



2012

VECTOR CONTROL ANNUAL REPORT

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Division of Environmental Health



THE CITY OF
COLUMBUS
MICHAEL B. COLEMAN, MAYOR

COLUMBUS
PUBLIC HEALTH

ABOUT THIS REPORT

This report is intended to provide information about the Columbus Public Health Vector Control Program to the public and policy makers. The purpose of the report is to ensure that the public and policy makers are aware of the risks of mosquito borne disease and efforts that are being made to control those risks.

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ABOUT COLUMBUS PUBLIC HEALTH

Organization

Columbus Public Health is the local public health agency for the Cities of Columbus, Ohio and Worthington, OH. The department is charged with assuring conditions in which people can be healthy. Columbus Public Health is made up of a range of programs providing clinical, environmental, health promotion, and population-based services. The department has an annual budget of approximately \$46 million and is staffed by approximately 400 full- and part-time employees.

Mission, Vision, Values

The mission of Columbus Public Health is to protect health and improve lives in our community. Our vision is that the Columbus community is protected from disease and other public health threats, and everyone is empowered to live healthier, safer lives. CPH is the leader for identifying public health priorities and mobilizing resources and community partnerships to address them. The values of Columbus Public Health are: customer focus, accountability, research/science based and equity and fairness.



Figure 1: Location for Columbus Public Health Main Office at 240 Parsons Avenue, 43215

THE MOSQUITO AND PUBLIC HEALTH

Mosquitoes are the most common and widespread of the numerous kinds of insects that are considered both pests and vectors of disease. Some species are active during the daytime, though most mosquitoes are active in the evening hours. They can make potential recreational areas unenjoyable and disrupt normal living and business activities. Most importantly, some species of mosquito successfully spread a number of disease causing agents to humans.

Mosquito Life Cycle

Mosquitoes have four separate stages in their life cycle. They begin as eggs that are laid atop bodies of water either singularly or in clusters called “rafts”. The eggs then hatch underwater and are called larvae. Larvae go through four stages of their own called “instars” before molting into

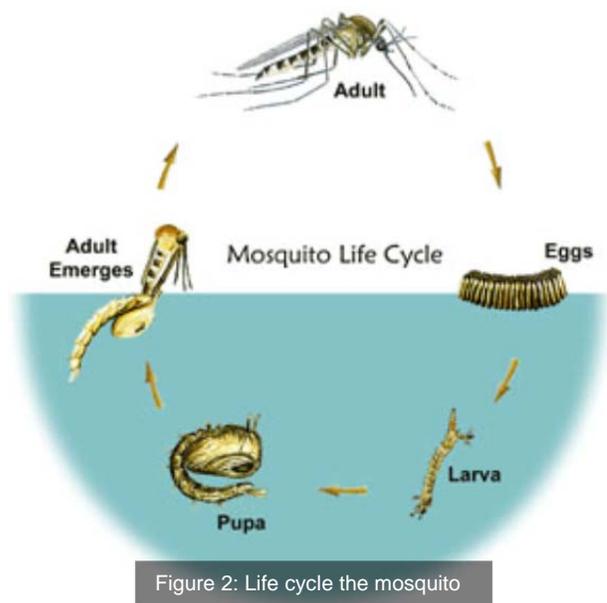


Figure 2: Life cycle the mosquito

pupae. It is in the pupal stage that the adult mosquito begins to form. Within a few days the cycle will be complete with the adult emerging on the surface of the water. Complete development can take as little as five days.

With the exception of the adult, all stages require water to complete development.

Biting and Breeding Habits

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. Females only mate once, after which they are capable of producing eggs on their own (with the help of another blood meal of course). Female mosquitoes typically live for about a month, but can produce up to 1,000 eggs in their lifetime. The adult female of some species lays eggs in masses or rafts on the surface of stagnant water. Another 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.

Ohio Species of Concern

There are over 60 different species of mosquitoes in Ohio. Not all mosquitoes carry diseases and most prefer not to bite humans. There are, however, several species known to carry diseases such as West Nile virus, La Crosse and St. Louis encephalitis. Three vector (disease carrying) mosquito species of particular interest in Columbus are ***Culex pipiens***, the primary vector for West Nile virus and St. Louis encephalitis; ***Aedes triseriatus***, a vector for La Crosse encephalitis; and' ***Aedes albopictus***, a primary vector for dengue fever. While dengue fever has not been identified in the Central Ohio region, the density of the ***Aedes albopictus*** population in the area requires that public health continue to monitor trends in the migration of this disease.

Public Health Interventions

Columbus Public Health strives to control mosquito breeding by interrupting every possible life cycle. For example, by ensuring that standing water is drained frequently, adult female mosquitos will not be able to lay eggs in that water. If there are sites where water cannot be drained, larvicide treatments are applied to those bodies of water. Should the mosquitos develop into adults, Columbus Public Health will apply adulticide treatments for those areas for which there has been a demonstration of zoonotic disease in the mosquito populations. Finally, by empowering the community through education and notification, bites from infected mosquitos can be prevented.

WEST NILE VIRUS

Since West Nile virus (WNV) was first isolated in 1937, it has been known to cause infection and fevers in humans in Africa, West Asia, and the Middle East. Human and animal infections were not documented in the Western Hemisphere until the 1999 outbreak in the New York City metropolitan area. It is not known how WNV was introduced to the United States. After 1999, WNV moved to the west and south and eventually reached Ohio in 2001, in the form of several hundred dead birds and about two dozen WNV-positive mosquito pools (groups of 1 to 50 mosquitoes of the same species).

The WNV disease trend continued at an alarming rate in 2002, as Ohio reported its' first human cases. In that year, there were 441 human cases of WNV, with 31 deaths.

The Centers for Disease Control and Prevention (CDC) declared that the 2002 West Nile virus epidemic was the largest mosquito-borne disease outbreak ever documented in the western hemisphere¹. Since then, the disease has spread across the United States.

WNV is spread to humans through mosquito bites. Mosquitoes become infected when they feed on infected birds that have high levels of WNV in their blood. Infected mosquitoes can then spread WNV when they feed on humans or other animals. In Ohio, the northern house mosquito, *Culex pipiens*, is believed to be the primary vector to humans. Only a small proportion of *Culex* and other mosquito species are infected with WNV. Members of the Corvidae bird family, especially crows and blue jays, are very susceptible to WNV and frequently die from the disease. Many other types of birds may also become sick and die from the disease and scientists are now investigating the role of common backyard birds, such as cardinals and robins, in the disease cycle. Horses may receive a specific vaccination to protect them against possible illness and death. WNV is extremely rare in other animals, such as dogs.

WNV is not contagious from person to person and there is no evidence that a person can get infected by handling live or dead infected birds. Most WNV infected humans have no symptoms. A small proportion develops mild symptoms that include fever, headache, body aches, skin rash and swollen lymph glands. Less than 1% of infected people develop more severe illness that includes meningitis (inflammation of one of the membranes covering the brain and spinal cord) or encephalitis. The symptoms of these illnesses can include headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, and paralysis. Of the few people that develop encephalitis, a small proportion die but, overall, this is estimated to occur in less than 1 out of 1000 infections.

There is no specific treatment for WNV infection or vaccine to prevent it. Treatment of severe illnesses includes hospitalization, use of intravenous fluids and nutrition, respiratory support, prevention of secondary infections, and good nursing care. Medical care should be sought as soon as possible for persons who have symptoms suggesting severe illness. Most people with severe illness due to WNV are over 50 years old.

WEST NILE VIRUS IN OHIO

Human Cases

In 2012, Ohio reported a total of 93 human cases of West Nile Virus (WNV) with 5 occurring in Franklin County, which includes the cities of Columbus and Worthington. The median age for cases was 57 years old with a range of 4-91. There were 50 male cases and 43 female cases in 2012. Table 1 shows a breakdown of human cases by County².

Of the 93 cases, 71 were hospitalized and 4 cases died from complications of WNV, specifically, encephalitis

Ohio Mosquito Surveillance

In 2012, the Ohio Department of Health (ODH) processed 185,985 mosquitoes into 6,198 pools for testing. Columbus Public Health accounted for 214 positive pools (sample of 1 to 50 mosquitoes of the same species) of the total 1,213 state positives, or 17.5% of Ohio's positive WNV pools.

Table 1: Ohio Cases of West Nile Virus by County 2012 (information provided by Ohio Department of Health)

COUNTY	CASES	COUNTY	CASES	COUNTY	CASES
Allen	5	Hamilton	6	Putnam	2
Butler	5	Lorain	2	Richland	1
Clark	8	Lucas	3	Ross	1
Clermont	2	Mercer	3	Sandusky	1
Cuyahoga	26	Miami	1	Stark	1
Darke	1	Montgomery	11	Van Wert	3
Defiance	1	Muskingum	1	Warren	2
Franklin	5	Preble	1	Wood	1

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Infection rates were roughly calculated as the number of positive pools (samples) in a week multiplied by the total number of mosquitoes tested that were collected that week in Ohio. The 2012 mosquito infection rate of 20% represented the highest rate since that 2002 outbreak, which was around 24%. Although the infection rates did not reach the levels seen in 2002 they were much higher than the last several years in Ohio, as represented by the 7% infection rate seen in 2011.

COLUMBUS PUBLIC HEALTH VECTOR CONTROL PROGRAM

The purpose of the Vector Control Program at Columbus Public Health is to reduce the incidence of vector borne diseases in humans. Columbus Public Health is continually working towards using a fully Integrated Pest Management (IPM) approach with a public health focus to reduce and control disease carrying mosquitoes within the city of Columbus. We utilize many tools and techniques to accomplish this. This includes a variety of educational materials and approaches, surveillance of adult mosquito larviciding breeding sites to prevent the hatching of mosquitoes in areas of stagnant water and combined sewer catch basins, and adulticiding (spraying) using Ultra Low Volume (ULV) truck mounted equipment to treat residential areas to reduce the incidence of vector borne diseases in humans. As such, the primary priority is to obtain maximum control of mosquito vectors. Other priorities include a commitment to reduce negative environmental impact; to minimize insecticide use; and to be cost effective.

Table 2: Mosquitoes Submitted by Local Health Districts in the State of Ohio 2012 (Information provided by Ohio Department of Health)

Submitting Agency		# mosquitoes submitted	# pools tested	Total (+)
1	Ashtabula Co. H.D.	1,584	33	1
2	Barberton MAD	18,933	605	73
3	Canton City H.D.	9,181	215	30
4	Cincinnati H.D.	6,078	246	70
5	Cleveland City H.D.	594	17	7
6	Columbus Public Health	33,261	807	214
7	Cuyahoga Co. BOH	7,698	260	54
8	Delaware General H.D.	4,731	286	28
9	Elyria City H.D.	236	23	2
10	Franklin Co. P.H.	26,685	1,005	176
11	Greene Co. H.D.	348	42	7
12	Hamilton County P.H.	477	16	9
13	Lake Co. H.D.	4,033	135	20
14	Licking Co. H.D.	13,087	422	118
15	Lorain Co. G.H.D.	4,677	145	13
16	Mansfield/ Ontario/ Richland Co. H.D.	743	27	2
17	Marietta City H.D.	7	3	
18	ODH ZDP - Columbus	623	27	15
19	P.H. Dayton and Montgomery Co.	8,824	343	128
20	Shaker Heights H.D.	123	20	4
21	Stark Co. H.D.	6,785	215	36
22	Summit Co. H.D.	33,240	1,123	156
23	Toledo Area S.D.	2,319	73	37
24	Westerville City	853	32	10
25	Wyandot Co. H.D.	447	31	3
26	Youngstown City H.D.	418	47	
Total		185,985	6,198	1,213

Education

This year, the program continued its utilization of a “Strike Team” approach to respond to mosquito control and pool complaints. The “Strike Teams” are an essential function of the program. They provide educational outreach to the community when responding to complaints. Using a hands-on door-to-door approach, these employees are tasked with reaching out and informing citizens of what they can do to prevent mosquito breeding and limiting exposure to possible disease carrying mosquitoes, while working with the individual property owners/occupants to correct any immediate issues that may be leading to increased mosquito populations. Figure 3 shows examples of the information that “Strike Teams” provide to the public regarding frequently asked questions during visits.

In addition to verbal communication, the Strike Teams pass out “Fight the Bite” brochures on every home visit to reinforce the information that they are providing. If there are issues found while on complaint investigations, further information and educational material is provided to explain to the individual who is causing the problem what the problem is, how it needs to be addressed, and gives a timeframe of when it needs to be corrected by.

Frequently Asked Questions and Answers for Strike Teams

Question: How can I help reduce the number of mosquitoes in my area?

Answer: You can reduce the number of mosquitoes around your home neighborhood by eliminating places where they lay their eggs. Young mosquitoes are aquatic and they must have standing water to develop from egg to adult. Here are some simple steps you can take:

- *Dispose of open containers which can fill with water*
- *Properly dispose of discarded tires.*
- *Empty bird baths and fill with fresh water at least once a week.*
- *Check and clean clogged roof gutters at least twice annually so they will drain properly.*
- *Turn over plastic wading pools when not in use.*
- *Turn over wheelbarrows.*
- *Aerate ornamental pools or stock them with fish.*
- *Use landscaping to eliminate standing water that collects on your property.*
- *Children’s toys and tarps covering cars, boat, and other equipment can also hold water.*
- *Cover trash containers to prevent rainwater accumulation.*
- *Tarp all boats and canoes, or turn them over.*
- *Keep ditches and streams adjoining your property free of grass clippings, garbage, and other debris, which will obstruct the natural flow of water.*
- *Fill in tree-rot holes with cement.*
- *Cover rain barrels with screening.*
- *Tightly cover wells, septic tanks, cisterns, and cesspools.*

Question: How can I avoid being bitten by mosquitoes?

Answer: These following actions will reduce your chances of being bitten by mosquitoes.

- *Wear long-sleeved shirts or jackets, and long slacks.*
- *Use mosquito netting when sleeping outdoors or in an unscreened structure.*
- *Avoid mosquito-infested areas or stay indoors when mosquitoes are active.*
- *Avoid physical exertion*
- *Use colognes and perfumes sparingly.*
- *Use mosquito repellent. Some common brands are:*
 - *Off*
 - *Rutgers 6-12*
 - *Cutter’s and Cutter’s Advanced*
 - *Repel*
 - *Deep Woods OFF!*
 - *Muscol*
 - *Ben’s 100*

Educational messaging was also created on the issues of scrap tire storage. Scrap tires are a perfect breeding ground due to their ability to retain water and be undisturbed. Columbus Public Health will begin using this material in the spring of 2013 at all known scrap tire locations.

Surveillance

A good adult mosquito surveillance program is the cornerstone of mosquito management and control. Surveillance involves trapping and counting mosquitoes, identifying the species, and performing disease testing on the mosquitoes. Columbus Public Health takes a proactive approach to mosquito management by performing daily adult mosquito surveillance. We do this by setting mosquito traps in various locations throughout the city limits.

At Columbus Public Health we have divided the City of Columbus and Worthington into 28 districts. Trapping is conducted extensively in all districts to ensure a comprehensive assessment of Columbus and Worthington.

This process allows Columbus Public Health to gain an accurate representation of mosquito activity and disease prevalence within the geographical area. Figure 4 represents district trapping maps. Once traps are set within every area of the city, additional trapping is focused in areas with historical disease prevalence.

The traps used to collect mosquitoes include gravid traps, which are used to collect mosquitoes that carry WNV, and CDC light traps used to find other disease carrying mosquitoes. Traps are set from mid-May through late mid-September. The species of mosquitoes collected in the traps are counted and identified by our staff.

In 2012, vector control staff caught a total of **33,261** mosquitoes from **355** locations throughout Columbus and Worthington. The average amount of mosquitoes collected per trap was **93.96**.

West Nile Virus Testing

West Nile Virus testing is performed on the adult mosquitoes that are caught in our gravid traps only. These mosquitoes are divided into “pools” or groups of fifty (50) and are then tested for the presence of WNV (807 pools tested in 2012). Columbus and Worthington had **214** positive WNV pools in 2012. **This represents a 28% increase of positive pools, despite submitting 277 fewer pools than in 2011.** Testing helps us determine when it is appropriate to adulticide or spray an area to control adult mosquitoes. All of the mosquito pools that are collected are sent to the Ohio Department of Health for testing using the RT-PCR (Real-time polymerase chain reaction) test.

West Nile virus mosquito activity in 2012 was up from previous years within our jurisdiction. The chart below compares WNV activity in the City of Columbus and Worthington over the last five years. Of the **807** pools of mosquitoes submitted to ODH for analysis, **214** or **26%** of the pools submitted in 2012 were confirmed as WNV positive carrying mosquitoes. This percentage is above expected levels when compared to previous years and the highest recorded percentage of positives over the last five years of surveillance.

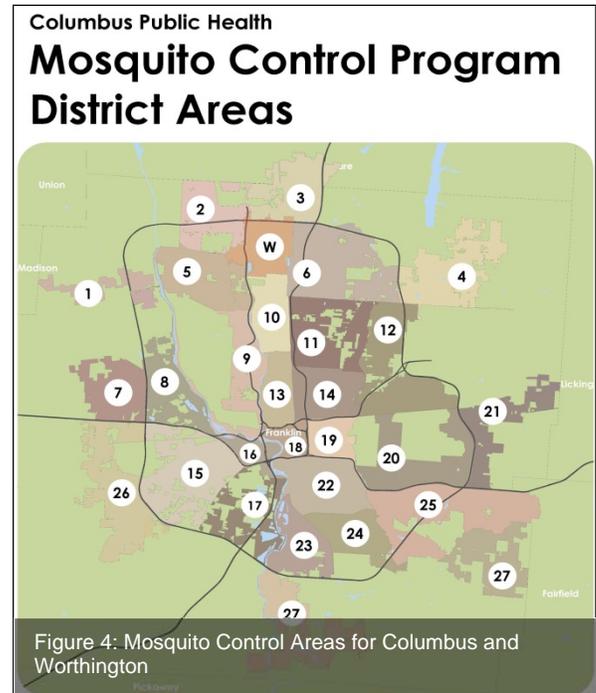


Table 3: Mosquito Surveillance Statistics 2008-2012

	2012	2011	2010	2009	2008
Mosquitoes Caught	33,261	49,078	48,671	38,859	56,050
Pools Submitted (50 mosq.)	807	1,084	1,165	1,059	1,203
Positive Pools	214	163	100	109	51
Percent of Pools Positive	26.5%	15.0%	8.6%	10.3%	4.2%

Trapping efforts were primarily concentrated over June, July, and August. Over those months approximately 118 traps were set per month. Most of the positive WNV pools resulted in late July and August. Historically, this is a common trend for West Nile. This can be attributed to the Culex mosquito, which is the primary vector of West Nile virus. Culex mosquitoes tend to thrive in dry conditions. 2012 was a little different in that it was a boom year for WNV and positive pools of mosquitoes started showing up much earlier this year than previous years. One theory for the early onset of WNV in mosquitoes was that an unusually mild winter last year allowed more WNV-infected mosquitoes to survive, giving the virus a head start when spring arrived. Additionally, the unusually hot weather and resulting drought Columbus suffered created an ideal habitat for promulgation of the Culex pipiens mosquito as they tend to thrive in dry conditions.

The Ohio Department of Health will not be testing mosquitoes for West Nile Virus starting in 2013. As surveillance for disease is a key component of any control program, scarce local resources will have to be used to identify diseased populations of mosquitoes.

LARVICIDING

Larvicides are both chemical and biological products applied to water that either kill or inhibit the development of mosquitoes. Larviciding is an integral part of our mosquito control program. Our staff spends much of each day looking for and treating mosquito breeding areas throughout the city.

Recalling the earlier section describing the life cycle of mosquitoes, we know that mosquitoes are easiest to control in the earlier stages of their life because they remain in water

until they become adults. EPA registered larvicides are applied by licensed and trained staff to areas of water where the mosquitoes are breeding. We are able to eliminate great numbers of mosquitoes before they become flying adults by using the appropriate larvicides. Columbus Public Health makes it a priority to use the most effective larvicides with the least environmental impact



Figure 7: Environmental Health Staff inspect water for mosquito larva and, if found, apply a larvicide registered for use by Environmental Protection Agency

Figure 8: 2012 Positive Traps/Locations June through September 2012

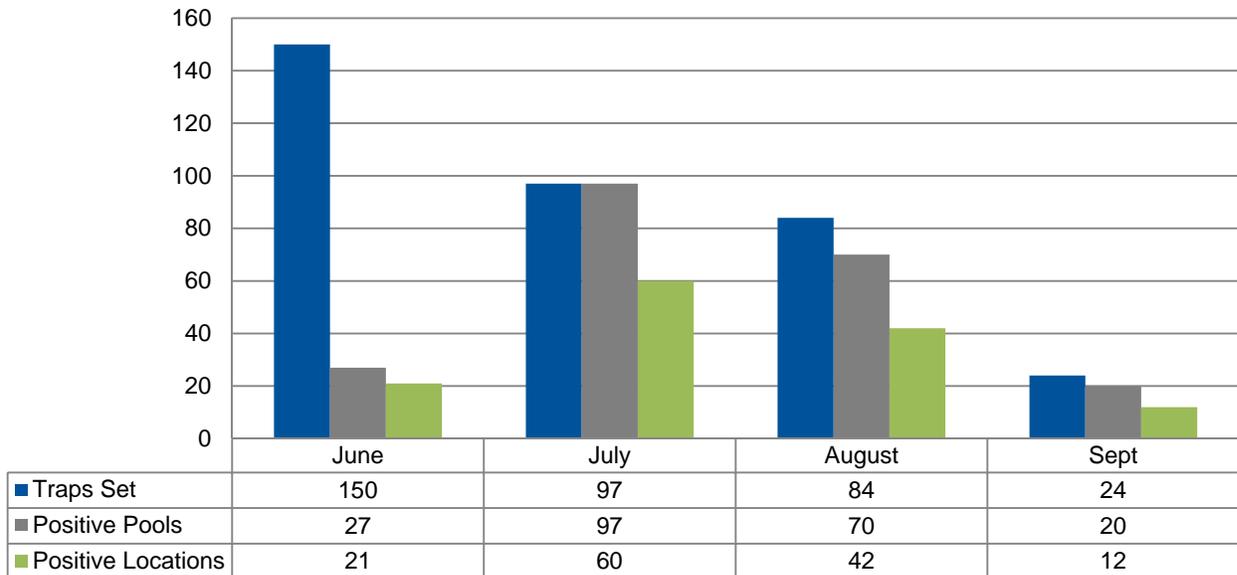
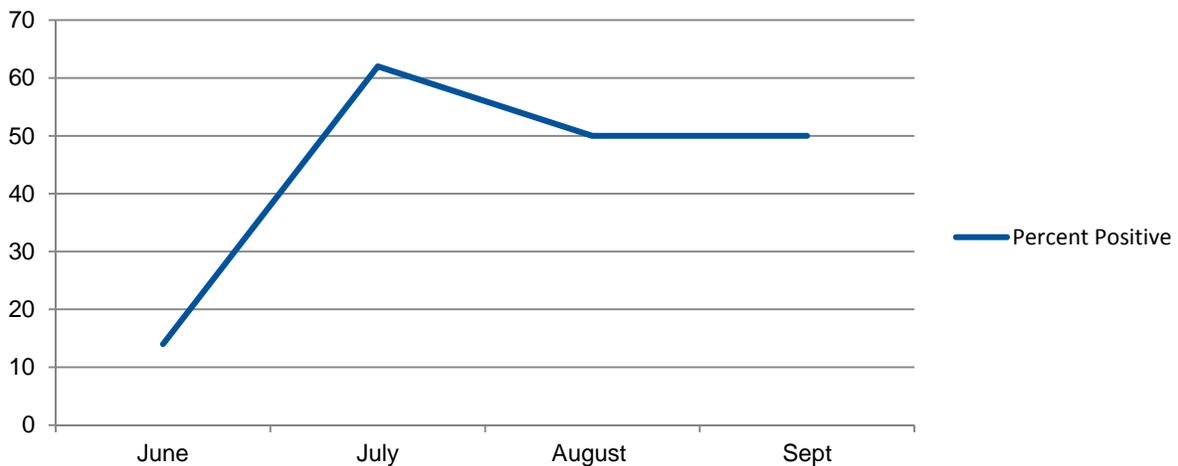


Figure 9: WNV Traps by Month June through September 2012



Larviciding Statistics

Our Public Health Sanitarian Aides made **1,663** larviciding inspections at **893** sites this summer. This averaged **1.86** visits per site, but this does not include visits to combined catch basin sewers. This is a 36 percent reduction from last year which is reflective of using a more effective and longer lasting larvacide as detailed below.

Larviciding sites are continuously evaluated to determine if they qualify for source reduction using environmental modification. If a site has no standing water for three years, the site is removed for follow-up inspection. Ninety (90) larviciding sites were able to be removed from follow-up inspection from 2011 to 2012. By eliminating these unnecessary inspections, Public Health Sanitarian Aides were able visit more problematic sites at a greater frequency. Table 4 describes larviciding site visits by district and frequency.

Table 4: Larviciding Inspection Activities

DISTRICT	# OF LARVICIDING SITES	# OF LARVICIDING VISITS	AVERAGE # OF VISITS PER SITE
W= Worthington	38	40	1.05
1	2	2	1.00
2	34	34	1.00
3	58	96	1.66
4	40	102	2.55
5	35	73	2.09
6	76	169	2.22
7	37	37	1.00
8	18	18	1.00
9	20	30	1.50
10	27	44	1.63
11	49	99	2.02
12	43	94	2.19
13	10	20	2.00
14	37	79	2.14

DISTRICT	# OF LARVICIDING SITES	# OF LARVICIDING VISITS	AVERAGE # OF VISITS PER SITE
15	61	92	1.51
16	1	1	1.00
17	29	35	1.21
18	2	2	1.00
19	5	5	1.00
20	31	80	2.58
21	22	58	2.64
22	34	97	2.85
23	19	63	3.32
24	42	47	1.12
25	57	130	2.28
26	48	83	1.73
27	18	33	1.83
TOTALS	893	1,663	1.86

Combined Catch Basin Inspections and Larval Control

As part of our commitment to mosquito control, each spring our staff implements a comprehensive catch basin (combined) treatment program throughout the city. Catch basins are inspected and historical data is used to determine its capacity to store water for over 5 days. Catch basins that are determined to store water are monitored throughout the season. Further, the catch basin are treated and reevaluated for effectiveness of the chemicals used. In 2012, the program significantly increased the number of larviciding inspections conducted for catch basins after field evidence last year verified that that mosquito breeding and activity is elevated in the areas surrounding the basins. In 2012, Sanitarian aides inspected **2,269** combined sewer catch basins and returned for follow-up monitoring twice after the initial treatment. The catch basins were originally treated with extended release briquettes that give up to 180 days of continued treatment. Toward the latter half of the season, the catch basins were re-inspected and treated as necessary with a quick acting short-term larvicide that controls the breeding for 5-10 days. Two applications were performed this way. In all, catch basins were treated three times during the season. **6,807** combined catch basins were inspected. Of those, the ones found to be breeding were treated. Catch basins were treated with one of two larvicides. The first is a briquette called **FourStar 180**, which uses the active ingredients ***Bacillus sphaericus (6%)*** and ***Bacillus thuringiensis subspecies israelensis (1%)***. This larvicide was used on the majority of catch basins. One briquette was used in each catch basin, which is in strict accordance with the label. Typically, we saw about 100 days of control from the FourStar 180 and

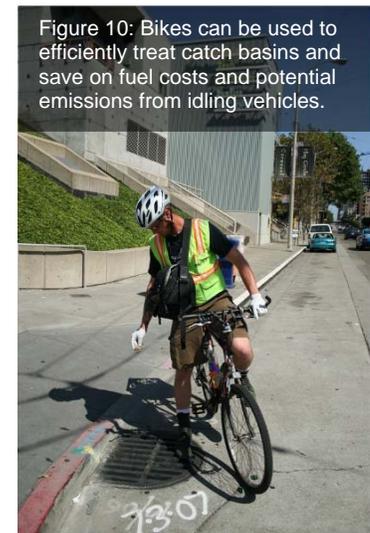


Figure 10: Bikes can be used to efficiently treat catch basins and save on fuel costs and potential emissions from idling vehicles.

then signs of mosquito breeding would return. The second larvicide used is called **Abate 4E**. This is a quick acting surfactant that inhibits mosquitoes from reaching the surface to breath, thus preventing adult mosquito emergence.

The active ingredient of this product is **Temephos** (44.6%). This product was primarily used later in the season, after the supply of FourStar was depleted. Abate is a liquid that is diluted according to the label, and it is effective for up to 10 days under typical environmental conditions.

Future

CPH plans to focus more on the use of the briquette method to treat catch basins. We found that this method allowed employees to nearly double the efficiency of treatment. In order to appropriately treat catch basins with briquettes, we would like to purchase bikes for Sanitarian Aides to utilize for quick and safe treatment of catch basins.

ADULTICIDING

Adulticiding is the application or treatment of pesticides to exterminate adult mosquitoes. The most common way to apply these pesticides is using truck-mounted ultra-low volume spray units driven on public roadways. Adulticiding is one of the tools we have in to control and manage mosquito populations. When done properly, adulticiding is an effective way to reduce the numbers of mosquitoes and, therefore, reduce people's risk of contracting mosquito-borne diseases.

It is important to apply these pesticides when mosquitoes are most active. For the species that carry West Nile virus, it is best to apply adulticide either just before sunset or just before dawn. As a practice, Columbus Public Health applies adulticide from the hours of 4:00 a.m. to dawn. Licensed and trained staff performs the applications specifically for mosquito control. The pesticides are registered with the U.S. EPA and Ohio Department of Agriculture, and are applied according to federal and state laws.

Columbus Public Health uses ultra-low-volume (ULV) spray machines that are calibrated to apply extremely small amounts of adulticide over large areas. The droplet size of the pesticide applied in the spray is small enough to be lethal to mosquitoes, but does not typically negatively affect other insects. Adulticides used do not persist in the environment for very long as they naturally break down within hours, will decompose as they are exposed to air, and are destroyed rapidly by sun light. The morning after an application, the amount of residual adulticide on exterior surfaces will be negligible.

The decision to apply adulticide is primarily based on two criteria:

1. Observation (through surveillance) that a significant number (400 +) of mosquitoes in our trapping locations in an area that, historically, diseased mosquitoes have been trapped.
2. Lab confirmation of West Nile Virus positive mosquitoes from specimens submitted for sampling.

Columbus Public Health continues to reserve the right to expand control activities beyond the aforementioned scenarios such as a confirmed human case of WNV or other mosquito-borne diseases, or a public health emergency as determined by the Board of Health and/or Health Commissioner.

When it is decided that an area will be sprayed based on high numbers in a historically WNV positive area or a trap comes back positive for WNV a spray area boundary is determined. Spray boundaries are set within a reasonable mosquito flight range from where the mosquitoes were trapped. Columbus Public Health generally applies adulticide within a ¼ mile radius. Our spray areas are concentrated in the area where the mosquitoes have been trapped and our hope is to eliminate and/or reduce the

population of adult WNV carrying mosquitoes. GIS software is utilized to assist in determining spray boundaries.

In 2012, we continued to honor “No Spray” requests. The number of households that apply for a no-spray request is continuing to increase. Prior to the mosquito spraying season, a notification letter is mailed to individuals that were on the previous year’s no-spray list. The notification includes the procedure to get on the list, the request for name, complete address and signature, and a notice that failure to reapply to the list could result in removal from said list after 36 months of no contact. Upon receipt of a written request to be placed on the no-spray list, the address and contact information is to be added to the list for that season. For these properties, our procedure is to turn off ULV equipment 200 feet in either direction of the residence.

As previously discussed, the amount of infection found in mosquitoes (infection rate) was the highest since 2002. The data suggested a great potential for spillover into the human population. According to the CDC ***Epidemic/Epizootic West Nile Virus in the United States: Guidelines for Surveillance, Prevention, and Control***, the City of Columbus had reached a Risk Level 4 for risk of human cases or outbreaks. The guidance calls for increased public outreach and intensifying adult mosquito control efforts. Columbus Public Health expanded mosquito control efforts based on this guidance as explained below:

No Spray Requests

In late August of 2012 that Columbus Public Health would not be able to honor various no-spray requests and/or bee-keeping locations in such areas. This decision was after much deliberation and was truly a necessary decision based on the infection rates of the mosquitos in the area.

Mosquito Control Activities

In addition to not honoring no-spray locations, we also began widening our truck mounted spray activities in areas with high numbers of infected mosquitoes and/or persistence of disease. An additional larviciding was performed at the catch basins in early September as the weather continued to be conducive for activity.

Public Outreach

Environmental Health worked with the Office of Health Communications on crafting messages around the changes in activities and these messages were distributed widely to the Area Commissioners. Media coverage was heavy compared to typical years allowing CPH to continue to speak prevention of bites and control of standing water.

Adulticiding Statistics

Adult mosquito control by ULV application was conducted in **113** locations on **40** days throughout the City of Columbus. Additionally, **48** city parks were sprayed over a two day period prior to the July 4th celebration: Red, White, and Boom. The two chemicals that were used this year for adult mosquito control were Duet and Zenivex. In 2012, a total of 426.5 gallons of adulticide was applied to **114,197.8 acres** of the city of Columbus and Worthington within recommended rates stated on the label. Of the 426.5 total gallons used, 30 gallons were Duet and 396.5 gallons were Zenivex. By contrast, in 2011 180 gallons of Zenivex was used netting an increase of 137 percent from 2011 to 2012.

Future

In 2013, it will be imperative to begin to measure knockdown rates of areas where adulticide has been applied. Knockdown rates should hover around 60 percent and, during times of likely spillover into human populations (e.g. 2012), areas that don’t achieve that level of knockdown should be reevaluated for application.

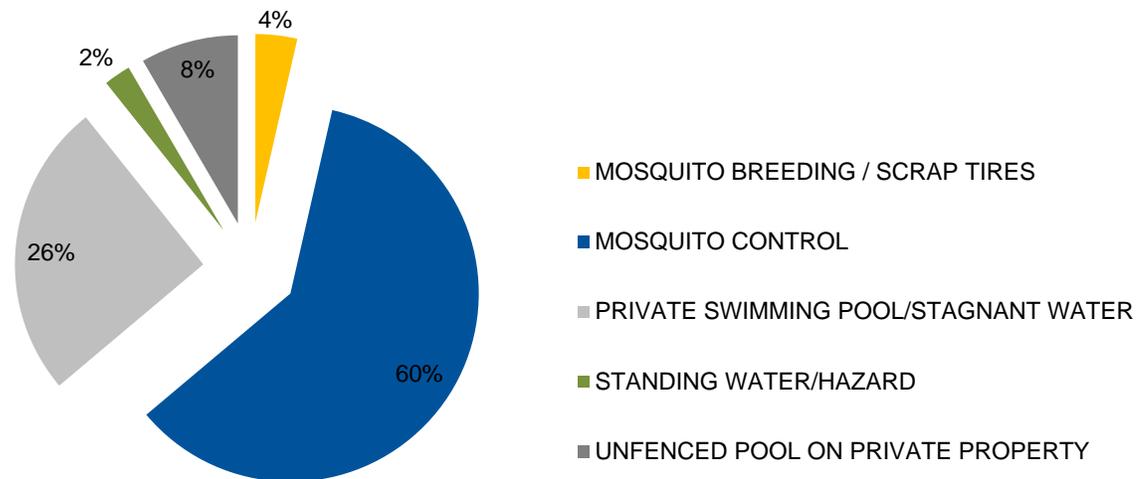
ENFORCEMENT

Part of the Vector Control Program consists of enforcement or legal action against facilities or individuals who do not comply with health regulations. Enforcement is used to address issues such as used scrap tire sites, standing water and private swimming pools that are breeding mosquitoes. A total of 400 complaints were received this year from the city 311 Center, walk-ins, email, and by phone. 143 were private pool complaints, 6 were dead bird reports, 38 were standing water/tire complaints; and 213 were for general mosquito control (request for spraying). The table below lists the numbers and type of complaint received. Complaint types are demonstrated in Figure 11.

Table 5: Complaint Types

TYPE OF COMPLAINT	EXPLANATION
Mosquito Breeding – Scrap Tire	Mosquitos breeding in scrap tires
Mosquito Control	Heavy mosquito activity observed
Private Swimming Pool – Stagnant Water	Pool identified with water that is standing allowing for potential for mosquito breeding
Standing Water - Hazard	General standing water observed
Unfenced Pool	Private pools without proper safety fencing

Figure 11: 2012 Complaint Breakdown



SAFETY & CHEMICAL INFORMATION

The chemicals used in our Vector Control Program carry inherent risks to humans and the environment. An extremely important part of our program consists of Hazard Communication (Haz-Com) training of all employees detailing the risks associated with handling and applying chemicals. Haz-Com training is given to employees and all employees are required to obtain a Pesticide Applicator license.

This phase of our program increases individual, public, and environmental safety. It is vital that staff be aware of proper safety protocols in regards. EH will work closely with the Safety Manager to ensure documentation is kept in regards to future trainings. Evacuation procedures and chemical storage is located in Appendix A.

The program has a large variety of chemicals that may be used. The wide range of chemicals allows specific environmental applications based on the vector and unique characteristics. The following tables list pesticide toxicity classifications, chemical inventory, suppliers, properties, and storage locations. Current inventory of chemicals are listed in Table 5. Toxicity information for the chemicals used are included as Appendix B.

CONCLUSION

2012 proved to be a challenging year for control of mosquitoes. More than ever, mosquitoes proved their continued threat of transmission of diseases that can develop into serious illnesses for the most vulnerable populations. Columbus Public Health will continue to be pioneers in how mosquitoes are controlled our community as there is an obligation to protect humans and animals from unnecessary burden of disease.

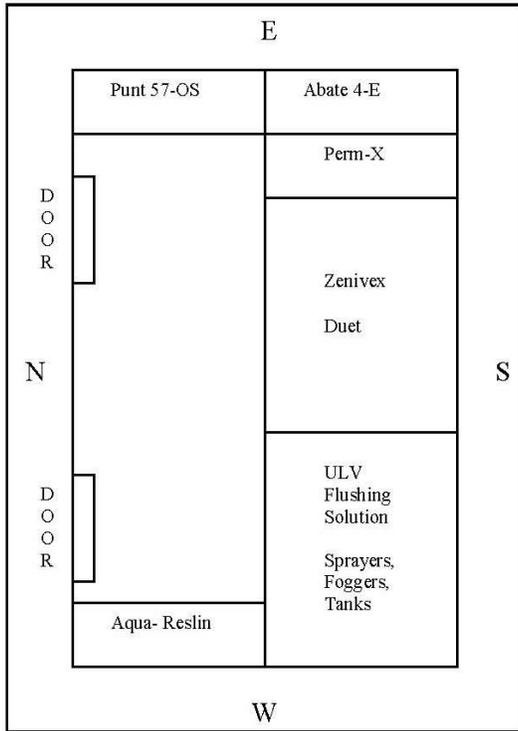
Table 5: CHEMICAL INVENTORY (as of October 2012)

Pesticide / Chemical	Inventory at end of 2011	Received in 2012	Amount Used in 2012	Inventory at end of 2012	Replacement Request for 2013
Perm-X	45 gal	None	None	45 gal	None
Engine oil (30w)	53 gal	None	2 gal	51 gal	None
Abate 4-E	35 gal	None	4.5 gal	11x2.5gal (28 Gallons)	None
ULV Flushing Solution	5x5 gal jugs (25 gal)	None	19 gal	5 gal	20 gallons
Punt 57-OS	4 x 2.5 gal	None	None	10 gal	None
Abate 5% Tire Treatment	119 lbs	None	5 lbs	9.1x 12.5 lbs (114 lbs)	None
5% Skeeter Abate	11 lbs	None	None	11 lbs	None
Altosid (30 day briq)	54 briq	None	54 briq	None	800 briq
Altosid XR (150 day briq)	1240 briq	None	539 briq	701 briq	500 briq
ZP Rodent Bait	2,608 lbs	None	None	2,608 lbs	None
Rodent Cakes	100 lbs	None	None	100 lbs	None
Maki Rat & Mouse Bait Packs	13,350	None	3,646	8,704	None
Flytek	14 lbs	None	None	14 lbs	None
Vectolex CG	176 lbs	None	None	176 lbs	???
Aqua Reslin	1 gal	None	None	1 gal	None
Zenivex E4	None	540 gal	396.5 gal	143.5 gal	180 gal (choose)
Duet	30 gal	None	30 gal	None	180 gal (choose)
FourStar 180	n/a	1200 briq	1200 briq	None	1200 briq
FourStar 45	n/a	800 briq	800 briq	None	800 briq

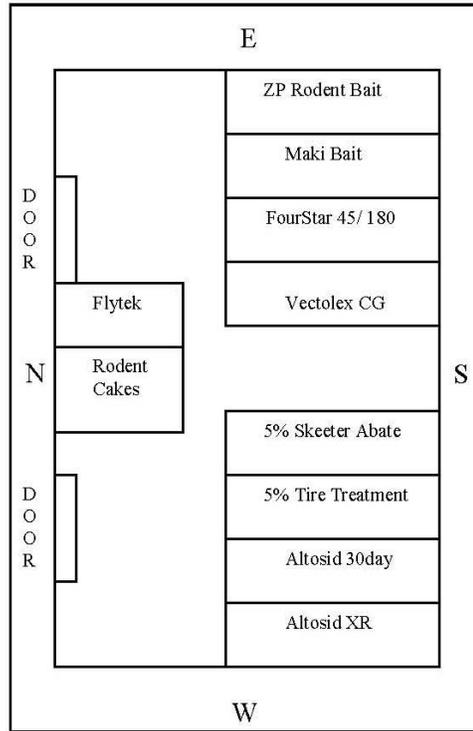
SOURCES

1. Emily Zielinski Gutiérrez, DrPH. West Nile Virus & Other Mosquito-borne Infections (date retrieved 12/13/2012) http://www.cdc.gov/ncidod/dvbid/westnile/resources/wnv_othermosqinfec.pdf
2. Richard Gary, personal communication (September 2012)

APPENDIX A: CHEMICAL STORAGE – CPH CAMPUS



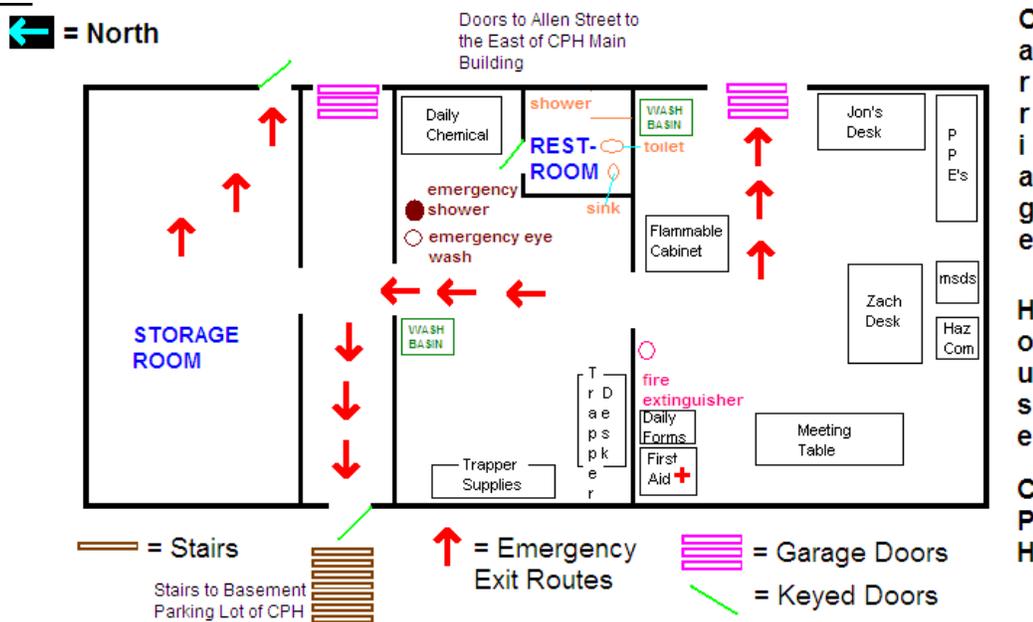
Storage Building #1



Storage Building #2

Carriage House Evacuation Routes

In an emergency, the following chart shows our evacuation route for the carriage house.



APPENDIX B: CHEMICAL SUPPLIER AND PROPERTIES

Pesticide / Chemical	Company Name	Label Signal Words	Class	Liquid or Solid	EPA Reg. #
Perm-X	Clarke	Caution	III	liquid	8329-35
Engine Oil (30W)	Unocal (76)	Caution	III or IV	liquid	N/A
Abate 4-E	American Cyanamid Co	Warning	II	liquid	241-132AA
ULV Flushing Solution	BVA Oils	Caution	III or IV	liquid	N/A
Punt 57-OS	Vectec Inc	Caution	III	liquid	42737-1
Abate 5% Tire Treatment	Clarke	Danger	II	granular	8329-30
5% Skeeter Abate	Clarke	Warning	II	granular	8329-15
Abate 2-BG	Clarke	Caution	III	granular	8329-16
Altosid WSP	Clarke	Caution		solid	2724-448
Altosid (30 day briq)	Zoecon	Caution	IV	solid	2724-375
Altosid XR (150 briq)	Zoecon	Caution	IV	solid	2724-421
ZP Rodent Bait	Bell Laboratories	Caution	IV Oral: LD50 >5000 mg/kg	granular	12455-18
Rodent Cake	Bell Laboratories	Caution	IV Oral: LD50 >5000 mg/kg	solid	23089
Maki Rat & Mouse Bait Packs	LiphaTech	Caution	IV Oral: LD50 >5000 mg/kg	solid	7173-186
Flytek	Professional Pest Management	Caution		granular	2724-274
Vectolex CG	Clarke	Caution		granular	73049-20
Vectolex WSP	Clarke	Caution		solid	73049-20
Aqua-Reslin	Bayer	Caution	IV Oral: LD50 >5000 mg/kg	liquid	432-796
Zenivex E4	Adapco	Caution	III	liquid	2724-807
Duet	Clarke	Caution		liquid	1021-1795-8329
FourStar 180	Adapco	Caution		Solid	83362-3
FourStar 45 Day	Adapco	Caution		Solid	83362-3