

Ticks in North Carolina: Increasing Disease and Confusion

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Any state that has a town named Tick Bite (Lenoir County) and a creek named Tick Creek (Chatham County) you know must have a big problem. Last year almost 1,000 people in NC had reportable tick diseases (see table on page 6). Since only a minority of reportable cases get reported and there are a number of non-reportable infections such as Southern Tick Associated Rash Illness (STARI), this means that many thousands of NC's citizens get sick each year from tick bites and a few die. This year tick issues seem worse than ever as judged by the emails and phone calls Tick-borne Infections Council of North Carolina, Inc (TIC-NC) receives. We get questions about everything from how to remove a tick to whether an area is safe to visit or move to. We are also hearing about a lot of illness. Some people report being very sick. One of the most common concerns we hear about is people's difficulty in finding medical care due to the different levels of knowledge and approaches among NC medical providers.

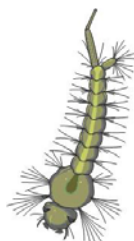
Tick

Disease

Lone Star Tick <i>Amblyomma americanum</i>	Ehrlichiosis, STARI, tularemia, tick paralysis, a Rickettsia that may be a human pathogen, and possibly Lyme disease and babesiosis in NC.
American Dog Tick <i>Dermacentor variabilis</i>	Transmits Rocky Mountain Spotted Fever, tick paralysis, tularemia, and possibly ehrlichiosis.
Brown Dog Tick <i>Rhipicephalus sanguineus</i>	Transmits ehrlichiosis and babesiosis, and possibly Rocky Mountain Spotted Fever.
Deer Tick or Black-legged Tick <i>Ixodes scapularis</i>	Lyme disease, babesiosis, ehrlichiosis, and possibly bartonella, Powassan encephalitis, and tick-borne encephalitis (viral).

Many health professionals as well as much of the public lack knowledge about the kinds of NC ticks that bite humans, the pathogens they carry, and the tick life cycle. Four types here bite humans and all may transmit one or more diseases. New "emerging infections" are being identified as well.

One of the confusions is caused by what people call the ticks. One often hears the name "seed" tick and "deer" tick. In NC, the most common tick now is the Lone Star (*Amblyomma americanum*) tick. It was not abundant 25 or 30 years ago. Back in the 1970s and 1980s people started seeing tiny ticks and assumed they were the "deer" ticks that carry Lyme disease. Most of the time these tiny ticks seen in the Piedmont are actually the nymph stage of the Lone Star tick. Sometimes people call these nymph ticks "seed" ticks. They are just as dangerous as black-legged (deer) ticks (*Ixodes scapularis*). Adult Lone Star and black-legged ticks also transmit disease agents. Fortunately, not all ticks are infected with disease-causing organisms but we do not know the proportion infected in various parts of the state because systematic studies have not been done. (Continued on page 5).



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Certification Program for Mosquito Control Professionals

The NCMVCA, in conjunction with Public Health Pest Management, NC DENR, is developing a certification program for the mosquito control professional. This certification will provide the foundation to document and objectively compare acquired skills in mosquito identification. Employers will be able to use this certification for hiring criteria, promotions and salary adjustments. The Mosquito Control Professional will be able to demonstrate competency with the various levels of mosquito identification skills.

The certification program will be composed of 3 levels. Certificate Level 1 professionals will need to demonstrate the ability to correctly identify, using an identification key, the adults of the more common species found in North Carolina. At Level 2, individuals will be required to correctly identify larval specimens. Level 3 certificate holders will have demonstrated the ability to do research and pool mosquitoes for testing.

The first exam, for Level 1 Certification will be given at the 2007 NCMVCA Conference at Atlantic Beach to be held in November. There is no fee to take the exam. If you have completed a mosquito identification course you are eligible to take the exam. Please contact Parker Whitt at parker.whitt@ncmail.net, or 336-771-5361 for more information and to schedule a seat for the exam.

HONOR A CO-WORKER

Mosquito season is about to begin and it is not too early to think about who in your organization should be honored. Sometimes you can not give that well deserved pay raise but, you can give honor and recognition. Our association gives you the opportunity to honor outstanding workers.

The Hamilton W. Stevens Award is given to a member of our association who has made an outstanding contribution to mosquito control in North Carolina. I am sure there are several such people in the state. Here is your opportunity to identify one such individual and give them due honor and recognition. A one page letter highlighting this persons' contribution is all that is necessary.

The Golden Dipper Award (presented for the first time last year) is to be given to outstanding Vector Control Operators or Technicians: those people who are on the front line of the vector control effort. Many of these people work long hours and go unnoticed. You now have an opportunity to recognize these "unsung heroes". Again, a one-page letter is all that is needed.

Letters of nomination can be emailed to Walker Rayburn at whr@ppcc.dst.nc.us before October 1, 2007.

Using the Data your Program Collects

Part VI Two Dominant Freshwater Wetland Habitats

Rick Hickman & Jeff Brown
Brunswick County Mosquito Control

There are two dominant freshwater wetland types in Brunswick County that produce mosquitoes. They are swamp forest and pocosin habitats. According to the North Carolina Division of Coastal Management, Brunswick County has 51,144.57 acres of swamp forest located across 2,063 locations. We also have 41,805.68 acres of pocosin habitat spread out over 1,092 sites.

Swamp-forest habitats can be semi-permanently flooded, including temporarily flooded depression systems (woodland pools). Typical tree species include cypress, black gum, water tupelo, green ash and red maple. Pocosin habitats can be defined as a swamp on a hill. They are seasonally flooded, usually by rainfall. They are usually not connected to large streams. An example would be a Carolina Bay. Typical tree species found in pocosin habitats include Pond pine and/or Loblolly pine.

The most important mosquito species found in Swamp forest habitats is *Culiseta melanura* the maintenance vector for Eastern Equine Encephalitis (EEE). This mosquito is strictly a bird biter. It maintains the EEE virus in the wild bird population. Locating and monitoring *Cs. melanura* habitat within your jurisdiction is essential for tracking disease potential and targeting your control efforts to protect your citizens from this mosquito transmitted disease. The idea is to locate swamp forest habitats near populated areas and initiate the best control strategy whether it is chemical, or biological.

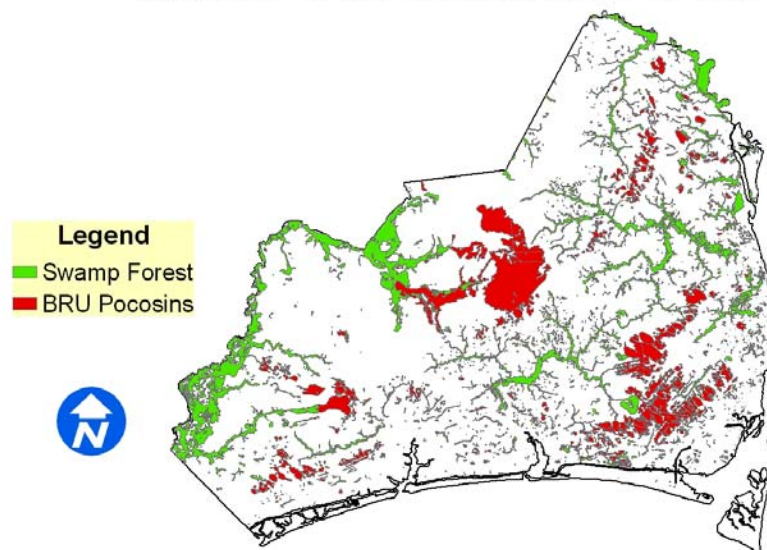
Pocosins on the other hand, typically create problems when the nuisance mosquito populations get out of hand in the last part of the season. Typically these habitats favor the flood water mosquitoes like *Aedes* and *Ochlerotatus* species. Most of these mosquitoes readily bite people and some have been tested positive for EEE. Once again, the most important factor is the proximity of your citizens to mosquito habitats.

Mapping mosquito oviposition sites gives us the edge we need to manage mosquito populations over a large area. The key is to manage the mosquitoes that occupy the same habitat as your citizens' whether its swamp-forest, Pocosin or salt marsh habitats. The next article will provide an overview of the salt marsh ecosystem

Pocosin and Swamp Forest in Brunswick County

51,144 acres of Swamp Forest and 41,805 acres of Pocosin

Figure 1



TWO NORTH CAROLINA MOSQUITO EXPERTS HEADED TO KANSAS TO ASSIST WITH MOSQUITO MONITORING, SURVEILLANCE

NCDENR Press Release July 23, 2007

**By Laura Leonard
NCDENR**

RALEIGH — State environmental health officials today announced two mosquito experts from the Public Health Pest Management Section, Division of Environmental Health, are heading to Independence, Kan., to assist with mosquito monitoring and surveillance of mosquito-borne diseases like West Nile virus.

“We know how it feels to be worried about the aftermath of floods, and, unfortunately, torrential rains have pounded south-eastern Kansas since late June, causing flooding and leaving Kansas health officials concerned about the threat of mosquito-borne diseases when the waters recede,” said DEH Director Terry L. Pierce. “A recent nationwide request from the Kansas Department of Health and Environment, along with the Centers for Disease Control, for the assistance of mosquito experts resulted in two of North Carolina’s mosquito experts being chosen to travel to Kansas to aid state officials with collecting, identifying and shipping mosquitoes to the CDC for testing.”

The staff members – Parker Whitt and Dr. Bruce Harrison – left on Saturday, July 21, and will remain in Kansas until early August. Harrison, program specialist for Western North Carolina, is an internationally-renowned mosquito taxonomist who is an expert on the mosquito species that transmit malaria. An Army retiree, Dr. Harrison has been with the division for 14 years and has received numerous accolades, including the R.E. Dorer Award from the Mid-Atlantic Mosquito Control Association.

Whitt, senior environmental specialist for Western North Carolina, is an expert on mosquito taxonomy and has been responsible for assisting with mosquito surveillance following hurricane events in North Carolina for the past 10 years. He has been with DENR for 12 years.

The Public Health Pest Management Section in the Division of Environmental Health provides technical and financial assistance to local health departments, local governmental entities and the public to control insects and related pests of public health significance. It also administers ongoing surveillance for mosquito- and tick-borne pathogens that affect human health.

Do we need to Update the NCMVCA LOGO?

We would like to hear your opinion. Is it time to update our NCMVCA logo? With all the talent our association has there have to be a few artists out there that can generate a new logo for the membership. If you have an idea for a new logo send a it to Jeff Brown via e-mail to jbrown@brunscos.net.



Our New NCMVCA Logo



The Current NCMVCA Logo



Our Old Logo

NOMINATIONS NEEDED

The post of Secretary-Treasurer will be coming open for 2008, so we need nominations. Robert Collins has been doing a great job, but it's time for him to pass the duties on. The Secretary-Treasurer keeps track of the association's funds and membership roster. It has also traditionally been a step towards the Vice Presidency and Presidency. If you know a good candidate, or would like to be considered yourself, please contact me at joe.rowell@mecklenburgcountync.gov

Ticks in North Carolina

Continued from page 1

Ticks have three stages and may spend a year between each one. When they first hatch all types are very small, the size of the period at the end of this sentence. Usually, the only larval ticks that bite humans are the Lone Star. (The Lone Star is an aggressive feeder and likes humans just as well as other animals in all its stages.) By the next stage, after molting, the tick is a nymph and is still very small. If it is the nymph of the black-legged (deer) tick it is the size of a poppy seed. The nymph of the Lone Star is only a little bigger than a poppy seed. Nymphs of the black-legged tick also bite people. Nymphs are often the stage that is associated with disease since they are so small they are often not noticed. Nymphs of the dog ticks do not bite people.



Female adult Lone Star tick



The only kind of tick that is easily identified by the public is the adult female Lone Star since it has a white spot on its back. All others usually require an expert for identification. Anecdotally, there seem to be fewer ticks in the mountains. The Piedmont has all four human-biting ticks with the Lone Star now being the most common. The coast also has all four and probably has more of the black-legged tick than the rest of the state due to their liking moist conditions. The state does not have any reliable up-to-date maps of the distribution and frequency of human-biting ticks and tick-borne infections (TBIs).

An attached tick



Most tick infections may cause similar symptoms at first-- often flu-like with fever, aches, and pains. Rocky Mountain Spotted Fever (RMSF) is very dangerous, killing 20%-30% of its victims if they are not promptly treated. It usually causes fever, chills, and severe headache and makes people quite sick. In the last 25 years, NC has had an average of 3.5 deaths per year from RMSF. Usually, deaths are due to delayed recognition and treatment. The two types of ehrlichiosis can also cause fatalities.

Brown Dog tick

Many of the infections have different kinds of rashes associated with them. The important thing to remember is that many people get one or more infections from tick bites and never have a rash. Tests are usually negative in the early stages of infections. The so-called "bull's-eye" rash associated with Lyme disease and STARI is a misnomer and should not be used because many of these rashes, which develop at the site of a bite, may be solid red. The official name of this rash is *erythema migrans* (EM). It starts at the site of the tick bite, is usually oval, and expands to greater than 2 inches. (It is normal to have small red, local reactions to tick bites, especially the Lone Star. These local reactions are usually itchy and are *not* EM rashes.) People presenting with an EM rash should be treated for Lyme/STARI borreliosis immediately. Only 50% to 80% of people infected with the Lyme or STARI bacteria ever get a rash so recognition of an infection may be difficult.



Black-legged (deer) tick
against a centimeter rule



Because of overlapping symptoms any flu-like illness or fever during tick season (March to November) in persons with exposure to ticks (which can mean just a walk in a park) should be considered for a tick-borne infection. The more quickly they are treated the better the outcome. Unfortunately, blood tests for the various infections are not entirely reliable and are not helpful in the acute stage. Ticks can also be active during warm spells in the winter, so TBIs need to be considered all year if symptoms are suggestive.

American Dog tick

Reported* Tick-borne Diseases, North Carolina 2006 (2005)

Continued from page 5

Disease	Number of cases
	Year 2006 (2005)
Ehrlichiosis, Granulocytic	1 (4)
Ehrlichiosis, Monocytic	53 (29)
Ehrlichiosis, Other	3 (4)
Lyme disease	30 (49)
Q Fever	4 (6)
Rocky Mtn Spotted Fever	842 (625)

Source: NC Department of
Health and Human Services, Division of Public Health

*Public health officials agree that most cases are not reported. Reported cases must meet strict surveillance criteria. Therefore, these numbers represent only a small portion of the actual cases. Reporting criteria are not meant to be used for diagnosis.

Borrelioses: Lyme disease and STARI (Southern Tick Associated Rash Disease)

There is also a lot of confusion about Lyme disease and STARI. Lyme disease is very controversial in general, and more so in southern states. There is currently a great deal of medical disagreement about diagnostic tests for Lyme, whether or not fetal and sexual transmission of Lyme disease occurs (some studies suggest this), how long to treat, whether late Lyme disease exists, and, if so, how to treat that. There is also political controversy about the epidemiology of Lyme disease and its treatment. The reasons are complex and include disagreement among medical professionals, insurance companies' fear of long-term payments, tourist industry concerns, economic ties, and many other issues.

Lyme disease. In spite of what some medical professionals believe, it is important to know that Lyme disease is present in NC though probably at a lower frequency than in the northeast and upper midwest. Studies in NC have identified cases, found the vector tick, and the bacteria that causes Lyme disease. This bacteria, a spirochete related to syphilis, is called *Borrelia burgdorferi*.

Southern Tick Associated Rash Illness. STARI is also sometimes called "southern Lyme disease" or "Master's Disease" (after Dr. Ed Masters who has researched it). It is not known exactly what organism causes this disease but it is likely a *Borrelia*, possibly *Borrelia lonestari*, a cousin of the Lyme disease spirochete. There are no tests for STARI and the state does not keep records of cases. Anecdotally, based on exposure and history many people in the NC Piedmont appear to have had this infection and some are chronically and seriously ill.

2007 Sustaining Members



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<p>Central Life Sciences/ Zoecon</p> <p>Charlie Pate 88 Whitney Street Eatonton, GA 31024 (706) 338-4734; Fax (706) 484-1720 cpate@central.com</p>	<p>Clarke Mosquito Control Products</p> <p>Joe Strickhouser PO Box 72197 Roselle, IL 60172 (800) 323-5727; Cell (704) 333-2523 joestrick-houser@clarkemosquito.com</p>	<p>Dynamic Aviation Group, Inc.</p> <p>Caleb Stitely P.O. Box 7, 1402 Airport Road Bridgewater, VA 22812 (540) 828-6070 cstitely@dynamicaviatin.com</p>
<p>Summit Chemical</p> <p>Jonathan Cohen 235 S. Kresson Street Baltimore, MD 21224 (410) 522-0661; Fax (443) 250-6500 jcohen@summitchemical.com</p>	<p>Univar USA</p> <p>Joe Andrews P.O. Box 177 Mars Hill, NC 28754 (252) 342-4651; Fax (828) 689-9139 Joe.Andrews@univarusa.com</p>	<p>Valent Bio Science</p> <p>Jim Andrews 4908 Wedgefield Drive Wilmington, NC 28409 (910) 547-8070; Fax (910) 392-7621 JamesAndrews@valent.com</p>

Ticks in North Carolina Continued from page 6

People in NC with Lyme disease-like symptoms may have Lyme disease or may have the Lyme-like disease that the Lone Star tick carries. It is not known whether people could have both infections at the same time. STARI (or whatever the infection associated with the Lone Star tick is) appears to be getting very common and needs much more research. The Centers for Disease Control (CDC) has suggested that STARI is a mild disease. However, the only case reports in the scientific literature are on people with a Lone Star tick bite and an EM rash who were promptly treated since it would be unethical not to treat. The CDC is currently asking for cases of STARI to study but, unfortunately, the public health system has not notified NC medical care providers about this. In our experience STARI as well as Lyme disease can be very serious and debilitating if not treated promptly and adequately. It might be better to refer to both diseases as Borreliosis. Diagnosis and treatment can be complicated by co-infections, such as simultaneous Borreliosis and babesiosis.

Prevention and removal

Methods exist for outdoor control of ticks but they are not highly practical or affordable. Personal protection is also not ideal since it involves wearing hot clothes in hot weather and using potentially toxic repellents that don't always work. Nor is it possible to always stay indoors, of course. Even then, people with indoor pets often get ticks inside their own houses. In spite of careful tick checks, ticks are easy to miss. So, even with the best methods many people will still get ticks and will be at risk of disease.

If an embedded tick is found, it is important to grasp it as close to the skin as possible with sharply pointed tweezers and pull it out slowly. Matches, Vaseline and other such methods do not make the tick let go and only serve to irritate it, which can increase the risk of disease transmission. It is important to **save the tick** because if an illness follows, identifying the tick can help sort out which infection(s) may be causing the illness. The easiest way to save the tick is to Scotch tape it on an index card and write the date and place on the body. Most studies show that ticks need to feed for several hours or even days before infections can be transmitted, though the amount of time is controversial and varies with the tick and the organism.

Tick populations are growing in our state along with the deer population. Deer serve as hosts to some of the ticks. Awareness helps. And staying out of tick infested areas.

PROTECTING YOURSELF OUTDOORS

- Avoid woods or other areas with ticks during March to October.
- Decrease the deer population.
 - Develop a dry border clear of brush around your lawn. (www.cdc.gov)
- Use repellants.
- Wear long light-colored clothes, tuck pants in socks.
- Conduct frequent tick checks.

Tick-borne Infections Council of North Carolina, Inc (TIC-NC), was started two years ago by several NC residents concerned about the ever increasing accounts of people sick with tick-borne infections (TBIs) and the lack of public awareness of the problem. The mission of TIC-NC is to improve the recognition, treatment, control, and understanding of tick-borne diseases in North Carolina. The organization also seeks to encourage the public health system to develop programs to protect the public. Marcia E. Herman-Giddens, PA, MPH, DrPH, President, became interested in TBIs many years ago while practicing pediatrics at Duke University Medical Center. Her interest and experience was further peaked when she moved to Chatham County 13 years ago and witnessed the changing environment and increase in tick diseases among her fellow Chathamites.

www.tic-nc.org

TIC-NC, Inc is a 501(c)(3) organization.

Topics for the 2007 Annual Meeting

Our Vice President David Jenkins and his Program Committee are working to put another outstanding meeting together this year. Some of the presentations include:

The AMCA's Technical Advisor Joe Conlon will be presenting the AMCA's position on mosquito misting systems.

Dr. Marcia Herman-Giddens the President of the Tick-borne Infections Council of North Carolina, Inc will be discussing ticks from the public point of view.

Dr. Charles Apperson will be discussing storm water retention ponds.

Kimberly Garvey From a regulatory Specialist with the U. S. Army Corps of Engineers will be discussing wetlands.

Parker Whit from NCDENR/PHPM will be discussing the states role in the disaster response in Kansas.

Amadou Jallow will be talking about a barrier treatment study.

Bill Janey from Clarke Mosquito Control will be discussing pesticides and non-target insect species.

Dr. Roe and or Allen Jones will be presenting on a new insect repellent

Dr. Mike Stringham from N.C. State University will be discussing fly control.

Ellie Pittenger will presenting an overview of the Southport mosquito control program.

Some of the other speakers that have agreed to present include Gene Payne the AMCA president, Dr. L.A. Williams the Director of South Carolina Mosquito Control Program, Robert Collins from the City of Rocky Mount, Marcee Toliver and Janet Driggers from NCDENR's Public Health Pest Management Program. Sounds like David and company are putting a good meeting together for the membership. Hope to see you all there!

MOSQUITOFISH AND OTHER PREDATORS

Excerpted from *Urban Waterways*

Published By North Carolina State University

Cooperative Extension

Research indicates that some ecological or biological controls can limit mosquito populations with varying degrees of success. In particular, mosquitofish (*Gambusia affinis*) are extremely effective at limiting mosquito population growth. *Gambusia affinis* is native to North Carolina, and the subspecies *holbrooki* occurs

in the N.C. mountains. Mosquitofish are amazingly tolerant. They can survive temperatures ranging from 33oF to more than 100oF. In addition, they can survive in a wide pH range (5 to 9.5) and in salinities as high as 15 parts per thousand (ppt).

Perhaps most amazing, the mosquitofish can live with dissolved oxygen levels of nearly 0.0 ppm. Its resilience in a wide range of environments makes the mosquitofish a good biological control for mosquitoes in some environments. Research in North Carolina indicates that sampled ponds and wetlands with mosquitofish present had significantly fewer occurrences of mosquitoes than those without the fish.

Because mosquitofish are resilient omnivores, however, they can have a detrimental impact on the diversity of a wetland or wet pond system. Their effect on populations of beneficial aquatic invertebrates—the many small insects, snails, and worms that nourish fish and other wildlife—is still being debated. Nevertheless, mosquitofish introduction is currently the only fail-safe ecological measure for limiting mosquito population growth. Some predators, such as bats and purple martins, simply cannot eat enough mosquitoes to make any noticeable reductions. Moreover, purple martins have been found to eat another voracious mosquito predator, the dragonfly.

To view the entire *Urban Waterways* article follow the link

<http://www.bae.ncsu.edu/people/faculty/hunt/Mosquitoes.pdf>



Male Mosquitofish (*Gambusia affinis*)



Female Mosquitofish (*Gambusia affinis*)

NCMVCA Annual Meeting Information

Meeting Dates November 14, 15, 16, 2007



www.sheratonatlanticbeach.com

2717 W. Fort Macon Rd.

P. O. Box 3040

Atlantic Beach NC, 28512

800-624-8875 / 252-240-1452 Fax

Room Rates:

Ocean view	\$59.75
Ocean Front	\$99.00
Ocean Front Suite	\$139.00

Meeting Registration Fees

Registration (Before October 8th) = 65.00 for member and 70.00 for non-member.

Registration (After October 8th) = 75.00 for member and 85.00 for non-member.

Companion/Spouse (Before October 8th) = 35.00

Companion/Spouse (After October 8th) = 45.00

One day only = 45.00 for member and 50.00 for non-member

Companion/Spouse for dinner = 35.00

Student (All 3 days) = 30.00

Vendor registration = Contact Joe Strickhouser at 704-333-2523

PRE-REGISTRATION FORM
 ANNUAL MEETING OF THE N.C. MOSQUITO AND VECTOR CONTROL ASSOCIATION
 NOVEMBER 14th-16th
 Sheraton Atlantic Beach
 2717 W. Fort Macon Rd.
 P.O. Box 3040
 Atlantic Beach NC, 28512
 1-800-624-8875

2007 Meeting Registration Form

Save a little cash and pre-register for the conference using the form below.

Name: _____
 Organization/Company: _____
 Mailing Address: _____
 City: _____ State: _____ Zip Code: _____
 Telephone: _____

Please Mark Your Registration Choice:

Pre-Registration _____ On-Site _____

Registration (Before October 8th) = 65.00 for member and 70.00 for non-member.

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One day only = 45.00 for member and 50.00 for non-member

Companion/Spouse for dinner = 35.00

Student (All 3 days) = 30.00

Vendor Registration:

1 table—\$175.00

2nd vendor rep—\$60.00 if pre-registered, \$70.00 on site registration

Total amount enclosed: _____

Vendor registration = Contact Joe Strickhouser at 704-333-2523

Send no Cash! Make check payable to NCMVCA and mail to:

Robert Collins

PO Box 402

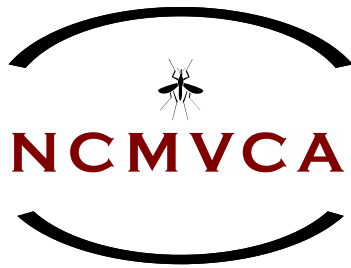
Rocky Mount NC 27802

Phone: 252-972-1307

E-mail: CollinsR@ci.rocky-mount.nc.us

Mail Registration to: Robert

Robert Collins
Secretary/Treasurer
PO Box 402
Rocky Mount, NC 27802



New Membership Application and Membership Renewal Form N.C. Mosquito and Vector Control Association

Name: _____

Organization/Company _____

Mailing Address _____

_____ Zip Code _____

Telephone Number _____ E-Mail: _____

Dues Payment for Year _____ Amount: (\$10.00/year) _____

Make check payable to NCMVCA and mail to:

Robert Collins
PO Box 402
Rocky Mount NC 27802
Phone: 252-972-1307
E-mail: CollinsR@ci.rocky-mount.nc.us