# 2017 Vectorborne Disease Monitoring and Prevention Report

Summary of Program and End of Year Results

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## INTRODUCTION

Oklahoma City-County Health Department (OCCHD) formed the West Nile Virus program following the 2012 WNV outbreak in order to develop procedures for monitoring mosquitos and preventing the occurrence of WNV. With the additional monitoring of Zika Virus vector mosquitos in 2016, the program changed to the Vectorborne Disease Monitoring and Prevention Program. With the further development of the mosquito program, we have the ability to serve proactive roles by counting and testing vector mosquitoes prior to notifying the public and municipalities of the presence of WNV or Zika vectors in the mosquito population. The program also focusses on mosquito control with larvicide applications and community education. This report details the roles of varying agencies and departments involved in the Vectorborne Disease Monitoring and Prevention Program, the findings of the 2017 mosquito season, and possible improvements for future seasons.

## MOSQUITO TRAPPING, IDENTIFICATION AND WNV TESTING

Trapping is accomplished using CDC Gravid Traps and BG-Sentinel 2 Traps. Both trap types use different mosquito attractants. *Culex* mosquitos are one of the more prevalent WNV vector mosquitos in Oklahoma. Therefore, the CDC trap used is designed to selectively capture female *Culex* mosquitos by utilizing hay and tap water that release $CO^2$ as the attractant. The hay and water mixture need to be replaced frequently. Due to the presence of Zika Virus, we expanded our efforts to monitor the presence of *Aedes aegypti* mosquitos through the addition of the BG traps. These traps use a lure cartage that releases lactic acid, ammonia, and fatty acids, which mimics the scent of humans. This lure lasts for 5 months. The BG traps also have the capability to add a $CO^2$ tank to use as an attractant which is recommended to run for 24-hours and a constant pressure.

With the exception of the 24-hour $CO^2$ trap, once a week the nets with trapped mosquitos are brought to OCCHD Consumer Protection and frozen overnight. The next morning, we separate mosquitoes from non-mosquitoes and males from females. Once the genus and species are identified, only the West Nile vector species are tested. Even though the BG trap's main purpose was to trap possible carriers of Zika they also captured WNV carrying mosquitos, which we tested as well. During this particular season, the $CO^2$ BG trap was not tested for WVN each week.

## COLLABORATIVE EFFORT

### THE ROLE OF OCCHD CONSUMER PROTECTION DIVISION

Other than performing the counting and testing of trapped mosquitoes, Consumer Protection identifies and treats areas with stagnant water following a complaint. These include but are not limited to vacant pools and properties where the inspector cannot contact or identify the owner. If stagnant water is observed at a vacant property, they remedy the problem by either applying larvicide or having the property owner treat the water. If the property is not vacant, an abatement notice is issued to the property owner. With every use of larvicide, the inspectors notify the program coordinator of the number used and the address. In the case where there is a positive human case, the location of the infected persons is traced to a territory

of one of the inspectors with Consumer Protection. The exact address is not disclosed to the inspector but instead provide an area to survey for stagnant water as well as pass out flyers in the community.

### The Role of Municipalities

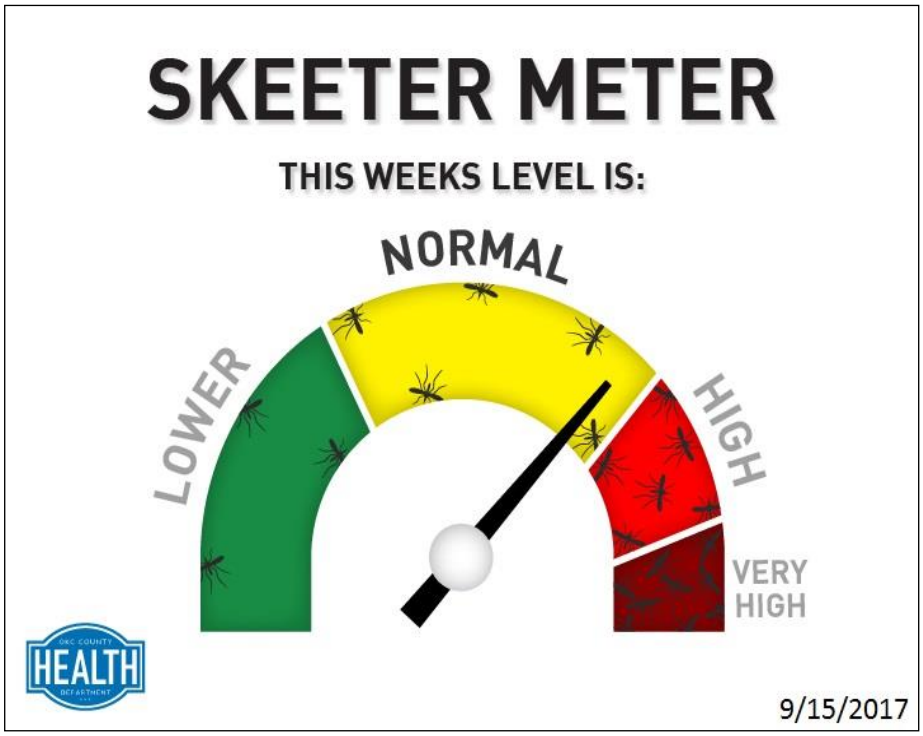
The two municipality agencies collaborating with OCCHD are Oklahoma City Storm Water Quality (OKCSWQ) and Edmond Code Enforcement (ECE). They set, maintain, repair, and pick up the traps at each site. OKCSWQ sends us weekly reports for each of the trap sites. These reports include the trap condition, needed repairs, and if the trap caught mosquitos at the end of the week. We provide the municipalities with larvicide to treat areas of stagnant water that are mosquito-breeding habitats and the municipalities purchase batteries to power the traps. With each application of larvicide, they document the address and date. At the end of the season, we use that data to note how much larvicide has been used in relation to OCCHD's mosquito data. In the case of a positive WNV result, the municipalities receive an email from OCCHD informing them of the site number. This allows them to remediate the problem through area surveys and elimination of mosquito habitats within one mile of the trap location.

### The Role of State and Local Epidemiologists

Throughout the season, OCCHD Epidemiologists gather information relating to where and when the infected person was outdoors, travel history and hobbies that may increase risk of contracting a vectorborne disease. Specific to Zika Virus, they also collect travel history of spouse/partner and, if travel was to an area with local Zika activity, any Zika associated signs or symptoms. Surveillance performed also includes blood donor programs. Epidemiologists collect the geographical data and produce GIS mapping to identify clusters of human cases and possible major sources of mosquitos. They also provide data such as the address of persons who contracted WNV and Zika Virus. During the mosquito season, the OCCHD Epidemiology department sends out vectorborne reports to municipal partners and the medical system providing information of state and national cases of WNV and Zika. This report also includes the quantity of local complaints of stagnant water and the quantity of stagnant water treated with larvicide. This comprehensive report provides detailed data for targeted messaging, abatement efforts and aids in trend identification. There was also the development of the Vectorborne Disease Toolkit by the OCCHD Epidemiology staff, which can be used by other city-county health departments that are interested in introducing a vectorborne response program.

In addition to these efforts, the OCCHD Epidemiology department created a risk communication tool called "Skeeter Meter". This weekly meter was developed to communicate the risk of WNV to community members. Temperature, mosquito abundance, presence of WNV, and WNV human cases were all used to calculated a risk number. A gauge (shown in image 1. Below) was created and shared each week to help make the community members aware of potential risk of WNV.

**Image 1. OCCHD WNV Risk Communication Tool "Skeeter Meter"**




THE ROLE OF MEDIA

We continued the use of the used 3D's and P to encompass the Zika carrying mosquitos and their preference for biting during the day. The OCCHD Media Relations issues a press release to surrounding media outlets following a positive test result in the beginning of the season. This in turn reaches the community so that preventative measures can take place at home. Messaging this season included radio, TV, transit, and posters distributed to local universities, schools, parks and recreation centers. The Skeeter Meter was shared weekly with media members and some presented it in their local weather reports. The development of a free mobile application by OCCHD has allowed for messaging to be released to the public through notifications. The OCCHD Communications department worked diligently and their efforts produced the following:

*EARNED MEDIA INTERVIEWS*

15 Television, 12 Radio, 6 Print (5 English & 1 Spanish).

Radio PSA rotation from 5 broadcasting groups.

1400 Fight the Bite Posters – posted in churches, schools, medical clinics, hospitals, businesses in areas across the county where traps yielded positive mosquitoes.

*EARNED OUTDOOR BILLBOARDS*

Vital Outdoor – 2 boards 4/15 – 6/30 $17,000

Tyler Outdoor – 8 boards 4/17 – 6/30 $35,000

Arnold Outdoor – 3 boards 4/17 – 6/30 $8000

9 Outdoor - 4 boards 4/1 – 5/31 & 7/1-31 $10000
Lamar Outdoor – 2 boards 4/28 – 6/13 $8000

Total of Earned Outdoor Advertising – 19 boards with value of $78,000

*PURCHASED OUTDOOR*

9 Outdoor – 2 boards – July 4-31st - $3000
OKC TV (5,9,4 & 25) 6/19 $9000
Tyler Bus Bench/Shelters June – July $5000

### THE ROLE OF OTHER AGENCIES AND DEPARTMENTS

Each season, collaboration takes place with the Oklahoma State Department of Health (OSDH) and OCCHD through the Epidemiology department in surveillance as well as through the supply of larvicide to Consumer Protection. Collaboration continued this season with the Oklahoma Department of Environmental Quality (ODEQ) and the tire-recycling program. The vectorborne program response plans are included in OCCHD Emergency Preparedness & Response team's Emergency Operating Procedures, which are used by the municipalities.

## RESULTS AND DISCUSSION

### TRAPPING AND TESTING

During the 2017 mosquito season, ECE, OKSWQ, and Consumer Protection deployed 18 traps; ECE had seven CDC gravid traps, OKSWQ had six CDC gravid traps and two BG Sentinel traps, OCCHD Consumer Protection had three BG Sentinel traps. The final day of sorting for Edmond took place October 18th, and October 25th for OKC. These stop dates were consistent with the decrease in mosquito numbers. The total number of trapping weeks differed for each of the BG traps. Overall, there were 23 trapping and testing weeks with a total of 43,079 mosquitos trapped and 33,846 mosquitos tested. This number included the BG sentinel traps. Without the BG traps included there were 40,149 mosquitos trapped. No less than 66% of the captured mosquitos were tested each week. Starting week 12 of the mosquito season, we began documenting the number of positive test pools as well as the number of positive mosquitoes for each trap site. This data was used to calculate the Maximum Likelihood Estimation (MLE) Infection Rate. This information, as well as the number of mosquitoes captured, tested, and number of positive traps each week is displayed in **Table 1** (page 6). An extensive table with all numbers per trap per week is included in the appendix.

**Table 1: Total number of mosquitos captured, tested, positive traps, positive pools, and positive mosquitoes.**

| Date | # Mosquitos Captured | # Mosquitos Tested | # Positive Traps | # Positive Pools* | # Positive Mosquitoes* |
|---|---|---|---|---|---|
| **5/24/2017** | 78 | 68 | 0 | n/a | n/a |
| **5/31/2017** | 381 | 289 | 3 | n/a | n/a |
| **6/7/2017** | 1027 | 830 | 2 | n/a | n/a |
| **6/14/2017** | 1249 | 947 | 2 | n/a | n/a |
| **6/21/2017** | 514 | 339 | 3 | n/a | n/a |
| **6/28/2017** | 1302 | 1031 | 5 | n/a | n/a |
| **7/5/2017** | 1147 | 1007 | 2 | n/a | n/a |
| **7/12/2017** | 1512 | 1273 | 4 | n/a | n/a |
| **7/19/2017** | 1695 | 1386 | 4 | n/a | n/a |
| **7/26/2017** | 2559 | 2217 | 3 | n/a | n/a |
| **8/2/2017** | 2689 | 2131 | 6 | n/a | n/a |
| **8/9/2017** | 2741 | 2122 | 4 | 10 | 453 |
| **8/16/2017** | 2109 | 1683 | 6 | 14 | 628 |
| **8/23/2017** | 2107 | 1670 | 6 | 9 | 364 |
| **8/30/2017** | 2858 | 2274 | 6 | 7 | 323 |
| **9/6/2017** | 3706 | 2953 | 7 | 9 | 413 |
| **9/13/2017** | 3529 | 2456 | 5 | 8 | 399 |
| **9/20/2017** | 4623 | 3144 | 7 | 11 | 548 |
| **9/27/2017** | 3176 | 2557 | 9 | 18 | 809 |
| **10/4/2017** | 1393 | 1200 | 8 | 13 | 475 |
| **10/11/2017** | 1673 | 1436 | 5 | 8 | 375 |
| **10/18/2017** | 605 | 498 | 3 | 3 | 150 |
| **10/25/2017** | 406† | 335 | 0 | 0 | 0 |
| **Total** | **43,079** | **33,846** | **100** | **110** | **4,937** |

*Method of counting the positive pools and mosquitoes began week 12
†Final trapping week only included OKC traps and MG-BG

The figure below, **Figure 1**, shows the number of mosquitos captured that is documented in **Table 1**, as well as the number of positive traps each week. There was a steady increase in mosquito numbers which spiked on September 20th prior to a steep decrease the following weeks. There were a total of 100 positive test site results this season. As displayed below, the weeks with the highest number of mosquitoes trapped did not always translate into a higher number of positive sites.

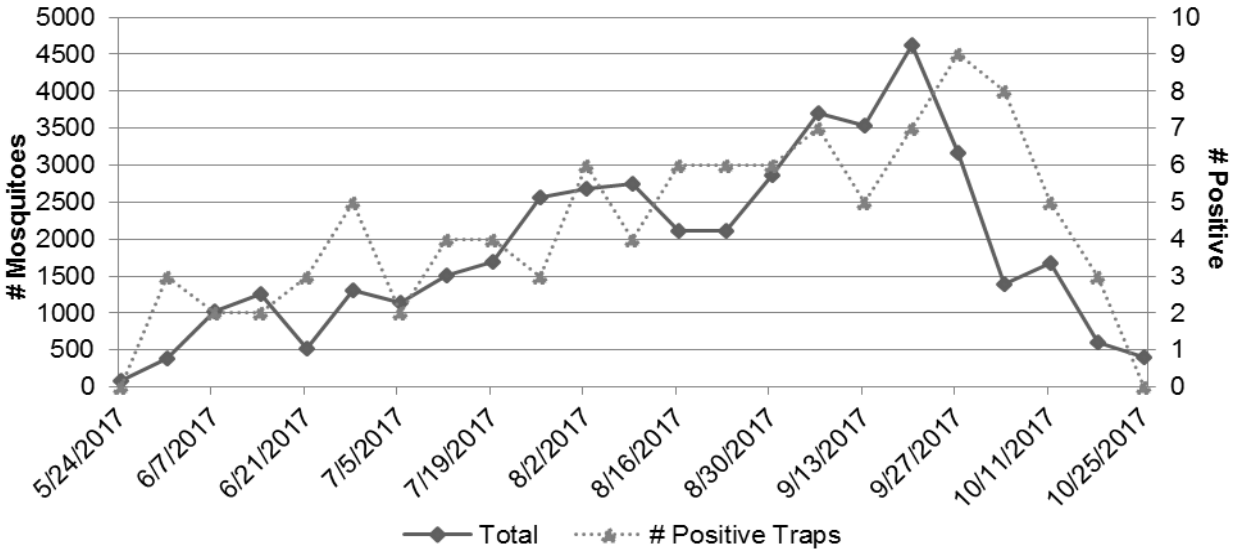



**Figure 1: Number of mosquitos captured and the total number of positive traps each week during the 2017 season with # positive traps displayed under secondary axis.**

Once the mosquitos were separated from non-mosquitos, the species were identified. The two main genera identified include *Aedes* and *Culex*. The number of the mosquitoes trapped by genus is displayed in **Figure 2**. There were two small spikes in *Aedes* mosquitoes at the end of July and the beginning of September and a few peaks in *Culex* numbers with the highest at the end of September.

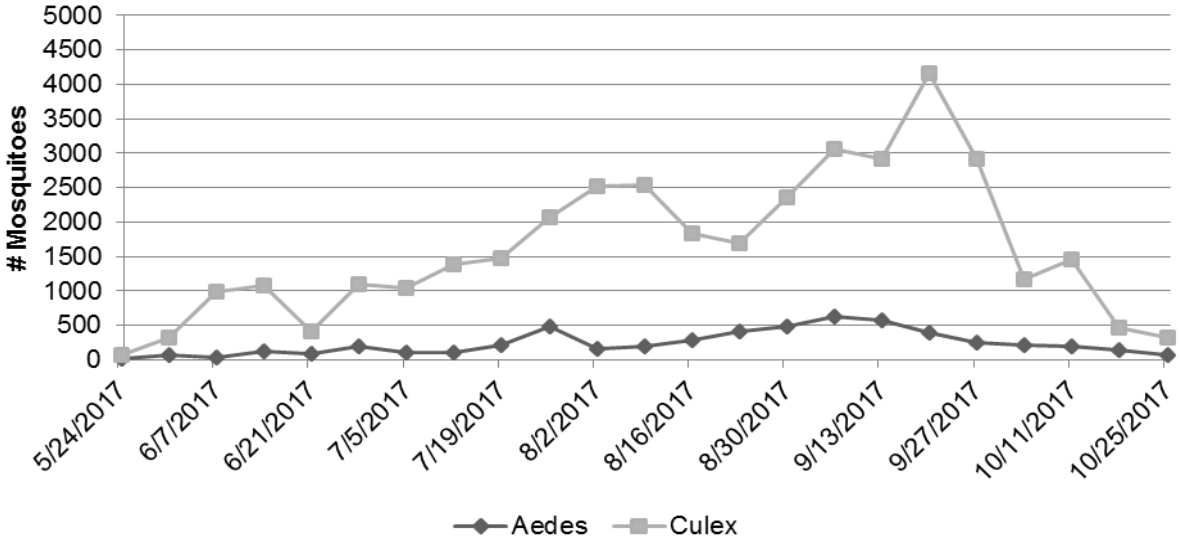



**Figure 2: Number of mosquitos captured each week based on genus.**

The numbers at each trap site were assessed. **Figure 3** below displays the average number of mosquitoes trapped at each site per week. Based on the graph, OKC-6 and E-6 had the highest average mosquito counts. In addition, the 24-hours trap had a higher average count than two other BG traps that were trapping mosquitoes for an entire week.

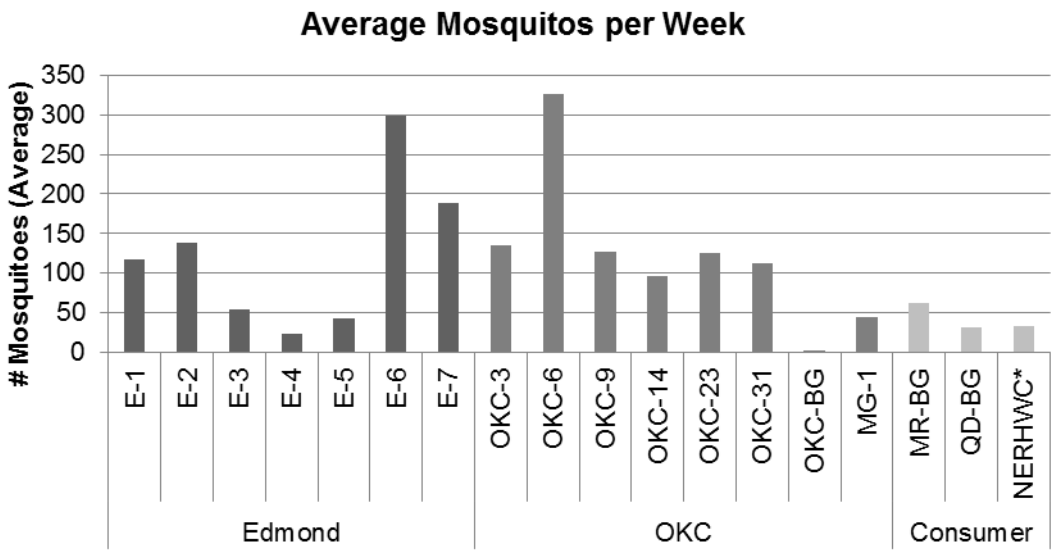



**Figure 3: Average number of mosquitos captured per week by trap site.**
***NERHWC was a 24-hour trapping and non-testing site.**

Each tested trap site, except OKC-BG, had at least one positive week. The total number of positive weeks varied with each trap site with E-1 and OKC-3 having the highest number of positive weeks (**Figure 4**). E-1 and OKC-3 did not have the highest average mosquitoes trapped per week but did have one of the highest numbers of positive trapping weeks.

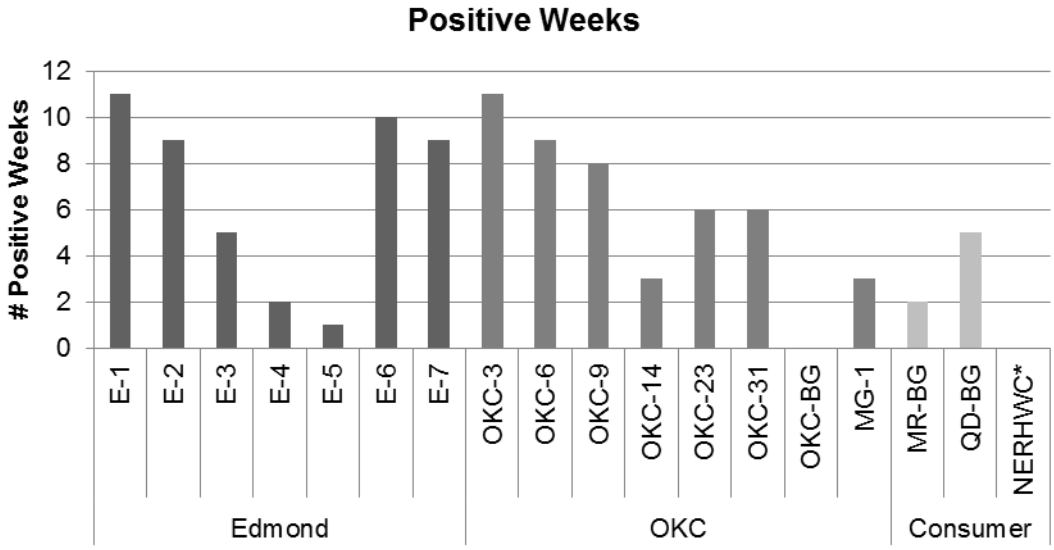



**Figure 4: Number of positive trapping weeks by trap site.**
***NERHWC was a 24-hour trapping and non-testing site.**

As previously mentioned, two different trap types were used this season, BG Sentinel and CDC Gravid. The frequencies and row percentages of the mosquito genus for each trap type are displayed in **Table 2**. The BG Sentinel traps included those using the human scented lures as well as the $CO^2$ tank. Most of the mosquitoes in the BG traps were of the *Aedes* genus

(55.87%) and the second highest was *Culex* (38.4%). A large portion of the mosquitoes trapped in the CDC type were *Culex* (90.25%) followed by *Aedes* (9.54%).

**Table 2: Frequency and row percentages of mosquito genus by trap used.**

| Trap Used | Mosquito Genus | | | | | | |
|---|---|---|---|---|---|---|---|
| | ***Aedes*** **n (%)** | ***Anopheles*** **n (%)** | ***Culex*** **n (%)** | ***Culiseta*** **n (%)** | ***Orthopodmyia*** **n (%)** | ***Psorophora*** **n (%)** | **Total** |
| **BG Sentinel** | 1,637 (55.87%) | 149 (5.09%) | 1,125 (38.4%) | 0 (0%) | 0 (0%) | 19 (0.65%) | 2,930 |
| **CDC Gravid** | 3,831 (9.54%) | 52 (0.13%) | 36,234 (90.25) | 6 (0.01%) | 24 (0.06%) | 2 (0%) | 40,149 |
| **Total** | 5,468 | 201 | 37,359 | 6 | 24 | 21 | 43,079 |

This mosquito season, three different attractant types were used for the two different trap types. The frequencies and row percentages of the mosquito genus for each attractant type are displayed in **Table 3**. Hay and water were used exclusively for the CDC gravid traps. Both the $CO^2$ and hay/water attractants trapped mostly *Culex* mosquitoes. The $CO^2$ tank attracted more *Anopheles* (26.76%) compared to *Aedes* (13.09%) mosquitoes. The human scented lure traps attracted more Aedes (64.93%) mosquitoes compared to *Culex* (34.41%).

**Table 3: Frequency and row percentages of mosquito genus by attractant used.**

| Attractant Used | Mosquito Genus | | | | | | |
|---|---|---|---|---|---|---|---|
| | ***Aedes*** **n (%)** | ***Anopheles*** **n (%)** | ***Culex*** **n (%)** | ***Culiseta*** **n (%)** | ***Orthopodmyia*** **n (%)** | ***Psorophora*** **n (%)** | **Total** |
| **$CO^2$ Tank*** | 67 (13.09%) | 137 (26.76%) | 293 (57.23%) | 0 (0%) | 0 (0%) | 15 (2.93%) | 512 |
| **Hay/Water** | 3,831 (9.54%) | 52 (0.13%) | 36,234 (90.25%) | 6 (0.01%) | 24 (0.06%) | 2 (0%) | 40,149 |
| **Human Scented Lure** | 1,570 (64.93%) | 12 (0.5%) | 832 (34.41%) | 0 (0%) | 0 (0%) | 4 (0.17%) | 2418 |
| **Total** | 5,468 | 201 | 37,359 | 6 | 24 | 21 | 43,079 |

*$CO^2$ tank trap was a 24-hour trapping site

Based on the proportions, more *Aedes* mosquitoes were trapped using human scented lures but not using $CO^2$ as an attractant. The addition of more $CO^2$ traps can determine whether the differences in mosquitoes captured within BG traps was dependent on the trap location or the attractant type. It is important to note that the deployment dates varied for each type of trap with three BG traps having deployment dates in July. If the human scented lures were deployed earlier in the season, this could have affected the mosquito genera trapped, especially since the numbers of *Aedes* trapped increased mid-season.

## COMPLAINTS

There were 255 stagnant water complaints in 2017, 2 were entered during the month of November. Throughout the season, 68 (26.7%) complaints were associated with duplicate locations. Without including the duplicate locations, there were 215 complaints (locations)

entered. The total number of stagnant water complaints per month and the number of mosquitoes captured per month is displayed in **Figure 4**. The number of complaints includes duplicate complaints at a given address. There were two slight peaks in complaint numbers during the months of June and September. The peak in mosquito numbers did not occur until September.

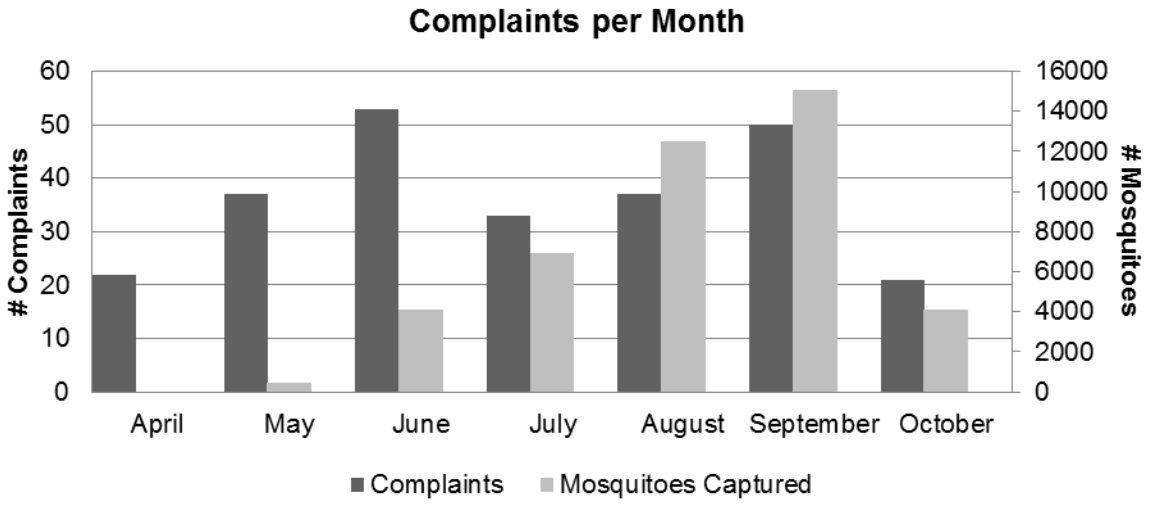



**Figure 4: Number of stagnant water complaints and mosquitoes captured per month, beginning April 1st and ending October 31st, 2017.**

LARVICIDE USE

This year, similar to 2015 and 2016, we used two different types of larvicide. The first is Altosid XR, which has a low cost of application and is effective for 150 days. The second larvicide used was Fourstar, which is effective for 180 days and has fewer ecological concerns compared to Altosid XR. With Fourstar, we can treat more than just stagnant pools without the fear of harming aquatic life. Other forms of stagnant water include storm drains, catch basins, underground drainage systems, storm water retention areas, and ponds. Larvicide provided by OSDH at the end of the 2017 season varies in active ingredients in order to counteract any resistance that developed in the mosquito population.

Out of the 215 stagnant water complaint locations, 16 (6.3%) were associated with larvicide use. Five (31%) of these locations were associated with multiple complaints. One of these locations had as many as five complaints throughout the season. It is important to note that most treatments by OCCHD are at vacant properties. Also, once a complaint location is treated, depending on the water type, it will not need another treatment during the season. **Figure 5** includes the amount of larvicide used in pounds each month in the 2017 season by the Consumer Protection Division in response to complaints. Each briquet weighs approximately 0.08 lbs.

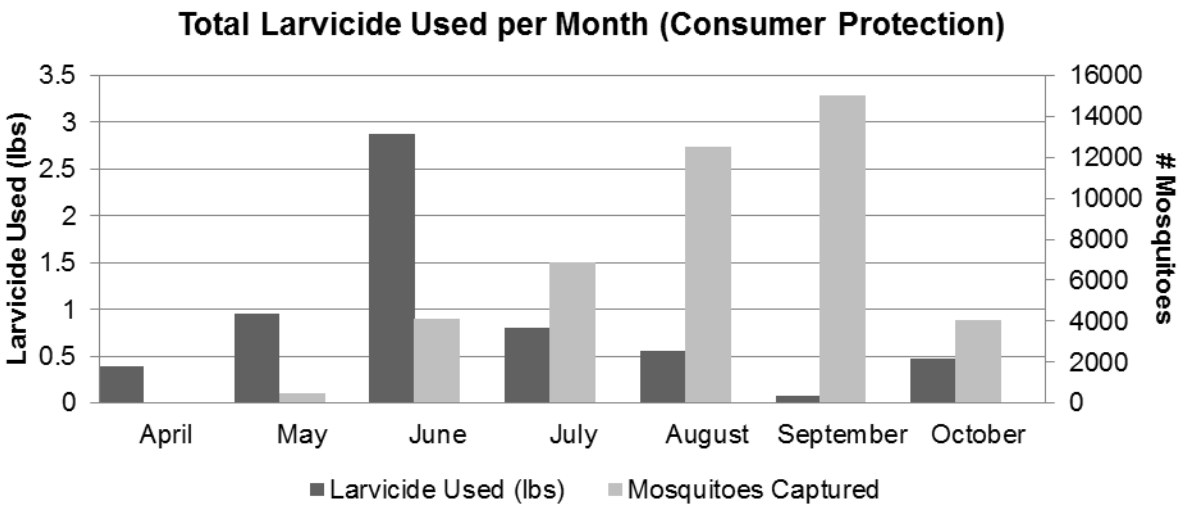



**Figure 5: Amount of larvicide used by pounds by Consumer Protection and mosquitoes captured each month.**

Other than OKCSWQ and ECE, we dispersed larvicide to Oklahoma County and the City of Choctaw. The City of Choctaw did not use the larvicide this season, and Oklahoma County used 3 briquettes at one location in October. **Figure 6** below displays the larvicide used by month in pounds for all except Consumer Protection. Since, the larvicide used by OKCSWQ and ECE is often in response to a positive trap site, the figure also includes the number of positive sites per month. Once larvicide is used it does not need treatment again until after 30, 150, or 180 days depending on the larvicide used. That could explain the higher larvicide used early in the season that does not continue as the number of positive traps increase.

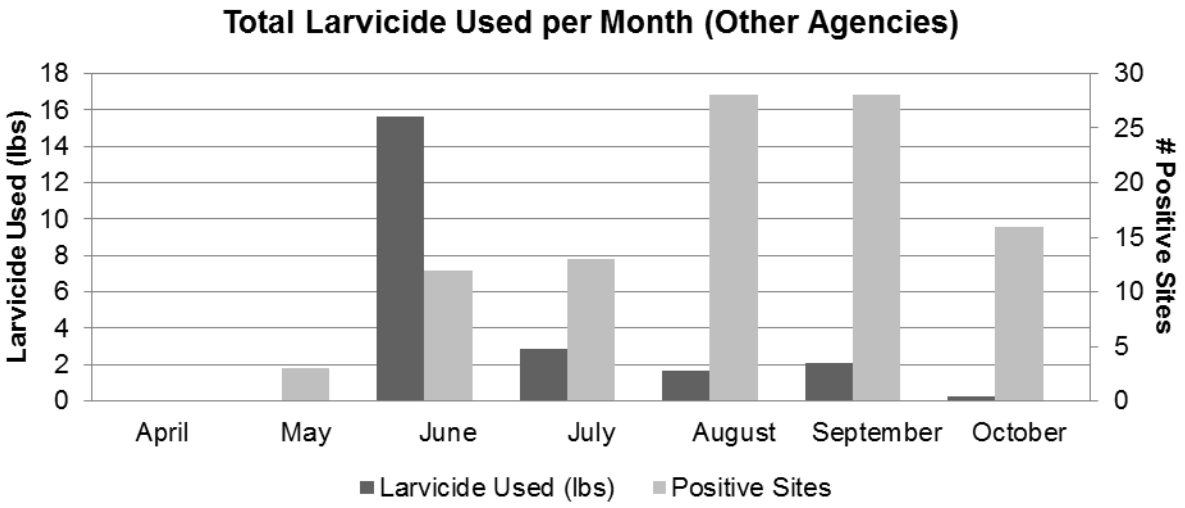



**Figure 6: Amount of larvicide used by pounds by other agencies and number of positive trap sites by month.**

## RESPONDING TO HUMAN CASES

In 2017, 7 human cases of mosquitoborne disease were investigated in Oklahoma County; 1 West Nile Fever (WNF), 5 West Nile Neuroinvasive (WNV Neuro) and 1 Zika Virus travel related cases (Image 2 below). Of these WNV cases, 5 were determined to likely have exposure in Oklahoma County and they occurred in the month of August, and all but one recall spending prolonged periods of time outside without repellent or specifically being bitten by mosquitos. After confirmation of a positive human case, the Epidemiologist conducts a detailed case investigation and after obtaining consent, provides the exact location where the case resides to the Consumer Protection area inspector in order to conduct a survey of the surrounding area and pass out flyers to the community on education and prevention mechanisms (Image 3 next page). This season Consumer Protection also did area surveys with travel associated positive Zika cases to help prevent the potential introduction of the virus into the Oklahoma City-County vector population. Statewide, there were 60 total cases (12 WNF, 27 WNV Neuro, and 1 Zika).

**Image 2. Map of Vectorborne Disease Human Cases During 2017 Season**

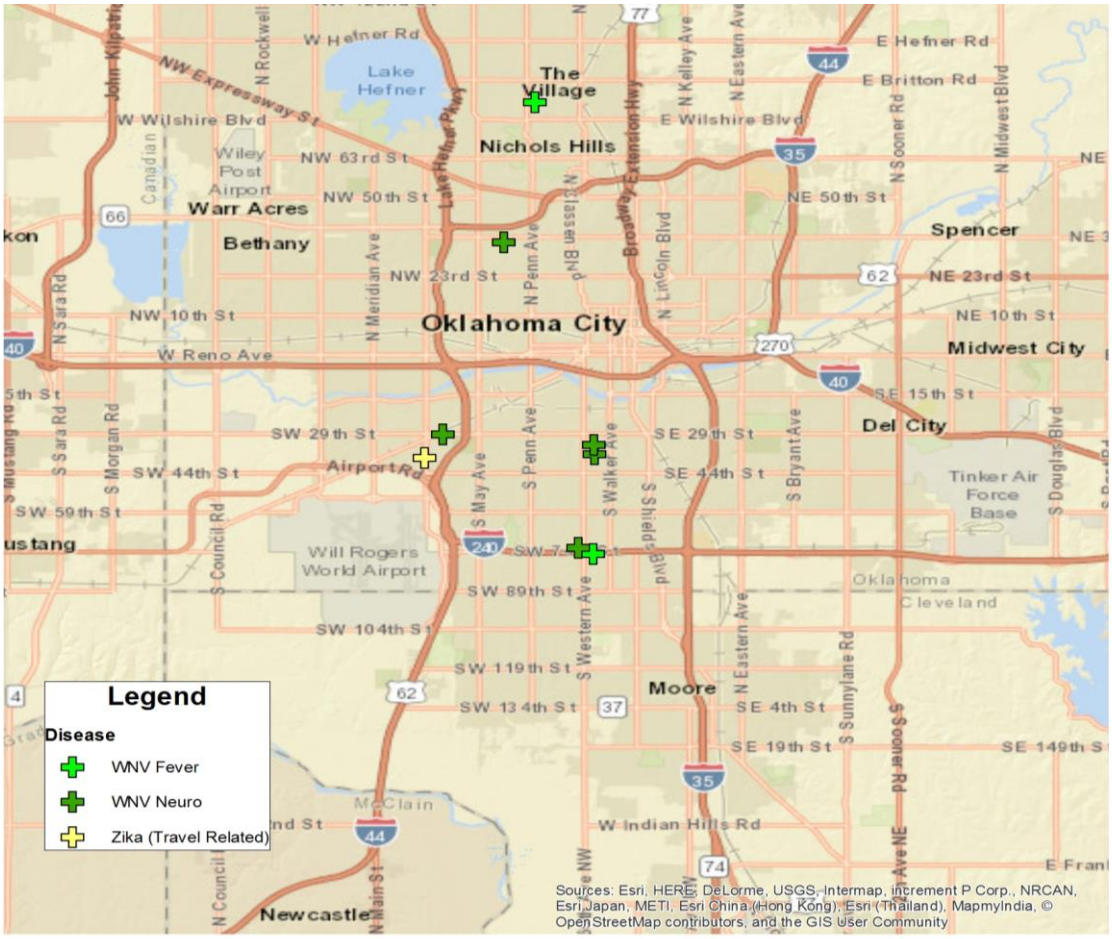


**Image 3. Satellite Image with 500 ft radius for mosquito habitat remediation**

## Comparing and Contrasting Four Program Years

During the course of the 2017 program, there was an increase in mosquitoes captured by 151% compared to 2016. This could be attributed to the increase in traps or the increase in trapping weeks however, when only comparing the 13 CDC Gravid traps, there were 16,591 mosquitoes captured in 2016 and 40,149 in 2017. In addition, when comparing average mosquitoes per week there were 754 per week in 2016 and 1,745 per week in 2017 making the percent increase in mosquitoes per week at 131%. Another difference in program years is the addition of trap shelters for the CDC gravid traps. These shelters protected the traps from excess sun and rain exposure. The shelters allowed for easier mosquito identification due to the improved quality of mosquito samples.

Each program year had differing progressions of mosquito numbers. **Figure 7** illustrates the number of mosquitos for each program year. In 2013, the number of mosquitos peaked in August before decreasing each week until October. In 2014, the numbers of mosquitos were consistent each month from July to September instead of steadily increasing. In 2015, the number of mosquitos began low and gradually increased each week. In 2016, there were a large number of mosquitos captured at the start of the season prior to a sudden decrease in numbers. This year, the numbers increased gradually each week with the number spiking towards the end of September before a steep decrease in October.

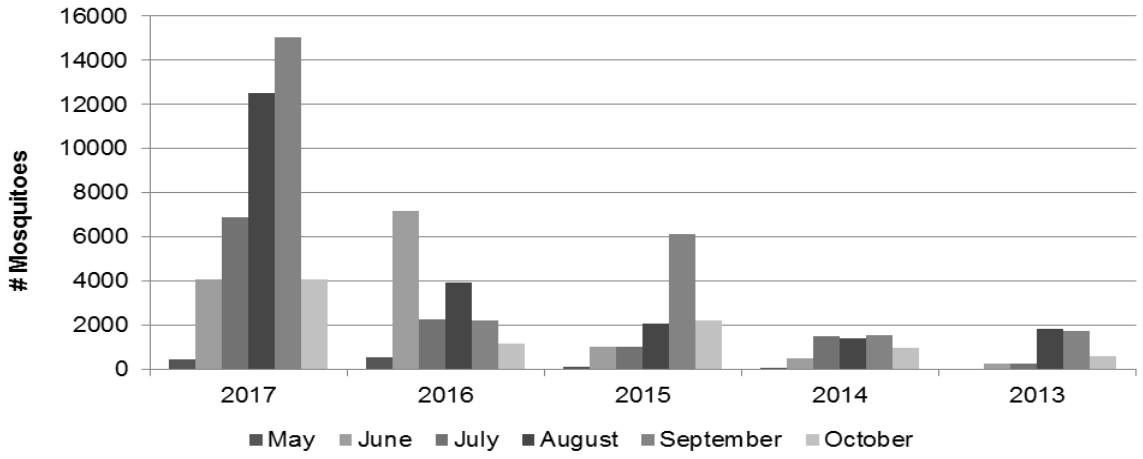



**Figure 7: Total number of mosquitos captured each month for the years 2013, 2014, 2015, 2016, and 2017.**

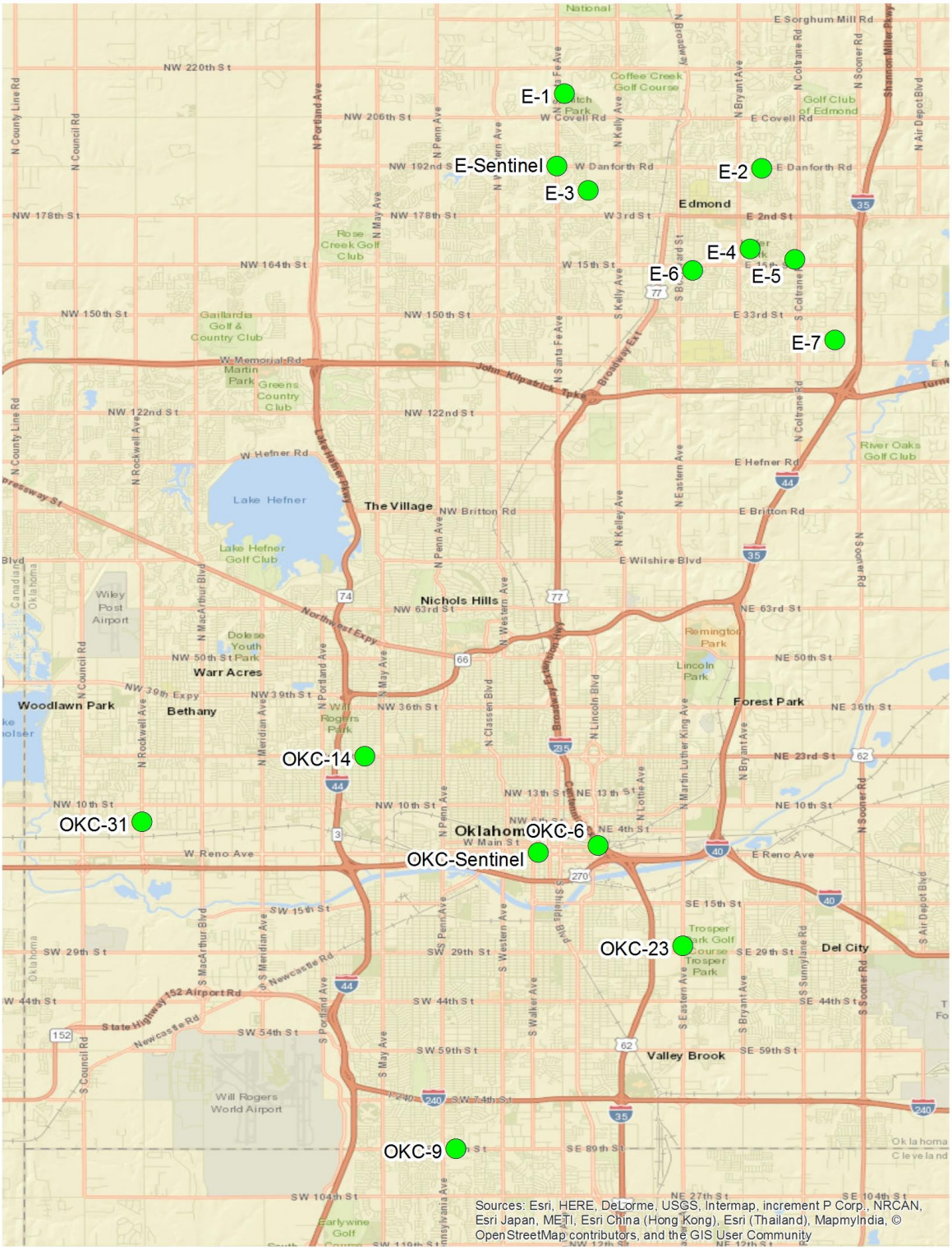
## LESSONS LEARNED AND FUTURE WORK

For the 2017 Mosquito Season, a majority of the lessons learned encompassed the new BG trap with a $CO_2$ tank used to attempt the capture of *Aedes aegypti* mosquitos, if present in OKC-County. Only one such trap was deployed at the NERHWC. To conserve the use of $CO_2$ and prevent the constant replacement of the tank, the trap was set up for 24-hours. The quantity of $CO_2$ varied was measured between 0.5 and 1 kg/day. This amount was based on the user manual specifications. In order to better assess the use of $CO_2$ tanks, future seasons should include more BG traps with $CO_2$. A continued improvement for the program is constant record keeping for ordered supplies as well as the use of the supplies including test strips and larvicide.

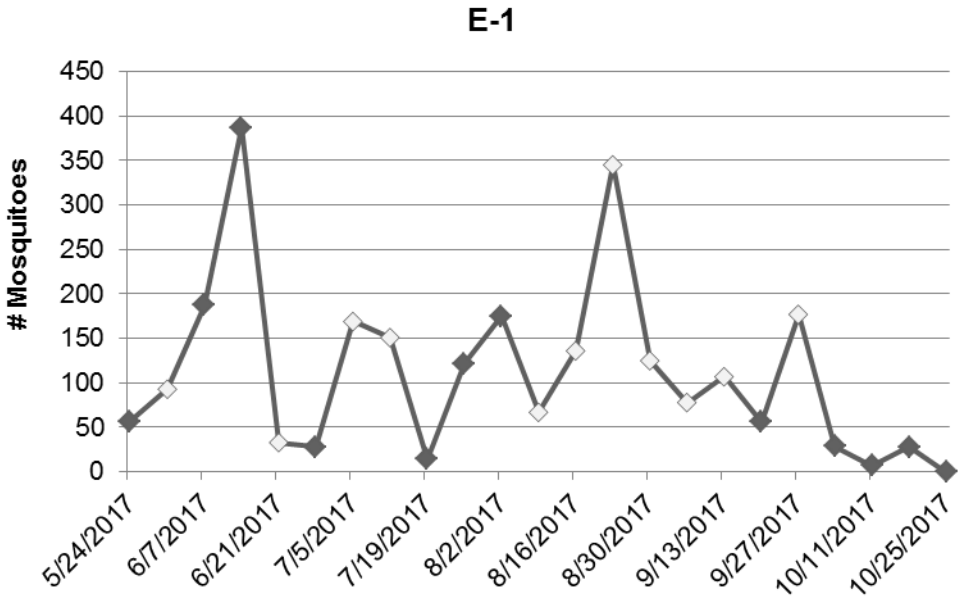
This season, there was the implementation of a mosquito meter that was released to the public each week. This meter used environmental conditions, mosquito abundance, infection rate, consumer complaints, and human cases to determine the activity level. Four different levels were used, to indicate the activity. One possibility for future work is expanding on this meter by using our mosquito data collected since 2013 to develop models used for predicting mosquito numbers or determining which factors are significantly associated with mosquito counts.

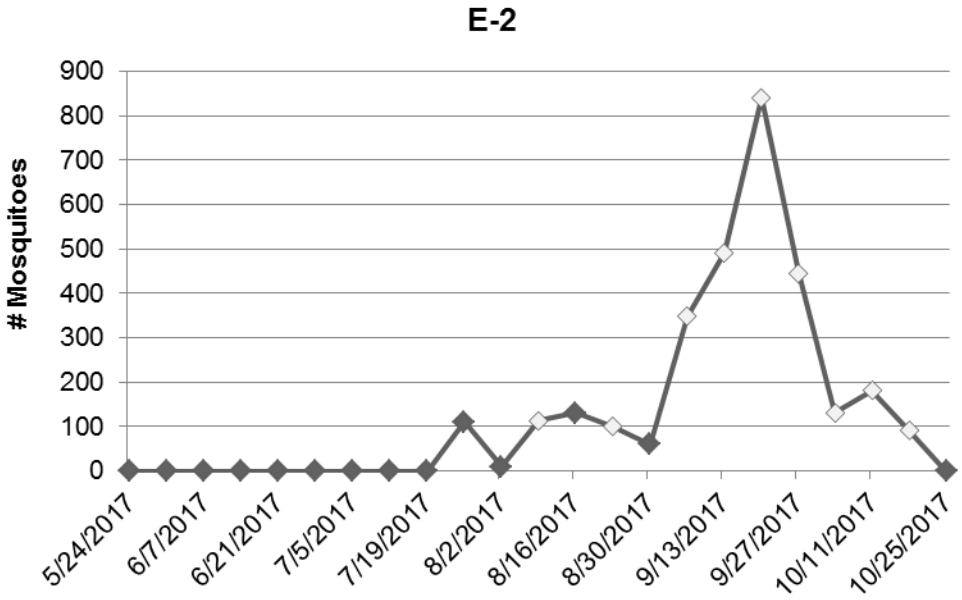
## APPENDIX

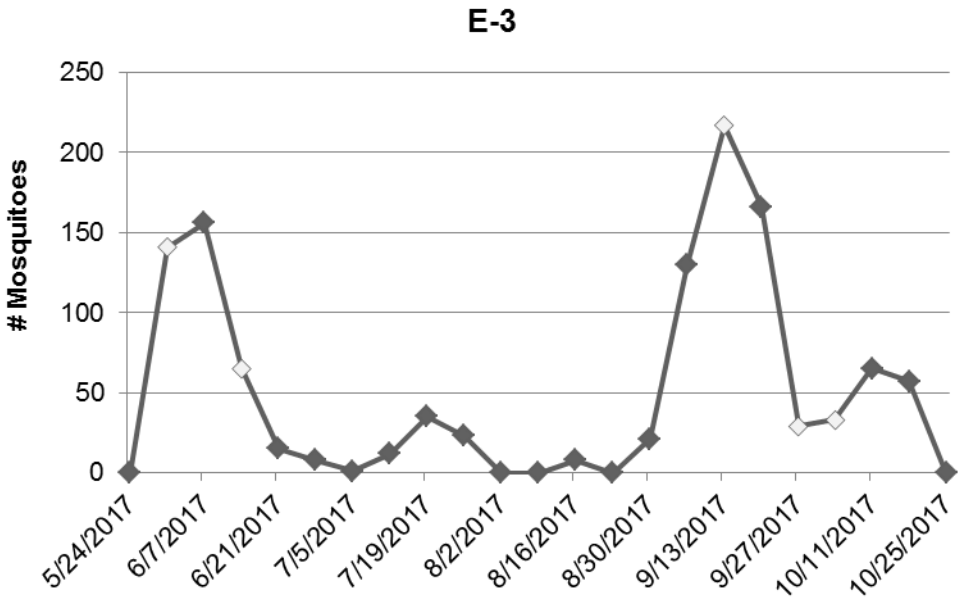
The following map shows the locations of the mosquito traps used in the 2017 season.

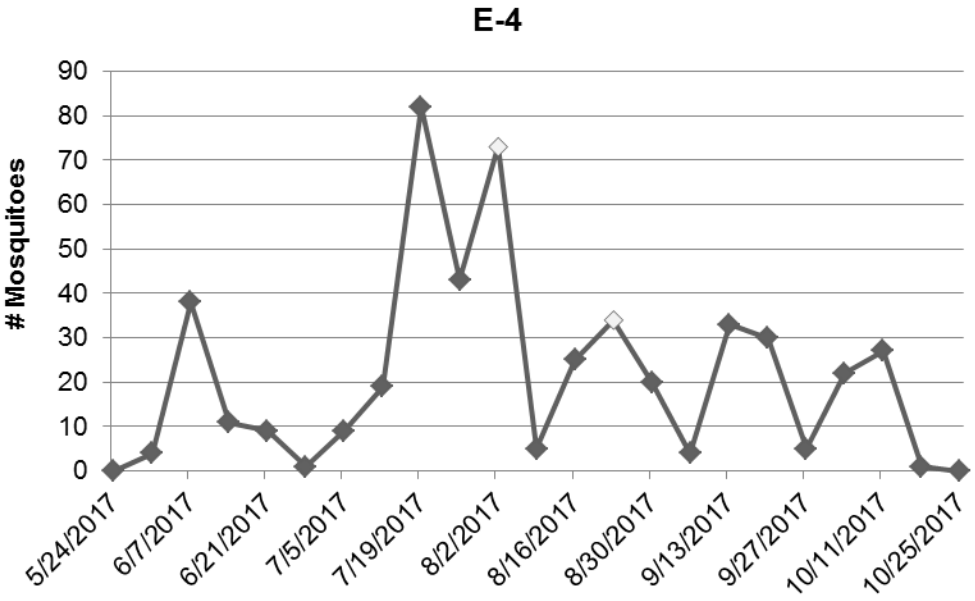


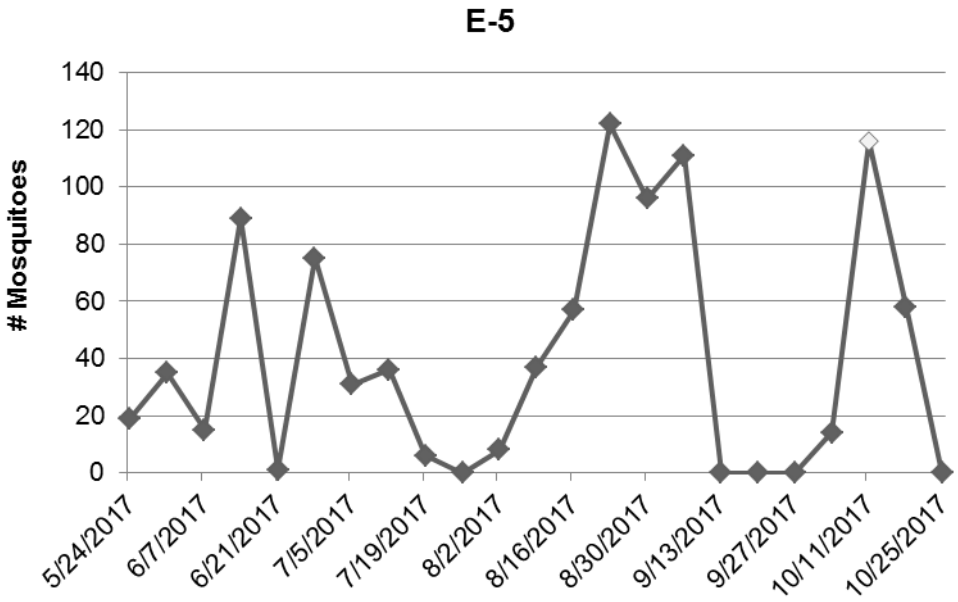
The following line graphs show the date as well as the number of mosquitos captured that week for each site. The data points labeled in white represents a WNV positive result.

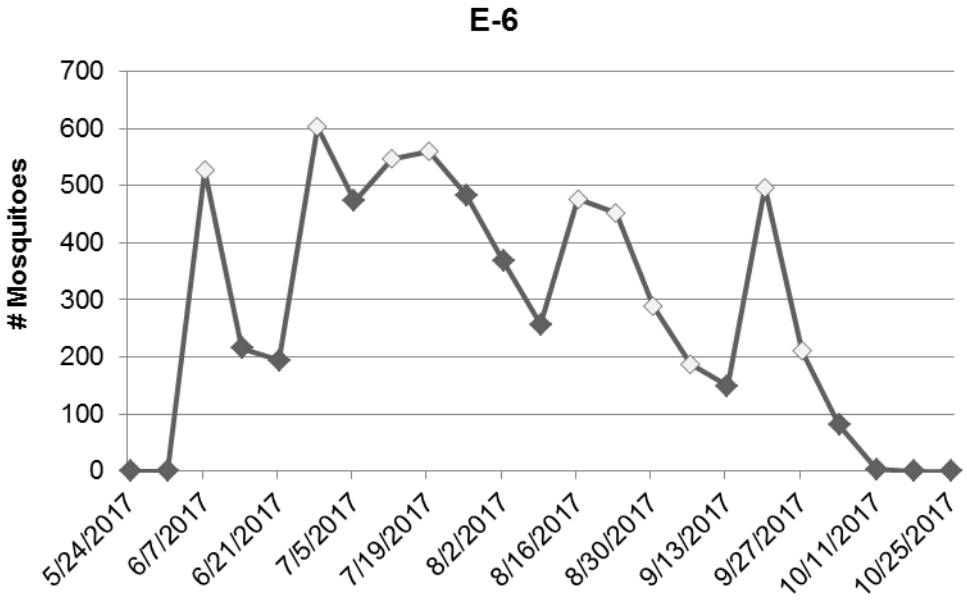


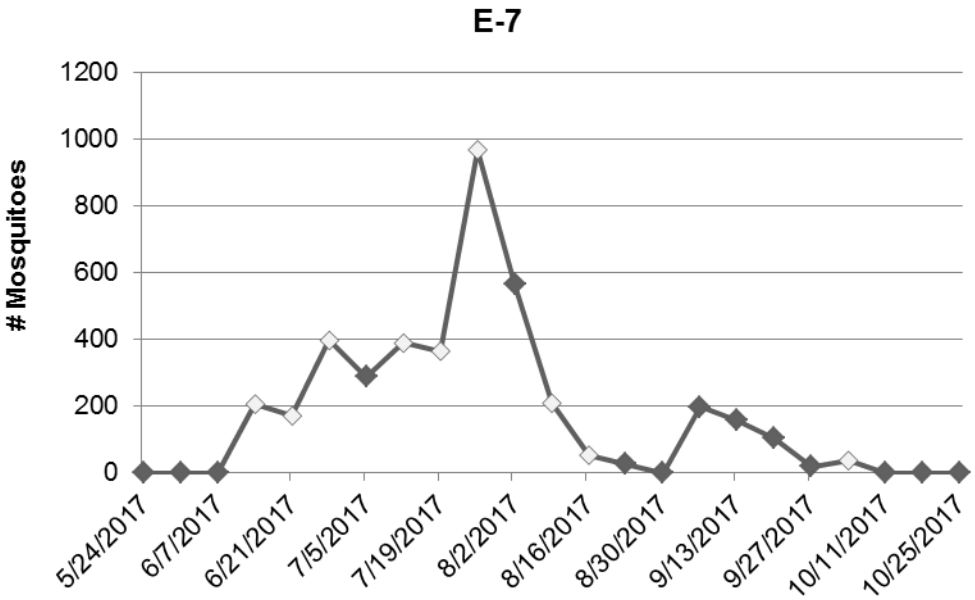



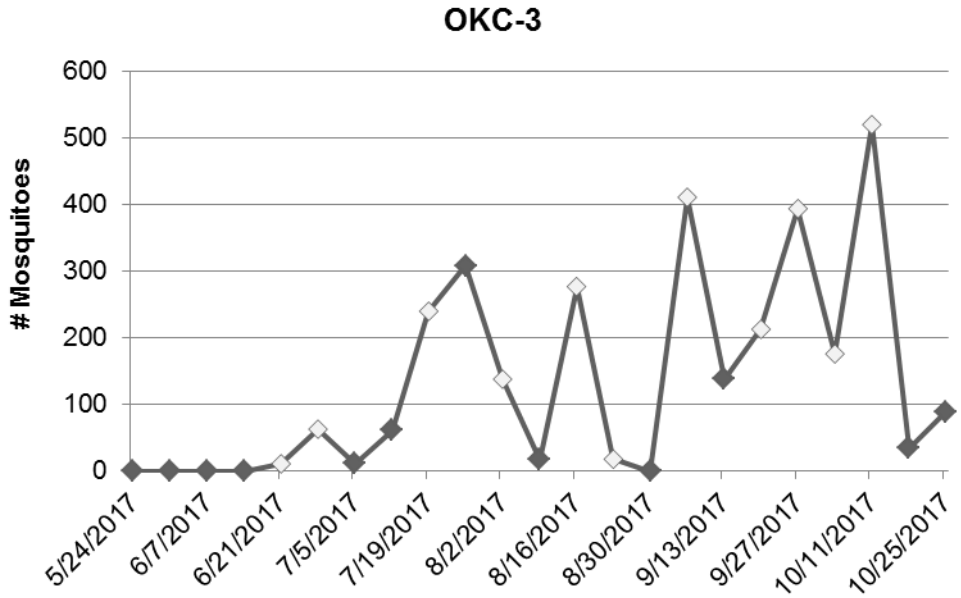

E-3
# Mosquitoes
250
200
150
100
50
0
5/24/2017
6/7/2017
6/21/2017
7/5/2017
7/19/2017
8/2/2017
8/16/2017
8/30/2017
9/13/2017
9/27/2017
10/11/2017
10/25/2017

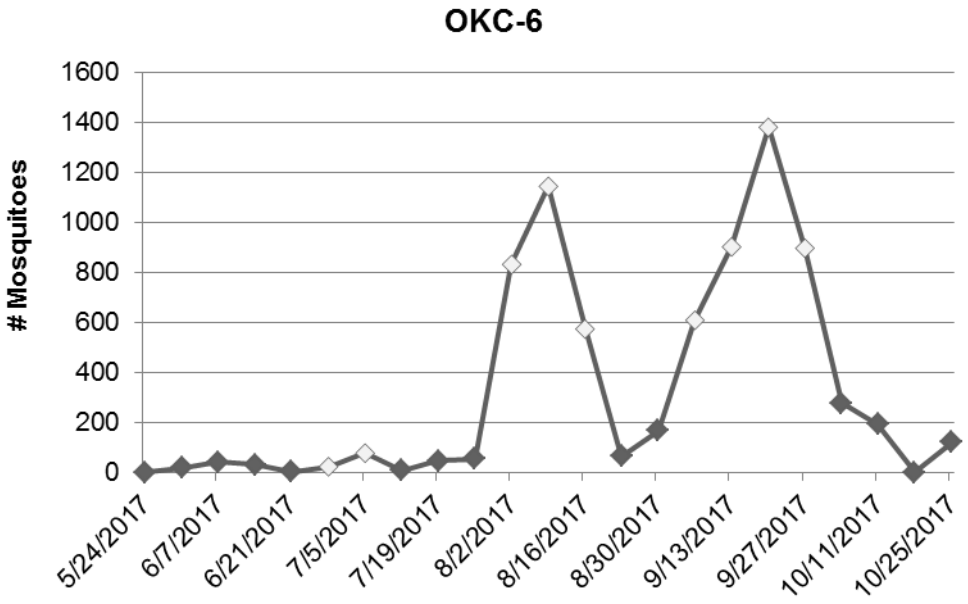

E-4
# Mosquitoes
90
80
70
60
50
40
30
20
10
0
5/24/2017
6/7/2017
6/21/2017
7/5/2017
7/19/2017
8/2/2017
8/16/2017
8/30/2017
9/13/2017
9/27/2017
10/11/2017
10/25/2017

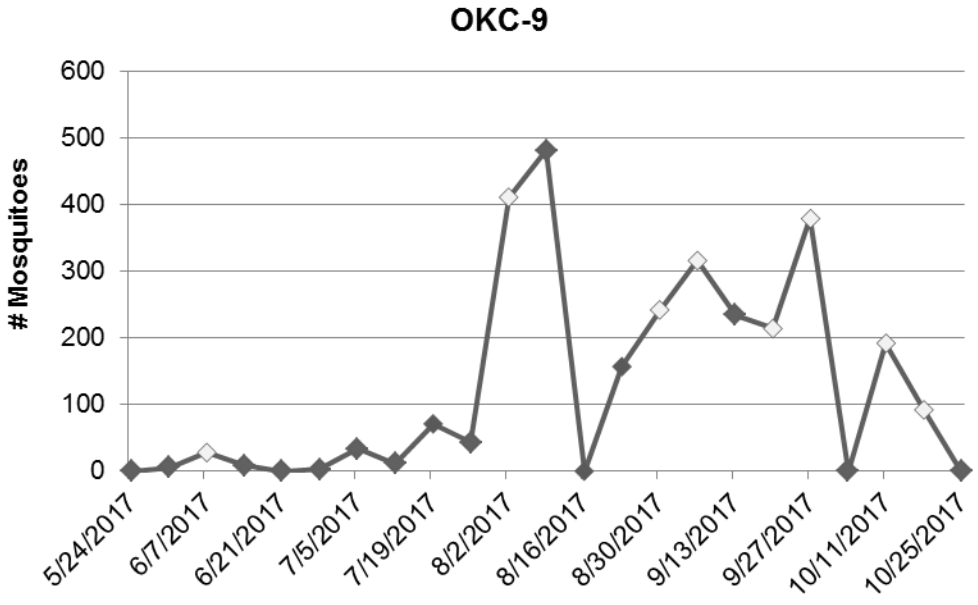

E-5
# Mosquitoes
140
120
100
80
60
40
20
0
5/24/2017
6/7/2017
6/21/2017
7/5/2017
7/19/2017
8/2/2017
8/16/2017
8/30/2017
9/13/2017
9/27/2017
10/11/2017
10/25/2017

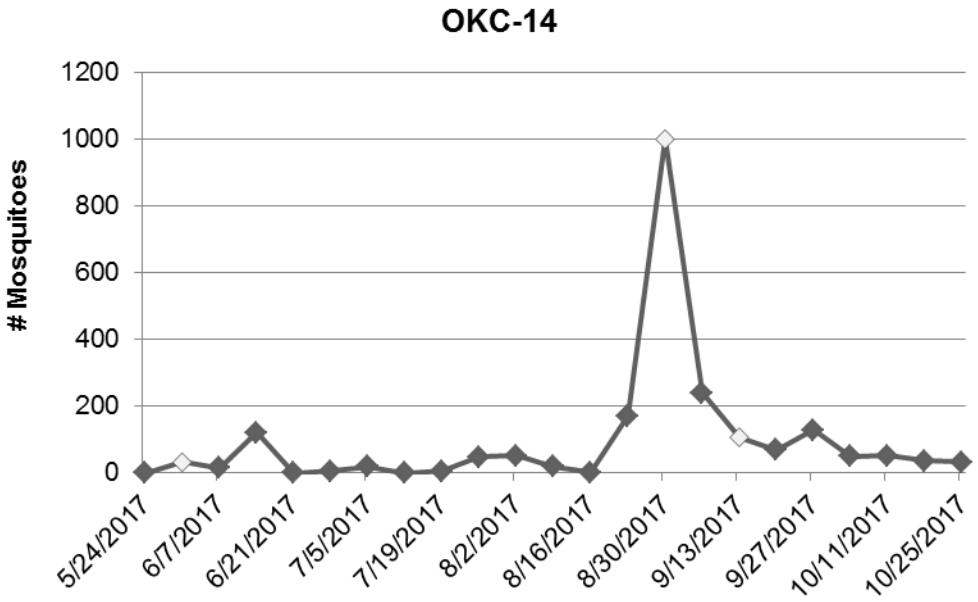

E-6
# Mosquitoes
700
600
500
400
300
200
100
0
5/24/2017
6/7/2017
6/21/2017
7/5/2017
7/19/2017
8/2/2017
8/16/2017
8/30/2017
9/13/2017
9/27/2017
10/11/2017
10/25/2017

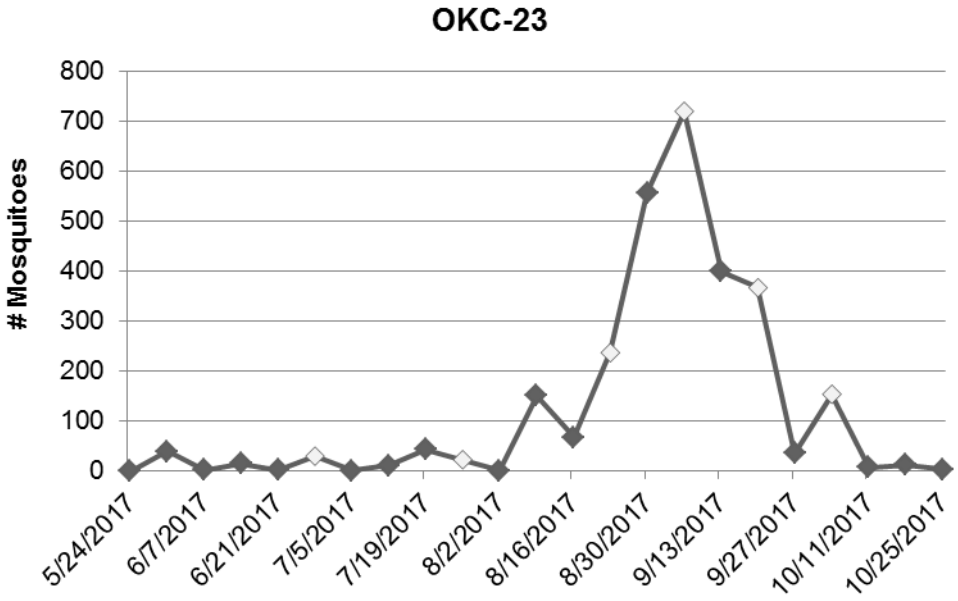

E-7
# Mosquitoes
1200
1000
800
600
400
200
0
5/24/2017
6/7/2017
6/21/2017
7/5/2017
7/19/2017
8/2/2017
8/16/2017
8/30/2017
9/13/2017
9/27/2017
10/11/2017
10/25/2017

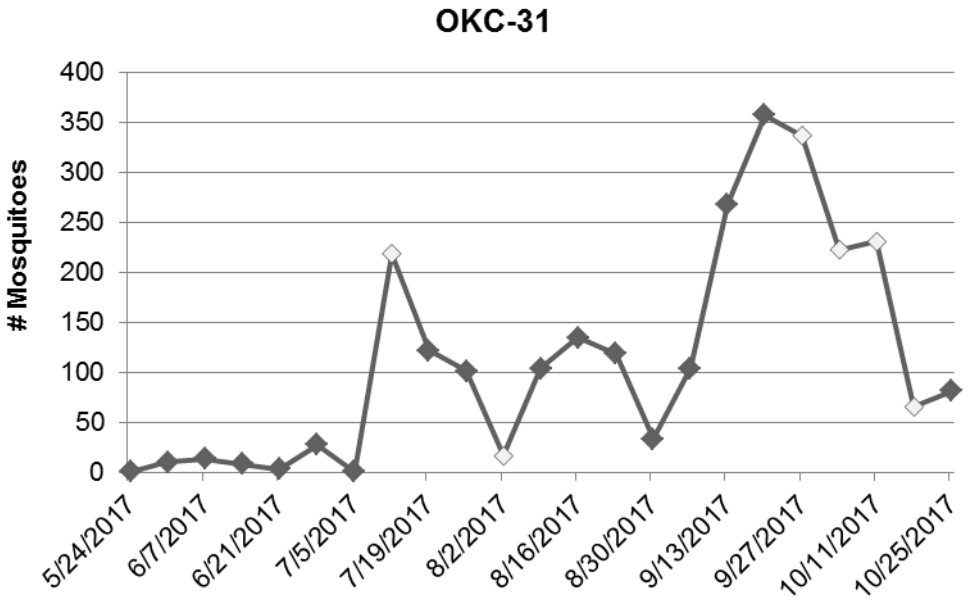

OKC-3
# Mosquitoes
600
500
400
300
200
100
0
5/24/2017
6/7/2017
6/21/2017
7/5/2017
7/19/2017
8/2/2017
8/16/2017
8/30/2017
9/13/2017
9/27/2017
10/11/2017
10/25/2017

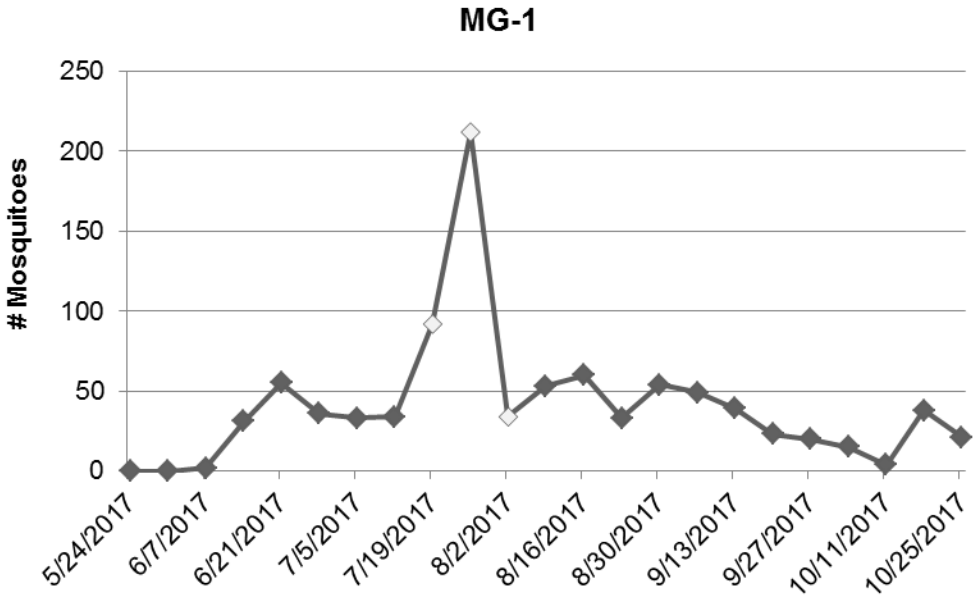

OKC-6
# Mosquitoes
1600
1400
1200
1000
800
600
400
200
0
5/24/2017
6/7/2017
6/21/2017
7/5/2017
7/19/2017
8/2/2017
8/16/2017
8/30/2017
9/13/2017
9/27/2017
10/11/2017
10/25/2017

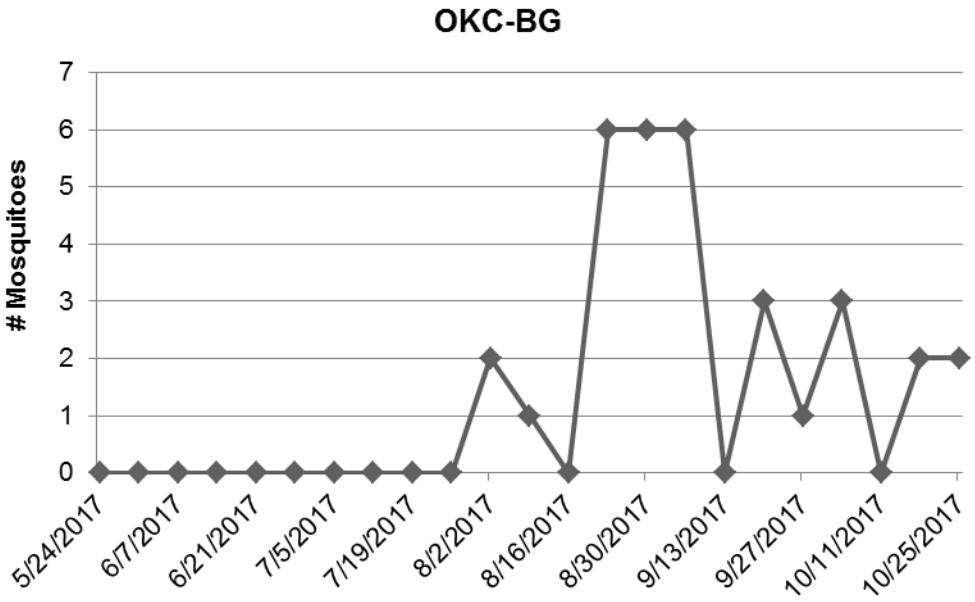

OKC-9
# Mosquitoes
600
500
400
300
200
100
0
5/24/2017
6/7/2017
6/21/2017
7/5/2017
7/19/2017
8/2/2017
8/16/2017
8/30/2017
9/13/2017
9/27/2017
10/11/2017
10/25/2017

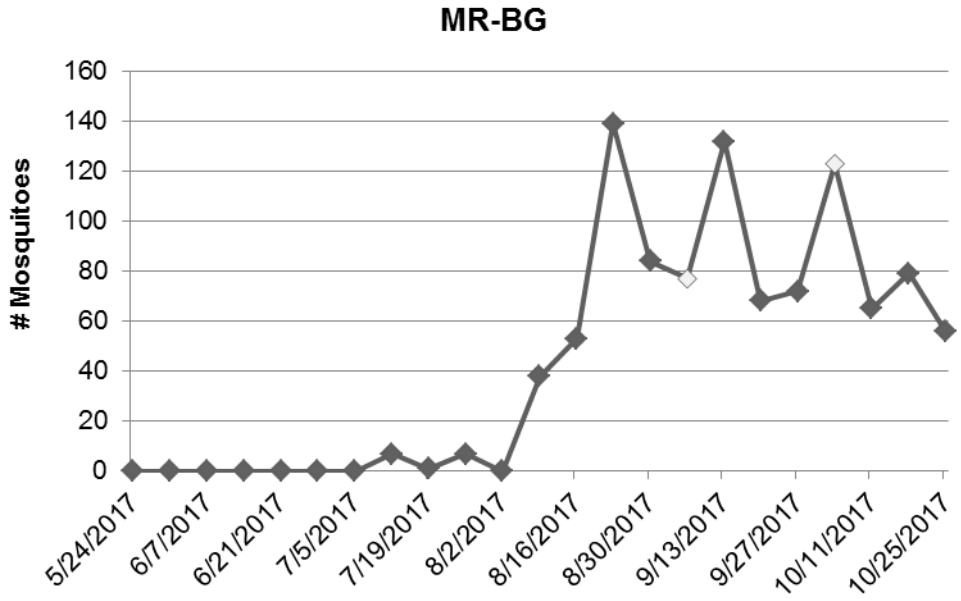

OKC-14
# Mosquitoes
1200
1000
800
600
400
200
0
5/24/2017
6/7/2017
6/21/2017
7/5/2017
7/19/2017
8/2/2017
8/16/2017
8/30/2017
9/13/2017
9/27/2017
10/11/2017
10/25/2017

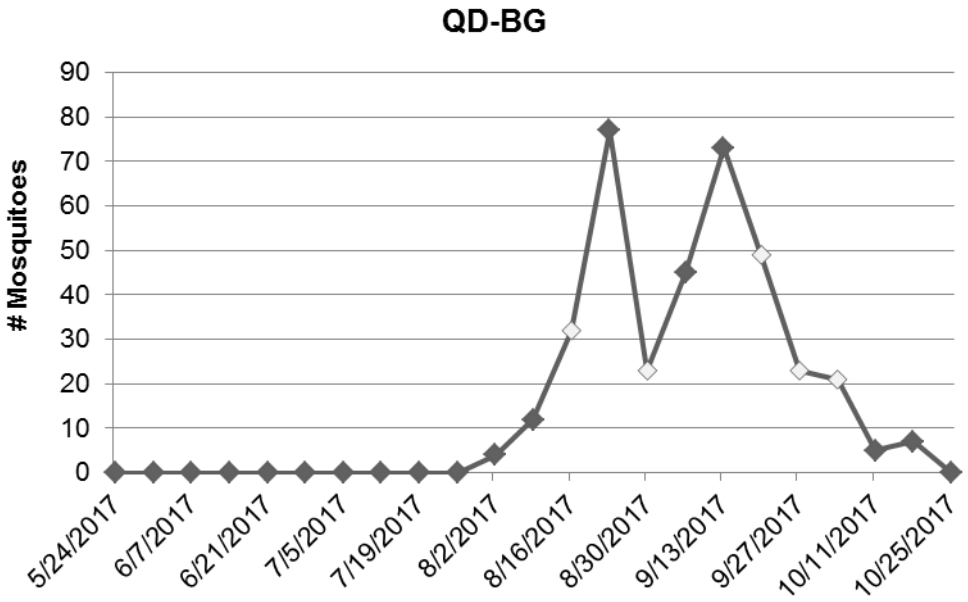

OKC-23
# Mosquitoes
800
700
600
500
400
300
200
100
0
5/24/2017
6/7/2017
6/21/2017
7/5/2017
7/19/2017
8/2/2017
8/16/2017
8/30/2017
9/13/2017
9/27/2017
10/11/2017
10/25/2017


OKC-31
# Mosquitoes
400
350
300
250
200
150
100
50
0
5/24/2017
6/7/2017
6/21/2017
7/5/2017
7/19/2017
8/2/2017
8/16/2017
8/30/2017
9/13/2017
9/27/2017
10/11/2017
10/25/2017


MG-1
# Mosquitoes
250
200
150
100
50
0
5/24/2017
6/7/2017
6/21/2017
7/5/2017
7/19/2017
8/2/2017
8/16/2017
8/30/2017
9/13/2017
9/27/2017
10/11/2017
10/25/2017


OKC-BG
# Mosquitoes
0
1
2
3
4
5
6
7
5/24/2017
6/7/2017
6/21/2017
7/5/2017
7/19/2017
8/2/2017
8/16/2017
8/30/2017
9/13/2017
9/27/2017
10/11/2017
10/25/2017


MR-BG
# Mosquitoes
0
20
40
60
80
100
120
140
160
5/24/2017
6/7/2017
6/21/2017
7/5/2017
7/19/2017
8/2/2017
8/16/2017
8/30/2017
9/13/2017
9/27/2017
10/11/2017
10/25/2017


QD-BG
# Mosquitoes
90
80
70
60
50
40
30
20
10
0
5/24/2017
6/7/2017
6/21/2017
7/5/2017
7/19/2017
8/2/2017
8/16/2017
8/30/2017
9/13/2017
9/27/2017
10/11/2017
10/25/2017

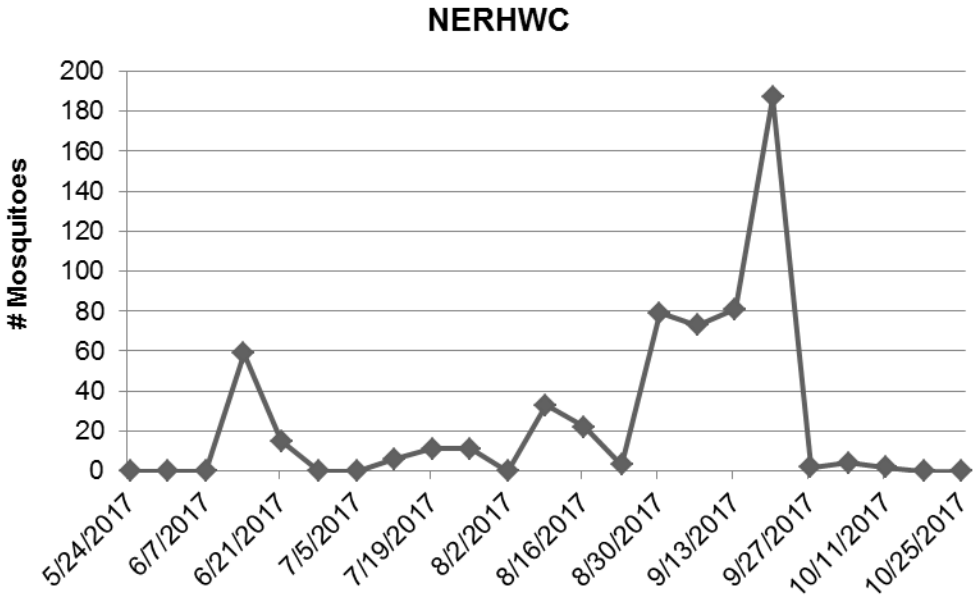

NERHWC
# Mosquitoes
200
180
160
140
120
100
80
60
40
20
0
5/24/2017
6/7/2017
6/21/2017
7/5/2017
7/19/2017
8/2/2017
8/16/2017
8/30/2017
9/13/2017
9/27/2017
10/11/2017
10/25/2017

Table with all mosquitoes number each week for each site. Positive trap sites are in red text. The highlighted cells are weeks where that particular trap was not set up.

**Table 4: Mosquito counts for each trap at each week of the mosquito season**

| | 5/24/2017 | 5/31/2017 | 6/7/2017 | 6/14/2017 | 6/21/2017 | 6/28/2017 | 7/5/2017 | 7/12/2017 | 7/19/2017 | 7/26/2017 | 8/2/2017 | 8/9/2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **E-1** | 57 | 93 | 187 | 387 | 33 | 28 | 169 | 151 | 14 | 122 | 175 | 67 |
| **E-2** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 111 | 10 | 113 |
| **E-3** | 0 | 141 | 156 | 65 | 15 | 8 | 1 | 12 | 35 | 23 | 0 | 0 |
| **E-4** | 0 | 4 | 38 | 11 | 9 | 1 | 9 | 19 | 82 | 43 | 73 | 5 |
| **E-5** | 19 | 35 | 15 | 89 | 1 | 75 | 31 | 36 | 6 | 0 | 8 | 37 |
| **E-6** | 0 | 0 | 527 | 215 | 194 | 603 | 473 | 547 | 560 | 483 | 367 | 257 |
| **E-7** | 0 | 0 | 0 | 206 | 171 | 397 | 288 | 389 | 365 | 968 | 564 | 209 |
| **OKC-3** | 0 | 0 | 0 | 0 | 11 | 63 | 11 | 61 | 240 | 308 | 138 | 17 |
| **OKC-6** | 1 | 20 | 43 | 34 | 4 | 25 | 79 | 9 | 47 | 56 | 833 | 1145 |
| **OKC-9** | 0 | 6 | 28 | 8 | 0 | 3 | 33 | 11 | 71 | 43 | 411 | 481 |
| **OKC-14** | 0 | 32 | 15 | 120 | 0 | 5 | 18 | 0 | 6 | 47 | 52 | 18 |
| **OKC-23** | 0 | 39 | 2 | 15 | 2 | 30 | 1 | 11 | 43 | 23 | 1 | 151 |
| **OKC-31** | 1 | 11 | 14 | 9 | 4 | 28 | 1 | 219 | 122 | 102 | 17 | 104 |
| **OKC-BG** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 |
| **MG-1** | 0 | 0 | 2 | 31 | 55 | 36 | 33 | 34 | 92 | 212 | 34 | 53 |
| **MR-BG** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 1 | 7 | 0 | 38 |
| **QD-BG** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 12 |
| **NERHWC** | 0 | 0 | 0 | 59 | 15 | 0 | 0 | 6 | 11 | 11 | 0 | 33 |

**Table 4 (continued): Mosquito counts for each trap at each week of the mosquito season**

| | 8/16/2017 | 8/23/2017 | 8/30/2017 | 9/6/2017 | 9/13/2017 | 9/20/2017 | 9/27/2017 | 10/4/2017 | 10/11/2017 | 10/18/2017 | 10/25/2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **E-1** | 136 | 345 | 125 | 78 | 107 | 56 | 177 | 29 | 7 | 28 | 0 |
| **E-2** | 131 | 101 | 60 | 349 | 491 | 840 | 445 | 131 | 182 | 92 | 0 |
| **E-3** | 8 | 0 | 21 | 130 | 217 | 166 | 29 | 33 | 65 | 57 | 0 |
| **E-4** | 25 | 34 | 20 | 4 | 33 | 30 | 5 | 22 | 27 | 1 | 0 |
| **E-5** | 57 | 122 | 96 | 111 | 0 | 0 | 0 | 14 | 116 | 58 | 0 |
| **E-6** | 476 | 452 | 289 | 187 | 149 | 496 | 211 | 80 | 3 | 0 | 0 |
| **E-7** | 53 | 26 | 0 | 197 | 157 | 104 | 19 | 37 | 0 | 0 | |
| **OKC-3** | 277 | 18 | 0 | 411 | 138 | 213 | 394 | 176 | 520 | 34 | 88 |
| **OKC-6** | 575 | 67 | 168 | 610 | 903 | 1381 | 898 | 278 | 195 | 2 | 122 |
| **OKC-9** | 0 | 157 | 242 | 316 | 234 | 214 | 379 | 0 | 192 | 92 | 0 |
| **OKC-14** | 1 | 171 | 1000 | 239 | 107 | 69 | 128 | 50 | 52 | 36 | 32 |
| **OKC-23** | 68 | 237 | 557 | 720 | 400 | 367 | 36 | 154 | 7 | 13 | 3 |
| **OKC-31** | 135 | 119 | 34 | 104 | 268 | 357 | 337 | 223 | 231 | 66 | 82 |
| **OKC-BG** | 0 | 6 | 6 | 6 | 0 | 3 | 1 | 3 | 0 | 2 | 2 |
| **MG-1** | 60 | 33 | 54 | 49 | 39 | 23 | 20 | 15 | 4 | 38 | 21 |
| **MR-BG** | 53 | 139 | 84 | 77 | 132 | 68 | 72 | 123 | 65 | 79 | 56 |
| **QD-BG** | 32 | 77 | 23 | 45 | 73 | 49 | 23 | 21 | 5 | 7 | 0 |
| **NERHWC** | 22 | 3 | 79 | 73 | 81 | 187 | 2 | 4 | 2 | 0 | 0 |