

PROTECT  
SOUTHLAKE



VECTOR  
CONTROL ANNEX

PUBLISHED 12/2020



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## INTRODUCTION

### MISSION

Our mission is to protect the health and safety of the residents of City of Southlake by minimizing the risk of mosquito-transmitted diseases and managing nuisance mosquitoes to a tolerable level.

### ACTION

We achieve this mission by sensitively monitoring mosquito abundance or indicators of mosquito-transmitted diseases and controlling larval and adult mosquitoes with environmental modification or the selective use of public health pesticides.

### PLAN PURPOSE

The objective of this plan is to define the operational strategy and tactics for controlling vector mosquitoes in the City of Southlake. Though this plan defines specific thresholds and triggers for certain activity, Emergency Management withholds the right to provide mosquito management outside of the parameters of this document when certain circumstances dictate.

## INTEGRATED MOSQUITO MANAGEMENT

City of Southlake Office of Emergency Management (OEM) operates under the best practices guidelines of Integrated Mosquito Management (IMM), which provides a multi-modal framework for achieving mosquito-transmitted disease risk mitigation. Public education, source reduction, surveillance, and pesticide applications (biological and chemical control agents) are all critical elements of IMM which OEM engages in to achieve its operational mission.

## ARBOVIRUS SURVEILLANCE

### Objectives

1. Timely detection of arbovirus transmission to guide intervention efforts to prevent human arbovirus infections.
2. Monitor, record, and analyze vector mosquito population parameters to increase the local vector ecology knowledge-base and inform intervention efforts.
3. Monitor the effectiveness of vector control efforts on arbovirus transmission.

Four arboviral pathogens, *Eastern equine encephalitis virus* (EEV), *La Crosse encephalitis virus* (LEV), *St. Louis encephalitis virus* (SLEV), and *West Nile virus* (WNV), have been historically observed and occasionally result in human infections in Southlake, TX. Some of these pathogens (EEEV, SLEV, and WNV) share certain ecological similarities such as enzootic cycling (non-human animal transmission) primarily among avian hosts and

mosquito vectors. Though similarities exist among each pathogen, the abilities of specific hosts and vectors to transmit pathogens along with local host and vector utilization patterns likely determine the occurrence of transmission.

As most of the observed arbovirus activity in City of Southlake and the United States within the past decade has been due to WNV, the City of Southlake Vector Control Plan will focus on providing advanced detection of WNV transmission as an indicator of elevated risk of human WNV infection. Recent epidemics of Chikungunya virus (CHIKV) starting in 2014 and Zika virus in 2016 in the Western Hemisphere have required an adjustment to local arbovirus surveillance. As arboviruses evolve continuously, arbovirus prevalence may exhibit high inter-annual variability with years of no observed transmission and years of marked human epidemics. As such this surveillance plan is intended to be revised in accordance with the changing epidemiological importance of arboviral pathogens in City of Southlake, as necessary.

Advanced detection of enzootic cycling of arboviral pathogens, such as WNV is critical to preventing human infections. Of the four traditional surveillance methods used to detect WNV in animal populations only diagnostic testing of mosquitoes for arboviruses provides timely and reliable results at relatively low resource costs. For this reason, the collection and subsequent testing of mosquitoes for arboviruses is the primary tactic employed by OEM for advanced warning of elevated human WNV risk.

#### Sample Frame

All areas within the boundaries of City of Southlake will be monitored for the risk of arbovirus transmission to humans. Since City of Southlake is a relatively large city with considerable land-use diversity and focally dense human populations, a systematic spatially stratified census-weighted sample strategy will be employed. This hybrid sampling strategy allows for optimal spatial coverage of the most densely populated regions of the city while providing limited data from less populated areas. The primary disadvantage of this sampling strategy is that it may not be representative of human arbovirus risk across all space. The strategy chosen is intended to be the most *sensitive indicator* of potential human arbovirus risk in City of Southlake– not necessarily *representative* of human arbovirus risk across the entire City.

#### Site Selection

There are approximately 5 sites in the City of Southlake vector surveillance network, consisting of 5 Gravid Traps that are sampled every week from April to November.

In addition, heightened surveillance is performed at areas that experience a high concentration of outdoor human activity including ballparks and high school stadiums, and ball fields. Routine inspections occur throughout the year to assess larval and adult mosquito presence and abundance at these sites.

#### Target Species

The primary vector of WNV in City of Southlake is *Culex quinquefasciatus*; therefore, the arbovirus surveillance will primarily target the collection of this species. *Culex salinarius*,

*Cx. erraticus*, *Cx. nigripalpus*, *Aedes albopictus*, and *Ae. vexans* may also be found in Southlake infected with WNV and may contribute to WNV transmission.

## Collection Methods

Gravid Traps use organically enriched water to collect gravid *Cx. quinquefasciatus* mosquitoes which seek an oviposition habitat. Since most mosquitoes collected in gravid traps have already taken a blood meal, there is a greater likelihood that these mosquitoes may be infected with WNV. By targeting previously fed *Cx. quinquefasciatus*, the gravid trap has historically have been considered to be the most sensitive trapping tool for detecting WNV. For procedures of setting gravid traps, see OEM SOP 1.6, Vector Control Procedures.

## Collection Schedule

The specimen collection schedule is primarily dependent on the diagnostic testing schedule set by the Tarrant County Public Health, Vector Control Department (TCPHVCD). Currently, TCPHVCD requires submission of mosquito pools by Wednesday for test result reporting on the following Friday. Traps will be set on Tuesdays and picked up on Wednesdays, for transport to TCPHVCD.

## Arbovirus Diagnostic Testing

Collected mosquitoes will be identified to species, enumerated, and pooled in accordance with the Texas Arboviral Surveillance Sampling Standards. Mosquito pools will be submitted to TCPHVCD based on their weekly testing schedule, which generally requires specimens to be received by Wednesday for test resulting reporting on Fridays.

## Data Entry

Mosquito population data (species, abundance, etc.) will be entered into a database the day after it has been identified. Mosquito pool data will be entered onto the ArboNet database system as well as a spreadsheet file distributed by TCPHVCD, during the week of specimen submission.

## PUBLIC EDUCATION

We are committed to educating citizens of the City of Southlake regarding the threat posed by mosquitoes, how we respond to that threat throughout the year, and what individuals can do to protect themselves.

We routinely attend local events in order to educate our citizens about mosquitoes. Complementary to in-person education, we also maintain an educational website and social media site. In addition, we distribute original pamphlets, tri-folds, and brochures for public education.

## SOURCE REDUCTION

Source reduction involves the removal of a potential breeding source, most often the

dumping out of water from small containers in and around the house. OEM evaluates water sources as potential breeding sites throughout the season, and in cases where water can be removed from the system, source reduction is our first method of mosquito abatement. This occurs routinely throughout each weekday but is particularly important when OEM is responding to requests for service from our citizens.

Source reduction is a vital and environmentally friendly avenue of mosquito abatement, but it cannot be performed in isolation. Containers holding water around the house often are refilled by rain and sprinklers shortly after being dumped, resupplying mosquitoes with breeding sources soon after removal. Source reduction cannot work without public education regarding sources of stagnant water (gutters, ditch water, potted plants, tarps, general yard debris, etc.) and alternative methods of control.

## INSECTICIDE APPLICATIONS

Insecticide applications are divided into two categories: insecticides that target larval mosquitoes (larvicides) and insecticides that target adult mosquitoes (adulticides). Insecticide applications are a last resort but are frequently the only actionable way of achieving mosquito abatement. As WNV transmission is a perennial problem in Southlake, most of OEM's operations described in this plan are designed to mitigate the risk of WNV transmission to humans. Operational procedures designed to mitigate the risk of other mosquito-transmitted diseases are described in detail in the Chikungunya, dengue, or Zika virus Response Plan section.

### Larvicide Application

Mosquitoes tend to emerge simultaneously in residential and wooded areas in response to rainfall. The persistence and abundance of mosquitoes can greatly impact resident's quality of life. Extended-release larvicides such as Dunk briquettes (methoprene) are deployed in stagnant ground pools. All areas that hold water are routinely assessed for the production of mosquitoes.

OEM will inspect individual residences within a neighborhood when WNV is detected repeatedly in an area or in response to large numbers of localized requests for service. Door-to-door inspections involve gaining permission from residents to surveil and treat possible mosquito breeding sites on personal property. OEM will also surveil areas with known or reported standing water, unkempt pools, and/or poor drainage areas to apply larvicides.

### Adulticide applications

Adult mosquito abundance and risk of virus transmission fluctuate throughout each mosquito season. OEM has developed adult mosquito management thresholds that trigger different control responses throughout the year, with a foundation in mosquito abundance, vector indices, and human cases of the disease.

### Frequency of application

As temperatures increase throughout the year, mosquito development time decreases

population abundance increases and the risk of virus transmission increases. In response to these changing pressures, OEM has developed adult mosquito management thresholds throughout the mosquito season.

Applications are limited to when thresholds are met and are performed to meet label requirements and minimize resistance development. The City of Southlake will spray for 3 consecutive nights when a threshold has been met unless other circumstances are present which allow for a less aggressive approach.

### Adulticide treatment thresholds

The City will contact the mosquito control contractor for adulticide treatment when one of the following thresholds are met:

1. A trap a sample has returned with a positive vector presence.
  2. TCPHVCD advised the City of Southlake that a resident has a confirmed vector disease.
  3. A resident can confirm, with certified medical paperwork that they have contracted a vector disease
- The City will not adulticide for nuisance mosquitoes. Adulticide treatment is used when one of the public health thresholds above are met. Public education will be conducted for mosquito population control and reduction methods.
  - Residents who do not wish to be included in adulticide treatments will be allowed to request a one-time opt-out. If a positive sample or human case is reported in subsequent weeks, the resident will then be subject to adulticide treatment for the best interest of public health and reducing the mosquito population.

### Aerial adulticide requirements

Aerial application will only be performed with guidance from TCPHVCD and approval from Southlake City Council. A case for aerial spraying must be formally presented by OEM to the Mayor and Council. All factors will be considered to affirm that aerial application is the correct solution for the citizens of Southlake.

### Nighttime truck adulticide requirements

Truck adulticiding is primarily performed after sunset, when non-target insects are least active and mosquitoes are most active, ending no later than 3 hours post-sunset. Applications are performed under a strict set of criteria. Wind must be between 1 and 10 mph. Vehicle speed must not exceed 20 mph. Surveillance must indicate thresholds have been met that warrant application or WNV must be present within target populations.

## CHIKUNGUNYA, DENGUE OR ZIKA VIRUS RESPONSE PLAN

### Local Risk

City of Southlake has established populations of Chikungunya (CHIKV), Dengue (DENV), and Zika virus (ZIKV) vector species *Aedes aegypti* and *Ae. albopictus*. Focal populations

of *Ae. aegypti* and widespread populations of *Ae. albopictus* in Southlake mean that there is some risk of local transmission of these viruses. These vectors are active seasonally from April to November in Southlake. Despite the presence of mosquitoes that can transmit these viruses, the risk of widespread local outbreaks of CHIKV, DENV, or ZIKV in Southlake is low due to relatively limited human contact with these mosquitoes. OEM is prepared to perform surveillance and mosquito control, with TCPHVCD guidance, in response to imported or locally acquired human cases of CHIKV, DENV, and/or ZIKV. Currently, we do not expect widespread transmission of CHIKV, DENV, or ZIKV in the City of Southlake.

In the event of notification of a locally acquired human case of Chikungunya (CHIKV), Dengue (DENV), or Zika virus (ZIKV).

A. In the region or neighboring jurisdiction

OEM will (pending availability of resources):

1. Aid with vector surveillance to assess the risk of continued local transmission to mosquito vectors and the geographic extent of local transmission.
2. Aid with existing educational material.
3. Discuss the possibility of using OEM mosquito control tools.

B. In the City of Southlake OEM will:

1. Create a map of the area near the human case. Highlight areas to focus surveillance and control activities.
2. Immediately begin vector surveillance near the human case to assess the risk of continued local transmission to mosquito vectors and/or determine the geographic extent of transmission. This should be conducted prior to mosquito control operations in the area.
  - Aspirate mosquito specimens for CHIKV/DENV/ZIKV testing (Prokopac and Nasci aspirators)
  - Collect mosquitoes in traps (Mosquito Magnet) for CHIKV/DENV/ZIKV testing
3. Immediately begin vector control activities near the human case.
  - Aerial application of mosquito adulticides
  - Special mix truck application of mosquito adulticides
  - Aerial application of mosquito larvicides
  - Door-to-door source reduction

4. Communicate among appropriate partners.
5. Engage residents in door-to-door general mosquito education and source reduction.
  - Use CHIKV/DENV/ZIKV targeted messaging (e.g. flyer or door hanger)

#### Disclaimer

The elements of this document should serve as a suggested basis for control decisions but should not preclude the consideration of additional contextual circumstances that may actually arise. We withhold the right to change any part of this document or response plan based on the local conditions at the time in which the control decisions are made. Additional control tactics may be implemented, or certain tactics may be ruled out at the discretion of OEM, the Fire Chief or City Management.