GLOBEPROGRAM®
A Worldwide Science & Education Program

Hydrosphere • Mosquito Protocol

Using the GLOBE Observer Mosquito Habitat Mapper

Overview

This module:

Reviews the use of the GLOBE Observer Mosquito Habitat Mapper

Learning Objectives

After completing this module, you will be able to:

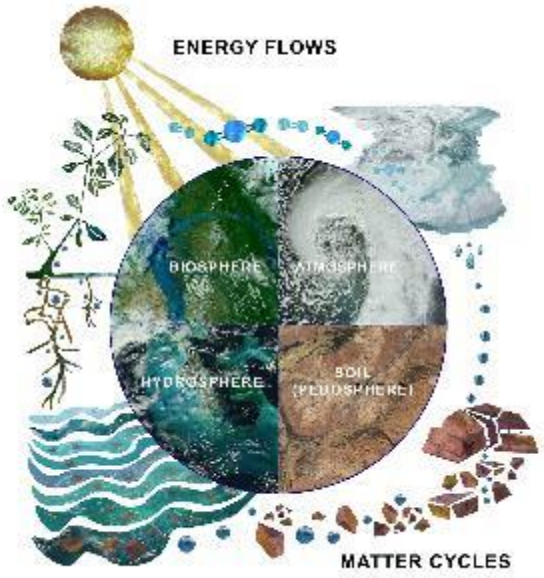
- **Identify mosquito larvae in the breeding ground sampled at the study site**
- **Understand the importance of representative sampling**
- **Compare the number of mosquito larvae in each genus or species in different habitats**
- **Explore relationships between the larvae, genus/species, climatic factors and disease**
- **Collaborate with other GLOBE schools in collection and analysis of data**
- **Report and visualize data using the GLOBE website**

Estimated Time Needed to Complete Module: 1.5 hours

The Hydrosphere

The hydrosphere is the part of the Earth system that includes **water, ice and water vapor**. Water participates in many important natural chemical reactions and is a good solvent. Changing any part of the Earth system, such as the amount or type of vegetation in a region or from natural land cover to an impervious one, can affect the rest of the system.

The hydrosphere is home to many organisms, including the eggs, larvae and pupae of mosquitoes.



The Earth System: Energy flows and matter cycles.

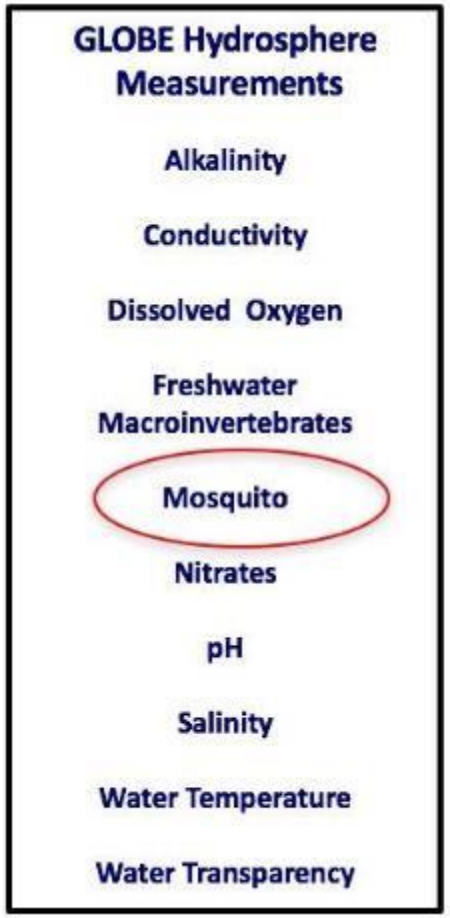
Hydrosphere Protocols

The Mosquito Protocol is one of the hydrosphere protocols used by GLOBE to describe the status of a water body.

Mosquitoes are common insects that **occur in many places around the world particularly in the tropic and sub-tropic regions.** Mosquitoes play an important role in ecosystems. They are food sources for many species of fish, birds, amphibians and reptiles. Male mosquitoes are pollinators and so they help to make fruits and vegetables.

There are over 40 genera and over 3500 known species. However, three of these genera, *Anopheles, Aedes*, and *Culex*, have species that transmit diseases that impact people including malaria, chikungunya virus, dengue fever, Zika virus, and West Nile virus.

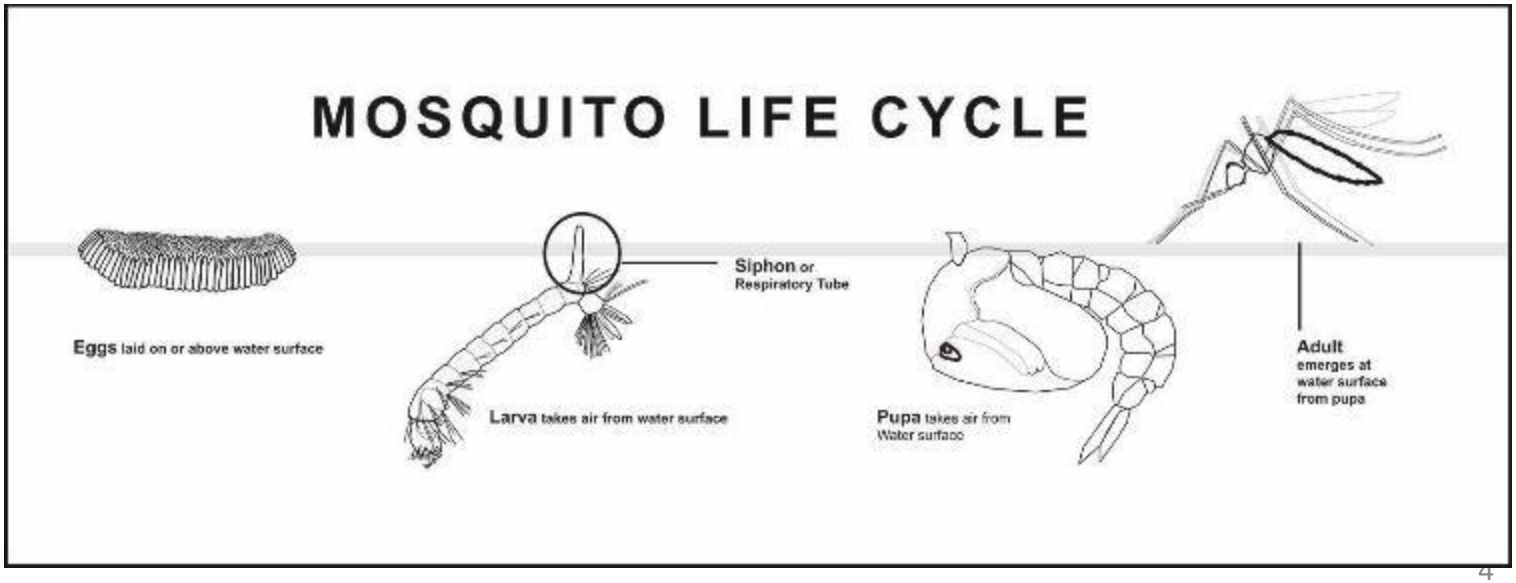
Identifying the breeding areas of mosquitos that are disease vectors for humans is an important component of local disease management and eradication.



Hydrosphere-Biosphere Connection

The egg, larvae and pupae stages of the mosquito life cycle are dependent on water. The GLOBE mosquito larvae protocol focuses on collecting and **identifying mosquito larvae in standing water.**

Note that handling of eggs and the larvae is safe: the eggs and larvae do not transmit pathogens that result in disease. Only the bites of female mosquitoes transmit pathogens that can cause disease.



Mosquitoes and Climate Change

Climate models predict global average warming in the range from **2 to 4 °C** (2–8 °F) by 2100. Rising temperatures may spread insect-borne diseases into areas where reports of infection have been relatively rare.

In the Earth system, “Everything is connected to everything else,” and changes in climate also have metabolic consequences for organisms, including *Aedes aegypti*, the mosquito that transmits the viruses responsible for **yellow fever, dengue, chikungunya, and Zika .** As the temperature rises, **nearly everything about the biology of the *Aedes aegypti* mosquito speeds up when it comes to spreading disease.**

Bill Reisen, entomologist at University of California Davis, explains: “With higher temperatures you have more mosquitoes feeding more frequently and having a greater chance of acquiring infection. And then the virus replicates faster because it's hotter, therefore the mosquitoes can transmit earlier in their life.” The thermodynamics of mosquitoes are "driven by temperature."

Image: CDC.

Why Collect Mosquito Data?

The life cycle of mosquitoes is closely related to their environment. By collecting mosquito and environmental data, students can contribute to better understanding the relationship between mosquitoes, the pathogens they may carry, and the environment. This kind of information can be used locally to determine when outbreaks of disease such as malaria or dengue most likely will occur, or when chemical or other controls will be most effective.

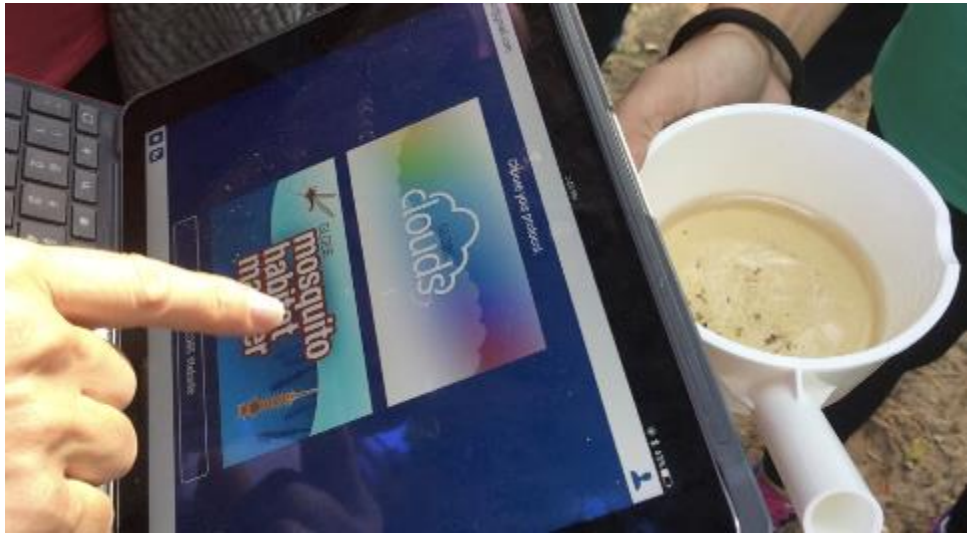
Your observations are valuable contributions to the scientific community and may be used by educators, students, researchers, and the general public to increase environmental awareness and STEM literacy, as well as advance Earth system science.

Why Collect Mosquito Data? (Cont'd)

Vaccines are not available for most mosquito diseases, including dangerous diseases such as Zika, chikungunya, malaria, and West Nile virus.

Where there are no vaccines available, there are only 3 ways to protect a community from mosquito vector borne disease. These are:

- **Surveillance**
- **Habitat mitigation**
- **Public education**



The GLOBE Observer Mosquito Habitat Mapper supports all three!

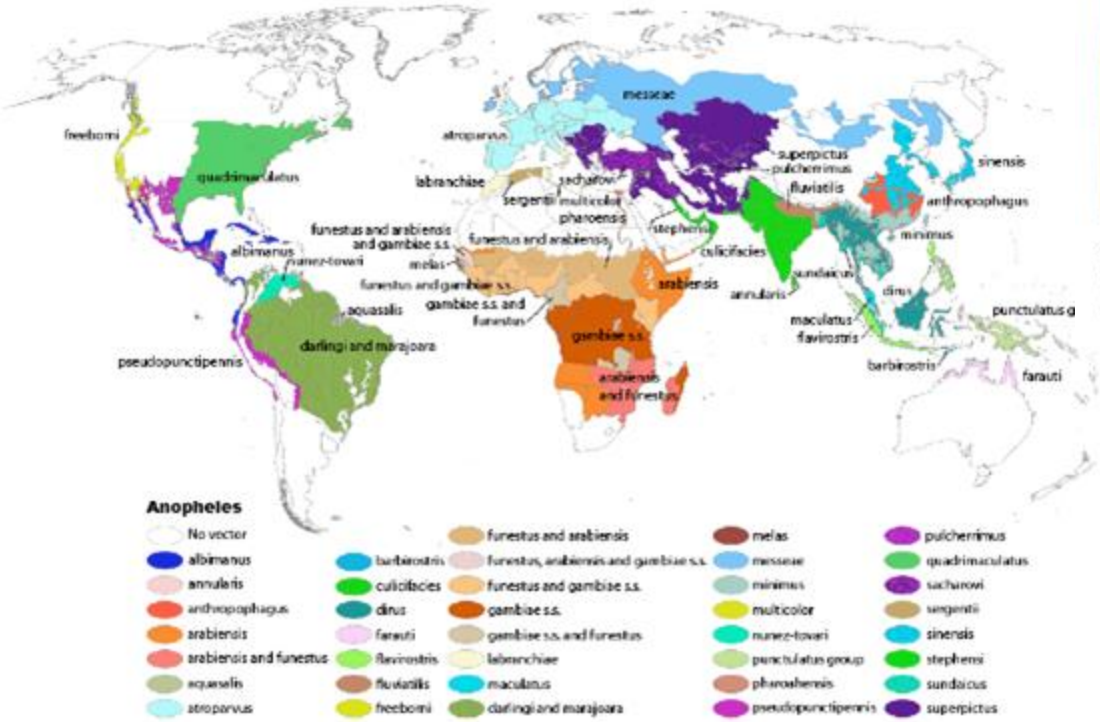
Mosquitoes and Zika Virus

The explosive spread of Zika throughout the Americas is raising questions about the best ways to predict and control outbreaks of mosquito-borne diseases. Zika is transmitted by the mosquito ***Aedes aegypti*** *and* ***Aedes albopictus***. These mosquitoes are a serious health problem because they have evolved and adapted to human environments. They preferentially breed in manufactured containers that contain standing water. They are also found in natural containers, such as water pooled inside a bromeliad plant, cut bases of bamboo, and shells and husks of nuts.

These two species can also transmit other pathogens that cause a number of dangerous diseases, including dengue, chikungunya, and yellow fever.

Mosquitoes and Malaria

The app also allows you to identify the larvae of Anopheles mosquitoes. Only about 40 species of the more than 500 species can transmit the pathogens to humans that cause malaria. If you are living in a malaria region, you will want to work with public health authorities and find out what species are found locally.



Anopheles gambiae
Credit: James Gathany
Source: CDC

Culex Mosquitoes

There are over 1000 species of *Culex* mosquitoes, and more than 150 species are vectors of disease in animals and humans. However, there is usually only a few of importance in any region. Find out what species you have locally that can potentially transmit pathogens that can cause disease, and what diseases are found in your community.

Culex quinquefasciatus
Credit: Jim Gathany
Source: CDC

Important Diseases- Culicine Mosquitoes
West Nile virus
Lymphatic filariasis
Rift valley fever
Encephalitis (Western and Eastern equine, Japanese, California)
Several other diseases can be transmitted to animals

How Your Data Can Help

Seasonal patterns of temperature and precipitation may be altered by climate change where you live. These changes could affect the movement of insects such as mosquitoes. Climate change can affect the spread of mosquito borne diseases such as Zika, malaria and Dengue fever. Other factors such as land use are important factors contributing to the spread of diseases. These factors contribute to providing suitable habitat for mosquitoes to breed and grow, and how the disease is spread between people.

Summary so Far…

Seasonal patterns of temperature and precipitation may be altered by climate change where you live. These changes could affect the movement of insects such as mosquitoes. As well, it could affect the spread and intensity of mosquito borne diseases. Other factors such as landscape change and land use contribute to providing suitable habitats for mosquitoes.

Let's do a quick review before moving onto data collection! Question 1

Mosquitoes are part of the biosphere, but the protocol for mosquito larvae is found in the _____GLOBE Investigation area because it is the habitat of mosquito larvae.

A. Land cover

B. Hydrosphere

C. Lithosphere

D. Earth System

What is the Answer?

Let's do a quick review before moving onto data collection! Answer to Question 1

Mosquitoes are part of the biosphere, but the protocol for mosquito larvae is found in the _____GLOBE Investigation area because it is the habitat of mosquito larvae.

A. Land cover

B. Hydrosphere- ☺ **Correct!**

C. Lithosphere

D. Earth System

Were you correct?

Let's do a quick review before moving onto data collection! Question 2

Which mosquito genus is responsible for the transmission of Yellow Fever, Dengue Fever, Chikungunya and Zika virus?

A. *Aedes*

B. *Anopheles*

C. *Culex*

D. All of the above

What is the Answer?

Let's do a quick review before moving onto data collection! Answer to Question 2

Which mosquito genus is responsible for the transmission of Yellow Fever, Dengue Fever, Chikungunya and Zika virus?

A. ***Aedes*** - ☺ ***Correct!***

B. *Anopheles*

C. *Culex*

D. All of the above

Were you correct?

Let's do a quick review before moving onto data collection! Question 3

What is the projected impact of a warming climate on mosquito populations?

A. It is projected that mosquito species will increase their range to areas where they are currently not found

B. It is projected that mosquito species will replicate more slowly, because their metabolism will slow down because of the heat

C. Both A and B

D. None of the above

What is the answer?

Let's do a quick review before moving onto data collection! Answer to Question 3

What is the projected impact of a warming climate on mosquito populations?

A. **It is projected that mosquito species will increase their range to areas where they are currently not found-** ☺ **Correct!**

B. It is projected that mosquito species will replicate more slowly, because their metabolism will slow down because of the heat

C. Both A and B

D. None of the above

Were you correct?

Let's do a quick review before moving onto data collection! Question 4

Why is the the mosquito larvae data collected by GLOBE important?

A. Students can collect data that can be used locally to predict outbreaks of mosquito-borne disease, such as malaria, dengue fever or zika.

B. Students can develop their own models to understand the specific ecological needs and tolerances of local mosquito populations, so that local breeding site eradication measures can take place.

C. All of the above

What is the answer?

Let's do a quick review before moving onto data collection! Answer to Question 4

Why is the the mosquito larvae data collected by GLOBE important?

A. In many parts of the world, there are insufficient ground validation Students can collect data that can be used locally to predict outbreaks of mosquito-borne disease, such as malaria, dengue fever or zika.

B. Students can develop their own models to understand the specific ecological needs and tolerances of local mosquito populations, so that local breeding site eradication measures can take place.

C. All of the above - ☺ Correct!

Were you correct? Let's now look at the data collection procedures in the protocol.

Mosquito Protocol: What do you need to start?

	Ideally, weekly during the mosquito season, and three weeks before and after
Where	Neighborhoods, school grounds, parks, wetland sites, and around the home
Time Needed	1-2 hours weekly
Prerequisites	none
Key Instruments	Dipper, magnifier, macro pipette (turkey baster), mobile device with GLOBE Observer Mosquito Habitat Mapper downloaded. A clip-on macro lens (60-100x) for your mobile device is recommended (available online)
Skill Level	Intermediate
References you need	GLOBE Observer Mosquito Habitat Mapper. Download at no cost from your app store to a mobile device.

Assemble Field Equipment

- GLOBE Observer Mosquito App
- Measuring tape
- Dipper, Net or Bulb Syringe (baster)
- Bucket
- Plastic zip bags
- Permanent marker and pencil
- White plastic plate
- Forceps
- Rinse bottle
- Paper towels
- Camera (phone camera is good)
- Ethanol alcohol
- Hand lens, magnifying glass or magnifying attachment for mobile device

Start your Fieldwork with Safety Steps

Safety is important when conducting the Hydrosphere protocols. While you will need to use your judgment in selecting only hydrosphere study sites that are safe to access and sample, additional precautions are needed:

- Students should wear protective gloves and goggles when handling water samples and chemicals to avoid danger from splashes.

- For the mosquito protocol, it is important to protect students from exposure to biting mosquitoes. Ask your students to wear clothes that cover the body so little bite area is exposed. Apply insect repellent. The best time to collect samples is at the heat of the day, near solar noon, when mosquitoes are least active. Women who are pregnant or are planning to become pregnant should not participate in this activity.

- Be aware that the eggs and larvae are not disease vectors, mosquito-borne disease is transmitted through the bite of the adult female mosquito.

***SAFETY** be sure students wear gloves and goggles during your investigations*

Identifying and Sampling potential mosquito breeding sites

Mosquitoes lay their eggs in places where water can collect. These can be natural places such as puddles or ponds, or artificial places such as flower pots or plastic bottles. How you collect your sample will depend on what type of place you are sampling. If you are sampling containers, you will either pour the water through the net if the container is small enough to do this. Or, if the container is big, you will use a net to gather a sample from the water in the container.

If you are sampling a pond, puddle, along a slow moving stream, or some other place that is not a container, you will dip a net or mosquito dipper in the water to collect the mosquito larvae. You will collect 5 samples waiting 3 minutes between sample collection. This is to make sure you get an accurate representation of how many larvae are in the water. With containers, you are gathering most or all of the larvae in the containers.

After collection, you will identify the mosquito larvae **using keys and count the number of larvae within each genus or species.**

***Note: if the breeding site is a natural hydrology site, it is recommended that you establish it as a hydrology study site. Then you can examine changes in the water parameters in conjunction with mosquito data, and record changes over time.**

Site Selection: Containers

There are a variety of indoor and outdoor containers that can be sampled around homes, schools or other buildings. You may have other types of containers in your community as well!

Indoor containers

Outdoor containers

Site Selection: Non-container sampling sites

Sampling sites include habitats like ponds, streams, marshes, puddles along streets or in yards, or agricultural areas (e.g., rice fields). These are places where you cannot lift the container and pour the water into a net or container. If you are using a repeat sampling scenario, find a site that is easy for students to visit. The site should be large enough so that it does not quickly dry up and sampling can be done on a regular (twice monthly, if possible) basis.

Mosquito Larvae Sampling: Natural Hydrology Sites

Using the mosquito dipper or net, skim the surface of the water. The net is maintained at an acute angle with respect to the water surface, see figure:

Take 5 samples. Wait 3 minutes between each sample. If you use a net, do the washing step next.

Larvae rest on the surface of the water but if they are disturbed they swim below the surface for safety. By waiting 3 minutes, the larvae will have returned to the surface to breathe

Tip: sample quickly! Try to not cast a shadow, because the larvae will dive to safety.

Mosquito Larvae Sampling Method: Small Containers

Pour sample water in container through net into a bucket. In the photo to the right, GLOBE students found an abandoned bucket that collected rainwater and created a sheltered habitat where mosquitoes could lay their eggs.

Or, you can use a dipper or a bulb syringe (turkey baster) to sample larvae. Here a bulb syringe is used to sample water puddled on a leaf in the Amazon.

Tip: when using a bulb syringe, depress the bulb before inserting and quickly pull in the water- don't give the larvae a chance to swim away and escape!

Mosquito Larvae Sampling- washing

After collecting a sample with a net, use a squirt bottle with water to gently remove the debris caught in the net into a bucket.

If you have used a dipper or a bulb syringe/macro pipette/baster, skip this step.

Mosquito Larvae Sampling

Pour sample in labeled plastic bags.

Leave air in bags so that larvae can breathe, and keep bags cool and in the shade. If they warm up in the sun, the larvae may die.

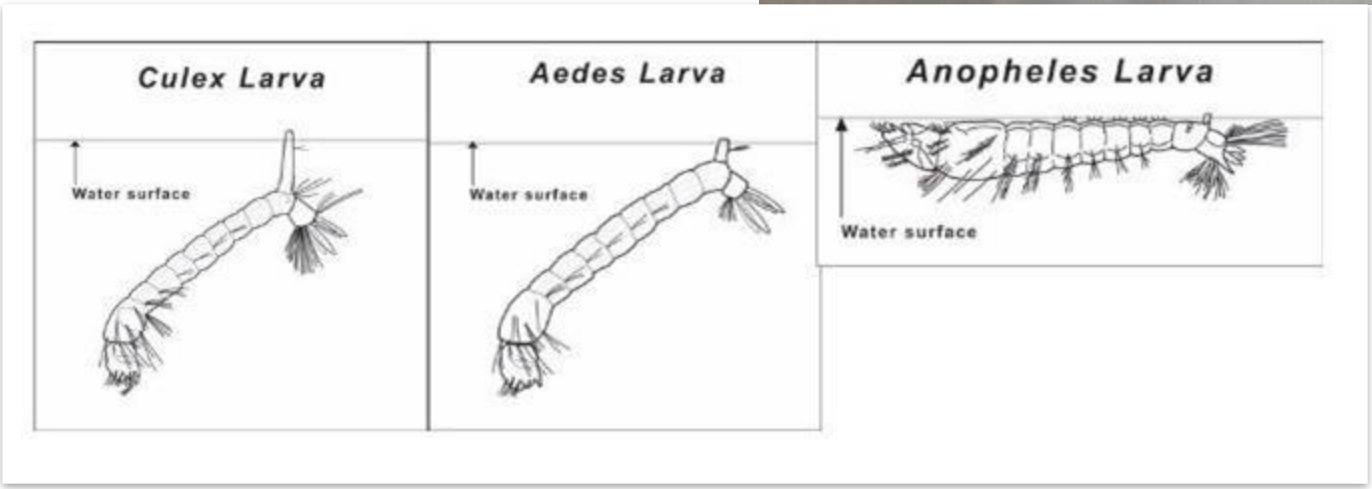
Identify the larvae soon after collection. If left overnight, any pupae in the sample may become adult flying mosquitoes.

If you find adult mosquitoes in your sample bag, shake the bag to drown the adult mosquitoes.

Tip: When you are done, your sample can be poured on the ground, any larvae will not survive. Do not pour samples into sinks or toilets where they might survive in a sewer.

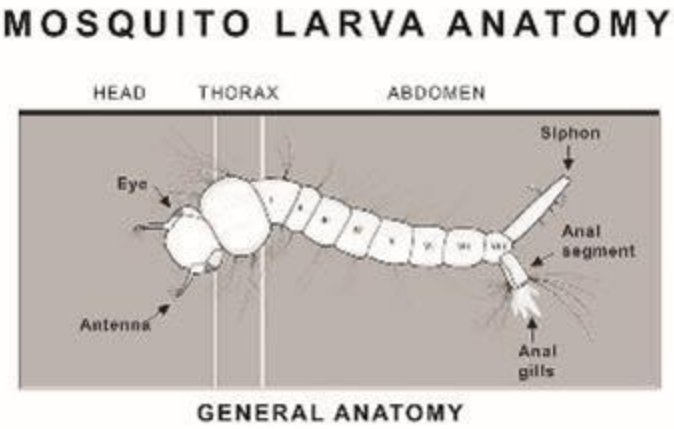
Mosquito Larvae Identification

You can place the larvae in vials to see how they suspend from the surface of the water to help with the identification. Only the larvae of one genus, *Anopheles*, has a resting position on top of the water. Most other mosquito genera will assume a resting position like seen in the picture (left).

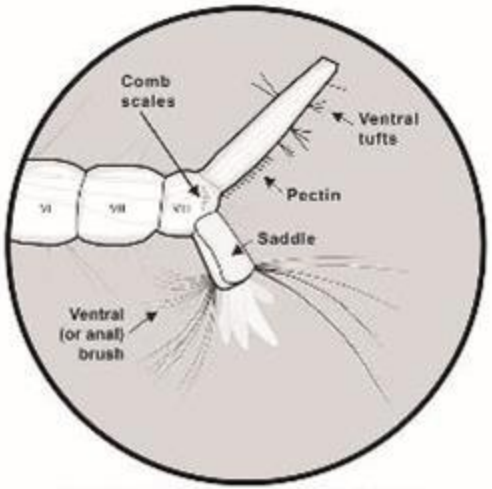


Mosquito Larvae Identification

Familiarize yourself with the general anatomy of the mosquito larvae and the key features that distinguish those genera or species that are found in your locality. In particular, key features are often found on the anal segment and the siphon. Consult with mosquito experts or mosquito identification keys for your locality.



GENERAL ANATOMY



IDENTIFICATION FEATURES

Mosquito Identification using a clip-on macro lens

Follow these instructions to make sure you get a clear view of your specimen.

For best results, use a clip-on macro lens on a mobile device. This will allow you to identify your specimen to species. Use a lens 60x-100x for best results.

Tip: You can also use hand lens to identify some of the characteristics and identify most specimens to genera. You can take a picture through the lens.

Mosquito Identification using a clip-on macro lens (Cont'd)

A note about lenses:

There are several types of lens available. Each has benefits. The 60x is very easy to use and is recommended, especially working with students. This is because it does not need to be focused.

If it is important for you to determine the difference between *Aedes aegypti* and *Aedes albopictus,* the 100x version, seen on the right, will provide sufficient resolution to see the comb scales on slightly older models. However it can be frustrating to learn to focus using this model. Select the right tool for your situation.

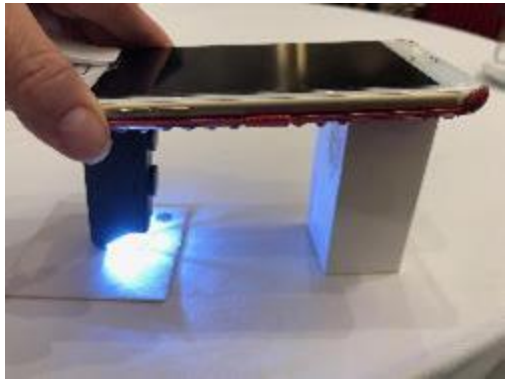
60x

100x

Here are a few tips using the 100x macro lens

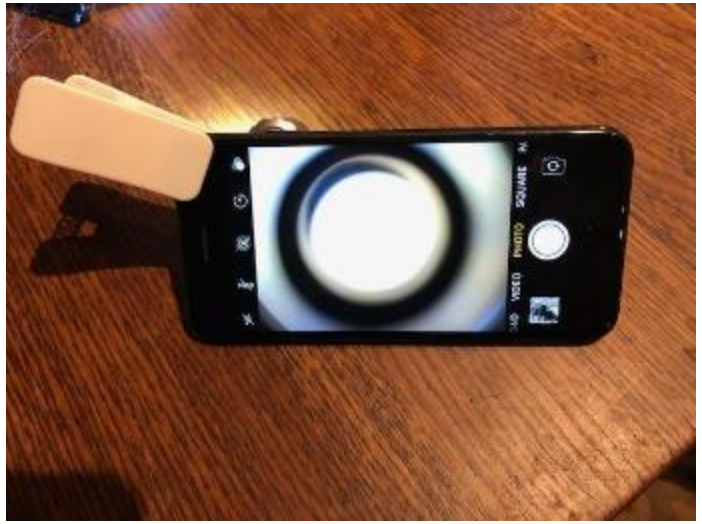
1. Remove the plastic tab that is protecting the batteries.
2. Make sure the batteries are alternated with +, -, + in a line.
3. Use the box to make a bridge to support your mobile device. That will allow you to use your other hand to focus using the knobs.
4. For most models, the clear plastic sleeve rests on the plate. This provides the correct focal length. The specimen is positioned in the circle inside the plastic sleeve.






Recording your Data- using a macro lens

- Clip the lens over the lens of the camera on the mobile device. Adjust the position until you have a perfect, white circle in the camera viewfinder.
- Place the plastic sleeve of the lens on the surface where you are examining the larvae.
- Focus, if necessary - you are ready to identify your specimen.



Let's do a quick review before moving onto data entry: Question 5

Ideally, how many samples should you take when sampling a non-container water body?

A. 3 samples, 3 minutes between each sampling with the net

B. 5 samples, 3 minutes between each sampling with the net

C. 1 sample, just like when containers are sampled, but split the sample into as many bags as you need.

What is the answer?

Let's do a quick review before moving onto data entry: Answer to Question 5

Ideally, how many samples should you take when sampling a non-container water body?

A. 3 samples, 3 minutes between each sampling with the net

B. 5 samples, 3 minutes between each sampling with the net-☺ Correct!

C. 1 sample, just like when containers are sampled, but split the sample into as many bags as you need.

Were you correct?

Let's do a quick review before moving onto data entry: Question 6

Which of the following a part of the mosquito larva you would look at first to determine the genus or species of your specimen.

A. Anal segment and siphon

B. Thorax

C. Eyes

What is the answer?

Let's do a quick review before moving onto data entry: Answer to Question 6

Which of the following a part of the mosquito larva you would look at first to determine the genus or species of your specimen.

A. Anal segment and siphon ☺ Correct!

B. Thorax

C. Eyes

Were you correct?

Let's do a quick review before moving onto data entry: Question 7

What precautions will you want to make to ensure student safety in the field?

A. Protective gloves and goggles, as in all hydrosphere protocols

B. Clothing that covers and limits exposed skin surfaces

C. Application of insect repellent, with permission

D. Sample the larvae at or near solar noon

E. All of the above

What is the answer?

Let's do a quick review before moving onto data entry: Answer to Question 7

What precautions will you want to make to ensure student safety in the field?

A. Protective gloves and goggles, as in all hydrosphere protocols

B. Clothing that covers and limits exposed skin surfaces

C. Application of insect repellent, with permission

D. Sample the larvae at or near solar noon

E. All of the above ☺ Correct!

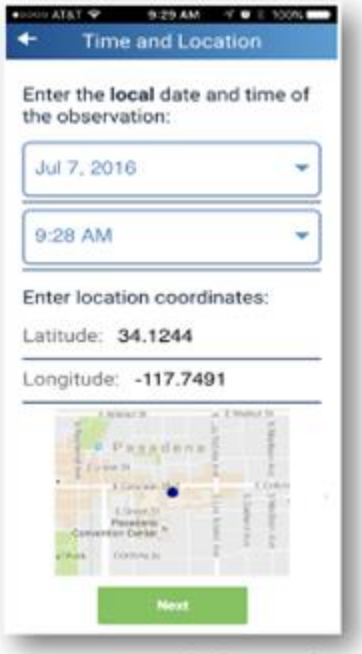
Were you correct? Let's now look at GLOBE data entry and visualization.

Submitting your data to GLOBE

- You will use the GLOBE Observer Mosquito Habitat Mapper mobile application to submit your data.
- The app will walk you through the steps.

These are the steps

Breeding site!



Locate and describe

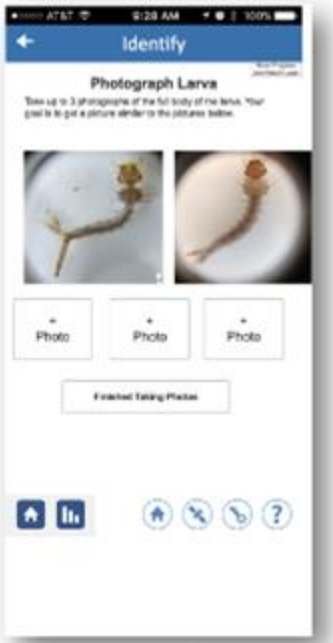
1

how many larvae?

sample & count

2

Vectors of disease?



identify

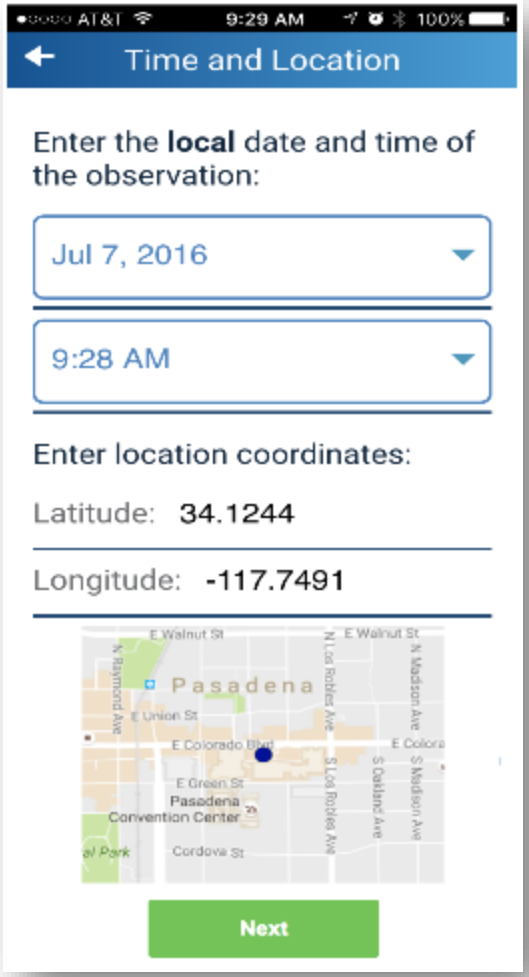
3

No breeding site!

decommission

4

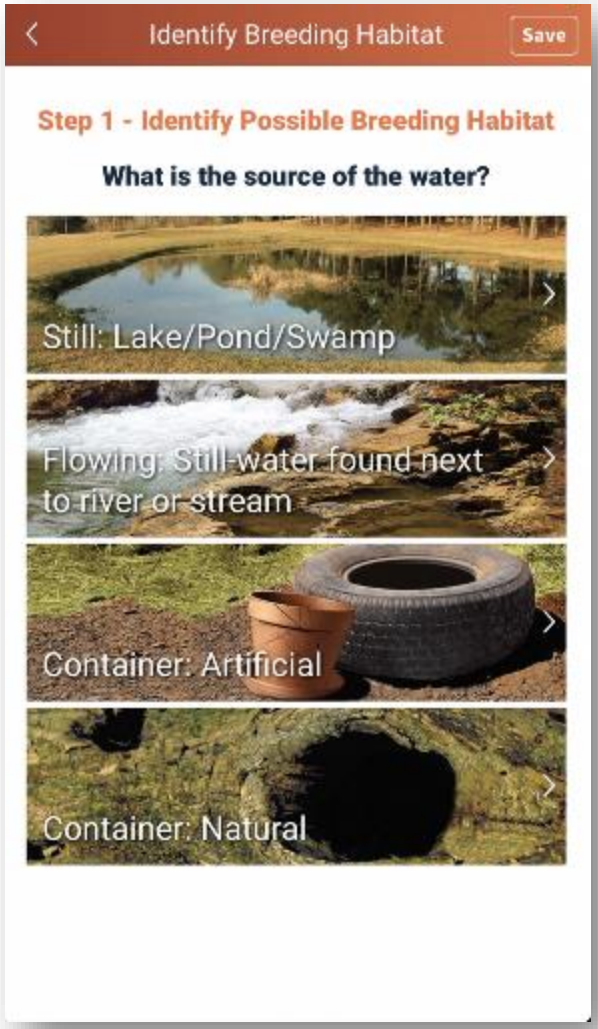
Provide the date, time and location of your sample



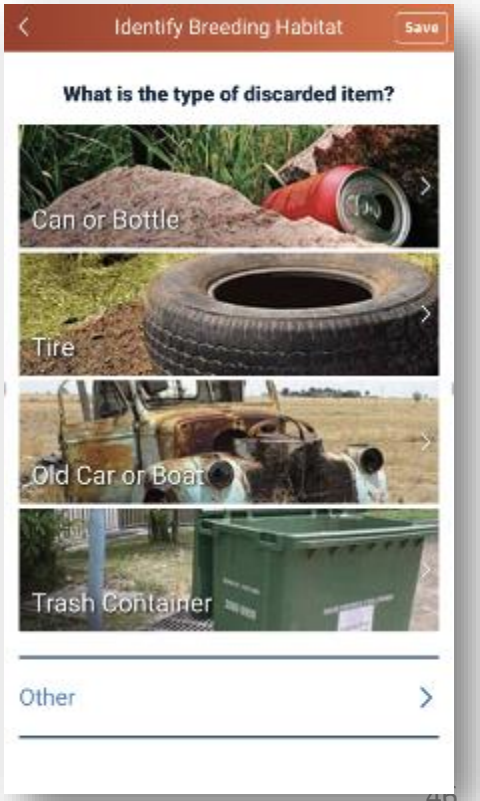
Tip: If you don't see your latitude and longitude, Make sure you have enabled "location services" on your mobile device.

Tip: You can manually adjust your position on the map by moving the location. Don't touch the map unless you need to adjust your location- otherwise, you might accidentally provide the wrong coordinates.

Describe the mosquito larvae habitat site



Select the type of site. Each of these selections will lead to other choices. Select the description that best fits your site.



Count Larvae

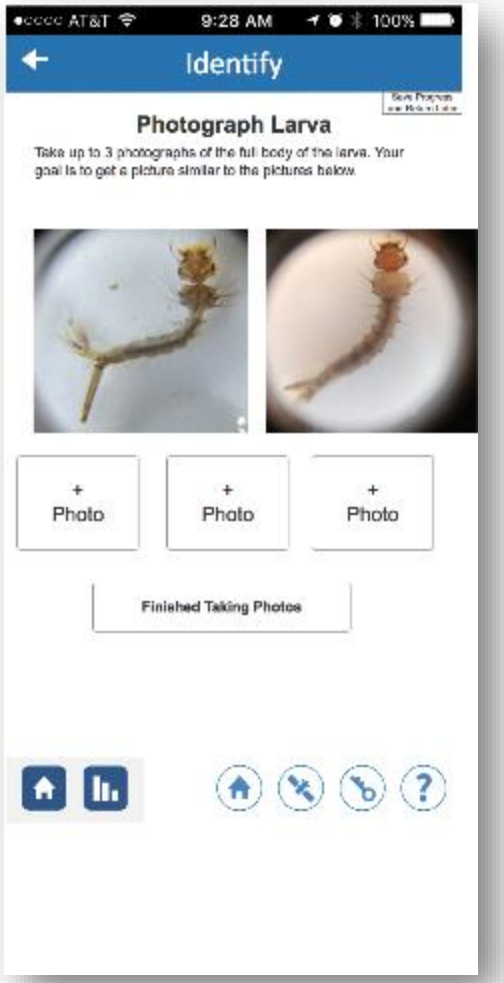
If possible, count the larvae you see in your habitat. If the water is murky, you will have to count the number after you sample.

For container sites, it is best to try and count all the larvae you can see.

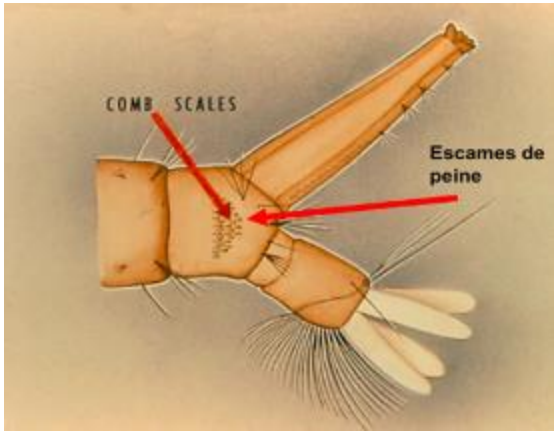
For natural sites, you will have to count the number in your sample, totaling all the larvae from the three dips of approximately a cup of water each time.

You will also be asked to say if you see eggs, adults, and pupae in the sample and environs.

Photograph Larvae

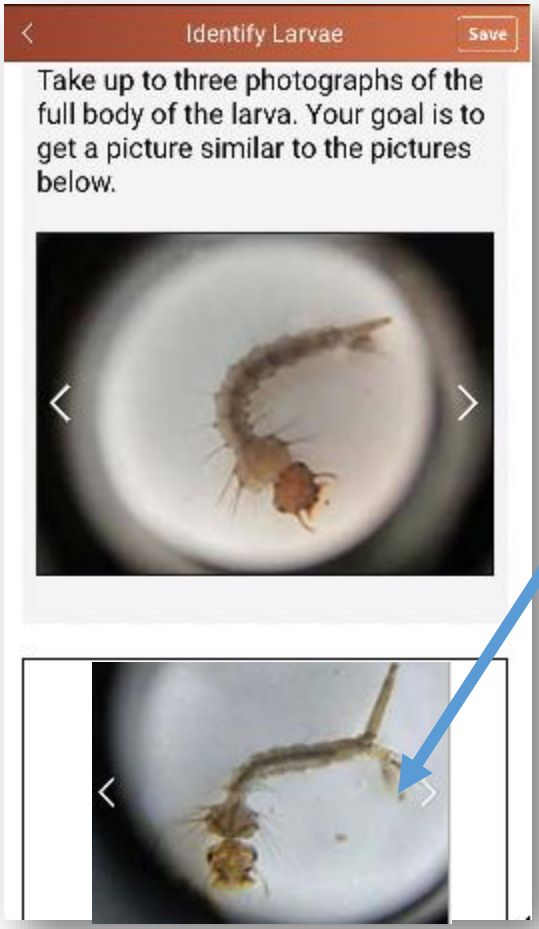


The app will ask you to take photographs of a representative larval specimen. The app provides a guide how to best photograph your larva. You can make up to 9 photos of your specimen. You will also be asked to photograph the terminal end of the abdomen where diagnostic features for identification can be observed.

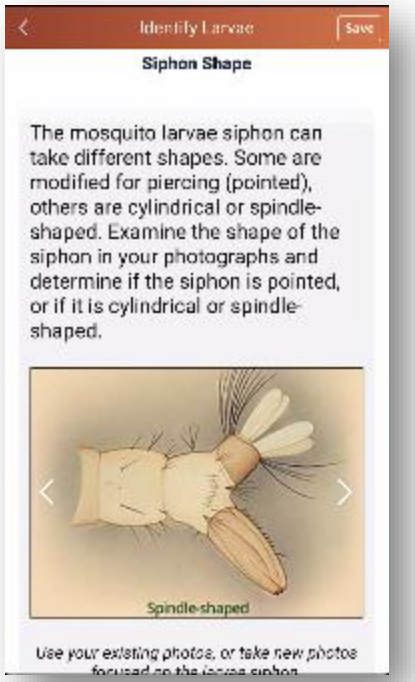


Tip: These photos serve as photo voucher specimens and will be uploaded as metadata, so scientists can check the data.

Identify Larvae

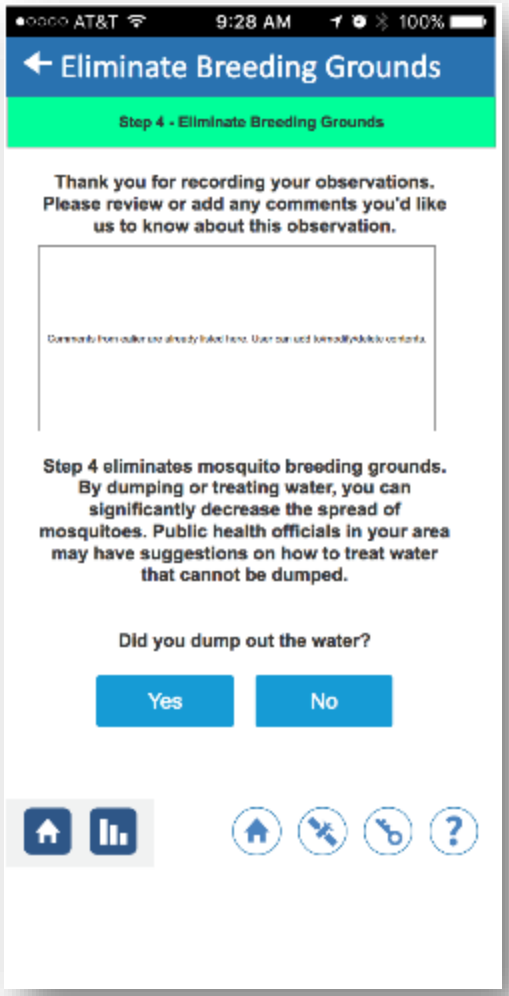


Your photograph is uploaded in to the app and you can compare your specimen with descriptions and diagrams.



In the example to the left, the uploaded photograph has a cylindrical long siphon, indicative of *Culex,* not spindle shaped, like the example photo.

Site mitigation



Every site that is taken out of use by users is recorded in the app.

If it is a container site, you can take it out of use by mother mosquitoes by dumping out the water and picking up trash.

For water storage containers you can cover the opening with a net or a lid.

For natural breeding sites, such as a pond or lake, you do not mitigate. If you have found a natural habitat with mosquito vectors you can contact your mosquito control agency.

Remember that most mosquito species do not transmit pathogens- they play a vital role in the ecosystem- feeding birds, bats and amphibians, as well as pollinating plants!

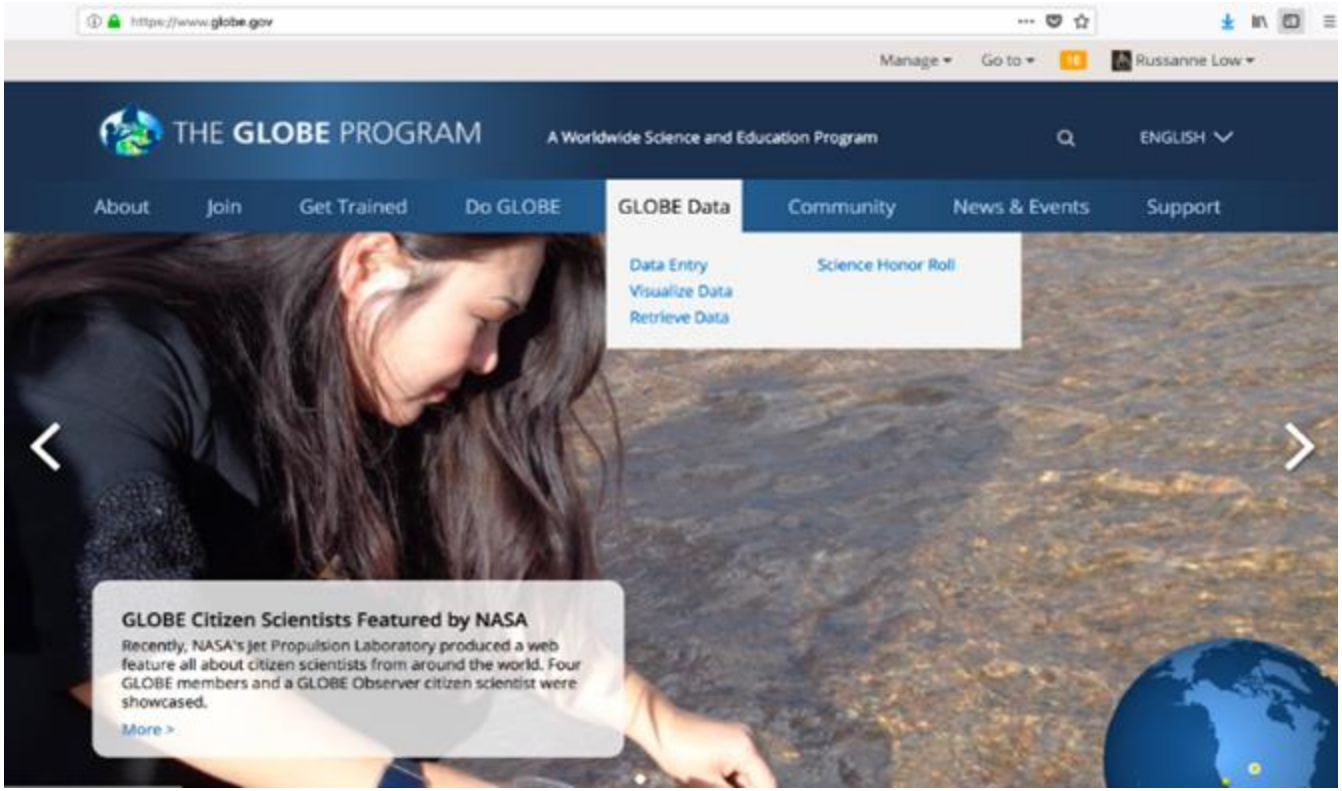
Visualize and Retrieve Data-1

GLOBE provides the ability to view and interact with data measured across the world. Select our visualization tool to map, graph, filter and export data that have been measured across GLOBE protocols since 1995. Here are screenshots of the steps you will use when you use the visualization tool.

Link to step-by-step tutorial on using the GLOBE Data Visualization Tool

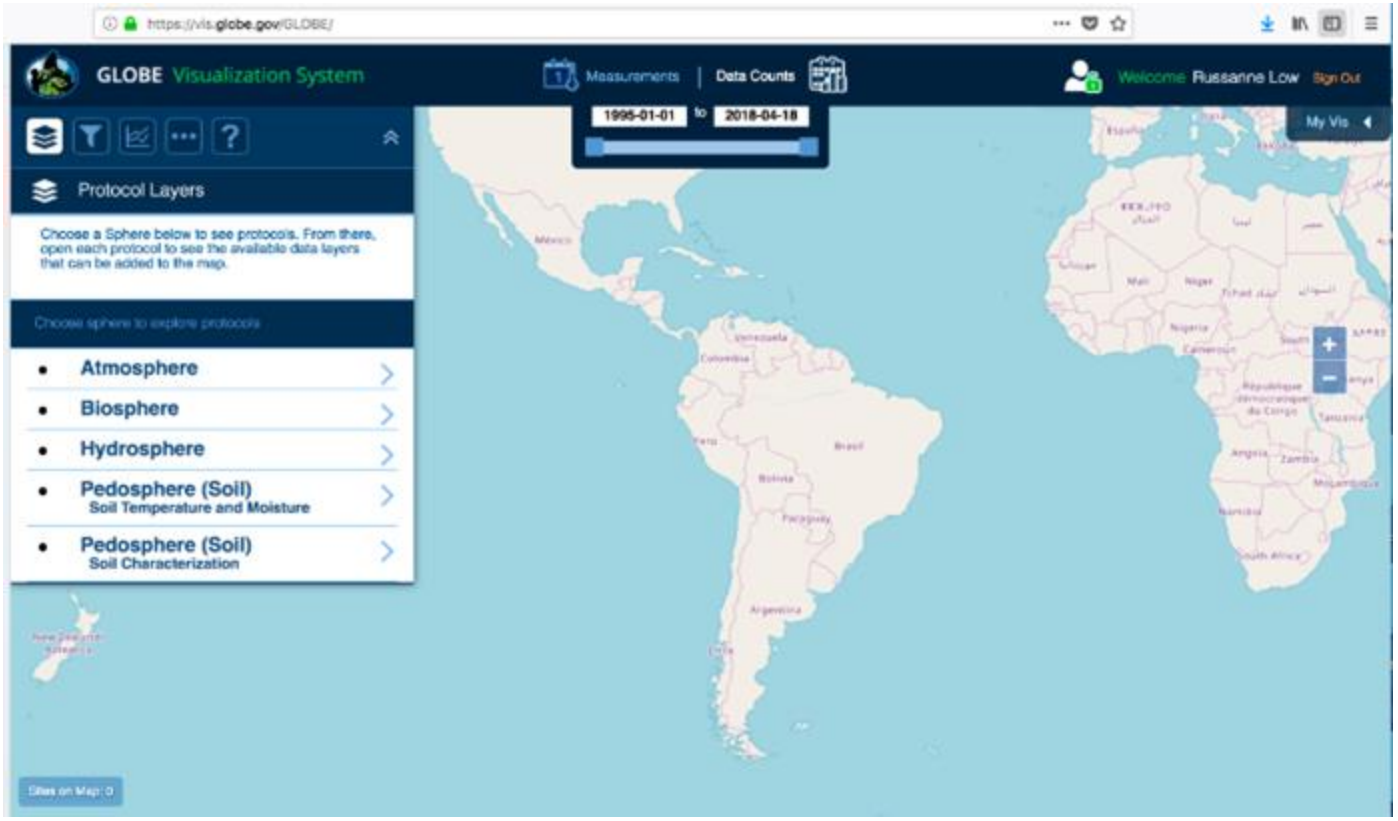
Visualize and Retrieve Data-2

Go to globe.gov and on the menu, select GLOBE data and click on “Visualize Data”.



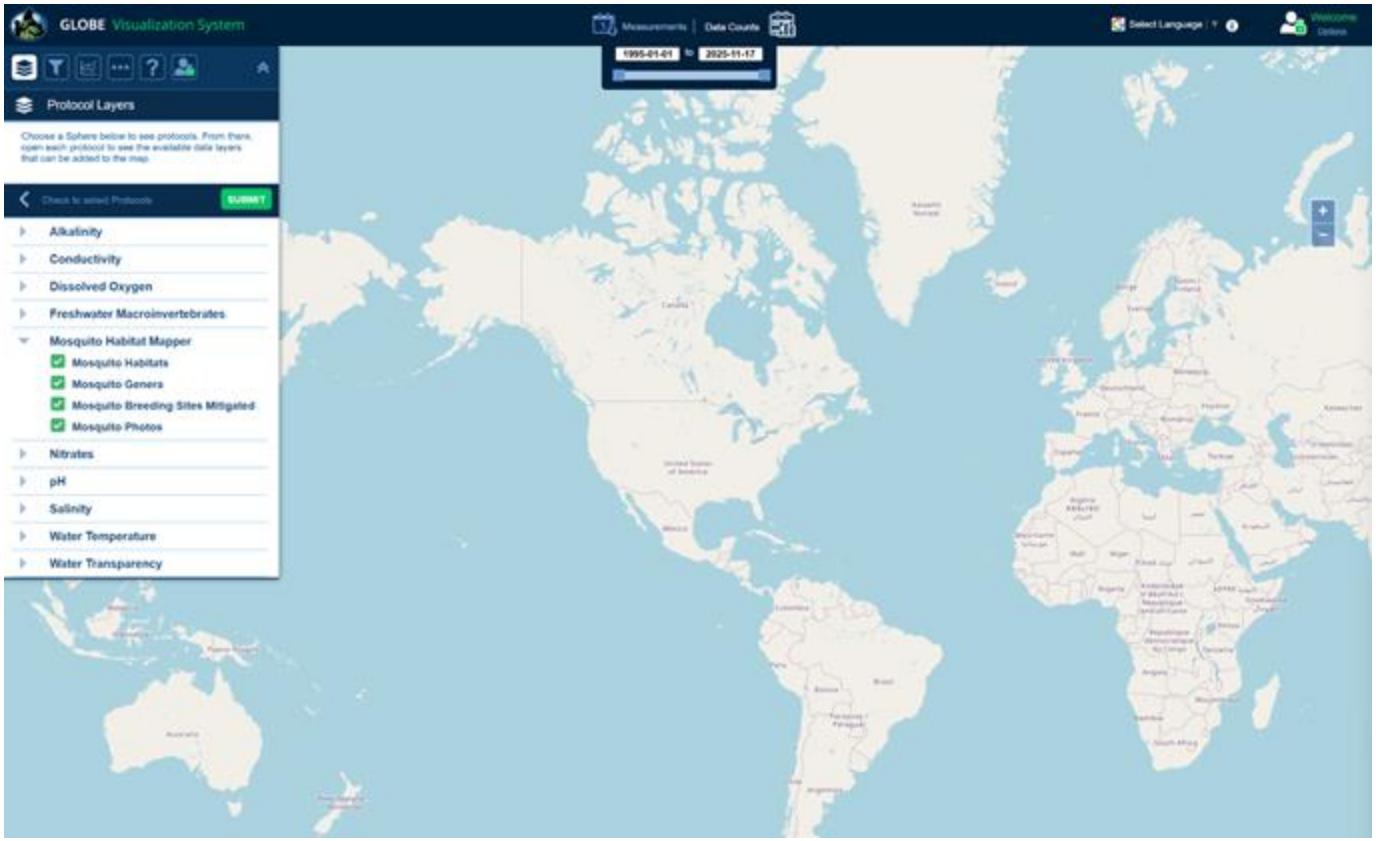
Visualize and Retrieve Data-3

Select the data layer icon, and you will see the protocol layers. Select Hydrosphere.
Select “Data Counts” if you want to see all the data available within a range, or select a single day.



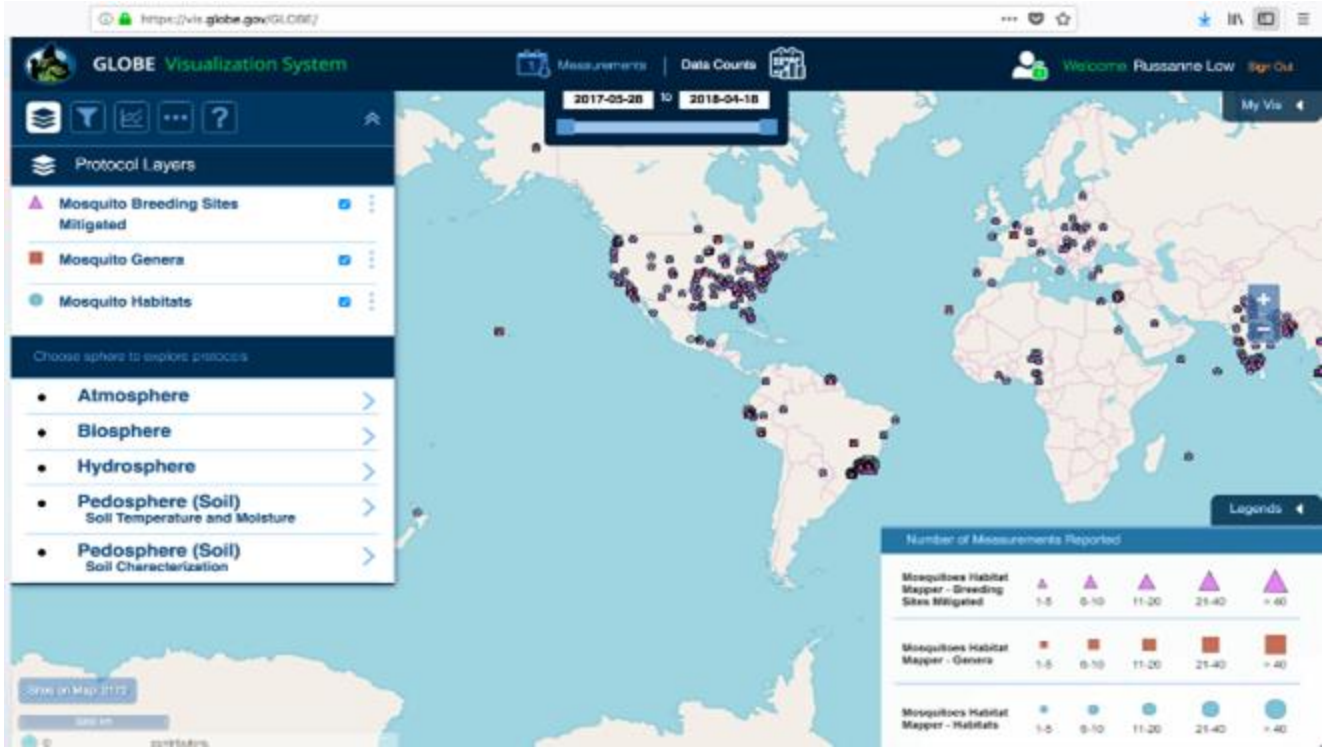
Visualize and Retrieve Data-4

In Hydrosphere, select Mosquito Habitat Mapper and the fields you want to examine.



Visualize and Retrieve Data-5

The data will populate the map. You can see the legend by clicking on the pull- out legend, lower right. You can zoom in and see on which street the data was found!

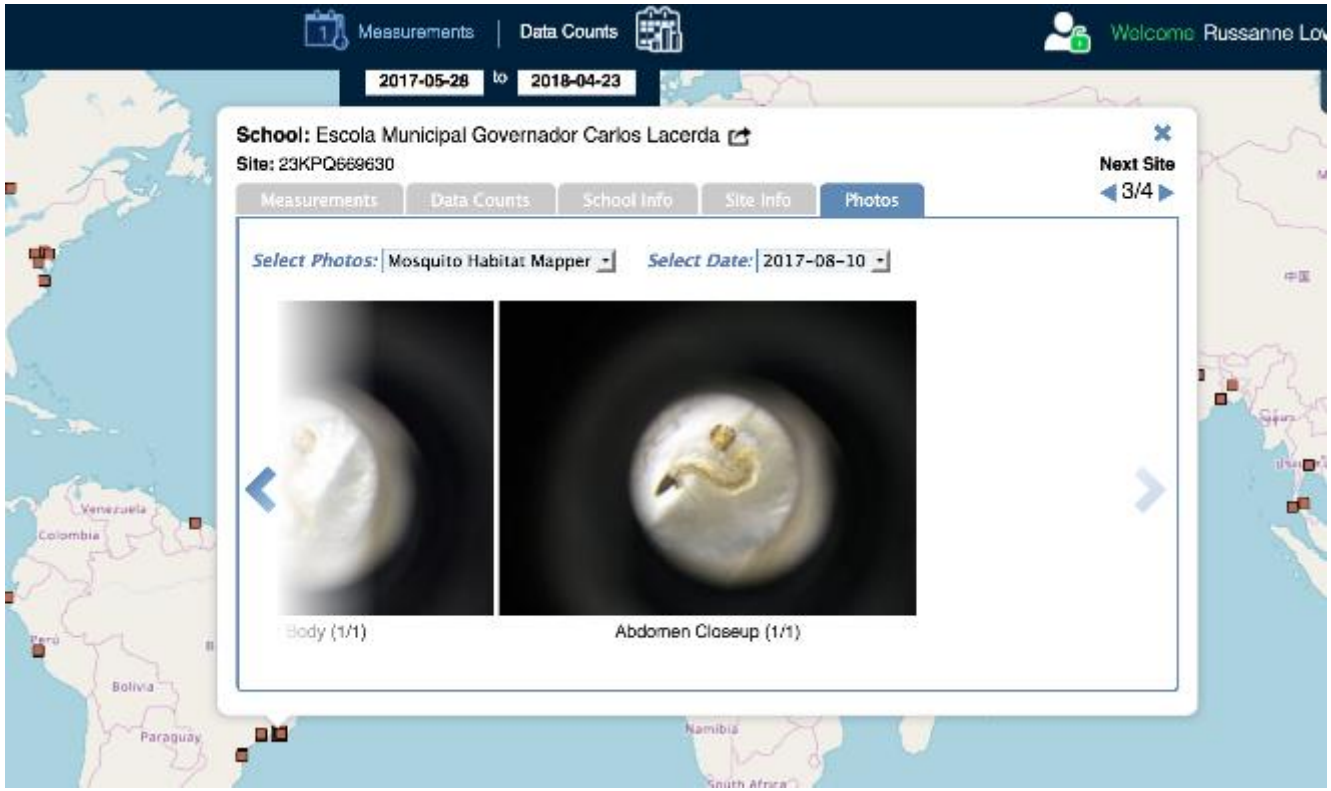


Visualize and Retrieve Data-6

Above: Data reported by citizen scientists since inception, using the GO MHM app, June-December 2017. See inset image, Rio de Janeiro, Brazil data hub, where an intensive training pilot took place in May-June 2017. N=1523. (https://vis.globe.gov/GLOBE/)

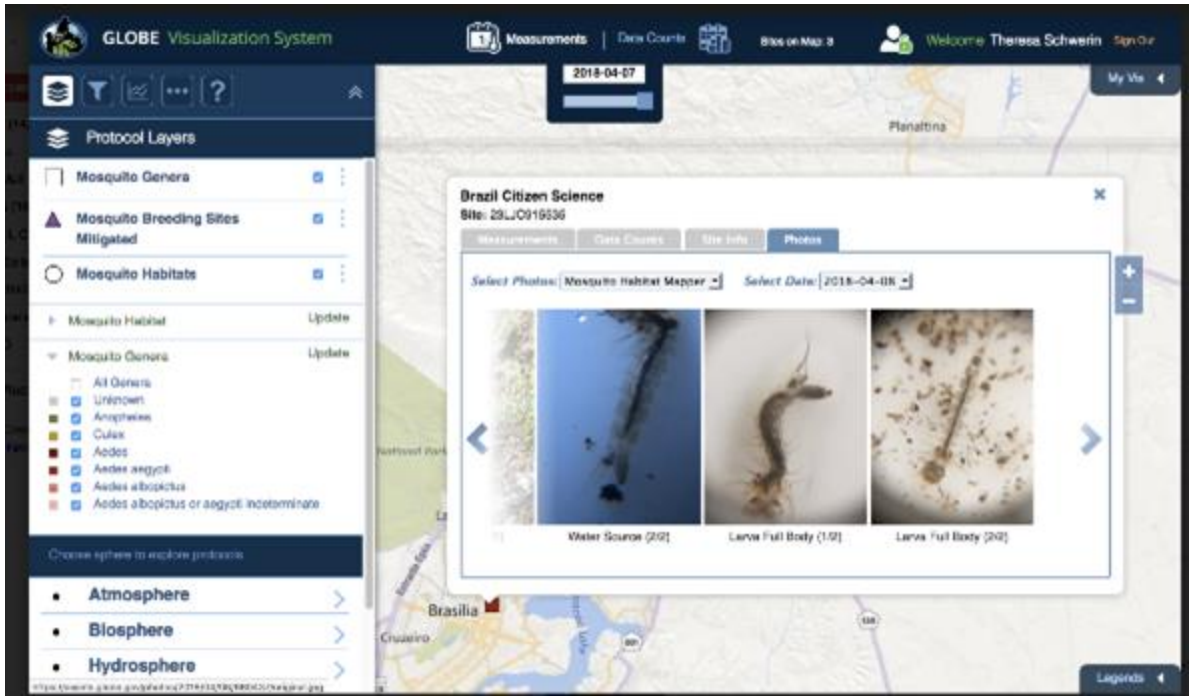
Visualize and Retrieve Data-7

Accuracy and data quality: voucher photo can be examined to ensure that the identifications are correct. Click on any data point to retrieve metadata for that location.



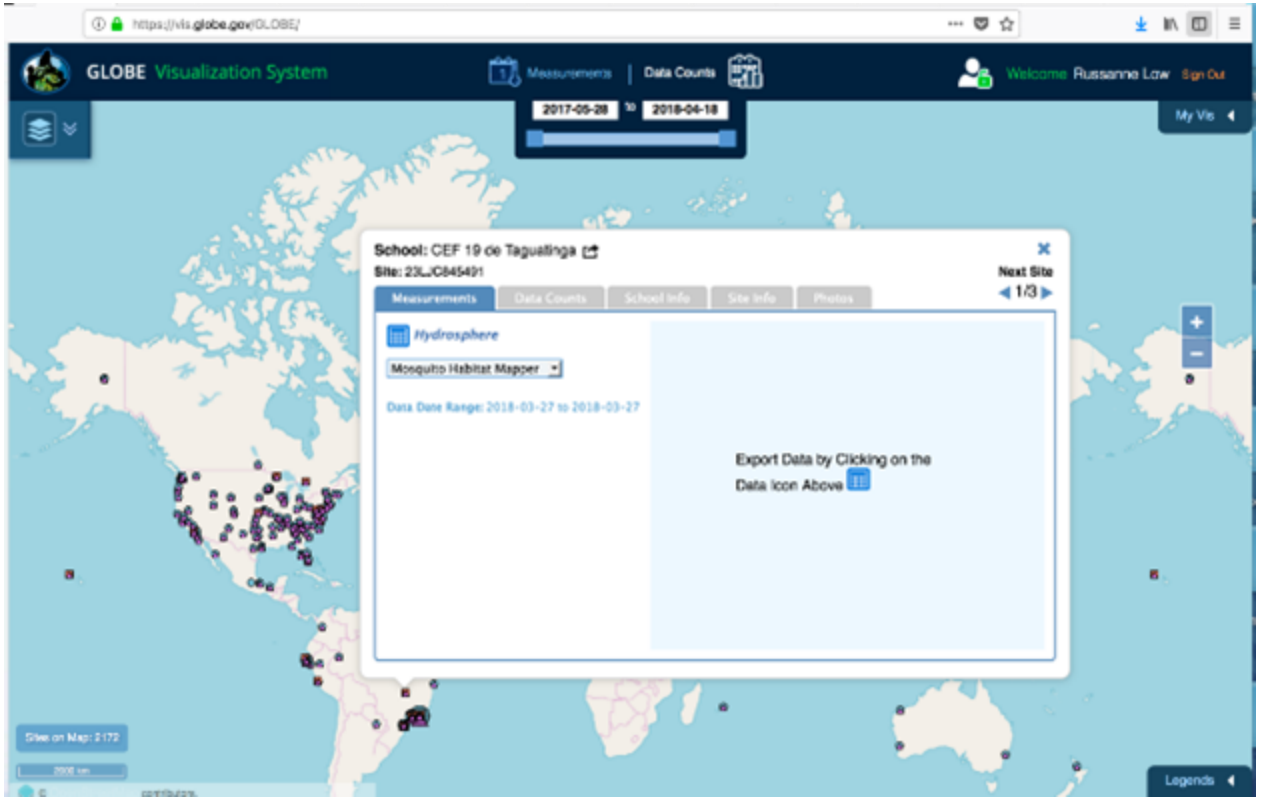
Accuracy and data quality

Accuracy and data quality: You can search by taxa, to see where different species or genera have been found.



Accuracy and data quality (Cont'd)

You can download data as a .csv or .kmz file by clicking on a data point and choosing the "Measurements" tab. Follow instructions to download.



Review questions to help you prepare to conduct the Mosquito Protocol

1. How many samples of a non-container site should you take?
2. What are some of the safety precautions that you need to take when conducting the Mosquito Protocol?
3. Ideally, how often can you do the Mosquito Protocol?
4. What are some of the types of data that you will report to GLOBE when conducting the GLOBE Mosquito Protocol?
5. If you were designing a research investigation to identify the environmental conditions that support successful Mosquito breeding seasons, what other GLOBE data sets might you consult?
6. True or false: mosquitoes can hatch and develop in open container environments as well as natural water bodies.
7. Name three genera of mosquitoes that can potentially transmit pathogens that cause disease in humans.
8. Which genus of mosquitoes carries Zika? Malaria?
9. What are the three things that we can do to reduce risk of mosquito borne disease, when there is no vaccine available? How does GLOBE Observer Mosquito Habitat Mapper help?
10. How does GLOBE Observer Mosquito Habitat Mapper ensure that data uploaded by GLOBE Observer users is scientifically accurate and reliable?

Are you ready to take your quiz?

You have now completed the slide set. If you are ready to take the quiz, sign on and take the quiz corresponding to Mosquito Larvae Protocol.

When you pass the quiz, you are ready to participate as a citizen scientist in the GLOBE Observer Mosquito Habitat Mapper network!

Frequently Asked Questions (FAQs)

What is the mosquito life cycle?

Adult eggs (2 -3 days) larvae (4 -5 days) pupae (1- 2 days) Adult. The times in each stage are environmentally dependent: in warmer temperatures, mosquito metabolism is faster.

How do you identify which one is the *Anopheles*, *Aedes* or *Culex* larvae (identify with unaided eyes)?

We can see the characteristics of mosquito larvae: In the water, *Anopheles* larvae cling parallel with the water surface. On the other hand, *Aedes* and *Culex* larvae cling at an angle of 45° with the side of the container. *Aedes* larvae have shorter siphons, *Culex* larvae tend to have have longer siphons.

What do the male mosquitoes feed on?

Male mosquitoes feed on any sugar source, including flowers, fruit, nectar and other insects.

At what seasons of the year are greater percentages of mosquito larvae found?

Most often they are found in the rainy season or shortly after the end of the rainy season.

What if I want to collect mosquito data and do not have a mobile device?

It is still possible to collect mosquito data. You will need to use the GLOBE Mosquito Protocol data form, and enter the data manually to the GLOBE data portal.

What if I want to collect mosquito data and do not have a clip-on macro lens to use with my mobile device?

You can use a hand lens. It is possible to take a picture of the larvae through the lens and upload it to the website. You can also use a school microscope, if available.

We want your Feedback!

Please provide us with feedback about this module. This is a community project and we welcome your comments, suggestions and edits! Comment here: Training@nasaglobe.org

Questions about module content? Contact GLOBE: help@nasaglobe.org

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