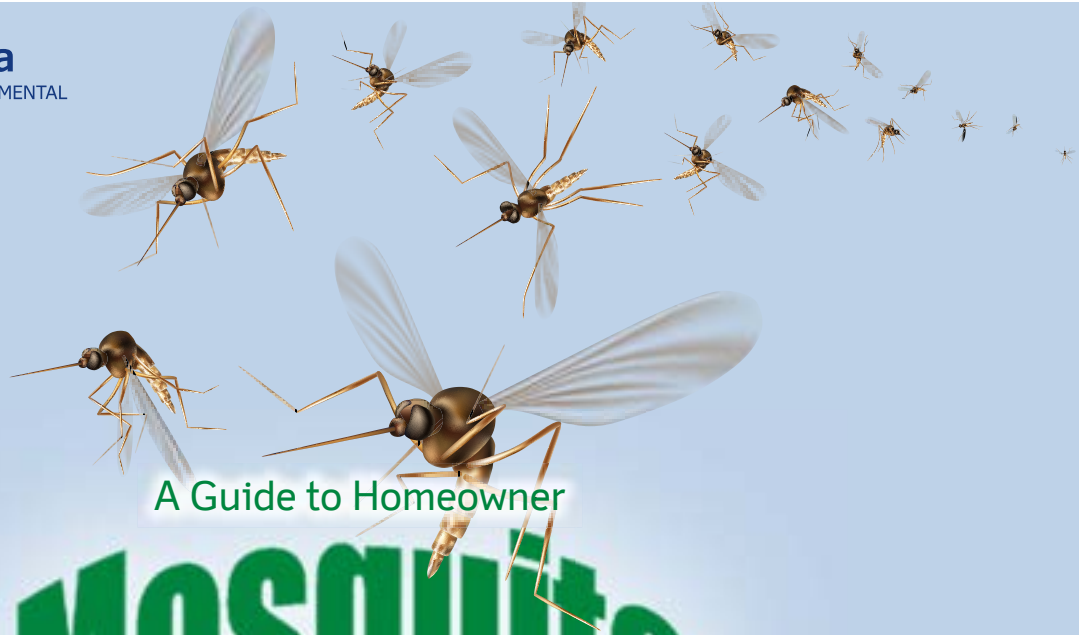




**pennsylvania**  
DEPARTMENT OF ENVIRONMENTAL  
PROTECTION



A Guide to Homeowner

# MOSQUITO

## control



# Mosquito Biology

Mosquitoes go through 4 life stages: egg, larvae, pupae, and adult.

## Egg



Some mosquito species lay eggs in water and others lay eggs on a moist substrate in floodwater areas. Eggs laid directly on the water surface require water to hatch and cannot withstand desiccation or drying out. These eggs are the ones most commonly associated with West Nile Virus.

## Larvae

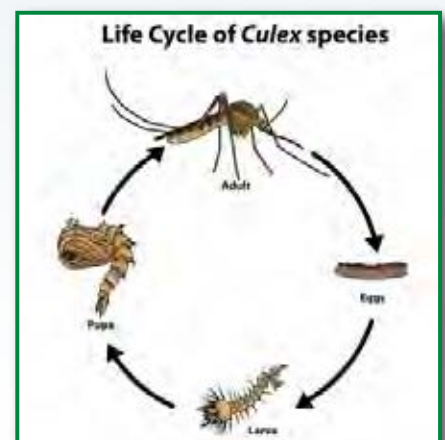


Mosquito larvae must have water to survive! They “wriggle” through the water column and breathe at the surface through a siphon tube or spiracles located on the abdomen. As larvae grow they molt four times before becoming pupae. Each growth period is known as an instar. The larval stage can last days to weeks depending on conditions.

## Pupae



Pupae or tumblers are also an aquatic life stage. They breathe at the surface through trumpets. They do not feed at this stage. This stage typically last 2-3 days.

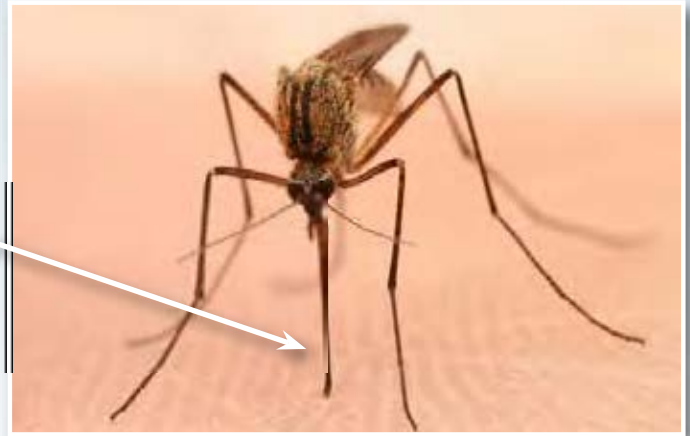


# Adult



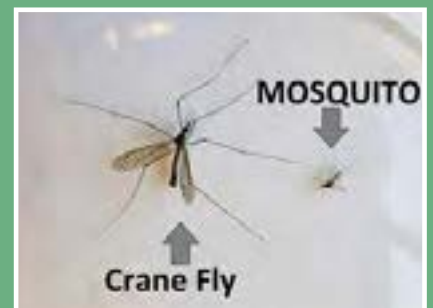
At the end of the pupal stage, the adult emerges through the split head/thorax onto the water surface. The wings must dry and harden before they are able to fly. This happens relatively quickly in about 4 minutes.

The giveaway to identifying adult mosquitoes is their proboscis. Female mosquitoes have to acquire a blood meal for egg production while males feed primarily on nectar.



## Common Myth

Check these out closer! Crane flies are also aquatic insects, but these are just a nuisance as they do not bite. Crane flies are missing the proboscis that mosquitoes will have.



# Mosquito Habitat

All mosquitoes require water for their eggs to hatch and for the larvae and pupae to survive. Different mosquito species prefer different habitats. These habitats can be broken down into containers, floodwater, and permanent water.

## Containers



Container habitats are ones that are man-made or natural that hold water. They are frequently in backyards such as plant saucers, tires, buckets, and more. Disease and nuisance mosquito species are associated with this habitat.

## Floodwater



Floodwater areas have temporary changes in moisture based on weather. These could be near permanent water, retention ponds, or drainage ditches. Many nuisance mosquito species are associated with this habitat.

## Permanent Water



Ponds, Lakes, Wetlands, Etc. These established areas have natural predators that feed on mosquito larvae, but still produce mosquitoes. Disease and nuisance mosquitoes are typically not associated with this natural habitat.

# Mosquito Habitat Checklist



Habitat
Containers, tires, etc.
Rain barrels
Plant saucers
Bird baths
Boats, canoes, jet skis
Gutters, drainage ditches, and culverts
Drain pipes
Tarps
Swimming pools
Ornamental ponds
Outdoor faucets
Tire ruts



Solution
Empty or Recycle
Cover with screening
Dump excess water
Change water twice weekly
Keep covered or store upside down
Clean out leaves and debris
Cover end of corrugated pipes
Keep them tight and clear of debris
Keep unused pool covered
Use an aerator
Repair leaks that may leave puddles
Backfill ruts to prevent standing water



# Mosquito Control

If source reduction isn't an option, there are some over the counter mosquito control products for home use. You can find them at stores like Amazon, Lowes, or Home Depot.

## Products

### Larval Control

- Mosquito Dunks
- Granular Mosquito Control
- Mosquito Bits
- No Mess Larvicide Pouches

### Adult Control

- Mosquito Fogger
- Mosquito Concentrate
- Home Defense Mosquito



## Questions to Ask Yourself

### **Am I confident that I can follow the label exactly?**

While mosquito larvicide products are target specific, adulticide products have the potential to kill nontarget species such as bees and butterflies. It is illegal to deviate from the label in any way.

### **Am I comfortable handling and applying mosquito control products?**

Some product labels state that personal protective equipment such as gloves, eye protection, and/or face coverings must be used.

### **Will I follow up as needed to ensure efficacy?**

Unless you're eliminating the source of larval habitat (such as discarding old tires, unclogging gutters, changing out bird bath water, etc.) mosquitoes will continue to breed. If you're treating standing water that cannot be eliminated, ensure that you're reapplying according to the label. See mosquito life cycle table for reference.

# What makes the PA DEP and its grant funded counties public applicators?

The PA DEP coordinates the Commonwealth's mosquito control program with focus on counties at the highest risk of mosquito-borne disease. This concept incorporates comprehensive mosquito surveillance and control. The PA DEP, with the support of legislature, provides funding to a network of counties to protect against disease and alleviate public nuisances. Because this is a taxpayer dollar funded program, applications are performed by licensed employees at no cost to citizens, though treatment is only performed when certain thresholds are met according to integrated mosquito management principles.

In accordance with the Environmental Protection Agency and Clean Water Act, we operate under an NPDES (National Pollutant Discharge and Elimination System) permit which ensures that our applications do not harm the environment. Applications are performed on public and private properties (emphasis on public property) on both large and small- scale levels. Large scale can include entire neighborhoods or communities, and small scale can include individual properties or areas of mosquito habitat.



# What services do the PA DEP and/or grant funded counties provide?

The PA DEP's integrated pest management program is comprised of education, habitat reduction, surveillance, and control - in that order. We spend a lot of time educating the public on how to reduce mosquito habitat and protect themselves against getting bitten. We also allocate funds to reduce mosquito habitat that would otherwise be left to produce mosquitoes. Finally, we conduct surveillance, and we use this data to justify control events. One of our goals is to empower homeowners to take control of their properties and eliminate mosquito habitat using products that can be purchased at any home improvement store. We will also work to find a permanent solution to your mosquito problem. If a solution is not possible, we are able to perform applications to mitigate mosquito activity and provide consultation on future mitigation efforts. However, certain thresholds must be met to perform control events and, in some cases, the services of private application may be suggested. Since every scenario is unique, please contact your county coordinator to answer any questions.

*More information can be found at:*

<https://www.dep.pa.gov/Business/ProgramIntegration/Vector-Management/Mosquitoes/Pages/default.aspx>



# What is a private applicator?

A private applicator is anyone who performs control events on a small-scale level on private property at a cost to the property owner. Private mosquito control companies offer fee-based services to homeowners/business owners who wish to utilize their services.

## Questions to ask Private Applicators

### The Business

- Are you certified applicators?
- Do you operate under a permit?

### Eliminating Mosquitoes

- Will you eliminate 100% of my mosquitoes?
- Will you work to find the source of my mosquito problem?

### The Product

- What pesticides do you use?
- Can you present a pesticide label?
- What rate are you applying the product at?
- Will the product impact non-target organisms?
- How often will you treat my property?

## Did You Know?

Adult mosquitoes fall prey to other insects such as damselflies and dragonflies.



Larvae are regularly consumed by fish and other aquatic insects



# Preventing Mosquito Bites

The best way to prevent mosquito bites is to prevent mosquitoes from breeding in the first place! Refer to the checklist to see where mosquitoes are most likely breeding on your property. Other things you can do include:

## Wear Insect Repellent

Find an insect repellent that works for you and be sure to wear it when outdoors!

Especially during twilight hours when mosquitoes are most active. Below are some active ingredients approved by the EPA:

- DEET
- Picaridin
- IR-3535
- Oil of lemon eucalyptus
- Para-methane-diol



## Home Repairs

In addition to making sure you remove mosquito habitat outside your home, ensure that all window/door screens are free of cracks or holes. This will prevent mosquitoes from entering your home.

## Dress Appropriately

Wear long sleeves and pants when outdoors at dusk or dawn.

## Use Physical Barriers

Mosquitoes are weak flyers. Using a fan can keep them from encroaching.



## Mosquito Myth

Bats are not avid mosquito eaters. In real world conditions, mosquitoes comprise only 1% of a bat's diet. Bats prefer to hunt larger insects as they provide more energy. Don't let that stop you from installing a bat house though! Bats are beneficial in that they keep other insect populations in check.