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Chesapeake Mosquito Control Commission

Annual Report
2015

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February 22, 2016

TO: Citizens of the City of Chesapeake, VA

FROM: Dreda A. Symonds, Director

SUBJECT: 2015 Chesapeake Mosquito Control Commission (CMCC) Annual Report

The 2015 CMCC annual report has a very different format from reports of the past. The first section of this document (pp. 1 – 13) is entirely composed of general information concerning the history of our organization, mosquito biology, mosquito-borne diseases and mosquito control operations in our city. If you are unfamiliar with mosquitoes and methods of control, I urge you to read this section so that you will understand the analyses that follow it. It also is a handy tool if you just need occasional reference information.

The second section of the document (pp. 14-19) is dedicated to the 2015 mosquito season in Chesapeake, the prevalence of different mosquito species, and the activity level of mosquito-borne diseases. This analysis is essential to understanding why and how our work progressed.

The last section (pp. 20 – 25) is an overview of our operations, including work and service request reports, personnel development, and our 2014-2015 financial report. Perhaps most important to us are our goals and challenges for the coming year. With newly emerging mosquito-borne diseases and a warm wet winter in progress, we anticipate many changes and look enthusiastically toward the future.

Dreda A. Symonds

Director, Chesapeake Mosquito Control Commission

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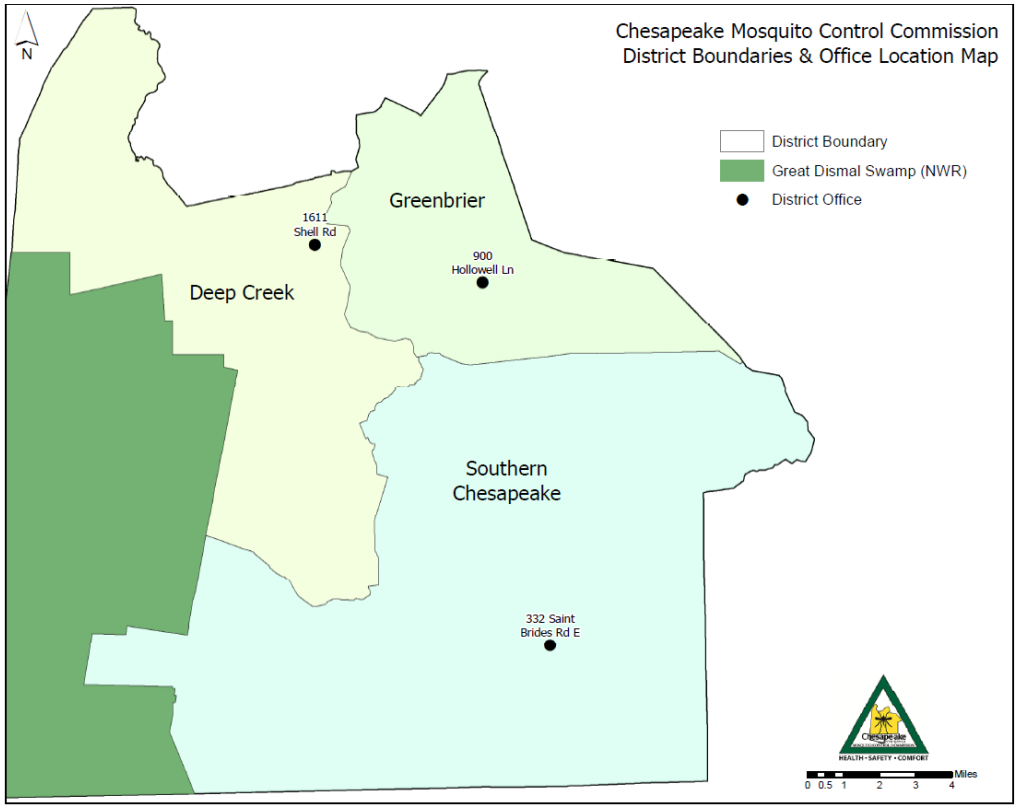
I. GENERAL INFORMATION ON MOSQUITOES AND MOSQUITO CONTROL IN THE CITY OF CHESAPEAKE

Mission and Organization

The mission of the Chesapeake Mosquito Control Commission is to protect the health and welfare of the citizens and visitors of Chesapeake by controlling mosquito populations and mosquito-borne diseases. Our philosophy is to use integrated pest management (IPM) practices, with an ecologically sensitive approach. By employing several different control techniques and the safest, most effective pesticides for target species, we strive to achieve our goals with minimal disruption to people or the environment.

The Chesapeake Mosquito Control Board of Commissioners consists of six volunteer members appointed by the Chesapeake City Council, and a designee of the Virginia State Health Commissioner who serves as Commission Chair. The Commissioners' role is oversight of the operating budget and the overall mosquito control program. Details of the operation and day-to-day financial decisions are the responsibility of the Director.

The Commission consists of three working districts: Deep Creek, Greenbrier and Southern Chesapeake. Administration headquarters is located at the Greenbrier field office and the biology laboratory is located at Deep Creek.



History of Mosquito Control in Chesapeake

Following is the sequence of events leading to the creation of five independent mosquito control districts in what is now the City of Chesapeake, Virginia, and their eventual consolidation into one operation. Each of the five commissions originally operated independently. They were individually funded by special taxes levied specifically for mosquito control. The current, single mosquito control Commission is also funded by a special tax, although the rate is dramatically lower than in past years.

May, 1948 - The Norfolk County Board of Supervisors created ***Deep Creek*** Mosquito Control Commission, which served that district only.

November, 1949 – The City of ***South Norfolk*** Council voted in favor of creating their own mosquito control district.

July, 1954 - Norfolk County Board of Supervisors recognized the need for mosquito control in ***Western Branch*** and that district was formed.

November, 1956 - A desire for mosquito control in ***Washington Borough*** resulted in a vote for a commission covering that district of Norfolk County.

January, 1963 - Norfolk County and the City of South Norfolk merged to become the ***City of Chesapeake.***

October, 1965 - Chesapeake City Council passed an ordinance forming the ***Great Bridge*** Mosquito Control Commission.

September, 2002 – The boundaries of the Great Bridge district were expanded to include the entire southern region of the city not previously included in mosquito control activities. This increased the service delivery area significantly.

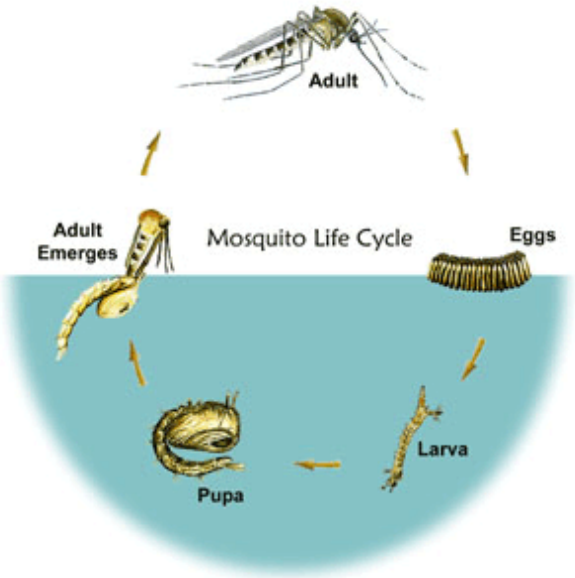
January, 2003 – The five independent mosquito control commissions consolidated to become the ***Chesapeake Mosquito Control Commission***.

Mosquito Biology

Mosquitoes are a huge group of insects that differ significantly from species to species. One of the biggest misconceptions about mosquitoes is that they are all the same, all "bad," and can be controlled using a few basic techniques. Nothing could be further from the truth: there are 2,700 species of mosquitoes worldwide (58 of these reside in Virginia). Each species is unique in its appearance, behavior and habitat. Considering mosquitoes as a group is akin to considering water birds – one species is as different from another as a goose is from a penguin.

As different as they are, all mosquitoes have one thing in common - their life cycle and its dependence on stagnant water. Mosquitoes undergo complete metamorphosis, i.e., they pass through four successive stages of development: egg, larva, pupa and adult. Depending on the species and environmental conditions, the life cycle can take from 3 days to 2 years, but averages ten to fourteen days during the season. The fact that the first three stages of a mosquitos' lifecycle occurs in stagnant water focuses many control efforts at this source.

Upon emergence, almost all adult female mosquitoes will seek a blood meal. Only female mosquitoes bite, because they require proteins from blood for the development of eggs. Male mosquitoes feed on plant juices or flower nectar and do not take blood meals. The adult females of some species lay their eggs in masses or "rafts" on the surface of the water. Other species lay eggs in depressions that will later be flooded, or in containers that will catch and hold rainwater. After two days, these eggs are ready to hatch. If not flooded right away, they can withstand drying for months. Heavy rains and flooding can produce huge mosquito populations in short periods.



The Impact of Mosquitoes on Health and Welfare

"Of all disease-transmitting insects, the mosquito is the greatest menace…" (World Health Organization). Certain species of mosquitoes can pick up and transmit some very devastating diseases that have significant impacts on human and animal health and the economic well-being of our region. Not only do these diseases sometimes result in death, the long-term suffering and medical costs imposed upon survivors are significant.

Several local mosquito species transmit West Nile virus (WNV) and Eastern equine encephalitis (EEE), neurological diseases that are endemic in southeast Virginia. Newly discovered mosquito-borne diseases such as Chikungunya and Zika virus have very recently emerged in the western hemisphere. These are readily spread by one of our most common and bothersome suburban species, the Asian Tiger mosquito. Although malaria is no longer endemic in our area, mosquito species that can transmit the disease are common in Chesapeake. Table 1 lists some common mosquito species in Chesapeake and the diseases they can transmit to humans and domestic animals.

Figure 1. Some common mosquito species in southeast Virginia and the diseases they can transmit (from "Mosquitoes of the Southeastern United States", Nathan D. Burkett-Cadena)

Scientific Name	Common Name	Diseases potentially transmitted
**Aedes albopictus*	Asian Tiger mosquito	CHIK
**Aedes canadensis*	Spring woodland pool mosquito	EEE, LAC, JCV
Aedes sollicitans	Golden salt marsh mosquito	EEE, DHW
Aedes triseriatus	Eastern tree hole mosquito	LAC
**Aedes vexans*	Common floodwater mosquito	EEE, WNV, DHW
Anopheles mosquitoes (4 species)	Freshwater marsh mosquito	MAL
**Coquillittidia perturbans*	Cattail mosquito	EEE
**Culex pipiens*	Northern house mosquito	WNV, EEE, SLE, DHW
**Culex restuans*	Spotted brown house mosquito	WNV, EEE
Culex salinarius	Salt-marsh Culex	WNV, EEE, SLE
Culiseta melanura	Dusky encephalitis mosquito	EEE, WNV

CHK – Chikungunya
DHW – Dog Heartworms
EEE - Eastern equine encephalitis
JCV – Jamestown Canyon virus
LAC – La Crosse encephalitis
MAL – Malaria
SLE – Saint Louis encephalitis
WNV – West Nile virus

* Important nuisance species in Chesapeake

Note that many of the mosquitoes listed above are characterized as "nuisance" species. There are many more species in Chesapeake that cause considerable pain and irritation to humans and domestic animals, especially when they emerge in large numbers. The discomfort and annoyance inflicted by these mosquitoes can cause major economic impact, especially in recreational areas and places where mosquito problems can result in depreciation of real estate values. Finally, huge mosquito broods can make storm clean-up and recovery efforts very difficult or impossible.

Modern Mosquito Control in Chesapeake

The basic philosophy of Chesapeake Mosquito Control Commission is an integrated pest management (IPM) approach. IPM requires the use of several different techniques and types of pesticides to control problem mosquito populations. Using IPM with various methods and materials accomplishes many goals:

1. It acknowledges that mosquito species differ dramatically in habitat, host preference (animals they will bite) and behavior, and require different monitoring and control techniques.

2. It emphasizes source reduction (eliminating mosquito egg-laying sites) which is a longer-term control strategy and does not involve pesticides. Source reduction involves many methods, from public education about artificial containers to drainage maintenance.

3. It increases the types of both natural and synthetic pesticides used to reduce the possibility of pesticide resistance. Different pesticides work in diverse ways in the mosquitoes' bodies. They are less likely to become resistant to any one class of pesticide if there are multiple effects on their biological systems.

4. It places priority on controlling immature stages (larvae and pupae) to reduce mosquito numbers before they become adults.

5. It is the safest system for humans and the environment and has the biggest impact on the target species.

6. It saves money by making pesticide applications dependent on surveillance data, rather than on a set schedule.

Integrated Pest Management Techniques

A. Public Education

The mosquito species responsible for the most service requests in the City of Chesapeake is the Asian tiger mosquito. This species lives in close association with humans, lays eggs in small containers that catch and hold rainwater, and is active during the day when people are most likely to be exposed. Educating the public on the role their own property plays in the development of these mosquitoes empowers them to eliminate breeding sites before adult infestation becomes a problem. It also alerts them to favorable harborage for adult mosquitoes (tall grass, overgrown shrubbery, ivy, etc.). It advises the best and safest methods of using insect repellants and (if desired) pesticide application. Finally, it alerts the public in the event of heightened mosquito-borne disease activity. Public education efforts include the following:

1. Seasonal personalized inspections in response to service requests
2. Special presentations or assemblies for public schools
3. Outreach programs for civic and special interest groups
4. Participation at public events, such as fairs and career days
5. Maintenance of a web site link and a telephone hotline
6. Press releases (in conjunction with the Chesapeake Health Department)
7. Appearances in various local media

Figure 2. Biologist teaching a school group about mosquitoes

B. Source Reduction

In addition to the elimination of container breeding sites mentioned above, the Commission performs drainage maintenance of mosquito control ditches in the late fall, winter and early spring seasons (figure 3). In most instances, this will improve drainage and eliminate stagnant water breeding sites. Sometimes crews will clear ditches or paths although the grade may not be great enough for proper drainage. This provides clear access to areas that may later be treated for immature mosquitoes, a process called larviciding.

Figure 3. Drainage maintenance

C. Larviciding

The optimal time to control mosquitoes is when they are in the aquatic immature stages. They are more concentrated in a smaller area, making them easier to find and treat. They also have not yet emerged as biting females or become a source of nuisance and disease transmission. If treated with certain pesticides, they also survive long enough in the aquatic habitat to provide food for some predaceous animals.

Larvicides are available in several different formulations, and may be applied by ground crews or aerial systems (figure 4). All pesticide applicators have had extensive training and are certified through the state of Virginia as either registered technicians or certified pesticide applicators in the Public Health category.

One of the larvicides employed by the Commission is a bacterial spore that only targets mosquito and black fly larvae and is very selective in its action. Another mimics the insects natural growth hormones and does not complete its action until the larva reaches a certain stage of development. Yet another type of pesticide is more useful for late stage larvae and pupae that are not susceptible to the other larvicides. The modes of action of all three pesticides are very different, a fact which makes development of resistance to all of them very unlikely.

Figure 4. Some larviciding techniques

D. Adulticiding

If the pesticide applicators cannot detect or reach larvae for treatment before they emerge, it is sometimes necessary to spray for adult mosquitoes. This process is called adulticiding or ULV (Ultra Low Volume) treatment. ULV treatments are usually accomplished by ground application (Figure 5), but can be applied aerially when emergencies exist. Although there are not as many basic types of adulticides available, the Commission uses at least two different types, rotating in different areas of the city to avoid resistance. Adulticides (and larvicides) are extensively tested for toxicity levels, carcinogenic properties, environmental impacts and safety to non-target organisms. All mosquito control pesticides must be registered through the Environmental Protection Agency and, when used according to label instructions, have a very high level of safety.

Figure 5. Ground Adulticiding

E. Surveillance

Surveillance of mosquito populations and mosquito-borne disease activity drives all pesticide application decisions. Monitoring mosquito populations can be as simple as identifying biting Asian tiger mosquitoes during a service request or dipping stagnant water in search of mosquito larvae. However, the Commission also has a sophisticated monitoring program designed to provide data on the populations of many different mosquito species and the activity of EEE and WNV. The biology laboratory carries out this program, employing several different types of mosquito traps (see figure 6). These devices have various designs and use different attractants to trap the many different mosquito species in Chesapeake. Depending on the species, technical personnel may test some of the mosquitoes for the presence of EEE and WNV using a dipstick type test.

Figure 6. Mosquito traps

CO2 baited **CDC** miniature light trap

CO2 and special lure baited **BG** sentinel trap

Gravid trap baited with water imitating an egg-laying site

The other main technique for monitoring disease activity is testing blood samples from sentinel chickens. Small groups of chickens are placed strategically throughout the city where they may be exposed to biting mosquitoes. Both EEE and WNV depend on circulation through the wild bird population, and as the diseases amplify, the chickens are often infected. This does not harm the chickens in any way – they quickly produce antibodies to the viruses and there is no ill effect. By taking a very small sample of the chickens' blood (figure 7) and submitting it to the state laboratory, technicians can detect the antibodies very quickly, the public can be notified of heightened disease activity, and control measures can be implemented.

Figure 7. Collecting a small blood sample for detection of mosquito-borne disease antibodies.

More than any other factor, mosquito populations and disease activity are dependent on weather conditions. The biology laboratory records daily weather data, including temperatures, rainfall and wind speed / direction, from different sources including weather stations at Deep Creek and South Chesapeake. This information is used to predict problems with certain species and direct control efforts. It is also essential in planning aerial larvicide and ground adulticide treatments.

F. Data Management and Geographic Information System (GIS)

All information, from requests for service to mosquito trap numbers and work accomplishments, is stored in various databases and can be retrieved at any time for analysis. Mosquito populations, and in turn the mosquito control work performed, are very dependent on geographic features, especially low-lying areas with accumulated water. The GIS expert maintains all pertinent information on these features, as well as human population densities, pesticide-sensitive sites, property boundaries, vegetative types, location of mosquito control ditches, and surveillance sites. Data on trap catches, work accomplished, location of disease positives and much more are mapped daily to assist in data analysis and work planning (example, figures 8 and 9).

Figure 8. Wetlands and Woodlands, City of Chesapeake

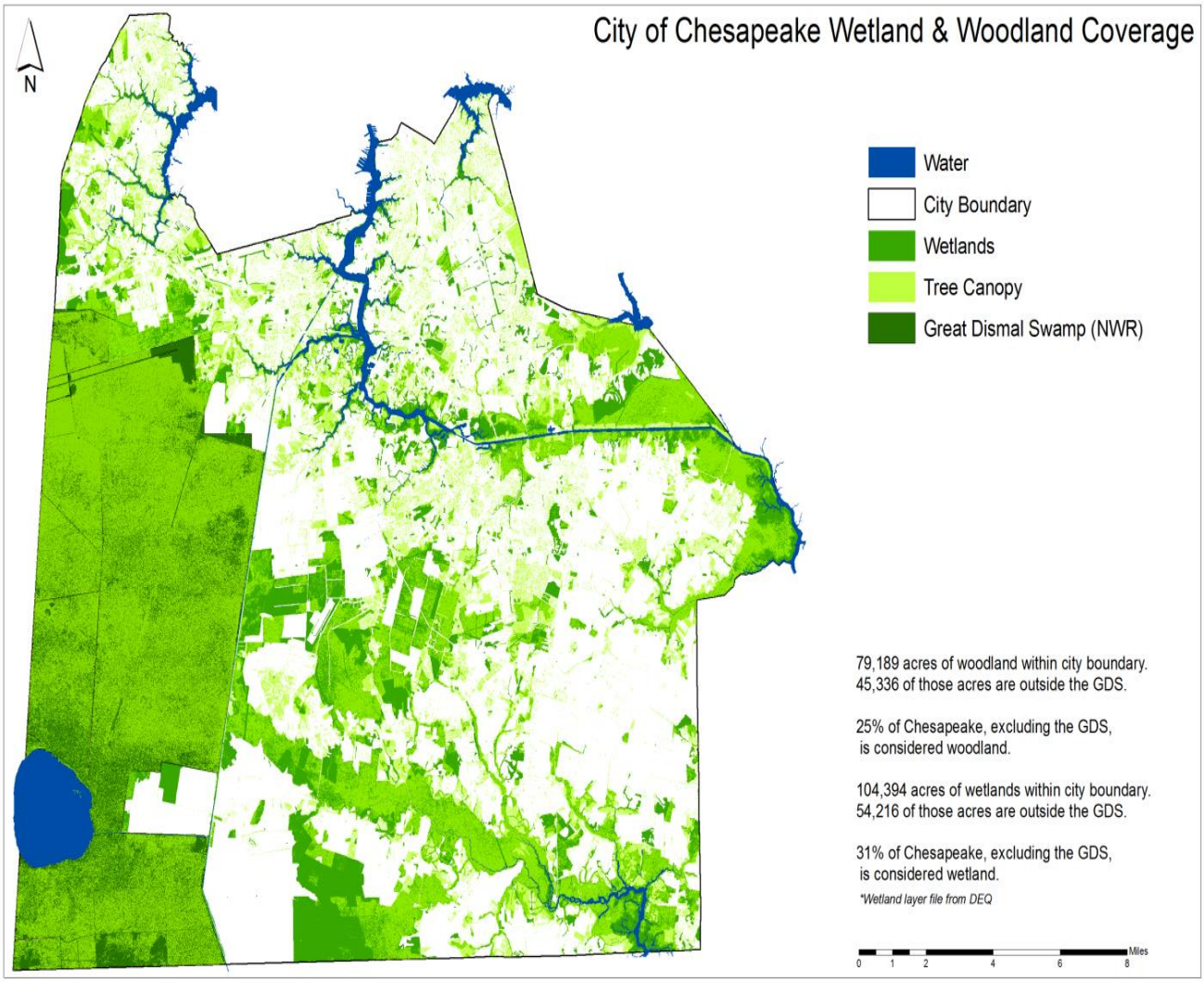
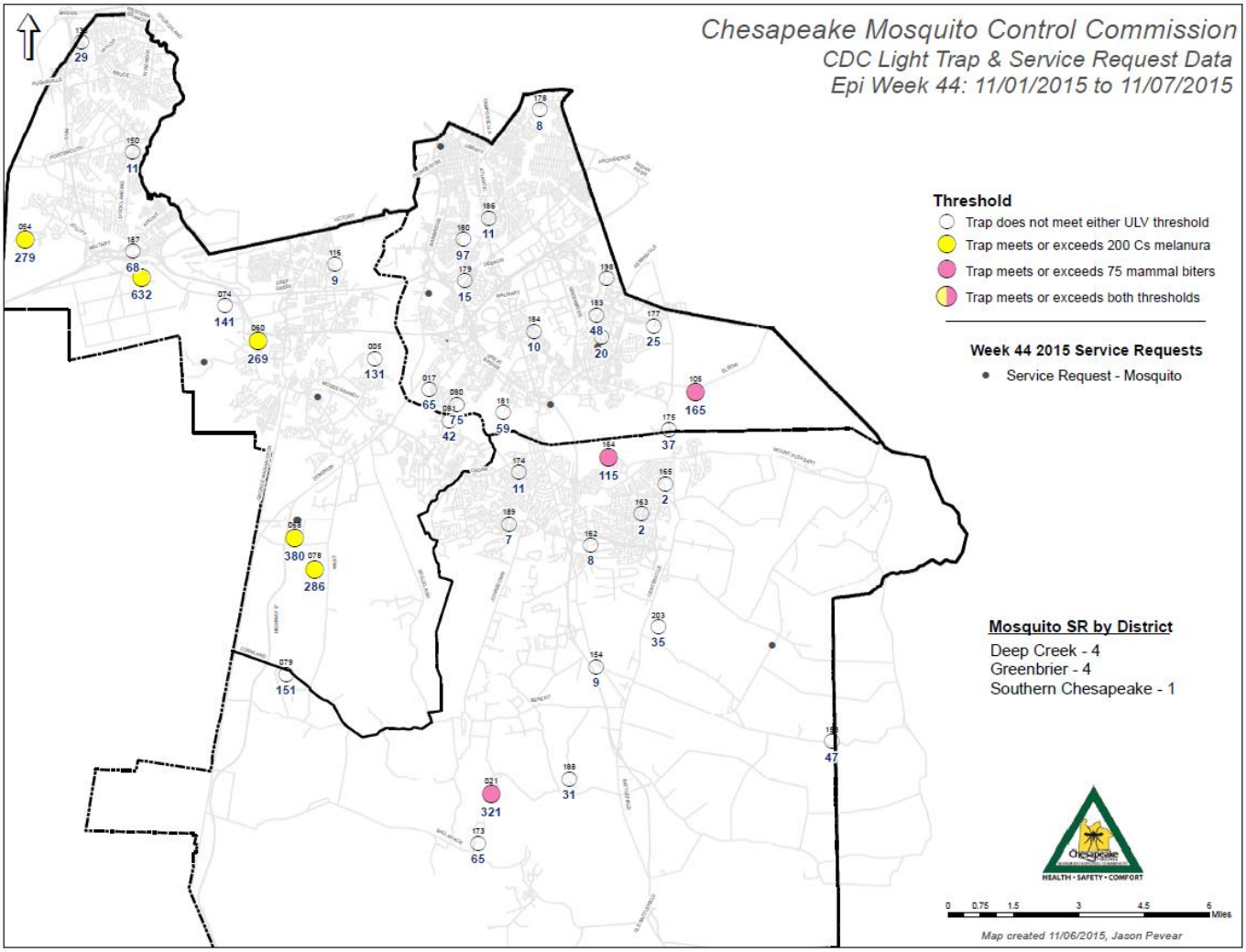


Figure 9. Representative map of mosquito trap counts and citizen service requests



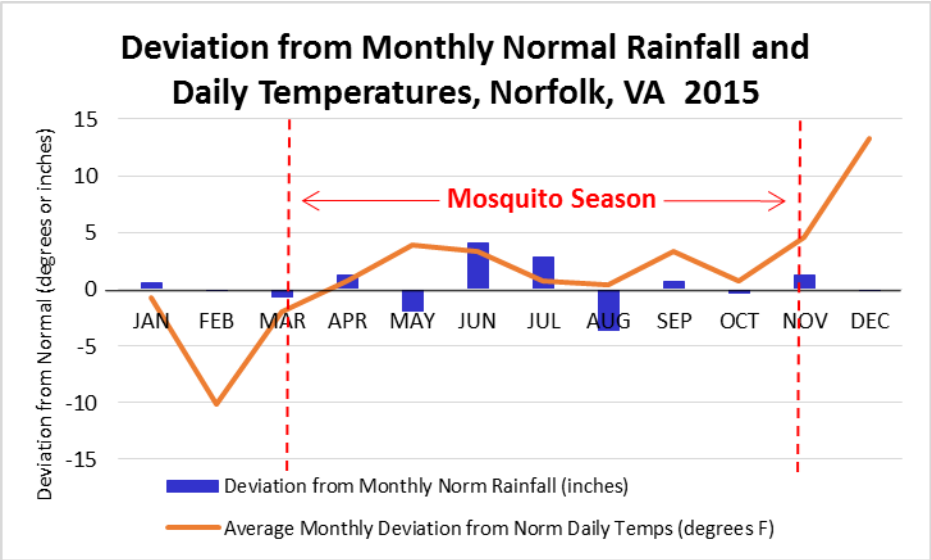
II. ANALYSIS OF THE MOSQUITO SEASON

Weather Conditions and Mosquito Populations

A. General observations

Figure 10 illustrates the deviation from normal weather conditions recorded at Norfolk International Airport in 2015. Note that the period generally considered the mosquito season (March – October) had close to normal rainfall (deviation = 0.28 inches) and slightly higher than normal average daily temperatures (deviation = 1.43 degrees F).

Figure 10. Deviation from normal weather conditions, Norfolk International Airport, 2015



Not surprisingly, our surveillance indicated a relatively normal mosquito season also. Figure 11 illustrates the average number of female mosquitoes caught per trap night from 2006 to 2015. Note that the 10-year median in Chesapeake is 185 females per trap night. The overall number of females per trap night for 2015 was 158, placing it only 4th in the ranking of mosquito populations over the past 10 years (see Figure 12).

Figure 11. Overall mosquito population fluctuations, 2006 – 2015

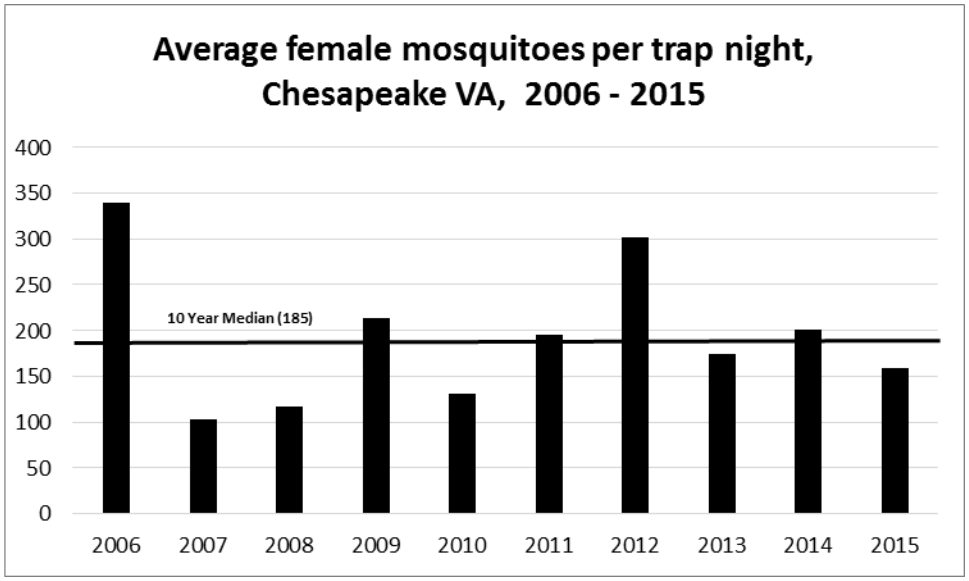


Figure 12. Ranking of the last 10 mosquito seasons, from least to most severe.

Year	Average female mosquitoes / trap night	10 year Median female mosquitoes / trap night
2007	103	
2008	116	
**2010*	131	
2015	158	
2013	175	**185**
2011	195	
2014	*200*	
2009	213	
2012	301	
2006	340	

* Last year trapping in Great Dismal Swamp

B. Species specific observations

Figure 13 contains a detailed comparison of some of the species trapped and identified by our biology lab staff during 2014 and 2015. The pink bars indicate a significant increase in 2015 and the green indicate significant decreases. The overall predominance of green reflects a more moderate season in 2015 than 2014. One of the exceptions to this rule was the increase in *Ae albopictus,* which was the result of setting a higher percentage of BG traps that are specifically designed to attract this species. If trap nights are modified to include only BG trap nights (see the bottom of Figure 4), *Ae. albopictus* numbers were actually lower in 2015.

Similarly, the number of *Cx pipiens* was actually 41 % (rather than 35%) lower than the numbers trapped in 2014 because most were caught in gravid traps designed to attract these West Nile virus vectors. More gravids were deployed in 2015 to improve monitoring of this disease, and since numbers caught were lower there must have been a significant decrease in the population. This decrease in WNV vectors is reflected in the decrease in WNV activity in 2015 (see figure 14, p. 18).

Figure 13. Comparison of most mosquito species (females) trapped in 2014 and 2015.

	2014		2015		
	Total	***Per TN***	**Total**	***Per TN***	***% Increase / Decrease per Trap Night***
Trap Nights	**1089**		**1143**		
Ae albopictus	2,220	*2*	3,077	*3*	32%
Ae vexans	3,999	*4*	5,466	*5*	30%
An crucians/bradleyi	18,722	*17*	12,698	*11*	-35%
An punctipennis	643	*1*	910	*1*	35%
An quadrimaculatus	1,807	*2*	3,045	*3*	61%
Cq pertubans	39,399	*36*	31,454	*28*	-24%
Cs melanura	99,034	*91*	85,359	*75*	-18%
Cx erraticus	4,360	*4*	4,699	*4*	3%
Cx pipiens	8,062	*7*	5,494	*5*	-35%
Cx restuans	372	*0*	264	*0*	-32%
Cx salinarius	8,885	*8*	7,741	*7*	-17%
Cx territans	99	*0*	60	*0*	-42%
Oc atlanticus/tormentor	4,396	*4*	2,020	*2*	-56%
Oc canadensis	12,326	*11*	7,966	*7*	-38%
Oc cantator	7	*0*	50	*0*	581%
Oc infirmatus	1,627	*1*	1,867	*2*	9%
Oc solicitans	2	*0*	46	*0*	2091%
Oc sticticus	5	*0*	0	*0*	-100%
Oc taeniorhynchus	12	*0*	124	*0*	885%
Oc triseriatus	174	*0*	133	*0*	-27%
Or signifera	37	*0*	19	*0*	-51%
Ps ciliata	44	*0*	114	*0*	147%
Ps columbiae	3,391	*3*	5,361	*5*	51%
Ps ferox	7,334	*7*	2,447	*2*	-68%
Ps howardii	180	*0*	104	*0*	-45%
Ur sapphirina	470	*0*	412	*0*	-16%
		0		*0*	
Total Females	217,607	***200***	180,930	***158***	**-21%**
Total Males	2,882	*3*	2,293	*2*	

	2014		***2015***		
BG Trap Nights	68		126		
Ae albopictus	2,220	33	3,077	24	-25%

	2014		***2015***		
Gravid Trap Nights	*153*		176		
Cx pipiens	8,062	*53*	5,494	*31*	-41%

Mosquito-borne Disease Activity

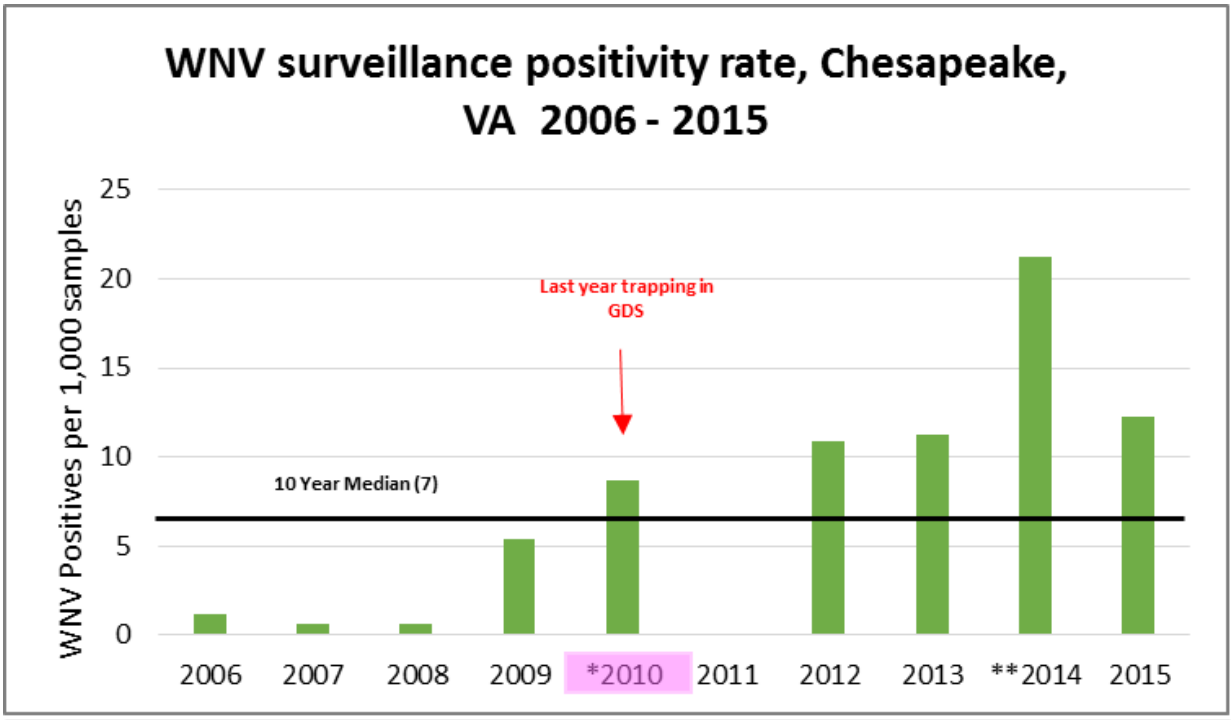
A. West Nile Virus (WNV)

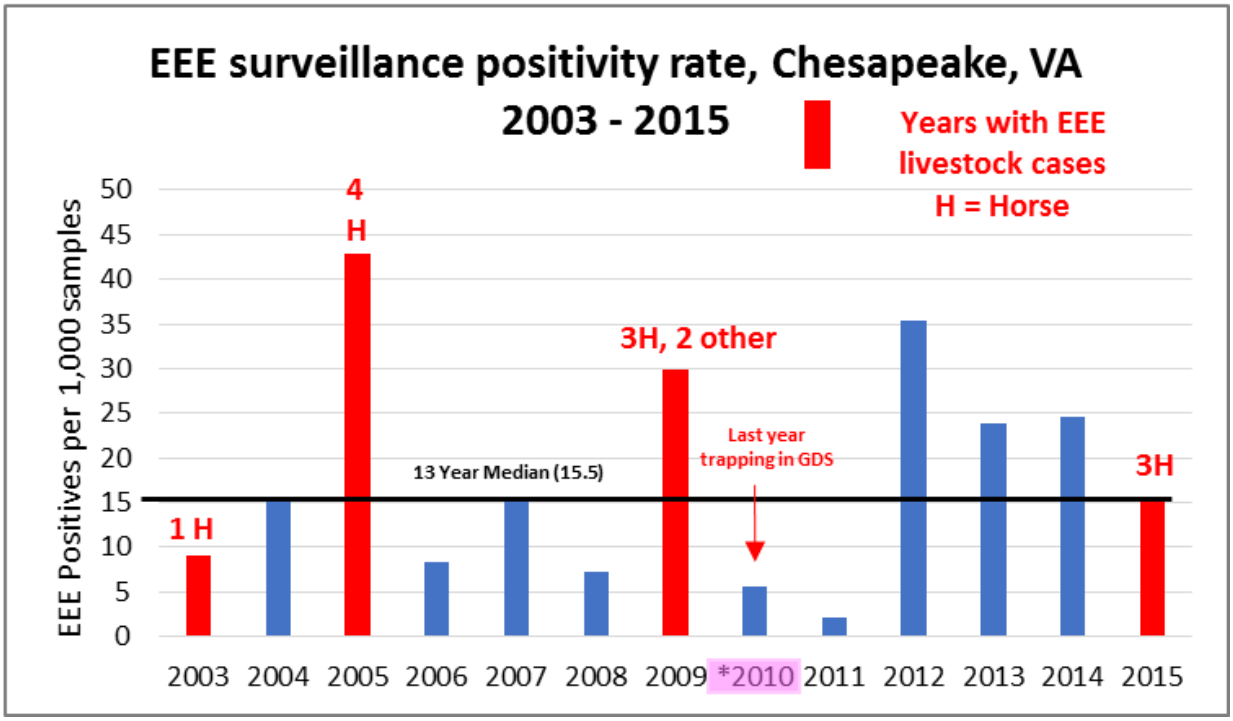
Although WNV activity was close to the 10-year median, it was considerably lower than in 2014. Gravid trapping increased from 2014 to 2015 in response to concerns over WNV, so the decrease seen in 2015 (Figure 14) is a true reflection of lower activity, not an artifact of less intense surveillance. *Culex pipiens* is a **primary vector** of WNV that spreads and "amplifies" the disease amongst wild birds. It also acts as a **bridge vector** for this disease because it will also bite humans and other mammals and transmit it to them.

B. Eastern equine encephalitis (EEE)

Similarly, EEE activity was also lower in 2015 than 2014, most likely a result of lower populations of the **primary vector** (*Cs melanura* – Figure 15, p. 19) to amplify the disease. Although our surveillance indicated lower EEE activity, there were **3 equine cases during 2015**. Equine cases almost always involve non-vaccinated or inadequately vaccinated animals, and the three cases this season were no different. It may be just an unfortunate coincidence that there were more unprotected horses this season. However, one of the **bridge vectors** of EEE, *Coquillittidia perturbans*, has been experiencing a 3 year surge in populations (see Figure 16, p. 19) and their prominence may have played a role in the equine cases this year.

Figure 14. Positivity rate of all samples from surveillance of WNV and EEE, 2006 – 2015.





*Notes: * Switched from Norfolk Health Dept. Lab testing to less sensitive field mosquito pool tests mid-season*

*** Increased Cx. pipiens (WNV primary vector) trapping, 2014 - 2015*

Figure 15. EEE primary vector (*Cs. melanura*) annual population fluctuations, 2006 – 2015.

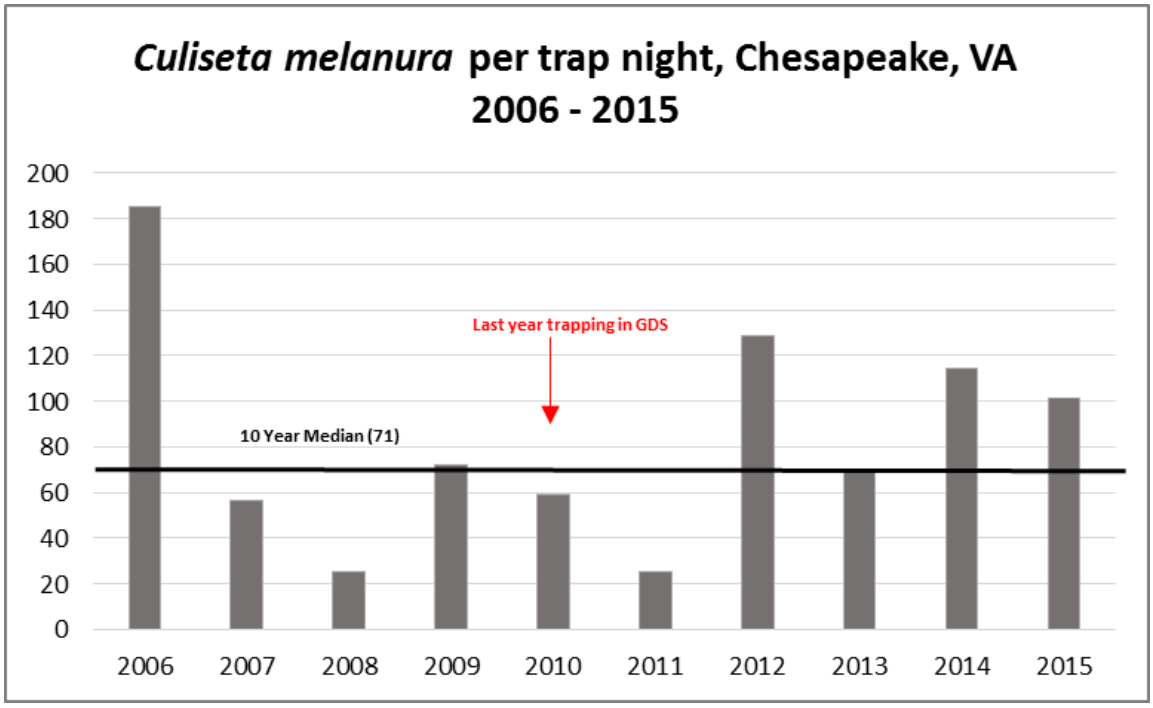
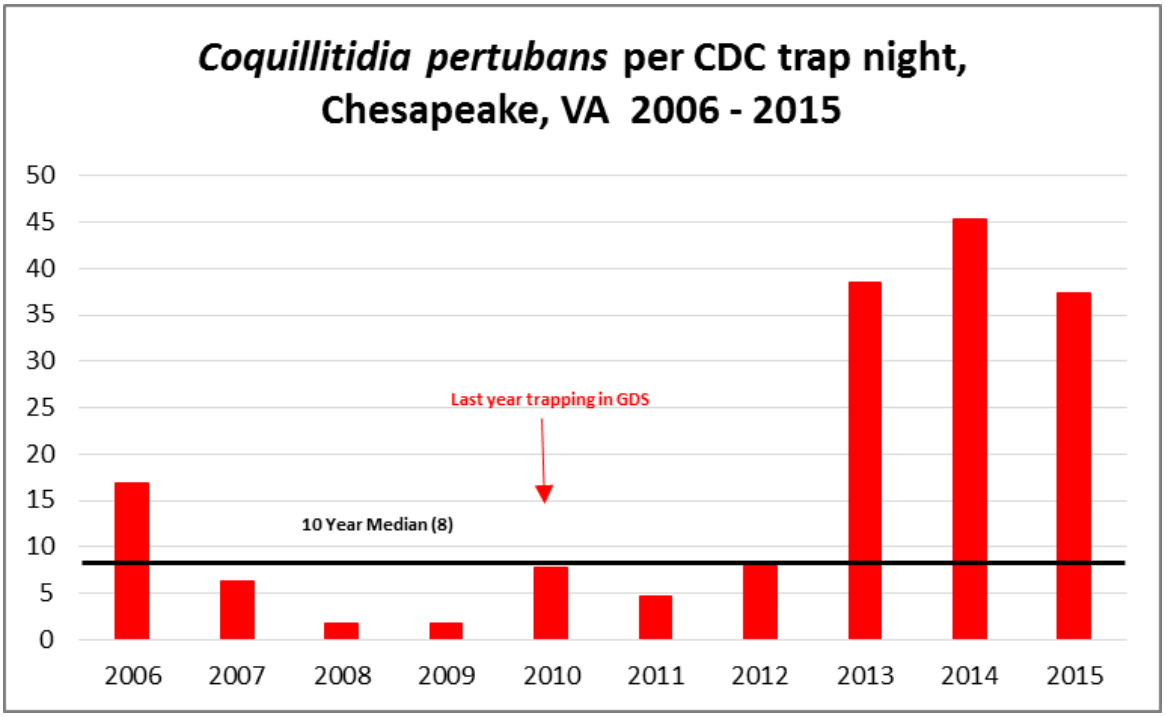


Figure 16. One EEE bridge vector (*Cq. perturbans*) annual population fluctuations, 2006 – 2015.



III. OPERATIONS

Work and Service Request Report

A. Field Work

Figure 17 (p. 21) illustrates work accomplished during calendar years 2014 and 2015 and the percent increase or decrease. Although many of the individual accomplishments in the drainage category are lower this year, note the 800% increase in grading accomplishment. The actual drainage maintenance tasks that the crews spend time on depend heavily on the nature of the ditches they are working on. More grading work was required on those assigned for 2015.

Work accomplished in pesticide application is almost entirely dependent on weather conditions and the resulting mosquito populations. As stated earlier, our season was less severe than normal. The small increase in accomplishments in larviciding, most of which occurred early for single-brood species, is understandable. Similarly, the lower than normal populations of nuisance species later in the season resulted in less adulticiding.

B. Service Requests

Service request numbers are also intimately tied to weather and mosquito populations. Since both these conditions were low to normal in 2015, service request numbers were down from 2014 and also lower than the 10-year median of 2,677. The only task in this category that has increased is special event treatments (5%), probably due to increased awareness of this special service. An online survey indicates that citizen satisfaction was very high this year with 84% of citizens rating us as “Excellent” and 12% as “Good” – an overall rating of 4.6 stars! In addition, unsollicited compliments from citizens numbered 105, nearly the same number per service request as were received in 2014.

C. Biology Laboratory

The biology lab logged 56 more trap nights in 2015 (an increase of 5%), but collected 22 fewer chicken blood samples than last season. A late-season storm shortened the sentinel chicken surveillance program by one week and was one of the reasons for this deficit. The laboratory continues to respond to the changing needs of both mosquito control personnel and citizens by increasing the variety of mosquito traps and the sites where they are deployed.

Figure. 17. Work and service request report, calendar years 2014 - 2015

	2014	2015	% Increase / Decrease
Field Personnel - Total FTE's	**30.80**	**30.20**	**-2%**
Drainage			
Bush - Hand (acres)	0.00	0.02	*No comparison*
Bush - Mach (acres)	39.20	26.00	-34%
Bush - Hog (acres)	17.40	8.75	-50%
Cleaning (miles)	39.60	31.36	-21%
Grading (cu. Ft)	1,105.00	9,947.00	800%
Refuse Removed (tons)	45.30	29.55	-35%
Other (Hours)	0.00	300.00	*No comparison*
Total Drainage Maintenance Hrs.	**10,204.00**	**8,832.00**	**-13%**
Pesticide Application			
Ground Larvicidng (acres)	3,342.00	3,779.00	13%
Aerial Larviciding (acres)	8,854.00	9,879.00	12%
Ground ULV (acres)	435,232.00	422,483.00	-3%
Total Pesticide Application Hrs.	**24,619.00**	**25,530.25**	**4%**

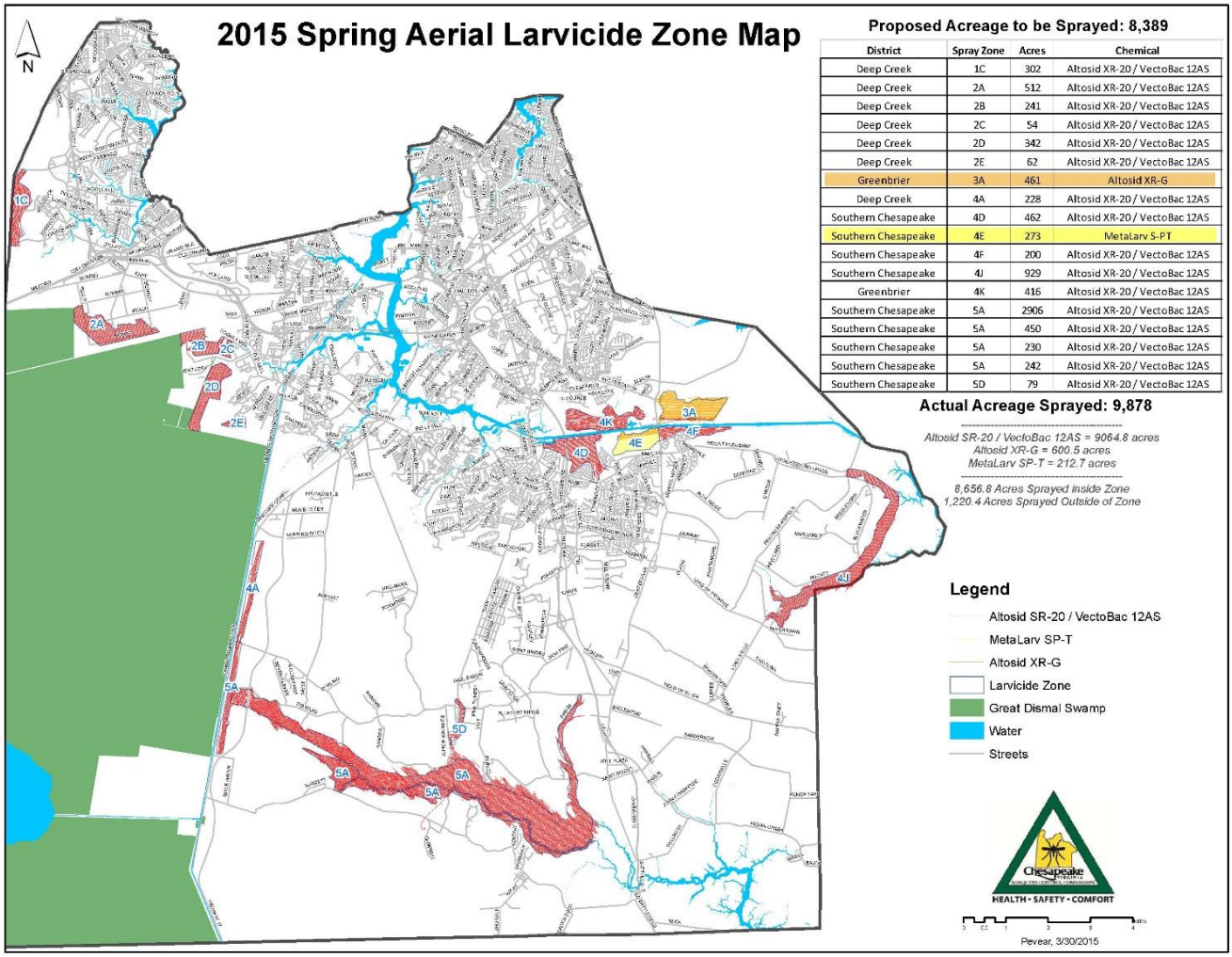
Service Requests			
Mosquitoes	2,260	1,944	-14%
Drainage	124	75	-40%
Property Release	31	23	-26%
Special Event	427	449	5%
Standing Water	104	91	-13%
Other	42	35	-17%
TOTAL	**2,988.00**	**2,617.00**	**-12%**

Biology Lab - Total FTE's	**3.50**	**3.50**	**0%**
Biology			
Total Mosquito Traps Set	1,087.00	1,143.00	5%
Total Chicken Samples	268.00	246.00	-8%
Public Education			
Schools	16	24	
Special Events	4	5	
Total Programs / Events	20.00	29.00	45%
Total Biology Hours	**6,061.00**	**5,932.00**	**-2%**

Aerial Larvicide Application

Kritter Crop-dusting performed the aerial larvicide application from April 6 – 9. The 9,878 acres treated are pictured as colored zones on the map in in Figure 18. The pink areas indicate treatment with a liquid mixture of B.t.i. (a bacterial spore) and Altosid (an insect growth regulator) and comprise about 92% of the total acreage. Zones colored gold and yellow were treated with longer-lasting granular Altosid formulations. Although more expensive, these granules show considerable promise for more effective control of target mosquitoes and we hope to expand their use in 2016.

Figure 18. Aerial larvicide treatment zones, 2015



Personnel Training and Development

Several employees were members of professional organizations or involved in career-specific training (see figure 19). We also encourage informal on-site computer skills training at times when weather impedes normal work activities.

Figure 19. Personnel training, certifications and professional affiliations.

2015 Organization	**Members or Participants**
American Mosquito Control Association (AMCA)	3
Mid-Atlantic Mosquito Control Association (MAMCA)	3
Virginia Mosquito Control Association (VMCA)	10
Virginia Assoc of Gov't Archives and Records Administrators	2
Virginia Association of Gov't Purchasing	1
Virginia Gov't Finance Officers' Association	1
City of Chesapeake external auditors - annual training	1
Human Resources Certification Institute - Society of Human Resource Management Certified Professional	1
Society of Human Resource Managers - Professional in Human Resources certification	1

2015 Special Training	
CPR & First Aid Training Certification	34
OSHA Spill Response Training/Certification	10
Chain Saw Training/Certification	10
City of Chesapeake Supervisory Certification	1

2015 Special Awards / Committee Members	
VMCA - Outstanding Service Award	1
VMCA Mosquito Identification Course - organizer & instructor	1
AMCA Federal Lands Subcommittee	1

Ongoing Periodic Certifications	
Forklift Certification	12
Chain Saw Training/Certification	19
Virginia Pesticide Applicator Certifications	
Registered Technicians	3
Category 8 Public Health Pesticide Applicators	31
Category 6 Right of Way Pest Control	1
City of Chesapeake Supervisory Certification	14

The performance review process was out of date and evaluations have not been accomplished in over a year. To rectify this problem, we improved the process by standardizing the evaluation form and simply weighing different components based on the job description. We also developed a very simple form for employees so they can have input in their own evaluations.

To improve morale, we initiated the Professionalism Award. Nominations are accepted from any employee for any other employee whose actions exhibit exceptional service, innovation or professional behavior. Individuals are recognized in the presence of their peers and receive 3 hours of leave to be taken at their discretion.

Goals and Challenges for 2016

A. Zika virus

At this time, we know little about what the impact of Zika virus will be on our residents in the moderate climate of Chesapeake. Zika is a mosquito-borne virus that emerged in Brazil late in 2015 and is linked to an increase in cases of microencephaly in infants of mothers exposed to the virus. It is transmitted by various species of Aedes mosquitoes, most notably the yellow fever mosquito (*Aedes aegypti*) and the Asian tiger mosquito (*Aedes albopictus*). The Asian tiger mosquito is common in our city and difficult to control, as it lives in close association with people and breeds in containers found on private property. We are working on control strategies specific to this threat and adapting our surveillance program to monitor this disease.

B. Other arboviral diseases

We continue to closely monitor and use different strategies to combat both EEE and WNV in Chesapeake. The WNV threat to humans is more common than that of EEE, so we will expand the gravid trapping program and work more intensely on suburban mosquito control to protect the majority of our citizens. Nighttime spray (ULV) operations will aid in this effort, as they currently do for EEE and large emergences of nuisance mosquitoes. We are planning improvements to ULV operations, as well as daytime (larviciding) treatments.

C. Records management

Documentation of work is transitioning from an out dated spreadsheet system to a custom data base format. Another database is being designed to capture larval surveillance data and the biologist's surveillance database is being updated. New Archer 2 pen-based hand held computers with an upgrade for the Datamaster adulticide tracking and management software will soon be in use by the nighttime spray operators. We will eventually expand and modify this system for use by daytime larviciding crews. Finally, an upgrade to our current ULV droplet size measurement system is in progress.

Clerical staff are using the Laserfiche data management system to scan and organize old documents. This system will eventually replace our computers' shared drives and will improve data management considerably.

Financial Overview

CITY OF CHESAPEAKE, VIRGINIA
2015 COMPREHENSIVE ANNUAL FINANCIAL REPORT *Schedule T-2*
Statement of Revenues, Expenditures, and Changes in Fund Balance
Chesapeake Mosquito Control Commission
Year Ended June 30, 2015

REVENUES	
Property taxes*	$ 3,984,316
Investment income	12,048
Other	81,946
Total revenues	4,078,310
EXPENDITURES	
Other salaries and wages	1,828,913
Other fringe benefits	851,543
Other repairs and supplies	700,933
Insurance premiums	222,535
Capital outlay	11,793
Other	371,671
Total expenditures	3,987,388
Excess of revenues over expenditures	90,922
Fund balance – beginning	**$ 4,630,549**
Fund balance – ending	**$ 4,721,471**

Reconciliation to Change in Net Assets:

Governmental funds report capital outlay as expenditures. However, when reporting net assets, the cost of those assets is allocated over their estimated useful lives and reported as depreciation expense.

Net change in fund balance	$ 90,922
Pension expense	114,534
Depreciation expense	(172,396)
Capital outlay expenditures	11,793
Change in Net Position	$ 44,853

**The City finances the operations of the Commission through incremental property taxes of $.01 per $100 of assessed value for real estate properties and $.08 per $100 of assessed value for personal property.*