

TUSCOLA COUNTY MOSQUITO ABATEMENT



2023 ANNUAL REPORT

2024 PROGRAM PLAN

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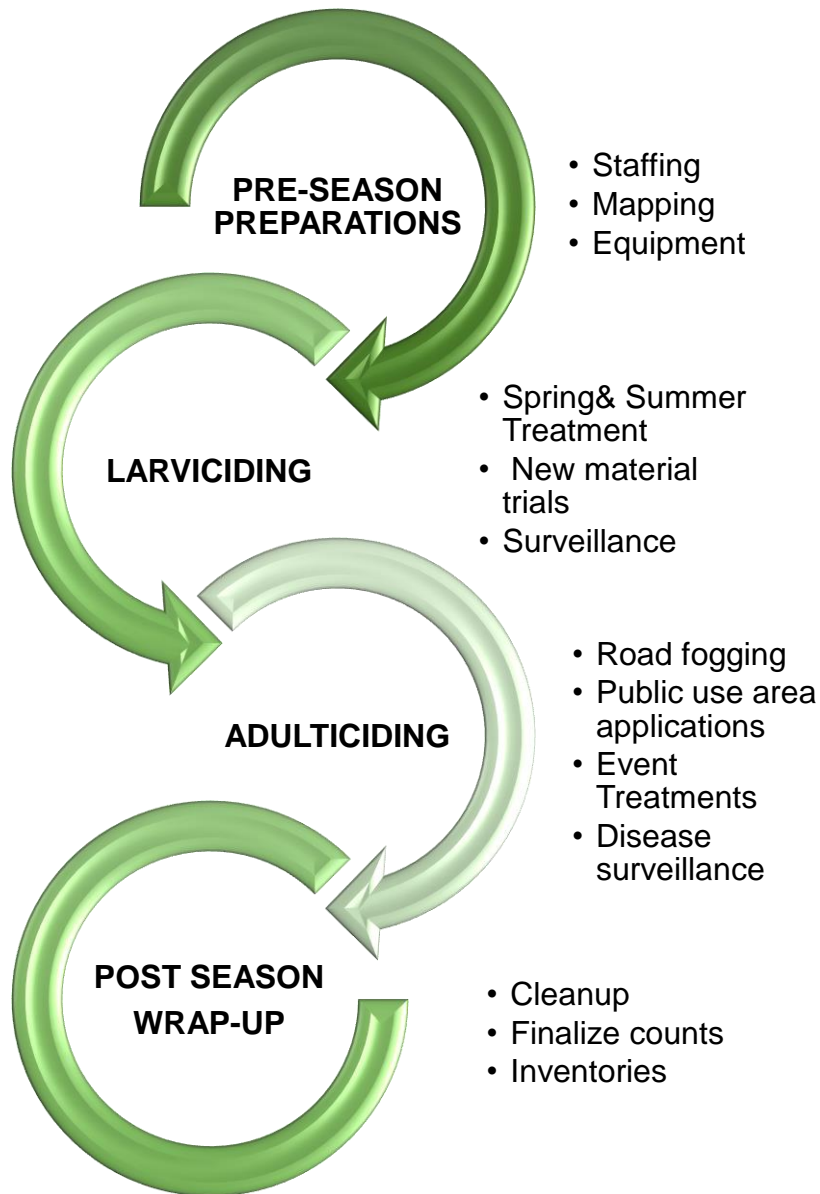
Mike Putnam

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Ronald Turner

Brandy Wynn

TCMA TIMELINE & HIGHLIGHTS



ORGANIZATION

The Tuscola County Mosquito Abatement (TCMA) district was originally formed in 1997, after a millage proposal was passed by the citizens of Tuscola County. In August 2020, a six year renewal was passed with overwhelming support. Funding for the 2023 mosquito control season was collected during the winter of 2022 taxes, at a rate of 0.65 mils.

Tuscola County is currently one of four counties in Michigan with a formal comprehensive mosquito control program. TCMA is a county governmental agency, which serves to control nuisance and disease vectoring mosquitoes.

A Technical Advisory Committee (TAC), which is composed of some of Michigan's leading biologists, entomologists, conservationists, and scientists review TCMA's program every March.

Mosquito Abatement is based on Integrated Pest Management (IPM) practices. IPM is generally broken down into five categories or steps. These steps include:

- Identification of the pest
- Understanding the biology of the pest
- Monitoring the pest
- Developing sound goals to manage the pest
- Implementation of an IPM program

Biological surveillance, disease surveillance, product evaluations, field operations, and public education are included in this program.



STAFFING

Tuscola County Mosquito Abatement employed 21 seasonal positions and four full time staff in the 2023 season.

All TCMA technicians are required to have a MDA Certified Pesticide Applicators License (with a mosquito specific – 7F endorsement).

Newly hired staff, and those in need of re-certifying, are given study materials to review prior to testing. At this time, the Michigan Department of Agriculture has made all testing virtual through Metro Institute.

Once newly hired staff have passed all testing requirements, several days of training are provided to help technicians become familiar with equipment and operations.

Beginning with our annual spring treatment of flooded woodlots, all technicians will be working the day shift, 8:00am to 4:00 pm. When night time fogging begins, we split our crew and a night shift will be added from 5:00pm to 1:00am.



SAFETY & EDUCATION

Michigan regulations require commercial applicators to pass two exams. One exam confirms practical knowledge of Core pesticide use and safety. The other exam is category specific to Mosquito Control-7F.

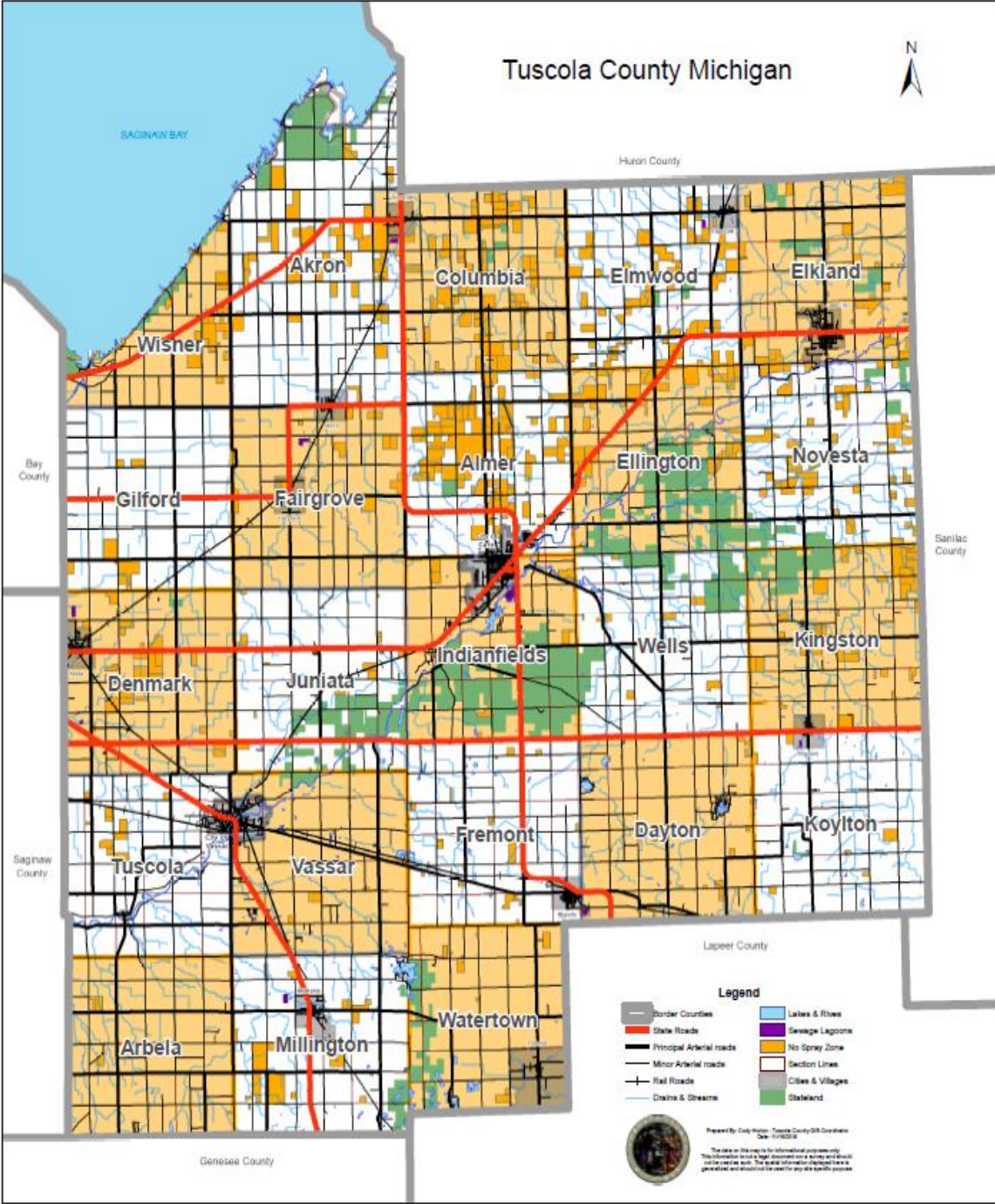
These exams require comprehension of pesticide label and labeling, safety and hazards, first aid, personal protective equipment use, and emergency response. Study manuals provide information about pesticides in the environment, pest identification and management, pesticide formulations, pesticide application equipment, application techniques, and laws and regulations.

All technicians employed at TCMA have successfully taken and passed both of these exams. This ensures all technicians are trained appropriately in knowledge and safety before going out into the field.

**STUDY
MODE**



TUSCOLA COUNTY MAP

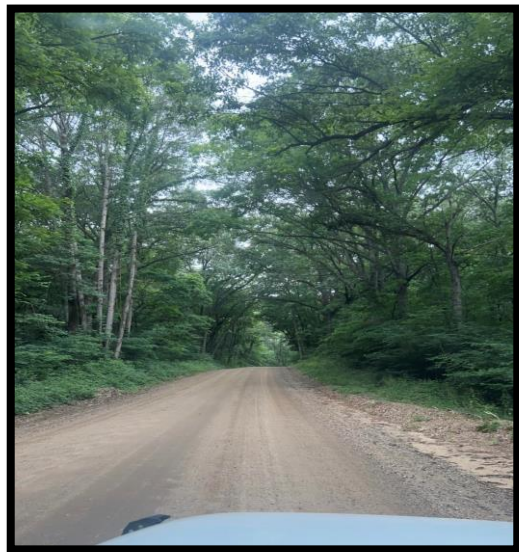


LONG DRIVEWAY PROGRAM

We realize that many homes in Tuscola County are set back from the county road and therefore, are subsequently shielded from the effect of the road-side aduclticing operations. If requested by the owner, their property will be reviewed to see if it meets the criteria. If the property does meet the established requirements, it will be placed on our Long Drive Program. The drive, at that time, will be marked with our long drive stake that has a reflective band at the top. These stakes are placed by our technicians. (We do ask the homeowners to remove them during the winter months to avoid possible damage from snow plows etc.). By placing these stakes at the end of the drives, our technicians are able to see the reflective band and treat the drive as required.

The criteria for a home to be placed on the Long Drive Program are:

- There must be a primary residence on the property and the front of the home must be 300 ft. or greater from the roadway.
- There must be an adequate turnaround for our trucks that does not require driving across any lawn areas.
- The drive must be passable with two-wheel drive vehicles.
- The drive must have significant vegetation that provides areas for mosquito harborage.



In 2023, we held our open enrollment for the long driveway program from March through April.

Tuscola County currently has 575 residents enrolled in this program.

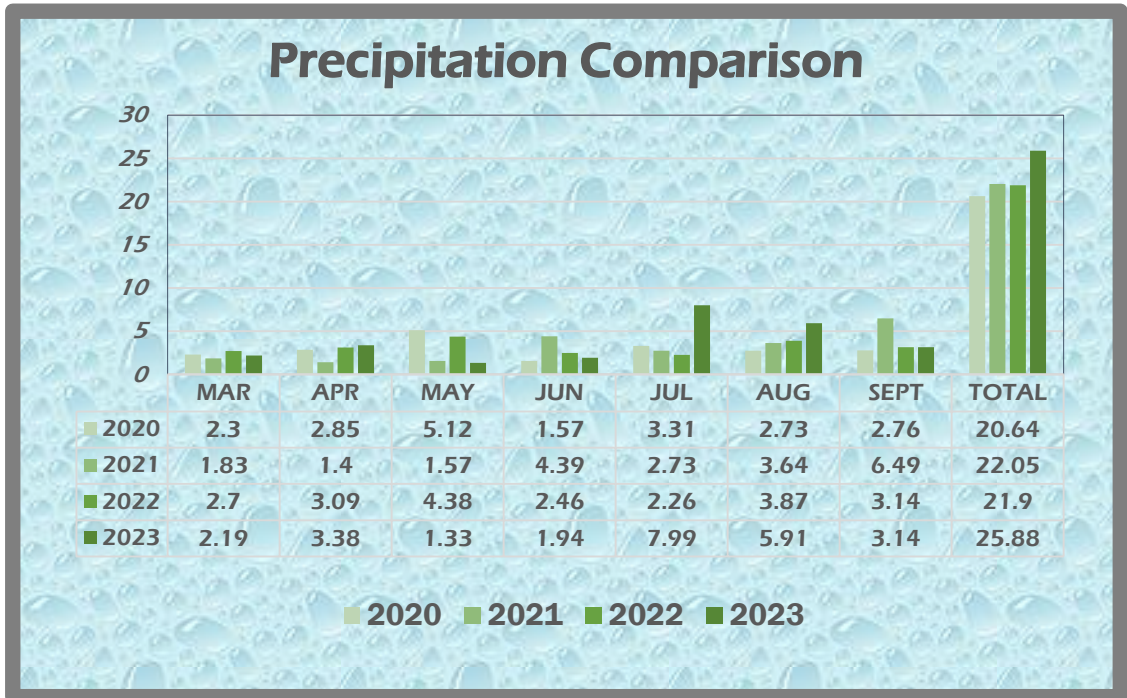
WEATHER DATA

Weather plays a very important role in determining our mosquito population.

Rain events that cause flooding or standing water create breeding areas that will result in a hatch of mosquitoes.

The 2023 season began relatively dry. On Monday April 3rd, TCMA began treatments of flooded woodlots.

Overall, the county received 25.88 inches of rainfall this season, making it much wetter than the last three years. Monitoring the weather is a daily event due to the fact that all treatment techniques are weather dependent.



OPERATIONS

Mosquito Abatement strives to keep residents safe from mosquito-borne disease by reducing the mosquito population in our county.

This is done through various forms of treatment, typically beginning in late March, when we begin surveillance and treatment of the flooded woodlots with ground crews.

Once adult mosquitoes are present, usually in mid May, we introduce our second shift of technicians. They will begin to conduct routine roadside fogging and yard treatments for homeowners, when requested.

Early summer larviciding will include routine surveillance and treatment of ditches, catch basins, and sewage lagoons. Later in the season we will conduct surveillance and treat cross country ditches.



We maintain public use areas such as parks, campgrounds, trails, conservation clubs, golf courses, and schools on a weekly schedule during the season. This is to keep our citizens safe from disease carrying mosquitoes.

Residents may request yard treatments for special events such as weddings, parties, etc. We also provide treatment for the many festivals that occur throughout the county.

TREATMENT SITES

MATERIAL	TREATMENT SITE
BVA (Mosquito Larvicide Oil) (highly refined petroleum distillate)	Swamps, Flooded Woodlots, Flooded Fields
Kontrol 4-4 (permethrin)	Roadside fogging, Public Use Areas, Private Property
Four Star Briquets 90 Day (Bacillus sphaericus 6% Bacillus thuringiensis 1%)	Retention Pools
Mavrik (Tau-fluvalinate)	Select Private Property
Mosquito Dunks (Bacillus thuringiensis)	Small water hole, artificial containers
VectolexFG(Bacillus sphaericus)	Catch Basins
Suspend Polyzone (Deltamethrin)	Select Private Property
VectoBac G (Bacillus thuringiensis)	Flooded Woodlots, Artificial Containers, Tires, Ponds
VectoBac 12AS (Bacillus thuringiensis)	Roadside Ditches, Retention Ponds

SPRING / SUMMER LARVICIDING

We begin in the early spring with the treatment of flooded woodlots.

This is done by our technicians, using hand held spreaders to deliver granular BTI or a backpack sprayer to deliver mosquito larvicide oil to the flooded areas.

We utilize a citizen tracking database, which allows us to keep a historical record of homeowners and locations throughout the county, with woodlots that may require treatment in the spring.

Biology staff and larviciding crews conducted routine surveillance and quality control on 2,424, flooded woodlot sites during the 2023 season, compared to 2,067 last season. In 2023 there was no delay in starting the season, so we were very pleased our crews were able to treat on schedule.



Tuscola County is home to nine sewage lagoons. Many of these areas have been known to be breeding sites. Each of these sites were checked routinely and treated throughout the 2023 season, using liquid BTI (VectoBac® 12 AS) and BTI (VectoBac® G). Catch Basins are typically treated 2-3 times throughout the season using VectoLex FG, but with the rain keeping the drains flowing we did not treat any catch basins this year.

In addition, larviciding is also performed in the cross country ditches, flooded fields and artificial containers as needed using BTI (VectoBac® G).

ADULTICIDING



Tuscola County is made up of 23 townships. Each township is assigned a technician that will perform roadside fogging throughout the season.

Tuscola County currently has 850 “NO Spray” areas. These areas are organic farms or beekeepers, as well as residents who wish not to be treated. We utilize the FieldWatch site to help us stay current with new fields or beehives.

Assigning a technician to a specific township, allows them to become familiar with these special conditions. No Spray signage is checked at the beginning of every season to replace or post signs where needed.

Treatment route maps are updated routinely during the season, utilizing updates received from FieldWatch and our county citizens.

Kontrol 4-4 (Permethrin) is applied at 4.5oz. per minute, with truck mounted ULV units. Treatment is also conducted on a routine basis in all public use areas (parks, golf courses, schools, campgrounds, rail trails, gun clubs and archery clubs) using our Kawasaki Mule, equipped with a ULV unit. For treatment to be effective, temperatures must be above 50 degrees and winds below 10 miles per hour.

Citizens requesting treatment of their property are treated using a hand held thermal fogger or ULV backpack sprayer.

ROADSIDE DITCH TREATMENT

TOWNSHIPS	MILES DRIVEN	GALLONS USED
AKRON	262	180
ALMER	161	105
ARBELA	332	385
COLUMBIA	159	120
DAYTON	165	283
DENMARK	184	161
ELKLAND	280	140
ELLINGTON	170	185
ELMWOOD	158	115
FAIRGROVE	189	225
FREMONT	333	400
GILFORD	170	140
INDIANFIELDS	165	130
JUNIATA	163	110
KINGSTON	148	180
KOYLTON	297	455
MILLINGTON	169	160
NOVESTA	312	205
TUSCOLA	155	205
VASSAR	183	230
WATERTOWN	280	280
WELLS	374	440
WISNER	90	75

ROADSIDE TRUCK FOGGING

TOWNSHIP	MILES DRIVEN	GALLONS USED
AKRON	1711	242.91
ALMER	1184.5	255.32
ARBELA	1975.9	322.81
COLUMBIA	230.3	23.01
DAYTON	1880.19	351.39
DENMARK	828.4	131.83
ELKLAND	1143.7	269.12
ELLINGTON	863.44	234.68
ELMWOOD	1039.1	136.45
FAIRGROVE	919	142.22
FREMONT	1666.1	416.05
GILFORD	843.6	136.24
INDIANFIELDS	2809.21	446.47
JUNIATA	1070.83	285.77
KINGSTON	1805.5	280.52
KOYLTON	1829.1	330.96
MILLINGTON	1571.3	399.14
NOVESTA	1130.7	169.85
TUSCOLA	968.1	258.1
VASSAR	3013	576.07
WATERTOWN	1403.6	270.71
WELLS	1633.5	274.25
WISNER	963.9	179.81

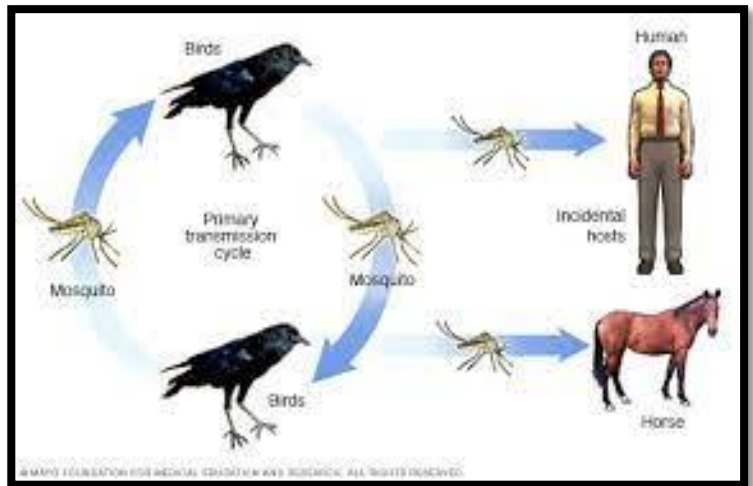
SURVEILLANCE & DISEASE



TCMA uses four types of traps to collect mosquitoes for surveillance. Mosquitoes caught in these traps are sorted and identified. The species that are more likely to be involved in disease transmission, are selected from the sorted groups for testing. These tests are used to check for the presence of the four most common mosquito-borne diseases in our area; West Nile Virus (WNV), St. Louis Encephalitis (SLE), Jamestown Canyon Virus (JCV) and Eastern Equine Encephalitis (EEE). This season, TCMA tested a total of 139 mosquito pools for disease.

Within those mosquito pools, 89 were sent to MDHHS for testing and only 5 tested positive for WNV. All other mosquito-borne diseases remained undetected throughout the season.

West Nile Virus (WNV) is a virus known to be the leading cause of mosquito-borne disease in the United States. This virus is commonly spread to humans by the bite of an infected mosquito, however once the virus infects a human it can not be spread to either other humans or back to mosquitoes. This is because humans are considered “dead end hosts”, meaning



that the concentration of the virus in their bloodstream is usually insufficient to infect mosquitoes. Therefore, the cycle is broken and a dead-end has been created. Below you can see the WNV cycle and how mosquitoes become infected.

IN-HOUSE TESTING RESULTS

TCMA Lab tested the 50 remaining mosquito pools in-house using the VecTOR Test Kit. This kit tests for WNV, EEE and SLE viruses. Of the 50 pools tested, all came back negative for these specified viruses.

The lab conducts in-house testing on dead birds that have been turned in by our county residents using the same VecTOR Test Kit. This season, we had no birds turned in to be tested.



<http://www.vectortest.com/index.html>


MDHHS SUMMARY REPORT

Arbovirus* Activity, Including West Nile Virus and Eastern Equine Encephalitis:


Weekly Summary, Michigan 2023

*Arboviruses are viruses transmitted by mosquitoes or other insects

Updated: November 17, 2023

134 


Mosquito pools testing positive for arbovirus infection

26 

Animals testing positive for West Nile virus infection

2 

Animals testing positive for Eastern Equine Encephalitis

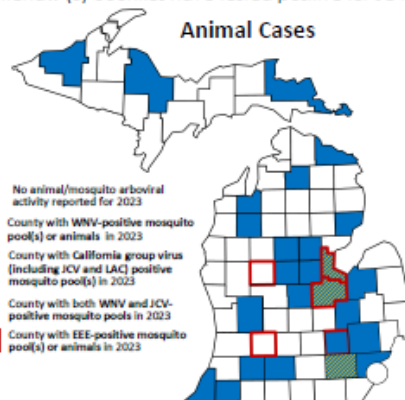
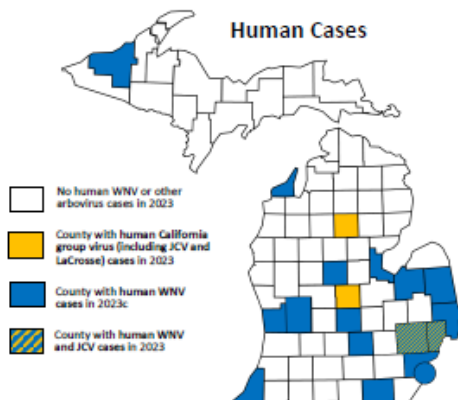
25 

Human cases of West Nile virus or other arboviruses reported

2023 Michigan Arbovirus Surveillance	
Total Number of Mosquito Pools Tested	6,351
Total Number of Mosquitoes Tested	119,236
Positive Mosquito Pools	134
Pools positive for EEE	4
Pools positive for WNV	124
Pools positive for JCV	6
Animal Arbovirus cases	28
Human Arbovirus cases	25
Human JCV cases	4
Human WNV cases	21

Highlights

- Twenty-one Michigan residents from Bay (1), Berrien(1), Clinton (1), Ingham (1), Isabella (1), Kent (2), Leelanau (1), Lenawee (1), Macomb (1), Oakland (1), Ontonagon (1), Ottawa (2), St. Clair (2), Sanilac (1), Tuscola (1), and Wayne (2) counties, and the City of Detroit (1) have tested positive for West Nile virus (WNV).
- Four Michigan residents from Gratiot, Macomb, Oakland, and Roscommon counties have tested positive for Jamestown Canyon virus (JCV).
- One horse from Mecosta County and one deer from Livingston County have tested positive for Eastern Equine Encephalitis virus (EEEV). Four mosquito pools from Bay (2), Barry (1), and Saginaw (1) counties have tested positive for EEEV.
- Twenty-one birds from Cass, Chippewa, Gladwin, Grand Traverse (2), Gratiot, Kent, Livingston, Marquette (3), Presque Isle, Ontonagon, Otsego (2), Saginaw (2), Wayne (3), and Wexford counties; 4 horses from Calhoun, Clare (2), and Isabella counties; and 1 camelid from Berrien County have tested positive for WNV. 124 mosquito pools from Bay (53), Genesee (1), Iosco (1) Kalamazoo (3), Kent (21), Midland (1), Oakland (6), Saginaw (20), Tuscola (5), Washtenaw (3), and Wayne (10) counties have tested positive for WNV.
- Six mosquito pools from Bay (2), Saginaw (1), and Washtenaw (3) counties have tested positive for JCV.



For more information



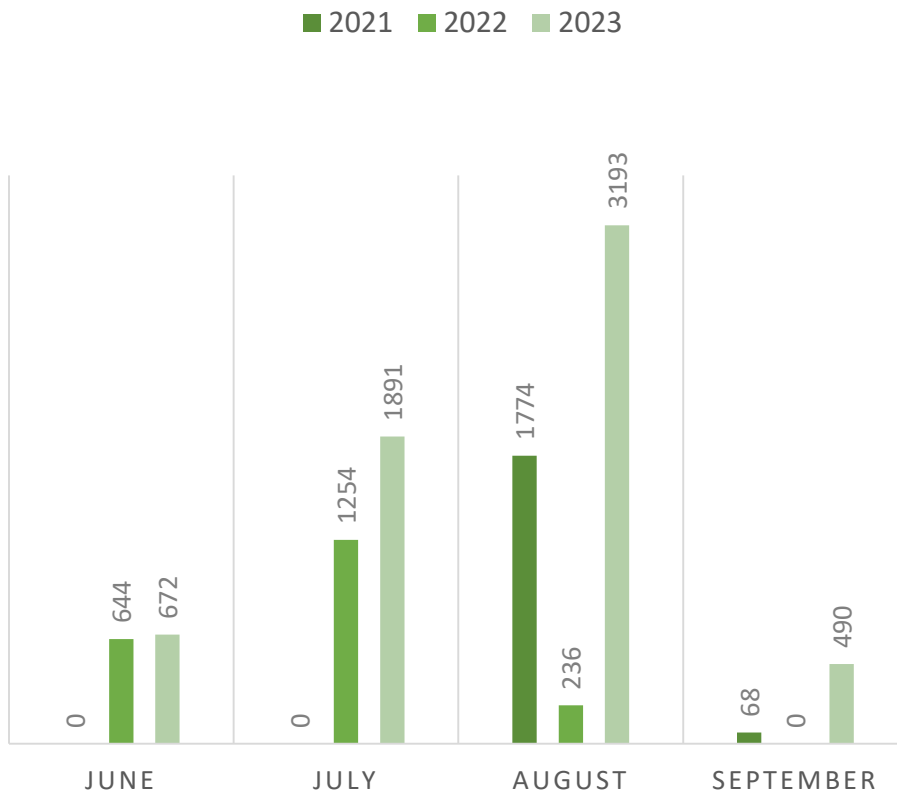
Michigan Department of Health & Human Services
Bureau of Infectious Disease Prevention
Emerging & Zoonotic Infectious Diseases (EZID) Section

www.michigan.gov/westnile

GRAVID TRAPS

Gravid Traps use highly organic water to lure in mosquitoes. These mosquitoes are typically females that have had a blood meal and are looking for a potential place to lay eggs. The mosquitoes collected from these types of traps are generally *Culex pipiens* and *Culex restuans*, that can transmit West Nile Virus. We use mosquitoes from these traps to test for disease.

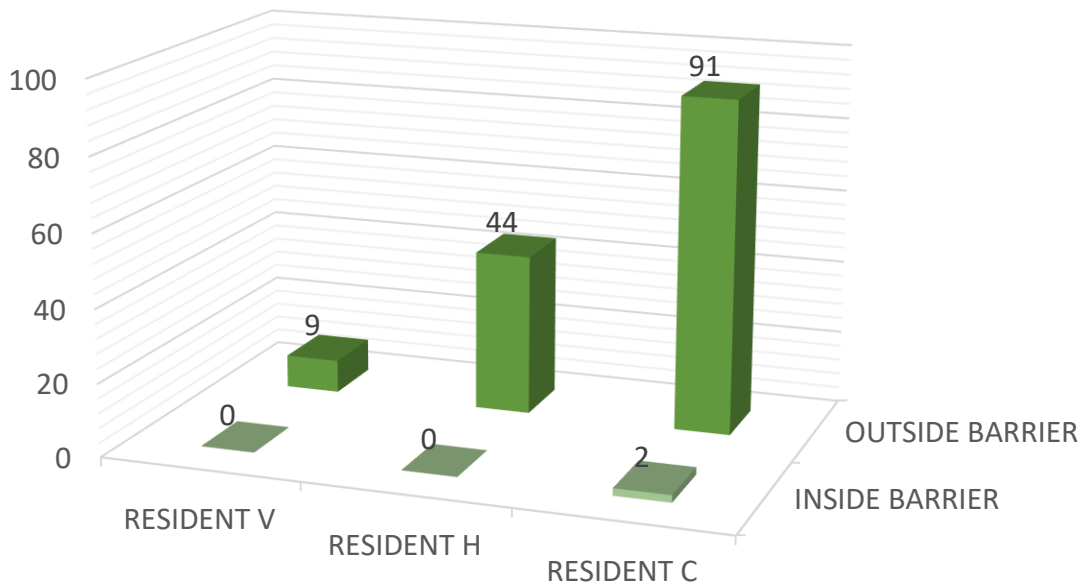
The graph below compares the number of female *Culex* mosquitoes trapped during the 2021, 2022 and 2023 season. As shown, our counts this season were similar to that of last year in June. An increase starts to be noticeable in July, rising above the previous years. This spike continues through August bringing us to our highest count for the season. September counts show mosquito population in trapping areas dropping off drastically. Ending our season with a monthly total of less than 500 mosquitoes captured.



CDC TRAPS

Using a combination of light and CO₂, this trap draws in mosquitoes that are searching for a blood meal. A fan inside the trap pulls the mosquitoes down into a collection chamber.

We use CDC light traps to test for nuisance levels and to see just how effective our barrier treatments are. In order to make sure our treatment methods are still adequate, we place two CDC within a residents yard treatment. One gets placed outside the barrier treatment and the other on the inside. Once we collect and count trapped mosquitoes, we are able to see if there is a significant difference between the two counts. If so, this means that our treatments were effective.



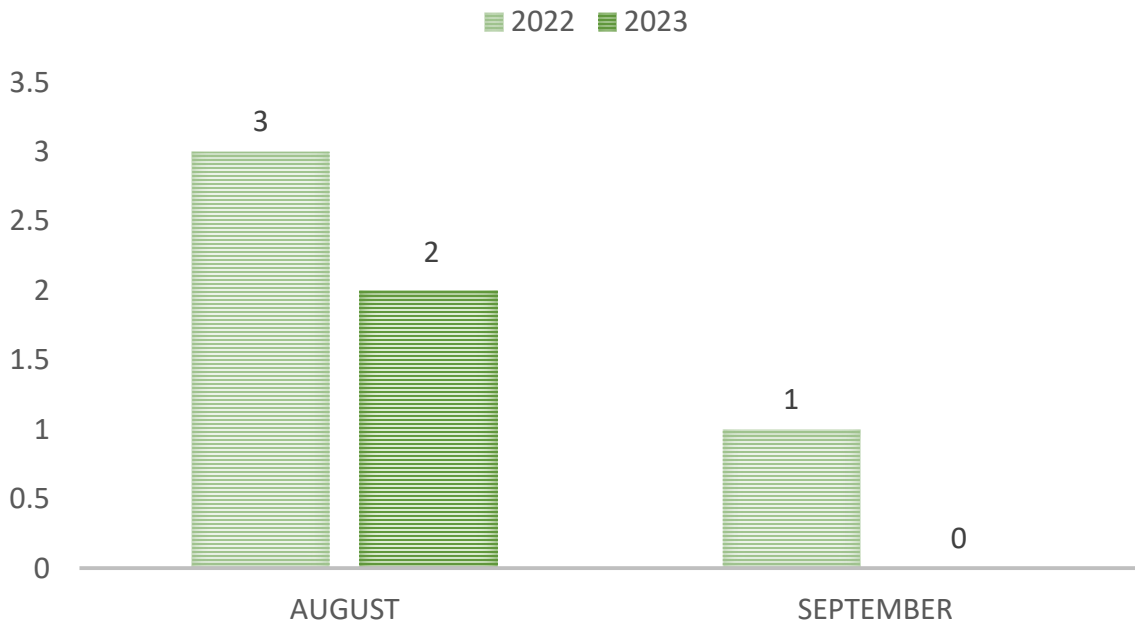
In the chart above, you will see data we were able to record from three different residents' yard treatments. These totals provide proof that our treatments are still very effective.

BG-GAT TRAP

The BG-GAT trap is primarily used to trap for specific mosquitoes, such as the *Aedes albopictus* (Asian tiger) and *Aedes aegypti* (yellow fever) mosquitoes. Like the Gravid trap, this trap also draws in already fed female mosquitoes that are looking for a suitable place to lay eggs. A solution of water and highly organic matter is placed in the bottom of the bucket to lure these mosquitoes in. Once inside, the mosquitoes are trapped on a sticky surface. We then remove the sticky trap to examine the mosquitoes caught.

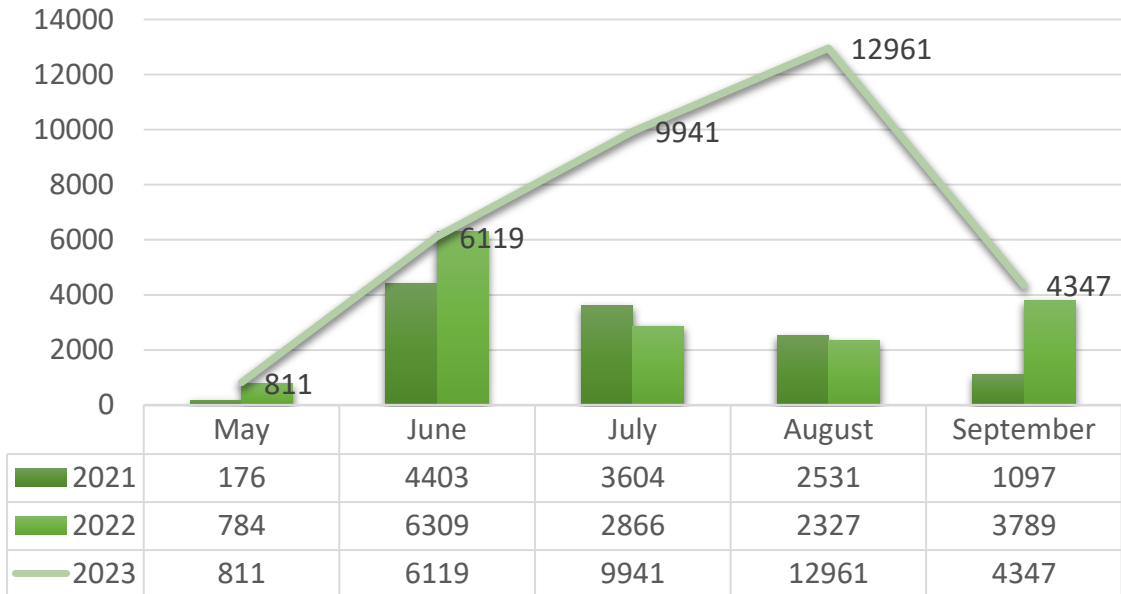
Due to very low volume of typical mosquito collections, we check and collect these traps one to two times a month.

The chart below shows our collections from a GAT trap placed near the southern border of our county. We chose a location that would be most likely to have these types of mosquitoes show up. However, this season we collected only 2 mosquitoes (one *Culex restuans* and one *Aedes japonicus*) during the month of August and no mosquitoes were captured in September.



NEW JERSEY LIGHT TRAPS

These traps are placed in fixed locations throughout the county every year, supplying historical data on mosquito populations. They require a supply of electricity, which provides a light source to attract mosquitoes. Once mosquitoes have been attracted, a fan pulls them downward into a collection container, in this case, we use a mason jar. Inside said jar, a pesticide strip kills any bugs that have entered the trap. These traps are collected one to three times per week, depending on the amount of mosquito activity. Often times, we will base our suppression strategy off the information provided by the NJLT.



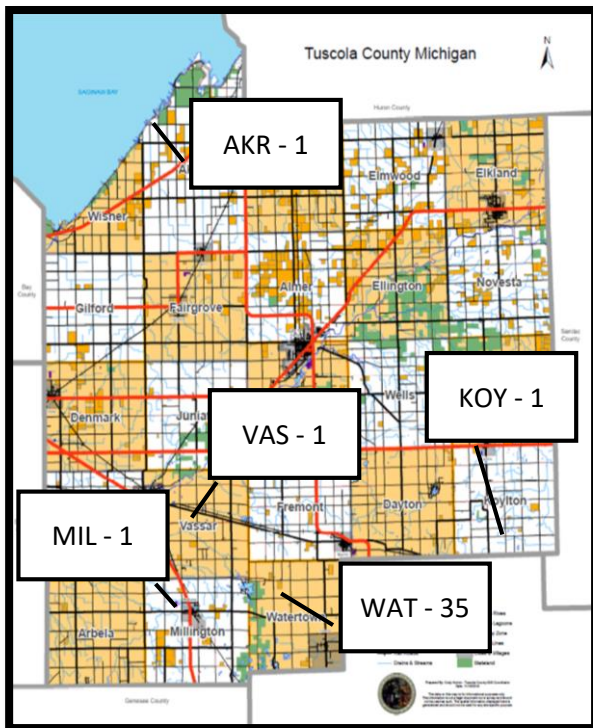
The mixed graph above shows this season’s total monthly counts compared to that of 2021 and 2022. Looking at the line graph, which depicts 2023’s monthly count totals, you can see how our monthly counts started slightly higher than the counts of previous years. Keeping that same momentum, counts skyrocket to nearly five times the amounts recorded from the past two seasons. Our counts then dropped off drastically from August to September and continued to taper off during the month of September.

NEW JERSEY LIGHT TRAP YEARLY TOTALS

YEAR OF COLLECTIONS	
2023	
SPECIES/LOCATION	TOTAL
<i>Ae. canadensis</i>	1226
<i>Ae. implicatus</i>	1
<i>Ae. stim./fit.</i>	210
<i>Ae. triseriatus</i>	883
<i>Ae. trivittatus</i>	515
<i>Ae. provocans</i>	342
<i>Ae. japonicus</i>	213
<i>Ae. cinereus</i>	8
<i>Ae. vexans</i>	3834
<i>An. punctipennis</i>	2231
<i>An. quadrimaculatus</i>	2222
<i>An. walkeri</i>	3
<i>Cs. inornata</i>	19
<i>Cs. minnesotae</i>	0
<i>Cs. morsitans</i>	0
<i>Cs. melanura</i>	0
<i>Cx. pipiens</i>	2041
<i>Cx. restuans</i>	42
<i>Cx. tarsalis</i>	1
<i>Cx. territans</i>	2
<i>Cq. perturbans</i>	3548
<i>Ps. ciliata</i>	36
<i>Ur. sapphirina</i>	0
<i>Ps. columbiae</i>	44
<i>Ps. ferox</i>	33
	0
Damaged	551
Total Female	17454
Total Male	16174
YEARLY TOTAL: 34179	

NEW & UNCOMMON SPECIES

The *Psorophora columbiae* (dark rice field mosquito/ Florida glades mosquito) is a floodwater mosquito with a salt-and-pepper appearance from a spattering of white scales over their body. They are commonly found in the contiguous lower 48, but have been located as close as Ohio, Indiana and Illinois. These vicious summer pests are a vector of the Venezuelan equine encephalitis virus (VEEV), Potosi virus (POTV), Rift Valley fever virus (RVFV) and can also carry West Nile virus (WNV).



Though they are not common in our area, this season TCMA found several *Ps. columbiae* mosquitoes throughout the lower townships and even in one northern township. Watertown township had the highest recorded amount at 35 females captured. Other townships such as Akron, Millington, Vassar and Koylton each only had 1 female captured. For more information on this mosquito species you can visit the University of Florida's 'Featured Creatures' web page at entnemdept.ufl.edu.

AT HOME PREVENTION

With the high amount of *Ps. Columbiae* caught in Watertown township and high counts across the county of other mosquitoes, knowing a few details on how to prevent mosquito bites outside of pesticide treatments may be useful.

Here are the best ways to protect yourself in the future:

DRAIN

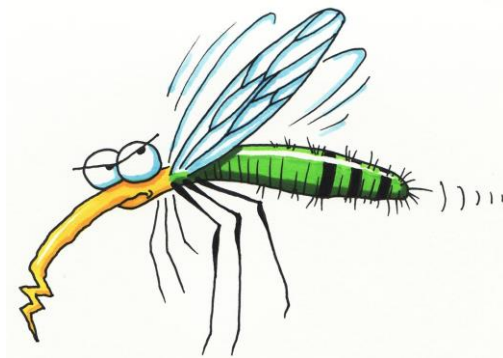
- Be sure to drain any standing water around your house.

DRESS

- Wear light colored, loose fitting, long sleeves and pants.

DEFEND

- Choose a mosquito repellent that has been registered by the Environmental Protection Agency such as DEET.

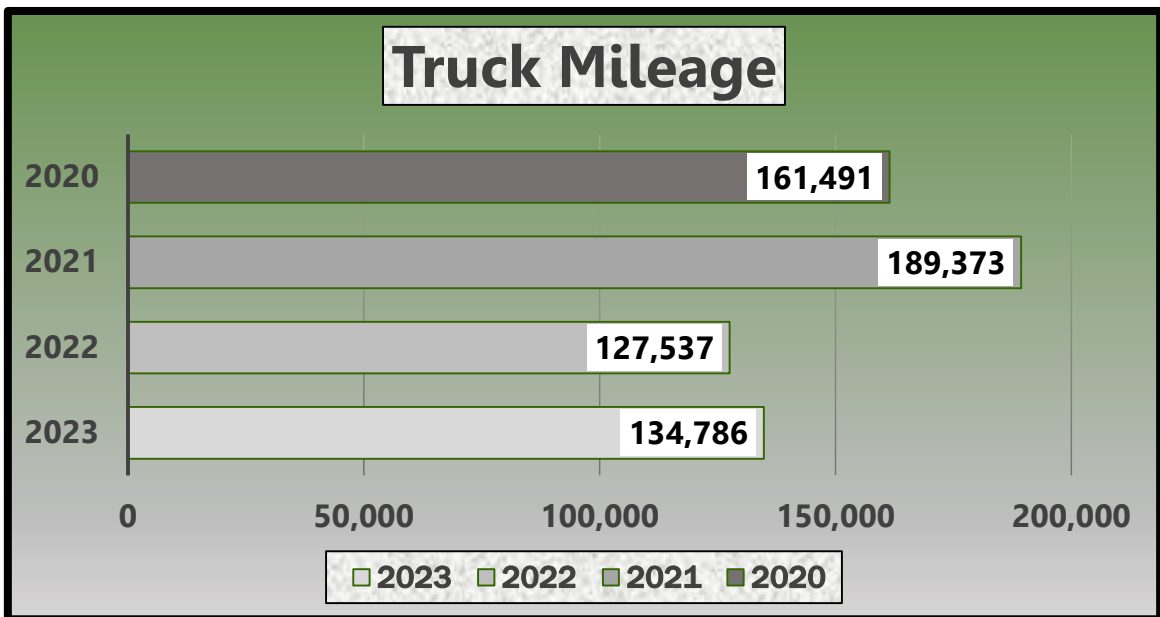


GARAGE NEWS

Pat Dennis has had another very busy season. The Kawasaki Mule needed multiple repairs including rewiring the blower pressure switch, replacing the blower nozzle solenoid and starter relay. He rebuilt two Grizzly starter motors, two Pioneer Handheld ULV's and two Superhawk Pulse jet engines. Eleven tires were replaced and three were repaired. He replaced multiple FMI pumps, catalytic converters, ball joints, EPD modules, hoses, caps, batteries, and headlights. He also had to replace an O2 sensor, an AC compressor, a heater hose and alternator. He performed 103 vehicle and ULV oil, filter, spark plug services.

Tuscola County Mosquito Abatement's twenty truck fleet, added 134,786 miles this season.

All truck mounted ULV's are set to deliver 4.5 ounces of Kontrol 4-4 per minute, compared to the 5 ounces used in the past. The droplet sizes produced by each ULV are measured and calibrated utilizing the Army Insecticide Measuring System (AIMS), following the label recommendations. The droplets are set to be delivered in a range that helps ensure safety and efficiency.



MEMBERSHIPS

TCMA staff are required to obtain and maintain licensing through the Michigan Department of Agriculture (MDA) as certified pesticide applicators, in both the Core Category and 7F (Mosquito Control).

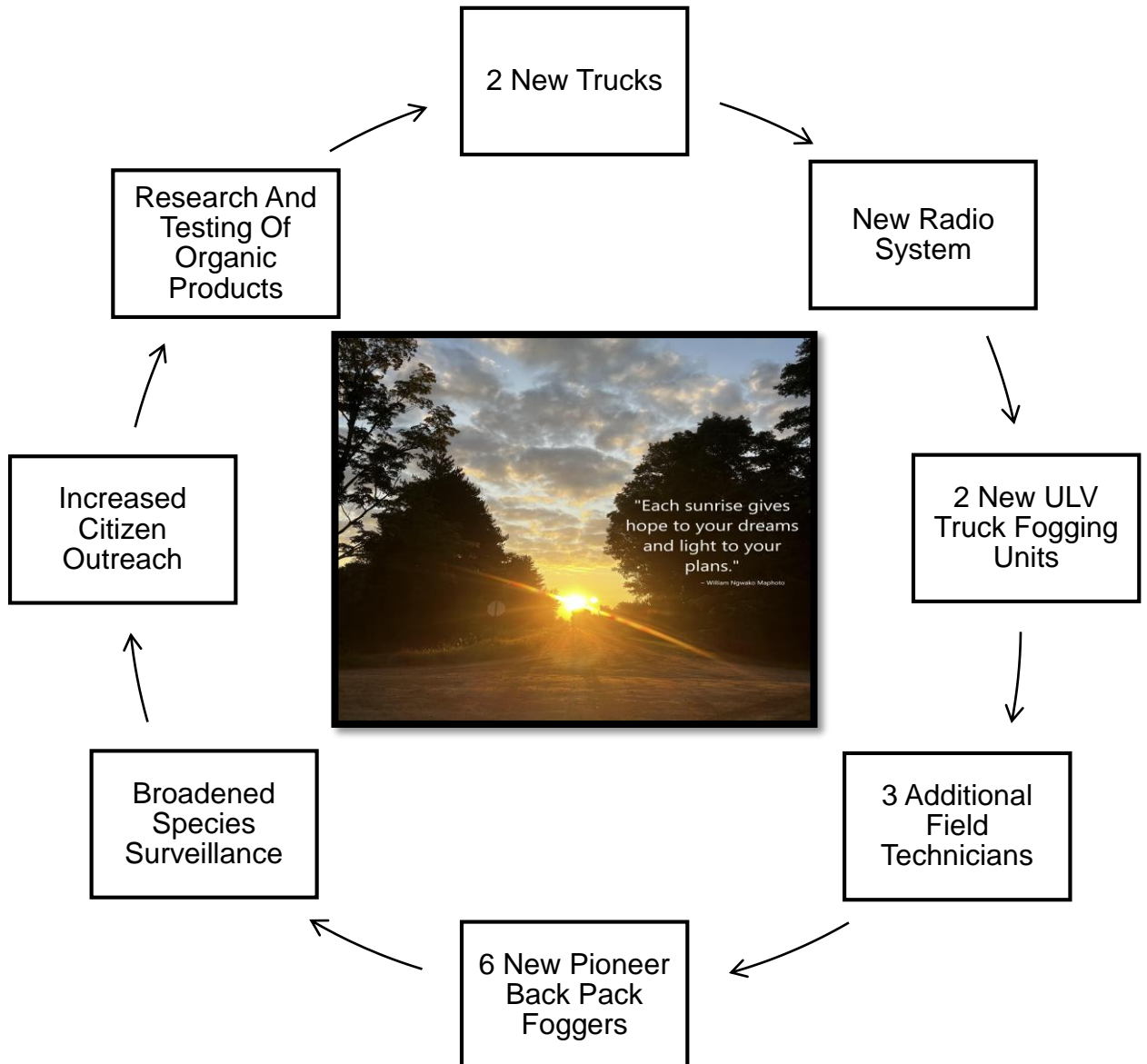
In order to stay informed of current developments, the permanent staff of TCMA are also encouraged to attend conferences, classes and seminars relating to mosquito biology and control. TCMA's Technical Advisory Committee (TAC) also provides new insight and important data in the areas of Biological Environmental Sciences.

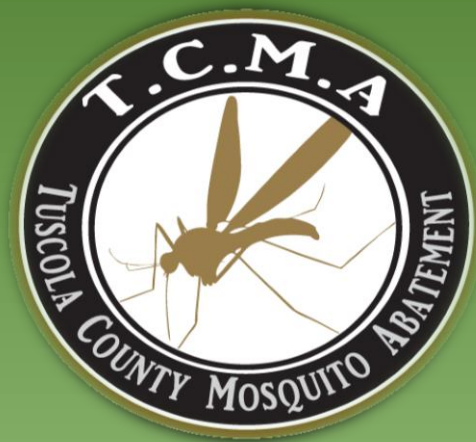
The permanent staff of TCMA also maintains memberships and are active in the Michigan Mosquito Control Association (MMCA) and The American Mosquito Control Association (AMCA).

Last year the annual MMCA Convention was held in-person at the Kellogg Center in Lansing. At this time, the Convention is being planned again as an in-person meeting in February in Battle Creek.



2024 PROGRAM PLANS





**1500 Press Drive
Caro, Michigan 48723
www.tuscolacounty.org**