. However, awnings, pool covers and our city's wonderful live oaks obscured many pools from view. The hurricane destroyed awnings, removed pool covers and stripped leaves from those trees it did not uproot. Aerial photos taken post-hurricane have exposed many more backyard pools (Figure 15). We continue to locate additional pools each time new aerial photos of the city become available.

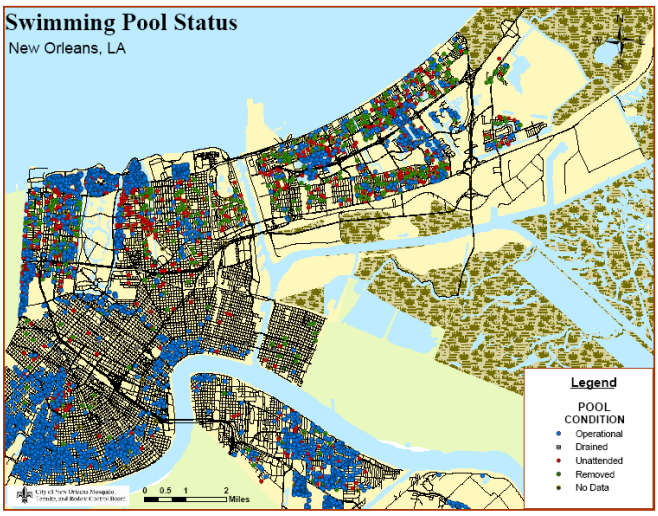

Figure 14. Mosquito Control has located 7,215 swimming pools in 2009.

Figure 15. Aerial photos of the city have help to locate many more swimming pools, that otherwise, may not have been found.

The percentage of the total number of pools that were now either being maintained by their owners or had been removed since our initial visit has grown to 85%. This is a smaller, but still significant, year-to-year increase in the percentage of pools that are no longer a threat to produce mosquitoes. Owners had removed or were now maintaining slightly less than 80% of the known pools in 2008.

This is great news in the sense that people continue to return to New Orleans. Unfortunately, this still leaves about 15% or 1,200 visited pools that will need once-a-year monitoring for the foreseeable future (Figure 16).

Figure 16. Pest Control Specialists, Mieu Nguyen and Cynthia Harrison inspect an abandoned pool.

We provided a list of unattended pools to a division of the city government that is citing and fining property owners for not maintaining or removing their pools. It was our belief that these legal actions would result in, at least, a large number of abandoned pools being filled in, but progress on code enforcement has been slow.

The NOMTCB and the city have been lucky in one way regarding these unattended pools. While awaiting our fish introductions, these unmaintained pools produced few mosquitoes during warm weather when the threat of mosquito-borne diseases is highest and produced their greatest numbers of mosquitoes after the weather has cooled and the threat of disease has lessened.

This pattern of high mosquito production during cooler weather may be the result of larvae-eating insect predators that have established themselves in these pools since the storm. A steep decline in insect predators in the winter probably permits more mosquitoes to develop into flying adults. Fish, when present, continue to consume and control mosquito larvae throughout the winter.

We concentrated our efforts on control rather than on research in the year after the disaster. However, we began research into the dynamics of the newly created pool ecosystems once the crisis had lessened (Figure 17). The staff involved in this project have needed to search their records and their memories to provide historical data for the planned publication of an article on how we got our mosquito-control-in-swimming-pools program up and running after the storm. It is the most sincere hope of all involved that one or more journal articles on the project will soon appear in print.

The lessons we have learned during this project seemed to have applicability to only rare large-scale natural disasters. Unfortunately, the bursting of the real estate bubble presented many cities with large numbers of abandoned homes and their hidden backyard swimming pools. Methods similar to ours will be required in these locations to reduce potential health risks to residents.

Figure 17. Research was initiated for a scientific publication about mosquito control in swimming pools.

AVIATION
BEN SMITH

Having come on board in March from the Pacific Northwest it has been quite interesting adjusting to life in the southeast. Just getting started, I attended Flying Tiger Aerial Applicator School in Rayville, LA. I completed the biannual flight review to become familiar with satellite spray systems and recurrent with aerial pesticide application.

The annual inspection was started early in the season because the inspection was due during the spray season. Upon the preliminary inspection of the Britten-Norman Islander, there were several areas of the aircraft inaccessible. Given the age of the aircraft and nature of the chemicals used, I elected to look into some of these areas which revealed extensive corrosion that needed to be remediated.

Due to the extent of the repairs needed, I attended the Britten-Norman factory maintenance school on the Isle of Wright in England in June (Figure 18). The school provided in-depth maintenance information which has been extremely valuable. The school complies with the Joint Aviation Authority (JAA) and the European Union (EU) training criteria for aircraft maintenance. The training covered the history of the company and the aircraft maintenance procedures. During my visit to Britten Norman I had the opportunity to do a little flying and take a pilot check ride in the same model aircraft as ours (Figure 19). During the check out, I was able to practice emergency procedures, engine shut down and air start procedures.

Figure 18. Britten-Norman factory maintenance school taken from the Bembridge Fort on the Isle of Wright.

Figure 19. A photo was taken during a practice flight.

Upon returning from England, I began the task of repairing the corrosion on the aircraft (Figure 20). The skins were removed from the fuel tank out board, (STA 180) to the wing tip and I rebuilt the outboard half of the right wing. The critical areas of the aircraft, as per the center section, control surfaces and all structural attach points were inspected very closely before beginning the repairs (Figure 21).

During this time LJ Kabel, Plant Maintenance Supervisor, along with several full-time employees and summer interns, did an excellent job of temporarily repairing the hanger from the damage done by Katrina. The storm surge from Lake Ponchartrain shredded the hanger walls, leaving it almost completely exposed to the elements. LJ and his crew patched the massive holes with corrugated sheet metal. It is a Band-aid until and new hangar can be built, but it has been a great help.

The annual inspection, airworthiness directives and all 337s and engineering was completed in September 2009. After the storm season, restoration will continue through the winter months. The spray system and tanks are currently undergoing a major rework**.**

Figure 20. Extensive corrosion was found in the Britten-Norman Islander spray aircraft.

Figure 21. The right wing of the Britten-Norman Islander after remediation of corrosion.

VECTOR/RODENT CONTROL
JOYCE BROWN

Service Requests

From January 2009 through December 2009, New Orleans Vector/Rodent Control Program received 1,567 service requests via e-mail, 311 and calls to the office. Of the 1,567 service requests, 63 (4%) were re-inspections. All requests were followed with inspections and treatments as needed. Rodent activity was present on 286 properties. During the year, rodent control used a total of 747 bait packs in rat burrows and treated a total of 9,914 storm drains throughout the city. Pest control literature, ant bait packages and verbal information were given to each resident that submitted a service request.

2009 Requests for Service by Month

MONTH	INITIAL INSPECTIONS	RE-INSPECTIONS	TOTAL
January	120	6	126
February	49	4	53
March	112	3	115
April	92	1	93
May	71	2	73
June	143	10	153
July	156	7	163
August	238	20	258
September	188	4	192
October	196	3	199
November	125	2	127
December	77	1	78
TOTAL	**1,567**	**63**	**1,630**

Special Assignment

In preparation for the Carnival season, rodent inspectors treated the neutral ground for fire ants from Tchoupitoulas St. and Napoleon Ave. to St. Charles Ave. to Lee Circle.

City property around the exterior of the 126 public and private schools were inspected for signs of rodent activity. The storm drains (2,114), which are City of New Orleans property, were baited for rodents.

Figure 22. Holes left in sheetrock at City of New Orleans public schools provide entry points for rodents.

Many more city facilities were included in the Intergraded Pest Management (IPM) program. Pest Control Inspectors, Timmy Madere and Ashley Freeman, have conducted the majority of the IPM inspections. It continues to be a struggle to change people's habits which lead to conducive rodent conditions. We have initiated talks with several schools about implementing an IPM program. There are many pest issues at New Orleans schools and these schools often have pest entry points (Figure 22).

The storm drains in the French Quarter were treated in February and in May this year. The February inspection and treatment included 659 storm drains. In May, summer interns assisted with storm drain treatment in the French Quarter and the Warehouse District and 555 storm drains were treated. Some drains were not accessible, some were broken, and some were clogged with debris.

Figure 23. Angelo Anderson treats a rodent burrow with tracking powder at the Audubon Zoo.

In the warehouse district, 1,353 storm drains were inspected and treated. The storm drains in this area had not been treated in over three years. There were several locations of elevated rodent activity and it was warranted to treat the area. Inspectors returned in 13 days to re-inspect and re-treat storm drains as needed.

The rodent division inspected and treated the Lakeview area and the Spring Lake area in New Orleans East. In Lakeview 295 storm drains were treated and in Spring Lake 103 storm drains were treated. These areas are treated at least once a year or as often as needed.

Our department has been assisting the zoo with rodent control. Areas of the Audubon Zoo were inspected and treated several times for rodent activity using Dictrac® tracking powder (Figure 23). Recommendations were made to the zoo staff about remediating conducive conditions.

City Facilities

City facilities are continuously being serviced for unwanted pests. Pest Control Inspectors always inspect the site first, take pictures, and evaluate the pest situation. A report is prepared and the staff at the site is educated about conducive conditions that lead to pest problems. If needed, treatment to control the pests is then applied. The sites that were treated include: NOPD stations, NOFD stations, City Hall, the day care center and senior citizen center in the Allie Mae Williams Complex, several multi-purpose centers, Criminal and Juvenile Court and many more.

Education

Rodent control inspectors attended the Greater New Orleans Pest Control Association/Re-certification in order to fulfill their yearly license requirements. The inspectors also attended the Pest Control Academy and Termite Academy which helped them increase their knowledge in pest control work.

Monthly Inspections

Rodent Control inspectors continue to inspect and treat 20 city sites once a month or as much as needed (Figure 24). These buildings include: City Hall, Juvenile Court, State Building, NO Public Library, Tulane, Charity, and University Hospital, Edna Pilsbury Clinic, Lafayette Square, Lee Circle, Union Passenger Station, Louis Armstrong Park, Treme Center, City Park, (Amusement Park, Greenhouse Garden), New Orleans Police Headquarters, Moonwalk, Café Du Monde, Woldenburg Park, Artillery Park and Property Management Building. Bait stations are placed at certain sites for public safety reasons (City Hall, Juvenile Court, and New Orleans Public Library). The bait stations are checked and re-treated every month if needed. Of the sites above, Louis Armstrong Park, The Union Passenger Station, Lee Circle, Lafayette Square, and Property Management building have shown a decrease in rodent burrows. The other sites continue to be treated and the rodent populations at those sites are under control. The storm drains at each site are treated as needed.

Figure 24. Clutter is a major contributor to pest problems.

TERMITE ENTOMOLOGY
ED FREYTAG

Computers and other Electronics
Internet service was finally implemented at the Biocontrol laboratory in New Orleans East, the USDA facility in City Park and the offices at the regional airport. The fiber optic system that the city uses for all of its satellite offices was only possible to tap into at the Biolab, so we had to contract with AT&T for a DSL line at the regional airport offices and with Cox cable for the office and laboratory at the USDA facility.

Frank DiGiovanni (Figure 25) was hired in early 2009 to manage all computer-related issues. Due to space restraints, a storage room was converted to an office in the USDA building laboratory. He has been working on maintaining and repairing computers, and has spent countless hours fighting an especially nasty system hijacker program that has infested several computers. His most important assignment and accomplishment has been the designing, construction and implementation of a website for our department. The website will include mosquito, termite and rodent information, as well as information on other nuisance pests. The website will be posted by an independent web host company in order to meet our special needs for information acquisition and dissemination

Figure 25. Frank DiGiovanni joined NOMTCB in February and has been an essential addition to the team.

New laptops and computers were purchased to replace older models that are no longer under warranty. The process of transferring the data and settings from one computer to another is very labor intensive, so a software program was purchased to make the process easier and more efficient. Several new laptops have been assigned and the old ones will have the hard drives formatted, software installed and either reassigned to new personnel, or if damaged, permanently removed from service because they are not economically feasible to repair.

Inspections
I assisted in many inspections of buildings in the French Quarter that required special attention in determining if roof repairs had solved moisture problems. I prefer using the infrared camera because moisture is straightforward to identify as it has unique patterns in the ceilings and walls. We may not always detect termites with the infrared camera, but moisture problems can always be confirmed using the moisture meter. It is more difficult to confirm the presence of termites with the acoustic device (detects sound), the Videoprobe (visual identification) or the Pestfinder (detects movement).

I helped our pilot, Ben Smith, operate the Videoprobe to locate and assess the extent of damage due to corrosion in inaccessible areas of the airplane wings of the Britten-Norman Islander. The Videoprobe is a great tool for inspecting inside airplane structures without having to make large openings to gain access. Ben ultimately had to remove large sections of wing skin of the airplane to repair and replace many stringers that were damaged.

Research projects
Two studies were initiated and completed for BASF (formerly Whitmire Micro-Gen). The projects involved both field and laboratory choice tests. A final report has been submitted for review

before we send it to BASF along with the original data book. An additional field study involving in ground bait stations is still ongoing (Figure 26).

We also had a BASF quality assurance review of the progress of the Advance bait system field study. We made two certified copies of the original data book and shipped the original data to Dr. Jim Cink in St. Louis, MO. A progress report was submitted but a final report will not be written until 2010.

Twenty-three trees on Esplanade Ave. (from Rampart St. to North Johnson St.) have been periodically inspected for the presence of FST in the monitoring stations installed around the base of the trees. The last inspection in October revealed that only five trees had activity in the stations. Five one-gallon buckets were installed to monitor termite activity outside the trees and to collect samples for DNA analysis. The trees will be treated in 2010 with a foam solution containing spores from Dr. Maureen Wright's (USDA microbiologist) lab. We were not able to treat any of the trees this year because the protocol requires that the monitoring buckets have termite activity prior to treatment.

Figure 26. Barry Yokum inspects a research site for termite activity.

Three pilot test boxes were installed for Michigan Tech. Institute at the Audubon Zoo (Figure 27). The FST activity was extremely high two months after installation and pictures of damage to the wood blocks were sent to Dr. Glen Larkin for review. Dr. Larkin flew to New Orleans in October to review the pilot test boxes and also to look at the sites in Lower Coast Algiers. A large scale study should be in place for 2010.

Figure 27. FST damage to wood blocks in a pilot test box.

Talks & Meetings

I joined the Institutional Animal Care and Use Committee (IACUC) at the University of New Orleans in January as a Community Member. We meet on Tuesdays twice monthly to review and approve animal research protocols and discuss rules and regulations.

February 19, 2009. Biocontrol Laboratory, New Orleans. Dr. Dawn Wesson's undergraduate medical class from Tulane University. Presented "Africanized Honey Bees."

March 13, 2009. I Attended and participated in the USDA Technical Committee meeting.

March 25, 2009. Attended with Frank DiGiovanni a half-day seminar and equipment showcase sponsored by Creative Presentations at the Best Western Landmark Hotel in Metairie.

April 4-9, 2009. Volunteered (with Frank DiGiovanni) to organize and update PowerPoint presentations in the computers and as projectionist under the supervision of Salvador Rico for the AMCA Annual meeting in New Orleans at the Hilton Riverside hotel. I also assisted with the NOMTCB display during the field day held at the St. Tammany Mosquito Control headquarters.

April 15, 2009. Harahan, Jefferson Parish. GNOPCA Technical Recertification. I Presented "What is Your Termite Biology IQ?"

April 23 and 24, 2009. I Attended the IACUC two-day training and certification workshop at the Georgetown University Hotel and Conference Center in Washington, DC.

July 14, 2009. Presbytere Museum, New Orleans. Training for pesticide regulators. I participated in walking tours of termite control history of the Upper Pontalba and Jackson Square. I also set up the audio-visual equipment in the third floor of the Presbytere Museum.

Photography

I have been exploring the capabilities and limitations of the Visionary Digital photographic microscope that we purchased this year (Figure 28). When used properly, it will produce close-up photographs with amazing clarity and depth of field. One of the main limitations is that the specimen must not move during the shooting process. Although the flash duration of the strobes (typically 1/1000 to 1/4000 of second) will freeze practically all movements, the specimen must remain static while I take several shots and at the same time varying the focus point. This allows the software to "stitch" together the shots into a single image with the subject in perfect focus. Otherwise, if movement is present in any axis, the software will create or remove artifacts (also known as halos) on the subject. There are also limitations in the lenses themselves. In order to get more depth of field (more of the subject in focus) by selecting a smaller aperture (larger F number), the resolution drops below its peak resolution. All lenses have a "sweet" spot where at a given magnification the pictures appear the sharpest. For most of the larger insects using the 100mm close-up lens, I have found, by trial and error, that an aperture smaller than F12 (F stop number larger that 12) results in loss of resolution. In order to get more of the subject in focus, I would have to place the subject farther away from the lens which results in too much pixelation (increased pixel size) when the image is zoomed in. The Infinity K2 long distance microscope also has an iris, but it is not a true aperture. For most close-up photography with the objectives CF2 and CF3, I shoot the images at an iris position of 5 as recommended by the manufacturer.

Figure 28. Ed Freytag sets up the fiber optic flashes of the Visionary Digital microscope.

No photographic system is perfect, but as far as picture quality, I find that this system exceeds my expectations. I am in constant communication with Roy Larimer, the inventor and owner of Visionary Digital, and find that he is always eager to listen to new ideas and modifications that will make the system better and easier to use. I have already suggested, to Roy, several modifications for making photography of live specimens more practical. Following are some of the better pictures of live specimens I have captured with the Visionary Digital system (Figures 29 and 30).

Figure 29. Polyphemus moth caterpillar captured with Canon 40D camera and 100 mm lens at F14, two strobe lights reflected off silver umbrellas. Caterpillar is approx. three inches in length.

Figure 30. Recently-hatched first instar bed bug and eggs captured with Canon 40D camera and Infinity K2 long distance microscope with CF3 objective. Bed bug is approximately 1.5 mm in length.

TERMITES

KENNETH S. BROWN, Ph.D. and CARRIE OWENS

Introduction

Two thousand and nine was another extremely productive year for the termite division. The accomplishments highlighted in this report are the sum of the efforts of the entire termite division staff: Ed Freytag (Research Entomologist), Carrie Owens (Entomologist), Barry Yokum (Lab Specialist), Perry Ponseti (Pest Control Specialist), Barry Lyons (Pest Control Inspector), Jamie Ward (Pest Control Inspector), Eric Guidry (Pest Control Inspector), and Timmy Madere (Pest Control Inspector). This group represents one of the most well-trained and highly skilled termite management and research units in the U.S. and continues to be recognized by industry personnel and cooperators for their efforts.

We would also like to recognize Frank DiGiovanni, Mark Mitchell, and Lee Attaway who are new to our group in 2009. Frank was hired as a Pest Control Inspector II in February. He came to our group with an extensive information technology background to which he is quickly adding pest biology and management experience. He has done a great job redesigning the departmental website (www.nomtcb.com; Figure 31) and keeping the department's computers up and running. Mark returned for a second year as a summer intern and has stayed on with the termite division. Mark has worked diligently mapping operational data and has been instrumental in moving our group forward with regard to GIS technology and toward a paperless workflow. Finally, although Lee Attaway is not officially a City of New Orleans employee any more, he is very much a part of our organization. Lee has done an outstanding job preparing and executing a laboratory study which will provide valuable information on the transferability and subsequently, efficacy of many of the most commonly used termiticides.

We would like to highlight and encourage our termite personnel who are currently pursuing bachelors, masters and doctoral degree programs. Eric Guidry continues to make progress towards his B.S. in biology at the University of New Orleans (UNO). Lee Attaway and Mark Mitchell are both working on M.S. degrees through UNO. Also, congratulations are in order to Carrie Owens who successfully passed her written and oral qualifying exams in 2009. These accomplishments now qualify her as a Ph.D. candidate through the University of Florida's distance education program. Congratulations Carrie!

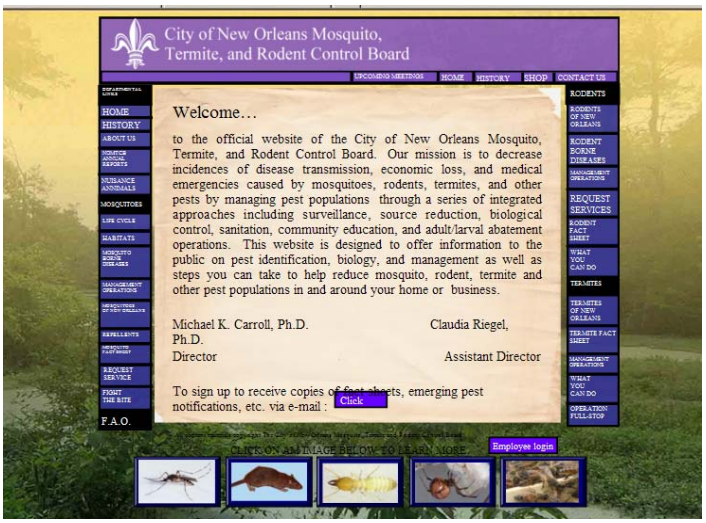

Figure 31. Redesigned NOMTCB website. (www.nomtcb.com)

Historic and City Owned Properties

The termite division continues to monitor for termite activity at multiple historic and city owned properties. Our inspectors do an outstanding job conducting monthly evaluations of in-ground stations at these locations. Sites with active termite infestations that were remediated in 2009 include oak trees along the Esplanade Ave. neutral ground from the river to N. Rampart St., the Louisiana Supreme Court Building (400 Royal St.), the riverfront railroad and planters from Governor Nichols Wharf to Canal St., the Cabildo (701 Chartres St.), trees within Jackson Square, Madam John's Legacy Museum (632 Dumaine St.), Bella Luna restaurant (333 Saint Joseph St.), the French Market (from

Barracks to Dumaine), the Lower Pontalba Apartments (500 block of Saint Ann St.), the Decatur Fire Station (317 Decatur St.), Perseverance Hall (Louis Armstrong Park), Milne Boys Home (5420 Franklin Ave.), Algiers Regional Library (3014 Holiday Dr.), the Old Algiers Courthouse (225 Morgan St.), Milton H. Latter Memorial Library (5120 St. Charles Ave.), Gallier Hall (545 St. Charles St.), the Historic District Landmarks Commission (830 Julia St.), the Orleans Parish Criminal District Courthouse (2700 Tulane Ave.), the Sydney and Walda Besthoff Sculpture Garden (1 Collins Diboll Cir.), the Malus-Beauregard House at the Chalmette battlefield (8606 W. St. Bernard Hwy.), and the Enrique Alferez Oak and Peggy Read Oak in the New Orleans Botanical Garden. These efforts save some of the most historic and storied structures and trees in the U.S. from structural damage and save the city thousands of dollars annually in remediation costs.

An historic structure that did not become active with termites this year but serves as an example of considerable savings to the city is the Cita Dennis Hubbell Branch of the New Orleans Public Library (725 Pelican St.). This structure has considerable termite damage in the attic area resulting from an infestation remediated by NOMTCB personnel in 2005 (Figure 32). The library has remained on our list of structures routinely monitored for subsequent termite activity. The most recent termite activity was identified and eliminated in September of 2007. In July, an inspection of the building conducted by a local pest control operator contracted by MWH indicated live Formosan subterranean termite activity in the crawl space as well as drywood termite activity in the attic and crawl. The costs for the recommended treatment of a liquid termiticide application and structural fumigation totaled over $12,000. A follow-up inspection of the entire building was conducted by NOMTCB inspectors with careful attention paid to the areas in question. The inspection confirmed the areas of previous damage but identified no areas with active Formosan termites and no evidence of current or previous drywood termite activity. This example saved the city the substantial cost of unnecessary termite treatments.

Figure 32. Extensive structural damage to attic area of the Cita Dennis Hubbel Branch of the New Orleans Public Library remaining from a termite infestation remediated in 2005.

Multiple additional city owned and historic buildings, trees, and green spaces, that did not become active with termites in 2009, continue to be monitored and routinely inspected by our group. Protecting these structures/trees remains a top priority for our division.

Operational Research

The termite division continues to conduct multiple operational research projects. The goals are to gain a better understanding of pest organism biology and treatment and detection tool efficacies, monitor for introduced pest of urban/medical importance, and monitor populations of established pest species. Information gained from these studies allows us to more effectively manage pest populations and provide accurate and up to date information to the public regarding pest populations, and garners recognition for our organization as leaders in the area of urban pests. The following sections provide examples of some of our operational research efforts.

FST Colony Survival and Movement During Inundation

To determine FST colony movement and possible survival mechanisms during inundation, in-ground monitoring stations are being serviced monthly at two sites that flood annually. These sites are located along the Mississippi river batture, between the river and the levee. One site is near the Endymion Den and contains five infested black

willow (*Salix nigra*) trees (Figure 33). The other is located adjacent to the Gretna-Jackson Ave. Ferry landing and contains one infested black willow tree. The monitoring stations have been established in a grid (3m centers) extending from the edge of the river to the toe of the levee and 9m beyond the infested trees along the length of the batture.

Figure 33. Carrie Owens (left) and Ed Freytag (right) view termite activity within an infested black willow on the Mississippi River batture.

Three control sites, which do not flood annually, are also being evaluated monthly. These include an infested hackberry (*Celtis occidentalis*) tree located at the corner of Downman Rd. and Hayne Blvd., an infested live oak (*Quercus virginiana*) tree located at the corner of Lakeshore Dr. and Beauregard Ave., and an infested live oak tree adjacent to Popps Fountain in City Park.

HOBO data loggers (Onset Computer Corporation, Bourne, MA) were installed on each infested tree. Each data logger contains three sensors which record temperature and relative humidity. These sensors were installed within the tree at predetermined locations of increasing height. This data was recorded throughout this year's flood season (March-June). The data loggers show that the humidity ranged between 65% and 100%, and the temperature ranged from 55°C and 65°C. This indicates that though the relative humidity fluctuated, the internal temperature of the inundated trees remained stable. Stable temperatures indicate a lack of movement of termites within inundated trees. An increase in temperature would indicate an increase in termite activity, while a sharp decrease in temperature would most likely be caused by flood water filling voids in trees.

No termite activity has been observed in any monitoring stations on the flooded side of the levee. However, foraging activity has been observed in six out of 29 (20%) in-ground monitoring stations on the protected side of the levee. At the site located on the corner of Downman Rd. and Hayne Blvd., 23 out of 50 (46%) in-ground monitoring stations have consistently had termite foraging activity. Three out of 54 (5%) of in-ground monitoring stations at the site located on the corner of Lakeshore Dr. and Beauregard Ave. have routinely had termite foraging activity. At the third control site in City Park adjacent to Popps Fountain, termite foraging activity has been noted in 18 out of 49 (37%) monitoring stations. At these study locations, there is an increased level of detectable termite foraging in soils surrounding infested trees in non-flooded areas when compared with flooded areas, where no soil activity has been observed.

Consumption rates are also being calculated for this study. Cellulose consumption is being used as an indication of relative termite foraging activity. To determine consumption rates, the dry weight of each cellulose resource placed in the in-ground monitoring stations is recorded prior to its placement in the station. When feeding is observed at monthly inspections, the cellulose resource is replaced and transported to the laboratory. In the laboratory, the cellulose resource that has been fed upon is dried in a Binder FED720 drying oven (Binder, Tuttlingen, Germany) at 103°C for 24 hours and weighed to determine the amount of wood consumed.

At the river batture site on the protected side of the levee, an average of 8% of the cellulose resource from each monitoring station containing foraging termites was consumed on a monthly basis. At the control site located on the corner of Lakeshore Dr. and Beauregard Ave., an average of 25% of the cellulose resource was consumed monthly. At the

control site located in City Park, an average of 8% of the cellulose resource was consumed. At the control site located on the corner of Downman Rd. and Hayne Blvd., the average amount of cellulose consumed was 16%. Again, no termite activity was noted in the ground stations surrounding the trees on the unprotected side of the levee.

Results of termite foraging activity and cellulose consumption within monitoring stations at all study sites, indicate that termites infesting trees that experience seasonal inundation have smaller foraging areas than termites infesting tress that do not experience seasonal inundation. This may be strictly due to flood waters restricting the termites' movement. It may also be a behavioral modification that has become a survival mechanism for termite colonies. Further research to determine survival mechanisms of termite colonies during inundation is scheduled to be initiated this spring. Elucidation of termite survival mechanisms may reveal avenues that can be exploited for their control.

Louis Armstrong Park

Louis Armstrong Park has historically served as a model of an area-wide termite management program such as the USDA-ARS led Operation Full Stop Program. Colonies within the park have been monitored before, during, and following area-wide treatment. The park has also served as a model for what may happen if such a program is suddenly stopped. Over the past seven years, termite activity as steadily returned to the park and is now at pre-treatment thresholds. This is the only data available on reinvasion of Formosan termite colonies in an urban area following area-wide management. The following paragraphs illustrate an example of some of the information to be gained from such a unique study.

Renovations within Louis Armstrong Park (Figure 34) that had commenced in 2008 were completed in February of this year. During monthly inspections, it was observed that foraging termites were located in monitoring stations that had not been previously exploited, while foraging ceased in some monitoring stations that had previously been occupied.

Figure 34. Renovations within Louis Armstrong Park included newly planted trees (top left), repaving of parking lots (top right), and extensive soil excavation

During periods of little to no disturbance (i.e. construction), large stable colonies with relatively static foraging territories had infested the park (Figure 35). This became the model of termite colonies in undisturbed areas (Messenger 2003, Messenger and Su 2005, Husseneder et al. 2005).

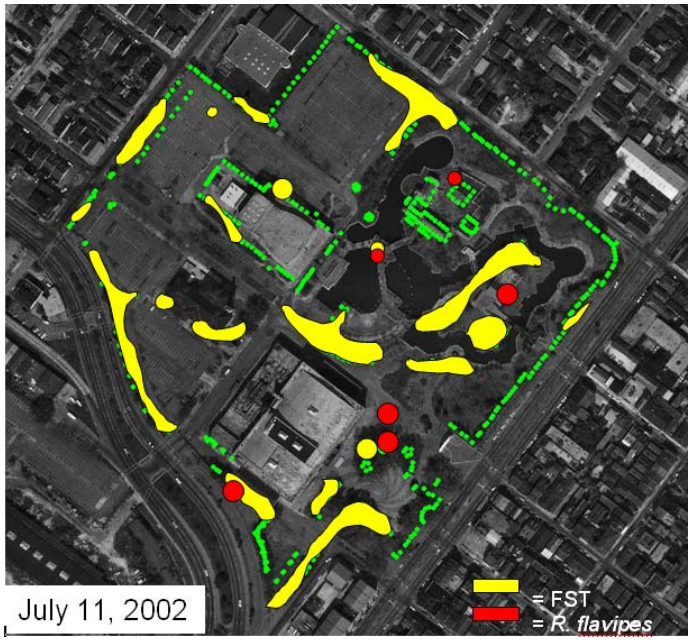

Figure 35. Aerial view of Louis Armstrong Park showing large, stable foraging territories of colonies delineated during a period of little to no disturbance.

To determine the effects of this construction on FST colonies infesting the park, microsatellite genotyping was conducted on samples collected during March 2008, before construction began, and those collected during April 2009, after construction was completed. Microsatellite genotyping detects sufficient variation of alleles to delineate colonies and determine the breeding structure of each colony. Colonies may either be a simple family colony, headed by a single pair of reproductives, or an extended family colony, headed by multiple breeding pairs. Historically, it was determined that simple family colonies are readily displaced in disturbed areas (Aluko and Husseneder 2007) and extended family colonies readily move into monitoring stations that had been previously occupied (Husseneder et al. 2007).

Colonies in Louis Armstrong Park were delineated by perfoming log likelihood G-statistics (Fstat, Goudet 2001). The breeding structure of each colony was then determined based on the genotypic frequencies of each colony (Vargo et al. 2003). Detected colonies in the park during March 2008 consisted of 18 FST colonies and two *Reticulitermes flavipes* colonies (Figure 36). Of the 18 FST colonies, eight were simple family colonies and 10 were extended family colonies. The two *Reticulitermes flavipes* colonies located in the park were extended family colonies.

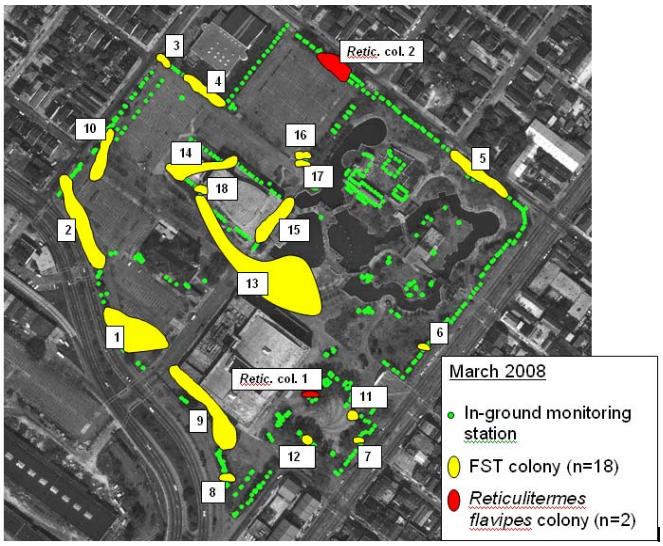

Figure 36. Aerial view of Louis Armstrong Park showing foraging territories of termite colonies delineated in March 2008.

Colonies detected during April 2009 consisted of 14 FST colonies and one *Reticulitermes flavipes* colony (Figure 37). Of the 14 FST colonies, six were simple family colonies, and eight were extended family colonies. The *Reticulitermes flavipes* colony was an extended family colony. Two simple family colonies and two extended family colonies that were not previously detected in the park were discovered in monitoring stations after construction.

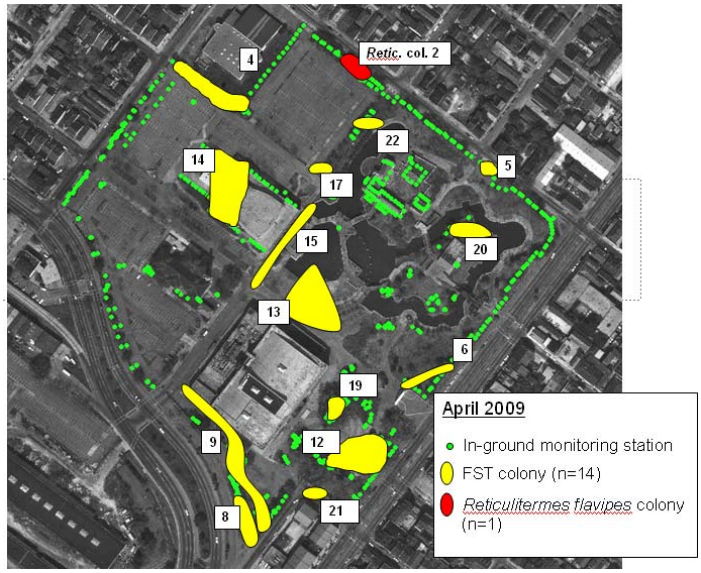

Figure 37. Aerial view of Louis Armstrong Park showing foraging territories of termite colonies delineated in April 2009.

There was movement of both simple family colonies and extended family colonies in the park after construction. Construction had an impact on previously undisturbed colonies in the park. The termite colonies were more representative of colonies located in urban environments, where treatment and construction are common, and termite colony movement is frequent. The colony movement after construction was independent of breeding structure, for both simple and extended family colonies exhibited increases and decreases in foraging territories.

Future research will evaluate relatedness among colonies to determine the origin of previously undetected colonies, determine if colony budding occurred during construction, and determine if colo-

nies along the perimeter of the park were eliminated due to treatment of structures and trees located in close proximity of the park. With the termite activity in the park at pre-treatment levels, a second area-wide elimination has been planned for spring of 2010.

Statewide Formosan Termite Survey

Formosan subterranean termites were collected from three "new" parishes during the 2009 statewide survey. Each spring, just prior to the FST reproductive flight season, light traps and sticky traps are deployed in areas of the state which have not previously had confirmed FST populations. These efforts are a formalized element of our research agreements with the USDA-ARS and have resulted in an average of 4 to 5 additional published parish records being added each year since 2006. This year's survey focused on the three remaining parishes in the southern half of the state which, until this year, had not had confirmed populations; West Feliciana, East Feliciana, and St. Helena. Monitoring devices were also deployed in parishes surrounding Ouchita Parish (Monroe, LA has an established FST population) as well as Caddo and Natchitoches parishes. During the survey, FST collections were made from the three Florida parishes (Figure 38).

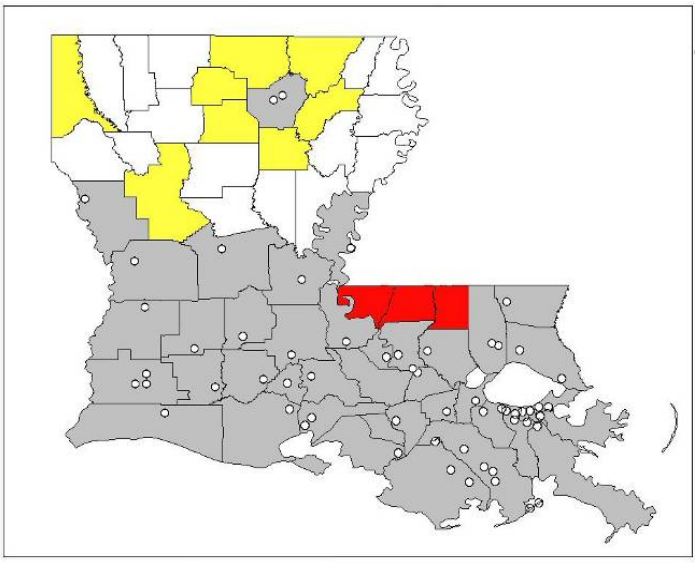

Figure 38. Current survey map of Louisiana. Dots indicate locations of previous FST collections. Parish shading indicates previously documented populations (grey), new records for 2009 (red), and locations of 2009 monitoring devices (yellow).

This survey effort has become increasingly vital as budget constraints within the Louisiana Department of Agriculture and Forestry (LDAF) caused the Office of Agricultural and Environmental Sciences to discontinue their Formosan subterranean termite surveillance program. The closure prompted the director of the LDAF Pesticide and Environmental Programs Division, Larry LeJune, to request that LDAF personnel around the state inform pest control operators in their districts of NOMTCB's interest in suspected FST introductions. This continued cooperation between the LDAF, LSU Ag. Center, USDA-ARS as well as pest control operators and mosquito control districts throughout the state is vital to homeowners and business owners throughout Louisiana as well as neighboring states.

Termiticide transferability

Lee Attaway, a 2009 NOMTCB summer intern, initiated a project which is designed to evaluate the transferability of novel and commercially available termiticides in 2-D extended foraging arenas (Figure 39). Lee has continued this work as an employee of the USDA-ARS and plans to incorporate the study into his master's thesis. Termiticide transferability is quantified in these 2-D arenas by evaluating mortality in relation to the treatment zone. The transferability of these compounds is important in understanding the extent to which a termiticide can impact the termite colony as termites tend to avoid dead/diseased nestmates. The more a compound can be sufficiently passed between nestmates prior to causing morbidity/moribundity, the greater the possibility of affecting the entire colony. Such data can be used to evaluate existing and novel compounds for use in population management programs.

The bioassay portion of the initial set of compounds has recently been completed. The final mortality data has been collected and the data is now being gathered from still images taken during the study. There has already been much interest from USDA-ARS collaborators as well as industry scientists in testing compounds in these extended foraging arenas. Current plans include testing commercially

Figure 39. 2-D foraging arena used to evaluate termiticide transferability/efficacy.

available termite baits and non-repellants, formulations of entomopathogenic fungi, as well as novel compounds.

Rodent bait station design

Our lab has served a role in the development of a unique rodent bait station which has the potential to be used to answer some important operational questions. The design and development has been the project of Ashley Freeman, Pest Control Inspector, with the assistance of L.J. Kabel, Timmy Madere, and Wayne Arceneaux. A vast majority of commercially available rodent bait stations are designed to be placed at ground level, commonly around the perimeter of a structure. The roof rat (*Rattus rattus*) almost exclusively nests and forages above ground, in trees, vines, and rooftops. The design of this "new" station provides a much greater flexibility in station placement. The design also incorporates a novel method for evaluating rodent station visits. This may facilitate the development of a rodent population index. Such indicators of rodent populations are currently woefully lacking.

The termite division continues to pursue multiple additional research possibilities with promise to answer operational questions. We have been talking to the manufacturers of a storm-drain rat "excluder," the developer of a novel landscape fabric which inhibits rodent burrowing, as well as a variety of products for other common urban pests.

Industry-Supported Research

Our division installs, monitors, and reports results of multiple industry supported research projects each year. Many of these projects involve novel termiticide chemistries and/or formulations. This type of research provides the opportunity to evaluate new products against FST populations in New Orleans and allows NOMTCB personnel to have first-hand experience with the latest products on the urban pest market. The trials also allow our group to effectively treat city owned and historic properties throughout the city at no cost.

For example, the U.S. Customs House (423 Canal St.), built in 1881, is a National Historic Landmark and is now home to the Audubon Insectarium. The building had a significant termite infestation which was recognized by Audubon staff during the termite swarm season this spring. Luckily, the site fit one of our industry-supported research protocols. We are happy to report that the infestation within the building has been eliminated. Several additional Audubon, historic, and city owned properties were also successfully treated in 2009 under similar research protocols.

We also developed a collaborative relationship with wood preservative specialists from Michigan Technological University in 2009. Drs. Glen Larkin and Peter Laks have done considerable work with the American Wood Protection Association (AWPA). In 2009, we had the opportunity to get involved in some of this work by conducting a preliminary field trial. Drs. Larkin and Laks were also kind enough to visit and provide talks at our 2009 Termite Control Academy in October. We are now in the process of identifying locations to be used for long-term wood preservative field trials. This collaborative work will, again, give our group first-hand knowledge with wood preservative products that perform best against FST and hold up in our warm, humid climate.

Our primary cooperators largely remained the same in 2009 with the exception of Whitmire MicroGen which was purchased by BASF in the first quarter of the year. We continue to evaluate field projects under agreements with FMC and Dow AgroSciences. Not surprisingly, we have had a considerable jump in the number of termite projects supported by BASF scheduled for 2010. We have also received support from BASF to conduct rodent related projects in the coming year.

Operation Full Stop

The termite division was again a vital cooperator in the USDA-ARS led Operation Full Stop program. Our organization monitors for termite activity at a considerable number of sites within the French Quarter (Figure 40). Each site is regularly evaluated and termite activity, when found, is eliminated. These activities reduce the overall termite pressure in the French Quarter, a primary goal of the area-wide program.

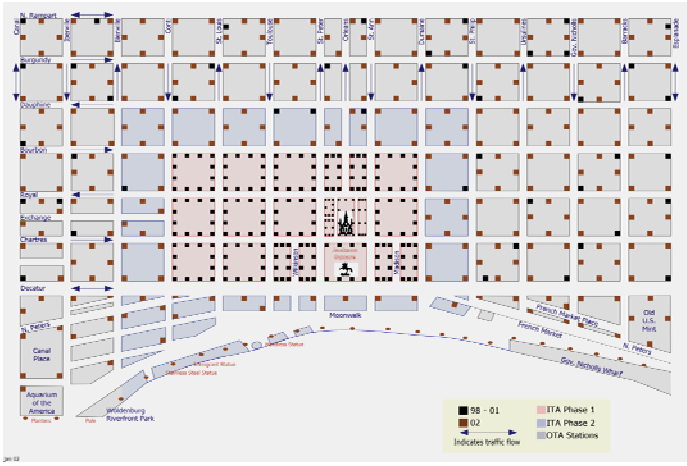

Figure 40. French Quarter map showing areas monitored by NOMCTB personnel (red polygons)

The approx. 600 in-ground monitoring stations associated with the program are monitored monthly by USDA and LSU personnel. Barry Yokum, Lab Specialist I, facilitates these evaluations by coordinating the use of the monitoring equipment and managing the upload of the data into the PestPac (site activity databasing) system. Barry plays a critical role in the program and does an excellent job ensuring the data accuracy.

The termite division performs many additional key functions that contribute to the overall success of the program. This year was the third year light traps, designed in our lab, were deployed throughout the French Quarter to collect winged reproductives. The specimens collected in the traps provide valuable information regarding the number of colonies in a given area and how often each colony contributes to a swarm. Perry Ponseti with the help of Timmy Madere, Eric Guidry, and others, conduct regular termite inspections of French Quarter properties. When termites are found, we are often asked to provide input on remediation efforts. The termite division also continues to monitor alate sticky traps located along the riverfront. The data gained from the traps is used to evaluate the overall success of the program.

Database and Archiving

A total of 8,457 termite samples, 416 mosquito samples, and 21 honey bee samples are currently archived and entered into the NOMTCB database. Carrie continues to archive field-collected samples submitted by NOMTCB, USDA, and LSU personnel. All samples are stored at the NOMTCB Biolab facility. This system facilitates searching and locating samples for identification and genetic studies, and therefore continues to be of value to NOMTCB and our collaborators.

Honey Bee Diagnostics

In recent years, multiple introductions of Africanized honey bees (AHB) into the New Orleans area have been confirmed by the Louisiana Department of Agriculture and Forestry (LDAF). However, Africanized genes have not been confirmed in local bee populations. Budget constraints caused the LDAF to discontinue its AHB monitoring program in 2009. This coupled with several stinging incidents, including an incident in which a colony of bees in the French Quarter was reported to be Africanized on the local news, has increased the need for our lab to monitor for AHB populations in the Greater New Orleans area.

Honey bee diagnostic testing is currently being conducted at the NOMTCB Biolab facility. This testing determines whether honey bee samples caught in the field are European or Africanized. Because of the medical significance of Africanized honey bees and growing public concern of their possible presence in the New Orleans metro area, this testing is of great value. Diagnostic testing involves DNA extractions, PCR using specific primers to detect alterations in the mitochondrial DNA cytochrome B gene found in Africanized honey bees, and running samples on an agarose gel. Using molecular methods, results can be obtained within two days of receiving samples.

Trap-Jaw Ants

Also of note in 2009 is the identification of multiple colonies of the trap-jaw ants (*Odontomachus haematodus*) on the grounds of the Audubon Zoo (Figure 41). This ant is an aggressive predator possessing the fastest bite in the animal kingdom. The first record of this species in Louisiana is from a collection made at the Zoo by Aaron Mullins (then an NOMTCB entomologist) in 2001. At that time, the colony was excavated and has been maintained at the Audubon Insect Rearing Facility. This year five additional colonies have been identified on the Zoo's campus (Figure 42). Our division is working with Dr. Linda Hooper-Bui, an entomologist with LSU's Ag. Center and ant expert, to survey the area and develop a management strategy.

Figure 41. Trap-jaw ant (*Odontomachus haematodus*) colonies have been identified on the grounds of the Audubon Zoo.

Figure 42. NOMTCB personnel and students from LSU and the University of Illinois excavate a trap-jaw ant colony at the Audubon Zoo.

Extension, Technology Transfer and Education

This year was another busy year for our division in the area of extension and education. In April, our group had the opportunity to be involved in the hosting of the 75th Annual Meeting of the American Mosquito Control Association. We not only benefited from the excellent program but also gained experience with the logistics of hosting a meeting of this size. Later that month, we held the first annual City of New Orleans (CNO) and Greater New Orleans Pest Control Association (GNOPCA) Termite Academy Recertification. This one day recertification included identification laboratories, in-class demonstrations, and a variety of presentations related to urban pests, the label, and safety. The second annual CNO and GNOPCA Pest Control and Termite Academies were held in October and November respectively. The academies were again a tremendous success. We again had participants from neighboring states prompting discussions on the possibility of having the Academies approved for regional training for certification.

Extension, Technology Transfer and Education

Other extension and education opportunities included a visit from Drs. Anne-Genevieve Bagneres of the Institut de Recherche sur la Biologie de l'Insecte, University of Tours, France, Ed Vargo of North Carolina State University, and Claudia Husseneder of Louisiana State University. Our inspectors assisted these visiting scientists in collecting samples of *Reticulitermes flavipes* (Kollar), the most common of our native subterranean termites, from multiple sites in the Greater New Orleans area. The specimens will be used for an ongoing project focused on the patterns of introduction of this genus throughout Europe.

We, again, hired a great group of summer interns who gained experience in a wide variety of laboratory and field techniques related to urban pest management. Carrie Owens successfully trained two summer interns this year on DNA extractions, polymerase chain reaction (PCR), and sample archiving. Summer interns were also trained in field operations and assisted in compiling the NOMTCB historical scrapbook. Perry Ponseti does and excellent job working with the interns to ensure that the experience benefits NOMTCB and provides each intern with valuable training.

We also had the opportunity to provide talks and walking tours for representatives from the Environmental Protection Agency, National Pest Management Association, Louisiana Department of Agriculture and Forestry and the USDA Agricultural Marketing Service's Pesticide Records Branch. The information provided during these tours gives decision makers from across the country a first-hand look at the unmatched termite pressure in the city of New Orleans and the challenges associated with Formosan termite management.

In February, our department was again asked to provide talks for the graduate medical entomology course in the Department of Environmental Health Sciences of the School of Public Health and Tropical Medicine at Tulane University. Ed Freytag and Ken Brown provided several talks on topics such as fleas, rats and public health, cockroaches and bedbugs, Africanized honeybees, and local spiders of medical importance.

Apart from these activities, our lab continues to serve our local pest control industry by identifying specimens, providing talks at recertifications and assisting with challenging urban pest management situations. The following is a comprehensive list of the scientific and extension publications and presentations members of NOMTCB participated in this year:

Workshops

Several members of the termite division participated in an Adobe Photoshop training workshop in February. Lisa Roussel of Romaguera Photography provided the training at no cost to our organization. Our staff learned photo editing techniques that have already been utilized for the AMCA t-shirt design and to prepare images for presentations and publications.

Ed Freytag and Frank DiGiovanni attended a half-day seminar/workshop March 26 sponsored by Creative Presentations at the Best Western Landmark Hotel in Metairie. The workshop described the available equipment that can be used for enhancing presentations. The information learned will be incorporated into our Pest Control Academies and recertifications.

Honors and Awards

2009. City Park Fall Garden Show Best of Show (Figure 43).

2009. City Park Fall Garden Show 1st Place Design Excellence Non-commercial.

2009. City Park Fall Garden Show 1st Place Government Agency Division.

Figure 43.

NOMTCB's award-winning display at the City Park Garden show

2009. City Park Fall Garden Show 1st Place Educational Excellence.

American Mosquito Control Association. 2009. 1st Place Annual Field Day Winner.

Attaway, L. 2009. City of New Orleans and Greater New Orleans Pest Control Association Pest Control and Termite Academy graduate.

Brown, J. 2009. City of New Orleans and Greater New Orleans Pest Control Association Pest Control Academy graduate.

Digiovanni, F. J. 2009. City of New Orleans and Greater New Orleans Pest Control Association Pest Control and Termite Academy graduate.

Lyons, B. A. 2009. City of New Orleans and Greater New Orleans Pest Control Association Pest Control Academy graduate.

Madere, T. 2009. City of New Orleans and Greater New Orleans Pest Control Association Termite Academy graduate.

Mitchell, M. A. 2009. City of New Orleans and Greater New Orleans Pest Control Association Pest Control and Termite Academy graduate.

Owens, C. B. 2009. City of New Orleans and Greater New Orleans Pest Control Association Pest Control and Termite Academy graduate.

Ponseti, P. 2009. City of New Orleans and Greater New Orleans Pest Control Association Pest Control Academy graduate.

Smith, R. 2009. City of New Orleans and Greater New Orleans Pest Control Association Termite Academy graduate.

Ward, J. M. 2009. City of New Orleans and Greater New Orleans Pest Control Association Pest Control Academy graduate.

Publications (peer reviewed)

Brown, K. S., B. M. Kard, and D. R. Keuhl. Soil movement capabilities of *Reticulitermes flavipes* (Kollar) (Isoptera: Rhinotermitidae). (accepted by J. Kansas Ent. Soc. April 2009).

Guillot, F. S., D. R. Ring, A. R. Lax, A. Morgan, K. S. Brown, C. Riegel, and D. Boykin. Area-wide management of the Formosan subterranean termite, *Coptotermes formosanus*, Shiraki (Isoptera: Rhinotermitidae) in the New Orleans French Quarter. (submitted to Sociobiology. November 2009).

Thoms, E. M., J. E. Eger, M. T. Messenger, E. Vargo, B. Cabrera, C. Riegel, S. Murphree, J. Mauldin, and P. Scherer, 2009. Bugs, baits, and bureaucracy: completing the first termite bait efficacy trials (quarterly replenishment of noviflumuron) initiated after adoption of Florida Rule, Chapter 2E-2.0311. American Entomologist 55:30-40.

Publications (non-peer reviewed)

Brown, K. S. and C. Riegel. 2009. Termite control in the City of New Orleans. Proc. 75th Annual Meeting of the American Mosquito Control Association.

Brown, K. S. and C. Riegel. 2009. Termite aboveground baiting systems – indoor use of an IPM approach. Proc. 6th International Integrated Pest Management Symposium.

Riegel, C. and K. S. Brown. 2009. New Orleans mosquito control: More than just mosquitoes. Proc. 75th Annual Meeting of the American Mosquito Control Association.

Riegel, C. and K. S. Brown. 2009. Termite inground baiting systems – the ultimate IPM program. Proc. 6th International Integrated Pest Management Symposium.

Posters/Presentations at Scientific Meetings

K. S. Brown. 2009. Using GIS to locate abandoned swimming pools in New Orleans following Hurricane Katrina: A fish story. URISA's GIS in Public Health Conference. Providence, RI.

Owens, C. B., N.-Y. Su, C. Husseneder, K. S. Brown, and E. G. Guidry. 2009. Genetic evidence of Formosan subterranean termite, *Coptotermes formosanus*, colony movement following construction in Louis Armstrong Park, New Orleans, Louisiana. Entomological Society of America. Indianapolis, IN.

Owens, C. B., N.-Y. Su, C. Riegel, and C. Husseneder. 2009. Molecular genetic evidence of the survival of Formosan subterranean termite colonies after flooding. Southeastern Branch of the Entomological Society of America. Montgomery, Alabama.

Presentations

Brown, K. S. 2009. Formosan Termites: what every homeowner needs to know. Gretna Homeowners Association. Gretna, LA.

Brown, K. S. 2009. The brown widow spider and other local spiders of medical importance. USDA-ARS Southern Regional Research Center staff safety training. New Orleans, LA.

Brown, K. S. 2009. Formosan subterranean termite vs. City of New Orleans. Environmental Protection Agency, National Pest Management Association, and Louisiana Department of Agriculture and Forestry. New Orleans termite walking tour. New Orleans, LA.

Brown, K. S. 2009. NOMTCB and Greater New Orleans Pest Control Association – Termite Academy. USDA Agricultural Marketing Service's Pesticide Records Branch Annual Cooperator's Meeting. New Orleans, LA.

Brown, K. S. 2009. Termite biology and management in New Orleans' historic French Quarter (talk and walking tour). USDA Agricultural Marketing Service's Pesticide Records Branch Annual Cooperator's Meeting. New Orleans, LA.

Brown, K. S. 2009. Fleas, rats, and public health. Graduate medical entomology course in the Department of Environmental Health Sciences of the School of Public Health and Tropical Medicine, Tulane. New Orleans, LA.

Brown, K. S. 2009. Cockroaches and bedbugs. Graduate medical entomology course in the Department of Environmental Health Sciences of the School of Public Health and Tropical Medicine, Tulane. New Orleans, LA.

Brown, K. S. 2009. Biology of termites. City of New Orleans and Greater New Orleans Pest Control Association Termite Academy. New Orleans, LA.

Brown, K. S. 2009. Drywood termites and other wood destroying organisms. City of New Orleans and Greater New Orleans Pest Control Association Termite Academy. New Orleans, LA.

Brown, K. S. 2009. Calculations and Calibrations. City of New Orleans and Greater New Orleans Pest Control Association Termite Academy. New Orleans, LA.

Brown, K. S. 2009. Introductory insect anatomy and biology. City of New Orleans and Greater New Orleans Pest Control Association Pest Control Academy. New Orleans, LA.

Brown, K. S. 2009. Name that bug – insects we commonly identify for the industry. City of New Orleans and Greater New Orleans Pest Control Association Pest Control Academy. New Orleans, LA.

Brown, K. S. 2009. Wood destroying insects. City of New Orleans and Greater New Orleans Pest Control Association Pest Control Academy. New Orleans, LA.

Freytag, E. October 22, 2009. Termite Biology and Control. Greater New Orleans Pest Control Association. Harrahan, LA.

Owens, C. B. 2009. Termite foraging and triple-mark-recapture. City of New Orleans and Greater New Orleans Pest Control Association Termite Academy. New Orleans, LA.

Riegel, C. and K. S. Brown. 2009. Termite in-ground baiting systems – the ultimate IPM program. Proc. 6th International Integrated Pest Management Symposium.

Riegel, C. and K. S. Brown. 2009. New Orleans mosquito control: More than just mosquitoes. Proc. 75th Annual Meeting of the American Mosquito Control Association.

Riegel, C. March 10, 2009. Biology and Control of Rodents. National Environmental Health Association and Indian Health Services Biology and Control of Insects and Rodents workshop. Gallup, NM.

Riegel, C. March 18, 2009. Africanized honey bees. Louisiana Mosquito Control Association annual workshop, Pineville, LA.

Riegel, C. October 22, 2009. Rodent Control and pest-proofing. Greater New Orleans Pest Control Association. Harrahan, LA.

Recertifications

Brown, K. S. 2009. Rodent control: back to the basics. GNOPCA technician recertifiation. Covington, LA.

Brown, K. S. 2009. Termites. LPMA licensee recertification. Kenner, LA.

Brown, K. S. 2009. General pest control: stored product pests. GNOPCA technician recertification. Harahan, LA.

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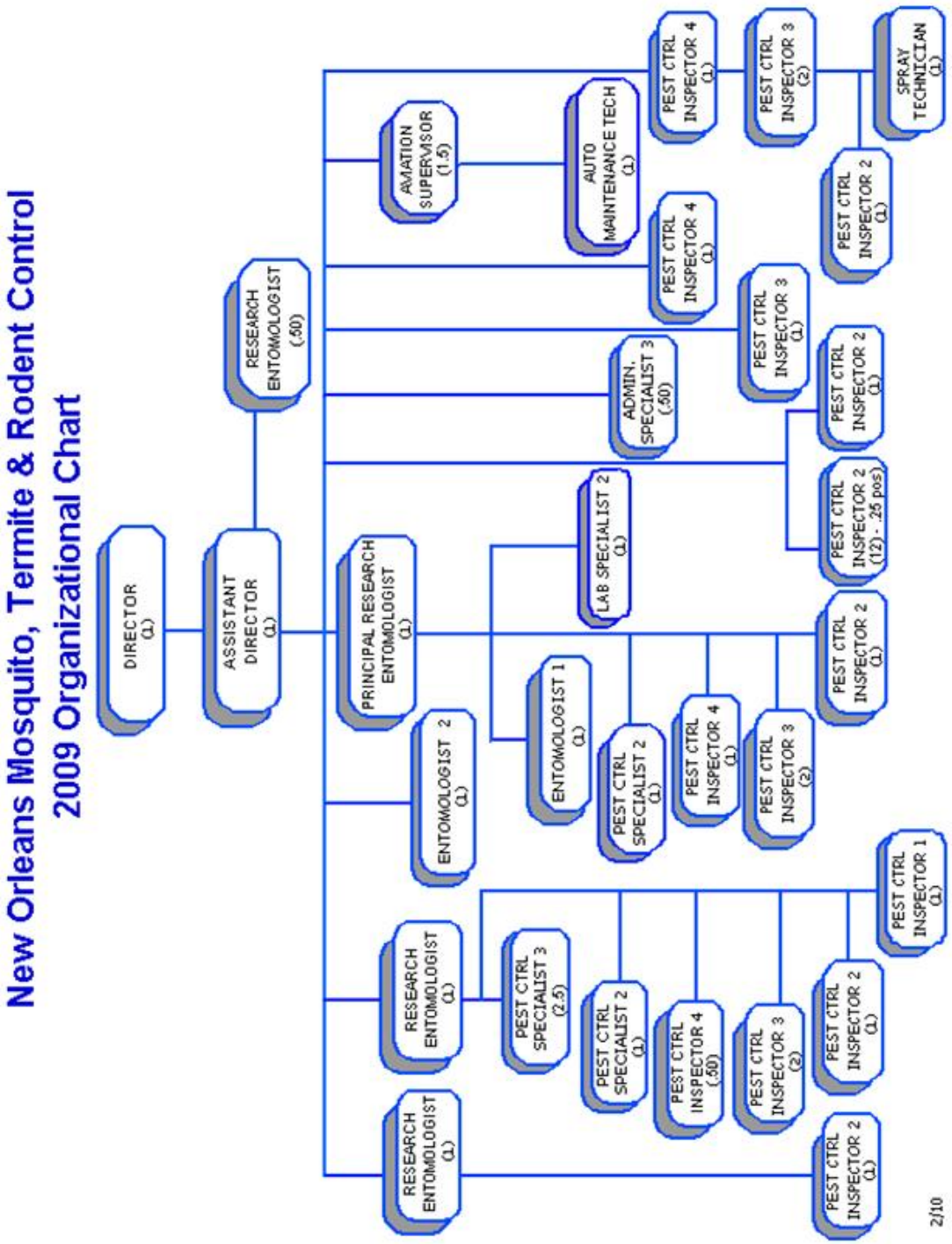
Messenger, M. T. and N-Y. Su. 2005. Colony characteristics and seasonal activity of the Formosan subterranean termite (Isoptera: Rhinotermitidae) in Louis Armstrong Park, New Orleans, Louisiana. J. Entomol. Sci . 40: 268-279.

Vargo, E. L., C. Husseneder, J. K. Grace, G. Henderson and D. Ring. 2003. Colony and population genetic structure of Formosan subterranean termites from Hawaii and Louisiana. Sociobiology 41: 67-69.


New Orleans Mosquito, Termite & Rodent Control
2009 Organizational Chart
DIRECTOR (1)
ASSISTANT DIRECTOR (1)
RESEARCH ENTOMOLOGIST (.50)
PRINCIPAL RESEARCH ENTOMOLOGIST (1)
AMATION SUPERVISOR (1.5)
AUTO MAINTENANCE TECH (1)
ADMIN. SPECIALIST 3 (.50)
LAB SPECIALIST 2 (1)
ENTOMOLOGIST 2 (1)
ENTOMOLOGIST 1 (1)
RESEARCH ENTOMOLOGIST (1)
RESEARCH ENTOMOLOGIST (1)
PEST CTRL SPECIALIST 3 (2.5)
PEST CTRL SPECIALIST 2 (1)
PEST CTRL SPECIALIST 2 (1)
PEST CTRL INSPECTOR 4 (.50)
PEST CTRL INSPECTOR 4 (1)
PEST CTRL INSPECTOR 4 (1)
PEST CTRL INSPECTOR 3 (2)
PEST CTRL INSPECTOR 3 (2)
PEST CTRL INSPECTOR 3 (1)
PEST CTRL INSPECTOR 2 (1)
PEST CTRL INSPECTOR 2 (1)
PEST CTRL INSPECTOR 2 (1)
PEST CTRL INSPECTOR 2 (12) - .25 pos)
PEST CTRL INSPECTOR 2 (1)
PEST CTRL INSPECTOR 2 (1)
PEST CTRL INSPECTOR 1 (1)
SPRAY TECHNICIAN (1)
2/10