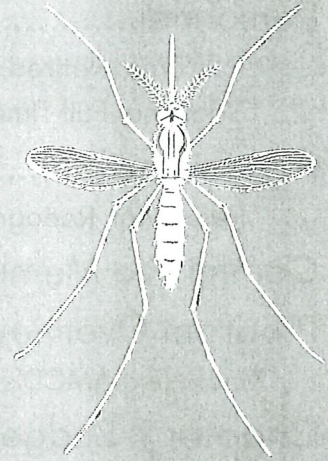


# ANASTASIA MOSQUITO CONTROL DISTRICT



OF ST. JOHNS COUNTY

ANNUAL PROGRAM  
REPORT  
FOR 2020

As an essential business AMCD  
continued all operations through the  
Covid-19 pandemic.

120 EOC Drive,  
St. Augustine,  
FL 32092

(904) 471-3107

[www.amcdsjc.org](http://www.amcdsjc.org)



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## Message from Chairperson of the Board of Commissioners

In 2020, our district, as an essential business, continued to provide excellent service during the COVID-19 (Coronavirus) pandemic. The Board of Commissioners approved to build the third outdoor screened enclosure due to the increased demand for usage. We approved the

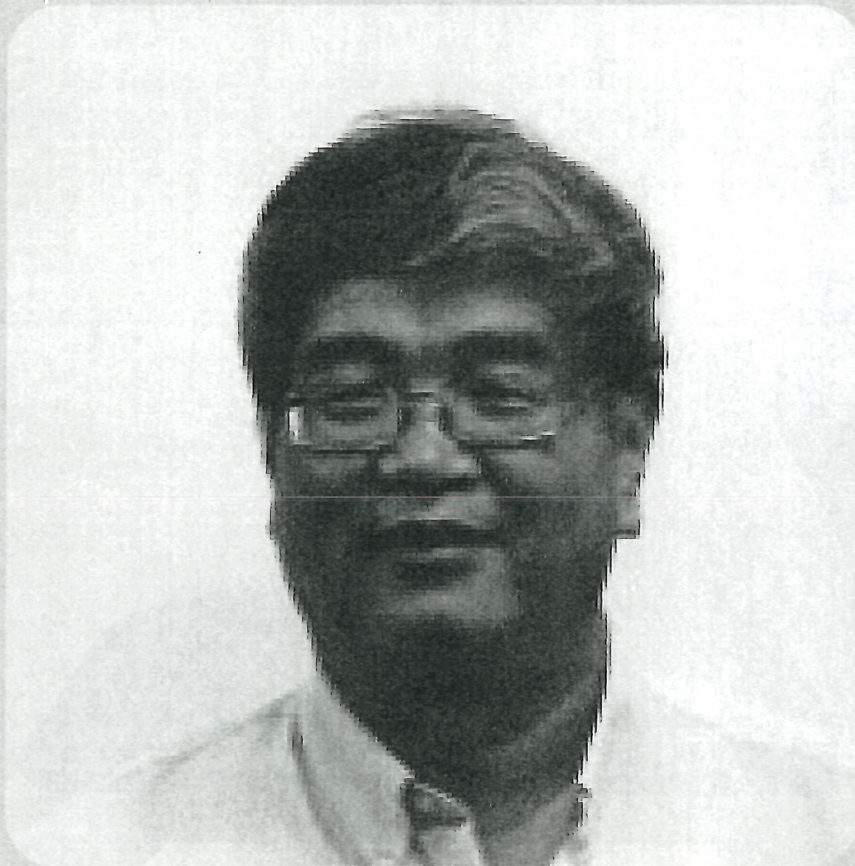
Disease Vector Education building design, site design, and construction. The Board authorized work on the Sterilized Insect Technique (SIT) building to include concept plan, proposals, documentation, support letters, and searching for local legislators' support for state appropriation dollars and to seek possible grant funding support. The Board approved and purchased two helicopters from military surplus. The Board reduced the millage rate from 0.210 to 0.205. During the 2020 election, AMCD's Board of Commissioners had three open seats. Each seat had three candidates running. Commissioner Donald Girvan retired from the Board. Commissioner Gina LeBlanc got re-elected, Commissioner Catherine Brandhorst got elected after a two-year break, Gayle Gardner got elected to replace Commissioner Gary Howell who served the board for a total of 16 years. We wish good health and safety for former Commissioners Girvan and Howell and welcome new Commissioners Gardner and Brandhorst.



**Mrs. Jeanne Moeller**

## Message from The Director

There was not any international travel associated or locally- acquired mosquito-borne diseases in St. Johns County in 2020. St. Johns County residents have been free of any locally- acquired mosquito-borne diseases for the past 17 years. The National Association of City and County Health Officers (NACCHO) awarded AMCD a mentorship to provide training for Columbia County Department Health's Vector Control Division. Due to the COVID-19 pandemic the AMCA annual meeting for March 16-20, 2020 in Portland, Oregon, and the annual AMCD Arbovirus Surveillance and Mosquito Control Workshop for March 30th through April 1, 2020, were canceled. AMCD received about \$786k for a three-year grant from DoD to study evidence-based decision action thresholds, \$680K for 2-year grant funds from CDC under the collaboration with the University of Florida to research and develop smart cages for mosquito adulticiding evaluation, continued receiving the CDC /DOH/DACS funds for SIT project under collaborations with UF and USDA/Center for Medical, Agricultural and Veterinary Entomology (CMAVE), and several other company's funds for spatial repellent, traps and trapping technology, and evaluation of new insecticides and new formulations. These grant funds benefited AMCD's operation programs and assisted AMCD in hiring 4-5 grant contracted full-time Scientists and Biotechnicians, 1 visiting scientist, and 7 intern students. AMCD enhanced arbovirus detection capability in-house, and the aerial program purchased 2 more helicopters (Bell 206 III) from military surplus. I am happy to have received the Leadership Award for innovation technology from the Governmental Technology's Special Districts, the Southeastern Region. I thank and appreciate the Board of Commissioners, all employees, and collaborators for their strong support, especially under the COVID-19 pandemic condition in 2020.



**Dr. Rui-De Xue**

# Board of Commissioners



**Mrs. Jeanne Moeller**  
Seat 2  
2007-2022

**Mr. Gary Howell**  
Seat 5  
20013-2020



**Mrs. Gena LeBlanc**  
Seat 1  
2017-2020

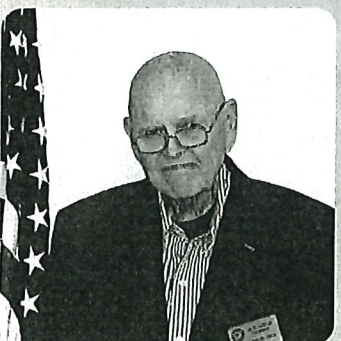


**Mrs. Panagiota K. "Trish" Becker**  
Seat 4  
2019-2022



**Mr. Don Girvan**  
Seat 3

2018-2020  
Appointed 12-7-18  
through 12-30-20



# Appointed Offices



**Mr. Wayne Flowers**  
Attorney Since: 11-9-10



**Ms. Julieann Klein**  
CPA Since: 9-11-03



**Dr. Rui-De Xue**  
Hired: 4-14-03  
Director Since: 2005



# Full Time Employees

**Johns Freddie Allen**



Mechanic  
7-08-2002-present

**Steven Kyle Arber**



Mosquito Control Technician  
5-01-2017-present

**Dr. Vindhya Aryaprema**



FT Grant Funded Term Limited Biologist  
8-05-2019 to 7-15-2023

**Dena Autry**



Assistant Supervisor  
8-24-2015-present

**Kai Blore**



Biological Lab Technician  
4-02-2019-present

**Ralph Bruner**



A & P Aircraft Mechanic  
9-03-2019-present

**Courtney Cunningham**



Mosquito Control Technician  
4-06-2020-present

**Morgan Duett**



Mosquito Control Technician, Surveillance  
2-06-2019-present

**Dr. Muhammad Farooq**



Field Biologist  
9-16-2019-present

**Marcia Kay Ganes**



Operations Manager  
8-07-2000-present

**Scott Hanna**



Accountant/Chief Financial Officer  
7-03-2007-present

**Cathy Hendricks**



Mosquito Control Technician  
7-08-2002-present

**Jerry Isler**



Mosquito Control Technician  
2-02-2015-present

**Dr. Steven Paper**



Molecular Entomologist/Biologist  
3-23-2020-present

**Michael Phillips**



PT Pilot/PT Mosquito Control Technician  
2-24-2020-present

**Dr. Whitney Qualls**



Entomologist/Scientific Manager  
10-28-2019-present

**Dana Smith**



Chief Pilot/Aviation Manager  
4-27-2020-present

**Steven Smoleroff**



Biological Technician  
10-02-2017-present

**Madeline Steck**



FT Grant Funded Term Limited Biological Technician  
10-01-2020 to 9-30-2022

**Rick Stockley**



Mosquito Control Technician  
2-04-2013-present

**David Strickland**



Mosquito Control Technician  
3-10-1997-present

**Olivia Sypes**



FT Grant Funded Term Limited Mosquito Control Technician  
4-06-2020 to 7-15-2023

**Heather Ward**



Biological Technician  
4-27-2020-present

**Richard Weaver**



Business Manager  
4-14-2003-present

**Jeremy Wohlforth**



Mosquito Control Technician  
2-06-2017-present

**James Wynn**



Mechanic  
3-04-1996-present

**Dr. Rui-De Xue**



Director  
4-14-2003-present

**Edward Zeszutko**



Education Specialist  
5-13-2019-present

## Retired



**Charollette Hall**  
Administrative Assistant  
11-05-2007 to 4-30-2020



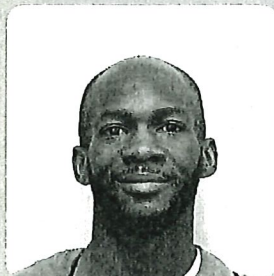
**Barry Scott**  
Mosquito Control Technician  
3-03-2014 to 4-30-2020

## Deceased



**Patrick Kendrick**  
Mosquito Control Technician  
4-07-2003 to 3-24-2020

## Full Time Seasonal (6 month) Employees



**Dazmond Hackney**  
Inspector/Sprayer  
6-01-2020 to 10-30-2020



**James Stockley**  
Inspector/Sprayer  
6-01-2020 to 10-30-2020



**Philip Vaughn**  
Inspector/Sprayer  
6-01-2020 to 10-30-2020

## Interns and Volunteers



**Jessica Baynocky**  
Intern/Seasonal  
1-06-2020 to  
10-30-2020



**Madeline Steck**  
Intern  
5-04-2020 to  
7-31-2020



**Dylan Rodriguez**  
UF Intern AMCD Intern  
7-21-2020 to 9-18-2020  
UF  
9-21-2020 to 12-17-2020  
AMCD



**McKinley Chapman**  
Intern  
8-17-2020 to  
12-18-2020



**Lea M. Bangonan**  
Intern  
6-03-2019 to  
10-30-2020



**Mandi Pearson**  
UF Intern  
AMCD Intern  
6-03-2019 to  
10-30-2020



**Olivia Sypes**  
Intern  
1-06-2020 to  
4-06-2020

## Visiting Scientists



**Dr. Asghar Talbalaghi**  
Visiting Scientist  
Italian MC. Assoc.  
3-08-2020 to  
6-01-2020



**Dr. Stephen  
Dobson**  
Adjunct Senior  
Entomologist  
March 2020



**Dr. Gunter Muller**  
Adjunct Senior  
Vector Entomologist  
October 2018



**Dr. Michael Turell**  
Adjunct Senior  
Arbovirologist  
October 2018

## Adjunct Professors

# Administration Personnel and Recognitions

## Personnel

Our volunteer visiting scientist in 2020 was Dr. Asghar Talbalaghi from the Italian Mosquito Control Association (3-8-20 to 6-1-20). Parttime Volunteer, Dr. Michael Pogue, retired (6-11-20). We had four grant-funded, time-limited full-time (FT) positions in 2020. Dr. Vindhya Aryaprema from Sri Lanka was hired as a FT, 14-month Biologist (8-05-19 to 9-30-20) and then her contract was extended to 3 years (to 7-15-2023) through another grant. Ms. Courtney Cunningham was hired as a FT 14-month Biological Technician (8-05-19 to 4-06-20). Ms. Olivia Sypes (prior Intern) was promoted to the grant-funded FT 9-month Mosquito Control position (to take Ms. Cunningham's position; 4-6-20 to 12-18-20) and then Ms. Sypes was promoted to 3 years (to 7-15-2023). Ms. Madeline Steck (prior intern) was promoted to a 2-year FT grant-funded Biological Technician position (10-1-20 to 9-30-2022).

The seasonal interns that worked for AMCD were: Ms. Lea M. Bangonan (6-3-19 to 10-30-20), Ms. Mandi Pearson (8-5-19 through 10-30-20), Ms. Olivia Sypes (1-6-20 to 6-30-20), Ms. Jessica Baynocky (1-6-20 to 11-30-20), Ms. Madeline Steck (5-4-20 to 7-31-20), Mr. Dylan Rodriguez (UF intern working at AMCD from 7-21-20 to 9-18-20 and then hired by AMCD from 9-21-20 to 12-17-20), and Ms. Mckinley Chapman (8-17-20 to 12-18-20). From June 1st through November 19, 2020, we had two returning seasonal (5 month) inspector sprayers working at AMCD (Due to the COVID-19 Pandemic, the inspector sprayers started one month later than usual): Mr. Phillip Vaughn (5th yr.) and Mr. Dazmond Hackney (3rd yr.), as well as one new inspector sprayer, Mr. James Stokley (1st year). AMCD hired Mr. Michael Phillips in a full-time position as a part-time (PT) Pilot and PT Mosquito Control Technician (2-24-20), Dr. Steven Peper as the Molecular Entomologist (3-23-20), Mr. Dana Smith as the Chief Pilot/Aviation Manager (4-27-20), Ms. Heather Ward as a full-time Biological Technician (4-27-20), and Ms. Courtney Cunningham was promoted from the grant-funded limited position to a full-time Mosquito Control Technician beginning 4-6-20.

Mr. Patrick Kendrick, Mosquito Control Technician (4-7-03 to 3-24-20), sadly passed away 3-24-20. He is greatly missed. Mr. Barry Scott, Mosquito Control Technician, retired on 4-30-20. Mrs. Charolette Hall, Administrative Assistant, retired on 12-18-20.

## Recognitions and Awards

The following AMCD personnel received an award for their years of service with the District:

- Mrs. Dena Autry, Assistant Supervisor, for 5 years;
- Mr. Jerry Iser, Mosquito Control Technician, for 5 years;
- Mrs. Kay Gaines, Operations Manager, for 20 years;
- Mr. Michael Phillips for achievement in education and obtaining his B.S. Degree.

The Managements Choice Award this year went to Mr. David Strickland, Mrs. Dena Autry, and Mr. Kai Blore for their significant contributions and dedication to the District throughout the year.

Dr. Xue was given an award by the Governmental Technology's Special District for his leadership for innovation technology from the Southeastern Region.





## Committee Members 2020

### SAFETY COMMITTEE

<b>Business Mgr.</b> (Safety Coordinator)	Richard Weaver (Chair)
<b>Operations Mgr.</b>	Mrs. Marcia Kay Gaines
<b>Asst. Supervisor</b>	Mrs. Dena Autry
<b>A&amp;P Aircraft Mechanic</b>	Mr. Ralph Bruner
<b>Biological Technician</b>	Mr. Steven Smoleroff
<b>MC Technician, Surveillance</b>	Mr. Morgan Duett
<b>MC Technician</b>	Mr. Rick Stockley
<b>Mechanic</b>	Mr. John "Freddie" Allen

### APPLIED RESEARCH COMMITTEE

<b>Commissioner</b>	Mrs. Jeanne Moeller (Chair)
<b>Entomologist/Scientific Mgr.</b>	Dr. Whitney Qualls
<b>Business Mgr.</b>	Mr. Richard Weaver
<b>Asst. Supervisor</b>	Mrs. Dena Autry
<b>Biological Lab Technician</b>	Mr. Kai Blore
<b>Biological Technician</b>	Mr. Steven Smoloeroff

### EDUCATION COMMITTEE

<b>Commissioner</b>	Mrs. Trish Becker (Chair)
<b>Education Specialist</b>	Mr. Edward Zeszutko
<b>Operations Mgr.</b>	Mrs. Marcia Kay Gaines
<b>Asst. Supervisor</b>	Mrs. Dena Autry
<b>Biological Technician</b>	Mr. Steven Smoloeroff
<b>Entomologist/Scientific Mgr.</b>	Dr. Whitney Qualls

### PLANNING COMMITTEE

<b>Commissioner</b>	Mrs. Gina LeBlanc (Chair)
<b>Director</b>	Dr. Rui-De Xue
<b>Operations Mgr.</b>	Mrs. Marcia Kay Gaines
<b>Business Mgr.</b>	Mr. Richard Weaver
<b>Asst. Supervisor</b>	Mrs. Dena Autry
<b>Biological Lab Technician</b>	Mr. Kai Blore
<b>Entomologist/Scientific Mgr.</b>	Dr. Whitney Qualls

### FINANCIAL/AUDIT COMMITTEE

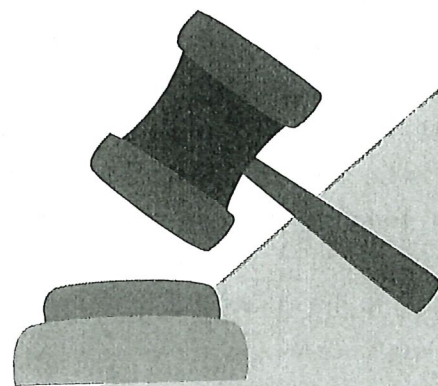
<b>Commissioner</b>	Mr. Don Girvan (Chair)
<b>Director</b>	Dr. Rui-De Xue
<b>Accountant</b>	Mr. Scott Hanna
<b>Business Mgr.</b>	Mr. Richard Weaver
<b>Admin. Assistant</b>	Ms. Charolette M. Hall
<b>Operations Mgr.</b>	Mrs. Marcia Kay Gaines

### EMERGENCY RESPONSE COMMITTEE

<b>Operations Mgr.</b>	Mrs. Marcia Kay Gaines (Chair)
<b>Field Biologist</b>	Dr. Muhammad Farooq
<b>Business Manager</b>	Mr. Richard Weaver
<b>Entomologist/Scientific Mgr.</b>	Dr. Whitney Qualls
<b>Admin. Assistant</b>	Ms. Charolette M. Hall
<b>Education Specialist</b>	Mr. Edward Zeszutko

### OPERATIONAL COMMITTEE GROUND/AERIAL

<b>Commissioner</b>	Mr. Gary Howell (Chair)
<b>Director</b>	Dr. Rui-De Xue
<b>Chief Pilot/Aviation Mgr.</b>	Mr. Dana Smith
<b>Field Biologist</b>	Dr. Muhammad Farooq
<b>Operations Mgr.</b>	Mrs. Marcia Kay Gaines
<b>Business Mgr.</b>	Mr. Richard Weaver
<b>Asst. Supervisor</b>	Mrs. Dena Autry
<b>Entomologist/Scientific Mgr.</b>	Dr. Whitney Qualls



## 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 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 by Ground and Aerial Application), Education, and Applied Research.



The American Mosquito Control Association's (AMCA) annual meeting was supposed to occur March 16th, 2020 through March 20th, 2020 but was canceled due to concerns from the COVID-19 that became an international pandemic. AMCD's 17th Annual Arbovirus Surveillance and Mosquito Control Workshop that was supposed to occur on March 30th, 2020 through April 1st, 2020 was also canceled due to the same concerns.

The annual FMCA meeting in November 2020 was also canceled due to COVID-19.

The District is developing a Payroll software system that will be incorporated into the current Mobisoft database. The district re-designed the AMCD website to be more modern and user-friendly, while still complying with all laws and regulations. The site continues to offer a multitude of information to the citizens of St. Johns County. The website went live on September 24th, 2020.

AMCD staff report to 120 EOC Dr., St. Augustine, FL which is the location of our growing Base Station Complex. On August 13th, 2020 the Board approved putting out a bid for the construction of the Education Center Building and on October 8th, 2020 they approved the bid to go out once the design documents were completed.

As we have done since 1949, AMCD has continued to provide many services to the citizens of St. Johns County. These services included but were not limited to: mosquito inspections, population and arbovirus surveillance, public outreach and education, the assistance of local organizations, larviciding, adulticiding, applied research and evaluations of new control tools and techniques, and employee training. All of this was done during the pandemic of 2020 with COVID-19 precautions in place for the safety of all citizens and staff.



# Budget

## FY 19/20 District Revenues Oct. 1, 2020 through Sept.30, 2020 Total \$6,519,820

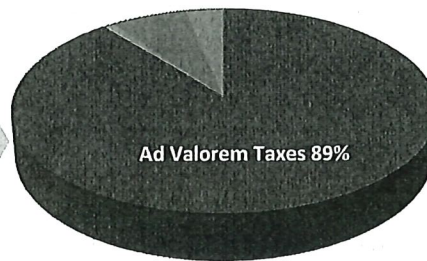
Ad Valorem (real property) Current Year Taxes, the primary source of revenue, \$5,805,698 comprised of, approximately, 89% of the total Revenues, \$6,519,820.

Grant Revenues, from Applied Research, totaling \$421,432, shows an, approximately, 98% increase over the prior year.

Interest Income Return on Investment, SBA Fund, non-current Operating Funds, yielded \$65,014.

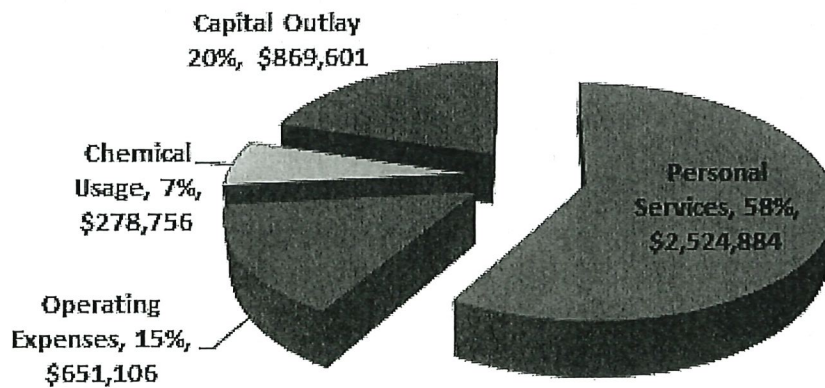
Other Revenues, were predominantly comprised of \$26,575 Surplus Sales, \$177,979 FEMA Hurricane Irma reimbursement, \$14,627 Dorm Rents.

The District's millage rate for the General Operating Budget was 0.2100 for the year.



- Ad Valorem Taxes \$5,805,698
- Prior Year Tax Distrib. \$8,376
- Interest Income \$65,014
- Intergovernmental \$0
- Grants \$421,432
- Other \$219,300

## FY 19/20 District Expenditures Total \$4,324,347



Expenditures for the year were comparatively less than Revenues. The majority were attributed to Personal Services, (58%), with Capital Outlay, Operating Expenses, and Chemical Usage comprising of 20%, 15%, and 7%, respectively.

## Administration and Supply.

### Board Business:

The AMCD staff provided many documents to Board members and the Board's attorney and for Committee meetings in 2020. The District hosted 12 Board meetings, including the annual First and Final Public Hearings in September for the 2020/2021 fiscal year budget and millage rate. The March Board meeting was canceled due to Coronavirus concerns.

### Administration & Finance:

The Board approved a Visiting Scientist (Intern) and Biology (Intern) job description on 3-12-2020 for GLP requirements and a Junior Accountant job description on 5-14-2020. The Board approved the Financial Auditor Report on 5-14-2020 for the fiscal year ending 9-30-2019. The Board also approved (5-14-2020) for Dr. Rui-De Xue and Commissioner Jeanne Moeller to request state funding of \$890,000 for the SIT building to be built on AMCD property as a Regional Center for Northeast Florida. The DACS Work Plan Narrative was approved on 7-9-2020.

### Policies:

At the January 16, 2020 Board meeting the Board approved the Revised Commissioner's Handbook and the revised dress code policy 6-11-2020. At the August 13, 2020 Board meeting, the Board approved the updated, revised Employee Handbook. Staff also continued updating the District's Policy Manuals, Commissioner's Handbook, and Employee Handbook, and worked on updating the Administration Handbook (formerly the Introduction and District portion of the Policy Manual), which should be approved in 2021. With a consensus of the Board on 7-9-2020, they approved having Dr. Xue look into having an HR Lawyer and HR Professional from Lee County review the AMCD policies.



### Inventory:

The monthly tire inventory and chemical inventory were completed as required. Three Vehicles (Ford Expedition, Ford F150, and Chevy half-ton) were surplus on the FY2019/2020 Surplus inventory (June 11, 2020 Board meeting), as well as a diamond cargo, covered trailer, along with various other pieces of equipment and items; The annual physical inventory was approved at the October 8, 2020 Board Meeting.

### 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 services included, but were not limited to, the Auditor Contract on June 11, 2020 (continually from 2003) with Julieann Klein from Lombardo, Spradley & Klein; the Cintas Uniform contract was approved at the September 10, 2020 Board Meeting, the Database and mapping contract renewal was approved February 13, 2020; and Resolutions 2020-02 for the Millage at 0.2050 for FY 2020/2021 and 2020-03 for the Budget for FY 2020/2021 on September 24, 2020 at the Final Public Hearing.

### RFPs & BIDs:

The Board approved the award of an RFP (January 16, 2020) and then approved the contract to Harrell Construction Co., Inc. (February 13, 2020) for the site plan, permits, and design of the Disease Vector Education Center. The Board also approved putting out a bid for the vertical construction of the Disease Vector Education Center (August 13, 2020), and they approved the bid to go out once the design documents were completed (October 8, 2020).

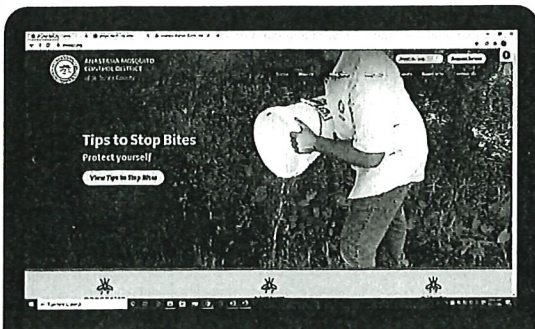
### Insurances:

The Board approved the aircraft hull and liability Insurance renewal 7-9-2020; the AIG TankGuard Ins. Renewal on 8-13-2020; the Fleet/Liability and Workers Compensation Ins. With Thompson Baker Ins. Co. on 9-10-2020, and the Health, Dental, and Life Insurance for the calendar year 2021 on 12-10-2020.

## Customer Service

### **AMCD Website:**

AMCD's new website: [www.amcdsjc.org](http://www.amcdsjc.org) is an important tool for providing information to the public, other mosquito control districts, and staff. The site contains important information including public notices, meeting dates, mosquito-borne disease advisories, training opportunities, education, and employment opportunities. One of the most important links on the AMCD website is the service request button. At this link, St. Johns County citizens can enter requests for service. This service request is linked to the District's database, Geomosquito, and immediately notifies the AMCD technicians in the field that a request for service has been made. This page on the website will also allow customers to access and review the status of a service request and see if there is any adulticide (fogging) scheduled in their area. There are new tools on the website to make it ADA compliant and the website is now easier than ever to use and find information. AMCD also keeps the public engaged using social media and has a presence on Facebook and Twitter. The Facebook site is very popular with a current following of approximately 1,260 friends. AMCD has developed a free app to enter service requests, check for adulticiding, and to get important notifications from the District. This free app is available for iPhone and Android phone users. AMCD staff frequently updated our website and in 2020 rolled out a completely new website that is more user-friendly and contains a multitude of information for the citizens of St. Johns County and our staff. The new site still has important links for service requests and adulticiding information, among many other rewarding features.



AMCD responded to 2,560 service requests in 2020. The average response time for a service request was 1.9 days. Service requests were received by the District office via phone, email, website, and phone app with more than 75% of service requests coming in through the phone app and web interface.

AMCD staff continued conducting many detailed tours of the AMCD facility and research buildings to members of the public, local and state officials, members of the education system, and other government agencies especially other mosquito control districts.

AMCD continued to provide service and to educate St. Johns County residents on many things such as adult and larval mosquitoes, adulticiding, and larviciding. The AMCD staff dispensed valuable information pertaining to the identification of mosquitoes, pesticide safety and other insects, mosquito prevention and pesticide applications, personal protection methods, commercial mosquito traps, repellents, insecticides, and assisting residents with concerns about no spray treatment areas, including bee-keepers' properties or personal/health conditions that require no treatments be made. Staff also assisted the public by distributing *Gambusia*, the mosquito larvae eating fish.

AMCD strictly adheres to the Florida Statutes, Chapter 388, and 5E-13 of the Florida Administrative Code. The District follows all Florida Department of Agriculture and Consumer Services and Environmental Protection Agency rules. Labels and Safety Data Sheet instructions are closely followed, as well as, the District's own policies and procedures. AMCD is committed to public safety while providing the important public service of larviciding and adulticiding in order to reduce the spread of vector disease and nuisance mosquitoes.

## Cooperative Organizations/Professional Services

AMCD works in cooperation with a number of related local, state, federal agencies, international, private, commercial organizations, and members of the medical community. Those listed below briefly describe the work associations with AMCD in 2020 to prevent and control vector-borne diseases in Florida.

### International Cooperation and

#### Activities:

The collaboration with Dr. Gunter Muller, the University of Science, Techniques, and Technology of Bamako, Mali working on Attractive Toxic Sugar Baits (ATSB) against vector mosquitoes was continued. Dr. Xue visited the malaria field site in Mali in January 2020.

The collaboration with Dr. Tong-Yan Zhao, Beijing Institute of Microbiology and Epidemiology to work on rice field mosquito management was continued.

AMCD hosted international visitor Dr. Asghar Talbalaghi from Italy for 3 months.

The collaboration with Jeddah City's Department of Environments, Saudi Arabia for dengue vector control consulting was continued.

Dr. Xue continues to serve the World Mosquito Control Association as their Executive Director.

Dr. Xue continues to collaborate with several Scientists from the Collaboration in Sciences and Technology (COST), Europe Commission for research and development of nanotechnology, and treated textiles against mosquitoes. Dr. Xue gave a lecture for the COST training program in Spain, March 1, 2020.

Dr. Xue has been elected as the Board member of the Investigation and Mathematical Analysis of Avant-garde Disease Control via Mosquito Nano-Tech Repellents (IMAAC, new association) related to the COST program in 2020.

Dr. Xue collaborated with Dr. H. Kawada, Nagasaki University's Institute of Tropical Medicine, Japan, on repellent-treated textiles against mosquitoes.

Dr. Xue Continued as the Expert Committee member to serve the International Standard Organization (ISO).

Dr. Farooq collaborated and attended the WHO's expert consulting meeting about droplets with aerial application in February 2020.



# Cooperative Organizations/Professional Services (Cont'd)

## **State Agencies and Services:**

Florida Department of Environmental Protection: AMCD collaborated with state parks and environmental education centers for salt marsh management grant applications in Fish Island.

Dr. Xue continued to serve as the DACS/FCCMC's research review subcommittee member.

Mr. Weaver continued to serve as the FMCA financial member.

Dr. Xue served as the FMCA's Publication Committee Chair, Editor of the JFMCA., Chair of the FMCA Exchange program committee, and on the By-law's committee.

Dr. Qualls served as the FMCA Scholarship Committee Chair and as the Dodd short course committee Co-chair.

Mrs. Moeller served as the FMCA legislation committee member.



## **National and Federal Agencies & Associations:**

The collaboration with USDA/CMAVE to organize the annual workshop and SIT for control of *Aedes aegypti* and other studies was continued.

The collaboration with Dr. Jerry Zhu at USDA/ARS for natural repellent evaluation was continued.

The collaboration with the DoD's NECE, Jacksonville, FL to evaluate ULV spray systems and new formulations of insecticides was continued.

Collaborated with the DoD's AFPMB for control action threshold grant and co-organized symposium for AMCA annual meeting.

Collaborated with CDC about developing a smart cage and SIT study under subcontracts with UF.

AMCD is a sustaining member of the AMCA and an AMCA/EPA PESP member.

AMCD has continued the collaboration with the CDC.

AMCD continued its collaboration with the CDC Southeastern Center for Excellence in Vector-borne Disease for training intern students.

Dr. Xue continued to serve the SOVE Board as the Regional Director.

Dr. Xue, Dr. Qualls, Dr. Peper, and Dr. Farooq reviewed numerous numbers of manuscripts for the ESA's Journals, AMCA's JAMCA, SOVE's JVE, Acta Tropic, PLoS one, Parasite & Vectors, Insects, and several other journals at their editors' requests.

Dr. Qualls is the AMCA Publications Committee Chair.

## Cooperative Organizations/Professional Services (Cont'd)

### **Companies And Other Districts:**

AMCD collaborated with several local mosquito control programs in the northeast region to receive their support letters for SIT proposal.

AMCD demonstrated and provided the blueprint of our complex to several districts and programs.

AMCD collaborated with Lee CMCD to receive their surplus items and train pilots.

AMCD collaborated with MGK for resistance and insecticide impact factors.

AMCD collaborated with Dyna Trap on new trap and spatial repellent device evaluations.

AMCD collaborated with Lamp Light Farmer on spatial repellent device evaluations.

AMCD collaborated with Central Life Sciences on spatial repellent device evaluations.

AMCD collaborated with DNW Global LLC on new larvicide evaluations and EPA registration of their new larvicide.

AMCD collaborated with MosquitoMate on an SIT project proposal.

AMCD collaborated with BigShot on an evaluation of natural insecticides against mosquitoes and ticks.

### **Agencies and Universities:**

AMCD cooperated with the University of Florida Department of Entomology and Nematology with Dr. D Hahn on the SIT grant.

AMCD collaborated with UF, Emerging Pathogens Institute with Dr. G. Morris on the Keystone virus survey.

AMCD collaborated with UF, Florida Medical Entomology Laboratory with Dr. L. Campbell for arbovirus vector mosquito survey.

AMCD collaborated with UF, Department of Electrical Engineering with Dr. B. Eisenstadt on the CDC grant for developing a smart cage.

AMCD collaborated with UF Dr. R. Dinglasan at EPI for intern training.

AMCD collaborated with UF, Department of Entomology and Nematology with Dr. Koehler for a non-target study.

Dr. Xue served as a voluntary professor for the University of Miami School of Medicine and continues to collaborate with Dr. John Beier for ATSB and biology and control of mosquitoes.

AMCD renewed the contract with the University of North Florida's College of Public Health for training intern students.

AMCD provided many mosquito samples for several universities nationwide.



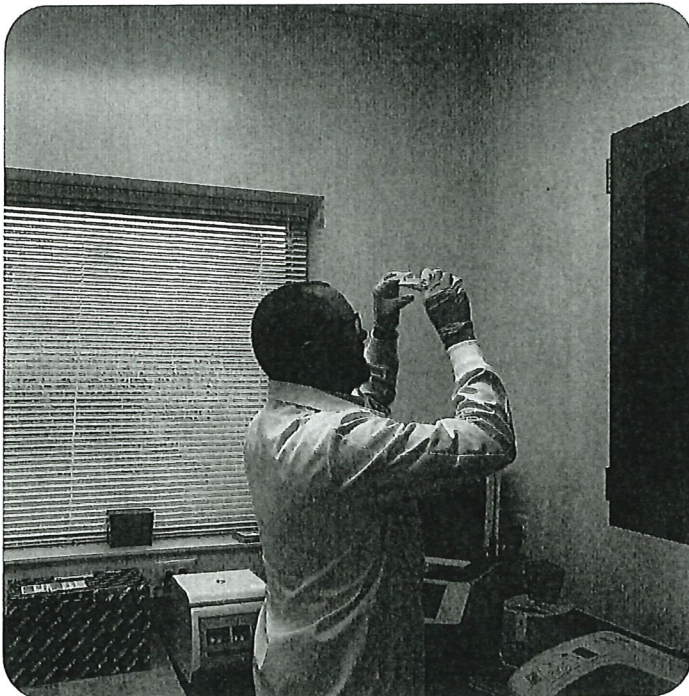
## Surveillance

### Mosquito-borne Diseases:

AMCD continuously cooperated 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 nine sentinel chicken sites around St. Johns County. AMCD personnel bled chickens every Monday, from June to December and sent the blood samples to DOH's Arbovirus Laboratory in Tampa for testing.

In 2020, a total of 5 sentinel chickens tested positive for arboviruses, 3 for EEE, 1 for SLE, and 1 for WNV. In 2020, there were no travel-related or locally acquired human cases of Zika, Chikungunya, Dengue, or malaria in St. Johns County.



### Mosquito Population:

Adult mosquito populations were monitored by 41 CDC light traps baited with octenol from May to November 2020 and a total of 17,920 mosquitoes (33 species) were collected. Twelve BG traps baited with a BG Lure and CO<sub>2</sub>, were used to monitor *Aedes albopictus* and *Aedes aegypti* populations, and a total of 42,378 mosquitoes were collected from January to December 2020. A total of 60,289 mosquitoes were trapped by both methods.

Larval surveys were conducted on a daily basis by dipping flooded areas as needed. A total of 24,548 dips were conducted and 3,219 dips were positive with 25,245 larvae found.

### Environmental Parameters:

Rainfall was monitored by 12 rain gauges once a week. The total rain average for 2020 was 0.12 inches.



# Surveillance (Cont'd)

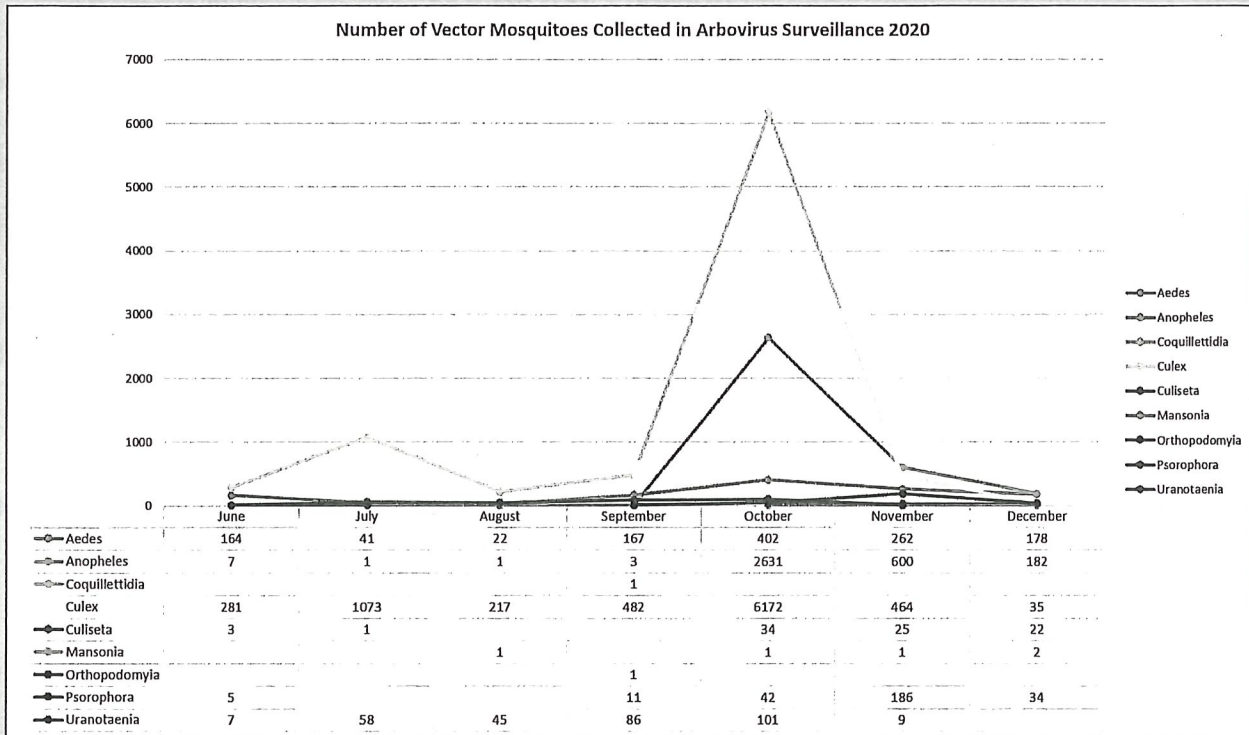


Fig. 1 Total mosquitoes collected throughout 2020 by month and genus in Arbovirus surveillance, BG-Sentinel *Aedes aegypti*, and *Aedes albopictus* surveillance, and Operational Surveillance.

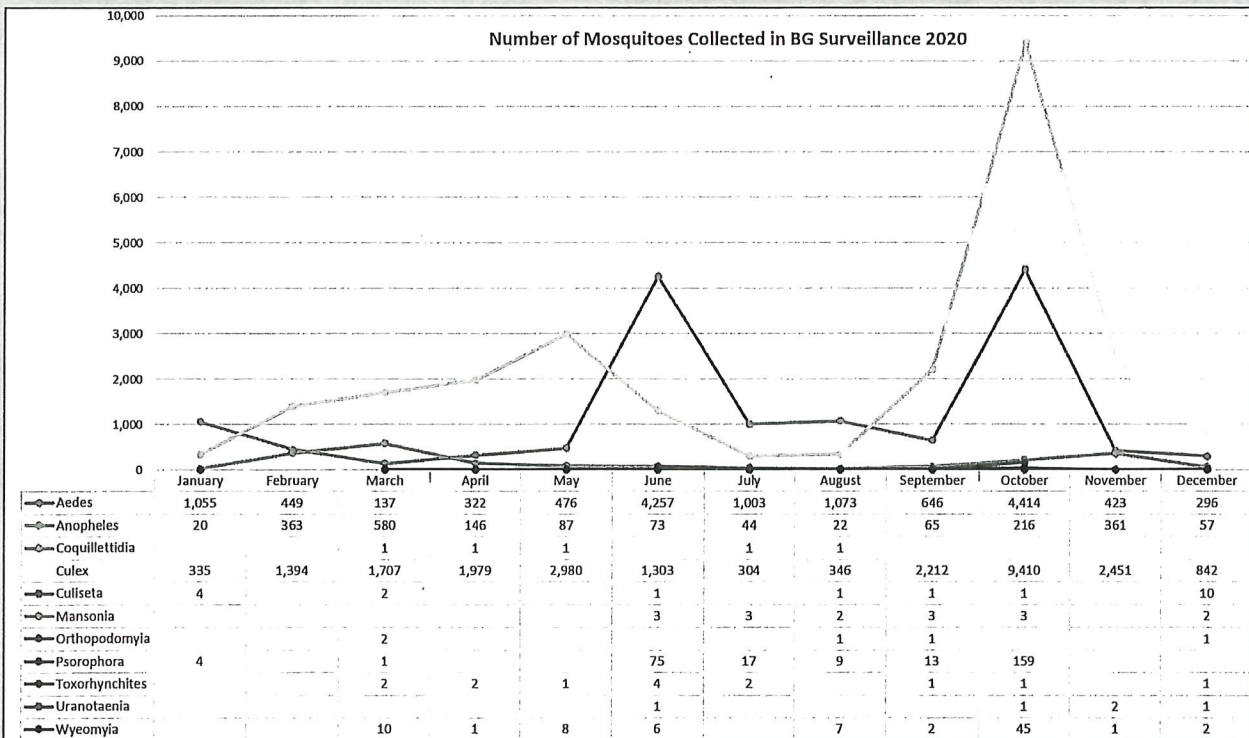


Fig. 2 Total mosquitoes collected throughout 2020 by month and genus in BG-Sentinel *Aedes aegypti* and *Aedes albopictus* surveillance.

# Surveillance (Cont'd)

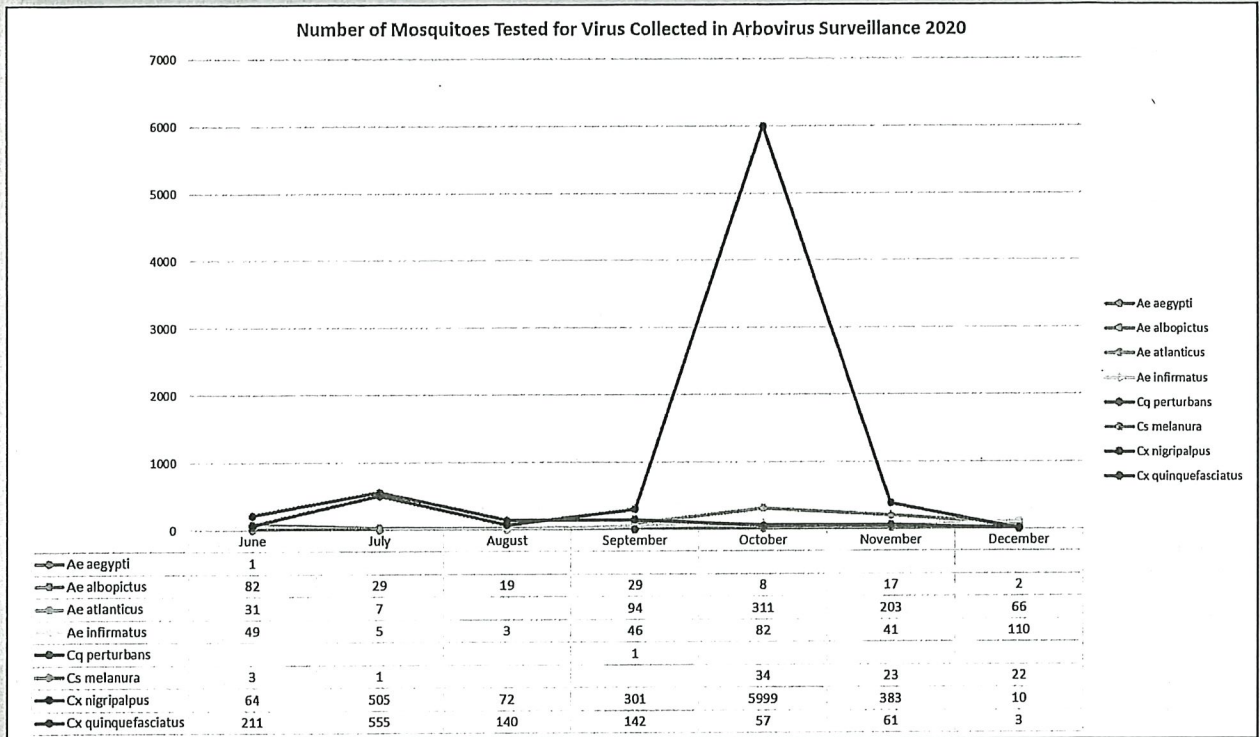


Fig. 3 Number of mosquitoes by month and species screen in Arbovirus Surveillance.

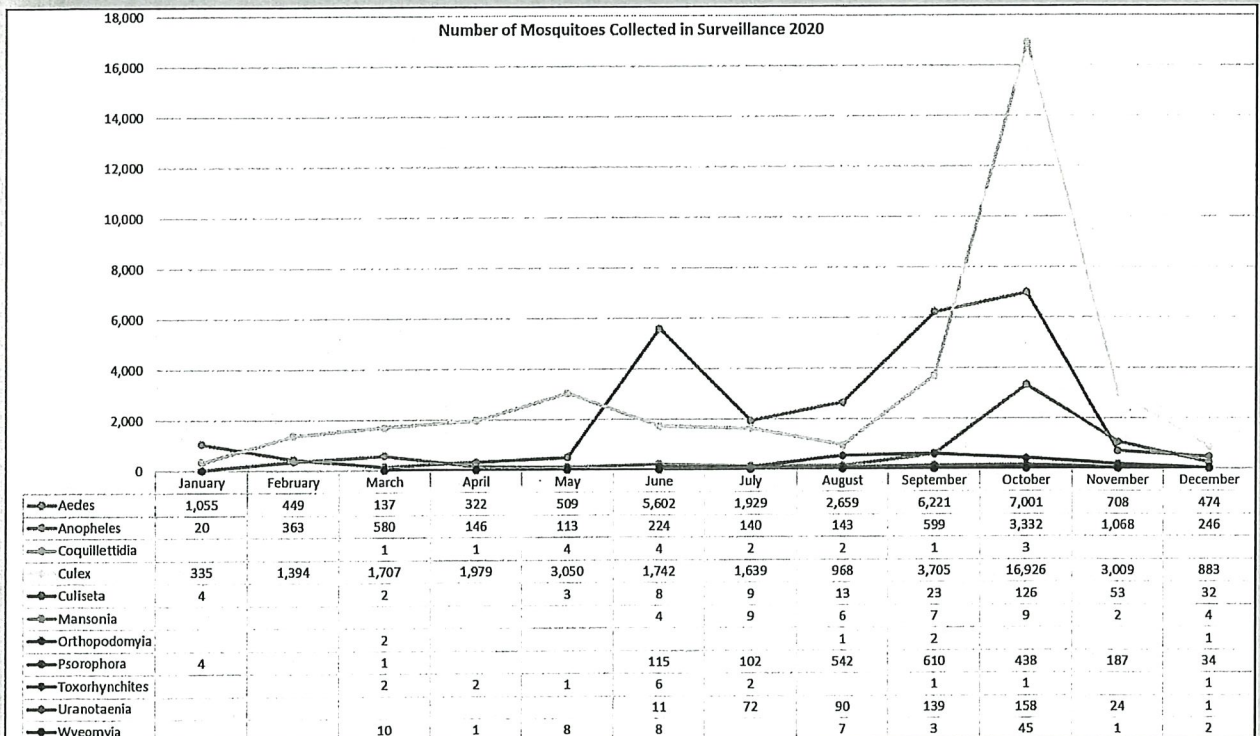


Fig. 4 Total mosquitoes collected throughout 2020 by month and genus in Arbovirus surveillance, BG-Sentinel *Aedes aegypti*, and *Aedes albopictus* surveillance, and Operational Surveillance.

# Surveillance (Cont'd)

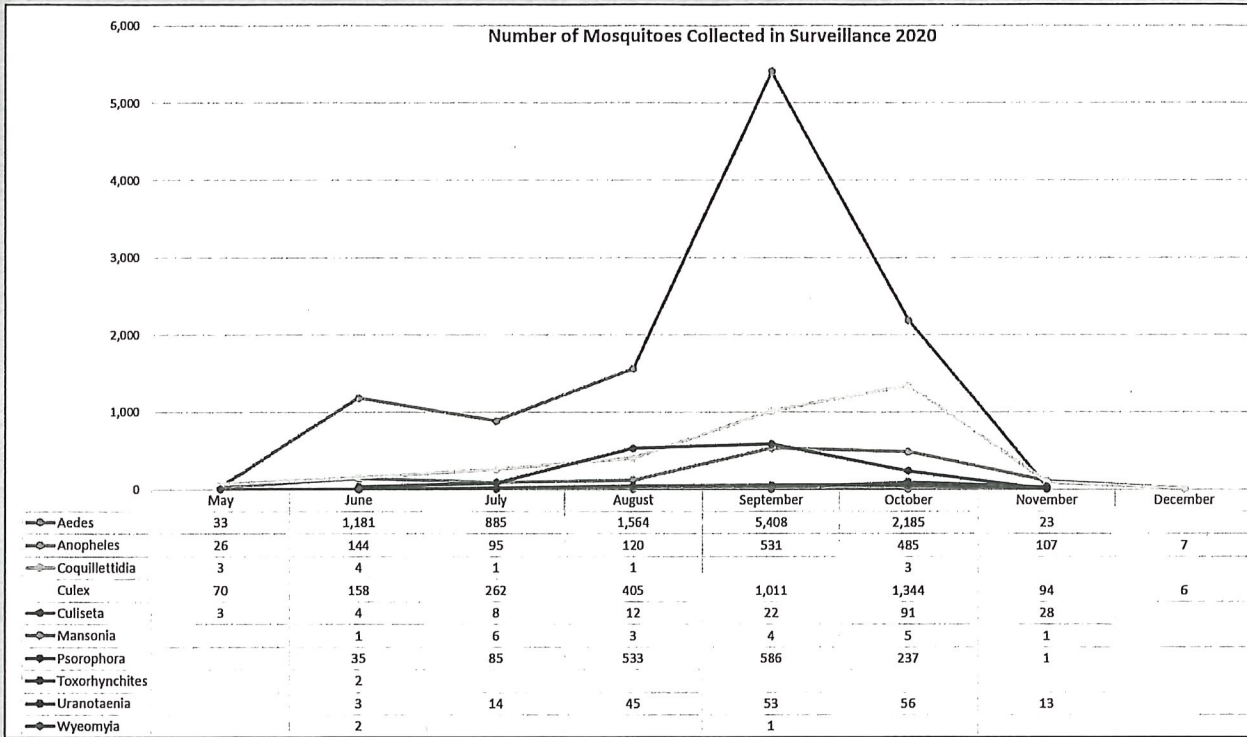


Fig. 5 Total mosquitoes collected throughout 2020 by month and genus in Operational Surveillance.



# Operational Control

## Larvicides and Larviciding:

In 2020, the District primarily used *Bacillus thuringiensis israelensis* to kill mosquito larvae, as well as methoprene products in areas where BTI was not applicable. Mosquito Control Technicians treated 1,528 times for a total of 4,835.61 acres treated. The aerial program made 54 applications for a total of 1,304.5 acres treated.

## Adulticides and Adulticiding:

Mosquito Control Technicians continued to use Aqualure 20-20 (Permethrin) and Mosquitomist Two (Chlorpyrifos) for ground ULV spraying and treated 229 times on a total of 169,004.4 acres for adult mosquito control. DUET was used in the hand thermal foggers to handle service requests and other areas 1,038 times for a total of 16,275 acres. Talstar P was used as an adult mosquito control barrier treatment in parks, special areas and for service requests a total of 283 times equaling 90.9 acres.



## Larvicides and Adulticides Used in 2020

Larvicides	Amount Used		Area Treated		Times applied
Altosid WSP	16,264	ea	50.4	acre	328
Altosid XR	550	ea	1.26	acre	54
Altosid XRG	3,390	lb	565	acre	149
Altosid XRG (air)	10,840	lb	1,052.5	acre	51
Aquabac XT	1,344	fl oz	84	acre	24
BTI Briquets	1,214	ea	2.79	acre	70
Cocobear	7,952	fl oz	20.71	acre	139
Natular DT	277	ea	0.04	acre	21
Sustain MBG	5,920	lb	788.88	acre	132
Sustain MBG (air)	2,520	lb	252	acre	3
VectoBac 12AS	54,835	fl oz	3,422.53	acre	611
Adulticides	Amount used		Area Treated		Times applied
Aqualure 20-20	24,934.33	fl oz	96,519.58	acre	132
Dibrum (air)	18,432	fl oz	26,331.42	acre	6
Duet 50%	25,552	fl oz	16,275.14	acre	120
Mosquitomist Two	47,840	fl oz	72,484.82	acre	97
Talstar P	30.71	gal	90.9	acre	283

## Source Reduction & Biological Control:

A total of 429 used tires were collected and removed throughout the year by AMCD staff and personnel as a means of source reduction, 209 tires were removed using state funds.

Empty 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 larval eating fish (*Gambusia*) for use in retention ponds and ditches eight times for a total for 135 fish provided.

## Applied Research

### County-wide In-house Sentinel Chicken Program

Due to the COVID-19 pandemic, state-wide resources that are typically devoted to testing sentinel chickens from mosquito control programs were briefly diverted to human diagnostics efforts. This left AMCD without the vital tool of sentinel chicken testing to help guide our control efforts. Due to this dilemma, we developed an in-house sentinel chicken program to test our chickens for West Nile virus (WNV) exposure. From June through December, we tested 54 sentinel birds each week which tallied over 1,400 samples tested for the year. As the state resumed testing, we were able to compare our in-house results with those of the state. One of the benefits of our in-house testing program included the rapid turn around of results. We managed same-day results while the state took 5+ days to return results. Same-day results allowed for a quicker response by the AMCD operational team regarding any positive birds. Another benefit was the accuracy of results. Our in-house testing identified one positive bird for WNV in 2020, which was confirmed by the state – albeit five weeks after our first in-house detection. Our positive bird remained positive throughout the year while the state would report it as positive one week then negative another week, and so on. The limitation to our current program is we can only test for WNV in-house while the state is capable of screening for exposure to several arboviruses. We look to strengthen our in-house program moving forward with the hopes of adding additional assays.

### Evaluation of Insecticides:

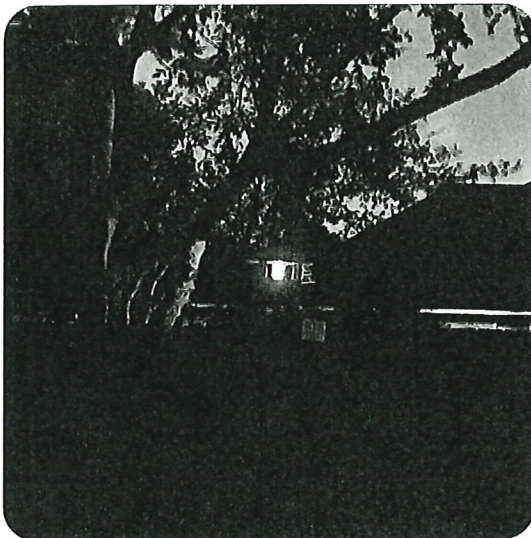
AMCD evaluated four ULV formulations of a new active ingredient (AI) for mosquito control against field and laboratory strains of *Aedes aegypti* and *Culex quinquefasciatus*. This project was funded by MGK. The ULV evaluation targeteded 0.015lbs/ac following an EPA-approved protocol. In addition to the ULV evaluation, the resistance ratio of field populations of *Ae. aegypti* and *Cx. quinquefasciatus* were to be determined. Each ULV application was conducted with winds between 1-5 mph, <90% relative humidity, and stable wind direction resulting in sufficient droplet yield.

For the resistance ratio, all four strains of mosquitoes (laboratory and field reared) were tested against the four ULV formulations provided by MGK and the positive control deltamethrin. Each insecticidal formulation was tested at five different concentrations for ten replications per mosquito strain, insecticidal formulation, and concentration. A resistance ratio (RR) equal to or greater than 10 is characteristic of a resistant strain. Only deltamethrin showed RR of 25 (>10) for *Ae. aegypti*. None of the insecticidal formulations had a RR greater than 10 for any of the *Cx. quinquefasciatus* mosquitoes.

AMCD collaborated with Lampfarm and Central Life Sciences, Cooperation of Science and Technology (COST[WQ1] [EZ2] ), and the United States Department of Agriculture (USDA) to evaluate spatial repellents and botanical insect repellents against mosquitoes and ticks in the laboratory and semi-field settings. A few of the natural plant oils showed some repellency and a few repellent devices demonstrated a slight repellency and/or toxicity to mosquitoes and ticks. These formulations need to be improved upon for further evaluation.



## Applied Research (Cont'd)

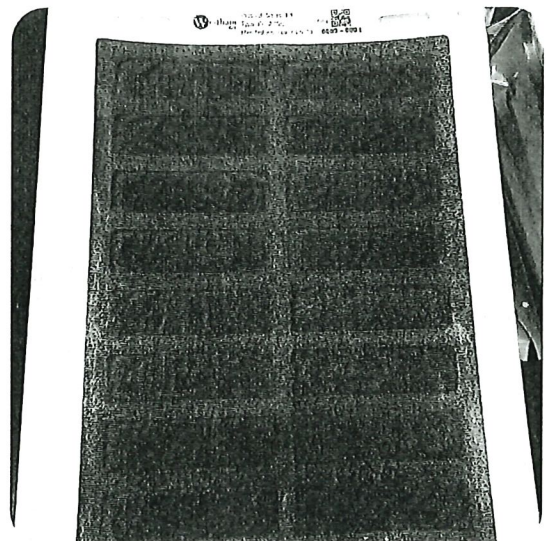


### **New Traps and Device Evaluations:**

AMCD conducted a seven-day survey of insects collected in a new trap, DynaTrap® ¼ Acre Decora Outdoor Flying Insect Trap funded by the Sponsor Woodstream. The purpose was to identify all biting insects collected by this trap. The trap was placed in a wooded residential setting and operated for seven days with collections every 12 hours to identify day and night-time biting insects. The seven-day survey collected a total of 3,101 specimens in 49 families in eight insect orders. A total of 103 mosquitoes in seven genera and 13 species were identified during the survey. The only other biting insect collected was in the family Ceratopogonidae with a total of 155 specimens. Collections of biting insects did not seem impacted by time of day. The trap overall was easy to operate. Additionally, this trap collected non-biting midges suggesting it might be a recommendation for residential areas experiencing a high burden of these nuisance midges.

### **ATSB Stations:**

AMCD evaluated the new Attractive Toxic Sugar Bait (ATSB®) Stations against *Anopheles quadrimaculatus* for the Sponsor Westham Co. This evaluation is important in the next steps of getting the ATSB Stations ready for field evaluation against the malaria vector in Africa. Mortality and feeding assessments were conducted over 72 hours for the ATSB Station evaluation. At 24 hours 94.5% cumulative mortality was observed in the ATSB Station treatment cages compared to 0% mortality in the control cages. At 48 hours 100% of the mosquitoes exposed to the ATSB Stations were reported dead with 0% mortality in the control cages suggesting that *An. quadrimaculatus* are feeding on the toxic bait presented in the Stations.



## Applied Research (Cont'd)

### Sterile Insect Technique

An operational pilot study was initiated in 2019 to evaluate the effects of a mass release of irradiated *Aedes aegypti* in reducing the population density in the treatment site in downtown St. Augustine. Continuation of weekly entomological monitoring, with 24 BGS traps and 34 ovi-traps per site, in the intervention and control sites was continued since January 6th, 2020 and 50 trap weeks were completed.

Irradiated male *Ae. aegypti* were shipped to the AMCD twice a week by the USDA/CMVAE. Suppression releases began in March, but were interrupted after five releases due to the closure of USDA/CMVAE for COVID-19. Releases were restarted in July and carried out twice a week to release ~50,000 mosquitoes a week. Forty-six releases were completed during 2020. Missing out on the most appropriate and important release periods due to COVID-19 had a significant impact on the SIT evaluation thus, the study was extended for another six months, ending June 30, 2021.



### Collaborative, Ongoing, and Completed Applied Research Projects for 2020:

Operational sterile insect technique for innovative *Aedes aegypti* control in St. Augustine Florida (Grant funded)

Establishing evidence-based action thresholds for *Aedes*, *Culex*, and *Anopheles* mosquitoes in different operational environments (Grant funded)

Evaluation of lotions of botanical-based repellants against *Aedes aegypti* (*Diptera: Culicidae*) coconut-derived fatty acids, 2-undecanone, or catnip oil (USDA project)

Relationship of precipitation and habitat to the spatial and temporal abundance of *Aedes atlanticus* and *Aedes infirmatus* in St. Johns County, Florida (Grant funded)

Relationship of precipitation and habitat to the spatial and temporal abundance of *Aedes atlanticus* and *Aedes infirmatus* in St. Johns County, Florida (Grant funded)

Shift in the spatial and temporal distribution of *Aedes taeniorhynchus* following environmental and local developments in St. Johns County, Florida (Grant funded)

Evaluation of attractive toxic sugar bait stations against *Anopheles quadrimaculatus* (Sponsor project)

Evaluation of ATSB production run against *Culex quinquefasciatus*, *Aedes albopictus*, *Ae. aegypti*, and *Anopheles quadrimaculatus* (Sponsor project)



## Applied Research (Cont'd)

### Collaborative, Ongoing, and Completed Applied Research Projects for 2020 (Cont'd):

Laboratory fitness evaluation of AMCD *Aedes aegypti* colony  
(GLP required study)

Surveillance of mosquito population infection rate with Keystone  
virus in Florida; further understanding of virus distribution across  
the state (Grant funded)

Survey of insects collected in the DynaTrap® ¼ Acre Decora  
Outdoor Mosquito and Insect Trap (sponsor project)

Evaluation of Central Life Sciences Linalool and Geraniol  
Combination Candles in outdoor screen enclosures (Sponsor  
project)

County-wide arboviral screening (AMCD funded)

Insecticide resistance survey (USDA)

Genetic comparison of *Aedes aegypti* mosquito populations (UF  
study)

Automatic mosquito identification project (Senecio in Israel)

Genetic comparison of *Culex pipiens* mosquito populations  
(Princeton University)

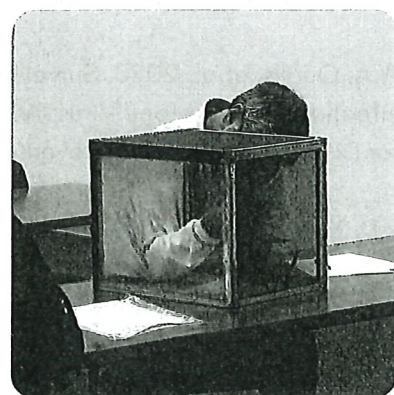
Evaluation of BigShot Maxim and clove oil for tick repellency  
(Sponsor project)

Evaluation of BigShot Maxim and clove oil for tick mortality  
(Sponsor project)

Evaluation of 17 different formulations for Tiki Torch (Sponsor  
project)

Field evaluation of BigShot Maxim as adulticide (Sponsor  
project)

Evaluation of BigShot Maxim as adulticide in wind tunnel  
(Sponsor project)



## Applied Research (cond't)

### Collaborative, Ongoing, and Completed

#### Applied Research Projects for 2020 (cond't):

Field evaluation of Fyfanon EW (Sponsor project)

Evaluation of mosquito repellents in olfactometer (Sponsor project)

Determination of spread factors for two MGK products (Sponsor project)

University of Florida ULV study in wind tunnel (University collaboration)

University of Florida evaluation of barrier applications (Grant funded)

USDA collaborative adulticide evaluations (USDA collaboration)

Smart bioassay cage development for evaluation of efficacy of mosquito control adulticides (Grant funded)

Evaluation of spatial repellent formulations for TheraCell. (Sponsor project)

Evaluation of DynaShield 25B repellent device in outdoor screen enclosures (Sponsor project)

Field efficacy evaluation of two formulations of tolfenpyrad against *Culex* and *Aedes* mosquito species (Sponsor project)

Laboratory efficacy evaluation of BigShot Maxim natural product against *Anopheles*, *Culex*, and *Aedes* mosquito species (Sponsor project)

#### Grant proposals & fund situation:

W.A. Qualls, et al. 2020. Establishing evidence-based action thresholds for *Aedes*, *Culex*, and *Anopheles* in different operational environments. Department of Defense Deployed Warfighters Protection Program.

W.A. Qualls, et al. 2020. Smart Bio-Assay Cage Development for Evaluation of Efficacy of Mosquito Control Adulticides. Centers for Disease Control and Prevention Broad Agency Announcement.

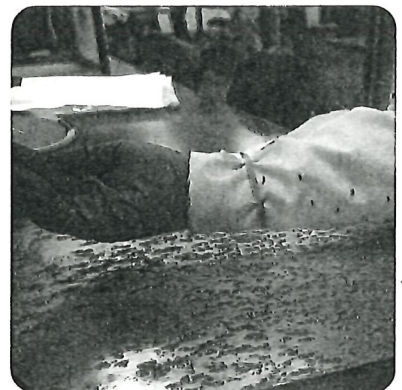
W.A. Qualls, et al. 2020. Surveillance of Mosquito and Reservoir Animal Infection with Keystone Virus: A Possible Cause of Human Encephalitis. Centers for Disease Control and Prevention Hurricane Cooperative Agreement.

R.D. Xue, et al. 2020. SIT grant extension for 6 months, CDC, Hurricane Cooperative Agreement.

S. Peper, et al. 2020. BTi & honey bees, AMCA

S. Peper, et al. 2020. Sentinel chickens, AMCA

V. Aryaprema, et al. 2020. Mosquito sex attraction

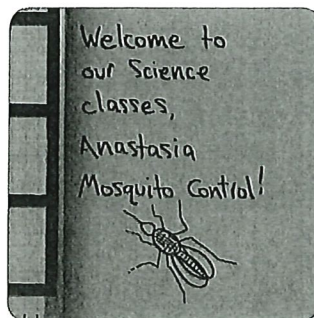
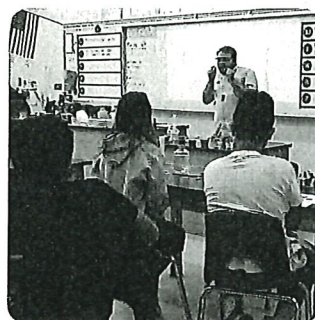
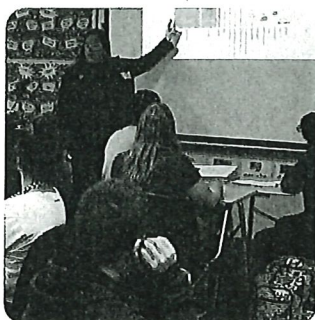


## AMCD Education and training

Annual training was done in-house in February for full-time employees and again in May and June for those that needed to make up any training or for new hires. In January 2020, Mr. Ralph Bruner, Mr. Morgan Duett, Mr. Steven Smoleroff, Mr. Richard Weaver, and Dr. Rui-De Xue attended the FMCA Fly-In at Lee County Mosquito Control. Dr. Whitney calls, Mr. Rick Stockley, Ms. Courtney Cunningham, Ms. Heather Ward, and Mr. Edward Zesztuko attended the Hazardous Materials Operations/OSHA Level II training on Sep. 25th, 2020 and received a certificate of completion. AMCD employees attended the DODD Short Courses from February 3rd to 7th, 2020. One Commissioner and two employees were supported by AMCD to continue their education.

## Community Events/Public Outreach

AMCD was involved with three public outreach events: Cracker day, community clean-up of Armstrong Road, and the handout of an SIT survey. AMCD held an informal meeting with the scientific leaders in our community to discuss plans and ideas for AMCD's Education Center on Feb. 4th, 2020. AMCD hosted a Facebook live lecture on April 15th, 2020. AMCD created a new YouTube channel with five videos with 589 cumulative views. AMCD was involved with the Meeting with the Academy of Coastal and Water Science Advisory Board. Many events that AMCD normally attended in past years were canceled due to COVID-19.

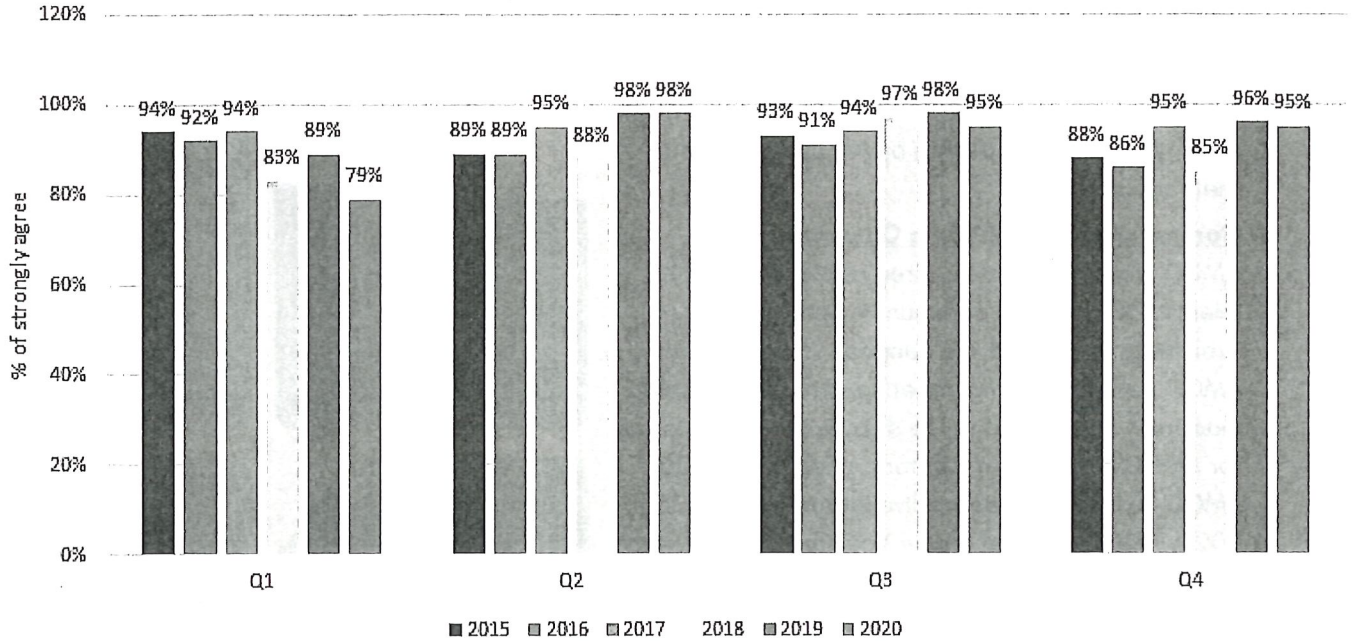


## St. Johns County School Program

In 2020, AMCD taught at four different schools reaching 350 students. Participating schools included: St. Johns Technical High, Valley Ridge Academy, Liberty Pines Academy, and St. Johns Academy. The District was once again asked to judge the St. Johns County STEM Fair.

# Education Program (cont'd)

Satisfaction Survey 2020



### Satisfaction survey questions

Q1-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.

- The number of people who respond "strongly agree" has declined since 2015

Q2- AMCD staff is informative and professional.

- The number of people who respond "strongly agree" has increased since 2015

Q3- AMCD responds to my service requests within the standard 1-2 business days.

- The number of people who respond "strongly agree" has remained steady since 2015

Q4- I am aware of and actively participate in DRAIN and COVER methods.

- The number of people who respond "strongly agree" has fluctuated since 2015

## Professional Meetings, Symposiums, & Workshops

Organized and Attended by AMCD Staff and Commissioners

R.D. Xue. 2020. Invited seminar about recent outbreaks of vector-borne diseases and their causes. Institute of Malaria, University of Sciences, Techniques, and Technology of Bamako, Mali, January 2, 2020.

J.J. Moeller, R. Weaver, R.D. Xue, R. Bruner, M. Duet attended the FMCA's Fly-In class, Lee CMCD, Ft. Myers, FL, January 13-15, 2020.

J.J. Moeller. 2020. Attended the FMCA Tallahassee legislation, January 21-22, 2020.

5 Commissioners and 13 employees attended the FMCA Dodd Short Course, Gainesville, Feb 3-6, 2020.

K. Bore, O. Sypes, E. Zeszutko, V. Aryaprema, C. Cunningham, J. Baynocky, and L. Bangonan [WQI] attended the UF/EPI research day, Gainesville, Feb 7, 2020.

M. Farooq. 2020. Invited for WHO expert meeting, Feb 2020.

W. A. Qualls. 2020. Mosquito Surveillance Data Informing Public Health Decisions. Texas AgriLife Vector Management Workshops, Grapevine, TX, March 4, 2020.

W. A. Qualls. 2020. Integrated Mosquito Management—Putting the Pieces Together. Texas AgriLife Vector Management Workshops, Grapevine, TX, March 4, 2020.

W.A. Qualls and M. Farooq. 2020. Drift Management and Equipment Calibration. VDCI 2020 Vector Management Workshop, Virtual Event, Dec. 9-10, 2020.

R.D. Xue. 2020. Invited speaker about what kind of data collected by AMCD and what do we need for help? COST Training School, Fuerteventura Island, Spain, March 2-4, 2020.

R.D. Xue. 2020. Symposium organizer, AMCA (decision make threshold), Portland, OR, March 16-20, 2020 (canceled due to COVID-19 pandemic).

W.A. Qualls. 2020. Symposium organizer, AMCA CDC Hurricane Crisis Funding, Portland, OR, March 16-20, 2020 (canceled due to COVID-19 pandemic).

R.D. Xue. 2020. Workshop organizer. 17th Arbovirus Surveillance and Mosquito Control Workshop, AMCD, St. Augustine, FL March 29-31, 2020 (canceled due to COVID-19 pandemic).

T. Becker, R.D. Xue, W.A. Qualls, R. Weaver, M.K. Gaines, and S. Stockley attended the FMCA Fall business meeting by virtual, Nov. 18, 2020.

M. Farooq. 2020. Invited presentation about tick repellent at Annual Meeting of the ESA virtual, Nov. 2020.

## Publications

Bibbs CS, Kline J, Kline DL, Estaver J, Strohschein R, Allan SA, Kaufman PE, Xue RD, Batich CD. 2020. Olfactometric comparison of the volatile insecticide, Metofluthrin, through behavioral response of *Aedes albopictus* (Diptera: Culicidae). *Journal of Medical Entomology* 57:17-24.

Traore MM, Junnila A, Traore SF, Doumbia S, Revay EE, Kravchenko VD, Schlein Y, Arheart KL, Gregely P, Traore AS, Gergely P, Xue RD, Hausmann A, Beck R, Prozorov A, Diarra RA, Kone AS, Majambere S, Bradley J, Vontas J, Beier JC, Muller GC. 2020. Large-scale field trial of attractive toxic sugar baits (ATSB) for the control of malaria vector mosquitoes in Mali, West Africa. *Malaria Journal* 19:72.

Cunningham CA, Aldridge RL, Kline J, Bibbs CS, Linthicum KJ, Xue RD. 2020. Effects of radiation on blood-feeding activity of *Aedes aegypti* (Diptera: Culicidae). *Journal of Vector Ecology (JVE)* 45:140-141.

Bibbs CS, Kaufman PE, Xue RD. 2020. Comparative evaluation of metofluthrin as an outdoor residual treatment for barriers and harborage against *Aedes albopictus* (Diptera: Culicidae). *Environmental Entomology* 49:435-443.

Pearson MA, Blore K, Efstathion C, Aryaprema VS, Muller GC, Xue RD, Qualls WA. 2020. Evaluation of boric acid as toxic sugar bait against resistant *Aedes aegypti* mosquitoes. *JVE* 45:100-103.

Aryaprema VS, Blore K, Kline J, Aldridge RL, Linthicum K, Xue RD. 2020. Laboratory evaluation of boric acid sugar baits against irradiated *Aedes aegypti*. *Journal of the Florida Mosquito Control Assoc. (JFMCA)* 67:76-79.

Aryaprema Y, Zeszutko E, Cunningham C, E. Khater, Xue RD. 2020. Efficacy of commercial attractive toxic sugar bait stations (ATSB) against *Aedes albopictus*. *JFMCA* 67:80-83.

Mullin LJ, Dixon D, Xue RD. 2020. The effects of infusion water and fermentation time on mosquito and non-target organism collected in the CDC's autocidal gravid ovitraps. *JFMCA* 67:23-27.

Acevedo N, Efstathion C, Autry D, Aryaprema VS, Xue RD, Qualls WA. 2020. Gravid infusion water comparison for collection of the west Nile virus vector *Culex quinquefasciatus* Say. *JFMCA* 67:10-14.

Dixon D, Autry D, Martin J, Xue RD. 2020. Surveillance of *Aedes aegypti* after resurgence in downtown St. Augustine, Northeastern Florida. *JFMCA* 67:15-22.

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## Publications

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