

Development of a successful education program and disease vector education center at the Anastasia Mosquito Control District, St. Augustine, Florida

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In April, 2003, Dr. Xue was hired as Entomologist at the Anastasia Mosquito Control District (AMCD) to conduct and manage the surveillance and education for the district. When Dr. Xue organized the 1st employee training class, it was surprised that some of the Inspectors / Sprayers could not read a paragraph that contained content on mosquito biology. Dr. Xue realized that the district needed to create and develop an education program which would be the key to assisting the employee success in the field (Xue 2009). Luckily, the director, staff, and Board of Commissioners all supported his proposal about the creation and development of the education program which included employee training, public education, and school programs. The 37 full time employees were divided into three groups (junior 0-3-years' experience, middle 4-10-years' experience, and senior 10-plus years' experience) based on their education, background, and experience and were provided training related to those different areas of experience. Trainings were conducted in small hands-on classes. Also, many different lectures, seminars, and workshops have been provided since 2004.

In May 2005 after Dr. Xue become Director, he requested the Board of Commissioners to create a full time Education and Public Relation Specialist (ES) position to coordinate the employee training, public education, school program, and website/social media platforms. In August 2005, a middle school science teacher Mrs. Gina LeBlanc was hired as the 1st Education Specialist (Fig. 1).



Figure 1. The 1st Former Education Specialists, Mrs. Gina LeBlanc (left), 2005-2009. She has been elected as one of Commissioners since 2016 to serve the District Board of Commissioners. Anastasia Mosquito Control District's 2022 Board of Commissioners (right) who made the decision to build the Disease Vector Education Center in 2021. From left to right: G. LeBlanc, C. Brandhorst, J. Moeller, T. Becker, and G. Gardner.

Since 2005 AMCD has had a total of 8 ES (Table 1). Each one has come to AMCD with a lot of energy, new ideas, and different talents and provided different contributions to our education program. Due to continuing education, professional desires or family issues, most of the ES have worked for 2-4 years for the district before leaving. In 2007, the district established the education committee chaired by Director, later by a AMCD Commissioner and created the employee education

fund policy to support employees who want to continue their education. The District education funds and grants have supported/funded four employees who received their Ph.D. through the University of Florida (UF), five employees who received their B.S. or M.S. degrees, and two have received their Associate Degrees. Also, the District has the annual mandatory training for all employees about work place professionalism, hazard communication, interpreting pesticide labels, review of personal protection equipment, biohazard safety, universal waste, and sexual harassment.

Table 1. Served years by each Education Specialist and education committee chair since 2004

Year	Name of Employee	Degree	Committee Chair
Sept 2005-Dec 2008	Gina LeBlanc	B.S. in Biology	Rui-De Xue (2004-2007) & Jeanne Moeller (2007-2015)
Nov 2008- Feb 2011	Adam Holt	M.S. in Entomology	Jeanne Moeller
May 2011- June 2012	Jessica Phillips	M.S. in Environmental Science	Jeanne Moeller
Aug 2012-June 2016	Jodi Scott	M.S. in Entomology, changed to Ph.D. student	Jeanne Moeller
June 2014- June 2019	Chris Bibbs	M.S. in Entomology, changed to Biologist / Ph.D. student	Jeanne Moeller
Feb 2017- Mar 2019	Molly Clark	B.S. in Wildlife	Jack Rock
May 2019-Aug 2021	Edward Zeszutko	B.S. in Wildlife	Trish Becker
Oct 2021-present	Taylor Ballantyne	M.S. in Public Health	Trish Becker

For professional training in our region, AMCD has cooperated with USDA/Center for Medical, Agriculture, and Veterinary Entomology (CMAVE), Gainesville, Florida (Xue et al. 2016) to organize annual arbovirus surveillance and mosquito control workshops since 2004 (Xue et al. 2014). From 2016-2023 the workshops were in conjunction with the Florida Mosquito Control Association (FMCA)'s Northeastern Region member meeting and the National NE1443 regional project annual meeting (2016-2019). The District selected/collected and published the workshop presentations in Technical Bullet of the Florida Mosquito Control Association for 4 volumes (2006, 2008, 2013, and 2016). AMCD also hosted the Society of Vector Ecology's annual meeting in 2012, organized symposia about pyrethroid insecticide products and EEE/WNV response in 2012. AMCD hosted the FMCA annual meeting in 2015 & 2019, FMCA Fly-In class in 2022, and Florida Entomological Society's annual meeting in 2018. AMCD collaborated with USDA/CMAVE to organize the GIS and modelling workshop in 2006, with the CDC to organize the insecticide resistance workshop in 2009, and AMCD hosted the international working group meeting about areawide genetic control of vector mosquitoes in 2013 and CDC biologist training for surveillance in May 2018 (Fig. 2). Over the years, AMCD has sent more and more employees to join state and national meetings and professional training program on an annual basis.

Due to many trainings and the promotion of education for professionalism, the District has slowly changed the team structure with higher educated employees. Currently, AMCD has five Ph.D., six M.S., and six B.S./A.A in the 32 full time employees. In addition, the District has trained post-doctoral fellows, visiting scientists, and many intern students since 2006 (Xue et al. 2015). The visiting scientists and intern students have benefited AMCD applied research, operation, and education programs. AMCD's public education program includes giving presentations to our local professional and civic associations, different clubs, home owner associations, attending local events, teaching at different schools (Fig. 3) and hosting science exploring classes, organized field trips and tours of AMCD facilities. The District has increased its presence on social media steadily since 2011. AMCD utilizes Facebook and has more than 1,000 followers (Fig. 4).



Figure 2. Left: CDC/AMCA/AMCD trained for certification of educators for Integrated Mosquito Management in 2018. Right: CDC attendances for visiting and training for surveillance at AMCD in May 2018.

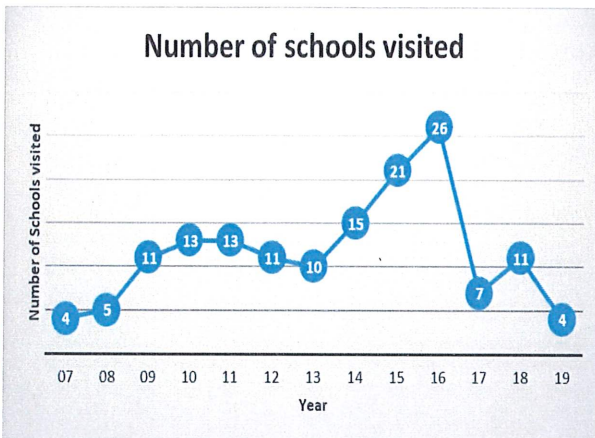


Figure 3. Left: School presentation and teaching at YMCA. AMCD's 1st Education Specialist Gina LeBlanc (left standing) and her students in 2006. Right: number of schools in St. Johns County visited by AMCD from 2007 to 2019.

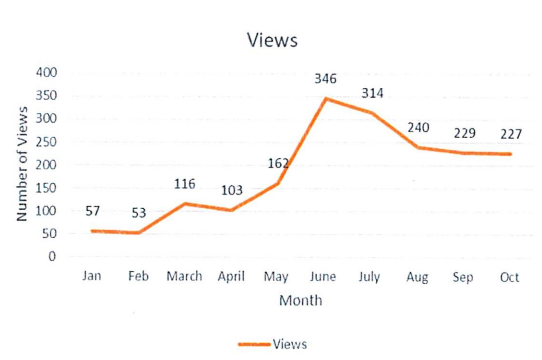


Figure 4. Links and views of AMCD's social media (Facebook) in different months in 2019.

In an effort to increase awareness of mosquito control activities among St. Johns County residents, spray and response to service requests maps are created in real time then, published on the District's website. The District is also frequently featured in St. Augustine's local TV, radio, and newspapers.



Figure 5. Top left: Original idea from visiting Jiangsu CDC pest and vector gallery in May 2017, from left: Ming-Hao Zhou (Jiangsu CDC Director), Uli Bernier (USDA National Program Leader), James Clauson (Beach Mosquito Control District Director), Rui-De Xue (AMCD Director), Daniel Strickman (Gates Foundation Office), Hong-Liang Chu (Director of Institute of Vector-borne Disease, Jiangsu CDC). Top right: Dr. Xue with their mosquito sculpture. Bottom: Current front outlook of the AMCD Disease Vector Education Center with 12 sections (marsh habitats, life cycles and rearing, specimens of mosquitoes, diseases transmitted by mosquitoes and other vectors, ticks and tick-borne diseases, class room, operation control tools included ULV truck and helicopter, surveillance tools and new technology, other insects and honey bees & butterfly provided by the Division of Plant Industry, AMCA, FMCA and AMCD's history, and outdoor children play ground, and outdoor garden with a bat house, a pool, and many flowers and plants).

In May 2017, a group of people (Fig. 5) from the U.S.A. visited Jiangsu CDC's pest and vector gallery and other related collections/displays of disease vectors for education and outreach purposes during the 6th International Forum for Surveillance and Control of Mosquitoes and Vector-borne Diseases in Nanjing, China. Their education facilities were very impressive which resulted in the idea to have an AMCD education facility as a part of AMCD's new control and research campus. The Board of Commissioners was presented the idea of the education facility, and gained their permission to further explore this idea. The former ES Molly Clark and Dr. Xue visited several CDC's Pest and Vector Education facilities, and other related biological and zoological museums in Nanjing, Wuxi, Hangzhou, and Beijing, China. We brought many ideas, pictures and developed an outline for the Board for further consideration. AMCD appointed a specific committee including

former AMCD Commissioner, Mrs. Mary Willis and former Director Mr. Hampton J. Mickler, St. Johns County Department of Health Director Dr. Dawn Allicock, County Agricultural Extension Director, Mr. Tim Wilson, Florida Department of Environmental Protection's Education Center Director Dr. Michael Shirley, St. Johns County School Board Superintendent, Mr. Tim Forson, University of Florida's Department of Entomology & Nematology's Chairman, Dr. Blair Siegfried, Urban Entomological Professor, Dr. Phil Koehler and Extension Professor, Dr. Rebeca Baldwin, Florida Department of Agricultural and Consumer Service/Division of Plant Industry (DPI) Bureau Chief, Dr. Leroy Whilby, CDC's Branch Chief Entomologist, Dr. Roxanne Connelly, USDA/CMAVE's Director, Dr. Kenneth Linthicum, and Bill and Melinda Gates Foundation Office, Dr. Daniel Strickman, and Florida Technology University's history Professor, Dr. Gordan Patterson. AMCD held several public meetings with school boards and related local agencies, and gave many presentations at local clubs and organizations. AMCD also held the committee meeting in the Division of Plant Industry (DPI), and Florida Museum of Natural History in UF campus, Gainesville. Then AMCD collaborated with the design and construction company to work out the preliminary design (Fig. 5) and finally the Board approved construction to begin in late 2020. The Disease Vector Education Center (DVEC) facility is anticipated to be completed by late 2023 with the interior exhibits already in development. Due to local political influence in 2019 and 2020, the original proposed name "Museum of Disease Vectors" has been changed to "Disease Vector Education Center".

So far, the District has trained 4 Ph.D. students through the University of Florida, 88 intern students, and 21 visiting scientists worldwide, and certified 108 educators for integrated mosquito management in 2017 & 2018. AMCD provided more than 380 continuing education credits to public health pest control license holders through annual workshops, symposia, seminars, and different professional meetings. AMCD has been recognized as one of the American Mosquito Control Association (AMCA)'s ten training hubs in 2017 & 2018 (Fig. 2), and AMCD provided surveillance training to CDC biologists in May 2018 (Fig. 2). AMCD has been a mentor organization providing training for small mosquito control programs awarded by the National Association of the City and County Health Offices (NACCHO) in 2019 & 2020. AMCD has eight MoU's with different Universities to train their intern students, and AMCD has been an intern student training site for the CDC Southeastern Center for Excellence in Vector-borne Diseases (Xue & Qualls 2022). Also, AMCD accepted and provided summer intern training for high school students (4 students each year) who are in the Academy Career program for Biotech and Medicine since 2021. AMCD was nominated and recognized as one of the best business partnership from the St. Johns County's School Board in October 2022. Recently, AMCD has been recognized/awarded as an intern training host by the Entomological Society of America. AMCD has been recognized as the Northeastern Florida mosquito control, applied research, and education center.

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