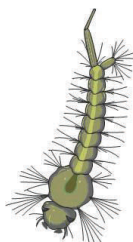


THE BITING TIMES



The Effects of Drought on Mosquito Populations

By

R. Hickman, J. Brown and Neal Williams
Brunswick County Mosquito Control

2007 was the driest year in recorded history in Brunswick County. The graph (Figure 1) shows depressed mosquito populations. It also shows weekly rainfall totals, but more importantly it shows the reduction of groundwater levels since tropical storm Ernesto in August of 2006. As of January 2008 groundwater levels are approximately 2 feet below average at the recording station in Sunset Harbor. The groundwater data is downloaded from the USGS North Carolina Drought Watch website. The mosquito production in Brunswick County was down 87.4% when compared against the historical yearly totals.

Can we use historical data to identify or anticipate the environmental variables we will have to deal with during the 2008 mosquito season? Think about it. We are currently going into the second year of a drought. Most of the places that normally produce mosquitoes have been dry for a while. If they remain dry, it follows that we will have a year like last year. The down side of this is we are losing the natural predator population as the drought continues. The over-wintering stage of most of our insect predators is typically around six months. So it could take at least six months for the predacious insect populations to recover after the rains return. What about the mosquito fish population (*Gambusia affinis*)? The woodland pool system in Brunswick has pretty much dried up. When the water comes back we will have to repopulate the woodland pools with *Gambusia*. It takes time for the mosquito fish to repopulate an area.

The current drought has had little effect on our salt marsh mosquito population's on the coast. Last year much of our coastline produced salt marsh mosquitoes. Typically, we see an increase in salt marsh populations after tidal surges from the new and full moon tide cycles. During the equinox and the solstice tides the tides can be above normal for the entire lunar cycle.

Hardwood trees like the red maple will start drawing water mid February. Pine trees will start pulling groundwater by mid-April. If the drought trend continues through early May, we can expect the groundwater levels to decrease even more during the 2008 growing season. From a mosquito Control standpoint, 2008 should be interesting. The key is to identify mosquito production variables and adjust our control strategies as those variables change over time.

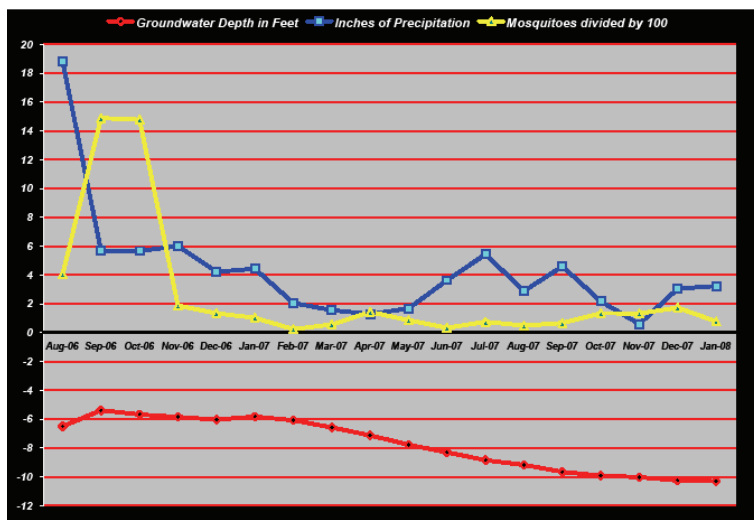


Figure 1

The effect on adult mosquito populations during drought conditions.

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Upcoming Training Opportunities in 2008

All the workshops listed below provide continuing education credits for the Category B Public Health applicators license. They are also a great place to meet and talk to other mosquito professionals.

Clarke Mosquito Control will be holding two workshops in March. One in Wilmington on March 12th at the Holiday Inn on 5032 Market Street. The March 13th workshop will be held at the Greenville Hilton located at 207 SW Greenville Road. To Register contact Joe Strickhouser at 704-333-2523 or e-mail him at JoeStrickhouser@clarkemosquito.com. You can also register online at www.Clarkemosquito.com. Three and a half continuing education hours for category B will be offered.

Category B Public Health Applicators School and Exams will be held in Kinston on April 1st and 2nd. The second will be held in Plymouth April 15th and 16th. Contact the North Carolina Department of Agriculture/ Pesticide Section at 919-733-3556 for more information or visit their web site at: www.ncagr.com/fooddrug/pesticid/exam.htm

These are the only two Category B pesticide schools offered in 2008. Sign up soon!

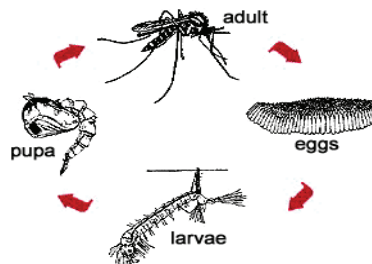
Public Health Pest Management will be holding **ULV Calibration Workshops** during the month of May. Contact the PHPM representative in your area or call 919-733-6407 for more information. See pages 6 and 7 for complete workshop information or visit the NCMVCA web-site at www.NCMVCA.org.

2008 Mosquito ID Course

The NCMVCA, in conjunction with PHPM Staff, will be offering both an adult and larval identification course this spring. The Larval ID course will be held at Catawba College on April 22nd and 23rd. The Adult ID course will be held at Goose Creek State Park on May 21st and 22nd.

Both courses are designed with the mosquito professional in mind, focusing on morphology, behavioral characteristics and surveillance techniques as well as updated information on vector potential of the various species of public health significance. Individuals who are using or developing Integrated Pest Management strategies and wish to enhance their surveillance abilities or seasoned professionals who would like a refresher course are welcome.

Each course has a \$90.00 fee, which includes course materials. More information about these courses can be found on the NCMVCA's website – see the link for Courses and Workshops or contact the instructor, Parker Whitt, at parker.whitt@ncmail.net.



The Mosquito Life Cycle

Useful up-to-date information about mosquitoes.

Bruce A. Harrison, PHPM, NC DENR

In 2007 there were two publications (see below) about mosquitoes that provided very useful general as well as taxonomic information about mosquitoes. Unlike much of the inaccurate information on the web, those two publications provide accurate numbers for mosquitoes and other general information. Plus, I've included some information and comments of my own. I think that many of you will find the information below of value in preparing reports, talks and in your discussions with people.

1. There are 3,490 (as of 2007) recognized species of mosquitoes in the world (the count changes on a weekly basis). Compare that number to the following:
 - (a) 175 species recognized in the United States
 - (b) 60 species recognized in North Carolina
 - (c) As of 2005 there were 436 species recognized in Thailand, a country the size of California (this represents 12.5% of the world fauna) – (see reference below)
2. All mosquito species are included in two Subfamilies of the Family Culicidae:
 - (a) Anophelinae
 - (b) Culicinae (previously *Toxorhynchites* was considered to be in a separate Subfamily, but now it is included as one of the 11 Tribes found in the Subfamily Culicinae).
3. World species numbers for the genera we have are:
 - (a) *Aedes* – 363 (based on data through 2003)
 - (b) *Anopheles* – 476 (2007 data)
 - (c) *Coquillettidia* - 57
 - (d) *Culex* – 763 (2007 data)
 - (e) *Culiseta* – 37 (2007 data)
 - (f) *Ochlerotatus* – 550 (based on data through 2003)
 - (g) *Orthopodomyia* – 38 (2007 data)
 - (h) *Psorophora* – 48 (2007 data)
 - (i) *Toxorhynchites* – 88 (2007 data)
 - (j) *Uranotaenia* – 265 (2007 data)
 - (k) *Wyeomyia* – 140 (2007 data)
4. Slightly less than 150 species are considered primary vectors of pathogens that are responsible for human morbidity/mortality. Most of those are *Anopheles* species involved in the transmission of malaria.
5. Mosquitoes are found on every continent except for Antarctica. Most species occur in the tropics. However, unimaginable numbers of a very few species can occur in extreme areas, even above the Arctic Circle.
6. Based on species diversity found in recent molecular studies it is estimated that about one-fifth of the species of mosquitoes have been described. Many species of *Anopheles* are known only by alphabetical designations like *An. crucians* A, B, C, D, or E, and remain undescribed. Molecular studies have not even begun in many of the other genera.

Continued on page 4

Useful information about mosquitoes. Continued from p.3

One final suggestion - when you talk to people about the numbers of mosquito species do not presume that they know what a “species” represents. Since many people think mosquito species are like varieties (or breeds) of dogs, chickens, cats, horses, cows, pigs, etc., always emphasize that mosquito species are not varieties. Each species is unique in many ways, like species of birds. For most people this is a hard concept to understand, but the great differences between mosquito species justify all of the work that needs to be done to effectively control mosquitoes and the pathogens they spread.

References

Harbach, R. E. 2007. The Culicidae (Diptera): a review of taxonomy, classification and phylogeny. Pp. 591-638. *in* Zhang, Z.-Q. and W. A. Shear (Eds) *Linnaeus Tercentenary: Progress in Invertebrate Taxonomy*. Zootaxa 1668: 1-766.

Harbach, R. E. and T. M. Howard. 2007. Index of currently recognized mosquito species (Diptera: Culicidae). *European Mosq. Bull.* 23: 1-66.

Rattanarithkul, R., B. A. Harrison, P. Panthusiri, and R. E. Coleman. 2005. Illustrated keys to the mosquitoes of Thailand. I. Background: geographic distribution: lists of genera, subgenera, and species; and a key to the genera. *Southeast Asian J. Trop. Med. Public Health* 36 (suppl 1): 80 pp.



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 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 should be emailed to Jim Bryan, at bryanlj@myway.com before October 1, 2008.

2008 Sustaining Members



<p>Adapco, Inc.</p> <p>Trey English 804 Thompson St 550 Aero Lane Sanford Fl; 800-367-0659 Fax (866) 330-988 tenglish@myadapco.com</p>	<p>B & G Chemicals</p> <p>David Sykes 710 N.E. County Road 150 Madison, FL 32340 (850) 673-9598 dsykes@bgchem.com</p>	<p>Bayer Environmental Science</p> <p>Peter Connelly 2 T.W. Alexander Drive RTP, NC 27709 (919) 549-2489; Fax (919) 549-3969 Cell (919) 622-0710 peter.connelly@bayercropscience.com</p>
<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 Jim.Andrews@valent.com</p>



PUBLIC HEALTH PEST MANAGEMENT
2008 ULV Mosquito Spray Machine
Annual Spring Calibration
workshop

**BRING MACHINES READY TO RUN,
 WITH GASOLINE, INSECTICIDE AND A COPY OF THE INSECTICIDE
 LABEL!**

**ALL MACHINES MUST BE CALIBRATED EACH YEAR BEFORE SPRAYING
 STATE-OWNED MACHINES MUST BE INVENTORIED AT THE WORKSHOP**

9:00—9:30	Mosquito Biology 101
9:30 – 10:00	Pesticide Storage & Safety
10:00 – 10:30	New Diseases, New Mosquitoes
10:30—10:45	Break
10:45 – 11:30	Bedbugs
11:30—Noon	Machine Maintenance Tips
Noon till done	LUNCH ON YOUR OWN / FLOW RATE TESTS & MA- CHINE CALIBRATIONS BEGIN

**THERE IS NO FEE TO ATTEND THE WORKSHOP.
 PLEASE REGISTER IN ADVANCE.
 CONTACT THE MAIN OFFICE AT 919-733-6407 OR E-MAIL
 BARRY.ENGBER@NCMAIL.NET TO REGISTER.
 DATES AND LOCATIONS ARE ATTACHED.**

Public Health Pest Management
 Division of Environmental Health
 1631 Mail Service Center, Raleigh, NC 27699-1631
 Phone: 919-733-6407/ Fax: 919-733-7618/ Internet: www.enr.state.nc.us/phpm

Date County
Thurs., **Chowan**
May 8 **County**

Locations and Directions

Northeastern Regional Airport

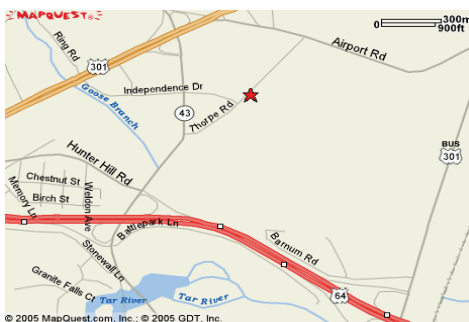


113 Airport Drive, Edenton, NC (252) 482-4664

From Hwy 17, take Virginia Road Exit, Route 32. Follow Route 32 through town (turning right on Broad Street, and Left at the Post Office to take Route 32 through and out of town). Make a right onto 94 turning left into the airport after about 3 miles

Fri., **Nash County**
May 9

Rocky Mount Environmental Services Complex

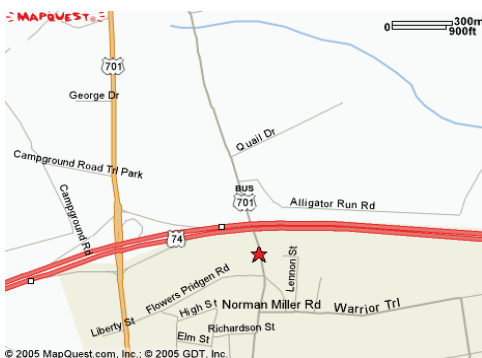


1221 Thorp Road, Rocky Mount, (252) 972-1300

From Hwy 64, take the Hwy 43/Hwy 48, Benvenue Road, Peachtree Street exit. From the exit ramp, turn north onto Benvenue Road. Thorp Road is on the right, about 1/4 mile. The Environmental Service Complex is on the right, approx. 200 yards.

Wed., **Columbus**
May 14 **County**

Cooperative Extension Office

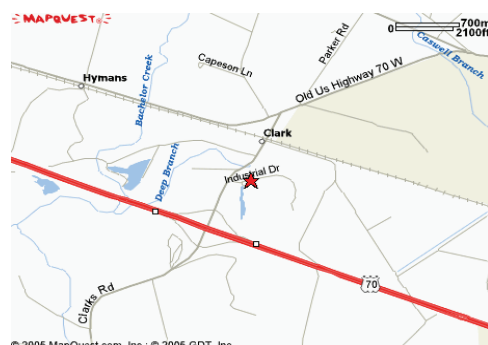


45 Government Complex Road, Suite A, Whiteville (910) 640-6605

From Lumberton: Take 74 East, exiting at Whiteville-Clarkton. Go South on 701. Make a left onto Flowers-Pridgen Drive (State Employee's Credit Union is on the corner). Follow to the end, turning left onto Pinckney Street (701 Business). After passing the cemetery on the Left, turn left onto Government Complex Road. The extension

Thurs., **Craven**
May 15 **County**

Cooperative Extension Office



300 Industrial Drive, New Bern (252) 633-1477

70 East from Raleigh: About 6 miles west of New Bern, exit north at Clarks Intersection (Industrial Park Exit). Take the first road to your right into the Industrial Park. The Craven County Extension Center is the 3rd building on the left, once you enter the park.

Janet Driggers
Secretary/Treasurer
222 Ryan Way
Goldsboro, NC 27535



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:

Janet Driggers
222 Ryan Way
Goldsboro NC 27535
Phone: 919-920-3393
E-mail: Janet.Driggers@NCmail.net