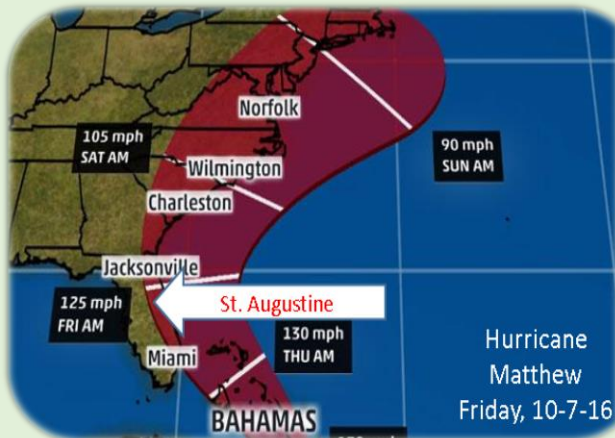


AMCD 2016



ANNUAL PROGRAM REPORT



ANASTASIA MOSQUITO CONTROL DISTRICT
OF ST. JOHNS COUNTY

www.amcdsjc.org
(904) 471-3107

120 EOC Drive
St. Augustine, FL 32092



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PREFACE

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A MESSAGE FROM THE CHAIRPERSON



We are happy to have moved into our new facility where we are even more capable of fighting Zika and other mosquito-borne disease outbreaks and where we hosted the 13th annual Arbovirus Surveillance and Mosquito Control Workshop. On June 30th we held a very successful open house and provided facility tours for more than 100 people. After hurricane Matthew in October, our District worked hard to control the outbreak situation of mosquitoes in answering and providing service to more than 3,000 service requests in October alone. St. Johns County residents have been free of locally-acquired mosquito-borne diseases for the past 14 years. The District attracted and received more than \$240 thousand dollars in grants and other funds to assist the District in fighting Zika, evaluating safety insecticides, and other applied research. The Board approved phase two for the development of the south parcel of the property and this will assist the District in moving forward for updating technology and improving operations efficiency. Commissioners' Ms. Vivian Browning and Ms. Janice Bequette retired from the Board in December 2016. Congratulations to them in their retirement from the Anastasia Mosquito Control District (AMCD) Board. Mrs. Gina LeBlanc and Mrs. Jacqueline Rock were elected as the new commissioners and we welcome them to the Board and we look forward to working together for the citizens of St. Johns County.

A MESSAGE FROM THE DIRECTOR



In 2016, there were more sentinel chickens that tested positive for EEE and St. Johns County was under a mosquito-borne illness advisory. The District responded to four confirmed, imported human cases of Zika and 26 suspected cases of Zika, Dengue, Chikungunya, and malaria in St. Johns County, in an excellent collaboration with the St. Johns County Health Department. In mid February, 2016, *Aedes aegypti* were collected from down-town St. Augustine and AMCD launched an eradication program through street by street and door by door inspections, education, and control efforts to limit the spread of vector mosquitoes to other areas.

AMCD moved to the new facility in late March, 2016 and successfully organized and held the 13th annual Arbovirus Surveillance and Mosquito Control Workshop in collaboration with USDA/CMAVE and in conjunction with the NE 1443 Project's annual meeting in the new facility. In early February 2016, AMCD organized AMCA's Symposium in Savannah, Ga., on "Vector Control Response to Suspected Human Cases" where Mr. Richard Weaver and I received American Mosquito Control Association (AMCA) awards. AMCD also organized the Medical and Veterinary Entomology in Florida Symposium for the Florida Entomology Society (FES), in conjunction with the XXV International Congress of Entomology in Orlando, FL, September 25-30, 2016, where I was elected as the President for the FES. I was also elected as the FMCA President at the 88th Annual meeting of the FMCA which was held at the Hilton Sandestin Beach Golf Resort & Spa, FL, November 13-16, 2016. AMCD trained 4 intern students and cooperated with the University of Florida to train Ph.D. students, Dr. Jodi Scott who graduated in May and a new Ph.D. student Mr. Christopher Bibbs who began his Ph.D. study in August, 2016. AMCD also cooperated with UF and received and conducted the Department of Agricultural and Consumer Service's grant for "Vapor active insecticides against mosquitoes".

I do appreciate and thank the Board, all employees, colleagues, citizens, contractors, and cooperating agencies and personnel for their support and service to AMCD's programs.

AMCD BOARD of COMMISSIONERS:

3



Mr. Gary Howell, Chairperson
Term 2013 - 2016 / Seat 5



Ms. Vivian Browning, Vice-Chairperson
Term 2009 – 2016 / Seat 1



Mrs. Catherine Brandhorst, Secretary/Treasurer
Term 2011 – 2018 / Seat 4



Mrs. Jeanne Moeller, Commissioner
Term 2007 – 2018 / Seat 2



Ms. Janice Bequette, Commissioner
Term 2009 – 2016 / Seat 3

AMCD APPOINTED OFFICERS



Dr. Rui-De Xue, Director
Hired 4-14-03,
Became Director in 2005



Mr. Wayne Flowers, Attorney
November 9, 2010



Ms. Julieann Klein, CPA
Since 2008

AMCD FULL TIME EMPLOYEES



4



Dr. Rui-De Xue, Director,
Hired 4-14-2003 / 2005

ADMINISTRATION



Christopher Bibbs, Education
Specialist, Hired 6-2-2014



Kay Gaines, Supervisor
Hired 8-7-2000



Charolette M. Hall, Admin.
Assistant, Hired 11-5-2007



Scott Hanna, Accountant
Hired 7-9-2007



Richard Weaver, Data
Manager, Hired 4-14-2003

ENTOMOLOGY DEPARTMENT



Dr. Daniel Dixon, Molecular
Biologist, Hired 2-16-2016



Michael Smith, Field
Biologist, 11-5-1984
Retiring 1-6-17



Jennifer Corrado, Biological
Technician, Hired 10-20-2014
Resigned 11-3-16

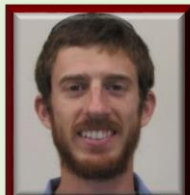
MOSQUITO CONTROL TECHNICIANS



Freddie Allen, Mechanic
Hired 7-8-2002



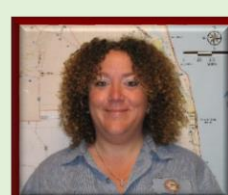
Dena Autry,
Hired 8-24-2015



Joseph D'Amato
Hired 4-18-2016



Ken Daniel
Hired 9-26-2005



Cathy Hendricks
Hired 7-8-2002



Jerry Iser
Hired 2-2-2015



Patrick Kendrick
Hired 4-7-2003



Elaine Scanzani
Hired 3-20-2002



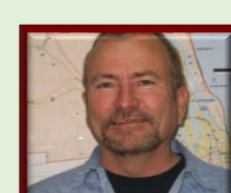
Barry Scott
Hired 3-3-2014



Steven Solana
Hired 4-24-2000



Ricky Stockley
Hired 2-4-2013



David Strickland
Hired 3-10-1997



Michael Vaughn
Hired 3-3-2014



James Wynn, Mechanic
Hired 3-4-1996

RETIRED / RESIGNED EMPLOYEES



Vincent Price, North
Supervisor 6/1/99 - 4/8/16



Dr. Lisa Drake, Entomologist
6/1/15 - 4/15/16



Codi Anderson, MC Tech
2/1/16 - 8/2/16

ADMINISTRATION ~ PERSONNEL & RECOGNITIONS

PERSONNEL

Entomologist, Dr. Lisa Drake resigned April 15, 2016; Dr. Jodi Scott, in her position with the Navy, continued working at AMCD as a visiting scientist/Ph.D. student until June 1, 2016; Dr. Mohamed Sallam worked as a voluntary visiting scientist at AMCD through October 28, 2016 and then as a regular visiting scientist beginning November 1st. Voluntary visiting scientists, Dr. Shen Yuan, from Wuxi CDC and Dr. Wang Fei from Hongkou CDC, Shanghai, China worked here from August through October and Dr. Yong Zhang, as a Visiting Scientist from the Beijing CDC, worked here from November 7, 2016 and will continue through February, 2017. Seasonal Inspector/sprayer, Mr. Morgan Duett was promoted to a Mosquito Control Technician I position that begins in February 2017; Mr. Vincent Price retired April 8, 2016, and Biological Technician, Mrs. Jennifer Corrado resigned November 3, 2016 and Mr. Joseph D'Amato was promoted as the new Biological Technician, from his position as a Mosquito Control Technician. Supervisor, Mrs. Kay Gaines was promoted to the new Supply Manager position and Mr. Christopher Bibbs, Education Specialist, was promoted to a Biologist position. Mosquito Control Technician Mr. Ken Daniel was promoted from Mosquito Control Technician III to Mosquito Control Technician IV. Five seasonal employees worked for AMCD from May to October. Two intern students worked at AMCD for four months, Ms. Tayler Katsma from July through October, and Mr. Kai Blore from May to mid August; two intern students worked at AMCD for 6 months, Mr. Jeremy Wholforth and Ms. Jesse Crosier, both from May through October.



RECOGNITION/AWARDS:

AMCD's District Director, Dr. Rui-De Xue was elected as the President for the FMCA in November and for the Florida Entomological Society in September. Dr. Xue also continued his appointment as the Southeast Regional Director for the Society of Vector Ecology (SOVE). Dr. Xue received the Meritorious Service Award and Mr. Richard Weaver received the AMCA Grass Roots award during the AMCA annual meeting in February.

The following AMCD personnel received awards for their years of service with the District: Mr. James Wynn for 20 years; Mr. Richard Weaver, Data Manager, received the Managements Choice Award for his significant contribution in overseeing the new AMCD building construction; and Mr. Michael Smith, Field Biologist, also received the Managements Choice Award for his significant contributions for the Zika vector mosquito eradication from downtown St. Augustine, as well as, an award for his retirement after more than 32 years of service, contributions, and dedication to the District. Safety Awards were also presented to employees with no accidents throughout the year.



AMCD SEASONAL, INTERNS, VOLUNTEERS, AND VISITING SCIENTISTS

SEASONAL (6 MONTH) EMPLOYEES



Diarmuid "DC" Connolly
6/1/16 – 10/28/16



Morgan Duett
6/20/16 – 10/28/16



Ray Gaulden, Jr.
5/2/16 – 10/28/16



Keaton Lofton
5/2/16 – 10/28/16



Phillip Vaughn
5/2/16 – 10/28/16

INTERNS



Kai Blore, Intern
5/30/16 – 8/19/16



Jesse Crossier,
Education Intern
5/2/16 – 10/28/16



Tayler Katsma,
Entomology Intern
7/6/16 – 10/28/16



Jeremy Wohlforth,
High School Education Intern
5/17/16 – 10/28/16

VOLUNTEERS/VISITING SCIENTISTS



Dr. Jodi Scott, Visiting
Scientist, 6/1/14- 6/1/16



Dr. Mohamed Sallam,
Voluntary Visiting Scientist
6/13/16 – 10/28/16



Dr. Shen Yuan, Voluntary
Visiting Scientist,
Wuxi CDC
8/1/16 – 10/28/16



Dr. Wang Fei, Voluntary
Visiting Scientist,
Hongkou CDC, Shanghai
8/1/16 – 10/28/16



Dr. Yong Zhang,
Voluntary Visiting Scientist,
Beijing CDC
11/7/16 – 2/7/17

COMMITTEE MEMBERS 2016

SAFETY COMMITTEE:

Safety Coordinator: Mr. Richard Weaver,
(Chair)

Supervisor: Mrs. Kay Gaines

Employees: Mr. Ken Daniels, Mr. Ricky Stockley; Mr. John "Freddie" Allen, and Mr. Steven Solana

APPLIED RESEARCH COMMITTEE:

Commissioner: Ms. Janice Bequette (Chair)

Entomologist: Dr. Lisa Drake (Resigned 4-15-16)

Molecular Biologist: Dr. Daniel Dixon

Biological Technician: Mrs. Jennifer Corrado
(Resigned 11-3-16)

Data Manager: Mr. Richard Weaver

Field Biologist: Mr. Michael Smith

Education Specialist: Mr. Christopher Bibbs

EDUCATION COMMITTEE:

Commissioner: Mrs. Jeanne Moeller, (Chair)

Education Specialist: Mr. Christopher Bibbs

Supervisor: Mrs. Kay Gaines

Biological Technician: Mrs. Jennifer Corrado

Employees: Mr. Patrick Kendrick, and
Mr. Vincent Price (Retired 4-8-16)

PLANNING COMMITTEE:

Commissioner: Ms. Vivian Browning, (Chair)

Director: Dr. Rui-De Xue

Supervisor: Mrs. Kay Gaines

Data Manager: Mr. Richard Weaver

Entomologist: Dr. Lisa Drake

Molecular Biologist: Dr. Daniel Dixon

Biological Technician: Mrs. Jennifer Corrado



FINANCIAL / AUDIT COMMITTEE:

Commissioner: Ms. Catherine Brandhorst,
(Chair)

Director: Dr. Rui-De Xue

Accountant: Mr. Scott Hanna

Data Manager: Mr. Richard Weaver

Admin. Assistant: Ms. Charolette M. Hall

EMERGENCY RESPONSE COMMITTEE:

Supervisor: Mrs. Kay Gaines

Data Manager: Mr. Richard Weaver,

Entomologist: Dr. Lisa Drake

Molecular Biologist: Dr. Daniel Dixon

Admin. Assistant: Ms. Charolette M. Hall

Education Specialist: Mr. Christopher
Bibbs

OPERATIONAL COMMITTEE:

Ground/Aerial

Commissioner: Mr. Gary Howell (Chair)

Director: Dr. Rui-De Xue

Field Biologist: Mr. Michael Smith (Retiring
1-6-17)

Supervisor: Mrs. Kay Gaines,

Entomologist: Dr. Lisa Drake

Molecular Biologist: Dr. Daniel Dixon

PROGRAM OVERVIEW:

AMCD MISSION, VALUES, VISION, and PROGRAMS

OUR MISSION:

To protect all people from the nuisance of mosquitoes and mosquito-borne diseases in St. Johns County, Florida.

OUR VALUES:

Service Driven, Scientific Based, Professional, Justified, Environmentally-friendly, Collaborative, Compassionate, Accountable, and Sustainable Excellence.

OUR VISION:

AMCD of St. Johns County will be among the leading Districts for mosquito control and the people in St. Johns County will be among the healthiest in the nation – a well served community, enjoyed by all and supported by all partners.

OUR PROGRAMS:

Customer Service, Operations (including Surveillance and Control), Education, and Applied Research.



The AMCD staff, during 2016, were located in two stations in St. Johns County (the Base, and the North) and officially moved into the new Base Station Complex, located at 120 EOC Drive, on May 13, 2016. AMCD provided the following services: conducted inspections and mosquito control; worked on eradication of the Zika Virus vector mosquitoes in downtown St. Augustine; worked with local organizations, schools, home- owners associations, etc. on public education to minimize the impact of mosquitoes on the St. Johns County residents; did surveillance continually to help reduce the mosquito population and to reduce the chance of human virus association and to protect the environment; conducted larviciding and adulticiding as needed, especially during the mosquito season from March through November; provided education to the community, schools, and associations, to better inform our public and to assist them in helping control the populations of mosquitoes and

conduct applied research to test ideas and products to reduce the mosquito population; and to provide employee training to keep up with modern equipment and methods to help in the control of mosquitoes.



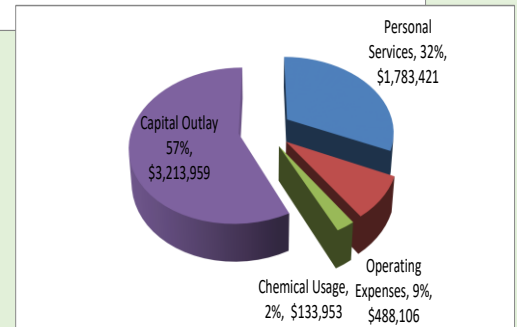
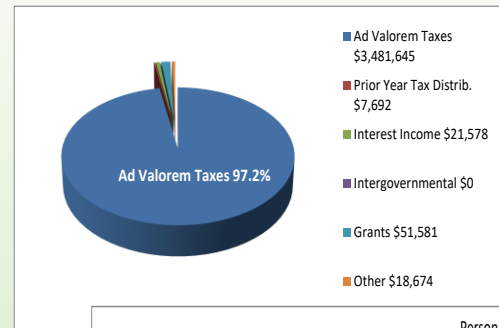
FY 15/16 District Revenues Oct. 1, 2015 through
Sept. 30, 2016 - Total \$3,581,170

Ad Valorem (real property) taxes, the primary source of revenue, comprised approximately 97.2% of totals.

Optimism continued to prosper in the St. Johns County with a second year of rising Property values. However, the District, through their prudent use of resources, were able to decrease its millage rate down to .1773 which was below both the current Roll Back and Prior Year millage rates of .2319 and .2485 respectively.

FY15/16 District Expenditures - Total \$5,619,439

Expenditures for the year were comparatively greater than Revenues. The majority of this was attributed to Capital Outlay utilized to complete the New Facility, which was commenced in the prior Fiscal Year 14/15. Since the entire project was budgeted and levied in the 14/15 Fiscal Year, Reserves were utilized and no additional levying was necessary to complete this project.



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ADMINISTRATION & SUPPLY

BOARD BUSINESS: AMCD staff provided many documents to Board members and the attorney for Board and Committee meetings in 2016 and supported 13 Board meetings, including the annual First and Final Public Hearings in September for the fiscal year budget and millage.

INVENTORY: The annual physical inventory, monthly tire inventory, and chemical inventory were done regularly. Four vehicles, 2 scooters, 1 ATV, and 1 trailer, along with various equipment and other items, were surplus in 2016. Also in October, the Board approved merging the daily operations of the North Station to the Base station and in December, they approved the RFP to St. Johns County for the sale of the 500 Old Beach Road property.

DACS INSPECTION: The Department of Agriculture and Consumer Services does a "Mosquito Control Pesticide Use Inspection" every two years. Last year it reflected no deficiencies and we will be due for our next inspection in 2017.

CONTRACTS: After approval from the Board, many annual contracts were sent out for bid, RFP, or by utilizing the state contracts, to assure the District was obtaining the best services at the best possible prices. Some of these included, but were not limited to, AMCD approved a business agreement between AMCD and Harrell Construction to design the eight acre parcel on AMCD's south portion of the property at 120 EOC Drive and an agreement with Comcast for phone service, high speed internet, and TV service, as well as, an agreement with St. Augustine Fire and Alarm for Burglar and Fire Services at the new Base Station Complex at 120 EOC Drive which was completed in March 2016.

INSURANCE: The Board renewed the dental, life, and health, as well as fleet and Worker's Compensation insurances in 2016 with little differences from last year.

POLICIES: Staff continued updating the District's Policy Manual, Employee Handbook, and the Commissioner's Handbook in 2016 as policies were changed or added.

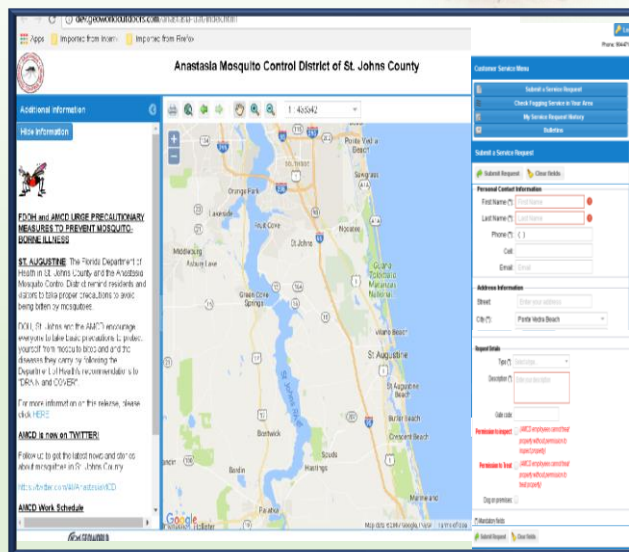


AMCD WEBSITE:

AMCD's website: www.amcdsjc.org continued to provide the following information: important links, public notices, meeting dates, illness advisories, training and workshop information, mosquito biology, as well as education and employment opportunities, and much more. AMCD is also active on Facebook and Twitter and hosts an online survey to determine customer satisfaction.

We frequently updated our website in 2016 to enable our St. Johns County residents to be informed, check to see if their address was scheduled for fogging and to enter service requests.

During 2016, AMCD continued working with Mobisoft and utilized the new database computer software program through the website for customer service requests and fogging.



AMCD answered 5,324 service requests in 2016 from local residents by phone, online through our website, by e-mail, fax, and walk-ins. After Hurricane Matthew in October 2016, there were over 3,000 service requests in just one week alone, which was more than in a whole year in the past fourteen (14) years.

We continued working with our new updated GEOMOSQUITO database, which went live January 2016. As always, AMCD continued to provide service and to educate residents on adult mosquitoes, larvae, adulticiding and larviciding. Staff also dispensed valuable information pertaining to pesticide safety, identification of mosquitoes and other insects, mosquito prevention and pesticide applications, personal protection methods, as well as commercial mosquito traps, repellents and insecticides, assisting residents with concerns about no treatment areas, such as, bee keepers properties or personal conditions that warrant no treatment.

Staff also assisted the public by distributing *Gambusia*, the mosquito larvae eating fish.



AMCD continues to follow Florida Statutes, Chapter 388, DACS's, 5E-13, EPA labels and Safety Data Sheets, and the District's policies and procedures while providing necessary inspections, adulticiding and larviciding.



The Anastasia Mosquito Control District of St. Johns County works in cooperation with a number of related local, state, federal agencies, even international, private and commercial organizations, and members of the medical community. Those listed below briefly describe the work associations with AMCD in 2016 to prevent and control vector-borne diseases in Florida.

INTERNATIONAL COOPERATION AND ACTIVITIES:

The Hebrew University of Jerusalem, Israel: (Dr. Gunter Muller) on attractive toxic sugar baits (ATSB) and ecology of vector mosquitoes.

Beijing Institute of Microbiology and Epidemiology (Dr. Tong-Yan Zhao on symposium for International Congress of Entomology & traps) and China CDC (Dr. Feng-Xia Meng on new trap evaluation and Mr. Dong-Sheng Ren on a new spray machine).

Dr. Xue attended and gave a presentation on new repellents and another presentation on ATSB for control of arbovirus at the International Workshop funded by WIN, Rio de Janeiro, Brazil, December 3-6, 2016.

Dr. Xue gave a lecture on the commercial mosquito traps and repellents at Sterling International, Inc, Spokane, WA, December 21-23, 2016.

Dr. Xue collaborated with Dr. H.B. Yi from Korea about auto-counting traps.

The District hosted 3 visiting scientists from China, Dr. Yuan Shen from Wuxi CDC who conducted spatial repellent assessments, Dr. Fei Wang from Shanghai Hongkou CDC, who conducted ATSB research, and Dr. Yong Zhang from Beijing CDC who conducted research on GIS and St. Johns County development and its impact on mosquito-borne diseases.

NATIONAL AND FEDERAL AGENCIES & ASSOCIATIONS:

The US Department of Agriculture/Center for Medical, Agricultural, and Veterinary Entomology (USDA/CMAVE): AMCD continued to cooperate with the CMAVE to organize the 13th Arbovirus Surveillance and Mosquito Control Workshop, ATSB, and trap evaluation projects. AMCD collaborated with the NE 1443 Project committee to organize the conjunctive workshop.

The Navy's Center for Entomological Excellence, Jacksonville, FL: AMCD continued to cooperate with NCEE for machine and ULV sprayers evaluation.

Dr. Xue reviewed many manuscripts for the Entomological Society of America's journals, American Mosquito Control Association (AMCA), Society for Vector Ecology and Acta Tropica journals. AMCD is a sustaining member of the AMCA and AMCA/EPA's PESP member and provides an annual report. Dr. Xue organized a symposium on Vector Mosquito Control Response to Suspected Human Cases at the AMCA annual meeting. Mr. Christopher Bibbs, Mr. Mike Smith, Mr. Richard Weaver, and Dr. Rui-De Xue gave several presentations at the AMCA meeting and published manuscripts in the JAMCA, JME, Parasites & Vectors, and Acta Tropica.



STATE AGENCIES AND SERVICES:

The Florida Mosquito Control Association (FMCA): Dr. Xue, as the President-Elect and the annual program Chair worked out the annual program. Commissioner Jeanne Moeller was re-elected as the Chairperson for the Commissioner section and organized the Commissioner's program for the Dodd Short course and FMCA annual meeting programs. Three Commissioners and three staff members attended the FMCA's Tallahassee Legislation meeting and gave 10 presentations at the FMCA annual meeting. Dr. Xue was elected as the President to serve the FMCA Board and continues to serve the FMCA's Publication Committee. Mr. Richard Weaver continues to serve as a member of the FMCA's Financial Committee.

The Florida Entomological Society (FES): Dr. Xue organized a symposium on Medical and Veterinary Entomology in Florida for the Florida Entomology Society (FES) in conjunction with XXV International Congress of Entomology in Orlando, FL and was elected as the President for the FES.

The District collaborated with the State and the St. Johns County Department of Health to fight Zika together and responded to approximately 30 imported and suspected cases in St. Johns County in 2016.



COMPANIES AND OTHER DISTRICTS:

AMCD continued to cooperate with: American LongRay to evaluate their ULV handheld machines; Central Life Sciences and UNIVAR for the new formulations of the IGRs; Bayer for DeltaGard; MGK for their two new formulations, Spring Star, Inc. for the National Institute of Health (NIH) project.

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COOPERATIVE ORGANIZATIONS PROFESSIONAL SERVICES ~ (CONT'D)



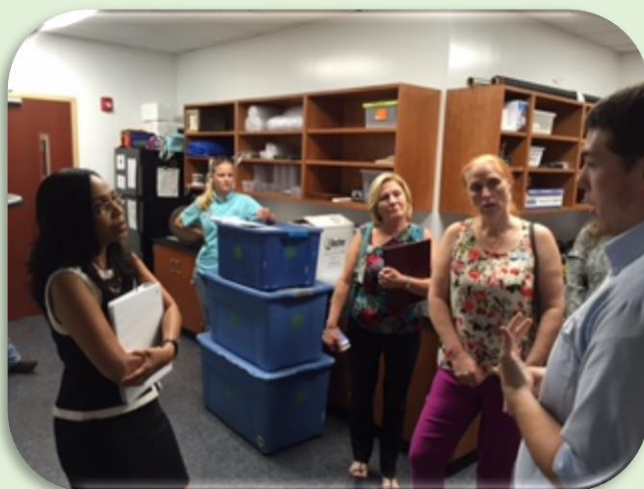
AGENCIES AND UNIVERSITIES:

The University of Florida, Department of Entomology and Nematology: AMCD cooperated with the University of Florida to continue to train a Ph.D. student and a visiting scientist and continues the research on ATSB and its impact on non-targets, and on vapor active insecticides funded by DACS.

University of Miami: Dr. Xue, as a Voluntary Professor for the School of Medicine, continues to cooperate with the University of Miami to study the ATSB project and to train graduate students.

DACS: AMCD renewed the Operations contract with DACS. Dr. Xue serves their Research Committee to review grant applications.

The St. Johns County Department of Health (DOH): AMCD continued to cooperate with the St. Johns County's Department of Health and the City of St. Augustine to conduct the surveillance of arbovirus, Zika vector control, and for news releases about mosquito-borne diseases in St. Johns County. Dr. Xue continues as a leadership council member to serve the St. Johns County DOH.





MOSQUITO-BORNE DISEASES:

AMCD continuously cooperates with the Florida Department of Health to monitor imported mosquito-borne diseases through local health providers.

AMCD monitored West Nile Virus (WNV), Eastern Equine Encephalitis Virus (EEE), Saint Louis Encephalitis Virus (SLE), Highland James Virus (HJV) and California Group Virus, using 10 sentinel chicken sites around St. Johns County. WNV was also monitored using the Rapid Analyte Measurement Platform (RAMP), a colorimetric method for virus detection using mosquito pools. AMCD personnel bled chickens every Monday, from April 4th to December 15th and sent the blood samples to DOH's Arbovirus Laboratory in Tampa for testing.

In 2016, a total of 12 sentinel chickens tested positive for arboviruses, 10 for EEE, and 2 for WNV. There was also 1 positive RAMP assay for WNV.

AMCD also responded to a number of suspected cases of Chikungunya, Dengue, Malaria and Zika Viruses through surveillance and treatment of the area where the cases originated. In 2016, there were 30 travel related suspected cases of Zika, Chikungunya and Dengue in St. Johns County. The 2 suspected travel related malaria cases turned out to be negative. There were 4 confirmed travel-related Zika cases. There were no locally acquired human cases of mosquito-borne diseases in St. Johns County in 2016.



MOSQUITO POPULATION:

The adult mosquito population was monitored by 32 CDC light traps baited with Octenol from April to November, 2016 and a total of 41,810 mosquitoes (25 species) were collected. Eight (8) BG traps, baited with BG Lure and Octenol, were used for *Aedes albopictus* and *Aedes aegypti* for a total of 4,816 mosquitoes collected from April to November, 2016. A total of 46,626 mosquitoes were trapped by both methods.

There were 132 landing rate counts conducted at 29 sites in St. Johns County with a total of 1,231 mosquitoes counted.

Larvae surveys were conducted on a daily basis by dipping flooded areas as needed. A total of 29,915 dips were conducted and 4,616 dips were positive with 58,723 larvae found.

ENVIRONMENTAL PARAMETERS:

Rainfalls were monitored by 32 rain gauges once a week. The total rain average for 2016 was 2.04 inches.

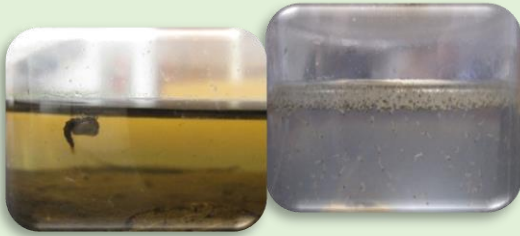




LARVICIDES AND LARVICIDING:

In 2016, the District primarily used Bti to kill mosquito larvae, as well as methoprene products in areas where BTI was not applicable.

Mosquito Control Technicians and Inspector/sprayers treated 1,189 times on a total of 7,117.85 acres for larval control.



ADULTICIDES AND ADULTICIDING:

As a result of Hurricane Matthew in late October, an aerial spray was conducted in the hot spot areas covering approximately 109,635 acres in St. Johns County, through contractor - Clarke, (Dynamic Aviation), on October 19th and 20th to reduce the mosquito population.

Mosquito Control Technicians and Inspector/Sprayers continued to use Aqualure 20-20 (Permethrin) and Mosquitomist Two for ground ULV spraying and treated 353 times on a total of 205,311 acres for adult mosquito control. DUET was used for hand thermal fogging for service requests and other areas 581 times on a total of 16,468 acres. Talstar P was used for barrier treatments in parks, special areas and for service requests 277



times for a total of 154 acres for adult mosquito control.

Most of this was conducted for mosquito populations and control of the Zika vector.

Larvicides and Adulticides Used in 2016

| Larvicides | Amount Used | | Area Treated | | Times Applied |
|------------------|-------------|--------|--------------|-------|---------------|
| Altosid WSP | 18,021 | ea. | 55.79 | acres | 226 |
| Altosid XR | 672 | ea. | 1.53 | acres | 47 |
| Altosid XRG | 2654 | lbs. | 442.37 | acres | 62 |
| Aquabac XT | 47332 | fl.oz. | 5910.5 | acres | 641 |
| Bti Briquets | 1080 | ea. | 2.48 | acres | 40 |
| Cocobear | 3792 | fl.oz. | 9.9 | acres | 30 |
| GB1111 | 2324 | fl.oz. | 6.04 | acres | 32 |
| Sustain MBG | 4480 | lbs. | 689.24 | acres | 111 |
| ADULTICIDES | AMOUNT USED | | AREA TREATED | | TIMES APPLIED |
| Aqualure 20-20 | 50281 | fl.oz. | 194635 | acres | 319 |
| Duet 50% | 13504 | fl.oz. | 16468.31 | acres | 89 |
| Mosquitomist Two | 16176 | fl.oz. | 10676.16 | acres | 34 |
| Talstar P | 51.82 | gal. | 153.58 | acres | 277 |

SOURCE REDUCTION & BIOLOGICAL CONTROL:

A total of 313 used tires were collected and removed throughout the year by AMCD staff and personnel, for source reduction.

Also, containers in and around residential yards, were emptied numerous times when AMCD staff and personnel performed their inspections.

AMCD provided the public with the mosquito larvae eating fish (named: Gambusia) for use in retention ponds and ditches 12 times. personnel



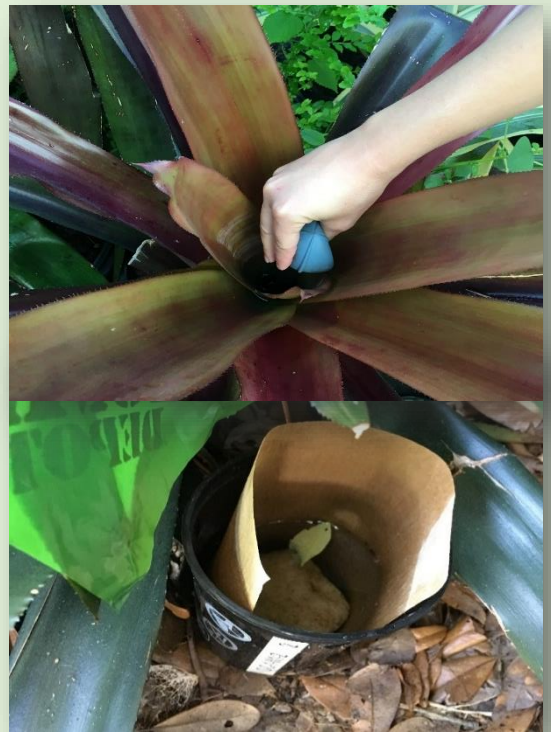
IMPACT OF THREE SPECIES OF AQUATIC PLANTS ON SURVIVAL OF *ANOPHELES QUADRIMACULATUS* AND ITS EFFECT ON THE EFFICACY OF ATSB:

Summer intern, Kai Blore, came from the MPH program at the University of Miami. He worked under the Mosquito Research Foundation grant to investigate the impact of local aquatic vegetation on the survival of *Anopheles quadrimaculatus*. *An. quadrimaculatus* are commonly found near aquatic vegetation because they provide stable habitat, protection from predators, and sugar sources for emerging adults. This study assessed feeding behavior and survivorship of *An. quadrimaculatus* on three common native aquatic plants in St. John's County: Fireflag, pickerel weed, and frogs bit. It was found that survival was highest on fireflag. Next, an efficacy evaluation for an attractive toxic sugar bait (ATSB) application to the same plants was performed with *An. quadrimaculatus*. It was found that ATSB is highly effective at killing mosquitoes that feed on treated leaves.



RESIDUAL EFFICACY OF THREE PUMP SPRAYERS USING AQUALUER 20/20 AS A BARRIER TREATMENT AGAINST *Aedes albopictus*:

Jesse Crosier was another summer intern. She completed an MPH program at the University of New England, and worked with AMCD to get more experience in the field. She investigated the effectiveness of new battery powered hand sprayers, as well as the viability of managing *Aedes albopictus* by targeting bromeliads with a residual treatment of Aqualuer 20/20. During the course of this work, bromeliads have been sampled from 2014, 2015, and now 2016. A progressive takeover by *Ae. albopictus* has limited the occurrence of mixed species composition, as well as reducing the overall diversity of these same sample sites over the years. In the study, the new Green Gorilla battery operated pump up sprayers were found to be effective at maintaining pressure, and did not sacrifice treatment efficacy. Meanwhile, targeting bromeliads with residual treatments significantly reduced *Ae. albopictus* presence, and limited their return to these cryptic habitats.



EVALUATION OF 5 TRAP TYPES FOR THE CAPTURE OF *CULISETA MELANURA* AND *COQUILLETIDIA PERTURBANS* IN A EEE HOTSPOT:

In 2016, AMCD sentinel chickens repeatedly tested positive for EEE at the Cartwheel Bay sentinel chicken site. EEE vectors were investigated near Cartwheel bay using five different trap types, with the goal of determining the optimal trap for the capture of two EEE vectors *Culiseta melanura* and *Coquilletidia perturbans*. The five traps analyzed for this assay were the gravid, resting, Mosquito Magnet X, SMACK, and Biogents Sentinel traps. The mosquitoes captured in each trap were identified and most of the mosquitoes caught were not EEE vectors. Over the 10 day period, the traps that captured the highest abundance of mosquitoes were the Mosquito Magnet X trap, the Biogents sentinel trap, and the gravid trap. The two traps that caught the least abundance of mosquitoes were the SMACK and Resting traps. Across the 10 day period, the traps did not perform well for capturing the two target species. The majority of mosquitoes caught were *Aedes atlanticus*, a floodwater species, but the results of this study will help AMCD develop a trap that specifically captures EEE vectors.



THE EFFECTS OF EARLY EXPOSURE TO ATSB ON MALE *AEDES ALBOPICTUS* SURVIVORSHIP AND FEMALE REPRODUCTION:

Dr. Wang 'Andy' Fei works for the Hongkou CDC in Shanghai and joined us at AMCD for the summer to work on a project involving Attractive Targeted Sugar Baits (ATSB). Previous studies with ATSB found they can significantly reduce the egg laying rate and successful hatch rate of the next generation of mosquitoes. We hypothesize that the early death of male mosquitoes exposed to ATSB results in decreased mating frequency, which reduces the number of progeny in the next generation. This hypothesis was tested through early exposure of males to ATSB with minimal exposure to females. After comparing treatment to control groups, this study observed a reduction in male survivorship within 24 hours while females were minimally affected. The early treatment of males with ATSB resulted in a reduction in egg deposition and successful hatch rate. To conclude, this study showed that the early exposure of male mosquitoes to ATSB results in a lower abundance of progeny in the next generation. This study contributes valuable information about how ATSB affects the subsequent generation.



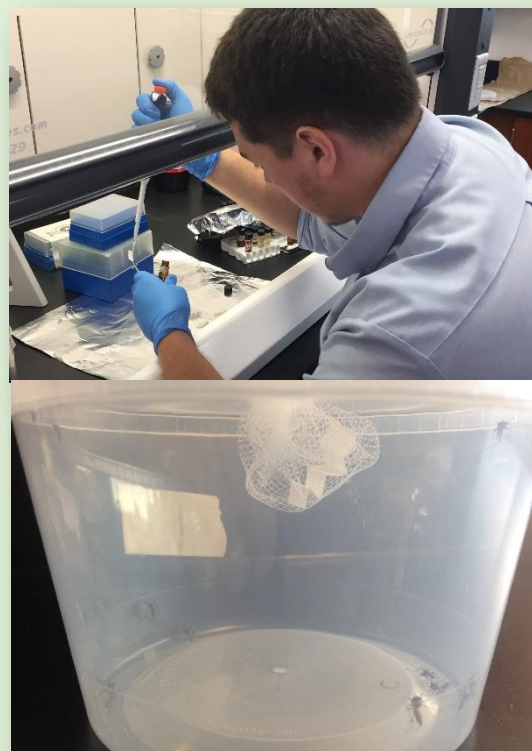
INSECTICIDAL EVALUATION OF THREE SPATIAL REPELLANT CANDLES AGAINST *AEDES AEGYPTI*.

Dr. Shen 'Sarah' Yuan is the Director of the Department for Disinfection and Vector Control at the Wuxi CDC, China. She visited AMCD over the summer to investigate how some commercial products could be used to combat urban disease vectors. She sampled three candle products: The OFF! Mosquito Lamp with 9.1% metofluthrin, the Insecticandel with 4% transfluthrin, and the Rescue DecoShield with 32.26% clove oil, 32.26% lemongrass oil, 32.26% peppermint oil, and 3.22% cinnamon oil. Comparative efficacy showed only the OFF! Mosquito Lamp to cause more than 50% mortality when used against *Aedes aegypti*. When tested for range in an outdoor field, the product still killed greater than 90% of mosquitoes, up to 6 meters away, and killed mosquitoes as far away as 15 meters.



EVALUATION OF VAPOR ACTIVE INSECTICIDES AGAINST MULTIPLE VECTOR SPECIES:

Some pyrethroids easily transition into vapors without being especially formulated to do so. These volatile pyrethroids are a relatively unexplored group for insecticides. Toxicity information exists for pyrethroids as droplets or contact insecticides, but the vapors, by themselves, have never been screened as insecticides. These chemicals are already used in spatial repellents in products such as the ThermaCELL or OFF! Clip-on. Other work has shown those repellents to be insecticidal. Therefore, a subset of commercially available ingredients were selected because of both a global and domestic history of use as spatial repellents: flumethrin, prallethrin, transfluthrin, and metofluthrin. These chemicals are being applied to *Aedes aegypti*, *Aedes albopictus*, *Culex quinquefasciatus*, and *Anopheles quadrimaculatus*. It has been found so far that transfluthrin has a high toxicity to mosquitoes, with lower than 0.01 part per million in air being required to kill vectors. Metofluthrin is the second most active, followed by prallethrin, and lowest with flumethrin. Work is ongoing. This study is funded by the Florida Department of Agriculture and Consumer Services Project P0010729 through UF.



APPLIED RESEARCH (Cont'd)



Completed AMCD Applied Research Projects 2016

Residual efficacy of three pump sprayers using Aqualuer 20/20 as a barrier treatment against *Aedes albopictus* ~ Ms. Jesse Crosier

Toxicity of vapor active insecticides for multi-vector control ~ Mr. Christopher Bibbs, in collaboration with the University of Florida

Field evaluation of 5 kinds of traps to collect adult mosquitoes in the EEE spot, Northeastern Florida ~ Dr. Daniel Dixon

Collaboration Research Projects 2016

California desert landscape plant survivorship of *Aedes aegypti* ~ Ms. Jesse Crosier, in collaboration with Coachella Valley Mosquito Control

Impact of three species of aquatic plants on survival of *Anopheles quadrimaculatus* and its effect on the efficacy of ATSB ~ Mr. Kai Blore, in collaboration with University of Miami and funded by The Mosquito Research Foundation

Laboratory and field evaluation of ATSB bait stations against *Culex quinquefasciatus* in St. Augustine ~ Mr. Kai Blore, in collaboration with the Westham Co. and the University of Miami

Insecticidal evaluation of three spatial repellent candles against *Aedes aegypti* (Diptera: Culicidae) ~ Dr. Shen Yuan (Sara), in collaboration with the Wuxi CDC, China

Evaluation of insecticide formulations from MGK against *Aedes aegypti* in laboratory and semi-field studies ~ Mr. Christopher Bibbs, in collaboration with the University of Florida – Florida Medical Entomology Laboratory (FMEL)

Honey card virus surveillance ~ DACS grant – University of Florida

Killing male *Aedes albopictus* using boric acid sugar baits and its impact on female fecundity and egg hatching rate ~ Dr. Fei Wang and Dr. Daniel Dixon, in collaboration with Hongkou CDC, Shanghai

Field evaluation of DeltaGuard and Aqualuer 20-20 in St. Augustine ~ Dr. Mohamed Sallam, in collaboration with the University of Florida

Insecticide resistance surveillance for *Aedes* mosquitoes cooperated with University of Florida/FMEL

Ongoing Applied Research Projects Continued in 2017

Optimizing molecular assays for the detection of arboviruses from mosquito pools ~ Dr. Daniel Dixon

Bromeliads as habitat and potential sugar source for mosquitoes

Eradication of *Aedes aegypti* from the tourist district of downtown St. Augustine, Florida

Field evaluation of larvicides against *Aedes albopictus* and *Culex quinquefasciatus* in bromeliad plants

Aedes mosquito gut's bacterial ecosystem, in collaboration with New Mexico State University

New trap evaluation (ovitraps and adult mosquito traps)

GIS/RS for impact of development on mosquito-borne diseases and mosquito population in the past 10 years

ST. JOHNS COUNTY SCHOOL PROGRAMS:

St. Johns County's first youth apprenticeship program was established between AMCD and the Coastal Academy of Water Resources at St. Johns Technical High School. This program pre-screens students by testing the Public Health Pest Control License curricula so that students are ready to receive licensure on arrival as an AMCD intern. The combined novelty of the program and classroom efforts of the EDU earned AMCD the Rookie Business Partner of 2015/16 award.

**School Program Growth**

In 2016 the AMCD taught at 26 different schools in St. Johns County (24% increase > 2015), reaching 2,942 students across K-12 (34% increase > 2015). The participating schools included Elementary Schools: Mill Creek, Hickory Creek, Otis Mason, MK Rawlings, Osceola, RB Hunt, Wards Creek, Hartley, RB Hunt, Durbin Creek, Liberty Pines, South Woods, Cunningham Creek, Webster School, Palencia, and Julington Creek; Middle Schools: Landrum, Palm Valley, Valley Ridge Academy, St. Joseph Academy, Liberty Pines Academy, Switzerland Point, Cathedral Parish, and Crescent Baptist Academy; High Schools: St. Johns Technical, , St. Joseph Academy, Ponte Vedra, and Pedro Menendez.

COMMUNITY EVENTS/PUBLIC OUTREACH:

The AMCD was involved in 89 public outreach programs in 2016 (33% increase > 2015). Zika created a sharp increase in demand for mosquito and mosquito-borne illness education. The St. Johns County Department of Health began collaborating both as incident management team members as well as outreach educators alongside AMCD to fill the demands. The impact for 2016 is 19,023 outreach participants (12% increase > 2015). Professional audiences were a particular emphasis, with 1,457 healthcare and service professionals reached as part of the address of Zika.



Education and Outreach Intern, Jesse Crosier



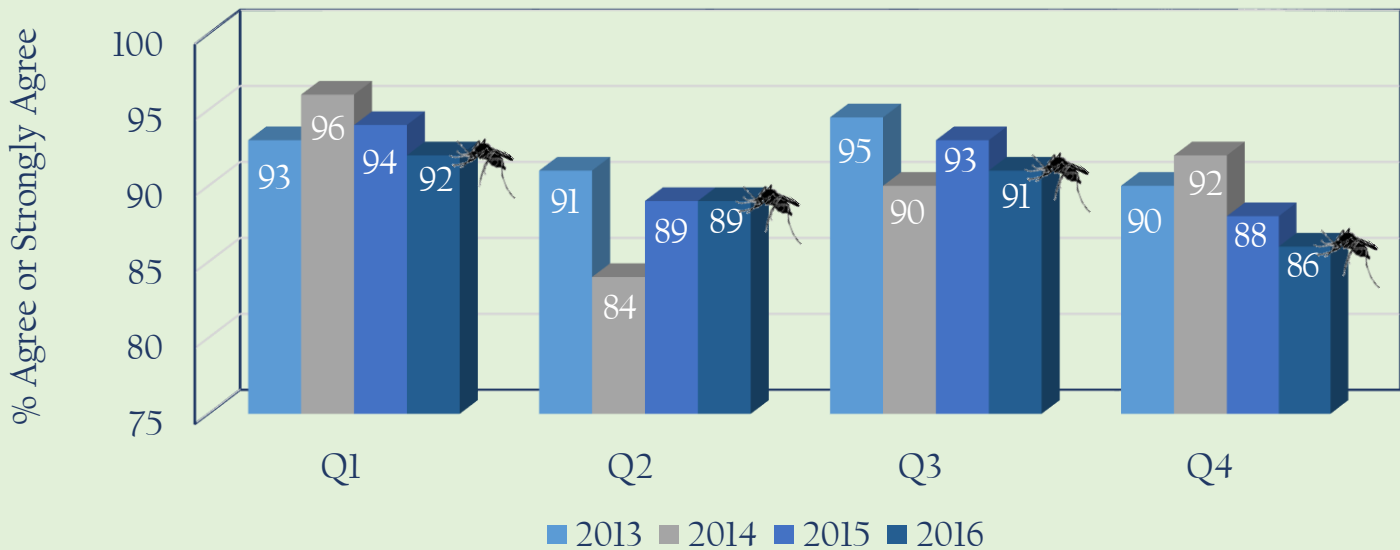
Apprenticeship Student and Summer Tech, Jeremy Wohlforth

MEDIA RELATIONS:

AMCD received extensive media attention with Zika virus, the resurgence of *Aedes aegypti* in downtown St. Augustine, Hurricane Matthew, and the post hurricane aerial spray operation. The AMCD was featured in 50 newspaper articles (4x increase > 2015, 2x increase > 2014), 49 television news broadcasts (10x increase > 2015, 5x increase > 2014), and 12 radio interviews (2% increase > 2015, 2x increase > 2014). This totals 111 media segments during 2016.



Customer Satisfaction Response History

Question

1. The goal of AMCD is to preserve and protect the community from mosquitoes and mosquito-borne diseases by reducing nuisance and disease spreading mosquito populations.
2. AMCD staff is informative and professional.
3. AMCD responds to my service requests within the standard 1-2 business days.
4. I am aware of and actively participate in DRAIN and COVER methods.

2016 CUSTOMER SATISFACTION SURVEY RESULTS

AMCD continues to gauge customer satisfaction using both physical and internet surveys. For 2016 there were 105 physical surveys returned and 13 internet surveys returned, for a total of 118 returned surveys.

Organized and attended by AMCD staff and commissioners:

January 20: Dr. Xue and Mr. Bibbs attended the FCCMC meeting at the UF/Whitney Lab.

January 22: Dr. Xue and Commissioner Moeller attended the FMCA Board teleconference meeting.

January 25-28: Four Commissioners and several employees attended the Dodd Short Courses. Commissioner Moeller organized and led the Commissioner's Caucus.

February 7-11: Four Commissioners, Director, Field Biologist, and Education Specialist attended AMCA annual meeting and Dr. Xue organized a symposium on Vector Control Response to Suspected Human Cases.

February 12: Dr. Xue, three staff, and Commissioner Browning attended the Department of Health (DOH) meeting on Zika control. Dr. Xue gave a presentation on Zika Vector in St. Johns County.

February 22-23: Two commissioners & two employees attended the FMCA Tallahassee Legislation meeting.

March 1-3 Dr. Xue attended and gave a presentation at the New Jersey Mosquito Control Association annual meeting, Atlantic City, NJ.



March 9. AMCD and NECE collaboration meeting.

March 29-31: AMCD/USDA/CMAVE organized the 13th annual Arbovirus Surveillance and Mosquito Control Workshop in conjunction with NE 1443 Project's 2nd annual meeting.

April 19: Dr. Xue & Mr. Bibbs attended multiple project management national trainings.

May 2. Dr. Xue attended and gave a talk on Zika at the DACS Zika Conference, Gainesville, FL.

May 10-15. Dr. Xue attended the Jiangsu Vector Surveillance and Management Conference and gave a talk on Professor Lu's contributions.

May 17-18. Dr. Xue, Commissioner Moeller, and Mr. Weaver attended the FMCA Financial and Board meeting in Apopka, FL.

June 7: AMCD hosted the Master Gardens Zika Workshop and gave a talk on Zika vectors.

June 22: AMCD held St. Johns County DOH & AMCD Collaboration mtg.

July 7. Attended DOH and EOC concerning Zika response table exercises.

August 8: Dr. Xue, Commissioner Howell, and Mr. Bibbs attended Governor Scott's Roundtable meeting on Zika control.

August 17: AMCD hosted the DOH Leadership Council meeting.

August 29. Held the DOH & AMCD Zika Collaboration meeting.

September 11. Dr. Xue & Commissioner Moeller attended annual SOVE mtg.

September 25-30. Dr. Xue attended XXV International Congress of Entomology, Dr. Xue organized a symposium about Medical & Veterinary Entomology in Orlando, Florida. Mr. Bibbs and Dr. Xue gave presentations. Dr. Xue was elected as the President of the Florida Entomology Society.

November 7-10. Dr. Xue attended the 6th International Forum for Management of Disease Vectors and gave a talk on ULV during his vacation in China.

November 14-16. Commissioner Moeller and 7 employees attended the FMCA annual meeting and gave 10 presentations. Dr. Xue was elected as the President and Mrs. Moeller was re-elected as the Commissioner Chair.

November 17. Dr. Xue attended the DACS's SIT/IIT meeting in Tallahassee, FL.

December 3-8. Dr. Xue attended the WHO/TDR/WIN International Workshop on Insecticide Resistance and Alternative Control Methods and gave two talks on repellents and ATSB in Rio de Janeiro, Brazil.



February 7-11, 2016: American Mosquito Control Association annual meeting, Savannah, Ga.
Qualls, WA, Muller, GC, **Xue, RD**: Evaluation and adaptation of ATSB for control of mosquitoes in Coachella Valley, California.

Farooq, M, **Gibson, J.**, **Drake, LL**, **Smith, ML**, Anderson, J, Cilek, J, **Xue, RD**: Effect of ground travel speed on dispersion and efficacy of truck mounted ULV sprayer against caged *Aedes aegypti*.

Bibbs, C, **Xue, RD**: OFF! Clip-on repellent device with Metofluthrin tested on *Aedes aegypti* for mortality at different time intervals and distances.

Smith, ML, Camelio, K, **Gibson, J**, **Drake, LL**, **Xue, RD**: Evaluation of three electric-powered hand-held ULV foggers with Aqualuer 20-20 against *Aedes albopictus*.

Xue, RD: AMCD's Response to suspect human cases in St. Johns County, northeast Florida.

Burkett-Cadena, N, Unnasch, T, **Gibson, J**, **Xue, RD**, McNelly, J, Lauth, M, VanOlphen, A: Honey-card surveillance of arboviruses in Florida: Can we beat the chicken?

March 29-31, 2016: 13th annual Arbovirus Surveillance and Mosquito Control Workshop, St. Augustine, FL.

Xue, RD: AMCD's mosquito vector control response to suspected human cases and plan for applied research at the new Base Station Complex.

Gibson, J: Arbovirus surveillance report in St. Johns County in 2015.

Scott, JM: Mosquitoes and non-target insects and attractive target sugar baits.

Drake, LL: DeltaGard against *Aedes albopictus* in St. Augustine South.

Bibbs, C: Thermal Cell & OFF! Clip-on devices tested for repellency and mortality against the lone star ticks.

Anderson, C: Autodissemination of Methoprene against *Aedes albopictus*.

Smith ML: Evaluation of three commercial hand ULV foggers operated by electricity against adult mosquitoes.

May 13-15, 2016: Jiangsu Vector Surveillance and Management Conference, Changsu, China.

Xue, RD: Invited presentation: Integrated Mosquito Management, memorial of Professor Baolin Lu's 100 years.

August 19, 2016: AMCD's Intern Students and Visiting Scientist Presentation.

Shen, Y: Seminar on overview of Wuxi CDC vector surveillance and control program.

Crosier, J: Evaluation of battery-operated hand sprayers against a regular hand sprayer to control *Aedes albopictus* in St. Augustine.

Boiel, K: Impacts of three common species of aquatic plants on survival of *Anopheles quadrimaculatus* and ATSB against storm drain water mosquitoes in St. Augustine, FL.

September 11-15, 2016: 47th Annual SOVE Conference, Anchorage, Alaska.

Xue, RD: Symposium presentation: Plant/sugar feeding and ATSB against mosquitoes.



Bolded Names are AMCD Staff and Employees

September 25-30, 2016: XXV International Congress of Entomology, Orlando, Florida, USA.

Xue, RD: Benefits from applied research and collaboration through AMCD.

Drake, LL, Lippi, C, Xue, RD, presented by C. Bibbs: Bromeliads as habitat and potential sugar resources for mosquitoes.

Bibbs, C (presented), Xue, RD: Intern student projects on ATSB.

Qualls, WA, Xue, RD, Muller, GC: Impact of vegetation types on efficacy of ATSB against two species of *Culex* mosquitoes.



September 29, 2016: Seminar at AMCD, St. Augustine, FL

Dr. Tong-Yan Zhao, Beijing Institute of Microbial & Epidemiology: Zika vectors in China for AMCD employees.

November 8-11, 2016: 6th International Forum for Sustainable Management of Disease Vectors, Chongqing, China.

Xue, RD: ULV and its impact on efficacy of adulticides against mosquitoes in residential areas.

November 13-17, 2016: 88th Annual Meeting of the FMCA, Miramar Beach, FL.

Xue, RD, Gibson-Corrado, J, Smith, ML: *Aedes aegypti* eradication efforts in downtown St. Augustine and additional costs.

Gibson-Corrado, J, Crosier, J, Bibbs, C, presented by J. D'Amato: Evaluation of battery-operated hand sprayers against a regular hand sprayer to control *Aedes albopictus* in St. Augustine, FL.

D'Amato, J, Smith, ML, Gibson-Corrado, J: Control effectiveness of *Aedes albopictus* and *Ae. aegypti* by larviciding and adulticiding in downtown St. Augustine, FL.

Bibbs C, Xue, RD: Preliminary evaluation of vapor insecticides against multiple mosquito vectors.

Weaver, R, Xue, RD: Construction experience of AMCD complex.

Gaines, MK, Xue, RD(presented by) : Response to suspected human cases at AMCD.

Sallam, M, Pereira, RM, Xue, RD: Ecological niche modeling of mosquito vectors of WNV in St. Johns County, Florida.

Dixon, D, Xue, RD: Field evaluation of five kinds of traps to collect adult mosquitoes in the EEE spot, Northeastern Florida.

November 22, 2016: Seminar at AMCD, St. Augustine, FL

Dr. Fei Wang, Hongkou CDC, Shanghai: CDC vector surveillance program and study report on ATSB for AMCD employees.

December 5-8, 2016, International Workshop on Insecticide Resistance in Vectors of Emerging Arboviruses: Challenge and Prospects for Vector Control, Rio de Janeiro, Brazil.

Xue, RD: New repellent for personal protection against arbovirus vectors.

Xue, RD, Qualls, WA: ATSB (boric acid) against arbovirus vector mosquitoes.

December 21-23, 2016, Invited Seminar at Sterling International, Inc. Spokane, WA.

Xue, RD: Commercial traps and repellents used in operation control of mosquitoes.

Bolded Names are AMCD Staff and Employees



1. Fulcher, A, Farooq, M, Richardson, AG, **Smith, ML**, Scott, JM, Gaines, MK, Xue, RD: 2016. Characteristics and efficacy of three commercial handheld thermal foggers with pyrethroid insecticides against three species of mosquitoes, JAMCA32:44-50.
2. Bibbs, CR, Xue, RD: 2016. Off! clip-on repellent device with Metofluthrin tested on *Aedes aegypti* (Diptera: Culicidae) for mortality at different time intervals and distances. J. Med. Entomol. 53:480-483.
3. Weaver, JH, Lippi, C, Sallam, MF, Gaines, MK, Xue, RD: 2016. Arbovirus surveillance report in St. Johns County, Florida, 2008-2014. Techn. Bull. Florida Mosq. Control Assoc (TBFMCA) 10:14-17.
4. Liu, MD, Dong, YD, Zhang, GL, Zheng, Z, Xue, RD, Zhao, TY: 2016. Mosquito species composition and impact of trapping sites on floodwater mosquitoes, *Aedes vexans* in Xingjiang, China, TBFMCA 10:39-43.
5. Thomson, EH, Scott, JM, Fulcher, A, **Smith, ML**, Koehler, P, Xue, RD: 2016. Evaluation of power breezer and misting citronella oil against *Aedes albopictus*, TBFMCA 10:70-75.
6. Gibson, J, Xue, RD, **Smith, ML**: 2016. Field comparison of thermal fog application of Sumithrin and barrier spraying of Talstar against *Aedes albopictus* in residential yards, St. Augustine, Florida. TBFMCA 10:96-98.
7. Fulcher, A, Xue, RD, Scott, JM, **Smith, ML**, Gaines, MK, Weaver, JH: 2016. Field evaluation of Mosquiron 0.12CRD against *Culex quinquefasciatus* in storm drains, downtown St. Augustine, Florida, TBFMCA 10:54-58,
8. Davidson, CA, Scott, JM, Hossain, TH, Beier, JC, Xue, RD: 2016. Relationship between citizen knowledge, vegetation coverage, and frequency requests for mosquito control service in St. Johns County, Florida. TBFMCA 10:30-38.
9. Xue, RD, Scott, JM, Fulcher, A, Qualls, WA, Henlzer, JM, Gaines, MK, Weaver, JH, Debboun, M: 2016. Laboratory and field evaluation of Off! clip-on mosquito repellent device with Metofluthrin against the lone star tick, *Amblyomma americanum* (Acari: Ixodidae), TBFMCA 10:85-90.
10. Xue, RD, Qualls, WA, Kline, DL: 2016. Population reduction of mosquitoes and biting midges after depolyment of mosquito magnet traps at a large golf course adjacent to salt marsh habitats in St. Augustine, Florida, TBFMCA 10:59-63.
11. Xue, RD: 2016. Host-seeking and blood-feeding behavior of *Aedes albopictus*. TBFMCA 10:2-13.
12. Sallam, M, Lippi, C, Xue, RD: 2016. Spatial analysis of arbovirus transmission in St. Johns County, Florida. TBFMCA 10:18-29.

❖ **Bolded Names are AMCD Staff and Employees**

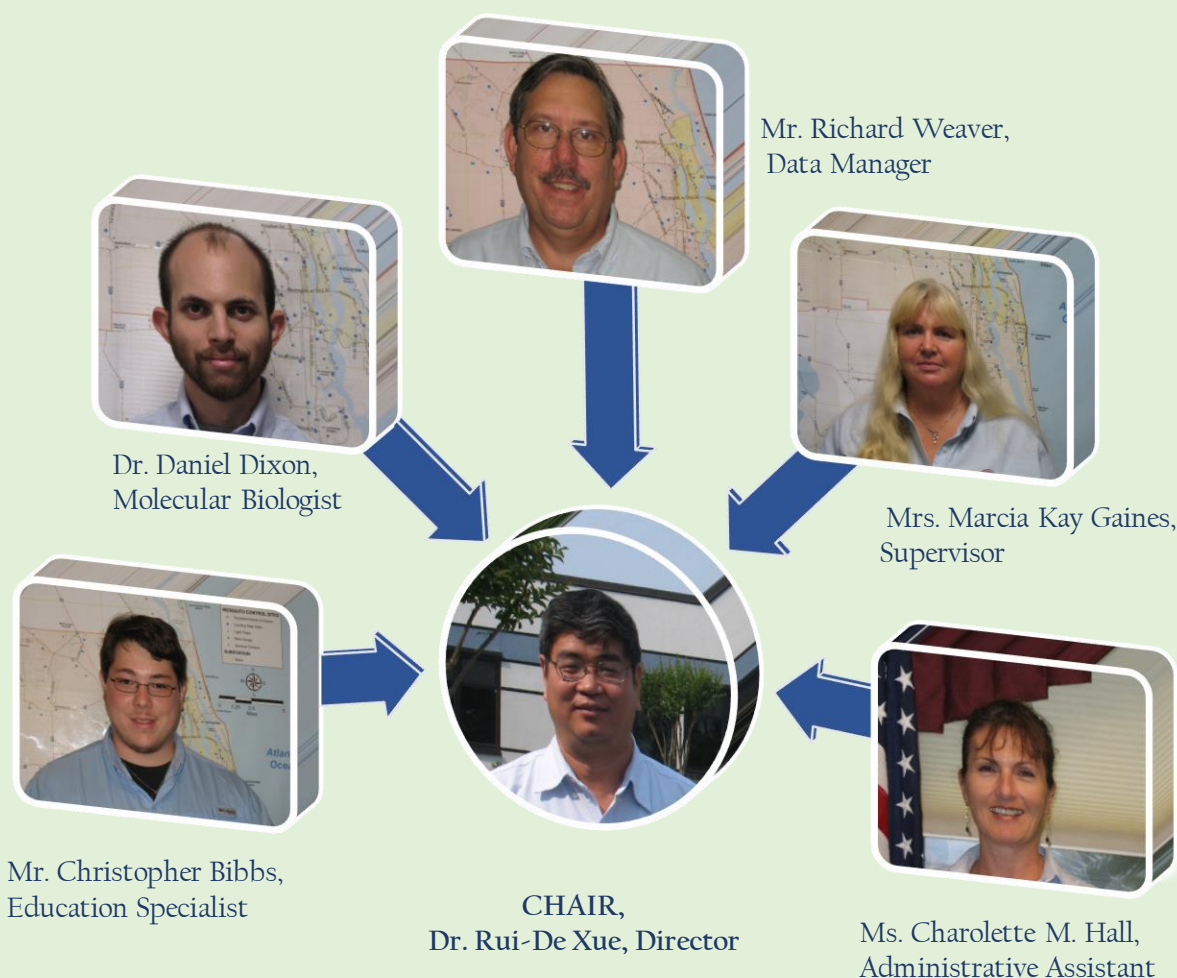


13. **Simth ML**, Qualls, **Xue, RD**: 2016. Evaluation of talent UV light traps compared with CDC light traps with or without dry ice to collect fresh and salt water mosquitoes in Northeast Florida. TBFMCA 10:91-92.
14. **Fulcher, A**, Shirley, **R**, **Smith, ML**, **Scott, JM**, **Xue, RD**: 2016. Field comparison of three commercial traps and five attractants in northeast Florida. TBFMCA 10:50-53.
15. **Anderson, C**, **Scott, JM**, **Fulcher, A**, Muller, GC, **Xue, RD**: 2016. Sublethal doses of attractive toxic sugar bait with the insect growth regulator, Pyriproxyfen, did not effect on survival or fecundity of *Aedes albopictus*. TBFMCA 10:64-69.
16. **Bibbs, C**, **Anderson, C**, **Smith, ML**, **Xue, RD**: 2016. Bifenthrin barrier spray against *Aedes albopictus* around an urban cemetery, St. Augustine, Florida. TBFMCA 10:76-80.
17. **Scott, JM**, **Fulcher, A**, **Henlzer, J**, **Xue, RD**: 2016. Laboratory evaluation of seven insect repellents against the lone star tick, *Amblyomma americanum*. TBFMCA 10:81-84.
18. **Scott, JM**, **Fulcher, A**, Qualls, WA, Muller, GC, **Xue, RD**: 2016. Effects of leaf washing on the persistence of a sugar bait- Pyriproxyfen mixture to control larval *Aedes albopictus*. TBFMCA 10:93-95.
19. **Camelio, K**, **Gibson J**, **Smith ML**, **Drake LL**, **Xue RD**: 2016. Evaluation of three commercial handheld ULV foggers with Aqualure 20-20 against adult *Aedes albopictus*. JAMCA 32:32:163-166.
20. **Gibson J**, **Smith ML**, **Xue RD**, Ren DS: 2016. Evaluation of a new thermal fog machine for control of adult *Aedes albopictus* in a large enclosed space. JAMCA 32:167-170.
21. **Drake LL**, **Gibson J**, **Smith ML**, Farooq M, **Sallam MF**, **Xue RD**: 2016. Evaluation of DeltaGard ground application against *Aedes albopictus* in a residential area in St. Augustine, Florida, JAMCA 32:160-162.
22. **Bibbs CS**, **Xue RD**: 2016. ThermaCELL and OFF! Clip-On devices tested for repellency and mortality against *Amblyomma americanum* (Acari: Ixodida: Amblyommidae). J. Med Entomol 53:861-865.
23. **Bibbs, CS**, **Anderson, C**, **Xue, RD**: 2016. Autodissemination of insect growth regulator, Methoprene, with two formulations against *Aedes albopictus*. JAMCA 32:247-250.
24. **Burkett-Cadena ND**, **Gibson J**, Laugh M, Stenn T, Acevedo C, **Xue RD**, McNelly J, Northey E, Hassan HK, **Fulcher A**, Bingham AM, Van Olphen J, Van Olphen A, Unasch TR: 2016. Evaluation of the honey-card technique for detection of transmission of arboviruses in Florida and comparison with sentinel chicken seroconversion. Journal of Medical Entomology 53:1449-1457.
25. **Sallam MF**, **Xue RD**, Pereira RM, Koehler PG: 2016. Ecological niche modeling of mosquito vectors of West Nile Virus in St. Johns County, Florida, USA. Parasites and Vectors 9:371.
26. **Wu, TP**, **Tian, JH**, **Xue, RD**, Fang, YL, Zheng AH: 2016. Mosquito (Diptera: Culicidae) habitat surveillance by android mobile devices in Guangzhou, China. Insects 7:79.

❖ **Bolded Names are AMCD Staff and Employees**

ANNUAL PROGRAM REPORT

COMMITTEE MEMBERS



IN APPRECIATION

We would like to thank all residents of St. Johns County for their support, as well as the AMCD Board of Commissioners, the District's attorney and CPA, all employees, colleagues, and all contractors, cooperative organizations and agencies for their help in 2016.