MOSQUITO-BORNE DISEASE WORKSHOP JANUARY 2020
# 2020 Calendar

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**Legend:**
- **Yellow** - Holidays
- **Blue** - Meetings
- **Green** - Conferences
1. **Call to Order**

2. **Roll Call**

3. **Approval of Agenda**

4. **Community Input:**
   Community Input shall be heard prior to each specified agenda item.

   The Board adheres to, and conducts each meeting in accordance with Robert’s Rules of Order. Presentations to the Board are limited to three (3) minutes for each individual speaker and five (5) minutes for the representative of a designated group. Transfer of time between individuals and/or groups is not permitted. Letters submitted to any Commissioner, the Executive Director, Executive Assistant, or any other District employee during a Board meeting will be placed into the record but will not additionally be read into the record at the meeting.

   The Board welcomes public input but also must maintain order. Thus, community input is not a time for open dialogue between the Board and the speaker. Speakers should direct their comments to the Board and not to the District Staff or any other audience members. Speakers should not expect Commissioners or staff to answer or respond to questions during community input. If appropriate, the Board may request the issue be added as a discussion item at a future District Board Meeting.

   Any person who wishes to be heard shall complete and provide the supplied Community Input Card or inform the Clerk/Executive Assistant to the Board, specifying the agenda item on which he or she wishes to be heard. Once public input begins on an agenda item, there will be no further speaker cards or speakers allowed on that specific agenda item or subject.

5. **Purpose of the Workshop:** Chairman Goodman announces the purpose of this workshop is to discuss the Florida Mosquito Control District’s mosquito-borne disease response plans.  

6. **Meeting Adjourned**
PART I:

_Disease Vector Response Plan:_

_Aedes aegypti_
Disease Vector Response Plan: Aedes aegypti

Background on the Vector: Aedes aegypti

Aedes aegypti is a mosquito species native to sub-Saharan Africa, but invasive to many tropical and subtropical locations including the Florida Keys. Ae. aegypti can be associated with human habitats, as larvae and pupae occupying small water-holding containers, and as female adults frequently feeding on humans. These habits and behaviors have enabled Ae. aegypti to become an important vector of multiple mosquito-borne viruses including yellow fever, dengue, chikungunya and Zika.

Yellow Fever (YF), Dengue, Chikungunya (CHIK) and Zika are viral diseases transmitted to humans by infected Ae. aegypti. Typical symptoms of these viral infections include fever, rash and severe muscle and joint pain.

- **Yellow fever** can cause severe disease in infected individuals, but can be prevented by vaccination when traveling to YF-endemic countries.
- **Dengue** is the leading cause of illness in tropical and sub-tropical countries with an estimated 400 million cases estimated to occur each year. More than one-third of the world’s population lives in an area at risk for dengue infection, including the Florida Keys. Although autochthonous outbreaks in the United States are rare, a dengue outbreak occurred in Key West in 2009 and 2010 that resulted in 89 reported cases. In 2019, there were a total of 371 travel-related cases of dengue in Florida and 16 locally-acquired cases.
- **CHIK** caused explosive outbreaks throughout Central and South America and the Caribbean in 2014. Most cases of CHIK are not life-threatening, although there is a slight increase in mortality associated with CHIK viral infection compared to dengue. In 2014, there were 11 locally-acquired CHIK cases in Florida, although none occurred in Monroe County. Florida has consistently seen travel-related cases each year.
- **Zika** presents as a mild flu-like illness in adults, but recent epidemiological studies have linked Zika infections in pregnant women to an increase in microcephaly in newborns. In early 2016, the World Health Organization declared Zika a Public Health Emergency of International Concern, and 218 locally-acquired cases of the virus were seen in Miami-Dade County that year.

Both CHIK and Zika can share some clinical signs with dengue including fever and joint pain; therefore, suspected cases of any of these diseases must be differentiated through serological tests. There is no available vaccine or cure for dengue, CHIK or Zika, and treatment is used only to alleviate symptoms.

Necessity of Response Plan

The Florida Keys Mosquito Control District recognizes the importance of Ae. aegypti as a prominent disease vector in the Western Hemisphere. Ae. aegypti is invasive to the Florida Keys, and as evidenced by the dengue outbreak in 2009 and 2010, conditions could be suitable for virus transmission.

Date Modified: 2020 January 2016
It is important to be prepared and as proactive as possible, within budgetary constraints, should any of the *Ae. aegypti*-vectored diseases be introduced into the Florida Keys.

**Prior to an Introduction**  
*Operational Aedes aegypti Control*

Currently, *Aedes aegypti* control is part of the Florida Keys Mosquito Control District’s operational plan. There are thirty-two inspectors throughout the Keys; Upper Keys (6), Middle Keys (6), Lower Keys (11), Key West (9). They are responsible for treatment of domestic larval and adult habitats. Each inspector has a list of highly-probable properties that produce domestic mosquitoes, including *Ae. aegypti*. These sites are visited every 4-6 weeks. Inspectors are also responsible for responding to all service requests from individual residences, which then will lead to door-to-door inspections of problem areas.

Current products used for domestic mosquito control include the following:

**Biological:** *Gambusia rhizophorae*

**Larvicides:** Abate 2-BG, Altosid Pellet, Altosid XR, Cocobear Larvicide Oil, Kontrol Larvicide Oil, Natular DT, Natular XRT, Prozap, Sustain, Vectobac DT, Vectobac G, Vectobac WDG

**Adulticides:** DUET, Demand CS, Fyfanon, Dibrom

**Current Suppression Plan in High Risk Areas of Key West**

Since the 2009 and 2010 dengue outbreak in Key West, the District has implemented an ongoing suppression plan in an effort to reduce the vector population below a viral transmission threshold. The District is focusing on Key West due to the high population density, high tourist population, the availability of potential mosquito-producing sites, and the historical occurrence of an *Ae. aegypti*-vectored disease in the city.

Currently, there are nine inspectors that visit homes in Key West on a daily basis. These inspectors reduce and/or treat larval habitats, apply adulticides if necessary, and educate homeowners. In addition to inspectors, the Lower Keys biologist sets weekly surveillance traps to estimate the adult *Ae. aegypti* population within Key West throughout the year. The resulting mosquito data routinely informs operations on the relative *Ae aegypti* density in Key West.

The District also applies Vectobac WDG aerially throughout the western portion of the island of Key West. These applications occur in response to rainfall.

**Media and Homeowner Education Program**

The Florida Keys Mosquito Control District has an extensive public education and outreach program. The purpose of the program is to educate the community on how to prevent mosquitoes from biting them, as well as what they can do to prevent mosquitoes from breeding in and around their homes.

Date Modified: 2020 January 2016
Speaking engagements for local civic groups as well as public outreach booths at community events and festivals are a significant part of the District’s outreach. Mosquito prevention tips are included in weekly newspapers from May through October and on the radio throughout the year. Homeowners and businesses receive informational door hangers and timely literature as part of the educational campaign.

The District also has a robust notification system in order to alert the public of mosquito control activities occurring in their area. This includes a strong social media presence through Facebook and Twitter, a website with live maps, and a smartphone app for both Android and iOS that provides live mosquito activity and push notifications.

Finally, the District has produced a 7-minute “Homeowner’s Guide to Mosquito Control” video which details the steps residents can take to rid their property of container breeding mosquitoes. This is distributed at local events and speaking engagements and is available for viewing on the District’s website.

**Response to Person Under Investigation (PUI) of *Aedes aegypti* transmitted disease**

*Steps Once Call Received from local Health Department to Imported Case*

1. Immediate notification of staff involved: local supervisor, staff in area
2. Sweep of three block radius from suspect case home and/or exposure area (work, other areas visited)
3. Sweep will include inspection and treatment of every residence in designated area
   - If no access, tag door and state we will be back tomorrow
   - If denied access, use letter provided by attorney to gain access
   - DO NOT question residents on privileged information (i.e. if they have been diagnosed with a disease, exposure to those with disease) and DO NOT share any of this privileged information with others
4. Handheld ULV each residence in the designated area, paying particular attention to harborage areas
5. Barrier treatments can be performed on sufficient vegetation, walls, under porches/houses, and any other harborage areas
6. Set BG Sentinel Trap at residence (or area of most mosquito exposure) to monitor adult *Aedes aegypti* population in area
   - All *Ae. aegypti* collected are pooled for testing should the PUI be confirmed
7. Indoor adult mosquito reduction if applicable
8. Ground Vectobac WDG in designated area

*Steps Once Call Received from local Health Department to Locally-Acquired Case*

1. Immediate notification of staff involved: local supervisor, staff in area

Date Modified: 2020 January 2016
2. Sweep of three block radius from suspect case home and/or exposure area (work, other areas visited)

3. Sweep will include inspection and treatment of every residence in designated area
   - If no access, tag door and state we will be back tomorrow
   - If denied access, use letter provided by attorney to gain access
   - DO NOT question residents on privileged information (i.e. if they have been diagnosed with a disease, exposure to those with disease) and DO NOT share any of this privileged information with others

4. Handheld ULV each residence in the designated area, paying particular attention to harborage areas

5. Barrier treatments should be performed on sufficient vegetation, walls, under porches/houses, and any other harborage areas

6. Set BG Sentinel Trap at residence (or area of most mosquito exposure) to monitor adult *Aedes aegypti* population in area
   - All adult *Ae. aegypti* collected are pooled for testing should the PUI be confirmed

7. Indoor adult mosquito reduction if applicable

8. Expand aerial Vectobac WDG treatment area if necessary and/or utilize ground equipment for treatment

9. Discuss possible truck and/or aerial adulticide measures

**Media and Homeowner Education Plan**

1. Inspectors will engage as many residents as possible during the initial sweep of designated area to educate on reduction of mosquito larval habitats and the importance of repellent and other actions to prevent mosquito bites

2. Leave doorknockers, mosquito reduction information and disease information at all residences/businesses in designated area

**Response to Confirmed Case of *Aedes aegypti* transmitted disease**

**Confirmed Imported Case**

Confirmation of cases by the Department of Health usually takes about one week. All persons under investigation should be treated as confirmed cases due to this time lag. Follow the above steps for all imported cases, whether confirmed or under investigation. If confirmed, all adult *Ae. aegypti* collected will be pooled and sent for testing, including samples collected prior to confirmation.

**Confirmed Locally-Acquired Case**

Once the District is informed of a confirmed locally-acquired case, the following should be done immediately:

1. Immediate notification of staff involved: local supervisor, staff in area

Date Modified: 2020 January 2016
2. Sweep of five block radius from suspect case home and/or exposure area (work, other areas visited)

3. Sweep will include inspection and treatment of every residence in designated area
   - If no access, tag door and state we will be back tomorrow
   - If denied access, use letter provided by attorney to gain access
   - DO NOT question residents on privileged information (i.e. if they have been diagnosed with a disease, exposure to those with disease) and DO NOT share any of this privileged information with others

4. Handheld ULV each residence in the designated area, paying particular attention to harborage areas

5. Barrier treatments should be performed on all harborage areas around homes and/or businesses
   - Treatment should include exposure area for confirmed case
   - Also, treatments of high risk areas should begin as well
     - High risk areas have the following characteristics
       - Many people outside during prime mosquito biting times
       - High number of vectors
       - Areas where viral introduction could take place

6. Set BG Sentinel Trap at residence (or area of most mosquito exposure) to monitor adult *Aedes aegypti* population in area, to be repeated weekly as necessary
   - All adult *Ae. aegypti* collected will be pooled and sent for testing, including samples collected prior to confirmation

7. Indoor mosquito reduction if applicable

8. Expand aerial Vectobac WDG treatment area to include area of exposure, repeat treatments weekly

9. Discuss possible truck and/or aerial adulticide measures using malathion, DUET and/or naled

**Media and Homeowner Education Plan**

1. Coordinate with Monroe County Department of Health and Emergency Management on messaging
2. Inspectors will engage as many residents as possible during the initial sweep of designated area to educate on reduction of mosquito larval habitats and the importance of repellent and other actions to prevent mosquito bites
3. Leave doorknockers, mosquito reduction information and disease information at all residences/businesses in designated area
4. Utilize local media (radio, print) to alert residents:
   - Key message: The Florida Keys Mosquito Control District has increased operations on ______ Key in response to information received from the Department of Health.
5. Utilize social media to encourage mosquito larval habitat reduction and use of repellent and other actions to prevent mosquito bites
6. Utilize FKMCD app to push notifications to areas of highest concern

Date Modified: 2020 January 2016


PART II:

Disease Vector Response Plan:

*Culex spp.*
Disease Vector Response Plan: *Culex spp.*

**Background on the Vectors: Culex nigripalpus and Culex quinquefasciatus**

*Culex nigripalpus* is a subtropical mosquito species, and is found throughout the southern United States and the Caribbean through Mexico and Central and northern South America. Females are opportunistic in their choice of host blood meal and will feed readily on vertebrates as diverse as lizards, birds, frogs, and humans. Like all *Culex* mosquitoes, *Cx. nigripalpus* females lay their eggs in groups that contain up to 200 eggs on the surface of a freshly flooded habitat. Their capacity to feed on a range of animal species and their sheer abundance in central and south Florida means that is one of the most important disease vectors in the state. *Culex nigripalpus* can transmit West Nile virus and Eastern Equine encephalitis but is most notable as the primary vector of St. Louis encephalitis.

*Culex quinquefasciatus* is known as the southern house mosquito. The species ranges from the tropics through the lower latitudes of temperate regions. Females are opportunistic feeders, and a blood meal study conducted in the Florida Keys revealed the species to feed on a variety of local fauna: approximately 32% fed on birds, 26% fed on humans, 36% fed on non-human mammals, and 6% fed on reptiles. *Culex quinquefasciatus* can transmit many pathogens including the viruses that cause St. Louis encephalitis and West Nile as well as the filarial nematode that causes lymphatic filariasis.

- **St. Louis encephalitis** is transmitted to mosquitoes by infected birds. Infections in humans usually are asymptomatic with only one of several hundred resulting in central nervous system symptoms. Children and elderly people are most affected. In the eastern US, mortality rates can range from 3-20%. Patients with clinical disease may have fever, headache, aseptic meningitis and encephalitis. Only birds play any part in transmission cycles, humans cannot spread the virus to other humans. In Florida, SLE virus transmission by *Cx. nigripalpus* females has been correlated with rainfall that produces large spring broods. When large numbers of vectors coincide with large population of nonimmune birds (especially mourning doves and common grackles) epidemics can occur. There have only been 2 reported cases of St. Louis encephalitis neuroinvasive disease in Florida since 2014.

- **West Nile virus** first appeared in the US in 1999. The virus is very similar to the St. Louis encephalitis virus in that birds are reservoirs and amplifying hosts. Approximately 80% of infections in humans are asymptomatic. Fewer than 5% present as WN neuroinvasive disease. Grackles, house finches and sparrows are competent reservoirs hosts. Because *Cx. quinquefasciatus* and *Cx. nigripalpus* feed readily on humans birds and other mammals these species can serve as bridge vectors which allows the virus to be transmitted to different hosts. In 2018, there were 35 reported cases of West Nile virus in Florida. The last reported case of West Nile virus in Monroe Co. was in 2003.
Necessity of Response Plan

The Florida Keys Mosquito Control District recognizes the importance of *Culex spp.* as prominent disease vectors in the United States. *Culex* vectors are found throughout the Florida Keys. While historically, these Culex-vectored diseases are rare, it is important to be prepared and as proactive as possible, within budgetary constraints, should any of these diseases be introduced into the Florida Keys.

Prior to an Introduction

*Operational Culex Control*

Currently, *Culex* control is part of the Florida Keys Mosquito Control District’s operational plan. There are thirty-two inspectors throughout the Keys; Upper Keys (6), Middle Keys (6), Lower Keys (15), Key West (10). They are responsible for treatment of domestic larval and adult habitats, natural field habitats, and catch basins. Each inspector has a list of highly-probable properties that produce domestic mosquitoes, including *Cx. quinquefasciatus*, as well as natural field habitats that can potentially produce *Cx. nigripalpus*. These sites are visited on a regular basis, either weekly or monthly, depending upon the site. Inspectors are also responsible for responding to all service requests from individual residences, which then will lead to door-to-door inspections of problem areas.

Current products used for *Culex* control include the following:

**Biological:** *Gambusia rhizophorae*

**Larvicides:** Abate 2-BG, Altosid Pellet, Altosid XR, Cocobear Larvicide Oil, Kontrol Larvicide Oil, Natular DT, Natular XRT, Prozap, Sustain, Vectolex CG, Vectobac GS, Vectobac WDG

**Adulticides:** DUET, Demand CS, Fyfanon, Dibrom

*Current Suppression Plan Throughout the Florida Keys*

*Cx. quinquefasciatus*: The District currently has thirty-three (33) inspectors located throughout the Keys that are responsible for the control of *Cx. quinquefasciatus*. These inspectors visit properties on a daily basis to reduce larval sources, treat with larvicides and adulticides if necessary, and educate homeowners. In addition to this, inspectors are also tasked with the inspection and treatment of catch basins, sewage treatment plants and septic tanks throughout the Keys. District biologists set weekly surveillance traps to estimate the adult *Cx. quinquefasciatus* population throughout the year. The resulting mosquito data routinely informs operations on the relative *Cx. quinquefasciatus* density throughout the Keys.

*Cx. nigripalpus*: The District currently has thirty-seven (37) inspectors that visit field sites throughout the Keys. These inspectors will sample and treat habitats which can produce *Cx. nigripalpus*, including, but not limited to, mangrove swamps, solution holes, and water-holding swales. In addition to larval surveillance conducted by these inspectors, adult surveillance traps are placed on a weekly basis to monitor adult *Cx. nigripalpus* populations throughout the year.

Date Modified: 2020 January 23
**Media and Homeowner Education Program**

The Florida Keys Mosquito Control District has an extensive public education and outreach program. The purpose of the program is to educate the community on how to prevent mosquitoes from biting them, as well as what they can do to prevent mosquitoes from breeding in and around their homes.

Speaking engagements for local civic groups as well as public outreach booths at community events and festivals are a significant part of the District’s outreach. Mosquito prevention tips are included in weekly newspapers from May through October and on the radio throughout the year. Homeowners and businesses receive informational door hangers and timely literature as part of the educational campaign.

The District also has a robust notification system in order to alert the public of mosquito control activities occurring in their area. This includes a strong social media presence through Facebook and Twitter, a website with live maps, and a smartphone app for both Android and iOS that provides live mosquito activity and push notifications.

Finally, the District has produced a 7-minute “Homeowner’s Guide to Mosquito Control” video which details the steps residents can take to rid their property of container breeding mosquitoes. This is distributed at local events and speaking engagements and is available for viewing on the District’s website.

**Response to Person Under Investigation (PUI) of *Culex* transmitted disease**

*Steps Once Call Received from local Health Department to Imported Case*

1. Immediate notification of staff involved: local supervisor, staff in area
2. Sweep of three block radius from suspect case home and/or exposure area (work, other areas visited)
3. Sweep will include inspection and treatment of every residence, catch basin, sewage treatment plant and field site in designated area
   - If no access, tag door and state we will be back tomorrow
   - If denied access, use letter provided by attorney to gain access
   - DO NOT question residents on privileged information (i.e. if they have been diagnosed with a disease, exposure to those with disease) and DO NOT share any of this privileged information with others
4. Handheld ULV each residence in the designated area, paying particular attention to harborage areas
5. Barrier treatments can be performed on sufficient vegetation, walls, under porches/houses, and any other harborage areas

Date Modified: 2020 January 23
6. Set BG Sentinel Trap and/or gravid trap at residence (or area of most mosquito exposure) to monitor adult *C. quinquefasciatus* population in area; set CDC Light Trap in field sites (or area of most mosquito exposure) to monitor adult *C. nigripalpus* population in area
   - All *Culex* collected are pooled for testing should the PUI be confirmed
7. Indoor adult mosquito reduction if applicable

**Steps Once Call Received from local Health Department to Locally-Acquired Case**

1. Immediate notification of staff involved: local supervisor, staff in area
2. Sweep of three block radius from suspect case home and/or exposure area (work, other areas visited)
3. Sweep will include inspection and treatment of every residence, catch basin, sewage treatment plant and field site in designated area
   - If no access, tag door and state we will be back tomorrow
   - If denied access, use letter provided by attorney to gain access
   - DO NOT question residents on privileged information (i.e. if they have been diagnosed with a disease, exposure to those with disease) and DO NOT share any of this privileged information with others
4. Handheld ULV each residence in the designated area, paying particular attention to harborage areas
5. Barrier treatments should be performed on sufficient vegetation, walls, under porches/houses, and any other harborage areas
6. Set BG Sentinel Trap and/or gravid trap at residence (or area of most mosquito exposure) to monitor adult *C. quinquefasciatus* population in area; set CDC Light Trap in field sites (or area of most mosquito exposure) to monitor adult *C. nigripalpus* population in area
   - All *Culex* collected are pooled for testing should the PUI be confirmed
7. Indoor adult mosquito reduction if applicable
8. Ground or aerial water-based larvicide treatment area if necessary
9. Discuss possible truck and/or aerial adulticide measures

**Media and Homeowner Education Plan**

1. Coordinate with Monroe County Department of Health and Florida Wildlife Commission on messaging, particularly surrounding dead bird reporting
2. Inspectors will engage as many residents as possible during the initial sweep of designated area to educate on reduction of mosquito larval habitats and the importance of repellent and other actions to prevent mosquito bites
3. Leave doorknockers, mosquito reduction information and disease information at all residences/businesses in designated area

**Response to Confirmed Case of *Culex* transmitted disease**

*Confirmed Imported Case*

Date Modified: 2020 January 23
Confirmation of cases by the Department of Health usually takes about one week. All persons under investigation should be treated as confirmed cases due to this time lag. Follow the above steps for all imported cases, whether confirmed or under investigation. If confirmed, all adult *Culex* collected will be pooled and sent for testing, including samples collected prior to confirmation.

**Confirmed Locally-Acquired Case**

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   - Also, treatments of high risk areas should begin as well
     - High risk areas have the following characteristics
       - Many people outside during prime mosquito biting times
       - High number of vectors
       - Areas where viral introduction could take place
6. Set BG Sentinel Trap and/or gravid trap at residence (or area of most mosquito exposure) to monitor adult *Cx. quinquefasciatus* population in area; set CDC Light Trap in field sites (or area of most mosquito exposure) to monitor adult *Cx. nigripalpus* population in area, to be repeated weekly as necessary
   - All *Culex* collected are pooled and sent for testing, including samples collected prior to confirmation
7. Indoor mosquito reduction if applicable
8. Expand ground or aerial water-based larvicide treatment area to include area of exposure, repeat treatments weekly
9. Discuss possible truck and/or aerial adulticide measures using malathion and/or naled

*Media and Homeowner Education Plan*

Date Modified: 2020 January 23
1. Coordinate with Monroe County Department of Health, Emergency Management and Florida Wildlife Commission on messaging, particularly on dead bird reporting
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3. Leave doorknockers, mosquito reduction information and disease information at all residences/businesses in designated area
4. Utilize local media (radio, print) to alert residents:
   - Key message: The Florida Keys Mosquito Control District has increased operations on ______ Key in response to information received from the Department of Health.
5. Utilize social media to encourage mosquito larval habitat reduction, use of repellent and dead bird notifications
6. Utilize FKMCD app to push notifications to areas of highest concern
Literature Cited


