The Biting Times

Newsletter for the North Carolina Mosquito & Vector Control Association

December 2018

55th Annual Conference

We are in the process of planning the 2019 annual conference. If you want to weigh in, please contact your Vice President, Eugene McRoy (eugene.mcroy@bchd.net)

What the Climate Assessment Report Means for NC

By Michael H. Reiskind, NCSU

Climate change has important implications for mosquitoes, hurricanes, floods, and the economy of North Carolina, concludes a recent report from the federal government. The Fourth Climate Assessment Report was released on November 23, 2018 from a panel of experts including policy makers, social, physical, and biological scientists, and economists. At least 18 federal agencies were involved, and it represents the most comprehensive examination of the impacts of global climate change on the United States to date. The previous report, from 2014, did not include as sophisticated modeling of climate and lacked precise economic impact estimates.

There are several areas of particular interest to the membership of the NCMVCA in the area of anticipated frequency and intensity of major rainfall events, hurricanes, as well as specific mention of the distribution of arthropod vectors of disease:

> "The geographic ranges of disease-carrying insects and pests are projected to shift as climate changes, which could expose more people in North America to ticks that carry Lyme disease and mosquitoes that transmit viruses, such as West Nile, dengue, chikungunya, and Zika" (NA4, p. 15, 2018).

Continued page 6...

Inside this issue:

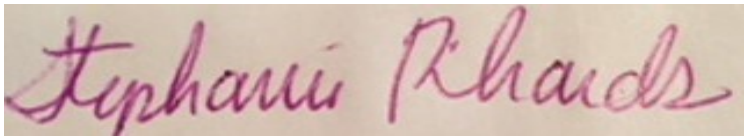
I'm a native mosquito that loves agriculture, flooded pastures especially. I set up an awful bite, and am one of many species that can rapidly increase after major precipitation events, like hurricanes. I can transmit dog-heartworm, but not much else, at least in North Carolina. Photo: Sean McCann. Answer page 10.

President's Message 2018

Stephanie L. Richards, MSEH, PhD

As we close the 2018 mosquito season in North Carolina, the aftermath of Hurricane Florence (September 13/14, 2018) and Tropical Storm Michael (October 10/11, 2018) still lingers. In late-September, eastern North Carolina was significantly impacted by hurricane damage, flooding, and a substantial spike in abundance of flood water mosquitoes. Some areas in North Carolina conducted emergency aerial insecticide treatments in response to citizen pleas for assistance and there are still many areas with structural damage from the storms. It is our hope that the mosquito-related aftermath of these storms reminds leaders and communities of the absolute importance of supporting and sustaining organized mosquito surveillance and control programs in North Carolina and other regions to protect public health. It is essential that we have a proactive approach to mosquito surveillance, targeted control, and community outreach. North Carolina is preparing to host a hands on training workshop on insecticide resistance on February 12, 2019 funded by the Centers for Disease Control and Prevention's (CDC) Southeastern Center of Excellence in Vector Borne Disease. Workshop attendees will learn about the importance of insecticide resistance testing, the entire process for conducting a CDC bottle bioassay, and how to analyze the resulting data to help make control decisions. This event will be held at East Carolina University and will train approximately 16 people (from NC and SC). Space is limited for this initial workshop and you can let me know if you have questions about this and any future resistance training (richardss@ecu.edu). We would like this type of workshop to be expanded and repeated in the future to serve additional mosquito control programs.

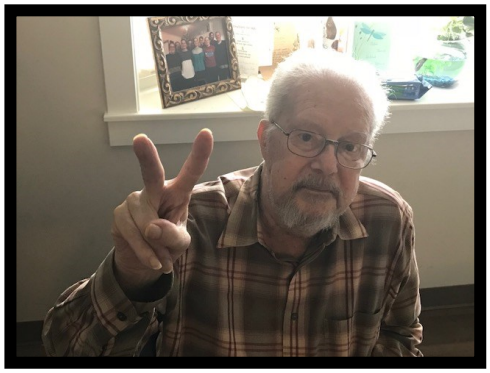
Mike Doyle (NCMVCA VP 2018) organized the program and venue for NCMVCA's December 3-4, 2018 workshop held in Greenville, NC. The workshop was a great success with more than 70 members in attendance. Bringing together personnel from across North Carolina provides a great opportunity to share experiences and ideas so we can all stay informed about best management practices for mosquitoes and other public health pests.



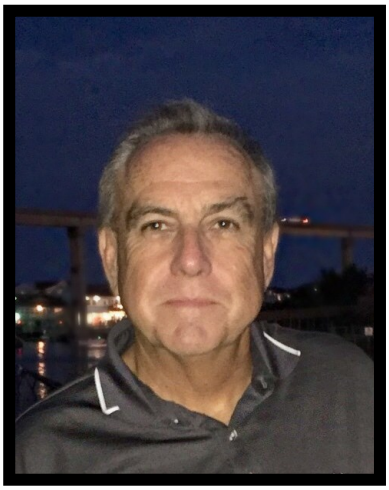
Remembrances

By Dr. Brian Byrd, Western Carolina University

It is with great sadness that our association mourns the recent passing of three luminaries, whose contributions to our community have been great. Dr. Bruce Harrison, Tommy Bowen, and Thurman Grady passed away since our last newsletter. Please find their individual obituaries on **Pages 13-14**.



Dr. Bruce Harrison



Mr. Tommy Bowen

Mr. Thurman Grady

The Biting Times, December 2018

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Photos: Matt Bertone, Sean McCann, Syngenta, Harrison family, Bowen family, City of Greensboro.

Prepping for Post-storm Mosquito Pressure: Best Practices for Barrier Applications

By Nicky Gallagher, Technical Services Manager, Syngenta Professional Pest Management

Heavy rains and flooding can lead to large increases in mosquito populations due to high water levels that have allowed long laid dormant eggs to hatch. As part of an integrated mosquito management plan, barrier applications can provide a significant reduction in mosquito numbers and bites. This involves treating vegetation like trees, bushes and shrubbery from ground level up to height of about 10 feet. Whether you currently offer barrier treatments or are considering entering the mosquito market, here are some important tips to prepare for success.

Get the right equipment

Mist-blowers: These are ideal for barrier applications, as they force insecticide droplets into dense vegetation and the undersides of leaves. Circular arm motions can help force leaves up to expose their undersides, where mosquitoes often rest.

Water-Sensitive Paper (WSP): This type of paper, which is yellow but stains blue when exposed to aqueous spray droplets, is excellent for evaluating spray distributions, swath widths, droplet densities and spray penetrations. Place WSP at various heights and depths within vegetation to determine which equipment setting provides adequate coverage. After the target area has been sprayed, allow WSP to dry and check the droplet pattern (Figure 1).

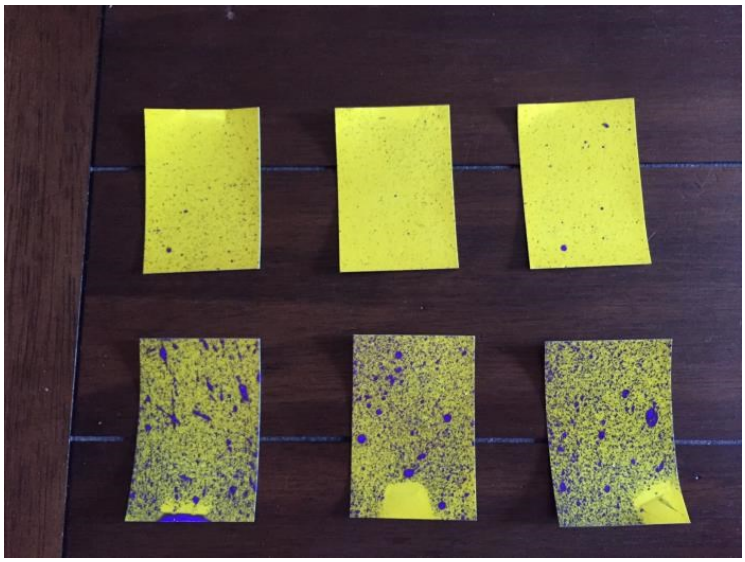

Figure 1. Water droplet dispersion on WSP using a STIHL® SR 200 mist-blower at two different settings and full throttle (top row was discharge setting 1, and bottom row was discharge setting 3). Vegetation was treated to the point of runoff. In this example, knob setting 3 provided thorough coverage. Photo courtesy of Syngenta.

Service containers: For a more uniform solution, mix insecticide in a labeled service container, rather than mixing directly in the mist-blower tank.

Reduce mosquito breeding sites

Natural areas or man-made objects that collect standing water are ideal mosquito breeding sites. Examples include bromeliad plants, ditches, plant pots, gutters, bird baths and neglected pools or fish ponds. If the water source cannot be removed, determine if the area can be treated with a larvicide or insect growth regulator (IGR). Containers should also be dumped and scrubbed weekly, as eggs of container-breeding mosquitoes can stick to their sides. **Next page...**

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Protect customers with confidence

Once you're ready to conduct a barrier application, choose a mosquito program with proven treatment protocols, technical support and performance guarantees. Using both an adulticide and IGR to suppress mosquito populations is recommended. A sprayable adulticide will help provide both immediate and residual control while an IGR interrupts mosquitoes' reproductive cycles, causing them to lay non-viable eggs and preventing existing mosquitoes from becoming egg-laying adults.

Manage customer expectations

Residential mosquito treatments are about managing populations and reducing the chances of being bitten. Avoid any claims of complete mosquito elimination or disease prevention. Ensure your customer agreement clearly states the treatment objectives, and what responsibilities the homeowner has if signing a contract. With the proper knowledge and tools in place, you can make mosquito barrier treatments effective for your business and your customers.

Mosquito Resistance Testing: A New Step for Georgia Mosquito Surveillance

By Annie Rich, Richmond County (GA) Mosquito Control

When was the last time your local mosquitoes were tested for resistance to chemicals used in effort to kill them? If you live in Georgia, until September of this year, the answer was easy: most likely *NEVER*. However, with a new statewide mosquito pesticide resistance testing program headed up by the State Entomologists and funded by the CDC, documentation of mosquito resistance occurrence in Georgia has already started.

In late August 2018 in the modest mosquito surveillance lab in Richmond County, Georgia, state vector surveillance coordinators, health department officials, and the state entomologists joined Richmond County Mosquito Control's supervisor Fred Koehle and entomologist Annie Rich, crowding into the lab space alongside shelves of mosquito cages to witness the beginning of the mosquito pesticide resistance testing process. Rich and state entomologist Tiffany Nguyen, adorned with gloves and protective eyewear, began the CDC Bottle Bioassay Protocol by treating glass bottles with pesticide.

Mosquitoes placed inside of these bottles containing pesticide were observed for mortality at predetermined time intervals and all results were recorded. The pesticides used were permethrin and lambda cyhalothrin, and mosquitoes tested for this experiment were *Culex quinquefasciatus* and *Aedes aegypti*.

Collaboration between local, state, and federal entities have made this project possible, and this project will continue to grow and produce more results to give a larger picture of the state of resistance in mosquitoes in the state of Georgia.

...From Page 1.

In addition, weather and climate are likely to have various effects on mosquitoes, possibly resulting in increased transmission of pathogens that cause disease.

The report provides evidence that there will likely be moderate mean temperature increases across much of the United States, with our region to have temperature increases of 2-4° C by mid-century, and up to 6°C by 2100 (Figure 1) . Our temperature increases are likely to be moderate relative to locations further north, but this general increase in temperature can decrease mosquito development time, increase vector competence, and decrease the period from exposure to a pathogen to transmission. These increases in temperature may also translate into longer mosquito seasons, which is turn may have important implications for the duration of mosquito control activities. Furthermore, the estimate of "very hot" days suggests a substantial increase in North Carolina, which can affect workplace safety for mosquito control operators.

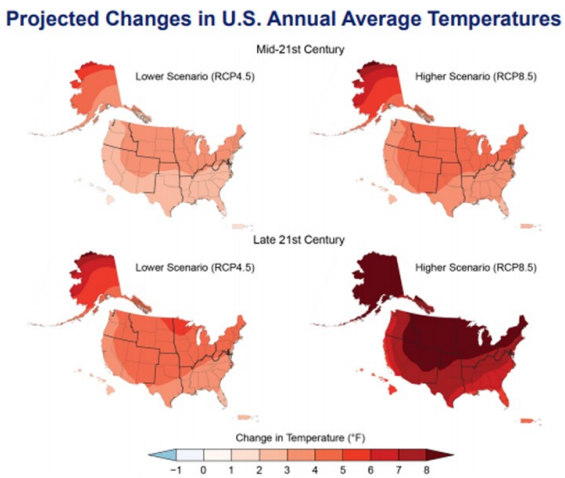

Figure 1. The shows the extreme estimates of temperature change across the United States by 2050 (top) and by 2100 (bottom).

Of more concern for our region is the likely increase in heavy precipitation events. These may include hurricanes, as well as other weather situations associated with rainfall (e.g. winter storms events, summer thunderstorms, tornadoes). Predicting these is more difficult, due to the complexity of hurricane formation. However, they report:

> "Some storm types such as hurricanes, tornadoes, and winter storms are also exhibiting changes that have been linked to climate change, although the current state of the science does not yet permit detailed understanding." (NA4, p. 57, 2018).

This also fits a recent trend in heavy precipitation over the last decade, although, unlike temperature, the recent trend is less clearly outside the historical record (Figure 2). Nevertheless, as we have recently experienced, hurricanes expose the vulnerability of our communities to massive populations of pest and vector mosquitoes (Brown, 1997). This results in a tremendous burden on mosquito control agencies, often requiring expensive outside contracts with for-profit aerial or truck-mounted spraying solutions. This, in turn, can result in division within communities about the use of insecticides over a wide area, possible increase in resistance within mosquito populations, and inequality in the provision of this service among affected counties. **Next page...**

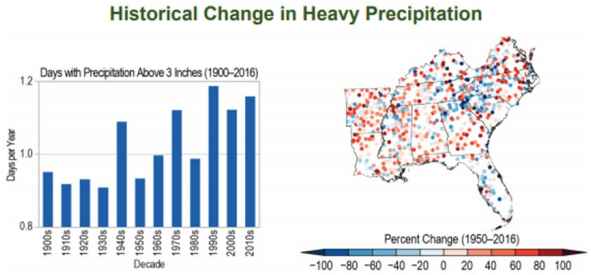

Figure 2. The shows the historical patterns of heavy precipitation, which went up in the 1990s-2010s, but remains variable.

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Currently, the Federal Emergency Management Agency provides reimbursement for most mosquito spraying, and the state has also released money, but there is no guarantee this will continue in the future.

In addition to flooding from precipitation events, the report also notes the risks of flooding in coastal areas, both from events like hurricanes, as well as the predicted increase in sea level. The impact of this on salt-marsh mosquitoes is not known, but logically this will result in more potential larval habitat, and likely increased abundance.

Finally, the report recognizes the importance of changes in local land use as a component of climate change. Work from our lab has demonstrated the importance of land-use in determining the community of mosquitoes, as well as the abundance of certain species. We have found that, not surprisingly, *Ae. albopictus* dominates suburban areas, with other vectors (such as *Culex pipiens/quinquefasciatus* and *Anopheles quadrimaculatus*) also common. Furthermore, we have found that as suburban neighborhoods age, the abundance of *Ae. albopictus* increases.

Taking these three major predictions of climate change in the southeastern United States, and applying them in the context of mosquito control, we can make the following conclusions. First, increases in temperatures will accelerate mosquito development, increase the ability of mosquitoes to transmit pathogens that cause disease, and extend the mosquito control season. Second, the higher frequency of heavy precipitation events will increase larval habitat, reducing competition and encouraging floodwater species, and result in larger mosquito populations. Finally, future land-use changes, which includes the increased suburbanization of North Carolina, will favor vector species closely associated with human (like *Ae. albopictus*), which will increase risk of pathogen transmission, as well as continue to shift the mosquito control mission from larger emergences of floodwater mosquitoes to the low-density, backyard based control effective for *Ae. albopictus*.

The best we can do, as mosquito and vector control specialists, is to inform policy makers, from local government officials to federal representatives, of the probable future need for mosquito control. Other issues may also arise, like invasive mosquitoes or large movements of human populations, that may also impact our mission. It will behoove policy makers to take these warnings seriously, and invest now in resilient mosquito control structures to ensure we are able to keep pest and vector mosquito in control. As noted in the climate assessment:

> "The evidence of human-caused climate change is overwhelming and continues to strengthen, that the impacts of climate change are intensifying across the country, and that climate-related threats to Americans' physical, social, and economic well-being are rising." (NA4, p. 26, 2018)

Integrated Pest Management (IPM) Emergency Considerations

By Jeff Brown & Rick Hickman, Brunswick County Mosquito Control

When we were taught the principles of Integrated Pest Management (IPM) in the early 1980's the first rule of IPM was to identify the pest. Once the pest was correctly identified, its biology was studied and an action plan was developed. IPM is a straight forward process in a closed system such as the occasional pest issues within a food handling facility. Typically, in food handling facilities there is a zero tolerance for pests such as cockroaches, rats or flies. The IPM methodology for these "closed systems" is readily apparent. A pest is introduced and is dealt with using IPM strategies. Mosquito control pest operations take place in an open system. This means not only do you need to correctly identify the pest before initiating control measures, you have to evaluate and consider the ecology of the ecosystem before a control decision is applied. Monitoring and record keeping help document the pest history and identify environmental changes affecting a pest species.

Both the Environmental protection agency (EPA) and Centers for Disease Control (CDC) encourage all communities and mosquito control districts to strictly adhere to Integrated Pest Management strategies. IPM is a science-based, common-sense approach for managing pests and vectors, such as mosquitoes. IPM uses a variety of pest management techniques that focus on pest prevention, pest reduction, and the elimination of conditions that lead to pest infestations. IPM programs also rely heavily on resident education and pest monitoring (US EPA). Successful mosquito management requires intervening at some point during the mosquito's life cycle before they bite and infect a human. The best approach to controlling mosquitoes takes advantage of every life stage of a mosquito to achieve control, using a unified approach referred to as integrated pest management (US EPA).

The term integrated pest management uses a combination of techniques, including biological control, cultural controls, mechanical and physical controls and chemical controls.

Biological Controls

Biological control is the use of natural enemies—predators, parasites, pathogens, and competitors—to control pests and their damage. The mosquito fish *Gambusia affinis* is an example. Recognizing that there are already beneficial insects using mosquito larva as a food source is another key feature. Sometimes the decision to larvicide or not can be determined by evaluating the presence or absence of beneficial insects like dragon flies and predacious diving beetles. **Next page...**

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Cultural Controls

Cultural controls are practices that reduce pest establishment, reproduction, dispersal, and survival. For example, improving sanitation by "Tipping and Tossing" containers around a residence is an efficient strategy to interrupt the *Aedes albopictus* reproductive life cycle by simply removing oviposition sites. Public education opportunities also fit nicely in the cultural control methodology.

Mechanical and Physical Controls

Mechanical and physical controls eliminate larval development habitats by making the environment unsuitable for it. Physical controls include water management projects by reducing oviposition habitats with in floodwater systems by manipulating water levels. Another method for adult mosquitoes is using barriers such as screens to keep adult mosquitoes from entering a dwelling.

Chemical Control

Chemical control is the use of pesticides. In IPM, pesticides are used only when needed and in combination with other approaches for more effective, long-term control. Pesticides are selected and applied in a way that minimizes their possible harm to people, non-target organisms, and the environment. Consider an adult mosquito treatment using a ultra low volume (ULV) sprayer. These applications can be either spot sprays or full route treatments. The frequency of the application is another consideration. Typically, adulticide decisions are based on mosquito species and time of year. Chemical applications are always used as a last resort in an IPM program. Obvious examples include, the response to arboviral disease transmission or in post disaster situations where the mosquito populations exceed the resources of local programs.

Control Mosquitoes at the Larval Stage

The greatest impact on mosquito populations will occur when they are concentrated, immobile and accessible. This emphasis focuses on habitat management and controlling the immature stages (egg, larva, and pupa) before the mosquitoes emerge as adults. This approach maximizes the effectiveness of pesticide application and minimizes the use from widespread pesticide application. Larvicides target larvae in the breeding habitat before they can mature into adult mosquitoes and disperse. Larvicide treatment of breeding habitats helps reduce the adult mosquito population in nearby areas (US EPA).

Control Adult Mosquitoes

Using an EPA-registered pesticide is one of the fastest and best options to combat an outbreak of mosquito-borne disease being transmitted by adult mosquitoes. **Next page...**

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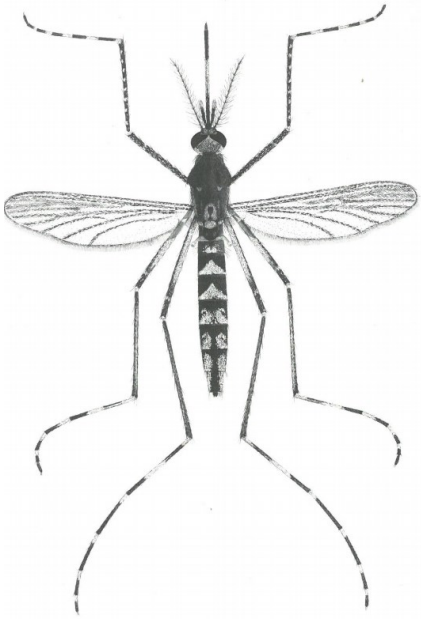
The pesticides registered for this use are known as adulticides. Adulticides are applied either using aerial applications by aircraft or on the ground by truck-mounted sprayers. Aerial spraying techniques can treat large areas with only small amounts of pesticide and have been used safely for more than 50 years. These aerial sprays are been fully evaluated by EPA and don't pose risks to people or the environment when used according to the directions on the label. Mosquito adulticides are applied as ultra-low volume (ULV) sprays. ULV sprayers dispense extremely small droplets. The naled insecticide, for example, uses 80 microns or less which means hundreds of thousands of droplets could fit inside something as small as one pea. When released from an airplane, these tiny droplets are intended to stay airborne as long as possible and drift through an area above the ground killing the mosquitoes in the air on contact. The small droplet size makes the pesticide more effective, which means less pesticide is used to better protect people and the environment (US EPA).

Extensive scientific research has been conducted by academia, industry, and government agencies to identify appropriate droplet sizes for individual compounds. The equipment nozzles undergo rigorous testing before being sold to the mosquito controllers. ULV applications involve very small quantities of pesticide active ingredient in relation to the size of the area treated. There are a number of registered adulticides to choose from. Choosing which adulticide to use in a given area is a job best done by experts and will depend on a variety of factors such as the type of mosquito, whether the mosquitoes are resistant to particular types of pesticides, weather, etc. The mainland US has successfully used naled to quickly reduce mosquito populations. This pesticide has been used for routine mosquito control and following natural disasters such as hurricanes and floods on millions of acres across the US. Naled was used recently for mosquito control in FL, TX, LA, GA, SC, GA, WA, CA, NV, and in a number of other states. The insecticide is used highly populated metropolitan areas, such as Miami, and in less populated areas. **Next page...**

Guess that Skeeter! *Psorophora columbiae*

By Michael Reiskind, NCSU

This mosquito is a common pest throughout North Carolina, particularly around flooded pastures and agricultural fields. It sometimes goes by the common name the dark rice-field mosquito, and this species (and subspecies) can be found from South America to Canada. Like many *Psorophora*, it has a dark integument, but this species has many light scales, including in bands on the legs and proboscis.



Psorophora columbiae plane view from Carpenter and LaCasse (1955). Labelled *Psorophora confinnis*, an older name.

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In 2004, naled was used extensively to treat eight million acres across Florida as part of the emergency responses to hurricanes. In 2005 after Hurricane Katrina, five million acres of Louisiana, Mississippi, and Texas were treated with naled to kill mosquitoes (US EPA). After Hurricane Florence this year, Brunswick County used an aerial application of Dibrom (naled) across 325,000 acres of the county. Evaluating the pre and post light trap data produced a 98% control from the aerial application. The application rate was 0.66 ounces per acre.

Natural disasters such as floods and hurricanes can create a potential for epidemics of vector-borne disease. When a response to these disasters or emergencies is beyond the capability of state or local governments, the president may determine that a disaster or emergency exists. A presidential disaster declaration makes state and local agencies eligible for reimbursement of disaster related expenses. The Federal Emergency Management Agency (FEMA), which oversees all federal disaster activities, calls upon CDC to evaluate the risk of vector-borne disease. Reimbursement for vector control depends on the presence of a clear risk of vector-borne disease that can be related to the emergency or disaster (CDC).

In order for CDC to rapidly and accurately evaluate the risk of vector-borne disease, it is important for state and local health and vector control agencies to have readily accessible as much data as possible. Historical data should be available for comparison with current data, to show how the disaster is related to any increase in vector or virus activity. The types of information that are needed to estimate the risk of an epidemic are the following (CDC).

- Mosquito population indices
- Virus infection rates in mosquitoes
- Evidence of increased virus transmission in vertebrate amplifying hosts
- Evidence of disease in equines (WEE/EEE)
- Rainfall and temperature data
- Time of year
- Risk to the human population

FEMA Guidelines Appendix G Mosquito Abatement also states, FEMA may provide reimbursement for mosquito abatement measures based on:

A determination that a significant increase in the mosquito population and/or the change in biting mosquito species poses a threat to emergency workers who are required to work out-of-doors, thereby significantly hampering response and recovery efforts (FEMA). **Next page…**

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Finally, and perhaps most importantly, pesticide application information should be documented and records maintained as required. The Clean Water Act (1972) regulates point source pollution to or near the waters of the United States, and the National Pollution Discharge Elimination System (NPDES) permit allows for discharges resulting from pesticide applications. Mosquito control entities must now apply for an NPDES General Use Permit or through authorized states. Applications must also still comply with all state pesticide regulations, statutes, and FIFRA labeling. Pesticide application records should contain applicator's name, address, and pesticide applicator certification number (if applicable), date of application, product applied name and EPA registration number, rate of material applied, total amount applied, location of application, and approximate size of area treated. Documenting time of day, weather conditions, and spray tracks or blocks, as recorded by an appropriate GPS system, is desirable (AMCA).

Successful IPM program applications applied to an open system should include an understanding of the pest biology, the seasonal distribution of the pest and general understanding of the ecology and associated weather patterns of each pest's habitat. Examples include, container, saltmarsh, woodland pool, floodplain and permanent water ecosystems. Once the "Identify the Pest" research is completed the appropriate Integrated Pest Management strategies can be identified and implemented. Using combinations of biological control, cultural control, mechanical and physical control and chemical control typically provides the best opportunity for success.

Keeping accurate records of mosquito collections, weather patterns and IPM applications from your day to day operations will also provide the baseline data sets required to respond to an arbovirus disease transmission or post disaster response scenario. The key to using the data sets is to identify what is normal for your area. That way when the extreme occurs, its readily apparent and the best operational control opportunities can be quickly identified and implemented.

If you not sure where to start your IPM process follow the link Mosquitoes of Brunswick County this table has the biology, and seasonal distribution of the mosquitoes of Brunswick county.

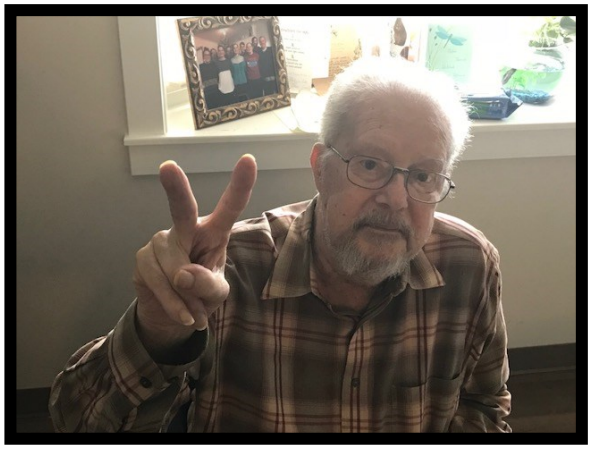
Internet References

1. Success in Mosquito Control: An Integrated Approach USEPA
2. CDC Arbovirus Guidelines
3. FEMA Appendix G Mosquito Abatement
4. AMCA Best Management Practices

Obituaries

By Dr. Brian Byrd, Western Carolina University

Dr. Bruce Harrison passed away on December 5th, 2018 at the age of 81. Dr. Harrison served 23 years in the United States Army retiring at the rank of Lt. Colonel. During his active duty, he received his Ph.D. in entomology at the North Carolina State University under the supervision of Dr. Ken Knight, a former president of the AMCA, and renowned culicid taxonomist. Over the course of his distinguished career, Dr. Harrison worked in 16 countries conducting or directing work on the vectors of malaria, dengue, lymphatic filariasis, scrub typhus, plague, yellow fever, chikungunya, Japanese encephalitis, and fly-borne diarrheal diseases. Known as a leading international expert in *Anopheline* taxonomy, Dr. Harrison received the AMCA's John N. Belkin Award in 1992 for his contributions to mosquito systematics. Following his Army career, Dr. Harrison worked at the National Academy of Sciences in Washington, DC, for 2.5 years, and in the Public Health Pest Management Section, NC Department of Environment and Natural Resources for 19.5 years. Following a "forced retirement", he continued to work as a consultant and affiliate university professor assisting with post-disaster mosquito control efforts and assisting all (young students and seasoned professionals) as called upon. In retirement, he published "*The Mosquitoes of the Mid-Atlantic Region: An Identification Guide*" and additional peer-reviewed manuscripts with colleagues across the globe. In total, Dr. Harrison has published more than 120 peer-reviewed articles relating to vector biology, taxonomy, mosquito-borne disease, and control. He was a longstanding member of the NCMVCA, receiving the Hamilton Stevens award in 1999 and serving as the association's president in 2000. Immediate funeral arrangements are private. At a later date, a memorial service will be held so that Dr. Harrison's colleagues across the globe can make travel arrangements and attend if they so desire. Cards or flowers are greatly appreciated by the family and may be sent to Carole Harrison (661 Drumheller Rd, Clemmons, NC 27012).



Mr. Thurman Grady passed on August 21st, 2018, at the age of 67. Born October 31st, 1950, Thurman began working for New Hanover County Vector Control in October 1990, and retired in March of 2012. He was a member of the NCMVCA for his entire career of almost 22 years. A resolution of sympathy was presented in his honor at the 2019 NCMVCA workshop held December 3rd and 4th, 2018 in Greenville, NC. **Next page...**

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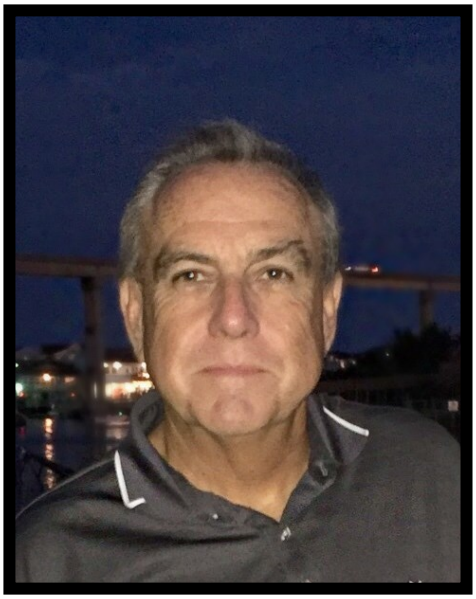

Mr. Tommy Wade Bowen passed away on October 8, 2018 at the age of 64. Tommy was born on June 2, 1954 in Williamston, NC where he was raised and later graduated from Martin Community College. He was hired by Duke Energy in 1974 where he worked for 44 years as a biologist. His obituary stated that "his love for his job and fellow coworkers was incomparable; truly his second family." He was a long-standing member of the NCMVCA and served on the associations' board. He was also instrumental in securing grant funding to underwrite the Harrison et al "*Key to the Mosquitoes of the Mid-Atlantic Region.*" His efforts continue to bear fruit today as the proceeds from the key are returned to our association. In 2013, Tommy received the Hamilton Steven's award, the association's highest honor. A resolution of sympathy was presented in his honor at the 2019 NCMVCA workshop held December 3rd and 4th, 2018 in Greenville, NC.

Association Awards, 2018

By Dr. Brian Byrd, Western Carolina University

William F. Strickhouser Award

The William F. Strickhouser Award ("Golden Dipper Award") was presented to Mr. Octavius "OJ" James of the Onslow County Environmental Services Department. His duties include surveillance, adulticiding and larviciding activities, environmental management, and other duties. For more than 18 years, OJ has conducted essential duties in the laboratory and field to "keep the mosquito program going at its maximum in Onslow County." OJ received a certificate of recognition, a "golden dipper", a dipper (with extension handle), and a $50 gift card.

Hamilton W. Stevens Award Nomination 2018

Mr. Jim Gardner, Pitt County Environmental Health, recently received the Hamilton W. Stevens Award out of respect for his commitment to the North Carolina Mosquito and Vector Control Association (NCMVCA) and his dedication to protecting the public from mosquito-borne pathogens across North Carolina. During his more than 10 years of work on mosquito borne disease and mosquito control issues in NC, he has supported the NCMVCA in numerous ways to include: serving on the NCMVCA board of directors, completing local arrangements for workshops, mentoring and assisting young NCMVCA members through internships, conducting field biology and mosquito control research with ECU and other universities, and other myriad good deeds. He also served as an officer of the NCMVCA in two positions (Vice President in 2013 and President in 2014). James is always available to provide advice and support to local mosquito control programs and is a dependable collaborator on several statewide initiatives supported through the North Carolina Department of Health and Human Services.

2018 Sustaining Members

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2019 Executive Committee and Committee Chairs

Officers			
President	Michael Doyle	michael.doyle@dhhs.nc.gov	919-546-1637
Vice-President	Eugene McRoy	eugene.mcroy@bchd.net	252-947-5042
Secretary	Kaley Myers	kaley.myers@haywoodcountync.gov	828-356-2108
Treasurer	Dr. Stephanie Richards	richardss@ecu.edu	252-328-2526
Past President	Dr. Stephanie Richards	richardss@ecu.edu	252-328-2526
Chairs of Standing Committees (TBD for 2019)			
Award and Nominations			
Constitution and By-Laws			
Finance			
Legislative			
Membership and Communications	Michael Doyle	michael.doyle@dhhs.nc.gov	919-546-1637
Program	Eugene McRoy	eugene.mcroy@bchd.net	252-947-5042
Member-At-Large			
Member-At-Large (Industry Rep)	Joe Strickhouser (Industry/Vendor Support)	jstrickhouser@clarke.com	704-333-2523

2019 Committee Members (TBD)

Award and Nominations			
Constitution and Bylaws			
Finance			
Legislative			
Membership and Communications			
Program			
Parliamentarian			
Auditor (from membership)			

Do you want to be more involved with the NCMVCA as a member on a committee? Speak to any of the above individuals, or contact the new officers to see how you can help your organization continue to grow and promote vector control in North Carolina.

NCMVCA

North Carolina Mosquito &Vector Control Association

Order Form

The Mosquitoes of the Mid-Atlantic Region: An Identification Guide

Bruce Harrison, Brian Byrd, Charles Sither, and Parker Whitt

This 201 page spiral-bound 8.5 X 11 inch guide includes dichotomous keys to the adult females and fourth instar larvae for 8 states (DE, GA, NC, MD, PA, SC, VA, and WV) with more than 585 novel Adobe Illustrator figures. Printed on 100 lb gloss paper, this guide includes sections such as: 1) Taxonomic Interpretations, 2) State Records, 3) Basic Morphology, 4) The Acquisition of Characters to Separate Larval Instars, 5) Extensive Notes, 6) Couplet Sequences, 7) Illustration Index, 8) How to Use a Dichotomous Key, 9) Glossary, and others. The keys were thoughtfully reviewed by experts from the Smithsonian Institute, North American Mosquito Control Districts, and Academia.

Item	Quantity	Price per key	Total
Mosquito key		**$30**	
		Grand total:	

Name: _____

Email Address: _____

Phone Number: _____

Employer: _____

Mailing Address (where key will be mailed): _____

_____

Method of Payment: Check (payable to **NCMVCA**) Invoice required (emailed to address given) Credit card (see below)

Card number: _____ Expiration date: _____

Code on back of card: _____ Billing zip code: _____

Email or Mail Completed Form and Payment To:

NCMVCA c/o Stephanie Richards
3403 Carol Belk Building, 300 Curry Court
Greenville, NC 27858

richardss@ecu.edu

NCMVCA: North Carolina Mosquito and Vector Control Association | www.ncmvca.org

Editor's Note: Provide feedback.

The Editor in Chief encourages feedback about The Biting Times, both specific concerns and general issues. Furthermore, we will happily publish letters to the editor on specific topics from any member of the association. So, if something strikes you in this issue and you want to compliment or complain, email the EIC: mhreiski@ncsu.edu.

The Summer Rains in the Piedmont

By Parker Whitt

As my life outside of PHPM still exists, I routinely collect mosquito and ticks. This year I got the first long-horned tick on a human in NC. After some heavy rains this summer, I set out to see what mosquito species might be popping up. I traveled to one of my "honey holes" here in Forsyth Co. As I stepped out of my truck to put on my rubber boots lots of mosquitos were all around me. I decided then to charge up my batteries for some CDC light trapping.

The next day I decided to do an experiment. I set one light trap in the daytime and one at night to compare the possible differences in my catch. The first was put out at 9am on a sunny 87 degree day and picked up at 5pm. Both of these traps had dry ice in a Thermos beside them as an attractant, and the lights were left on each trap. The second trap was set out at 5pm and retrieved at 8am the next morning. Both traps were full of mosquitoes and placed in my freezer for identification at a later date.

I identified the daytime trap first after a few days of them being in the freezer. I went through the trap and discovered to my surprise that I had lucked out! More than 400 *Psorophora horrida* with a few of the rare *Psorophora mathesoni* as well! I also had many *Aedes tormentor*, *Ps. ferox, Ae. vexans, Ae. infirmatus, Cx. erraticus, An punctipennis, An. quadrimaculatus*,, *Ae. cinereus, Cx. salinarius,* and *Ae. canadensis.*

As I then went through the nighttime trap, there were not as many *Ps. horrida*. I had maybe 200+ in this trap. No *Ps mathesoni* as well. I wish I had gotten to this habitat earlier in order to try and collect some *Ps. horrida* and *Ps. mathesoni* larvae. I have never collected *Ps. mathesoni* larvae, and only once have I been lucky enough to collect *Ps. horrida* larvae, which was in Murphy, NC. It is always exciting to go out after any heavy rains and see what you may collect. I would have never expected the daytime trap to have more mosquitoes in it versus the nighttime trap. Go out and get some exciting mosquitoes in your area after some nice rains. You never know what may be out there for you to discover.