



# Town of Little Elm

## Mosquito Management & Response Plan



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Appendix A Town of Little Elm Response Plan

## **Introduction**

There are more than 2500 species of mosquitoes now recognized as occurring in the world, with over 165 species and subspecies found in the United States. At least 84 species of mosquitoes are found in Texas, with about 8-10 implicated in the transmission of serious disease. There are also some species of mosquitoes that are beneficial in controlling disease-causing mosquitoes. For example the larvae of some mosquitoes in the genus *Toxorhynchites* prey upon other mosquito larvae, but the adult mosquitoes do not feed upon people, preferring to feed entirely upon nectar or other host. Therefore, not all mosquitoes are of public health concern.

Mosquito control efforts should be focused upon the several species of mosquitoes that can carry disease and parasites that afflict people and domestic animals in our community. These diseases and parasites include heartworm, dengue, yellow fever, and various encephalitides that may occur in Texas which have been of most concern in recent times. The major mosquito-borne encephalitides in Texas that can affect humans include eastern equine encephalitis (EEE), western equine encephalitis (WEE), St. Louis encephalitis (SLE), California encephalitis (CE), and the most recently discovered and highly publicized West Nile Virus (WNV).

Mosquito Control activities are important to the public health. Complete mosquito eradication in any locale is impossible, therefore, the goal of mosquito control program in general is to maintain local mosquito population at relatively levels that disease is not transmitted and/or people are not significantly annoyed.

The current interest in ecology and the environmental impact of mosquito control measures, along with increasing problems that have resulted from insecticide resistance, emphasizes the need to develop integrated mosquito management program. The Environmental Protection Agency (EPA), Centers for Disease Control and Prevention (CDC), State of Texas Health Official, and American Mosquito Control Association encourage adherence to ecologically based integrated pest management (IPM) strategies for mosquito control. According to IPM strategies, the underlying philosophy of mosquito is bases on the fact that the greatest impact on mosquito population will occur when they are concentrated, immobile, and accessible this emphasis focuses on habitat management and controlling the immature stages (larva & pupae) before the mosquito emerge as biting adults. This policy reduces the need for consideration of widespread pesticide application. An IPM based program considers all available control actions, including no action, and evaluates the interaction among various control practices, cultural practices, weather, and habitat structure. Both the EPA and CDC also recognize a legitimate and compelling need for spraying with insecticides under certain circumstances, such as controlling adult mosquitoes during periods of mosquito-borne disease transmission. In such cases, the only option that may be available to effectively suppress a disease outbreak is to use adulticides to quickly reduce the populations of ineffective adult mosquitoes.

Bases upon the IPM guidelines, The Town of Little Elm Mosquito management tactics may include:

- Mosquito survey and surveillance measures
- Mosquito source and harborage reduction
- A biological and larvicide strategy
- Applications of adulticides as needed
- Public Education

A brief summary about each of these mosquito management tactics is presents in the sections that follow.

## **Mosquito Survey and Surveillance measures**

Mosquito surveys are essential for planning, operation, and evaluation of an effective mosquito control program. Surveys are considered to be the eyes of the mosquito control program. The two general types of surveys used widely in mosquito control are the initial survey (an original basic survey) and the continuous operational survey (surveillance survey).

Initial surveys are used to determine the species of mosquitoes at the sites where control is being considered during the planning phase of a mosquito control program.

Surveillance surveys are conducted throughout the lifetime of the control program and include a variety of sampling techniques for larvae, pupae, and adult mosquitoes. This provides continuous flow of information about changes in status of mosquito populations such as species compositions, densities, sources, and location.

The Town of Little Elm plans to conduct mosquito survey and surveillance activities, particularly from May through September, when mosquito activity is expected to be the highest. Collecting mosquito larvae at various locations throughout the town, as well as using light will accomplish this and gravid traps to collect live adult mosquito samples. The larval and adult mosquito samples will be sent to Texas Department of Health Bureau of Laboratories or a Contract Service for species identification and disease analysis. Most collection activity is expected to be accomplished on public property, however, collection of larvae and adult mosquitoes may also be accomplished on private property when requested or authorized by the property owner. Survey and surveillance data such as sampling locations, mosquito species identifications, sample sizes, and location of disease positive samples will be plotted on maps; GIS will be utilized if available. Procedures prescribed in the Texas Department of Health "Guidelines for Mosquito Surveillance" will serve as general guidelines for the Town of Little Elm surveillance activities.

In addition to collecting larvae and adult mosquito samples for identification and analysis, the Town of Little Elm plans to participate in Texas Department of Health sponsored dead bird collection and testing programs if available.

## **Mosquito Source and Harborage Reduction**

The life cycle of all mosquitoes consists of four distinct life stages; egg, larva, pupa and adult. The first three life stages require water, where the mosquito is most concentrated, immobile, and accessible-based upon the underlying philosophy of IPM, this is where the greatest control impact on mosquito populations can be achieved.

Source reduction tactics involve altering the environment or removing sources of mosquito breeding habitat so the mosquito populations cannot complete their life cycles. Source reduction actions range from simple overturning of a discarded bucket, or disposing of waste tires, to clearing vegetation and slit from roadside, sewer and other types of draining ditches.

Harborage reduction involves removing or minimizing areas where adult mosquitoes rest during the day. Mosquito adults prefer to rest in moist, shaded areas such as thick shrubbery and thick stands of grass or weeds. Adult mosquitoes can be discouraged from living near humans, pets, and livestock if the harborage they use for resting sites is removed.

The Town of Little Elm plan for source and harborage reduction may include:

- Educating the public about mosquitoes and emphasizing the benefits of removing mosquito breeding sources and harborage on their property. The public's role in eliminating potential breeding habitats for mosquitoes is a critical step toward reducing the risk of mosquito-borne disease transmission in the community
- Identifying mosquito breeding source and harborage sites in the town maintain areas so they can be eliminated, reduce, or treated with larvicide by the appropriate department. These areas may include drainage ditches along roadways, standing water in parks, tall weeds in or near drainage system, residual floodwaters, etc.

### **Biological Control and Larvicide Strategy**

Regardless of the sources or habitats of immature mosquitoes, some level of biological control is usually already being achieved by naturally occurring predatory, parasitic and/or microbial disease causing organisms, including native fish, worms, bacteria, fungi, etc. Unfortunately, there is no basis to support popular claims that biting is significantly suppressed by bats or purple martins; predation is insufficient to significantly alter mosquito density.

Agents that are used to control mosquito larvae are called larvicides. Commercially available microbial mosquito larvicides are a significant addition to naturally occurring biological controls of mosquito control programs. The microbial larvicides used for mosquitoes control include the bacterium *Bacillus sphaericus* (Bs) and the toxin produced by *Bacillus thuringiensis israelensis* or Bti. Mosquito larvae ingest the Bs or Bti. This disrupts the gut in insects but not in mammals. The larvae normally begin dying within 24 hours after ingesting the BS or Bti. According to EPA test, neither of these larvicides poses a risk to humans, wildlife, no target organisms, or the environment.

The compound methoprene mimics the action of an insect growth-regulating hormone and prevents mosquito larva from maturing into biting adults. Methoprene does not have to be ingested by the larvae to be effective; the larvae need only to absorb. EPA evaluations indicate that methoprene does not pose significant risks to human health, wildlife, or the environment. Toxicity to birds and fish tend to be low, and is nontoxic to bees.

The Town of Little Elm mosquito control plan includes dispensing the larvicides Bti and/or Bs into standing water areas that have been confirmed as containing mosquito larvae. Bti and Bs provide effective larval control for 2-3 weeks depending upon the species of mosquito being targeted, environmental, and water quality. Where larvae persist and/or evidence exists that they are maturing into adult mosquitoes, the application of the growth regulator methoprene, may need to be considered.

### **Public Education**

To be of maximum effectiveness, the people for whom protection is provided must understand and support mosquito control. An integral part of most organized mosquito control programs is public education. It is important that residents have good understanding of mosquitoes, the benefits realized from their control, and how they can help in the community mosquito control effort. People who are informed about mosquito biology and control methods are more likely to mosquito-proof and eliminate mosquito-breeding places on their property. Keeping people accurately informed also helps to reduce problems that tend to arise when people misunderstand or receive incomplete or erroneous information.

If adulticides (spraying) are to be used in the control of adult mosquito populations, it is important for people to be aware of application times and locations so they may consider and/or take applicable precautions during the applications of adulticides. This is particularly true for people who may have chemical sensitivities or feel that spraying may aggravate a preexisting health condition.

The Town of Little Elm plans to provide educational information to the public about mosquitoes and how to help control them through a variety of media, including

- Local Newspapers
- Cable
- City Website
- City Newsletter
- Brochures
- Public service announcement via radio or TV as appropriate.
- Facebook: <http://www.facebook.com/#!/pages/Town-of-Little-Elm-Office-of-Emergency-Management/337410013672>

All public education items will be coordinated through the Town of Little Elm Town Managers Office.

### **Application of Adulticides**

Chemicals that are toxic to adult mosquitoes are called adulticides. A few plant-derived and synthetic pesticides are available as liquid and dust formulations. They include natural pyrethrins derived from certain species of chrysanthemums, and some synthetic organophosphate, carbonate, synthetic pyrethroid compounds that have been specifically labeled for use in mosquito control by the EPA. For various legal, environmental, economical, and biological reasons, the arsenal of chemical insecticides labeled for use against mosquitoes has been dwindling. Because this trend is likely to continue, mosquito control personnel must be good stewards of those insecticides and base their prudent use on accurate surveillance data.

In Texas and other parts of the United States, most mosquito adulticiding now involves the use of non-residual chemicals applied in sprays in the forms of fogs, mists, or occasionally fine dust. This method of application creates an air column at or near ground level that is filled with a dense suspension of fine droplets or particles of pesticides. The mosquitoes are killed when they come in contact with these droplets or particles.

Spraying mosquito control chemicals most often involves dispensing liquid pesticide formulations by either ultra-low (ULV) cold fogging equipment or thermal fogging equipment. ULV applications involve small quantities of pesticides in relation to the size of area treated, typically 0.5 to 3.0 ounces of active ingredient per acre, which minimizes exposure and risks to people and the environment.

Spraying usually occurs during the late afternoon, early evenings, and/or early mornings when there is an air temperature inversion and air movement is at its lowest on any given day. It is also when the adults of most mosquito species are at their peak flight activity so they will be exposed to the insecticide droplets. Spraying must be performed when wind speeds are low, usually below 10 mph, and when few warm air currents or thermals are rising from the ground. Some air movement is needed for spraying so that the cloud of insecticide droplets, whose median diameter is about 10 to 20 microns, will slowly drift across the area to be treated. Crosswinds 2-8 mph are preferred in most cases.

Although greater emphasis is placed on other nonchemical control tactics, especially control of immature stages of mosquitoes, chemical insecticides are still expected to be needed in the near future. An

application of adulticides to kill mosquitoes is usually the least efficient mosquito control technique and should be considered the last resort.

The Town of Little Elm may be compelled to consider the application of adulticides if there is evidence of escalating mosquito-borne disease activity within or near the town, the probability of human outbreaks high, or if there are multiple cases of mosquito-borne disease sources confirm in the town. Even though the EPA approved pesticides used to protect public health are applied by methods that minimize the risk of human exposure and adverse health and environment effect, no pesticide is 100% safe. Therefore the decision of whether or not to apply adulticides involves a great deal of consideration with regards to the potential impact of pesticide application vs. potential disease threat to public health, along with the underlying legal issues.

If the application of adulticides is to occur, the following actions will need to be accomplished:

- If the application of adulticides will impact a residential area, notifications will need to be made to the public at least 48 hours in advance. Residents in the area to be sprayed will need to be informed about the application times and steps that they can take to help reduce possible exposure to pesticides. Steps to reduce exposure including staying indoors, closing windows, and turning off window-unit air conditioners.
- If the application of adulticides will impact a residential area, and notifications cannot be made at least 48 hours in advance, considerations should be given to having the town's staff go door to door in the impact area to notify residents of the application times. This should be done as far in advance as possible to allow residents more time to react. Another option could be to provide a police escort to travel a significant distance ahead of the applicator's vehicle to announce via PA that the application of adulticides will be taking place
- If the application of adulticides will not impact a residential area, such as a relatively isolated park or recreation area, the impact area will need to be closed during the application and for several hours thereafter. This should be communicated to the public as far in advance as possible

Again, the application of adulticides is the least efficient method of controlling mosquitoes and should be a last resort consideration in response to the actual or high probability of mosquito-borne disease outbreak. Any application of adulticides must be accomplished in accordance with requirements prescribed by the state and federal pesticide laws and regulations. Special consideration will need to be made regarding the type of adulticides to be used since some cannot be used within 100 feet of lakes or streams. The Town of Little Elm may need to consider using more than one type of adulticides depending upon the location of the area to be sprayed, however, adulticides than can be used within 100 feet of lakes or streams tend to cost about 2-3 more per gallon.

**References:**

Centers for Disease Control and Prevention, Epidemic/Epizootic West Nile in the United States: Revised Guidelines for Surveillance, Prevention, and Control. 2003

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Texas Department of Health. 2004 West Nile (WN) Virus Public Health Response Plan.

Texas Department of Health. 2004 Guidelines for Mosquito Surveillance

United States Environmental Protection Agency. Joint Statement on Mosquito Control in the United States from the U.S. Environmental Protection Agency (EPA) and the U.S. Centers for Disease Control and Prevention (CDC), Updated September, 2005.

United State Environmental Protection Agency. Pesticides: Topical & Chemical Fact Sheets, Pesticides and Mosquito Control, updated September 2005.

City of The Colony, Texas

City of Frisco, Texas

## **Appendix A**

### Town of Little Elm Response Plan

# The Town of Little Elm Response Plan

The Town of Little Elm Response Plan is modeled after the Texas Department of Health (TDH) and the Public health Response Plan relating to West Nile Virus (WNV). The Town of Little Elm plan is also designed to address other mosquito-borne disease that could affect our community, such as western equine encephalitis (WEE), eastern equine encephalitis (EEE), and St. Louis encephalitis (SLE), dengue virus, yellow fever, etc.

As with other disease, one of the keys to a proper response lies in ensuring that prompt, accurate information campaign implemented by TDH should be supplemented and reinforced at the local level with information targeted specifically for our community.

This response plan is divided into three (3) levels based on risk of human disease, with recommended response based on that risk. However, the methods and scope of surveillance and control may vary on a case by case due to available resources, environmental impact, and the preferences of people in our community.

The Town of Little Elm Response Plan incorporates integrated pest management concepts advocated by the CDC, EPA, State Health Officials, and nationwide mosquito control associations and impact and risk to human health and environmental. These concepts include:

- Mosquito- borne disease surveillance
- Promoting the reduction and/or elimination of mosquito sources
- Using environmentally friendly larvicides at mosquito breeding sites that cannot be eliminated
- Public Education
- Considerations of the prudent use of the EPA approved insecticides in response to actual or potential disease outbreaks

The effectiveness of this response plan relies heavily upon committed, cooperative effort among various department and the public to identify, eliminate and/or treat private and public vector mosquito sources in the town.

Following is the West Nile Virus Response Plan. If you have any questions, please contact the Town of Little Elm Emergency Management at 214-975-0420, Health Services at 972-731-3276, and Public Works at 972-377-5556.

## Level One Standard Response

**Conditions:** Normal mosquito activity with little or no evidence of West Nile virus (WNV).

**Response:**

Emergency Management and Health Services will:

- Coordinate with area Health Departments and County Agencies.
- Educate the public about mosquitoes and emphasizing the benefits of removing mosquito breeding sources and harborage on their property.

Public Works and or approved contractor will:

- Apply larvicides to mosquito breeding sites located in storm drains and other areas within the Town owned property.
- Conduct mosquito surveillance measures.

## Level Two Enhanced Response

**Conditions:** Confirmation of West Nile Virus positive mosquitos or positive confirmation of one (1) human case of West Nile virus received from Texas Department of State Health Services (TDSHS), or Denton County Health Department (DCHD) received by the Town of Little Elm Emergency Management Office.

**Response:**

Emergency Management and will:

- Coordinate a Press Release providing the location of the positive mosquito pool, with continued emphasis on protective barriers.

Public Works or approved contractor will:

- Intensify mosquito surveillance measures.
- Continue to apply larvicides to breeding sites on Town owned or public property

Development Services Department – Health Services will:

- Inspect private property for nuisance abatement and avenues for legal penalty.

## Level Three Intensified Response

**Conditions:** Confirmation of West Nile Virus (WNV) positive mosquitos pools in different/multiple locations, with one (1) human case or multiple human cases of West Nile virus received from Texas Department of State Health Services (TDSHS), or Denton County Health Department (DCHD) by the Town of Little Elm Emergency Management Office.

**Response:**

Emergency Management and will:

- Coordinate a Press Release providing the location of the positive mosquito pool, with continued emphasis on self-protection.

Development Services Department – Health Services will:

- Intensify inspections of private property that may harbor mosquitoes and pursue legal nuisance abatement remedies.

The Public Works or approved contractor will:

- Continue intense mosquito surveillance measures.
- Routinely continue adulticide program until identified mosquito vector species has significantly reduced in number or is no longer identified through routine mosquito surveillance and testing.

If you have any questions, please contact the Town of Little Elm:

Emergency Management at 214-975-0420

Health Services at 972-731-3276

Public Works at 972-377-5556