

CHESAPEAKE MOSQUITO CONTROL COMMISSION

ANNUAL REPORT

2009



R. JOE SIMMONS, DIRECTOR

Annual Report information compiled and edited by
Kirby R. Foley, Sr.
Revised by R. Joe Simmons

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COMMISSIONERS



Nancy Welch, MD, Chairperson



Joe E. Davis



William Hoddinott



Robert L. Mann



Janie Tompkins



James Sawyer

Barry Thacker



Gene R. Payne, Director

R. Joe Simmons, Director

SPECIAL NOTE:

Gene Payne was Director until August 14th at which time Joe Simmons became the Director. They worked together for the next six weeks in a coordinated transition before Gene actually retired on September 30th.

CENTRAL OFFICE STAFF

Amy Pippin, Administrative Assistant Kirby Foley, Operations Director

Janet Haley, Human Resource Specialist Jason Pevear, G.I.S. Analyst

Christina Coup, Payroll Technician Susan Freeman, Office Specialist

Deborah Vines, Office Specialist Roger Burnham, Custodian

BIOLOGY DEPARTMENT

Jason Williams, Biologist Lisa Wagenbrenner, Biologist

Connie Gregg, Biology Technician Tanya Hodges, Biology Technician

Nyssa Thongthai, Biology Intern Shaun Walsh, Biology Intern

Special Note:

Kirby Foley became Acting Operations Director on February 23rd but continued to help with trapping and adult identification through out the season.

Jason Williams was head of the Biology Department until he moved to Dallas, Texas in mid August.

Joe Simmons became the Director on August 14th but continued to help with adult identification through the rest of the season.

Lisa Wagenbrenner was hired as head of the Biology Department September 14th.

DISTRICT OFFICES

Deep Creek District

Allen Peoples, District Supervisor

**Zollie Russell, Field Supervisor II
Ronald Wells, Field Supervisor I
Alice Ramsey, Applicator II
Chris Shearin, Applicator I
Patricia Scott, Applicator II
Michale Powell, Sm.Eng.Mechanic
Dennis Washington, Field Technician I
Charles Darden, Applicator I**

**Derrick Adams, Field Supervisor II
Martell White, Field Supervisor I
Shamsiddeend Ali, Applicator I
John Trotter, Mechanical Technician
Joseph Cato, Applicator II
Jason Wagner, Field Technician II
Claudia Holly, Field Technician I
Russell Eley, ULV Driver/PT**

Greenbrier District

Jim Lemnios, District Supervisor (retired September 30th)

Robert Whitaker became Acting District Supervisor October 1st

**Robert Whitaker, Field Supervisor II
Mark Leary, Field Supervisor I
Jack Akers, Jr., Field Technician II
Gary Harmon, Applicator II
Jacqueline Snowden, Applicator II
Erik Hockensmith, Field Technician II**

**Steve Lemnios, Field Supervisor II
Scott Stevens, Field Supervisor I
John Cole, Applicator I
Tameka Smith, Applicator II
George Wilson, Field Technician II**

Southern Chesapeake District

Leroy Bohn, District Supervisor

**Steve McPherson, Field Supervisor II
Ronald Johnson, Field Supervisor I
Darin Brown, Applicator III
Jerry George, Applicator III
Chad Piver, Applicator I
Eddie Perry, Field Technician I
Dexter Kendrick, Field Tech. II**

**Winfred Cooper, Field Supervisor II
Richard Jones, Field Supervisor I
Chris Gautier, Applicator I
George Lamb, Applicator II
Pat Solomon, Field Technician II
Chris Hendricks, Field Tech. II**

Mechanics

John Tyndell, Mechanic II

Jack Akers, Sr., Mechanic I (retired September 30th)

INTRODUCTION

The purpose of the Chesapeake Mosquito Control Commission is to conduct mosquito control activities in the city, as directed by the Director who is appointed by the Board of Commissioners.

Six of the Board members are volunteer residents appointed by the Chesapeake City Council; the seventh is a designee of the Virginia State Health Commissioner and serves as Commission Chair.

The goal of the Chesapeake Mosquito Control Commission is to reduce and control the mosquito populations using the safest and most effective means available. We use an integrated mosquito management (IMM) approach which is an ecologically based strategy that relies heavily on natural mortality factors and seeks out control tactics that are compatible with or disrupts the environment as little as possible. We use adulticides during periods of mosquito-borne disease transmission or when source reduction and larval control have failed or are not feasible. All control activities and decisions are based on surveillance.

The Commission is made up of three service districts: Deep Creek, Greenbrier, and Southern Chesapeake.

BIT OF HISTORY

The Chesapeake Mosquito Control Commission came into existence through the consolidation of the five separate Mosquito Control Commissions in 2003. The five prior individual commissions were Deep Creek, Great Bridge, South Norfolk, Washington Borough, and Western Branch Mosquito Control Commissions. Deep Creek Commission was formed in 1948, Washington Borough Commission in 1952, and Western Branch Commission became official in January 1955. These three Commissions were started by the Norfolk County Board of Supervisors. Norfolk County became the City of Chesapeake in 1963. The Great Bridge and the South Norfolk Mosquito Control Commissions were formed in the 1960s by the Chesapeake City Council.

MOSQUITO BIOLOGY

Mosquitoes are a part of the aquatic and the terrestrial food chains but are known more for their significance to man as pests and especially as vectors of human and animal diseases.

A mosquito undergoes a complete metamorphosis by passing through four successive stages in its development: egg, larva, pupa and adult. Complete development can take as little as five days but normally takes ten to fourteen days depending on the species and environmental conditions. With the exception of the adult, all stages require water to complete development.

After breeding, the adult female requires a blood meal for the development of viable eggs. The male mosquitoes feed on plant nectar and do not take blood meals. The adult female of some species lay their eggs in masses or rafts on the water's surface. The other scenario involves mosquitoes that lay their eggs on moist soil or other substrates in areas that will be flooded with water later. After two days, these eggs are ready to hatch,

but if not flooded, can withstand drying for months. Heavy rains and flooding can produce extremely huge mosquito populations in a short period of time.

The adult female of *Anopheles* and some *Culex* pass the winter in hibernation in protected places, whereas others over-winter in the egg or larval stage.

The flight habits of mosquitoes vary greatly with the different species. Some stay near their aquatic habitats, while others may wander a half, one, five or up to fifty miles.

IMPORTANCE OF MOSQUITO CONTROL

There are two main reasons why mosquito management is important. Many mosquitoes can transmit disease causing pathogens to man and animals, and mosquitoes can be a major annoyance.

Mosquito-borne diseases are among the world's leading causes of illness and death today. It is estimated by the World Health Organization that more than 300 million clinical cases each year are attributable to mosquito-borne illnesses. Malaria, dengue, encephalitis, yellow fever, filariasis, and heartworm are mosquito-borne diseases and are having devastating effects throughout the world. Most of these diseases have been endemic and/or caused epidemics in the United States in the past. Today, only the arboviral encephalitides occur annually and dengue occurs periodically in the U.S.. The major types of viral encephalitis in the United States include St. Louis, LaCrosse, Eastern equine, Western equine, and West Nile virus. These viruses are normally infections of birds or small mammals. During these infections, the level of the virus may increase in these infected animals facilitating transmission to humans by mosquitoes. Human cases of encephalitis may be mild to very severe illnesses and a few cases can be fatal. Dengue is a viral disease transmitted from person to person by mosquitoes. Most infections will cause mild illness but some can be severe and even cause death. Dengue is endemic in the Caribbean, Central and South America. Recently, dengue has occurred with increasing frequency in Texas and Florida. Other pathogens transmitted by mosquitoes include a protozoan parasite which causes malaria, and *Dirofilaria immitis*, a parasitic roundworm and that causes dog heartworm.

Mosquito-borne diseases also affect both wild and domestic animals. Unvaccinated horses and emus are highly susceptible to Eastern Equine Encephalitis: death rates may reach 90% once encephalitis is contracted. Horses, a few small mammals, and some birds are very susceptible to West Nile Virus. Dog Heartworm, mention above, kills many domestic dogs each year. Dog Heartworm is both preventable and treatable.

The presence of mosquitoes can cause reductions in labor efficiency and depreciation of real estate values. They can also interfere with outdoor activities and recreation.

The Chesapeake Mosquito Control Commission practices integrated mosquito management principals by employing the following techniques: source reduction, public education, surveillance, biological controls, larviciding, and adulticiding. The proper philosophy of mosquito control is based on the fact that 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 before the

mosquitoes emerge as adults. This policy or practices reduces the need for adulticiding applications.

SOURCE REDUCTION

Effective mosquito control must include efforts to eliminate or reduce sources of mosquito breeding. We eliminate, empty, or treat artificial containers that can become mosquito habitats. Mosquitoes reproduce in impounded and standing water; therefore maintenance of drainage ditches is one of the commission’s primary concerns.

We did not accomplish as much ditch cleaning as we wanted to this past season. We have reduced our personnel by 22% over the last two years because of budget woes and we have had to extend our larviciding and adulticiding into the normal ditching time.

The following source reduction activities were completed in 2009:

Bush (weed-eater)	58 acres	4,839 hours
Cleaning	70 miles	8,195 hours
Grading	48,737 cu.ft.	163 hours
Refuse removed	88 tons	1,201 hours
Miscellaneous		1,402 hours
Total		15,828 hours



SURVEILLANCE

Although surveillance is a primary concern of the Biology Department, it is conducted by a combined effort of the larviciding crews, field supervisors and the biology personnel.

During the breeding season, surveillance programs are conducted so that control activities can be concentrated in those areas with the most serious problems. Surveillance is also done to determine if any virus activity is present in the mosquito population and the sentinel chickens.

The surveillance techniques used are: larval dipping surveys, trapping with CO₂ baited traps, testing of mosquitoes, testing sentinel chicken serum, and service request from the public.

2009 SERVICE REQUEST:

Mosquitoes	2,086
Drainage	304
Property Release	20
Special fogging	368
Other	47
Total:	2,825

In 2009 we had 614 more service calls than we had in 2008.

CDC, GRAVID, ROTARY, and BG-SENTINEL TRAPS 2009:

The Biology Department uses CDC, BG – Sentinel, Gravid and Rotary Traps to survey the adult mosquito population in Chesapeake.

The carbon dioxide (CO₂) baited CDC light trap is the primary method used to capture adult mosquitoes. They are set for over-night collections of mosquitoes, which are then separated and speciated into pools for arboviral testing. We set at least forty of these traps each week throughout Chesapeake. CDC light traps utilize a battery powered light source to attract mosquitoes and are baited with CO₂, as an additional attractant. CMCC uses pressurized tanks, which emit regulated low levels of CO₂.

The BG-Sentinel is designed to use a special lure that contains lactic acid, ammonia and fatty acids like the human skin. We also use carbon dioxide as an attractant with the lure. We received and started using two BG – Sentinel traps in mid August of 2006. We have set the BG-Sentinel and CDC Light Traps side by side over the last four years to determine which is the better trap. The BG-Sentinel Trap averaged collecting 485% more mosquitoes than the CDC Light Trap. The CDC Light Trap is more efficient in collecting the Anopheles and two of the Culex species. Due to this fact, we set the BG and CDC Traps in combination to determine which species are involved when we have a problem area. The BG Trap is extremely more efficient than any other type trap for

collecting adult mosquitoes. In fact they are too efficient. If we used BG Traps for all our trapping, we would have to triple our man hours just to identify and pool the samples.

The Gravid Trap is used to attract and capture gravid adult mosquitoes. The attractant used is an infusion of hay, grass clippings, chicken feces, yeast, and water that has been allowed to ferment. The primary target species are *Culex* and *Aedes albopictus*.

We set the Gravid Traps in areas that have the older sewage systems and have high numbers of the above species.

The Rotary Trap is used to survey the adult mosquitoes and their periods of activity. It allows us to trap eight 2 hour periods for a total of sixteen hours each night. We separate and speciate each two hour period to determine which species were active and what hours they were active. This information can be used to indicate the most effective hours to adulticide. The Rotary Trap also uses a light source and CO₂ as attractants for the mosquitoes.

The presence of CO₂ widens the array of mosquitoes that are attracted and allows these traps to be effectively set to collect mosquitoes that are active during both daylight and evening hours.

The mosquitoes are collected alive in the CDC, BG-Sentinel and Gravid traps by containing them in a net instead of a killing jar. Collecting the mosquitoes alive is necessary for viral detection.

Our biology personnel set 890 baited traps including 118 that were set in the Great Dismal Swamp National Wildlife Refuge. A total of 193,994 mosquitoes were captured at ninety-six trap sites, and the species known to be capable of transmitting Eastern Equine Encephalitis (EEE) and West Nile Virus (WNV) were tested at the Norfolk Department of Public Health Lab.

CMCC is a member of the Tidewater Regional Arboviral Surveillance Team (TRAST), a cooperative effort of the regional mosquito control agencies and the Norfolk Health Department laboratory for the arboviral testing program.

Our 2009 season was an average year for mosquito populations, trapped mosquitoes, and tested pools. The ninety-six confirmed disease incidents we had would have to be considered way above the average season. In fact this the most WNV and EEE positives that we have had since 2005 when we had one hundred and eighty. Once again, we did not have any confirmed human cases but we did have three horses, one goat, and one emu confirmed for EEE in Chesapeake.



CO₂ baited CDC Trap



BG-Sentinel Trap



Gravid Trap

MOSQUITOES TRAPPED IN CHESAPEAKE BY DISTRICT – 2009

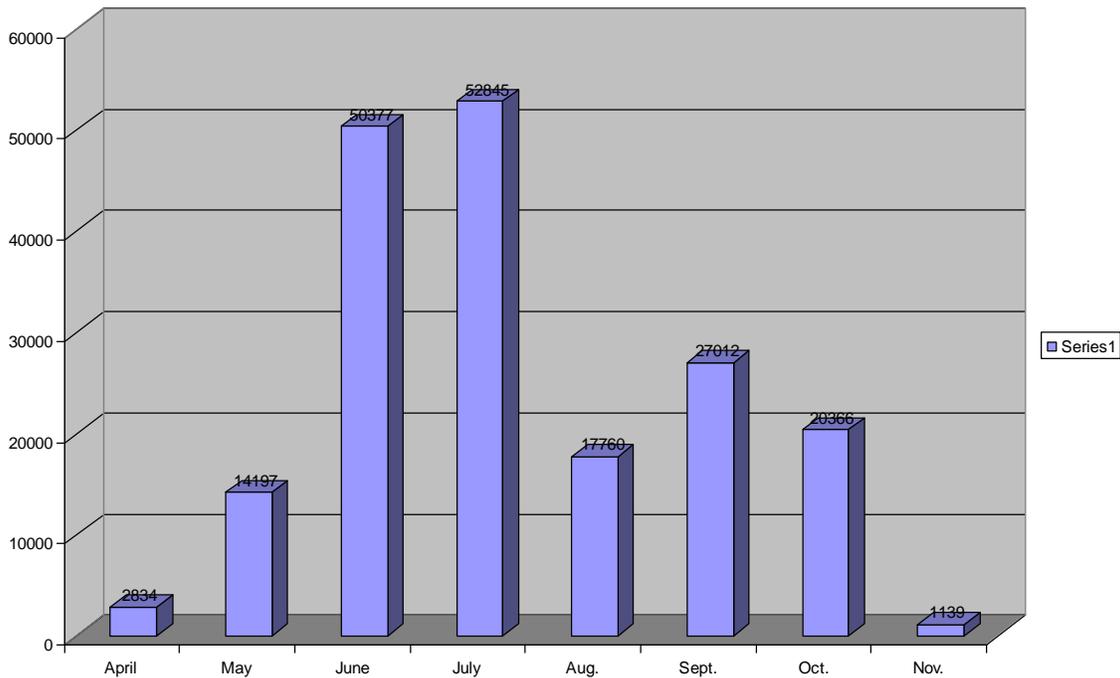
	Deep Creek	Greenbrier	GDS Refuge	Southern	City-Wide	Percent
Number of Traps	310	173	118	289	890	
% of Traps:						
Males	973	1001	899	1482	4355	2.25%
<i>Ae. albopictus</i>	282	1901		134	2317	1.19%
<i>Ae. vexans</i>	1554	1380	880	2096	5910	3.05%
<i>An. crucian</i>	872	4036	119	15131	20158	10.39%
<i>An. punctipennis</i>	39	64	6	458	567	0.29%
<i>An. quadrimaculatus</i>	50	94	7	2148	2299	1.19%
<i>Cq. perturbans</i>	646	39	758	170	1613	0.83%
<i>Cs. inornata</i>				42	42	0.02%
<i>Cs. melanura</i>	27712	1397	29175	5995	64279	33.14%
<i>Cx. erraticus</i>	463	577	156	617	1813	0.93%
<i>Cx. pipiens</i>	50	127	4	13	194	0.10%
<i>Cx. restuans</i>	260	303	42	265	870	0.45%
<i>Cx. salinarius</i>	9285	8274	1392	5591	24542	12.65%
<i>Cx. territans</i>	52	39	14	230	335	0.17%
<i>Oc atlanticus</i>	3272	582	2728	1655	8237	4.25%
<i>Oc canadensis</i>	17099	1254	26882	3428	48669	25.09%
<i>Oc hendersoni</i>	6	4	31	16	86	0.04%
<i>Oc infirmatus</i>	199	287	108	622	1216	0.63%
<i>Oc mitchellea</i>	1			3	4	0.00%
<i>Oc sollicitans</i>	27	6	2	3	38	0.01%
<i>Oc. taeniorhynchus</i>	184	89	2	5	280	0.14%
<i>Oc. triseriatus</i>	65	12	55	76	208	0.11%
<i>Or signifera</i>	5	4		2	11	0.00%
<i>Ps. ciliate</i>	51	12		38	101	0.05%
<i>Ps. columbiae</i>	197	96	17	229	539	0.28%
<i>Ps. ferox</i>	1427	150	372	1220	3169	1.63%
<i>Ps howardii</i>	47	24	29	54	154	0.08%
<i>Ur. Sapphirina</i>	140	37	477	561	1215	0.63%
MUTILATED	311	122	148	191	772	0.40%
TOTAL FEMALES	64021	20788	63256	40802	188867	97.36%
TOTAL MOSQUITOES	65305	21911	64303	42475	193994	100%
% of TOTAL MOSQUITOES	34%	11%	33%	22%	100%	

CHESAPEAKE WEATHER 2009

Jan.-March - 3.01 rain averaged 0.9° cooler

MONTH	Normal Rainfall	2009 Rainfall	+ or -- Difference	Normal Average Temp.	2009 Season Temp.	+ or -- Difference
April	3.38	2.28	1.10	57.40°	59.5°	2.10°
May	3.74	4.77	1.03	66.30°	68.90°	2.60°
June	3.77	5.81	2.04	74.50°	75.60°	1.10°
July	5.17	2.47	2.70	79.10°	77.6°	1.50°
August	4.79	13.22	8.43	77.40°	79.60°	2.20°
Sept.	4.06	7.77	3.71	72.10°	71.10°	1.00°
October	3.47	3.21	0.26	61.10°	62.50°	1.40°
Totals:	28.38	39.53	11.15	69.70°	70.68°	0.98°

Mosquitoes Trapped Each Month During 2009 Season



SENTINEL CHICKENS

The purpose of the Sentinel Chicken Program is to get an early warning of an active presence of the West Nile virus and/or Eastern Equine Encephalitis virus.

Ten flocks of four chickens each were strategically placed throughout the city. The Biology personnel drew blood samples from each chicken every two weeks. This serum was tested for EEE and WNV by the Norfolk Health Department Lab. There were twenty-seven conversions (54%) for EEE and eleven (22%) for WNV. All of the coop locations had at least one positive ...100%. The chickens have proven to be very effective and true sentinels for us during the past ten years.



Taking Serum Sample from Chicken

PUBLIC EDUCATION

Extensive efforts are made to inform and educate the public about potential diseases related to mosquitoes and methods of mosquito control. Resident education is very important in controlling mosquito populations. A well-informed and alert resident can be as effective as a weekly property inspection by mosquito control personnel.

Public Service Announcements and ads are placed on radio and in news papers. Some informative interviews with Commission personnel are conducted by News Departments of local television stations.

Joe Simmons and Connie Gregg spearheaded our educational program again this year. They worked all twenty elementary schools that have third grade classes conducting thirty-one presentations to 2,980 students. Career Days were conducted at five elementary schools involving 1,125 more students. Leroy Bohn, Jason Williams, and Zollie Russell helped with the Career Day presentations.

Joe Simmons also did presentations before 778 more people attending Chesapeake Environmental Council, Elizabeth River Cub Scout Day Camp, and a Public Utilities Safety Conference.

Upon invitation, presentations are made to schools, clubs, or civic groups and are routinely made at the state and regional conferences. Our Biologists help with the annual state recertification classes each year. Our Biologists made three presentations at the annual Virginia Mosquito Control Association meeting in Williamsburg last year and three at the Mid Atlantic Mosquito Control Association meeting. Jason Williams, one of the Biologist made a presentation at the American Mosquito Control Association

meeting. The Commission is listed on the City’s public speakers list. Commission personnel are also very active in local, state, and regional training activities.



Joe working one of the schools and a civic group

LARVICIDING

Larviciding is the act of controlling mosquito larvae and pupae in the water by the application of *Bti*, fish, or some chemical that will kill them. Larviciding is one of the most important activities of the Commission personnel during the breeding season.

Inspections performed throughout the city identify those areas where breeding occurs and when found an appropriate larvicide technique is employed according to the area and/or stage of breeding found.

We treated 13,172 acres by an aerial liquid larvicide application during April 2009. We larvicided 7,183 acres by hand, ATVs, and Roadside Jeeps.

TOTAL COMBINED LARVICIDING FOR CHESAPEAKE20,355 acres
TOTAL MAN HOURS30,682



by Backpack



by ATV



by Roadside Jeep

ADULTICIDING

During mosquito control season, it is impossible to find and larvicide all breeding sites. In addition, mosquitoes migrate into control areas from adjacent non-controlled areas. The Commission performs adulticiding on an as needed basis.

Adulticiding is the act of operating a machine to uniformly disperse small amounts of pesticide over a target area to control adult mosquitoes. This is accomplished utilizing various forms of ULV (ultra-low-volume) spraying equipment.

The City, less the Great Dismal Swamp Wildlife Refuge, is divided into some thirty truck routes and fifteen ATV routes. Additional adulticiding, special fog request and individual yards are treated by ULV backpack or hand-held sprayers on an as needed basis.

In 2009 we had eleven inches more rain than normal which produced an average mosquito population but way above average number of disease incidents. Due to the high number of disease incidents and citizen complaints, we had to adulticide more to control the situation. We adulticided 881,642 acres by hand held, ATV, or truck equipment. That is an 81% increase in acreage and 58% increase in man hours over last year. A total of 4,512 man hours were used in this effort. We did no aerial adulticiding

Total Adulticiding in Chesapeake During 2009881,642 acres
Total Man Hours 4,512



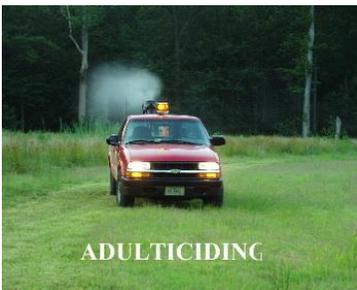
by Backpack



Hand held



Thermo



by Truck



by Aircraft



by ATV

BIOLOGICAL REVIEW 2009

We started the year by completing the Annual Report, refurbishing and/or replacing equipment and organizing for the season.

We conducted larval surveys during February, March and early April to determine when we should do an aerial larvicide application. During April 5 - 15, 2009, our contractor applied liquid *Bti* and liquid Altosid larvicides to 13,173 acres with good results.

No aerial adulticide application was needed or conducted in 2009.

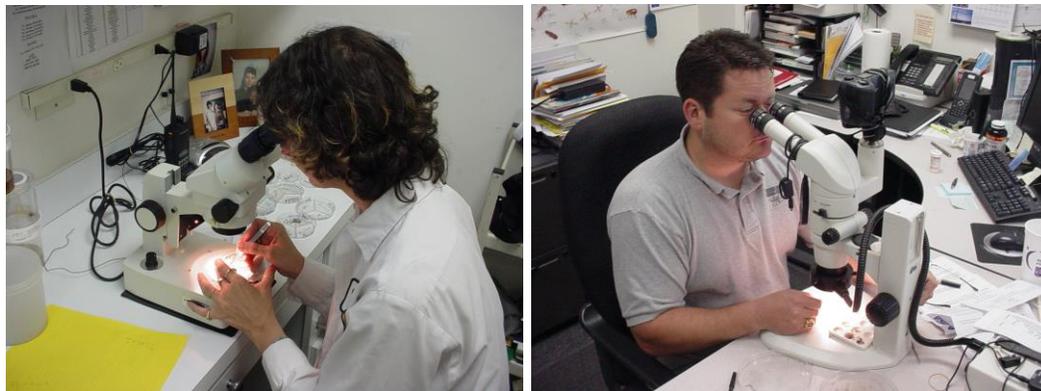
We averaged setting thirty-five traps each week during the season. We set CDC, Gravid, Rotary, and BG-Sentinel traps in the three Operational Districts and the Great Dismal Swamp National Wildlife Refuge. The CDC and BG-Sentinel traps are our most used and most effective. They really compliment each other because both are more effective attracting and collecting different species. The Rotary trap is set for a sixteen hour period with eight collection jars each jar collects mosquitoes for two hours. We can then determine what species are active during what hours and when we will be more effective with our adulticiding. The Gravid traps are used to attract and collect gravid females and hopefully *Culex pippins* mosquitoes which is best test species for West Nile Virus.

We trapped and identified 193,994 mosquitoes during the season. We pooled 2,145 pools that were tested by the Norfolk Health Department Lab for Eastern Equine Encephalitis and West Nile Virus. We had 50 pools positive for EEE and only 3 pools positive for WNV.

Twenty blood serum samples were drawn each week from the sentinel chickens and delivered to the NHD Lab for testing. Twenty-seven of our chickens tested positive for EEE and eleven for WNV. All of our ten chicken locations were positive for EEE and/or WNV.

The weather for the season averaged about one degree warmer and we had eleven inches more rainfall than normal for April through October.

We had an average year for mosquito populations but a heavy year for disease incidents. We had a total of ninety-six positives ...53 mosquito pools, 38 chickens, three horses, one goat, one emu but **no human cases**.



Mosquito Identification and pooling

PERSONNEL HOURS 2009

ADMINISTRATIVE	3,118
SUPERVISION	4,730
FIELD SUPERVISION	10,214
TOTAL FIELD HOURS	52,060
OFFICE	11,699
BUILDING & GROUNDS	7,142
BIOLOGY	7,145
MECHANIC	6,766
TRAINING & EDUCATION	2,933
VACATION	7,129
SICK	4,717
JURY	8
FUNERAL	128
OVERTIME LEAVE	236
FAMILY MEDICAL	116
COMPENSATORY	701
HOLIDAY	6,272
UNPAID LEAVE	1,770
TOTAL HOURS	126,884

