

**Fight The Bite!**

**Mosquito Awareness Patch Project**



**County of San Diego**  
**Vector Control Program**  
**Department of Environmental Health**



## **Table of Contents**

Patch Project Description.....	<a href="#">Page 3</a>
Mosquito Overview.....	<a href="#">Page 7</a>
Example Breeding Source Tracking Chart.....	<a href="#">Page 12</a>
Breeding Source Tracking Chart.....	<a href="#">Page 13</a>
Pre-Survey Questions.....	<a href="#">Page 14</a>
Post-Survey Questions.....	<a href="#">Page 16</a>
Survey Answer Key.....	<a href="#">Page 18</a>

# Fight the Bite!

## Patch Project: Mosquito Awareness and Prevention

### Introduction:

Mosquitoes can bite people and transmit serious diseases. The Vector Control Program works hard to keep people safe from mosquitoes and the diseases they carry, but it's important that residents do their part to keep their homes and neighborhoods as mosquito-free as possible.

The main cause of many mosquito problems is that people don't realize that mosquitoes can breed in their own homes and they don't know how to prevent it. In this patch project, your troop will learn about mosquitoes and how to prevent them from breeding at home and will then share this information with your community. By focusing on the root cause of the problem, we can develop solutions that continue to have an effect after the end of your project.

By spreading awareness of mosquitoes throughout your neighborhood, you will be helping to reduce mosquito breeding and to protect your family and neighbors from diseases transmitted by mosquitoes.

Let's get started!

### Step One: Learning about the Issue!

#### A. Identify the Issue

Mosquitoes are the deadliest creatures on earth, spreading viruses like West Nile, chikungunya, dengue, Zika and others. Viruses and diseases spread by mosquitoes are called "mosquito-borne." There are over 3000 different species of mosquitoes in the world; 27 of them are found in San Diego County, 9 of which can potentially spread diseases to people (these mosquitoes are called "vectors"). You can help by educating yourself and your community how to prevent mosquito-borne illnesses. Teaching your family, friends and neighbors how to prevent and remove mosquito breeding in their yards will have a direct impact on keeping everyone healthy!

#### B. Research it!

Learn more about mosquitoes and mosquito breeding so that you can become an expert for your community. Visit our [Scout website](https://www.sandiegocounty.gov/deh/pests/ScoutResources.html) to get started!

<https://www.sandiegocounty.gov/deh/pests/ScoutResources.html>

Here are a few more resources to use in your research:

- Centers for Disease Control and Prevention (CDC)  
[www.cdc.gov/features/stopmosquitoes/](http://www.cdc.gov/features/stopmosquitoes/)
- California Department of Public Health (CDPH)  
<https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/MosquitoesandMosquitoBorneDiseases.aspx>
- County of San Diego Vector Control Program [SDFightTheBite.com](http://SDFightTheBite.com)
- Attached [mosquito overview](#)

C. Share what you learned!

Get back together with your troop and discuss what each of you learned during your research. As you discuss what you learned, consider asking the following questions:

- What did you learn about mosquitoes that you didn't know before?
- What did you learn about mosquitoes that was most surprising to you?
- Is there anything you still want to learn about mosquitoes?

## Step Two: Explore Your Community

Use your knowledge about how and where mosquitoes breed to inspect your home and community for possible mosquito breeding sources. Keep in mind that mosquitoes can breed in something as small as a bottle cap of water!

A. Inspect your home:

Make a list of possible breeding sites at your home and investigate. Record your results and take pictures of mosquito breeding if found. A chart is provided on [page 13](#) to record your results. An example of how to fill it out is on [page 12](#).

B. Talk to family, neighbors or friends and inspect their homes:

Make a list of at least 2 neighbors, family or friends that you can teach about mosquito-borne diseases and help find and remove mosquito breeding on their property.

1. Using the pre-survey questionnaire, interview at least 2 of your neighbors, family members or friends to determine their knowledge of mosquitoes and mosquito borne-diseases. Feel free to modify the questionnaire if you'd like to include more questions from your research. Bring their answers to your next troop meeting!
2. Inspect their property (with permission) to see if you can find areas where mosquitoes could breed. Look for any amount of standing water – even  $\frac{1}{4}$ " is enough for mosquitoes to breed. Check in the water for larvae or pupae (use a flashlight to help you see into dark containers). If you find standing water and/or mosquito breeding, show your neighbors where you found it and DUMP out the water! Record your results on the chart provided.

## Step Three: Work Together

Now that you have explored your community, get back together with your troop to share what you learned. Bring the results of your exploration (the pre-survey questionnaires and the chart from your survey for breeding sites) and share what you found with the other scouts. Work together to summarize your results and to answer the following questions:

- Where do your family, friends and neighbors have the correct knowledge? Are there any gaps in their knowledge?
- How many homes did you inspect? Did you find any breeding?
- What can you do as a group to educate your community?

## Step Four: Spread the Word

You've done your research, inspected your and your neighbors' homes, and assessed how much knowledge your friends, family and neighbors have about mosquito-borne diseases and prevention. Now, it's time to decide how to spread the word even further!

Use the answers to the questions you asked in step three to decide what to make as the topic of your project. For instance, if your survey showed that not many people are familiar with the mosquito life cycle, you may choose to make that the topic of the final stage of the project.

Then, decide how you think you can best spread the word about mosquitoes. You might consider the following options (or come up with one of your own): make a presentation, short YouTube video, play, scrapbook or report addressing the gaps of knowledge in your community and teaching people how to prevent mosquito breeding. Keep in mind that projects like this are most impactful when they are **sustainable and measurable**.

- Your project is **sustainable** when it can carry on or continue to have an impact.
- Your project is **measurable** when you collect information or data and use it to show that your actions have had an impact on the community issue you've chosen.

Consider the following examples as you and your troop plan your project:

### **Example 1:**

*Your troop might decide to impact the people they already surveyed and inspected in step 3. So, you make a plan to develop a presentation and then return to those houses. There, you will educate your neighbors on how to prevent mosquito breeding and how to protect themselves from mosquito bites. After educating your neighbors, you will ask them to complete the post-survey questionnaire. You will also give your neighbors the name and number of County of San Diego Vector Control Program to report mosquito breeding if they find it outside their homes!*

*This project will be sustainable because your neighbors will have lasting knowledge about preventing mosquito breeding and a number to call if they find breeding outside their homes. You plan to measure your impact with the post-survey and chart results.*

**Example 2:**

*Your troop might decide to create a short video on how to prevent mosquito breeding at home. Then, you might upload the video to YouTube to share with others on the web. To make sure your project is sustainable and measurable, you can email your video to family, friends and neighbors including the pre and post survey and instructions on how they can inspect their own property. Like the example above, you can measure your impact with the survey and chart results.*

Remember, these are just examples. Plan a project that fits best with your community!

Once you've decided on a project; put your plan into motion! It's time to create a list of tasks and deadlines and figure out who will be doing what. Decide what tasks need to be done, how they will be done, when they should be finished and which team member will complete each task. If you make a planning chart with all the details above, it might help organize it all.

Then, have fun making and sharing your project!

**Step Five: Share your success!**

Congratulations! By spreading the word about mosquitoes, you and your troop have made a difference in the health of your community! Great job!

Now it's time to share your success. First, thank everyone who helped you with your project. They'll be glad to hear what you were able to accomplish with their help.

Next, send Vector Control an email letting us know how it went! Share the results of your explorations from step 2 as well as your final project. We'd love to share your hard work with the whole county.

Finally, celebrate what you have accomplished! You learned a lot and helped make the world a better place.

## Mosquito Overview

### Mosquito Life Cycle

During warm months a mosquito may complete its life cycle in as little as one week. A mosquito has four stages in its life cycle:

1. **Egg:** The eggs are laid in or near standing water. Different mosquitoes lay their eggs in different ways. For example, *Culex* mosquitoes lay several hundred eggs in a raft on the surface of the water. Eggs hatch into larva in 2 to 3 days. In contrast, *Aedes* mosquitoes lay their eggs one by one on the sides of small containers holding water – the eggs hatch when submerged in water.



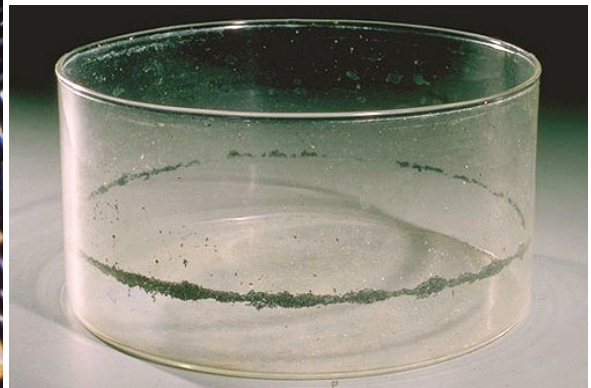
a. *Culex* mosquito laying her egg raft



b. *Culex* mosquito egg raft



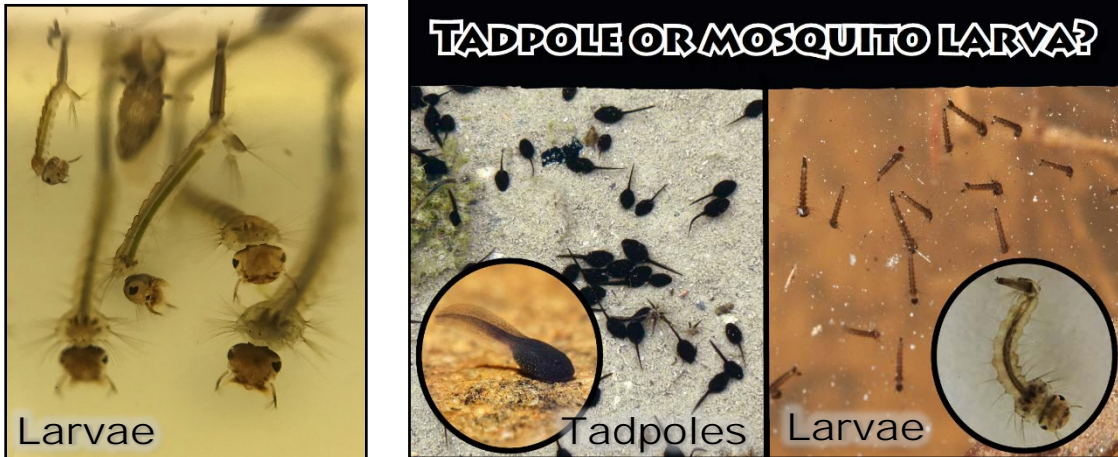
c. *Aedes aegypti* eggs



d. *Aedes* eggs laid along the water line in a glass container



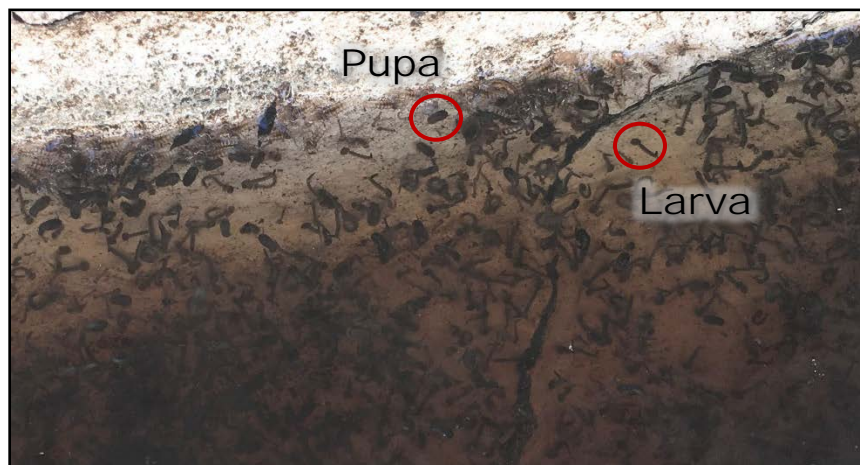
2. **Larva:** Larva look like tiny wiggling worms in the water. They come to the water surface to breathe and feed on organic matter, such as algae. Many people confuse them for tadpoles, but mosquito larvae are more “worm” shaped and tend to stay near the surface. Check out the videos on our [Scout website](#) to see what mosquito larvae look like in motion!



3. **Pupa:** Larvae turn into pupae. This is the metamorphosis stage; pupae live in the water alongside larvae but do not feed. Inside they are changing into an adult mosquito.



Both larvae and pupae are very small and tend to stay close to the surface of the water. They will squirm and wiggle away if you disturb them.





4. **Adult:** Adult mosquitoes emerge from the pupa case in 2-3 days depending on temperature. The newly emerged female adults are ready to find a blood meal. The average mosquito will live for about 2 weeks.



*Aedes aegypti*



*Culex quinquefasciatus*

## Mosquitoes Spread Diseases

People react differently to mosquito bites. Some show very few signs of being bitten. Others may have redness, swelling, and itching. This is an allergic reaction to the mosquito's saliva. Mosquitoes can also spread diseases to people through their bites. In San Diego County there are 27 different types of mosquitoes. At least 9 types (including the two species pictured above) are known to spread diseases to people such as:

West Nile virus	St. Louis Encephalitis	Malaria
Yellow Fever	Zika virus	Dengue
Chikungunya	Western Equine Encephalitis	

## Prevent Mosquito Bites

Prevent mosquito transmitted diseases by avoiding mosquito bites. Follow these tips to protect yourself from mosquito bites:

- Wear light colored long sleeves and pants to cover your skin when outdoors. This will make it easier to see a mosquito if it lands on you.
- Apply an insect repellent that contains the active ingredient DEET, Picaridin, Oil of Lemon Eucalyptus, or IR 3535 to exposed skin or on top of clothing. More information about repellents is available at <https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Mosquito-Repellent.aspx>

- Install or repair screens on windows and doors to keep mosquitoes out.
- Put mosquito fish or a product that kills mosquito larvae (called a larvicide), such as “Mosquito Dunks” (Bti), in backyard ponds, fountains and unused pools to kill mosquito larvae. “Mosquito Dunks” are available at many home improvement stores.

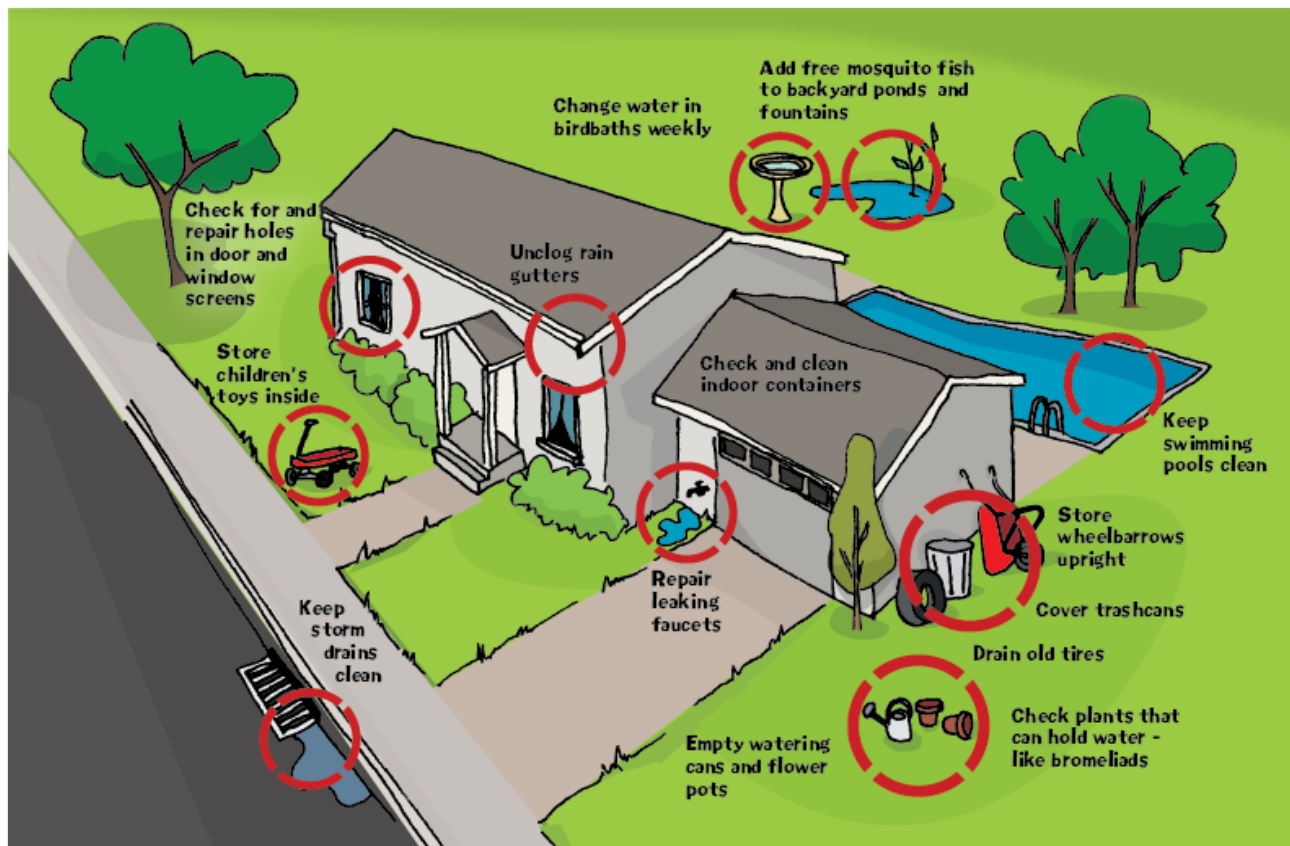


## Breeding Sources

Mosquitoes need a small amount of water to lay their eggs. Any water that stands still for more than a couple of days can become a breeding site. Removing standing water around your house will reduce the number of mosquitoes at your home.



Check your yard for possible mosquito breeding sites. If you find water in these items, **DUMP IT OUT** or follow the instructions below!



### Prevent Breeding Sources At Home

**Birdbaths:** Clean weekly

**Containers/Buckets:** Tightly cover or store upside down

**Ponds:** Stock with mosquito fish (*Gambusia affinis*)

**Drains:** Keep outdoor drains flowing freely

**Faucets & hoses:** Fix leaks to prevent puddles from forming

**Irrigation:** Do not over water and eliminate areas with standing water

**Playground:** Dump water collected in swings or slides

**Wheelbarrows:** Store upright so water does not collect

**Litter:** Throw cans, bottles, and other litter in the trash or recycle it before it can collect water

**Basketball hoops:** If the base is filled with water, make sure any holes are plugged or covered

**Pools/spas:** Keep clean and circulating or put mosquito fish in unused pools and spas that contain water

**Potted plants:** Do not over-water; empty saucers weekly or fill with sand.

**Rain barrels:** Put screens over openings, treat with Bti larvicide (Mosquito Dunks) monthly

**Rain gutters:** Clean out debris so water flows freely

**Tires (discarded):** Dispose of or drill holes to drain water

**Toys:** Pour out water and put away

**Trash cans:** Keep covered with lids

**Pet water bowls:** Replace water at least weekly

**Bromeliads:** Flush out water and treat remaining water between the leaves with Bti larvicides

## Example of how to fill out the Mosquito Breeding Site Tracking Chart

Description	Community	Item found with water	Did you find mosquito breeding?	Did you Dump it out?!
My house	El Cajon	Wheelbarrow	No	Yes
My house	El Cajon	Birdbath	No	Yes
My house	El Cajon	Kiddie Pool	Yes!	Yes
Grandma's house	Santee	Trash Can	No	Yes
Grandma's house	Santee	Rain Barrel	Yes	No (Grandma treated it with a mosquito dunk)
My neighbor Dave's house	El Cajon	Bucket	No	Yes
My neighbor Dave's house	El Cajon	Saucer under potted plant	Yes	Yes

Print out copies of the chart on the following page to use when you look for mosquito breeding!



## Mosquito Breeding Site Tracking Chart

[illegible]

## **Pre-Survey Questions**

---

- 1. Which of the following lists the correct order of the mosquito life cycle?**
  - a) Egg, Larva, Pupa, Adult
  - b) Adult, Egg, Larva, Pupa
  - c) Nymph, Pupa, Larva, Adult
  - d) Egg, Pupa, Larva
  
- 2. Which of the following are potential mosquito breeding sources?**
  - a) Flower pots, buckets and plant saucers that hold a thin layer of water
  - b) Discarded tires
  - c) Sprinkler boxes
  - d) A swimming pool with a broken pump
  - e) All of the above
  
- 3. West Nile Virus is transmitted by:**
  - a) Birds
  - b) Mosquitoes
  - c) Horses
  - d) Dogs
  - e) Humans
  
- 4. How confident are you that you can recognize and report mosquito breeding sites and dead birds while taking precautions to prevent mosquito breeding and bites?**
  - a) Very likely
  - b) Likely
  - c) Somewhat likely
  - d) Not likely
  
- 5. Which of these is scientifically proven to repel mosquitoes?**
  - a. CO<sub>2</sub>
  - b. Repellent containing DEET
  - c. Mosquito wristbands
  - d. Ultrasonic sound



**6. What local government agency works to reduce mosquito breeding?**

**7. Where does the Invasive *Aedes* mosquito prefer to breed?**

- a) Large stagnant bodies of water
- b) Irrigated pastures
- c) Salt marshes
- d) Near humans in small pots, planters or saucers

**8. What types of diseases do Invasive *Aedes* mosquitoes transmit?**

- a) West Nile virus
- b) Malaria
- c) Zika, Dengue and Chikungunya
- d) St. Louis Encephalitis

**9. Can Invasive *Aedes* mosquitoes breed inside homes?**

- a) Yes
- b) No

**10. Do you think mosquitoes are breeding on your property right now?**

## Post-Survey Questions

---

1. Which of the following lists the correct order of the mosquito life cycle?
  - a) Egg, Larva, Pupa, Adult
  - b) Adult, Egg, Larva, Pupa
  - c) Nymph, Pupa, Larva, Adult
  - d) Egg, Pupa, Larva
  
2. Which of the following are potential mosquito breeding sources?
  - a) Flower pots, buckets and plant saucers that hold a thin layer of water
  - b) Discarded tires
  - c) Sprinkler boxes
  - d) A swimming pool with a broken pump
  - e) All of the above
  
3. West Nile Virus is transmitted by:
  - a) Birds
  - b) Mosquitoes
  - c) Horses
  - d) Dogs
  - e) Humans
  
4. How confident are you that you can recognize and report mosquito breeding sites and dead birds while taking precautions to prevent mosquito breeding and bites?
  - a) Very likely
  - b) Likely
  - c) Somewhat likely
  - d) Not likely
  
5. Which of these is scientifically proven to repel mosquitoes?
  - a) CO<sub>2</sub>
  - b) Repellent containing DEET
  - c) Mosquito wristbands
  - d) Ultrasonic sound

**6. What government agency helps the community reduce mosquito breeding?**

**7. Where does the Invasive Aedes mosquito prefer to breed?**

- a) Large stagnant bodies of water
- b) Irrigated pastures
- c) Salt marshes
- d) Near humans in small pots, planters or saucers

**8. What types of diseases do the Invasive Aedes transmit?**

- a) West Nile Virus
- b) Malaria
- c) Zika, Dengue and Chikungunya
- d) St. Louis Encephalitis

**9. Can the Invasive Aedes mosquito breed inside homes?**

- a) Yes
- b) No

**10. What steps will you take to avoid mosquito breeding on your property?**

## **Questionnaire Answers**

1. A
2. E
3. B
4. Answer will depend on the person being asked
5. B
6. Vector Control Program
7. D
8. C
9. A
10. Many potential answers which may include: dumping out standing water, covering buckets and containers that can collect water, keeping toys stored inside, using a mosquito larvicide like mosquito dunks, etc.