



Skeeter Scanner

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www.mimosq.org

President's Message



As mosquito control professionals we are accustomed to following various laws and regulations ranging from product labels to NPDES permits. Not all regulations apply to all and quite frankly some make little sense. Regulations for the most part provide confidence and structure from which mosquito management can be planned and executed. There are those regulations that complicate or limit our best efforts, and in some cases consume resources that would be best served controlling mosquitoes. Regulations and laws of course can and do change and lately mosquito control and pest control is experiencing quite a bit of activity in regards pesticides and their application.

The EPA is currently re-evaluating pyrethroid risk assessments, and recently did the same with certain organophosphates. The expectation is that the use or availability of these groups will become more restrictive. Pollinators, which we all value and account for in our control activities, more specifically honeybees are seeing policies written focusing on pesticides and their perceived threats. Michigan recently issued their draft Pollinator Protection Plan, which lays out best management practices for beekeepers and pesticide applicators. The impact of this plan will vary depending on operations and ones existing beekeeper notification process. I wish I could say that these undertakings will help us in our efforts to promote and maintain public health, but I am not very optimistic. There is value in revisiting risk assessments and impacts of pesticides on non-targets, but the emphasis and/or reason for the assessment may not be solely based on science.

What can be done to keep valuable pesticides and resources available for public health mosquito control? Get involved! Keep up-to-date on what activities government agencies are undertaking that may impact our profession and service. Comment and lend your support to maintaining proven and environmentally minded products and techniques currently used. We as professional, responsible applicators must make our thoughts and concerns known, I am sure the other side will. We must be confident in defending our integrated mosquito management tool box and stand behind the science that directs our activities. The MMCA continues this effort but needs your help, please let your thoughts be known.

“There are in fact two things, science and opinion; the former begets knowledge, the latter ignorance.” - Hippocrates

Study Finds Native North American Mosquito Can Transmit Zika

A recently published study shows that some native mosquito species can transmit Zika. *Aedes vexans* is a common mosquito in many upper US States. Keep in mind though that these are lab studies, which may not translate under field conditions.

“A new study from researchers at the University of North Dakota found that *Aedes vexans*, a mosquito species indigenous to North America, has the capability to transmit Zika. This is the first native North American mosquito species shown to be able to transmit the virus.”

“To test the capability of the species to become infected with the virus, the researchers used mosquitoes collected from North Dakota and Minnesota and fed them blood containing Zika virus. Some (about 3 percent) developed infections. Then, infected mosquitoes were tested to see if they could transmit the virus. Surprisingly, *Ae. vexans* had a higher transmission rate than *Aedes aegypti*, which was tested alongside *Ae. vexans* in the study and is the primary vector of Zika.”

“Because of its wide geographic distribution, often extreme abundance, and aggressive human biting activity, *Ae. vexans* could serve as a potential vector for Zika virus in northern latitudes where the conventional vectors, *Ae. aegypti* and *Ae. albopictus*, cannot survive,” write the researchers.

<https://entomologytoday.org/2017/05/12/study-finds-native-north-american-mosquito-can-transmit-zika>

Three Non-Pesticide Reasons Beekeepers Lost 44% of Bees in 2015-16

The Bee Informed Partnership takes an annual survey of commercial and backyard beekeepers in order to track health and survival rates of honey bee colonies. The latest results show that colonies declined 44 percent during the year spanning April 2015 to April 2016.

That sounds alarming, and it is in contrast to studies showing that bee numbers are not in decline, they were instead at a 20-year high last year.

How can the claims be so different? Should we be alarmed or not?

There are three reasons why journalists who rewrite Friends of the Earth press releases are not only getting it wrong claiming pesticides are a cause, they are misrepresenting the data:

- 1) **Surveys are not studies.** Beekeeping has become a fad and that means a whole lot of amateurs have killed a whole lot of bees. Despite what the kind of people who go into amateur beekeeping in the last few years think, you can't just stick a hive in your backyard and watch the awesome power of nature take over. Well, nature will take over, but it will be the mean kind of nature -- the bees will die. [More bees are killed in truck accidents](#) than due to pesticides, but that doesn't show up in surveys or in press releases from environmental groups. If I were a bee, I'd be really "stressed" about being hauled on a truck out to some place that will sell or rent me to an amateur beekeeper likely to kill me with incompetence.
- 2) **They use both winter loss and summer loss combined.** Lots and lots of bees die during the winter, and the harsher the winter the more that die, so this combined number doesn't have much validity because it hasn't been gathered long enough -- only six years. On the other hand, the more recent term Colony Collapse Disorder is actually a recurring issue that has been documented for as long as beekeeping has been documented. [See reports in the years](#) 950, 992, 1443, 1853, 1868, 1891, 1896, 1903, 1905, 1918, 1919, in the 1920s, the 1930s, the 1960s, 1975 and 1995. During those early years they had low literacy. Imagine how many collapses would have been recorded if everyone knew how to write.

[The real difference this year over last: 3.5 percent.](#)

In nature, that is statistical wobble.

- 3) **One-off results are not really telling much of a science story.** Activists are promoting this latest number as an impending Neonicotinoid pesticide doomsday only your check or credit card donation (act now!) can prevent, but scientists recognize there are many factors contributing to wild swings in bee deaths. The biggest culprit is the [varroa mite](#), a deadly parasite that rapidly spreads between colonies but doesn't show up in surveys. And there are changes in climate and land use that make a difference -- weather is the big reason northern Europe seemed at one point to have more bee losses while Australia, which uses plenty of neonics pesticides, had no decline in bees at all.

Though journalists are making this a pesticide issue, the scholars behind the work don't.

"We're now in the second year of high rates of summer loss, which is cause for serious concern," Dennis vanEngelsdorp, an assistant professor of entomology at the University of Maryland and project director for the Bee Informed Partnership, [said in its statement](#). "Some winter losses are normal and expected. But the fact that beekeepers are losing bees in the summer, when bees should be at their healthiest, is quite alarming."

[He said much the same thing last May](#), and implicated parasites: "Our biggest surprise was the high level of varroa, especially in fall, and in well-managed colonies cared for by beekeepers who have taken steps to control the mites. We knew that varroa was a problem, but it seems to be an even bigger problem than we first thought. Moreover, varroa's ability to spread viruses presents a more dire situation than we suspected." Indeed. They are, as he called them, dirty hypodermic needles that are a vector for viruses. Who will be impacted most by these mites? Small beekeepers, like the amateurs in point 1, who don't have any varroa control strategies in place. But due to that lack of knowledge or unwillingness to engage in pest control, their problem will result in even good beekeepers, who

control mites, losing colonies as the disease spreads.

Estimates of economic "value" say honeybee pollination is worth up to \$10 billion annually. At some point it might make sense to pay Natural Resources Defense Council donors *not* to become amateur beekeepers thinking they are saving Gaia. They are probably doing more harm than good.

www.acsh.org/news/2016/05/11/87403

Renewed Push to Strengthen Vector Control Globally

Vector control is the main method for tackling many of the world's major infectious diseases. When effective methods of targeting mosquitoes, flies, ticks, bugs, and other vectors that transmit pathogens are well implemented, lives have been saved and the health of millions has been protected.

Between 2001 and 2015, two core methods of vector control—insecticide-treated bednets and indoor residual spraying of insecticides—prevented an estimated 663 million cases of malaria in sub-Saharan Africa. Major reductions in onchocerciasis, visceral leishmaniasis, and Chagas disease have also been achieved through large-scale vector control.

However, controlling vectors is a constant challenge, and both old and emerging diseases are exposing new threats. The recent outbreak of Zika virus disease and the re-emergence of yellow fever, along with an increase in cases of dengue and chikungunya, have highlighted the importance of sustainable vector control and the urgency of boosting global capacity to respond to these threats.

Today more than 80% of the world's population is at risk of vector-borne disease, with half at risk from two or more diseases. Many of these diseases are concentrated in the poorest communities in tropical and subtropical regions; they cause unacceptable mortality and morbidity and impede economic growth.

The pathogens of malaria, dengue, lymphatic filariasis, chikungunya, Zika virus disease, yellow fever, Japanese encephalitis, and West Nile fever

are transmitted to humans by mosquitoes. Onchocerciasis is carried by blackflies; leishmaniasis by sandflies; Chagas disease by triatomine bugs; Lyme *borreliosis* and encephalitis by ticks; human African trypanosomiasis by tsetse flies; and schistosomiasis by snails.

Addressing the World Health Assembly in 2016, WHO's Director-General expressed grave concern over the poor state of vector control globally. A new and comprehensive approach to preventing diseases and responding to outbreaks was clearly needed—one that engages multiple sectors and communities and is based on the best available data.

1 year later on May 30, 2017, the 70th World Health Assembly welcomed the strategic approach outlined in a new WHO Global Vector Control Response (GVCR) for 2017–2030. The response aims to reduce the burden and threat of vector-borne diseases through effective, locally adapted, and sustainable vector control. It is not a blueprint for attacking a single disease but, rather, a method for tackling multiple vectors and diseases that requires action across many sectors beyond health, including environment, urban planning, and education. We believe this approach will use resources more cost-effectively and yield more sustainable results.

Success will depend on strengthening the capacity and capability of country programs, which have suffered from staff reductions and an erosion of vector control expertise in recent decades. Basic and applied research also needs a boost to supply the evidence base required for disease control and elimination.

Continued investment in innovation is essential; promising new interventions at various stages of development include new insecticides, spatial repellents, odor-baited traps, improved house screening, *Wolbachia*-based biocontrol, and transgenic mosquitoes. Once WHO confirms their safety, efficacy, quality, and utility, these interventions should be deployed in the field and integrated into vector-control programs to maximize benefit.

"Controlling vectors is a constant challenge, and both old and emerging diseases are exposing new threats."

The GVCR lists four necessary priorities. First, strengthening intrasectoral action because vector-borne disease control is a shared responsibility of all members of society, and collaboration beyond the health sector is crucial. Second, engaging and mobilizing communities for sustainability and to build resilience against future disease outbreaks. Third, enhancing surveillance and monitoring to trigger early action if vector populations increase, and to identify if interventions are not working as expected. Finally, evidence-driven scale-up and integration of vector-control interventions to maximize impact on disease while minimizing impact on the environment.

Such action is reliant on strong country leadership and support. Vector control should become a core element of national health strategies in affected and at-risk countries and an integral part of national plans to implement the 2030 Agenda for Sustainable Development. Effective communication across ministries, increased financing, capacity building and staff retention, and revision of legislative controls for public health are also important.

The GVCR has ambitious but attainable goals: to reduce mortality from vector-borne diseases by at least 75% and incidence by at least 60% by 2030, and to prevent epidemics in all countries. The cost of priority activities to boost staffing, surveillance, monitoring, and coordination is estimated at just 5 cents per person at risk per year, or about US\$330 million annually worldwide. Compare this fairly modest amount to the more than \$4 billion required each year globally for vector control against malaria, dengue, and Chagas disease alone. Integrated and locally adapted vector control is expected to not only save lives and reduce ill health, but also to improve efficiency and ultimately save money.

The GVCR was unanimously supported by WHO Member States at the 2017 World Health Assembly and promises a new dawn for the control and elimination of vector-borne diseases. WHO is committed to lead this effort and protect the health of populations around the world.

<http://www.who.int/mediacentre/commentaries/strengthen-vector-control/en>

Missing Link in Malaria Evolution Discovered in Historical Specimens

A family's collection of antique microscope slides became a trove of genetic information about the eradicated European malaria pathogen.

Ebro Delta is a low, marshy region in Catalonia, Spain, that borders the Mediterranean Sea—prime land for growing rice, but also perfect mosquito habitat. Like much of Europe, the area was long burdened with malaria until mosquito-control efforts following the Second World War drove down infection rates, eradicating the local strain of the parasite by 1964.

Decades later, scientists, like investigators at a crime scene, are trying to recover evidence of this lost European strain of malaria. The unicellular parasites responsible for the disease, *Plasmodium* spp., originated in Africa, scientists believe, and dispersed around the world by hitching rides in their human hosts. Just as globe-trotting humans fanned out from Europe in the colonial era, the now-extinct European strains of *Plasmodium* played a key role in malaria's spread.

Carles Aranda and Raul Escosa, government mosquito-control researchers based in Catalonia,



devised a long-shot plan in the 1990s to recover this evolutionary missing link. During the eradication effort in the mid-20th century, the Spanish government conducted widespread malaria surveys to identify and treat affected communities. To confirm the pathogen's presence in an area, doctors inspected blood samples under microscopes. Aranda and Escosa wondered if anyone had saved a few of those old microscope slides.

The search for slides paid off two decades later when Escosa met the family of Ildefonso Canicio, a doctor who had led eradication efforts in the Ebro Delta. After Canicio's death in 1961, his daughter and son-in-law held on to his medical equipment, including some slides bearing droplets of blood from malaria patients. The family agreed to donate three of those slides, their yellowing labels dating them between 1942 and 1944.

Aranda and Escosa contacted geneticists and malaria experts to help them analyze the find. Carles Lalueza-Fox, a paleontologist for the Institute of Evolutionary Biology at Pompeu Fabra University, Barcelona, spearheaded the task of extracting readable DNA from the historical slides, drawing on his previous studies of genetic material in ancient human skeletons. "I am used to samples that are difficult, but these [malaria] samples, even though they are much more recent, were of a limited size—they are just blood drops," Lalueza-Fox says. In addition, *Plasmodium* cells were mixed in with human blood cells. "I was not sure if I would be able to extract DNA from the pathogen." So the team tried a few different approaches.

The researchers hit pay dirt when they used DNA "baits," molecules of biotin bound to short strings of RNA, to latch onto human DNA in the samples. They filtered the samples through beads coated in a substance that binds to biotin and sifted out the baits along with the DNA to which they had attached.

Lalueza-Fox and his colleagues were left with the first genetic material of extinct European *Plasmodium* species ever studied. They recovered DNA from both *P. falciparum*, the predominant species in Africa and the species responsible for the majority of today's malaria deaths, and *P. vivax*, a less virulent species found widely across the globe. Scientists have long debated how *P. vivax* arrived in the Americas, with one theory suggesting colonial Europeans brought the pathogen over, while another posits entry from the other direction, when early humans crossed the Bering Land Bridge from Asia. The two theories, notes Jane Carlton, a malaria researcher at New York University who was not involved in the study, are not necessarily mutually exclusive.

The extinct European *P. vivax* genome more closely resembled strains found today in South America than those found in East Asia, lending credibility to the theory of a more recent introduction by European colonists. The European *P. falciparum* genome, however, was starkly divergent from the modern South American subtype, supporting the theory that this more-deadly species came to South America directly from Africa during the slave trade. The team published its findings in *PNAS* this October (113:11495-500, 2016).

"You have to understand the pathogens and how they got there to understand the disease," Lalueza-Fox says. "It's crucial to understand the diversity and the history to try to get a global picture of the disease."

But while he and his colleagues re-assembled most of the *Plasmodium* mitochondrial genomes, they could not capture the complete nuclear genomes due to the limited amount of blood on Canicio's old slides. So they're searching for other historical specimens. "I have discovered there is a whole market for antique microscope slides on the Internet," Lalueza-Fox remarks. A day after their paper was published, he saw a set of five malaria slides go up on eBay for a few dollars. They were dated to England, 1931. "I tried to buy them, and at the last moment of the auction, someone overpriced me and took them!" Until more slides surface on the Internet, he and his colleagues are exploring other sources, such as university medical collections and mass graves containing the skeletons of plague victims.

Piecing together the *Plasmodium* family tree arms researchers with information about the pathogen they are trying to erase, malaria researcher Richard Culleton of Nagasaki University wrote in an email to *The Scientist*. "If we can better understand the speed and capacity of the parasite to evolve and adapt to new populations, then we will be better placed to predict where it might go in the future, and how it will react to the implementation of new drugs and vaccines."

EPA, U.S. Army Move to Rescind 2015 "Waters of the U.S."

The Environmental Protection Agency, Department of Army, and Army Corps of Engineers (the agencies) are proposing a rule to rescind the Clean Water Rule and re-codify the regulatory text that existed prior to 2015 defining "waters of the United States" or WOTUS. This action would, when finalized, provide certainty in the interim, pending a second rulemaking in which the agencies will engage in a substantive re-evaluation of the definition of "waters of the United States." The proposed rule would be implemented in accordance with Supreme Court decisions, agency guidance, and longstanding practice.

"We are taking significant action to return power to the states and provide regulatory certainty to our nation's farmers and businesses," said Administrator Scott Pruitt. **"This is the first step in the two-step process to redefine 'waters of the U.S.' and we are committed to moving through this re-evaluation to quickly provide regulatory certainty, in a way that is thoughtful, transparent and collaborative with other agencies and the public."**

This proposed rule follows the February 28, 2017, Presidential Executive Order on "Restoring the Rule of Law, Federalism, and Economic Growth by Reviewing the 'Waters of the United States' Rule." The February Order states that it is in the national interest to ensure that the Nation's navigable waters are kept free from pollution, while at the same time promoting economic growth, minimizing regulatory uncertainty, and showing due regard for the roles of Congress and the States under the Constitution. To meet these objectives, the agencies intend to follow an expeditious, two-step process that will provide certainty across the country.

The proposed rule would recodify the identical regulatory text that was in place prior to the 2015 Clean Water Rule and that is currently in place as a result of the U.S. Court of Appeals for the Sixth Circuit's stay of the 2015 rule. Therefore, this action, when final, will not change current practice with respect to how the definition applies.

The agencies have also begun deliberations and outreach on the second step rulemaking involving a re-evaluation and revision of the definition of "waters of the United States" in accordance with the Executive Order.



"The Army, together with the Corps of Engineers, is committed to working closely with and supporting the EPA on these rulemakings. As we go through the rulemaking process, we will continue to make the implementation of the Clean Water Act Section 404 regulatory program as transparent as possible for the regulated public," said Mr. Douglas Lamont, senior official performing the duties of the Assistant Secretary of the Army for Civil Works.

For the pre-publication Federal Register Notice and additional information: <http://www.epa.gov/wotus-rule>

10,000 Mosquito Corpses for Sale

“Truly killed by human hands. Can be used for science studies, decoration, and collection.”

That is the ad for a Chinese man who set up an online business selling dead mosquitoes. He has received over 10,000 orders in just two days. He told Qianlong News that his goal is to make his face and name public which will attract visitors to his online jewelry shop.

His site registered 250,000 hits within two days and a few companies were offering to pay for adding advertisement links to his online shop.

The cost of his mosquito corpses are around \$0.88.

Too Much Plastic? Caterpillars to the Rescue!

Various kinds of plastic are everywhere in modern society — and one that is most obvious is the polyethylene (PE) bags we get at grocery stores. According to the EPA, these ubiquitous items are among the top ten sources of aquatic pollution, and one estimate is that a trillion are produced every year (that's twelve zeros). Society is probably not going to stop producing and using these oh-so-useful items, so we need a better way to dispose of them than the local landfill. Enter our possible savior — the caterpillar of the wax moth *Galleria mellonella*.



These caterpillars actually inhabit beehives, where they live on beeswax (thus the wax moth name) until they mature into moths. Purely by accident, one researcher discovered that putting these caterpillars into plastic bags was not a good way to retain them since she found that they made holes in the bags.

Dr. Federica Bertocchini and colleagues investigated this phenomenon. First, they simply left some of the caterpillars on a PE sheet — and found that holes began to appear after about 40 minutes. Then, to determine if the worms were simply chewing the holes, they made a paste by grinding up the worms. This was then applied to sheets of PE and left for 14 hours. Again, the investigators found holes in the plastic and thus showed that some activity other than chewing was

responsible for making the holes. Whether that was due to bacteria or enzymes in the caterpillars' digestive systems are two possibilities which deserve further investigation.

This is, of course, a very preliminary study which needs replication by other laboratories. But one can speculate that if these caterpillars are tiny plastic-eating entities, and we can determine how they do it, modern technology might amplify their prowess and allow us to use it at will and more efficiently than the worms do to cope with our overabundant supply of plastic bags.

Bay County Mosquito Control Announces New Staffing

Bay County Mosquito Control is pleased to announce the hiring of two new staff members for the 2017 season.

Kristy Brandt became the new larviciding Field Supervisor effective February 27, 2017. Her responsibilities include supervision of larviciding field personnel, GIS mapping, and public outreach. Kristy holds a bachelor's degree from Central Michigan University majoring in Biology, and had been employed with Mosquito Control as the seasonal adulticiding Field Supervisor since 2015. In her spare time she is actively involved with the Bay County Fair Board, Bay County 4-H, and farming. Kristy currently resides in Freeland.



Ken Misiak assumed the position of Field Supervisor for the adulticiding shift in March. Ken had been employed as a Saginaw County Park Ranger for 5 years before joining Mosquito Control. He holds a bachelor's degree from MSU majoring in Natural Resources/Recreation including internships with the DNR and U.S. Forest Service. His experience working in a natural resources field for local government has already proved beneficial. Ken resides in Bay City and is an avid outdoorsman and sports fan.

Bay County expects great results from these bright new additions to our staff!



News From Around The Districts

BAY

The treatment season began on April 17 with successful results from our aerial campaign based out of James Clements Airport. Nearly 50,000 acres of woodlots were treated throughout Bay County with 92% mortality. Rain and warm temperatures in late April to early May brought about concerns of a potential early *Aedes vexans* hatch, but we were fortunate to see negligible larval development at that time.

On May 15, we brought on our full seasonal staff of 30 field technicians. This was the first year we offered MDARD pesticide applicator testing at our office which worked well. Kevin Kern of MDARD also gave an overview to seasonal staff of expectations and responsibilities of being a certified pesticide applicator that was well received by our entire staff.

Two training sessions were held in May for all seasonal employees. Since then, meetings at the beginning of each shift have occurred regularly to better educate our technicians on a variety of topics including chemical label comprehension, proper sampling techniques, safe driving techniques, and mosquito biology. With seasonal staff on the front lines of our program it is essential to keep them as well-informed and educated as possible.

Our first summer tire drive at BCMC on June 3 was successful, collecting nearly 1,435 tires. The cost of the 2 trailers will be offset by the MDEQ Scrap Tire Grant.

Minimal rain from May into early June provided us time to treat tires, catch basins and focus on fully training new staff on day-to-day larviciding methods. Our adulticiding shift faced cool nightly temperatures and numerous windy nights which limited fogging, but also kept adult mosquito counts down naturally.

In mid-June the townships surrounding the Saginaw Bay were hit with an early hatch of *Coquillettidia perturbans*. These mosquitoes peak around the 4th of July each year, but the mid-June arrival this year was a little earlier than expected. We are still dealing with high numbers of *perturbans* as we approach July and expect to see them for the next couple weeks. The lack of floodwater mosquitoes in mid-June allowed us to specifically focus adulticiding on *perturbans* areas.

A trial of VectoBac WDG, a BTI product, was conducted in roadside ditches and containers, and looks to be a viable option for future ditch treatments.

A deluge of rain hit the County between June 17-23, totaling 6-12". A state of emergency was declared by County government with heavy flooding and road washouts throughout the western and northern parts of Bay County. For 2 weeks, larviciding crews worked 12-hour days and Saturday to minimize the major hatch that occurred around July 1. The focus has now shifted to adulticiding measures throughout the entire County, with crews working extended hours each night and weekends.

As part of BCMC's routine disease surveillance, 158 mosquito samples containing 5,622 female mosquitoes have been submitted for testing with only negative results thus far; results on the remaining samples are pending. In addition, 9 crows have been tested with 3 positives for West Nile virus-2 from Monitor Twp. and 1 from Bangor Twp.

MIDLAND

We are swamped keeping up with phone calls so this entry will be short! Dealing with historic levels of mosquitoes following the flood of 2017 rains. Running our fog trucks every evening and putting in extra hours during the night shifts. West Nile virus has been a significant concern – up to six positive crows tested as of 11 July. Day crews are doing some woodlot fogging and treatment of catch basins for control of WNV vectors. I will write more when this period has passed!

This mosquito season will likely be defined by the nuisance population produced by nearly a season's worth of rain falling over a period of 10 days in the northern portions of the county. With the addition of record rainfall in Midland and Isabella Counties over that same period, the Tittabawassee River reached a flood stage of 32.15 feet, less than 2 feet below the record of 33.9 feet set in 1986. This record rainfall resulted in a vast amount of floodwater, which produces a variety of mosquito nuisance species. A very substantial mosquito nuisance is expected for the month of July in those areas that received the rain or experienced the flooding associated with the rise of the Tittabawassee and Saginaw Rivers.

The season began with a warm February resulting in the early emergence of overwintering *Anopheles* mosquitoes; a dry March followed by a wet April produced a healthy population of spring mosquitoes; a dry stretch from May through mid-June resulted in very little nuisance and the early arrival West Nile virus activity. Control operations have followed this mosquito activity; treating *Culex* habitat during the dry periods, and treating floodwater habitat after large rainfall events. On average SCMAC devotes 16 hours out of the day larviciding and 4 hours adulticiding between our two shifts. However, with large adult nuisance populations we will adulticide both in the evening and early mornings increasing spray time to nearly 7 hours between the shifts.

West Nile virus (WNV) activity was found earlier than normal with a dead crow testing positive for WNV on May 15th. May ended with 2 additional crows testing positive and a WNV positive collection of *Cx. restuans*. Arbovirus activity slowed in June with just one crow and *Culex* collection confirmed with WNV. In response, *Culex* control efforts began in early June with larviciding of catch basins, sewage lagoons, tires, and neglected pools. Mosquito disease vector collections and dead corvid samples are again being tested at Michigan State University.

Summer activities for our Education Department will include participation at Camp Kazoo (Arrowwood School); Step by Step Summer Day Care; Birds, Bugs, Butterflies (Children's Zoo); Friday Night Live; Consumers' Fun Day; Play Date Bugs (Imerman Park); Saginaw County Fair; and Family Fun Day (Haithco). New educational activities this summer include the City of Saginaw's Farmer's Market and Family Field Day on the Shiawassee National Wildlife Refuge. We are continuously looking for additional opportunities to engage the community.

We had our first week-long household scrap tire drive the week of June 19th and have our final tire drive scheduled for the week of July 17th. Our source reduction efforts have collected over 3000 tires. For more information about our scrap tire collection efforts, please visit our website at www.scmac.org or follow us on Facebook.

We began the season on March 14th with MDARD testing our new and returning staff needing certification.

Treatment of spring flooded woodlots began on April 3rd this season.

Five scrap tire drives have been completed in various townships, more are scheduled this summer.

June 1st our biology department gave a presentation to the second graders at Caro Elementary. The students learned a lot and had a great time with the bugs.

Disease surveillance is under way, we have seen a higher than normal amount of *Culex* mosquitoes so far this season. As always, mosquitoes collected will be sent to Michigan State University for testing. So far this season two birds have been turned in by residents and were tested in-house using the Vector Test kit. Both birds tested negative.

We are currently doing routine treatment of roadside ditches, sewage lagoons and catch basins.

We expect the heavy rains that occurred in June will be keeping us busy for a while.

Michigan Mosquito Control at MDARD, EPA, DEQ Earth Day Celebration

Constitution Hall, Lansing

April 20, 2017



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Summer