

THE SKEETER

Vol. 78. No.1

2018 Winter/Spring Newsletter



Official Newsletter of the Virginia
Mosquito Control Association

President's Address

I am honored to serve as the president of this organization. My first term as president of this organization was over 15 years ago. I am amazed how things have changed through the years. This organization was built at the beginning to fight to manage and control Malaria. None of our programs would exist today had it not been for our predecessors who conducted the detailed biological assessments, tested the applications for modern chemistry, designed and built the equipment as well as developed application techniques to eliminate Malaria from the state. Flash forward to today and we have dedicated, well-trained membership. It is your innovation and determination that will carry the organization into the future.

The 2018 Annual Meeting is in the rear view mirror and many of us are ramping up for this season's control efforts. I want to pause for a moment and thank everyone that helped make the meeting this year a success. Overall, the meeting was well received and we had a good attendance. We did have some constructive criticisms that we will try to address for the 2019 meeting. I encourage anyone that has suggestions for improvements to please step up and help make next year's meeting even better. One of the reoccurring suggestions is to include more operational presentations on the program. I am asking everyone as you work through the season to think about your operation and what you might be able to share with the membership as part of the 2019 program. Please send topics to [LaToya White](#) (our 2019 program chair).

The committee list for this year is on [page 30](#). Thanks to everyone that volunteered for this year, your participation is what keeps the organization moving forward. It is not too late to sign up to participate on a committee. If you are interested, please do not hesitate to contact us. Specifically, we still could use some help with public relations, legislative, and special awards. Please take the time to participate in a committee. We need your help to keep the organization running.



George Wojcik
2018 VMCA President

What's in this issue

Announcements, What's That?	3	Let's Rap Lyme	16-17
VMCA Adult ID Course	4-5	One Batty Bug	18-19
VMCA Annual Meeting Recap	6-11	ODU Tick Lab	20-21
VMCA Meeting Summary	6	April Showers Bring...	21
VMCA Student Competition	7-8	In Defense of Green Spaces	22-23
Meeting Awards, Hospitality Suite	8	On the Hunt for Emerald Ash Borer Larvae	24
Outstanding Service Award Nomination	9	Virginia Puts Mosquitoes to the Test	25-28
Meeting Survey Results	9-11	What's That? Answer	28
TMVCC Update	11	Merchandise Sales Continue	29
2018 Annual MAMCA Meeting	12	2018 VMCA Committees	30
2018 Annual AMCA Meeting	13-14	2018 Sustaining Members	31
I Wonder if Anyone Heard....	14-15	Jurisdictions & Other Resources	32
Website Committee Update	15	2018 Executive Board	33

Announcements

From the Editor

A new year, a new look for the Skeeter! I adore graphic design, but I lack any formal training in the discipline, so bear with me as I experiment with different color schemes and layouts.

Thank you to all of the VMCA membership for waiting patiently for this first 2018 edition. We hope you enjoy it. Thank you to everyone who contributed an article; we had an incredible number of submissions and there is some fantastic content in this issue. We can always use more! Keep us up to date with what your jurisdictions are working on, any unusual discoveries in the field or lab, any upcoming trainings, anything you can think of. This year we hope to expand our social media presence as well, so take photos! Send any and all content to me (Rachel Kempf) at rkempf@pwcgov.org, or info committee co-chair Karen Akaratovic (kakaratovic@suffolkva.us).

You can now sign up for or renew your VMCA membership online! Visit our website and fill out the form [here](#)

VMCA Organizational Mailing Address

Virginia Mosquito Control Association
Jay Kiser, Secretary/Treasurer
800 Carolina Rd
Suffolk, VA 23434
Phone: (757) 514-7608
Email: virginiamosquito@gmail.com

Upcoming Meetings

Great VA Tick Field Meeting

April 30, 2018
Richmond, VA
(contact Dr. Holly Gaff hgaff@odu.edu)

VMCA Adult Mosquito ID [Course](#)

May 7, 2018
Suffolk MC

TMVCC Adulticide Rodeo

May 9, 2018
Hampton, Virginia

AMCA Annual Washington [Conference](#)

May 14-16, 2018
Washington, DC

ESA, ESC, ESBC Joint Annual [Meeting](#)

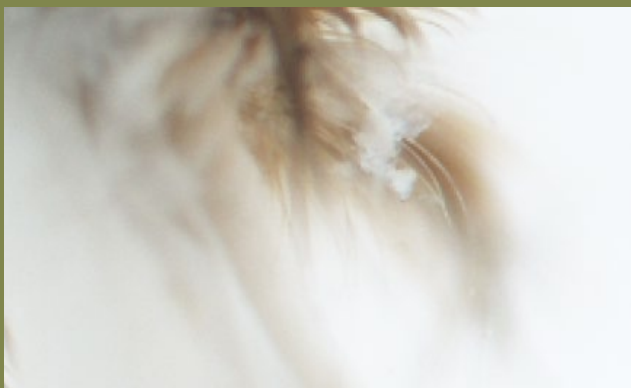
November 11-14, 2018
Vancouver, Canada

NCMVCA Annual [Meeting](#)

December 3-4, 2018
Greenville, North Carolina

72nd Annual VMCA [Meeting](#)

February 5-7, 2019
Virginia Beach, Virginia



What's That...?

Answer on [page 28](#)

VMCA Adult Mosquito Identification Course

Virginia Mosquito Control Association is holding its annual Adult Mosquito Identification Course on Monday, May 7th, 2018. This is the first year we are attempting a one-day class, as opposed to two. It will be conducted by the combined efforts of local mosquito control biologists (new faces teaching this year!).

This will not be strict taxonomy, but more of a practical training geared toward seasonal interns, summer part-time biology positions, or mosquito biologists new to the area. Class size is limited to 30; attendees should have mosquito surveillance and/or identification in their job description and duties. New participants will take precedence over returning individuals; if space is available then others will be accepted. Sign-up is on a first-come basis so please sign up early!

The course will be held at Suffolk Mosquito Control, 800 Carolina Road, Suffolk, Virginia 23434 in the administration building training room 128. A light breakfast and lunch will be provided by VMCA. If you have dietary restrictions and would like to bring your own food, a refrigerator/freezer and microwave are available.

You will need to bring the following items:

- Microscope with light source
- Harrison et al. 2016 Mid-Atlantic Region ID Guide
- Power strip
- Extension cord
- Forceps
- Petri dishes
- Notebook/pens/pencils
- Refillable coffee mug/tumbler (if you're one of those tree-hugger types)

Supplies (including microscopes) are limited but we will have a few extras on hand.

VMCA Adult Mosquito Identification Course

Tentative Schedule, Monday 5/7/2018

7:00-7:30	Light breakfast (provided by VMCA) donuts, fruit, coffee, water	
7:30-7:35	Course overview	Karen Akarovic , Suffolk Mosquito Control
7:35-8:30	General mosquito information, diseases	Tim DuBois , Hampton Environmental Services
8:30-8:40	Lab protocols	LaToya White , Newport News Public Works
8:40-8:50	Environmental concerns with field work	Tim DuBois , Hampton Environmental Services
8:50-9:00	<i>Anopheles</i> genus	Michael Bowry , Hampton Environmental Services
9:00-9:10	<i>Culex</i> genus	Karen Akarovic , Suffolk Mosquito Control
9:10-9:20	"Minor" genera (<i>Cs</i> , <i>Cq</i> , <i>Or</i> , <i>Ur</i>)	Jennifer Barritt , Virginia Beach Mosquito Control
9:20-9:30	Dichotomous key demonstration	Jay Kiser , Suffolk Mosquito Control
9:30-11:30	Identify <i>Anopheles</i> , <i>Culex</i> , and minor genera using microscopes and keys	

Continued on next page

VMCA Adult Mosquito Identification Course

11:30-12:00	Lunch (provided by VMCA) pizza variety, water, soda	
12:00-12:20	<i>Aedes</i> genus	Jay Kiser , Suffolk Mosquito Control
12:20-12:30	<i>Psorophora</i> genus	Penelope Smelser , Norfolk Vector Control
12:30-3:30	Identify <i>Aedes</i> and <i>Psorophora</i> using microscopes and key	
3:30-4:00	Trapping demonstration and freezing	Michelle Slosser , York County Mosquito Control
4:00-4:30	Breakdown of equipment and room clean-up	

To sign up: please e-mail Education Committee co-chair, Karen Akaratovic (kakaratovic@suffolkva.us) with participant name, associated city/county/employer, as well as any supplies you lack from the provided list.

This information is also posted on the VMCA website [training page](#) and [Facebook page](#).

Directions

800 Carolina Rd, Suffolk Virginia may be slightly difficult to find once you get close to the facility. Google maps and other direction software may put the address slightly off target. If you use 800 Tyson Ct, Suffolk Virginia, that might help, or you can follow the directions and maps to the right.

From the North (I-664S/I-264W/I-64W)

Take exit for US-58W/US-13S

Merge right to stay on US-13S, follow signs for Ahoskie NC/
Edenton NC/Virginia 32

Go straight through light crossing Carolina Road
Turn left at the yield sign

From the South (SR-32N/US-13N)

Merge/stay on US-13N past Suffolk Airport

Turn right onto Tyson Court

Follow the road to the front or rear parking lots (see diagram on the right).

The training room is located in the administration building (see diagrams on the right).

Contact 757-514-7608 for assistance

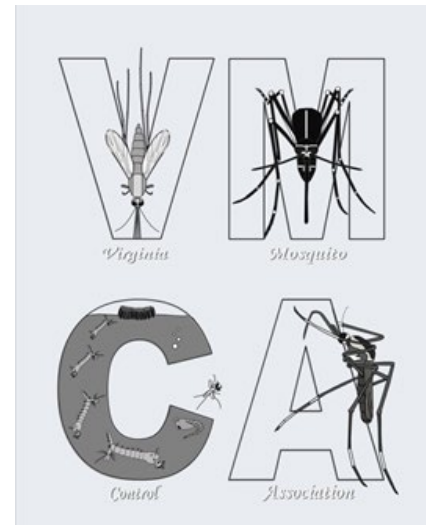


2018 Annual VMCA Meeting

2018 Annual VMCA Meeting Recap

-Submitted by Karen Akaratovic

The 2018 [annual meeting](#) saw an excellent turn-out with 70 out of 96 regular members attending. Overall, 104 people attended this year, 11 of them sustaining members. On the first day of the meeting, after the last presentation, a group of members went out to a local brewery and had a “phenomenal” time according to members Jay Kiser and Charles Abadam. The Biting Times social the following night, which was sponsored by VMCA (with free drinks and heavy hors d’oeuvres!) was a great time to socialize with colleagues and discuss all things mosquito. The hospitality room was also a huge after-hours hit, as usual (see the committee report below). The Student Competition Committee held the second annual poster competition (see the committee report below), including a silent auction and 50/50 raffle to raise funds for the \$500 award that is given to the winning student. The Merchandise Committee had a neat new item this year (eco-friendly cork coasters!) along with new apparel and had two new designs, one from Janice Gardner and one from Pedro Arias (pictured right).



Survey results showed most of the membership really like having the meeting on a Tuesday-Thursday schedule as opposed to Wednesday-Friday. Pesticide resistance was a hot topic this year, and most members felt this was the most beneficial information shared at the meeting, along with the topics of pesticide effects on bees, education, adulticide, surveillance, and data management. Of those that filled out surveys, most had a favorable opinion on the speakers, breaks, luncheon, location, program, and meeting organization. Some weaknesses mentioned included the lack of recertification this year, too many tick talks, lack of participation within some committees, and the need for more public outreach.



2017-2018 VMCA Student Competition

-Submitted by Jay Kiser

-Photos by Betsy Hodson

During the 2018 VMCA annual meeting, the Student Competition Committee (SCC) held their second annual student poster competition. Eight posters were submitted by Virginia university students and displayed in the meeting hall foyer of the Renaissance Portsmouth-Norfolk Waterfront Hotel. First place and the recipient of the 2018 Dr. Jorge Arias Student Competition Award, with a \$500 grand prize, went to Laura Bitzer from ODU (pictured to the right). Her poster was titled "The role of the northern short-tailed shrews in the maintenance of *Borrelia burgdorferi*." Authors of runner-up posters included Alexandra Cumbie from ODU, Madeline Illar from GMU, Michelle Bershers from ODU, and Kathryn Hogan from GMU. First place and all runners-up were awarded free registration to the VMCA annual meeting, which was provided by VMCA.

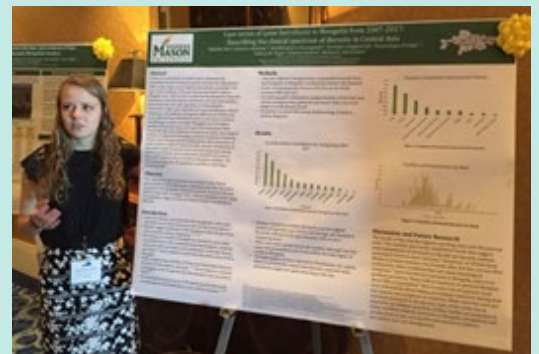
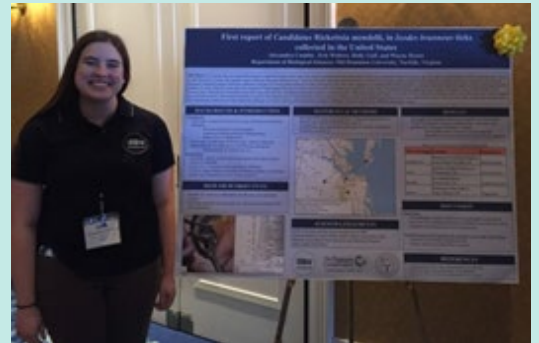
During the meeting, both students and VMCA members were able to participate in several SCC events. On Wednesday morning everyone was able to partake in a Q&A poster session held in the meeting foyer. This session gave VMCA members a chance to talk one-on-one with the students and investigate each poster more thoroughly. During that same day, several students were able to give presentations on their poster research. Thanks to the Agenda Committee, not only Laura Bitzer but also the top two runners-up, Alexandra Cumbie and Madeline Illar (pictured to the right), were able to present.

For the second year, the SCC held two successful fundraising events during the annual meeting; a 50/50 raffle and a silent auction. With the help of the SCC, VMCA members, and sustaining members, we were able to collect a total of almost \$1,400. This money will be used to fund future competitions that encourage research in fields of vector biology. Throughout the meeting, Francis Valera and Karen Akaratovic were hard at work selling raffle tickets and sold over \$463 worth. George Wojcik was the lucky winner whose ticket was drawn, but generously donated his winnings back to the student fund (Thank you George!!!). Ann Herring spearheaded the 2018 silent auction. With the help of several VMCA members and vendors, she was able to auction off 24 donated items and collect over \$900. If anyone is interested in donating items to next year's auction, please contact Ann Herring at mherring@suffolkva.us

I would like to thank all the students that participated in the poster competition this year. Your participation reassures us that this competition is needed and encourages us to keep moving towards our goals. I would also like to thank everyone that contributed to the



Above: Receiving the second annual "Dr. Jorge Arias Student Competition Award" during the lunch banquet at the 2018 VMCA annual meeting. Jeff Hottenstein (left), VMCA President, just gave Laura Bitzer (right) her award and a check for \$500.



Above: Runner-up posters at the VMCA annual meeting. Alexandra Cumbie (top) with her poster titled "First report of *Candidatus Rickettsia mendelii* in *Ixodes brunneus* ticks collected in the United States", and Madeline Illar (bottom) with her poster titled "Case-series of Lyme borreliosis in Mongolia from 2007-2017: Describing the clinical spectrum of *Borrelia* in Central Asia."

silent auction and 50/50 raffle this year. Without your donations, this program would not have the success it has seen over the last two years and hopefully will see in the years to come. Last but not least, I would like to thank the members of the SCC (including judges). A lot of hard work has gone into this committee over the last two years and I appreciate everything you have done. Looking forward to round 3.

Right: 2017-2018 Student Competition participants at the 2018 VMCA annual meeting. Photo includes students, judges, and committee members.



2018 VMCA Meeting Awards

-Submitted by Jennifer Barritt, Awards Committee Chairperson

The following awards were presented at the 2018 VMCA meeting:

Michelle Slosser was presented with an Outstanding Service Award for her exceptional service in fieldwork. Jeff Hottenstein was presented with the President's Plaque for his outstanding leadership as VMCA President. Congratulations to Michelle and Jeff!

Thank you to everyone who submitted nominations for the 2018 meeting. Please continue to look for opportunities to recognize the work that others do for the organization and consider submitting nominations for the 2019 meeting.



Left: 2017 VMCA President Jeff Hottenstein presents Michelle Slosser with the Outstanding Service Award

Right: Incoming 2018 VMCA President George Wojcik presents 2017 VMCA President Jeff Hottenstein with the President's Plaque

2018 VMCA Hospitality Room

-Submitted by Ann Herring, Hospitality Room Chairperson

The Hospitality Room for the 2018 VMCA meeting happened on Tuesday and Wednesday nights after the day's wonderful presentations. Your 2018 Hospitality Room Committee consisted of Jay Kiser, Michelle Slosser and me, Ann Herring. There were lots of food, beverages, fun and camaraderie of friends and associates to share stories, ideas and laughs; a shout out to all the vendors that stopped by with refreshments.

Your Hospitality Room Committee for the upcoming 2019 VMCA is, Michelle Slosser, Luz Grant and me. We look forward to seeing all of you next year, until then Happy Mosquito-ing!!!



Randy Buchanan and his mini-me, Chewy, enjoy the VMCA after-hours events

Outstanding Service Award Nomination

-Submitted by Betsy Hodson

It is a great pleasure for me to nominate this individual for the, "Outstanding Service Award: for exceptional service in field work." This person is one of the most talented and well-rounded biologists I have ever met. Her sound qualitative abilities, extensive knowledge of terrain coupled with clear and concise communication prowess makes her a tremendous asset to public health and mosquito control. This person consistently completes complex field projects, such as reorganizing the county's mosquito surveillance methods, from an outdated system to a simplified and logical one that our citizenry can understand. One example of her creative endeavors was finding a better way to map our trap sites, becoming so involved with the project that she has gone back to college to receive a certificate in GIS analysis. This has also given the division more contacts, who have been working with us to build a better surveillance program.

These pragmatic changes have enhanced our data collection and interpretations to better serve our citizens through sound data based decisions. Because of these improvements, we have gone from a program that trapped 6000 mosquitoes a year to a program that has trapped over 45,000 mosquitoes this last season. We have also identified and confirmed five additional species in our AOC due to the surveillance reorganization, her identification skills and her positive influence through mentoring to our summer interns. She is admired by her co-workers for her approachability and is a constant biological sounding board and an invaluable resource. Despite her substantial responsibilities, she works tirelessly with the Virginia Master Natura list Program. Her expertise in bats is what motivated me to hire her; she has proven to be a visionary for my division.

She has truly inspired me to become more involved in the community, to reach out to those who are not as knowledgeable about mosquitoes creating one of the best education programs bar none. Even though my division's primary job is to kill mosquitoes, she understands why it is necessary to establish a better understanding of the economics and treatments we use to inform our citizens. I am not sure how my division could operate without the passion and drive she has. For all these reasons and more, I feel confident that you will agree that Michelle Slosser from York County is a most deserving candidate for this award.

Respectfully submitted,
Betsy Hodson
Operations Superintendent
York County Mosquito Control

2018 Meeting Survey Results

-Submitted by Tim DuBois

Strengths

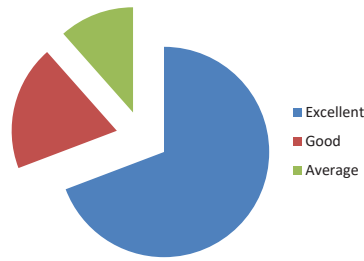
- Networking
- Well-trained people
- Committee participation from members
- Good mix of speakers
- Different talks
- Willingness of a few people to work hard
- Communication
- Training Opportunities

Weaknesses

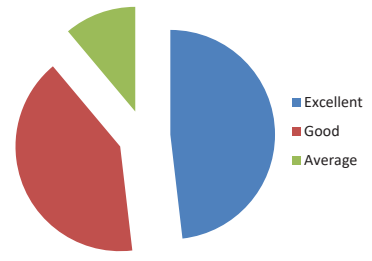
- No Recertification
- Need more public outreach on why mosquito control is needed
- Student interest in mosquito research
- Too many tick talks; keep them relevant
- Organization
- Not getting participation in committees
- Burnout issues in committees

Subjects Most Helpful	
Pesticide resistance	8
Bees	4
Getting the most out of your adulticide program	3
Surveillance	3
Survey123	3
York County education program	3
Barrier treatments	2
Gravid/CO2	2
Operational issues	2
Statewide update	2
Using your whole toolbox	2
VA new aliens	2
VDACS update	2
<i>Aedes aegypti</i>	1
Backyard inspection	1
Battling zika with hip-hop	1
Bio talks	1
Insect idioms	1
New research	1
Sustaining member presentations	1
Tick talks	1
Using Natular G	1

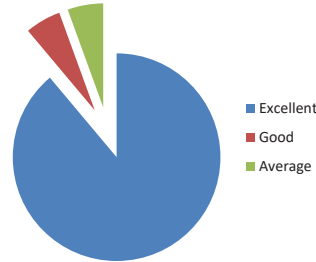
Location and Lodging



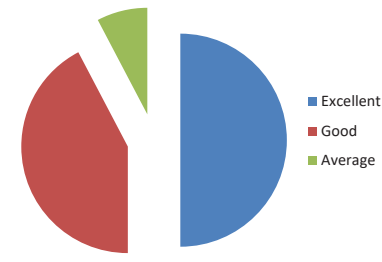
Overall



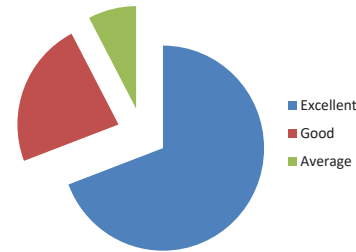
Hospitality Room



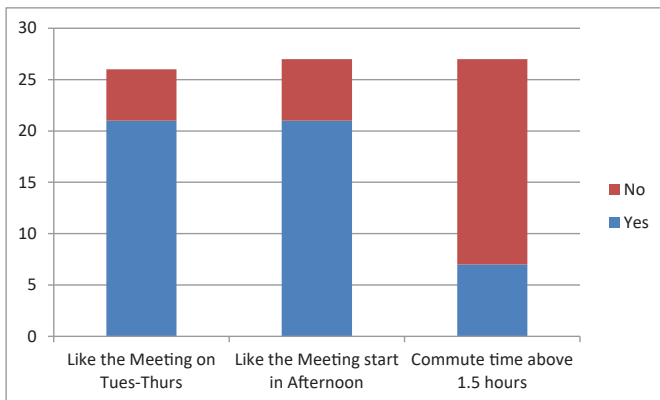
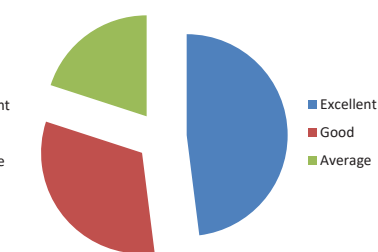
Meeting Program



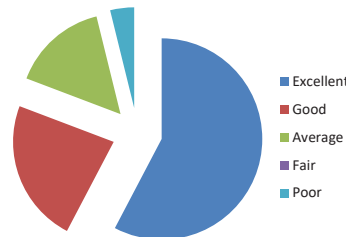
Speakers



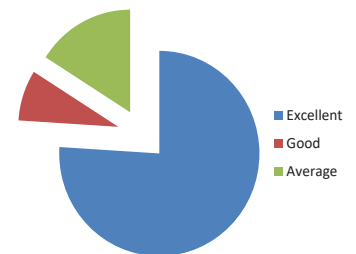
Meeting Organization



Handling Questions & Discussion



Breaks



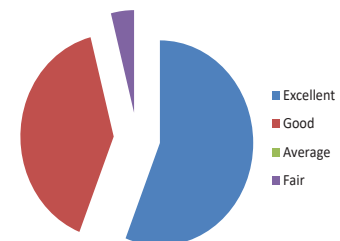
Subjects that need more attention

- Everyday mosquito control
- Practical application of research
- Field work
- Pesticide field trials
- More time for interaction
- Larvaciding
- Provide microphone for questions or repeat to audience

Why Did You Attend?

To learn	15
Networking	6
Presenter	4
Work requirement	3
New ideas	2
Recert	2
Love of VMCA	1
Part of VMCA collaboration	1

Luncheon



How the VMCA can support your organizations

- Increase networking capabilities
- More outreach information and materials
- Continue training opportunities (ID Course, etc.)
- Technical support, more info on technology
- Continual update on newsletter and website
- Facilitating more communication and new ideas

Additional Comments

- Post presentations on website for viewing and download
- Really like ability to have online presenters
- Screen needs to be higher for middle and back seats
- Need coffee and drinks throughout the meeting
- Recertification has to happen next year
- Speakers weren't high quality (some maybe under the influence?)
- Agenda needs to be sent out sooner
- Less tele-speakers
- Too many breaks, everything seemed shorter this year

TMVCC Update Spring 2018

-Submitted by Michelle Slosser

The 2017 meetings were a success with eight events, including our annual sprayer calibration rodeo and season wrap up oyster roast. Thank you to Mitch Burcham for a good year and to everyone who added to the events as hosts, equipment operators, and speakers. Thank you to Norfolk Vector Control for hosting our season wrap up oyster roast, and to Ted Bean and Jeff O'Neill for co-sponsoring.

The new board for 2018 consists of Michelle Slosser as president, Chris Hohnholt as vice president, and Mike Bowry as secretary. Looks like it's going to be another fun year, starting off with a larvicide measuring demonstration from Dreda Symonds in Chesapeake on March 28th. April's meeting will be in Suffolk on the 11th, with Joe Andrews from AllPro teaching us about "The Cost of Complacency." Everyone who would like their adulticide sprayer calibrated can come on down to the Annual TMVCC Truck Rodeo on May 9th at Gosnold Hope Park in Hampton, where Jeff Hottenstein from Clarke will be calibrating all sprayers. Then in June, we will be back at Tucanos Brazilian Grill in Newport News, with a talk by Wes Robertson from Henrico County.

If anyone has an interesting speaker or subject they would like to hear about this season, please contact Michelle at michelle.slosser@yorkcounty.gov



Michelle Slosser



Chris Hohnholt



Mike Bowry

2018 Annual MAMCA Meeting

-Submitted by Tim DuBois

The 43rd Annual Mid-Atlantic Mosquito Control Association's [meeting](#) took place February 12-14th, 2018 in beautiful Carolina Beach, North Carolina. 145 people attended, including 9 representatives from Virginia. Chesapeake, Hampton, Suffolk and York County brought representatives, as well as two students from Virginia Tech in Blacksburg.

Virginia's own Tim DuBois from Hampton was president during this meeting, and was voted in as past president at the end of the meeting. Suffolk's Ann Herring passed the torch of VA state director onto York County's own Betsy Hodson. Ann was also given a certificate of appreciation for serving as the VA state director for the past 5 years.



Left: Tim DuBois is voted in as MAMCA past president

Right: Ann Herring is presented with a certificate of appreciation for serving as the VA state director for the past five years

The meeting was a combined North Carolina and Mid-Atlantic Annual Conference, so attendance was very high. The student competition for North Carolina took the spotlight throughout the agenda with multiple student presentations that were spread throughout North Carolina's colleges. There were three student awards given this year. First place was Merideth Beaulieu from North Carolina State University, who was awarded a \$500 check from MAMCA; second place was Ben McMillan from Virginia Tech, who brought home a check for \$250 from NCMVCA; and third place was Danielle Kowacich, who took home a total of \$250 that was split between the two organizations.

Next year's Mid-Atlantic Annual Conference will take place in Harrisburg, Pennsylvania on March 26-28, 2019. For further information on the association or any upcoming meetings, please go to MAMCA's [website](#).



First place student competition winner
Merideth Beaulieu



Second place student competition
winner Ben McMillan



Third place student competition winner
Danielle Kowacich

2018 Annual AMCA Meeting

-Submitted by Nate Nagle

The American Mosquito Control Association (AMCA) held its 84th [Annual Meeting](#) from February 26 – March 2, 2018 in Kansas City, Missouri. Virginia had five attendees representing three jurisdictions including Josh Smith and Lauren Lochstampf of Fairfax County Health Department, Karen Akaratovic of Suffolk Mosquito Control, and Filipinas Caliboso and Nate Nagle of Prince William County Mosquito and Forest Pest Management.

The Grand Opening of the Exhibit Hall and Welcome Reception on Monday evening was the official start to the conference. Everyone gathered to reconnect with old friends, meet new acquaintances, and view all the new products and technology brought by the exhibitors. The posters for the competition were also on display so it was the first taste of the upcoming talks and presentations. Everyone seemed to take this time to fill their bags with new information, make plans for the week, and relax after their journeys. Overall, it was a great opportunity to talk with friends and colleagues from every facet of the mosquito control industry.

The meeting started full swing on Tuesday morning with an address from the President, Wayne Gale. Awards and a memorial lecture also took place at this time to take a few moments to recognize individuals who have made significant contributions to both the AMCA and the mosquito management profession. We saw a presentation from the keynote speaker, Dr. Tracey McNamara, which gave an interesting perspective regarding our preparedness of combating zoonotic threats in the present day compared to where we were with the introduction of West Nile Virus in 1999.

Something new and different this year to the meeting was a panel discussion titled, “From Chaos to Calm: Professional Mosquito Control Response to Hurricanes Harvey, Irma, and Maria”. This particular discussion brought together members from Federal, State, and Local entities along with industry partners to discuss the successes and improvements to the mosquito

control responses to natural disasters. This was an interesting and eye-opening experience to hear input on how all these different organizations came together for a common goal.

There were many interesting talks throughout the meeting covering all aspects of mosquito control. Topics discussed included research, operations, surveillance, and new products. The focus this year shifted slightly away from Zika to more of a central idea of strategies to manage *Aedes* mosquito populations and the importance of monitoring and managing resistance in the mosquito population.

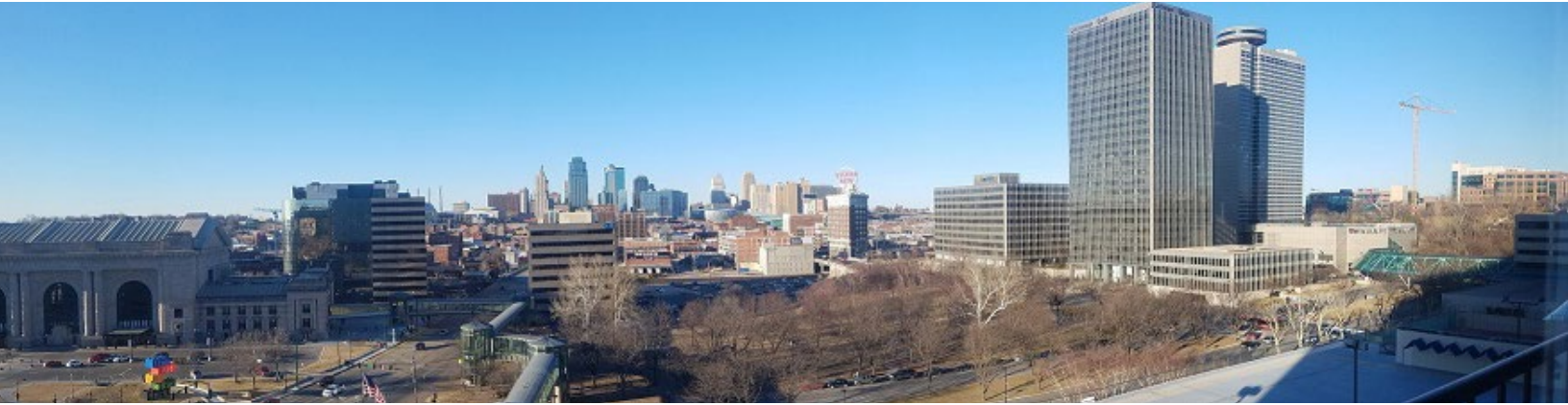
The presentation topics did not disappoint and included integrating Unmanned Aerial Vehicle (UAV) Systems in mosquito surveillance and control, pyrethroid impregnated fencing for controlling container-breeding mosquitoes, and even using frogs as a vehicle to disseminate larvicides. VMCA's own Karen Akaratovic was the sole presenter with the topic, “First record of *Culex coronator* in Virginia with a look at its recent rapid range expansion”. Karen did an excellent job and was an excellent representative for what VMCA stands for.

Thursday night was the meeting social and banquet that is the pinnacle of the entire meeting. We enjoyed a delicious meal and saw some additional awards that recognized members of the Young Professionals and other members with outstanding contributions. This was also the time where we heard from a young woman who survived a mosquito-borne illness. Her heart-breaking story and the troubles she has faced served as a reminder to all of us in the audience about the importance of what we do every day. The severe repercussions of the diseases we work to prevent have real impacts on real people and we should never lose sight of why we do what we do.

Kansas City was a beautiful city with a thriving downtown filled with nice restaurants and places to relax and grab a drink. We all had some time to enjoy

some delicious Kansas City barbeque and take in some of the local scenery. We did not escape the weather pounding the Mid-Atlantic at the time and some of the VMCA group had to deal with flight cancelations. I will say that for those of us flying into Reagan

International, it was certainly a nerve-racking landing. Overall, it was a great meeting and an excellent opportunity to learn and interact with our colleagues and coworkers in mosquito control from across the country and around the world.



I Wonder if Anyone Heard What I Just Heard

-Submitted by Joe Andrews

I have just returned from the annual American Mosquito Control Association conference held this year in Kansas City, MO. Every year includes a grand banquet with introduction, awards, and a keynote address, a welcome way to end the week of papers and talks. This year's address was given by woman who has survived a neuro-invasive case of West Nile Virus. Despite her survival, she is forever altered and complications will continue.

She is a preschool teacher, who taught dance and had a vibrant, fun, and family-centered life; evidenced by the photographs flashing on the screen behind her. She began her story sharing the early signs of West Nile that mimic so many other ordinary illnesses. After going to the doctor and receiving a non-specific diagnosis, she was sent home. She continued, her symptoms grew worse and turned to another doctor, again she was sent home with pain medication and told to "tough it out."

Through all of this, she was missing work and social outings and time with her family. Her suffering grew unbearable. After, several weeks of pain and anguish and internet research she found an infectious disease specialist who had the right tools and information to

diagnose her with West Nile Virus.

Weak, racked with pain, a headache so terrible she could no longer tolerate the, she had her diagnosis but too late. Sadly, the damage had been done. Forced to wear sunglasses in the dim light of the banquet, her stance at the podium, and needing assistance to and from the podium all proved that her story is one of misdiagnosis.

During her speech, she mentioned that her nephew wants to be a mosquito control superhero. In fact, he looks forward to the mosquito control truck rolling through the neighborhood, every Tuesday.

Every Tuesday.

I wonder if anyone heard what I just heard. Yep! Every Tuesday, like clockwork, came the mosquito control truck. I am sure you have all read the literature and attended the presentations that show, categorically, that West Nile vectors are most active on Tuesday evenings. I'd bet dimes to doughnuts that the mosquito control program in her area does not have the ability or the capability of surveillance. In this instance, ability is "to

have the knowledge to do surveillance” and capability is “to have the budget to do so.” This instance of misapplication and missed surveillance could also be interpreted as misdiagnosis.

Surveillance is a broad term meaning “to have an awareness of mosquitos and their pressures at a given time.” It can be fancy or it can be simple. For many small towns it has to be simple to meet the ability and capability of the program. I am envisioning a public works employee who sprays for mosquitos on top their myriad responsibilities. Partnering with, or even communicating with, a larger district can increase the ability and capability of a smaller operation.

Imagine if the larger district two counties over had shared their knowledge on an increased risk of West Nile Virus. Imagine if that same district reached out in the off-season to help the smaller operation understand the importance of surveillance and targeted application or how to setup a trap. Often times a small organization does not have the resources or knowledge to reach out when needed but should when needed, just as a larger organization should share with their neighbors in the spirit of public health.

I implore all reading this to continue to strive toward a public health stewardship. When told to spray in the afternoons explain why dusk would be better. When told to spray every Tuesday explain why regularly scheduled application may not be appropriate. Break it down to cost if you have to. Tell them that the nature of mosquito control lends itself to spraying at the right times on the right days (not necessarily Tuesdays) for maximum efficacy and efficiency.

If the woman at the beginning of this article didn't contract West Nile in her backyard, it could have been at the park while with her family. The misdiagnosis of her illness may have been related to the misdiagnosis of the mosquito control surveillance program in her area. Our mission should be to reduce the potential of transmission of vector-born disease. This state is blessed to have a deck loaded with vector management professionals, from our universities to the good ole boys who have been around the block more than once. Give 'em a holler and see what you can be doing better.

Respectfully submitted,
Joe Andrews

Website Committee Update

-Submitted by Website Committee Member, Karen Akaratovic

Since my introduction to the website via production of the Skeeter in 2016 and with the help of Chairperson Penelope Smelser, I have slowly begun to learn the workings of the WordPress software. I am still a beginner, so bear with me. Recently, I have been updating various pages and currently am interested in a major renovation of the “[Mosquitoes of Virginia](#)” page, which is found at the bottom of the “Info” tab on the main toolbar. If you visit the page, you will see roughly 50% of the species have an associated hyperlink that takes you to an information page, which includes pictures and/or bionomics. Some pages are great, some could use some updating, and others could use multiple photos and a lot more biological information. I would eventually like to get all species pages filled with multiple photos of key features (larva and adult) and complete bionomics as well as relevant references. I realize this is a significant undertaking and will most likely require several years to finish, but if you're willing to contribute, it would be greatly appreciated.

I know there is a plethora of information and photography online but I think original photos from membership would be best, if feasible. If you have the ability to take high-resolution pictures using a microscope digital camera, that would be preferable. However, some people (myself included) have had decent results just positioning a smartphone over a microscope eyepiece. In any case, please submit photos, information, references, etc. to Karen Akaratovic (kakaratovic@suffolkva.us).



Let's Rap Lyme

-Submitted by Andy Lima-

MC Bugg-Zzzzz...we're droppin' rhymes to target Lyme disease, callin' attention to prevention so please use repellent and do a tick-check upper Midwest, mid-Atlantic and Northeast nod your headache if ya got Bull's-eye rash, fever, fatigue

Repeat

watch ya back in the woods, brushy spots and leaf litter walk in the center of trails, don't be arachnid dinner eight legs are creepin' in that overhangin' vegetation stop these blood-sucking parasites with information

eliminate brush piles, that's where rodents like to kick it Lyme runs in their blood?! Larvae pick it up when they sip it hunker down for several months to survive the winter in spring infected nymphs emerge to seek blood from the leaf litter

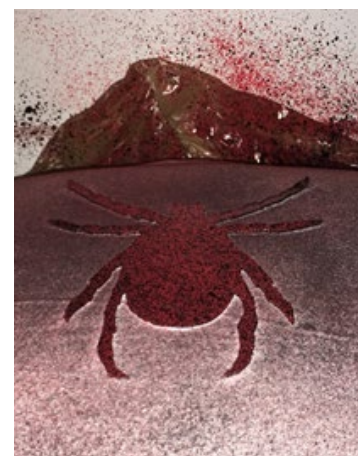
ticks dig humidity, keep the yard trimmed mind the edge, where your lawn transitions to woodland they like it overgrown—so keep the grass mowed ticks are known to seek hosts, wherever wildlife roam

we're droppin' rhymes to target Lyme disease, callin' attention to prevention so please use repellent and do a tick-check upper Midwest, mid-Atlantic and Northeast nod your headache if ya got Bull's-eye rash, fever, fatigue

Repeat

in both the heat of the summer and when it's chilly outside ticks are "questing" for hosts—basically blood and a ride arms waving, their saving grace is when you brush on by they're clingin' on with tiny hooks, they don't jump, drop or fly

apply repellent to your clothing, as well as exposed skin use CDC-recommended active ingredients IR3535, DEET or picaridin treat clothing with 0.5% permethrin, but never skin





**bathe or shower ASAP when you get back inside
check out your body with a mirror, 'cause ticks like to hide
examine gear and pets, for hitchhikers and stowaways
dry clothing with high heat, ticks will die posthaste**

**we're droppin' rhymes to target Lyme disease, callin' attention
to prevention so please use repellent and do a tick-check
upper Midwest, mid-Atlantic and Northeast
nod your headache if ya got Bull's-eye rash, fever, fatigue**

Repeat

**early summer's the time for most Lyme disease cases
in May, the tiny nymphs reached peak populations
last summer they got infected, don't let them go undetected
stay protected—treat yo self! to a full-body inspection**

**you found a tick?! don't panic, use tweezers to grab it
close to the head, pull slow and steady until it detaches
clean and disinfect the site, then watch your bod for 30 days
call up the Doc if you get rash, fever, fatigue or headache**

**blacklegged ticks feed and drop, you may not even know
often they bite outta sight, later the symptoms show
if you spend time outside, then ask your Doc about Lyme
treatable when detected early, yo, most of the time**

we're droppin' rhymes



“Let’s Rap Lyme” is the latest music video from Andy Lima’s hip-hop alter ego, MC Bugg-Z. This project is a collaboration between two Fairfax County agencies—the Health Department and Department of Consumer and Cable Services, Channel 16. The track was written in January, recorded in February, filmed in March, produced in April and rolls out to the planet in May for Lyme Disease Awareness Month.

This is the first of Lima’s projects to be produced and directed by someone else—but it’s sure to be the best yet due to expanded film and editing capabilities from Channel 16. “Let’s Rap Lyme” will contain scenes filmed both on green screen (!) and in the field at Lima’s home and surrounding woods. Producer Sean Metzger with Channel 16 has proven to be extremely creative with the film shoots, and his graphic editing capabilities are sure to lead to a nicely polished product. The Health Department is excited to share this new video with the world to promote Lyme disease prevention in 2018, and we hope that you’ll find it useful in your community this spring, summer and beyond!

Check out the lyrics if you’re so inclined!



One Batty Bug

-Submitted by Wes Robertson

You are jolted awake by an ominous scratching sound coming from the walls and ceiling. After a quick inspection of the room and floors, you find nothing of significance. To ease your mind, you blame the wind and those trees you've been meaning to cut back. Groggy, yet satisfied, you clumsily stumble back into bed.

As you begin to drift back to sleep more scratching penetrates the nebulosity of your mind but, unlike the first outburst, this time you also hear high-pitched chirping. Frustrated and drowsy you begin to rationalize the noises. A quick sorting of possibilities draws the conclusion that a critter (e.g. bird, squirrel, raccoon, etc.) must have found their way into your walls; but how? After several minutes of contemplation, you realize the only true point of entry must be in the attic.

Awake now, you go downstairs and grab a long-handled broom from the utility room. As quickly as your body will allow you clamber back up the steps and slowly begin to lower the attic ladder. Relieved that nothing immediately jumps out, you begin your ascent.

As you reach the top of the ladder, you are enveloped by a puissant ammonia smell. You reach for the light but remember the bulb recently burned out and you lazily forgot to replace it. Angry with yourself, you begin to take a quick survey of the attic. The overwhelming smell seems concentrated around several areas of splashed white residue.

Despite the smell, you press forward and move deeper into the dark space. Having left the ladder behind you struggle to see but begin to sense movement in the rafters overhead. Gathering courage, you quietly wait for your eyes to finish their adjustment.

You quickly realize you are surrounded by several masses of squirming shadows. You take a few steps towards the closest mass and begin to cock back the

broom. Suddenly, the shadows burst into a frenzied motion. Instinctively you swing toward the closest advancing horde of shadows. Your efforts are pointless. Within seconds the mass has relocated to the other side of the attic and you have failed to contact anything.

Refocusing, you plan your second attack and begin to advance. Just as you are about to swing, one of the shadows frantically leaps off its perch and slams right into your chest. Startled you let out a scream and drop the broom.

After regaining your breath, you realize the shadow is flailing uncontrollably on the floor at your feet. Still scared but determined you grab the closest empty box and quickly pin your adversary under it. Despite its wild thrashing the shadow creature appears to be trapped. Several minutes later the box falls silent. Confident now, you systematically secure the box and immediately exit the attic.

Once safely in the light you peek under the box flaps and realize your attic monster wasn't a monster at all but a small brown bat. Your house has more tenants than you realized, but are the bats the only creatures using your attic as a refuge?



Continued on next page



Little Brown Bats ([ODNR](#))

Bat infestations are a common occurrence. Natural bat populations seek out new shelters in the spring and summer months, creating many residential complications as they frequently inhabit homes. Infestations are not only an annoyance but can present a plethora of worrisome issues. While structural damage, disease, and sanitation are the primary focus, residents should also be mindful of hitchhikers.

Often tenants and pest management companies don't address this issue. In fact, most people believe their issue to be resolved once a colony is removed and all damage is repaired. One of the most damaging effects of any bat infestation can be the miscreants left behind.

The Eastern Bat Bug a.k.a. *Cimex adjunctus* tops this list. These bloodsucking insects easily pass for common bed bugs (*Cimex lectularius*) and frequently go unseen. However, unlike their well-known cousins, Eastern Bat Bugs are free-living parasites of bats. When bats are in short supply, and opportunity arises, infestations and feedings on humans become frequent and attacks can be horrifically difficult to eliminate.

What's worse is that many bat-removal services don't include bat bug surveillance as part of their service. This presents a major issue for many former bat landlords, as these bugs can go unnoticed for years

only to explode out of hiding once their host bats are evicted. In some cases, thousands of *Cimex adjunctus* have been documented radiating out of wall cracks and crevices within days of host removal.

When searching for a new home, bat bugs prefer dark and secluded areas that are within striking range of a new host (e.g. humans). These hidden habitats often include walls, carpets, ceilings, cracks, crevices, and even mattresses. From these spots, individual bugs will produce nighttime assaults on sleeping human hosts.

While eradication is possible, these critters are furtive and resourceful making resolution by any single method highly impractical. The best method is prevention, which can be accomplished by checking homes for bat access points.

*Insect Images courtesy of [BugGuide](#)



Eastern Bat Bug, *Cimex adjunctus



Common Bed Bug, *Cimex lectularius

ODU Tick Team

-Submitted by Laura Bitzer

Laura Bitzer was the winner of this year's VMCA Student Poster Competition, with her entry "The role of northern short-tailed shrews in the maintenance of Borrelia burgdorferi"

Old Dominion University has been known as a leader in tick research since Dr. Daniel Sonenshine arrived on campus in the early 1960's, and the current ODU Tick Research Team works hard to continue Dr. Sonenshine's excellence in all things tick. The Tick Research Team has been conducting an active tick surveillance project since 2009, but we do far more than that: We study the preferred hosts of ticks, the habitats ticks live in, the genetic make-up of ticks, and the pathogens ticks may carry.

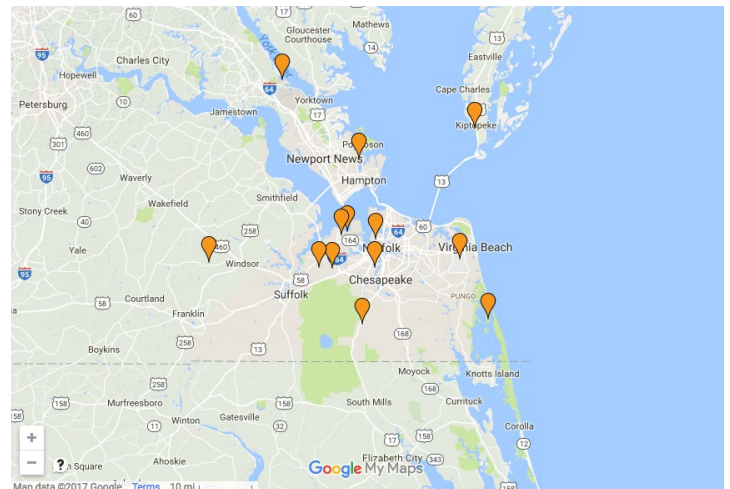
To do this, we currently have a team of three PhD students, one biology masters student, a couple MPH interns, and anywhere from 10-50 undergraduates and volunteers, and many faculty advisors, such as Dr. Holly Gaff, Dr. Wayne Hynes, Dr. Dave Gauthier, and Dr. Eric Walters as well as emeritus faculty Dr. Bob Rose and Dr. Dan Sonenshine. We also collaborate with researchers across the Mid-Atlantic, the United States, and throughout the world.

The Team spends hundreds of hours each year collecting ticks from a dozen sites in the Hampton Roads area of Virginia. The sites stretch from Zuni to Kiptopeke, on the Eastern Shore, and from Yorktown to Virginia Beach. We visit each site to collect ticks at least biweekly from April to October and at least monthly the rest of the year with the encroachment of cold weather and the retreat of most ticks.

Fun Fact #1: No one has created a common name for *Ixodes affinis*, likely because they will not bite humans!

We collect a variety of ticks from flagging vegetation as well as from birds, small mammals, animals at hunt checks, and road kill. The vast majority of ticks that we collect from flagging are lone star ticks, *Amblyomma americanum*. We also find blacklegged ticks (*Ixodes*

scapularis), *Ixodes affinis*, Gulf Coast ticks (*Amblyomma maculatum*), rabbit ticks (*Haemaphysalis leporispalustris*), American dog ticks (*Dermacentor variabilis*), and a few others. The results of our surveillance have helped us to understand the phenology and abundance of these ticks. Lone star tick adults and nymphs are seen in the first half of the summer, and lone star larvae in the second half of the summer. In the *Ixodes* world, blacklegged nymphs and adult *Ixodes affinis* are found in the summer months.



Fun Fact #2: Timing of when you see adult blacklegged ticks is opposite of most other tick species in our area. These adults are up in the winter. So, do your tick checks all year!

For those who have been following our work over the past few years, we have been following the spread of *I. affinis* throughout Virginia. These ticks have completed an eight-year march northward from North Carolina, across the coastal plain and this summer have crossed into southern Maryland. Virginia's Gulf Coast tick populations continue to come and go from various sites.

Pathogen testing in collected ticks shows that

Continued on next page

Borrelia burgdorferi, the causative agent of Lyme disease, is present in both *Ixodes* species found in the area. Approximately 60% of the more than 500 *I. affinis* tested were positive, and approximately 32% of the blacklegged ticks were positive for *B. burgdorferi*. Other pathogens such as those that cause babesiosis and anaplasmosis as well as other *Borrelia* species were detected in a small number of ticks.

Fun Fact #3: Ticks don't just feed on mammals! They will feed on almost any vertebrate, including birds, snakes, and lizards!

For 2018, the Tick Team has some big goals! We will continue our ongoing surveillance of ticks and tick-borne pathogens in the Hampton Roads area. We will be pinpointing the western edge of established *I. affinis* populations. We will be continuing work investigating the role of rodents and small mammals in the cycle of Lyme disease in the environment, as well beginning research regarding the role of reptiles! We will also be continuing to test various integrated tick management possibilities with fieldwork and mathematical modeling. We also received a five-year grant from the National Institutes of Health to study *Amblyomma* species ticks and the pathogens they may be associated with as part of a collaboration with researchers in Louisiana, Zambia, and South Africa. As

part of this grant, we will be adding some field sites to our existing ones and visiting the Eastern Shore barrier islands again.

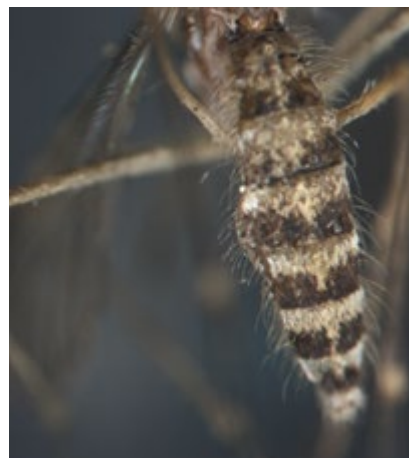
How can you help us? Easy--send us your ticks! We love to get ticks from anywhere you find them, be that from yourself, your pets, or other animals you encounter. We also appreciate ticks from any hunted animals such as bears, deer, wild boar, or anything else you can get. In addition, if you have chickens, turkeys, guinea fowl, or some other poultry, we would love to know about any ticks you find! If you would like us to test ticks that you find feeding on you or your pets, then we can also do that (see our [website](#) for more information). As always, follow all of our adventures on [Facebook](#).



April Showers Bring.....

-Submitted by Karen Akaratovic

...*Culex restuans* with notched banding?? Suffolk Mosquito Control Biology Technician Amber Rymer collected this specimen from a Reiter gravid trap a couple miles south of Suffolk's downtown area. None of us have ever seen this species display this type of banding, which appeared almost like a median longitudinal pale stripe. All other morphological features were present, so we feel confident it is a *Culex restuans*...but an odd one indeed. In addition to keeping an eye out for variations in species, everyone should be on the lookout for our two new state species, *Culex coronator* and *Culex nigripalpus*! It would be very interesting to see if these two species are establishing populations within our state.



In Defense of Green Spaces

-Submitted by Eli Hosen

There is a competition happening

constantly, each and every day that everyone experiences, perhaps most without realizing. The skirmish is for our attention, most notably visually, between not merely screens and paper, but also our created environment versus open green natural resources. This back and forth is exemplified in the drastic uptick in technology access, use, ubiquity in education, as well as reality augmentation – meanwhile desire to experience preserved natural areas rises drastically yearly with national parks visitations going up 5%¹. We see this in education systems too, as of 2016 screen time of 13-18 year olds was at 9 hours per day, while consistent and quality outdoor times are proportionately decreased, particularly when this use leads to a rise in poor sleep and stress at record young ages².

That stress is key, it is a big part of the wear and tear on our brains and bodies from everyday life that is drastically mediated and decreased by just spending some time in a natural open space. Some of these benefits are noticeable and quantifiable – lower blood pressure, heart rate, along with cortisol and blood-glucose levels³; overall immune function is raised⁴; as well as traditional mental health, cognitive, and emotional therapies⁵ are significantly enhanced through outdoors time. Notably, when a small ‘wander garden’ was placed as a green roof of a nursing home,⁶ incidents of agitation and emotional outbreaks dropped. An interesting result with prominent education implications surrounds the diminished ability of 13-18 year olds with nominal screen time to accurately read emotions in face-to-face interactions as compared to those who spent 5 days at a screen-free camp⁷.

Beyond the internally healthful elements of having positive and easy access to natural areas they can provide the best protections to our bodies in homes in natural disasters. Forested buffers protect residents from industrial or commercial areas. Natural areas and systems are also used by storm water management

infrastructure to prevent mass flooding to mitigate the impact by built infrastructure that also increases our cognitive load, causing mental exhaustion⁸. Even elements of Feng Shui describe systems of planting Fukugi trees (*Garcinia subelliptica*) that provide emotional and cultural benefits but importantly vitally prevent wind and flooding damage⁹.

Some education systems have begun to focus on or adapt to the concepts of maximizing learning through local natural resources. Swedish outdoor schools have flourished, the main idea summed up by, ‘I ur och skur’, or ‘come rain or shine’, in that there are no bad weather days, just bad attire days¹⁰. European and British models are beginning to show increasing data regarding the across the board benefits demonstrated by forest kindergarteners better prepared for first grade¹¹. Educational systems are also environmentally affected through the changing climate, influencing what to teach, including the now requisite sustainability efforts that permeates by necessity every occupation and career.

As the increasingly changing future progresses, the known knowns of climate change exacerbate the known unknowns of the ecology of life and habitats – most notably mosquitoes and with *albopictus* at the forefront of expansion¹². This creates a scenario in which sadly, there are existing restrictions on spending time outside, particularly in the best seasons, which are growing at increasing rates. A problem with prominence is not just the disease potential from vectors, but also the pest element. The knowledge of the sheer importance of having outdoor time in natural areas for individuals and communities builds a construct in which public health encompasses more fundamental aspects of mosquito control beyond just arboviral surveillance and prevention.

With at least 60% of people reporting reducing their outdoors time due to being bitten – mainly *Ae. albopictus*¹³, the importance of addressing this unique confluence of biological and socio-cultural issues

grows as the range continues to grow each year. The standard of outreach to get populations to attend to their standing water is canvassing with knowledge, literature, and on-site inspections. Unfortunately, the construct of ‘herd immunity’ applies, in that the community buy-in must be very high for effective reductions in mosquito population¹⁴.

A few studies have reported on the efficacy of typified canvassing and outreach events with mixed to negative results. In Baltimore, researchers found no difference in mosquito rates based on socio-economic indices¹⁵. A source reduction effort studied in New Jersey reports that “*albopictus* control will require scrupulous and repeated cleaning or treatment of everyday use containers and extensive homeowner collaboration”¹⁶. Another New Jersey team enacted various combinations of mosquito-control and outreach that ultimately “suggest that traditional passive means of

public education, which were often considered the gold standard for mosquito control programs, are not sufficient to motivate residents to reduce backyard mosquito-larval habitats”¹⁷.

The bright spot in the future is not just the sun drying out ditch lines, but it is the growing understanding of our local natural resources. Whether that comes in the form of building infrastructure to take advantage; encouraging and developing sustainable biocontrol; providing more opportunities to take part of these spaces; and educating our citizens and society best on what they can do as an individual and true community. For all, health is out there, just for some there is a particularly buzzing barrier.

References

- 1 Gilman, “Maxing out Capacities; Growth Challenges for Zion National Park, Springdale | St George News”; Olson, “National Park Visitation Record Expected in 2015 (U.S. National Park Service).”
- 2 Rideout, “Measuring Time Spent with Media”; Hale and Guan, “Screen Time and Sleep among School-Aged Children and Adolescents.”
- 3 Hansmann, Hug, and Seeland, “Restoration and Stress Relief through Physical Activities in Forests and Parks”; Lee et al., “Effect of Forest Bathing on Physiological and Psychological Responses in Young Japanese Male Subjects”; Ohtsuka, Yabunaka, and Takayama, “Shinrin-Yoku (Forest-Air Bathing and Walking) Effectively Decreases Blood Glucose Levels in Diabetic Patients.”
- 4 Li, “Effect of Forest Bathing Trips on Human Immune Function.”
- 5 Kyriakopoulos, “How Individuals with Self-Reported Anxiety and Depression Experienced a Combination of Individual Counselling with an Adventurous Outdoor Experience.”
- 6 Murphy et al., “Longitudinal Analysis of Differential Effects on Agitation of a Therapeutic Wander Garden for Dementia Patients Based on Ambulation Ability.”
- 7 Uhls et al., “Five Days at Outdoor Education Camp without Screens Improves Preteen Skills with Nonverbal Emotion Cues.”
- 8 Joye and van den Berg, “Is Love for Green in Our Genes?”
- 9 Chen and Nakama, “A Study on Village Forest Landscape in Small Island Topography in Okinawa, Japan.”
- 10 Friluftsrämjandet, “I Ur Och Skur.”
- 11 Gorges, “Forest Kindergarten Children in the First Grade”; O’Brien and Murray, “Forest School and Its Impacts on Young Children.”
- 12 Armstrong et al., “Northern Range Expansion of the Asian Tiger Mosquito (*Aedes Albopictus*)”; Rochlin et al., “Climate Change and Range Expansion of the Asian Tiger Mosquito (*Aedes Albopictus*) in Northeastern USA.”
- 13 Halasa et al., “Quantifying the Impact of Mosquitoes on Quality of Life and Enjoyment of Yard and Porch Activities in New Jersey.”
- 14 “Vaccines Protect Your Community | Vaccines.Gov.”
- 15 Becker, Leisnham, and LaDeau, “A Tale of Two City Blocks.”
- 16 Unlu et al., “Crouching Tiger, Hidden Trouble.””
- 17 Bartlett-Healy et al., “Source Reduction Behavior as an Independent Measurement of the Impact of a Public Health Education Campaign in an Integrated Vector Management Program for the Asian Tiger Mosquito.”



On the Hunt for Emerald Ash Borer Larvae

-Submitted by Valerie Huelsman

-Photos by Rachel Kempf

Right about the time we usually can look forward to finding our first mosquito larvae of the season we were looking for a different critter- young Emerald Ash Borers, an invasive species imported from Asia.

In Northern Virginia and in many other states in the country, the effects from the Emerald Ash Borer (EAB) are very apparent (and very devastating). Adults are a beautiful sparkling green beetle- it's the larval stage that really causes all the damage as they feed on tree tissues under the bark. Ash Trees, (*Fraxinus spp.*), and to some extent White Fringe Trees, are targeted. While some of our native animals, like woodpeckers, feed on EAB, they unfortunately are unable to significantly reduce the overall population. As a result, 99% of native Ash trees are projected be killed in areas where EAB has invaded.

One way some agencies are trying to manage EAB populations is by coordinating with USDA's Animal and Plant Health Inspection Service (APHIS) to release parasitoid wasps. These wasps develop in or on EAB eggs and larvae, killing EAB as they feed and grow.

After two years of EAB parasitoid releases in Prince William County we were investigating Ash trees to check for the presence of parasitoids and to see what life stage EAB larvae were in. Scraping and peeling back the bark (drawknives and wood chisels are definitely better than machetes) revealed many EAB larvae, but not many parasitoids. We were able to confirm that almost all EAB larvae were close to pupating- indicating our area probably has a primarily one year EAB life cycle instead of a two-year life cycle found further north. In our last year of recovery, we're hoping to confirm that our parasitoid buddies have established and expanded their population to help protect our Ash Trees.

Check out APHIS' [website](#) for more info on EAB, parasitoids, and research. For additional information on EAB check out [this excellent resource](#).

The parasitoids were produced and supplied from, the United States Department of Agriculture's Animal and Plant Health Inspection Service (APHIS), Plant Protection and Quarantine (PPQ) EAB Parasitoid Rearing Facility in Brighton, MI. For parasitoid information, please call 866-322-4512.



Virginia puts Mosquitoes to the Test

-Submitted by Charles Abadam

With the recent introductions of exotic arboviral diseases like Chikungunya and Zika, many mosquito control operations in Virginia paid close attention to the day that an autochthonous *Aedes albopictus* transmitted these diseases. More concern for our ability to efficiently exterminate *Aedes albopictus* was raised and different ways to deal with this cryptic species became a priority for many mosquito control programs throughout the United States. We became interested in knowing whether or not *Aedes albopictus* was resistant to the adulticides that we were using in Suffolk. However, we were not well informed about pesticide resistance and how to test mosquitoes for any resistance. Knowing this type of information would allow us to understand the susceptibility our mosquito populations had to the adulticide that we were using, and it would give us a better understanding of how to use our adulticide application more efficiently.

I had heard different presentations on pesticide resistance at previous AMCA's that I had attended, and knew that the CDC would train programs how to administer the standard pesticide resistance protocol. I began contacting the people I knew from the CDC, and through several emails, I reached Dr. Janet McCallister, the expert on mosquito pesticide resistance. She informed us that the training would be free. We would need to find a training room, begin rearing the mosquitoes that were to be used, and the CDC would send all the materials we needed for the training demonstration. Suffolk already had the perfect training room, and it would be easy enough to receive all the items and store them until training day. I was excited to hear that we would need to rear mosquitoes for this purpose, because I had never intentionally raised mosquitoes from eggs. Most of the mosquitoes I have raised have been larvae from field samples, intended for speciation.

The most difficult part of organizing this training was the timing. I realized that many of the programs in Virginia might want to attend the training, so I began a

dialog that was well received. Eleven mosquito programs responded (Chesapeake, Fairfax County, Hampton, Henrico, Langley Air Force Base, Newport News, Norfolk, Prince William County, Suffolk, Virginia Beach, and York County), and 22 people attended the training. Since many of these people would also be attending the VMCA annual meeting on January 23-25, it would be a perfect time to schedule the training on January 26.



Janet helps participants prepare bottles for testing

So the date was set and the next variable I had to contend with was the rearing of the mosquitoes. We needed to receive the eggs in enough time that they would hatch out and reach adulthood in time for the training on January 26th. Since we do not have access to an incubator, we had to take into account a longer rearing period, because we would be using the ambient temperature and humidity of the room that the mosquitoes were being reared, which are not the most optimal conditions for mosquito growth. We figured that the eggs would need two weeks of rearing to account for the longer growing period.

The CDC sent the *Culex quinquefasciatus* eggs on Tuesday, January 9th via FEDEX. We were to receive them in 24 hours, and this would ensure that the wet filter paper that they were placed on would not dry out, and keep them viable for rearing. Unfortunately, the eggs had a delayed delivery and arrived a day late on Thursday, January 11th. After notifying Janet of their late arrival, she became worried that the eggs would

Continued on next page

not hatch because they might not be viable. You see, these *Culex* egg rafts usually hatch within 24 hours. So we were hoping that there was enough water on the filter paper they were set upon and that the coolness of the winter would delay the hatch.

When the egg rafts arrived with all of the hatching equipment, they were broken apart and eggs were scattered throughout the petri dish, but the filter paper was still wet and the possibility that they were viable was high. So I gave it a shot and set up six rearing pans, sprinkling eggs on top of the water in each of the pans. A few days later, we were lucky enough to see 1st instars populating the pans. Both Janet and I were relieved, but now we were concerned that there would be enough adults for all the training participants. All we could do was wait and see. Using the instructions that Janet provided with the eggs, I continued to feed the larvae throughout the next two weeks and it looked as if they would hatch out into adulthood in time and there would be enough adult mosquitoes to proceed with the training.

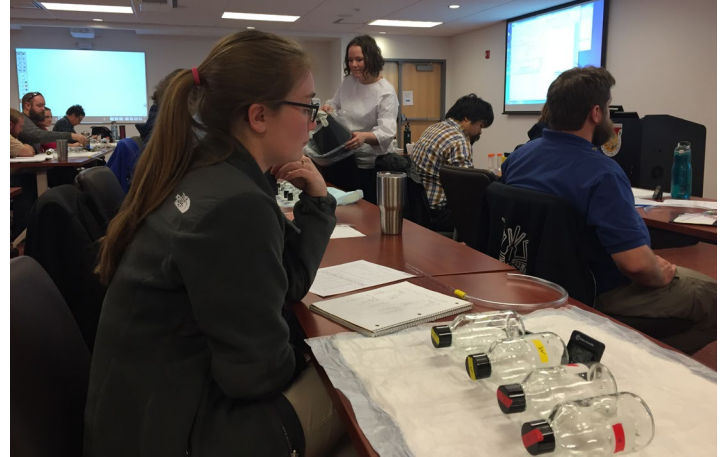


Janet discussing the various details of the bioassay

As the VMCA Annual meeting approached, we were well on our way to having everything ready for the training. Janet had already confirmed that she would attend the VMCA annual meeting to do a presentation on pesticide resistance before the actual training. We were also lucky enough to know that the CDC would be paying her flight, room, and board, so the least we could do was to waive her registration fee to the annual meeting. The remaining supplies were sent to our facility in Suffolk, and we were ready to roll.

The weekend prior to the annual meeting became a very important and tumultuous time in politics. I never thought that politics would play a significant role in organizing, planning, and execution of both the VMCA and this very important yet small pesticide resistance training in Suffolk, VA. That's what

happens when you forget that the only constant in life is change, because what Janet and I didn't think would happen actually did. On Saturday, January 20th, the federal government shut down after legislation to continue funding government operations and agencies, including the CDC, failed to pass.



Janice Gardner ponders the protocol

Coincidentally, this occurred on the first anniversary of Donald Trump taking office. Due to the shutdown, Janet had to cancel her flight to Virginia, and we were worried that the pesticide training wouldn't take place. It also put one of the presentations that was to be given by Lt Colonel Karl Haagsma, Ph. D. on hold. We were on a wait-and-see-what-happens timetable, and thankfully the federal government got it together, ending the shut down on Monday, January 22nd. We were back in the game, but Janet could not reschedule her flight in time to give her presentation in person, and Karl was in the same boat. Janet was able to present remotely using GoToMeeting, but we were not able to connect with Karl in time for his presentation. The VMCA annual meeting passed, and we were ready for the pesticide training.

On the afternoon of Thursday, January 25th, after the VMCA annual meeting, Janet, Cassie (who arrived that day), and I setup the Suffolk training room. The next day we proceeded with the training and it went smoothly. Participants were divided into two or three person groups so we could share materials and discuss various elements of the pesticide resistance protocol. We decided to group people with their colleagues in their program.

Janet started by giving us an overview of how mosquitoes achieve resistance to particular chemicals. Mosquitoes that survive the onslaught of adulticide droplets during a spray application can reproduce and pass on this survival skill or pesticide resistance to

Continued on next page

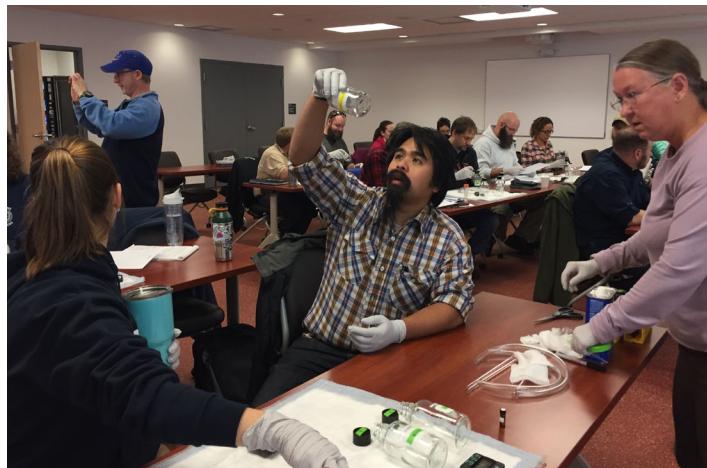
their offspring in the next generation, creating a population of mosquitoes resistant to that particular adulticide. Then she moved forward with discussing the CDC Bottle Bioassay protocol that is used as a standard in the contiguous United States. We were given papers, presentations, equipment, and materials needed to administer the CDC Bottle Bioassay protocol thoroughly and appropriately.

Janet and Cassie were great teachers. One of the first things we did was make our own aspirators or “pooters” - as we like to call them in Suffolk - to safely and effectively transfer the adult *Culex quinquefasciatus* to the bottles prepared with the active ingredients of several adulticides used in the mosquito industry. Then we prepared our solutions of Malathion, Permethrin, and Sumithrin. Each active ingredient coated one of four bottles used during our training. The fourth and final bottle was a control that was without an active ingredient, and was cleaned with acetone that would evaporate. It is important to only test the active ingredient, so that you exclude the effect of any of the proprietary chemicals, which make up a large portion of the adulticide that you purchase from manufacturers. This allows you to see the true effect of the active ingredient on the mosquito species you are targeting.

Once you begin to test mosquitoes for pesticide resistance, it is important to test the same mosquitoes year after year. This is an important step in the process, because you begin to see any trends of pesticide resistance that the species will develop, whether they become more or less resistant to the pesticides you are using in your abatement program. Two important parameters that we discussed were diagnostic dose and diagnostic time. “The diagnostic dose is a dose of insecticide that kills 100% of susceptible mosquitoes within a given time. The expected time for the insecticide to achieve this objective is called the diagnostic time. Those are the reference points against which all other results are compared. Resistance is assumed to be present if a significant portion of the test population survives the diagnostic dose at the diagnostic time.”

We also had to ask ourselves; when is a mosquito “DEAD?” This is important because you want to make sure that the persons interpreting the data are interpreting a dead mosquito the same way. The protocol classifies a mosquito as “dead” if it cannot stand, and immobile if it slides along the curvature

of the bottle. Once you establish the parameters of a “dead” mosquito amongst your group and colleagues performing the test, you can then interpret the data that you gather from your protocol.



Charles Abadam checking for “DEAD” Mosquitoes

The points below outline the WHO’s recommendations for assessing the significance of detected resistance. 97%–100% mortality at the recommended diagnostic time indicates susceptibility; 90%–96% mortality at the recommended diagnostic time suggests the possibility of resistance that needs to be confirmed; <90% mortality at the recommended diagnostic time suggests resistance.

Note: Where <95% mortality occurs at the diagnostic time in bioassays that have been conducted under optimum conditions and with a sample size of >100 mosquitoes, then resistance can be strongly suspected.

As we worked our way through the protocol, we were guided or coached along if needed. Catching live mosquitoes using our homemade pooters was probably the most challenging part of the training, because you had to reach into an insect rearing cage with adult mosquitoes flying about, corner them, suck 10-25 mosquitoes into the pooter, and transfer them safely into the pesticide coated bottles. Watching other participants do this without letting mosquitoes out of the rearing cage was quite entertaining.

After mosquitoes were put into bottles, we waited to see their mortality time for each pesticide being tested. We followed the protocol to its conclusion. All of the results showed no resistance to the pesticides that we were testing, because the mosquitoes that we used were from a known susceptible colony of *Culex*

quiquefasciatus from the CDC. After interpreting the results of the bottle bioassay, we concluded with a discussion of the process and how to move forward. Janet and Cassie were able to answer any questions we had and programs were able to discuss their intentions for the upcoming season. Overall, the training was a success, and broke down the protocol of pesticide resistance training into easily understandable steps that everyone could grasp. The notion that pesticide resistance testing was difficult was put to rest. Commencing a project like this and continuing a pesticide resistance program year to year seems to be the hardest and most challenging part of this all-too-important process. I hope to see everyone who participated in this training rise up to the challenge and implement this into their programs this and following years.



Penny poos mosquitoes from the bug dorm (left) and blows them into the pesticide jar (right).

What's that?

Answer



This is a picture of a 4th instar *Culiseta melanura* larva whose inner membranes have ruptured and are oozing out of the base of the antennae and mouthparts. This occurrence will happen when using water that is too hot during the larval preservation steps. Water should be roughly 140°F and larvae should be submerged for only 30 seconds. Using water that is too hot or submerging larvae for longer than 30 seconds will run the risk of cooking your specimens. Be sure to preserve your specimens in 80% ethanol and place them in an airtight vial.

Merchandise Sales Continue!

Didn't get what you wanted at the VMCA Annual Meeting?
Couldn't attend due to weather, funding, time?

There's still time to get all that mosquito swag you just have to have!



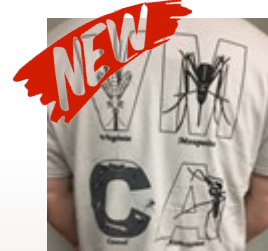
Black t-shirt with
Aedes albopictus
design

\$5



Gray t-shirt with
2018 MAMCA/
VMCA design

\$10



2018 VMCA
lettered t-shirt
design

\$15



Gray *Aedes
albopictus* pullover
hoodie

\$15



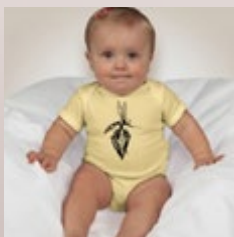
Gray zip-up hoodie
with 2018 MAMCA/
VMCA design

\$20



2018 VMCA
pullover hoodie
with flying
mosquito design

\$25



2017 MAMCA/
VMCA yellow
onesie

\$5



VMCA pint glass
with *Aedes
albopictus* design

\$6
2 for \$10



Green reusable
tote bag with
VMCA logo

\$1
Free with \$50
purchase



Blue can cooler
with mosquito
silhouette

\$2



Black leatherette
portfolio with VMCA
design (pad & pen
included)

\$5



2017 MAMCA/
VMCA tumbler

\$8



2018 VMCA
lettered logo
cork coaster set

\$4



VMCA sticker with
Aedes albopictus
design

\$.50



Black/white
VMCA logo pen

\$.25

The Merchandise Committee is continuing to sell the items listed through local pickup or shipment. If you have any questions or are interested in purchasing something, please contact VMCA Merchandise Chair, Tim DuBois (tdubois@hampton.gov) AND VMCA Secretary/Treasurer Jay Kiser (virginiamosquito@gmail.com). Payments can be made by cash (local pickup only), check, or credit card. Shipping will be paid by the purchaser and will be done through the lowest cost method (unless otherwise requested). This information is also available [online](#).

2018 VMCA Committee List

[Table of contents](#)

The VMCA is successful because its members get involved in the operations of the association. Below are the current committees and their chairs. Please join a committee by contacting any executive board member listed on the last page of this edition of The Skeeter!

Committee	Chair(s)	Members	Projects
Annual Meeting (Local Arrangements)	Tim DuBois	Luz Grant, Ann Herring, Lisa Wagenbrenner, Charles Abadam	Decides location of future meetings
Annual Meeting (Program/Agenda)	LaToya White	Mitch Burcham, Jay Kiser	Organize annual meeting program
Annual Meeting (Vendor Planning)	Ted Bean	George Wojcik	Vendor correspondence/setup
Audit	Mitch Burcham	Penelope Smelser, Chris DeHart	Annual audit of financial record
Bylaws	Jay Kiser	Luz Grant, Charles Abadam	Bylaw revision/maintenance
Education	Karen Akaratovic, Lisa Wagenbrenner	Ann Herring, Jennifer Barritt, Wes Robertson, Jay Kiser	Recertification, Adult ID course
Elections	George Wojcik	Penelope Smelser	Sets up online voting, sends out voter information, counts votes, announces winners during annual business meeting
Historian	Tim DuBois	John Orr	Historical Archives
Hospitality Room	Ann Herring	Luz Grant	Annual meeting hospitality room
Information	Rachel Kempf, Karen Akaratovic	Eli Hosen, Janice Gardner, Wes Robertson, Charles Abadam, Tim DuBois	The Skeeter, Facebook, Instagram
Legislative	Randy Buchanan		NPDES, VPDES, PESP
Membership	Jay Kiser	Ann Herring	Keeps updated list of membership
Merchandise	Tim DuBois	Lisa Wagenbrenner, Ann Herring, Penelope Smelser Rachel Kempf, Karen Akaratovic	Coordinating sales merchandise for annual meeting
Nominating	Jeff Hottenstein		Finds candidates for election, prepares/gathers profiles of nominees for ballots
Photography	Janice Gardner	Rachel Kempf	Takes photos of VMCA-related events for website, The Skeeter, Facebook, and Instagram
Public Relations	Ann Herring		Mosquito Awareness Week/Outreach & Education
Special Awards	Jennifer Barritt		Annual meeting awards– R.E. Dorer, Outstanding Service
Student Competition	Jay Kiser	Ann Herring, Ashley Byers, John Orr, Wes Robertson, Karen Akaratovic, Francis Valera, Charles Abadam, Dennis Salmen	Organizes a student research/poster project competition with an award to be given at the annual meeting, raises funds for award
Technical Support	Charles Abadam	Eli Hosen	Maintains/advises on VMCA hardware/software; operates computer/projector during annual meeting
Website	Penelope Smelser	Charles Abadam, Karen Akaratovic	Maintains/revises website

2018 Sustaining Members

The VMCA gratefully acknowledges the support of the following sustaining members for 2018. Without their generous contributions, much of what we do would not be possible. Please do not hesitate to contact them. They are here to help you!



Bayer Environmental Science



[ADAPCO, Inc](#)

Ted Bean
(814) 671-6516
tbean@myadapco.com

[Central Life Sciences](#)

Jeff O'Neill
(302) 312-3950
joneill@central.com

[Summit Chemical Company](#)

Zachary Cohen
(410) 522-0661
zcohen@summitchemical.com

[AllPro Vector Group](#)

Joe Andrews
(888) 603-1008
joea@allprovector.com

[Clarke](#)

Jeff Hottenstein
(703) 498-9362
jhottenstein@clarke.com

[UNIVAR USA, Inc.](#)

Jason Conrad
(912) 704-1407
jason.conrad@univarusa.com

[AP&G Co., Inc \(Catchmaster\)](#)

Bob Weist
(917) 533-8723
rweist@catchmaster.com

[Crabbe Aviation, LLC](#)

Matt Crabbe
(804) 334-7370
crabav@gmail.com

[Valent Biosciences Corp.](#)

Jim Andrews
(910) 547-8070
james.andrews@valent.com

[Bayer Environmental Science](#)

Kurt Vandock
(919) 549-2226
kurt.vandock@bayer.com

[Morrell Instruments Company, Inc.](#)

Chris Hatcher
800-570-4277
chatcher@morrellonline.com



Virginia Mosquito Control Jurisdictions & Other Resources

As a result of revisions to the VMCA By-Laws, the organizational member category was eliminated. In order to facilitate communication among mosquito control programs, jurisdictions with known mosquito and vector control programs are listed below. If there are other jurisdictions that should be listed, please submit them to the editor.

Virginia Mosquito Control Jurisdictions

[Alexandria Health Department](#)
Boykins, Town of
[Chesapeake Mosquito Control Commission](#)
[Chincoteague Mosquito Control](#)
[Fairfax County Health Department](#)
Fort Eustis
[Gloucester County Mosquito Control](#)
[Hampton Environmental Services](#)
[Henrico County](#)
[Newport News Vector Control](#)
[Norfolk Vector Control](#)
[Poquoson Mosquito and Drainage](#)
[Portsmouth Mosquito Control](#)
[Prince William County Mosquito & Forest Pest Management](#)
[Suffolk Mosquito Control](#)
US Air Force / Langley Air Force Base
[Virginia Beach Mosquito Control](#)
[Williamsburg Mosquito Control](#)
[York County Mosquito Control](#)

Other Mosquito Control Organizations

[American Mosquito Control Association](#)
[Mid-Atlantic Mosquito Control Association](#)

Other Resources

[Virginia Department of Health](#)
[Centers for Disease Control & Prevention](#)
[Fairfax County Education and Outreach Materials](#)

Wanted: Submissions!

Do you have information you'd like to include in the next issue of The Skeeter or a photo you'd like to share? We are always looking for organizational updates, operational news, education and outreach activities, pictures, stories, and anything remotely vector-related to include in upcoming newsletters as well as on [Facebook](#) and [Instagram](#).

Please send all items to the Skeeter editor, Rachel Kempf at rkempf@pwcgov.org

THE SKEETER

Newsletter of the [Virginia Mosquito Control Association](#)

Contact: Rachel Kempf
Prince William County
Mosquito & Forest Pest
Management
14879 Dumfries Rd
Manassas, VA 20112
703-792-4694
rkempf@pwcgov.org



facebook.com/mosquitova



[@virginiamosquitocontrol](https://www.instagram.com/virginiamosquitocontrol)

The Skeeter Production Team:

Committee Co-Chair/Editor:

Rachel Kempf
PWC Mosquito & Forest Pest
Management
rkempf@pwcgov.org

Committee Co-Chair:

Karen Akaratovic
Suffolk Mosquito Control
kakaratovic@suffolkva.us

Committee Members:

Eli Hosen
PWC Mosquito & Forest Pest
Management
ehosen@pwcgov.org

Janice Gardner
York County Mosquito Control
janice.gardner@yorkcounty.gov

Wes Robertson
Henrico Dept. Public Works
rob106@henrico.us

Charles Abadam
Suffolk Mosquito Control
cabadam@suffolkva.us

Tim DuBois
City of Hampton Environmental
Services
tdubois@hampton.gov

Editorial Review :
[VMCA Executive Board](#)



2018 Virginia Mosquito Control Association Executive Board



President
George Wojcik
757-393-8666
gwojcik@portsmouthva.gov



Past President
Jeff Hottenstein
703-498-9362
jhottenstein@clarke.com



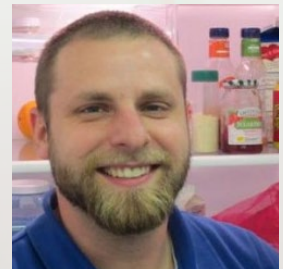
President Elect
LaToya White
757-513-3400
lnwhite@nnva.gov



Vice President
Andy Lima
703-246-8474
andrew.lima@fairfaxcounty.gov



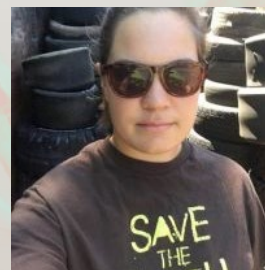
First Vice President
Timothy DuBois
757-727-2808
tdubois@hampton.gov



Secretary/Treasurer
Jay Kiser
757-514-7608
virginiamosquito@gmail.com



***MAMCA Representative**
Elizabeth "Betsy" Hodson
757-890-3791
Elizabeth.Hodson@yorkcounty.gov



***TMVCC Representative**
Michelle Slosser
757-890-3790
michelle.slosser@yorkcounty.gov



***Sustaining Member Representative**
Ted Bean
814-671-6516
tbean@myadapco.com

***Non-voting member of the Board**

Take the time to volunteer on a committee! An active membership makes for a stronger organization. Contact anyone on the Board to participate.

The Skeeter is the official production of the Virginia Mosquito Control Association. The VMCA membership is encouraged to submit articles, reviews, and any other interesting facts or tidbits for publication. Submissions can be sent to Rachel Kempf at rkempf@pwcgov.org or Karen Akaratovic at kakaratovic@suffolkva.us