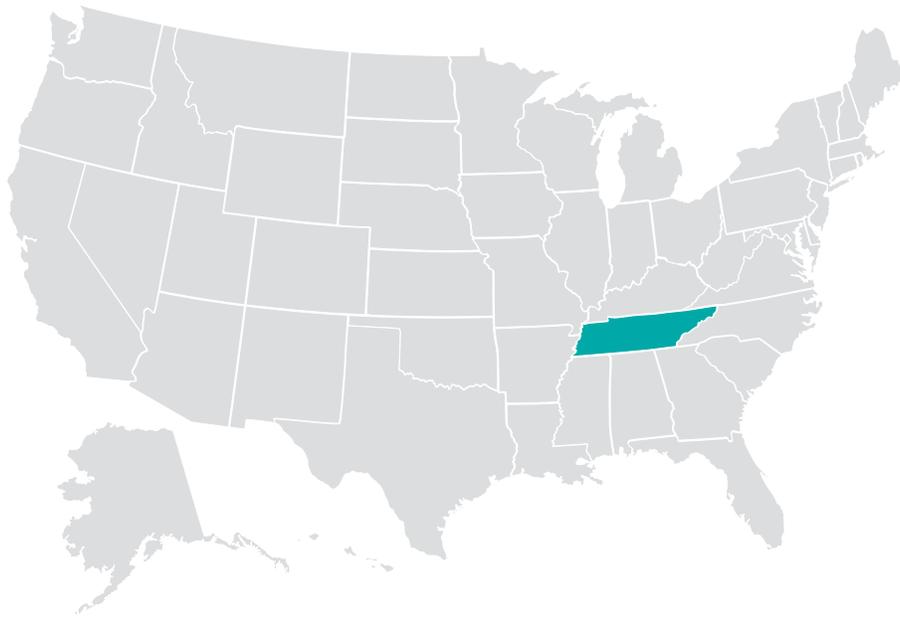


▶ ACROSS THE COUNTRY WHAT'S HAPPENING IN ENVIRONMENTAL HEALTH



Editor's Note: This feature in the *Journal* is intended to provide readers with interesting and novel stories of environmental health being practiced across the country and to offer an avenue for story sharing and community building. Do you have a story to share? Please send your story ideas to jeh@neha.org.

TENNESSEE

Local Health Department Mosquito Control Response to Zika Virus

The Shelby County Health Department Vector Control Program (SCHD VCP) has been in operation since the early 1960s. In response to an alarming increase in West Nile virus cases in summer 2014, the health department, along with backing from local legislators and stakeholders, was able to pass state legislation that created a special revenue fund of \$0.75/month for each utility rate payer (\$9.00 annually). This charge appears each month on every utility rate payer's monthly bill. This special revenue is utilized to solely fund SCHD VCP for the entire year (approximately \$3.2–3.6 million annually).

SCHD VCP conducts an integrated control program that incorporates surveillance and multiple forms of control including, but not limited to, adult mosquito control, habitat reduction, community surveys, larval control, and sanitation enforcement. Control operations are primarily directed by surveillance. Larval habitats of mosquitoes are located, classified by type, catalogued, and mapped for the purposes of larviciding. Adult mosquito densities are monitored by traps and captured mosquitoes are tested for diseases (>487,000 mosquitoes were tested in 2015). Control operations are designed to reduce larval habitat, as well as target the different mosquito life stages.

The growing concern of Zika virus introduction into the community prompted SCHD VCP to begin preparation in early 2016. Special mosquito equipment was purchased to specifically target *Aedes albopictus* (known as the Asian tiger mosquito), which has been confirmed to carry Zika virus and is the only mosquito species in Shelby County that can transmit Zika virus. Additionally, a Zika action plan was developed to outline mosquito-control larvicide and adulticide operations if an imported human case of Zika virus was introduced into the county.

As of August 16, 2016, Shelby County received confirmation of seven imported human Zika virus cases. As an opportunity to grow the science and share best practices, below contains a summary of the mosquito-control operations related to case 2. A summary of cases 3 and 4 can be found at www.neha.org/publications/journal-environmental-health/jeh-issue-october-2016.

The index case (case 1) occurred at the end of March 2016. There was no mosquito-control response at that time as the first hatch of *Ae. albopictus* was not observed until approximately April 21, 2016, nearly 30 days after confirmation of the human case. Therefore, with no mosquitoes present to potentially induce local transmission, SCHD VCP did not perform a response. Cases 5–7 were identified at the time of publication and mosquito-control operation information was not fully available.

While each case presents a unique approach to responding to Zika virus threats based on baseline mosquito counts, geographic oddities, and population density, it is important to recognize that a rapid and effective mosquito-control response is integral to the health of the community, as well as to minimizing the introduction of local Zika virus transmission.

Response to Imported Human Zika Virus: Case 2

SCHD VCP was notified at about 11 a.m. on June 15, 2016, of a Zika virus polymerase chain reaction (PCR) positive test result in an individual returning from travel to a country with active Zika virus transmission. SCHD VCP was given the address of the individual, along with information on when symptoms started, travel history, and test results. SCHD's Zika action plan was initiated due to the fact that the individual had active Zika virus in their blood, which can be infectious to mosquitoes.

BG-Sentinel traps baited with carbon dioxide and ovitraps were placed the afternoon of June 15, 2016. BG-Sentinel traps collected on June 16, 2016, did not contain any mosquitoes due to severe weather that passed through the area around sunset on the day the traps were set. BG-Sentinel trap collections on June 17, 2016, collected eight different mosquito species. Trap A, which was located closest to the infected individual's address, contained seven mosquitoes: *Ae. albopictus* (1), *Ae. japonicus* (2), *Anopheles quadrimaculatus* (2), *Culex erraticus* (1), and *Cx. pipiens quinquefasciatus* (1). Trap B, which was further from the address, contained 14 mosquitoes: *Ae. albopictus* (4), *Ae. japonicus* (1), *Cx. erraticus* (3), *Cx. pipiens quinquefasciatus* (3), *Cx. territans* (1), *Psorophora ciliata* (1), and *P. ferox* (1).

Ae. aegypti was not observed or collected at either location, but *Ae. albopictus* was. Ovitrap placed at the site were allowed to stay in place until June 20, 2016. While inspectors were on site, a female *Ae. albopictus* was observed depositing an egg in the trap. A total of four ovitraps were placed near the infected individual's address and they collected 173 *Aedes* (*Stegomyia*) eggs in 6 days.

Along with mosquito trapping, inspections of neighboring properties were conducted in order to remove known egg laying locations of *Ae. albopictus*. The addresses were mapped by the Tennessee Department of Health (TDH) and SCHD VCP on June 15, 2016, to identify the area of potential mosquito transmission. TDH used a 200 yd (600 ft) radius that included 90 addresses and SCHD VCP used a 200 m (650 ft) radius that included 353 addresses. Both address lists contained properties mainly located within an apartment or condominium complex. On June 16, 2016, SCHD VCP inspected 74 of the 90 TDH addresses and 318 of the 353 SCHD VCP addresses. More inspections were performed on June 20, 2016, at the 16 remaining properties from the TDH list and the 35 missing properties from the SCHD VCP list.

Ae. albopictus was collected from various sites within the infected individual's apartment complex. Two tires, an outdoor deep fryer, several pieces of trash, and numerous corrugated gutter drains contained larvae. Trash was removed and the tires were treated with larvicide in order to prevent larval development. The apartment complex's biggest problem is the number of partially buried corrugated gutter drains that cannot be inspected, drained, or properly treated. Due to this finding some adulticiding was performed at the

complex in an attempt to decrease the adult *Ae. albopictus* population. Vehicle mounted ultra-low volume sprayers were capable of getting very close to a large number of the drains, but probably had a very limited impact on the adult mosquito population. Adulticiding was performed on June 16, 2016, and again on June 20, 2016.

The breakdown of the 353 properties on the SCHD VCP list was 36 single-resident properties, 85 condominiums, and 232 apartments. All of the common areas around the 317 apartments and condominiums were easily inspected, and a few items were found to contain mosquito larvae as previously mentioned. Of the 36 single-family residences, eight were fully inspected. Of the eight inspected properties, containers and other potential places for larvae to be found were observed at three properties. Larvae were found at one property in a fire pit. Overall, the single-family residences appeared well maintained, and only two individuals mentioned being bothered by mosquitoes in the evening. Partial front yard inspections or no inspection occurred at 28 single-family residences due to no one being home or denied access.

Timeline

- June 9, 2016: Infected individual returns from the Dominican Republic.
- June 12, 2016: Infected individual develops symptoms and is now able to infect mosquitoes.
- June 15, 2016 (11 a.m.): SCHD VCP is notified and given details of the case.
- June 15, 2016 (1:30 p.m.): SCHD VCP starts setting traps and checking around the infected individual's address for mosquito larvae and egg-laying locations.
- June 16, 2016 (10:30 a.m.): BG-Sentinel traps collected.
- June 16, 2016 (11 a.m.–2:30 p.m.): Property inspections performed.
- June 16, 2016 (9:19–9:30 p.m.): Adulticide applied to the area.
- June 17, 2016 (11 a.m.): BG-Sentinel traps collected.
- June 19, 2016: Any mosquitoes that took a blood meal from the infected individual on June 12, 2016, are now able to transmit Zika virus to other individuals.
- June 20, 2016: Infected individual should no longer be able to infect mosquitoes.
- June 20, 2016: Ovitrap collected.
- June 20, 2016 (10:42–10:44 p.m.): Adulticide applied to the area.
- July 2, 2016: Probable date that all possibly infected mosquitoes should be dead.
- July 12, 2016: Latest probable date that a human case could develop a Zika-related illness. 🙏

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