

# Solano County Mosquito Abatement District

MARLON OSUM, President, Suisun City  
RONALD SCHOCK, Vice President, Trustee-at-Large  
PAUL WADE, Secretary, Fairfield  
MIKE WHITE, Benicia  
TAD SMITH, Dixon  
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BRET BARNER, Biologist  
TAMI WRIGHT, Admin. Asst.

Meetings: Second Monday Every Month 4:30 P.M.

## MINUTES OF THE MEETING OF FEBRUARY 10, 2025 BOARD OF TRUSTEES OF THE SOLANO COUNTY MOSQUITO ABATEMENT DISTRICT

### 1. Call to Order:

President Osum called the meeting to order at 4:30 p.m. at the Solano County Mosquito Abatement District Building, 2950 Industrial County, Fairfield, CA 94533.

### 2. Pledge of Allegiance:

All those in attendance recited the pledge of allegiance.

### 3. Roll call:

Present Trustees: Schock, White, Glaze, Wade, Osum, Meador, Stanish and Smith.

Absent Trustees: None

Also in attendance:

Miguel Cardenas, Manager  
Tami Wright, Admin. Assistant

### 4. Minutes of the meeting of January 13, 2025.

Unanimously approved on motion by Trustee D. Glaze seconded by Trustee T. Smith.

### 5. Examination Manager's Report for the month of January 2025.

Trustee Schock inquired about the drone usage with the electric truck. Manager Cardenas stated that Alameda MAD is having success with their Ford Lightning drone truck set up. They have enough charge to operate the drone and drive to the treatment sites with no concerns for the truck battery. Trustee Stanish asked about the cost of the electric truck and Manager Cardenas stated that there is a work pro version of the Lightning that runs under \$40,000 but the wait time for that vehicle could be years. What is available is the mid-tier trim that runs close to \$70,000. The electric truck is a

viable option if we want to expand on the drone program. Trustee Osum inquired about how long the batteries last, Manager Cardenas stated approximately 10 years.

Accepted as written.

**6. Payment of Bills for January 2025.**

Unanimously approved on motion by Trustee M. White seconded by Trustee D. Glaze.

**7. Examination of Financial Sheet for the month of January 2025.**

Accepted as written.

**8. This time is reserved for members of the public to address the Board relative to matters of Board Business:**

- a. None

**9. Correspondence:**

- a. None

**10. New Business:**

- a. Consideration/Action of Resolution 25-02 Establishing Reimbursement from Duck Club Owners for Aerial Application Costs for 2025. (Action)

Unanimously approved on motion by Trustee M. White seconded by Trustee R. Schock.

- b. Consideration/Action approving the letter to City of Vacaville requesting appointment of a trustee to represent the City of Vacaville. (Action)

Unanimously approved on motion by Trustee D. Glaze seconded by Trustee M. White.

- c. Consideration/Action approving the letter to Wells Fargo requesting the update of authorized signers on account. (Action)

Unanimously approved on motion by Trustee D. Glaze seconded by Trustee M. White.

- d. Consideration/Action of District Manager evaluation policy. (Action)

Unanimously approved on motion by Trustee M. White seconded by Trustee R. Schock.

- e. FY 2024-2025 Second Quarter review. (Information)
- f. Statement of Economic Interest 700 Forms are Due April 1, 2025. (Informational)

**11. Unfinished Business:**

- a. Strategic plan with measure of success and strategic plan checklist.

Establish an ad hoc committee to discuss Strategic plan with measure of success for the district. (Action)

Instead of establishing an ad hoc committee Trustees will provide Manager Cardenas with feedback via email. He will compile the feedback and present it at the March 10, 2025, meeting.

**12. Reports:**

- a. Reports by Trustees Smith and White on their attendance at the MVCAC Annual Conference. (Informational)

Trustee White stated that the meeting had a lower attendance than usual. They talked a lot about *Aedes aegypti*, that they are here to stay and how to reduce with fogging, sterile male mosquitoes and Wolbachia. The FBI presented on drone security. They advised to have your remotes secured away from the drone when not in use. He also attended an AI presentation, which would help in mosquito identification and phone services. He also attended the talk by a Public Health Agency regarding Dengue cases.

Below are Trustee Smith's conference notes:

Plenary session:

The legislative update indicated new funding from the state was unlikely due to budget issues and the need for a 2/3 vote in the legislature to raise taxes and fees. In the California assembly and senate, roughly 25% of the legislators turn over every two years, showing the continuous need to educate and advocate for mosquito control. There was discussion about better use of the Advocacy Day for causes such as mosquito control.

Dan Markowski, the American Mosquito Control Association (AMCA) representative pointed out that the organization can help with issues at the federal level, and there is an extensive on-line training series of six models, covering topics from mosquito biology to control.

Of concern is the increase in cases of Oropouche virus in Southern American, Central America and the Caribbean. This is a virus spread by bites from mosquitoes and midges. The disease is particularly dangerous to pregnant women as it can cause death of fetus or congenital abnormalities. In a way, it is like the situation with Zika virus in 2014. The CDC has issued a grant to 10 states to monitor mosquitoes for this pathogen and better understand disease transmission.

THE AMCA is working with EPA to gain clarity on enforcement of the “vulnerable species action plan” as mosquito control strategies could run afoul of the policy. Spraying for mosquito control could be viewed as harassment of some vulnerable species, such as the monarch butterfly and Bird’s Beak flower.

Phil Lounibos, PhD, retired from University of Florida, discussed the historical aspects of mosquito control. Malaria still infects 300 million people per year and causes 1 million deaths. The use of bed nets impregnated with insecticides is one of the most significant and successful strategies for control of disease transmission.

A Dengue fever outbreak in Brazil in 2008 overwhelmed the health care system. This was concerning as Brazil has a reasonably advanced health system and this shows other countries can face major issues during a disease outbreak.

Biological control of mosquitoes with parasites or insect predators has not been a successful strategy, as there are not many organisms available. One successful example is the use of a small copepod crustacean, *Mesocyclops*, spp., for control of mosquitos spreading Dengue fever in Vietnam. The copepods consume mosquito larvae in water containers stored in homes and greatly reduced the incidence of Dengue fever.

A microscopic, eukaryotic ciliate microbe, *Lambornella clarki*, can function as a parasite of tree hole mosquito larvae, such as *Aedes sierrensis*. This mosquito breeds in water found in tree holes over western North America. So far, it has not been practical to use this ciliate as a biocontrol agent.

Biological control with bacteria, besides the well-known *Bacillus thuringiensis israelensis* (BTI), has focused on *Lysinibacillus sphaericus* (previously = *Bacillus sphaericus*). *L. sphaericus* has a narrower spectrum of control that BTI, is more effective in water containing large amounts of organic matter, and it is more persistent in treated water. Valent BioSciences sold an insecticide containing *Bacillus sphaericus* 2362, Serotype H5a5b, strain ABTS 743, starting in 2001. The product, VectoLex granules, does not seem to be a major bioinsecticide, probably due to its expense and presence of numerous generic versions of BTI.

A summary of invasive mosquito introductions showed a few examples of elimination of the pest. One example was the introduction of *Anopheles gambiae* into Brazil in 1930.

This mosquito is a highly effective vector of malaria. By 1943, the mosquito was eliminated, but this was accomplished by the extensive use of Paris Green, a highly toxic material, originally developed as a green dye. It is arsenic- and copper-based salt. Being such, it does not degrade. Its extensive use was highly damaging to the environment and killed many pesticide applicators.

In the United States, the introduction of *Aedes albopictus* reduced the presence of another introduced pest, *Aedes aegypti*. This was caused by reproductive interference, occurring when *A. albopictus* males mated with *Aedes aegypti* females, thus effectively sterilizing them for life.

Robert Ferdan presented a summary on the use of Generative A.I. for mosquito control. We have gone from deep learning models in 2010 to generative A.I. Some examples of MAD using A.I. are examining satellite images for the presence of green swimming pools. Larger Districts are experimenting with A.I. software to field the initial request for service. A.I. might be a good tool to summarize meetings and allow for quicker access by the public of such summaries. The downside is many free A.I. versions will use your information for training their software and thus your information is not secure. Secure services are still expensive. All A.I. output still needs to be checked, as the programs can sometimes generate outlandish results, deemed hallucinations.

A representative from the FBI, Nicholas Callahan, discussed the need to have proper security of drone programs. Drones have been used for numerous maliferous actions. Some examples were the use of drones to spray a foul-smelling liquid on a political rally in Brazil and triggering a panic, dropping contraband into a prison, and smuggling drugs over international borders. Of course, drones are now a tool of war, with the Ukraine invasion by Russia serving as a proving ground for the rapidly advancing technology.

Some uses of the emerging benefits of drone technology are to monitor power lines for defects, monitor crop growth for targeted pesticide and fertilizer applications on farmland (precision agriculture), monitor livestock, public safety (locating missing people, law enforcement), and outside building inspections.

The FBI is concerned about inappropriate use of large drones with high carrying capacity. A stick of dynamite weighs 2 lbs. Large drones can carry up to 150 lbs., so it is easy to imagine the damage caused by a rouge operator or terrorist. High-capacity drones are expensive; a 150 lb. payload drone can cost over \$56,000. As mosquito districts use high-capacity drones to deliver pesticides, they make a potential target for theft.

All districts should review their drone security plans. Storage such be secure and monitored. The controllers and drones should be stored separately. Tools, such as multi-factor authentication, passwords, and registration with manufacturers need to be fully activated. Some Districts should employ trackers on their equipment. More advanced

trackers such as LoJack are available for large transport vehicles. It is recommended to have a system to disable a missing drone. Obviously do not delay in contacting the police and manufacturer immediately, if drone equipment is missing.

Phuong Luu, MD, presented her experience in dealing with a Dengue Fever outbreak in the US territories of the Northern Mariana Islands. Siapan is the largest island, and the entire complex of islands has one hospital in the city of Siapan. Dengue Fever is a mosquito-borne viral disease. It is frequently asymptomatic. If symptoms appear, it is often 2 to 7 days after infection. Dengue virus has four serotypes. Infection with one serotype usually gives lifelong immunity to that version, but weak immunity to the others. Worldwide, there are millions of infections each year. There have been local outbreaks in the US and Europe, mainly associated with foreign travel. Disease symptoms often are general and are not diagnostic for the disease. Lab tests also tend to be variable and non-specific, making diagnoses difficult. In one of 20 cases, the disease becomes severe, usually after the fever subsides. At this point, platelet levels often collapse, leading to internal bleeding or brain hemorrhages. In the Siapan hospital, it is often a race against time to import platelets from Honolulu to save critically ill patients.

For travelers, it is important to monitor any disease symptoms after traveling to Dengue area. Any illness should not be treated with typical NSAID medications, as they limit the function of platelets. Tylenol would be the preferred pain and fever reducer.

Vaccines are not a recommended prevention tool. A vaccine provided to an immuno-naïve person can trigger a severe immune system reaction if that person become infected with the virus. Vaccines can be useful in hotspots to provide protection against other serotypes of Dengue, after a person has naturally acquired an infection to an initial strain.

Property rights and vector control was discussed by representatives from the San Gabriel MVCD. There is a significant cost in time and personnel to contact property owners located around a disease hotspot. A successful contact only occurs in 57% with the initial visit. After two attempts this rises to 81%. To gain access to all properties requires additional contact attempts, often on weekends, mailers to explain the reason, and in some cases, an inspection warrant will be needed. Where SGMVCD obtained warrants, breeding mosquitos were identified in 30% of the cases. The cost to inspect, and treat if necessary, 203 properties around a Dengue outbreak was \$116,000.

Planning is critical. The current policy is to make three inspection attempts and then issue a letter to allow a property owner to schedule a time with the district. If there is no response, a warrant inspection is obtained. This requires cooperation with the local police department and the courts. It is best to have a plan in place, before any of these steps are needed. For small districts, the overtime costs, weekend work, and deferment of routine activities can take a toll on the staff.

### Special Session, Mosquitofish:

Most districts use mosquitofish, or *Gambusia*, for control of mosquitoes in closed water systems, such as irrigation ditches and ponds. The fish are small with a maximum size of 1.6 inches and are unusual in that the females give birth to live fry. Some large districts produce vast quantities of *Gambusia*, distributing them by the pound, one pound = 1000 fish. Production of fish in large numbers is a challenge. In confined systems, fish are susceptible to fungal diseases, such as *Saprolegnia* disease, a water mold fungus. Other issues, such as bacterial rot diseases and gill fluke parasites are common.

Fish rearing presents problems as well. Systems designed for optimal conditions for the fish will allow production of large numbers but pose a problem when the fish are released into mosquito infested waters. Fish accustomed to clean water and an artificial diet may not survive the sudden shock after an introduction into the wild.

Ponds have their own problems. Algae blooms can kill over other plant life. When plants and algae die, the conditions in the ponds can go anaerobic and kill the fish. Dyes have been used to limit algae growth. Aerators are often needed to maintain oxygenation and circulation of water. The presence of fish in the ponds often attracts birds. Ducks can consume large numbers of fish, making the buildup of a large population impossible.

Tank systems inside buildings tend to be expensive and require resources for maintenance and routine operation. Outside systems, designed to for koi fish are an option when large numbers of fish are not needed. Aquariums could serve to maintain fish through the winter and provide a year-round source of fish for small districts, particularly in winter when demand is low.

Some districts have experienced a decline in their fish production. This may be due to using old parent breeding stock. The fish have an expected life of 70 weeks, but can live up to 200 weeks in controlled environments. Monitoring the age of breeding stock is critical.

The Sac-Yolo MVCD produces 3600 lbs. of fish annually, mainly for the rice fields in their area. They use twenty-one netted ponds and go through 90 lbs. of fish food each day.

Districts heavily invested in fish rearing should have a comprehensive SOP, including topics of fish propagation, security, disease control, equipment fabrication, vendors, and consultants.

### Special Session, Mosquito Resistance and Control:

Insecticide resistance is always an issue when a specific class of chemistry is used for control. Pyrethroids are a commonly used class of synthetic insecticides for mosquito control, in addition they are used for agricultural and livestock pest control. They function

by preventing closure of sodium channels in nerve cells, thereby keeping the nerve depolarized and paralyzing the insect. The natural material, pyrethrins, are derived from the flowers of the chrysanthemum plant. Both the synthetic and natural version are deemed relatively safe for humans, as our sodium gate channels are different than that of insects and we have an effective detoxification cellular process to metabolize the insecticide.

Insects develop resistance by changes in the sodium channel, modifications to the insect cuticle preventing effective penetration of the insecticide, and amplification of detoxification mechanisms in the insect cells. Resistance has been associated with higher levels of the enzyme glucose-6-phosphatase and lower levels of histamines. Due to the various types and degrees of insecticide resistance, both larval and adult mosquitoes need to be tested for resistance before a specific class of insecticides are used. For the most part, commercial insecticides are stable, have a long shelf life, and major manufacturers have good quality control. Failure of a product to perform is usually due to partial resistance in the insect or inadequate application of the product to label standards.

In the Yolo-Sac MVCD, there was a significant shift towards pyrethroid resistance in the 2020-2021 seasons as compared to the 2007-2008 seasons. They were using Pyronyl 525 oil concentrate, containing 5% pyrethrins. In bioassays done with confined adult mosquitoes, the kill time increased from 1 hour to 12 hours.

Repellants have been tested for specialized use in areas such as residential area storm drains, containing inaccessible standing water. It would not be appropriate to inject insecticides into such areas. Botanical oils, such as eugenol and peppermint oil combinations are highly irritating to mosquitoes and are effective in exuding them from specific areas. More field trials would be needed to confirm this approach for control.

Wolbachia is a naturally occurring bacterium that infects many types of insects, including mosquitoes. In some species of mosquitos, mosquito eggs are not viable when sperm of a Walbachia-infected male fertilizes eggs from an infection-free female. In addition, the presence of Walbachia in mosquitoes has been shown to reduce the transmission of some diseases, such as Dengue, Zika, and Chikungunya. The Fresno MVCD has used infected male *Aedes aegypti* mosquitoes and obtained a 95% reduction in their population. They worked with Debug, out of Florida, to obtain their Wolbachia-infected male mosquitoes.

Several large MAD in southern California have used a different technology of releasing sterilized male mosquitos, produced by x-ray radiation. They targeted 25 sites and released between 1,000 and 3,000 sterile males at the sites. Over the season, 110,000 sterile males were released (at roughly a cost of 50 cents per mosquito, or \$55,000. The radiation treatment was estimated to provide 99.4% sterility. At the end of the season, there was a 44% drop in the mosquito count and a 45% drop in the number of requested service calls.

Invasive *Aedes* Successes and Failures:



The identification of mosquito species is time consuming and not always accurate. Various automated systems have been investigated. The use of near IR spectroscopy of the cuticle was effective accurately identifying lab-raised mosquitoes, but the wear and tear on the cuticle on field insects lessened its effectiveness. It was noted that older mosquitoes were much better at spreading disease, as they have had more time to acquire a viral infection and allow it to reproduce in their bodies. The use of Raman spectroscopy proved to be too expensive, and it was labor intensive and used a destructive process to the insect. The use of qPCR for determining the presence of genetic material associated with mosquitoes from collected environmental samples can be effective, but the process is also expensive and labor intensive.

There have been recent detections of *Aedes* mosquitoes in Martinez and Antioch. Although not discussed, one could speculate that the Amtrak passenger train service is functioning as a transport system for mosquitos from further south, as both cities have train station stops and service up and down the valley to Bakersfield.

The use of pesticide sprays for control of mosquitoes in residential areas clearly shows that better control is obtained in test cups located in the front yards than the back. Foliage canopies and distance from the applicator source are likely major factors in limited pesticide performance away from the street.

The Sutter-Yuba MVCD recently used the new insecticide, Zenivex E20. It is an oil-based material containing the insecticide, etofenprox. Etofenprox has extremely low toxicity profile for mammals and birds and is not highly toxic to bees. It is a newer pyrethroid. In some of their trials, they had better performance with the older product, Pernamone 31-66, which contains the older pyrethroid, permethrin.

Dengue Fever, has increased rapidly in California. The number of cases jumped from five travel and two local in 2023 to 27 travel and 11 local in 2024. This increase should put every District on notice to have a plan to control a local disease outbreak. Develop a SOP and guidelines now, both to have defined plan and limit liability in the event of a disease outbreak.

Overall Suggestions and Comments:

- 1) Does the District have the equivalent of a mutual aid agreement with other Districts, just as police and fire departments have with other local agencies?
- 2) Would it be feasible to add aquariums with mosquitofish and mosquito larvae to our District Office foyer area for tours and demonstrations? The information in the foyer is informative, but not very engaging.
- 3) We should consider purchasing x-ray irradiated male mosquitoes for control of *Aedes aegypti*. This would enable staff to gain experience with the technology and provide

some legal cover, showing that we were being aggressive in using all available control technology if there was a disease outbreak caused by *Aedes aegypti* in Solano County. Some of the newer systems for irradiating mosquitoes seem to be more effective in balancing the need for complete sterilization without injuring the mosquitoes to the point that they cannot compete for mates.

- 4) Please follow the EPA registration process of Walbachia-infected mosquitoes and be ready to consider their use as purchased insects.
- 5) It sounds like we have good control over our drone system, but are we prepared for the worst-case scenario such as a takeover of the equipment when it is out in the field? Do we have all tracking systems on the appropriate equipment?

Thank you for the opportunity to attend the MVCAC.

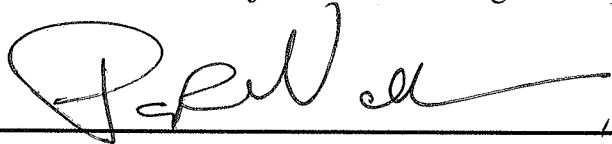
**13. Board Discussions and announcements:**

- a. If any Trustees would like to add times to the agenda, please forward the request to Manager Cardenas by the 1<sup>st</sup> Monday of the month.

Trustee White informed trustees the

**14. Adjournment:**

President Osum adjourned the meeting at 5:30 p.m.

 Paul Wade

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Secretary

 Daniel S. Glaze

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Attest Trustee