

## TEXAS DEPARTMENT OF STATE HEALTH SERVICES' TECHNICAL GUIDANCE: MOSQUITO ABATEMENT POST-WEATHER INCIDENT

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**ABSTRACT.** The Texas Department of State Health Services provides assistance to local health departments following severe weather events and other public health emergencies. Following the reports of large mosquito populations hindering recovery efforts after Hurricane Harvey, the Texas State Medical Operations Center created the Vector Control Task Force (VCTF) to organize the mosquito response requested through the State of Texas Assistance Requests. Since Hurricane Harvey, there have been other severe weather events that have activated the VCTF. The purpose of this developed document is to provide guidance to local jurisdictions requesting mosquito abatement assistance from the state level in response to a proliferation of nuisance mosquitoes that hinders governmental response and recovery efforts after a severe weather incident. The document also establishes criteria that the VCTF will evaluate to determine if and how resources should be allocated to programs requesting assistance for mosquito abatement. The guidance document provides background information on mosquito surveillance and control and identifies tasks, roles, and responsibilities for local jurisdictions, state, and federal partners.

**KEY WORDS** Emergency management, guidance document, floodwater mosquito control, postdisaster response

### BACKGROUND

The purpose of this document is to provide guidance to local jurisdictions requesting mosquito abatement assistance from the state level in response to a proliferation of nuisance mosquitoes that hinders governmental response and recovery efforts after a severe weather incident. It provides background information on mosquito surveillance and control and identifies tasks, roles, and responsibilities for local jurisdictions, state, and federal partners.

After a severe weather incident, an increase in standing water due to heavy rains and/or flooding can lead to a significant increase in nuisance floodwater mosquito populations. However, the risk of mosquito-transmitted arboviruses does not increase. For example, *Culex* mosquitoes, which transmit the West Nile virus, prefer to lay eggs in stagnant, nutrient-rich water, which is less available immediately following flooding. *Culex* mosquitoes may start to use that water as a development site after 2–4 wk when the water becomes stagnant and nutrient-rich enough to be favorable for *Culex* oviposition.

An extraordinary or unusually large number of nuisance floodwater mosquitoes could impede response or recovery operations even when evidence of vector-borne diseases is not present or prevalent in the disaster-affected areas. Recovery workers who are required to work out-of-doors (e.g., debris removal operations, protection of damaged structures, restoration of power and telephone services) can often be significantly hindered in their work to restore a community to an operationally effective state.

### Definitions

*Recovery:* The reestablishment of critical infrastructure (power lines, debris removal from roads, etc.) and repairs to a jurisdiction. This does not apply to individuals repairing their homes or personal property.

*State of Texas Assistance Request (STAR):* Electronic request for state resources submitted by local jurisdictions.

*State-declared disaster:* An executive order or proclamation from the governor declaring a state of emergency that activates the disaster recovery and rehabilitation aspects of the state emergency management plan applicable to the area covered by the declaration but may or may not be fully funded by state-level government agencies.

*Federally declared disaster:* System in place by which a presidential disaster declaration or an emergency declaration triggers financial reimbursement and physical assistance through the Federal Emergency Management Agency (FEMA) to state and local governments to relieve hardship and damage.

*Nuisance floodwater mosquitoes:* These types of mosquitoes will be the primary issue following a severe weather incident involving flooding. Nuisance mosquitoes lay their eggs in moist soil prior to the rain event. As the soil dries, the eggs become dormant. After a rain event, the eggs are flushed out of the soil and are stimulated to hatch. The adults may emerge 4 days to 2 wk after the initial rainfall, depending on the mosquito species. Normal rain events may flush small batches of eggs. However, severe weather incidents often result in large areas of

standing water that have accumulated many floodwater mosquito eggs that will develop and emerge, resulting in large nuisance mosquito populations.

It is important to note that nuisance floodwater mosquitoes do not lay their eggs in standing water. Thus, once all the adults emerge, there will not be another emergence of nuisance floodwater mosquitoes from that rain event. There is only 1 generation of nuisance floodwater mosquitoes per incident.

### Critical information

- An incident involving excessive rainfall and flooding may lead to the hatching of nuisance floodwater mosquitoes.
- If local response capability and/or capacity for nuisance floodwater mosquito abatement is exceeded, local jurisdiction(s) may request state assistance through submission of a STAR.
- The state will support assistance requests if proliferation of nuisance floodwater mosquitoes is hindering response and recovery (see definition of “recovery”) efforts.
- Nuisance mosquitoes alone do not pose a public health risk, but their presence may justify mosquito abatement measures if they hinder recovery efforts.
- The Texas Department of State Health Services (DSHS) does not have an ongoing, routine mosquito abatement program.
- Mosquito abatement activities should be focused in areas with a higher human population density to be the most cost-effective, not in agricultural or unpopulated areas such as swamps or livestock grazing land.
- Jurisdictions requesting mosquito abatement assistance will provide evidence of ongoing response and recovery efforts that are hindered by the presence of nuisance mosquitoes.
- Personnel involved in outdoor response and recovery efforts should take personal protective measures to reduce mosquito bites by properly applying mosquito repellent and wearing long sleeves and long pants when active in the field.
- Individuals who apply ground-based pesticides should have proper training and be licensed by the Texas Department of Agriculture (TDA).
- Mosquito surveillance conducted,
- Larval inspections conducted,
- Heavily impacted areas,
- Larvicide activities (including usage/burn rate),
- Adulticide activities (including usage/burn rate),
- Number of service requests or governmental customer complaints received and for which there was a response,
- Manpower hours expended,
- Floodwater habitats identified.

*Mosquito surveillance:* Surveillance activities should be conducted for adult mosquitoes in affected areas where nuisance mosquitoes pose a threat to outdoor emergency workers supporting ongoing response or recovery efforts.

Mosquito surveillance data may include complaints (above-average complaint volume), landing rate counts, and/or adult mosquito trap counts. Consistent surveillance locations and activities around recovery efforts should be thoroughly documented. Longitude and latitude should be noted in the documentation if Global Positioning System equipment is available.

The following adult mosquito surveillance activities to be carried out by local mosquito abatement personnel are recommended, as soon as weather permits following the event:

- Perform and document mosquito landing rate counts in populated areas prior to intervention. Set a threshold for control efforts.
- Perform and document mosquito landing rate counts the day following intervention to document efficacy.
- Perform adult mosquito collections in the evening to verify abundance and species of mosquitoes in the affected populated areas. Use the Centers for Disease Control and Prevention (CDC) light traps baited with dry ice. Set up sentinel mosquito trap sites in heavily impacted areas (parks, in neighborhoods that were flooded) to get a picture of when the floodwater mosquito populations start to peak. Set a threshold for control efforts.
- If an existing surveillance system does not have an adequate number and distribution of fixed trap sites to represent the jurisdiction, map service requests or customer complaints and use this information to guide sentinel mosquito surveillance site selection. If several calls are from the same area, set out a trap in that area and use the threshold to determine if control measures are necessary.
- Complete all adult surveillance activities with proper documentation.
- Provide detailed information on how response and recovery efforts are hampered by the determined nuisance mosquito activity.

*Mosquito abatement capability and capacity:* Local jurisdictions’ mosquito abatement capability

## CONCEPT OF OPERATIONS

### Local response

Local jurisdictions should coordinate nuisance mosquito abatement activities and efforts with their respective counties to assure efficient and effective use of resources for an area response.

Following a severe weather incident, local jurisdictions should record detailed data on the following mosquito abatement activities:

and capacity varies across the state. Following a severe weather event, local jurisdictions should initiate abatement efforts in line with their capability and capacity and should obtain necessary supplies to continue those efforts for as long as needed.

- DSHS reserves the right to decide whether to enter into cost-sharing contracts or agreements with local jurisdictions before providing mosquito abatement resources. Local jurisdictions will be expected to expend \$0.40 per capita in abatement efforts prior to requesting assistance from the state and will be expected to show proof of these expenditures.
- Simultaneously to meeting this \$.40 per capita requirement, jurisdictions will be expected to calculate their daily burn rate of current supplies. Should the projected needs of the jurisdiction exceed existing resources and the jurisdiction does have the means to procure additional resources, the jurisdiction(s) may submit a request to the state for resources. This request must be made within a reasonable amount of time prior to exhausting current mosquito abatement resources. Jurisdiction(s) should keep in mind that certain mosquito abatement resources may take several days or weeks to be delivered to the requesting jurisdiction.
- Requests should include documentation listed in the next section that indicates a reasonable rate of resource depletion and hindered response and recovery efforts.

#### *Chemical suppression measures:*

- Ground-Based
  - All ground-based activity should be directed by mosquito surveillance data. Once control thresholds have been met at sentinel surveillance sites (see Local Response surveillance section), adulticide activities should begin in those areas. Decisions concerning ground-based control should be determined by surveillance data and other associated data such as service requests and customer complaints. Any measures used must be thoroughly documented, including areas treated, chemical name(s), concentration, and amount of chemical(s) used.
- Aerial Spraying
  - Local jurisdictions may enter into their own contract for aerial spraying.
  - Aerial spraying should only be considered when it is determined that ground-based mosquito abatement measures are insufficient to facilitate recovery efforts.
  - Aerial spraying may not be the most effective tool in mitigating nuisance mosquitoes. As with ground applications, weather conditions must

be right for application to occur. The product label must be referenced to ensure that the wind speed and weather conditions are met for both ground and aerial applications.

- Aerial spraying should be focused in populated areas where recovery efforts are ongoing.
- Any aerial spraying must follow proper procedures dictated by the Environmental Protection Agency, CDC, and TDA to ensure that the aerial applicator is properly licensed and applies products at the correct label rate to mitigate any nontarget impacts.
- Aerial spraying is prohibited over national parks, wildlife refuges, and agricultural areas.
- Officials contemplating aerial application must consider potential harm to beneficial insects, such as honeybees (*Apis mellifera* (L.)) which are important to agriculture, and that not all persons and groups support aerial spraying.

*STAR process and documentation:* See the Post-incident Mosquito Abatement STAR Submission Algorithm (Fig. 1) and STAR Submission Process (Fig. 2).

The following items must be thoroughly documented throughout the entirety of the event and must be attached to any related STAR for assistance in mosquito abatement efforts:

- Once local jurisdictions have depleted their on-hand supply and have expended \$0.40 per capita in abatement efforts, a STAR can be submitted through the Disaster District Coordinator to the State Operations Center for those jurisdictions requesting additional or ongoing assistance with mosquito abatement.
- A map or location of areas of *ongoing* response and recovery efforts, and an accompanying list of those efforts being hindered by nuisance mosquitoes. Response and recovery activities that will end a few days after rainfall and can be supported by local efforts will not be supported by the state. This must be considered when submitting any STAR.
- Any mosquito data that the program is currently collecting, to include landing rate counts (day-before and day-after spraying), larval inspections, and adult trap counts.
- List of ongoing mosquito abatement activities and where they are occurring. The submitting jurisdiction should provide a list of their manpower, chemical output, burn rate, etc.
- Expenditures should include relevant information such as, but not limited to:
  - Existing mosquito abatement program expenditures,
  - Current abatement efforts as a per capita expenditure (treatment).
- Documentation of inventories should include:

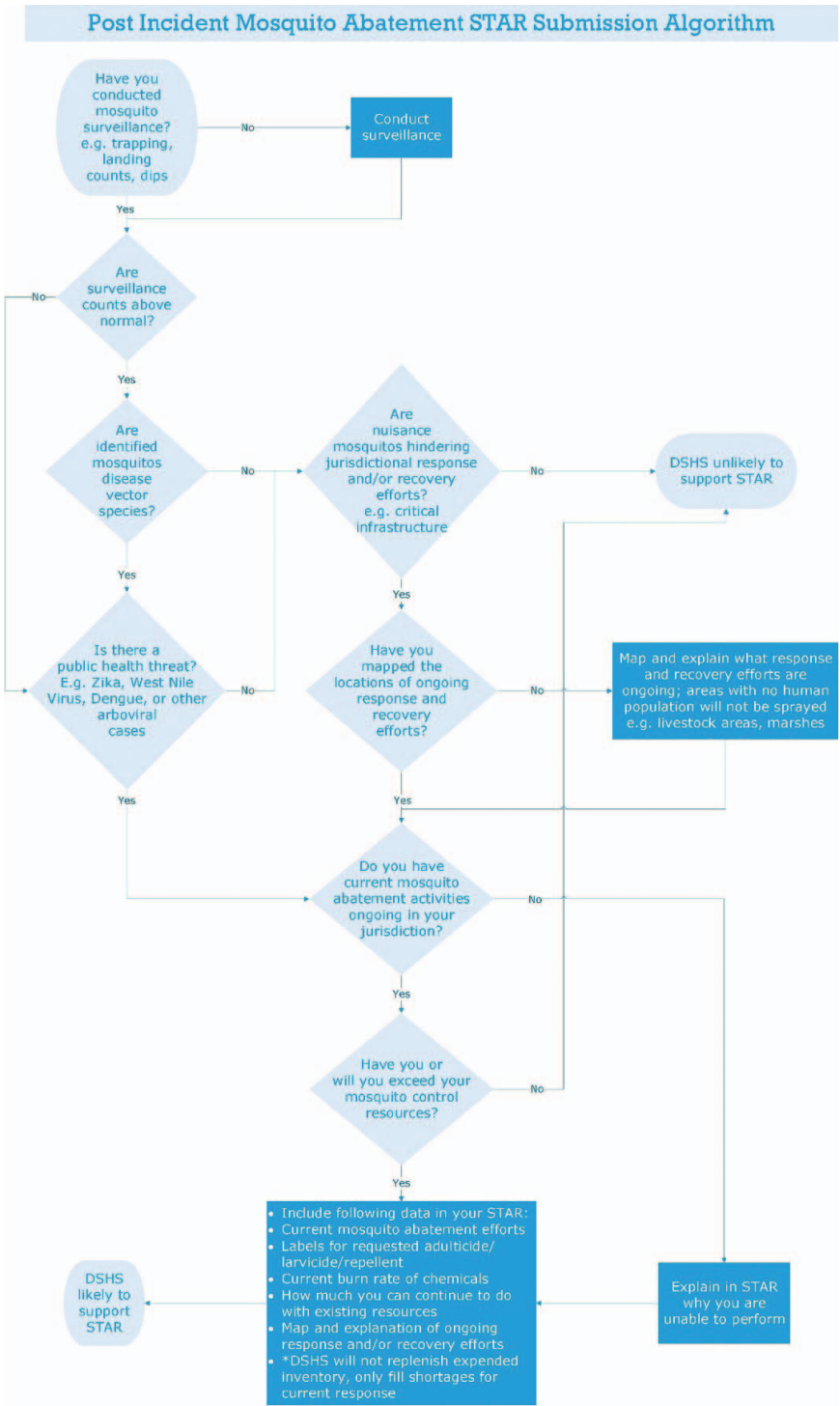


Fig. 1. Postincident Mosquito Abatement State of Texas Assistance Request (STAR) Submission Algorithm.





- For FEMA reimbursement, specific scientific surveillance data and management are required by state and local jurisdictions.
- Expenses incurred by local jurisdictions and the State of Texas in responding to hurricanes and other natural disasters producing heavy rains and flooding may be eligible for reimbursement by FEMA.
- Wear solid light-colored long sleeves and pants, and work gloves. Mosquitoes are more easily seen on solid light-colored material versus a dark-patterned background.
- Maintain a consistent clothing color among the counters within a county to keep the results comparable.
- Mosquitoes do exhibit color preferences, and wide variation in the background color of the clothing could cause variation within the data set.
- If possible, the same person should perform the counts to maintain consistency.
- No repellents, aftershaves, or perfumes should be used.
- Disturb the surrounding vegetation before starting the counts.
- Stand still for 3 min before beginning the count.
- Take all landing rate counts from a standing position.
- Count only those mosquitoes that land in a 1-min time span on the front of one leg from the waist to the foot.
- Complete a landing rate form using real numbers for the mosquito landing counts. For example, “25” or “75” are much more meaningful than using “50+” or “100+”.

### **MOSQUITO LANDING RATE COUNT GUIDELINES**

The following guidelines apply to landing rate collections:

- Divide the city, precinct, or county into 4 geographical zones and conduct counts at 5–10 locations within each zone.
- The timing of the landing rate count should be consistent. Landing rate counts should be taken at the same time each day. Counts should not be taken during the heat of the day because most mosquitoes are inactive. A time period between 8:00 a.m. and 10:00 a.m. or prior to adulticiding application for mosquito landing counts is recommended.
- If time and resources permit, mosquito landing counts should be conducted daily.