

GLOBE Mission Mosquito

Newsletter #9
July 17, 2019

Welcome Message: Dorian Janney, Campaign Coordinator

Did you know that as of June 30, 2019, we have collectively submitted 13,700 *Mosquito Habitat Mapper* (MHM) observations? When this campaign began on Oct. 1, 2018, I noted that there were 4,740 MHM data submissions. Over the past eight months, people around the globe have collected data on almost 9,000 potential mosquito breeding habitats and have eliminated a great many of these. Think of the impact we are having on reducing the threat of mosquito-transmitted disease globally!

As a reminder, it is really easy to do an MHM observation and submit it. You just open the GLOBE Observer app, and click on the "MHM" tool. Click that you want to do a "New Mosquito Habitat Observation." Check to make sure the location setting is correct, and then click the source of the water you are looking at from the pictured options. Sometimes you have to get in there and open up the options to see the wide variety of places where adult female mosquitoes will lay their eggs.

In this edition of the newsletter, you will find out how citizen scientists in the GO Oklahoma! campaign are working together using the MHM to try to monitor invasive species. We share some great examples of the ways in which the LaSalle Public Library is programming to better inform their community about how to reduce the potential mosquito breeding habitats. There are resources you can use with students on how mosquitoes transmit diseases to humans, and the link to the new "Zika Zine" comic-style booklet.

Guest Scientist Blog:

**Dr. Caio Franca, Southern Nazarene University, Bethany, OK
GO Oklahoma! Citizen Science Campaign**

Oklahoma is an ecologically diverse state in the Southern plains of the U.S. It is part of the central flyway for migratory birds, which makes it a sentinel location for West Nile Virus (WNV) surveillance. Why birds? Birds play a role in the WNV transmission cycle. Mosquitoes become infected with WNV when they bite an infected bird. Birds can develop high levels of the virus in their bloodstream. Because WNV is usually non-lethal in birds, birds serve as reservoir hosts. In disease ecology, there are organisms that serve as natural reservoirs for the pathogen. Reservoir hosts refer to organisms where the infectious pathogen naturally lives and reproduces. Mosquitoes acquire WNV through a blood meal from a bird and can then transmit the pathogen to humans.

My research focus is on surveillance of mosquito-borne arboviruses with an emphasis on whole viral genome sequencing. I'm interested in discovering evolutionary elements that could provide key information about epidemiology, geographic range and spread of WNV strains.

The mosquito fauna of Oklahoma has 62 known different species of mosquitoes from nine different genera. These species occur seasonally and approximately only 10 of these species are considered medically important because they transmit diseases to people. Among these vectors, there are two invasive species that are especially important: the yellow fever (*Aedes aegypti*) and Asian tiger (*Aedes albopictus*) mosquitoes.

The current extended range of invasive *Aedes* mosquitoes in the U.S. changes the landscape for arboviral risk because they can transmit diseases like Zika, dengue, and chikungunya. To address this important public health issue, citizen scientists in the greater Oklahoma City metropolitan area were recruited to be part of GO Oklahoma!, an intensive monitoring campaign in Oklahoma coordinated through NASA GLOBE Mission Mosquito. Citizen scientists monitor the presence of *Aedes* mosquitoes during the mosquito season using the GLOBE Observer Mosquito Habitat Mapper mobile app. We will focus on analyzing patterns of Asian tiger/yellow fever mosquitoes' presence/absence in space and time and determine whether the presence of these *Aedes* mosquitoes is associated with environmental conditions in the surrounding landscape.

These two *Aedes* mosquito species have an interesting history in OK. The presence of the yellow fever mosquito in Oklahoma was first described in 1933. Despite the cold winters of Oklahoma, this tropical and subtropical species withstood freezing temperatures in the egg stage and permanently established its presence, as reported by the pioneering 1938 work of L. E. Rozeboom. Beginning in the 1950s, the yellow fever mosquito was nearly decimated in Oklahoma due to eradication efforts led by the spraying of DEET. In the late 1980s the Asian tiger mosquito was detected in Harris County (Houston)TX, and by the summer of 1990 was reported in five counties in Oklahoma. At present, the Asian tiger mosquito has been reported

in 69 of the 77 Oklahoma counties and it has displaced the yellow fever mosquito to restricted areas near the Texas border.

GO Oklahoma! is a collaboration between Dr. Mike Wimberly, University of Oklahoma, Dr. Caio França, Southern Nazarene University and Dr. Russanne Low and Cassie Soeffing, The Institute for Global Environmental Strategies (IGES), and the NASA GLOBE Observer Mosquito campaign. For more information on GO Oklahoma, or to volunteer for the campaign, contact Dr. França at cfranca@mail.snu.edu.

Educator's Corner: LaSalle Public Libraries

LaSalle Public Library has an active social media presence for their GLOBE Observer Mosquito Habitat Mapper program – [join their public Facebook group](#) to get an inside look at their program.

Librarian Donna Blomquist noted, “As a public library, our greatest challenge was finding a location to place the traps. I knew that we were not able to host them on our property, and that an off-site location was needed. This location had to be within a reasonable distance from the library for us to complete the off-site work following an introduction and building the mosquito trap.” Another challenge was finding a location where the traps would be undisturbed. The library team has been working with a nearby nature preserve to set up mosquito larval traps, and created signs that they staked to the ground identifying the traps as part of their program to collect data for the NASA GLOBE program, with a link to follow them on their Facebook group. Their Facebook group was set up to also provide a way for participants to stay connected and share their results.



Figure 1. LaSalle Public Library community members placing their signs outside.
Image credit: LaSalle Public Library.

Featured Resource: Disease Guide- Liz Burck

What happens “Beyond the Bite.”

Female mosquitoes bite. They are in search of proteins needed for the development of their eggs. That is all.

But for humans, the consequences of that encounter with the female mosquito can go well beyond the bite. Depending on what the female leaves behind after her blood extraction, the human may suffer many physiological symptoms, some of which can result in death.

The Mosquito Habitat Mapper and many of the toolkit resources include references to six diseases that can occur after the female bites. They include: chikungunya, dengue, malaria, West Nile virus, yellow fever, and Zika virus.

One of the goals of GLOBE Mission Mosquito is to build an awareness of the diseases transmitted by mosquitoes. To address that goal, the team has developed a guide to each of the six that provides easy access to introductory information and historical background.

We present the story of mosquito-borne diseases by introducing the pathogen (**the mosquito is not the pathogen, it is a pathogen delivery service**), then identifies the vector (**she is trying to be a good mosquito mother, not a bad disease-causing insect**), describes the attack (**she will find you, and your blood, using visual, olfactory, and thermal cues**), and reveals the effects on the victim (**the species that suffers the consequences: humans**).

Many of the diseases transmitted by mosquitoes to humans have been around a very long time. But it was not until 1900, following the publication of a paper by Dr. Carlos Finlay of Cuba and the investigations of the Yellow Fever Commission under the direction of Dr. Walter Reed, that the mosquito was confirmed as the vector of disease. They discovered *who* was transmitting the deadly disease to humans (the mosquito), and now we know *what* they are transmitting to humans, *how* it is transmitted, *why* the victim gets sick, and *when* and *where* it is most likely to happen.

Learn more by accessing the documents on the [GLOBE Mission Mosquito site](#).

Zika Education and Prevention News

The GLOBE Zika Education and Prevention project is happy to present *Zika Zine!* Developed by the UCAR Center for Science Education, *Zika Zine* is a comic-style book that follows three fictional mosquitos through their developmental life cycles to teach readers about the *Aedes aegypti* mosquito and the Zika virus.

Zika Zine shows students collecting mosquito larvae, using the GLOBE Observer Mosquito Habitat Mapper (GO MHM) tool to identify mosquito species and eliminating mosquito breeding sites. *Zika Zine* is a great resource for use by teachers, public health officials, citizen scientists and community members to raise public awareness and use at mosquito trainings.

The resource is currently available online in English and Spanish. In a few months it will be available in Dutch, Filipino, French, Hindi, Nepali, Portuguese, Thai and Vietnamese.

[Read “Zika Zine” now online](#) in English and Spanish at the GLOBE Zika Education and Prevention project webpage.

What's the Buzz News Articles

Fighting Mosquitoes From Space

Mosquitoes flourish in warm, wet conditions. Most of the time, their bites are just a nuisance, but they can spread harmful diseases to humans such as malaria, West Nile and Zika. To reduce the risk of these diseases, NASA scientists are working with local governments, doctors and public health officials, even pest control companies – all to find new and innovative ways of combating mosquitoes.

Souped-up Fungus Spells Death for Mosquitoes

A weapon made from spider toxin destroys blood-sucking enemies from the inside and helps save people from disease and death. It sounds like the plot of a superhero movie, but it's actually a new way to combat malaria. NIAID-funded researchers who developed a genetically modified mosquito-killing fungus and tested it in the West African nation of Burkina Faso have shown that it even works against mosquitoes that have become resistant to chemical insecticides.

Where Disease-Carrying Mosquitoes Will Go In The Future

As temperatures rise in certain parts of the world, warmth-seeking mosquitoes will invade, making themselves at home in previously inhospitable patches of the globe. Now researchers are trying to figure out exactly how far north these mosquitoes will migrate.

Mosquito Disease Danger Days

The number of days each year that are suitable for disease transmission by mosquitoes is rising in much of the U.S., as temperatures climb with climate change. This can increase the risk of mosquito-borne diseases such as Zika and West Nile. Following research from Stanford University, Climate Central analyzed the number of days in the spring, summer, and fall each year with an average temperature between 61°F and 93°F, which is the range for transmission of diseases spread by *Aedes* or *Culex* type mosquitoes. Of the 244 cities analyzed, 94 percent are seeing an increase in the number of these "disease danger days."

GO MHM Top Data Collectors last month

GLOBE Member	School/ Institution	Country
D. Palacios	I.E. Enrique Lopez Albuja	Peru
G. Aikpon	University of Abomey Calavi	Benin
I. Mauad	Escola Minas Gerais	Brazil
E. Martinez	Columbia GLOBE v-School	Columbia
S. Moreno	I.E. Virgen Dolorosa	Peru
J. Bouwman	Shumate Middle School	USA
A. Kauai	St. Scholastica Catholic School	Kenya
F. Gueye	Lycee Thilmakha	Senegal

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Wednesday, July 24th at 2 PM (ET)

Citizen Science webinar: *“How can mosquito citizen science data protect communities from disease?”*

Wednesday, August 7th at 8 PM (ET)

Education webinar: Around the World with MHM

Look for our next newsletter on August 14th.

GLOBE Mission Mosquito is an initiative of **NASA Goddard Space Flight Center** and the **Institute for Global Environmental Strategies**, in partnership with **The GLOBE Program**.

Learn more at www.globe.gov/web/mission-mosquito.

