Evaluating a Drone Application of VectoBac FG+ in a Duck Club Pond

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ABSTRACT: Coachella Valley Mosquito & Vector Control District typically uses granular larvicides with 2.8% *Bti*. These products are applied to rural water sources by drone at a rate of 10-15 lbs/acre. We performed a field assay to test VectoBac FG+ (6.075% *Bti*) to see if it would be effective at a lower application rate than other *Bti* granules. This would allow for fewer refills, reducing treatment time and the amount of product needed. Pre- and post-treatment dip counts of wild larvae and floating sentinel cages containing susceptible, lab-reared *Culex tarsalis* larvae were used to evaluate product effectiveness and application technique. The application was made on October 28, 2024.

INTRODUCTION:

From October to February, ponds are flooded for duck hunting in the eastern Coachella Valley. These become excellent habitats for rural mosquitoes like *Culex tarsalis,* a local vector of West Nile Virus. Applying larvicides by drone is faster and safer than technicians treating large ponds on foot every week. Due to the drone's limited carrying capacity and battery life, applying products at lower rates can increase efficiency and reduce cost.

OBJECTIVE:

- Will VectoBac FG+ effectively reduce mosquito larvae when applied to a duck club pond by drone at 5 lbs/acre?

27-gal bin with two floating larval cages

Removing mesh liner from a sentinel cage to count larvae

MATERIALS:

- Drone: Precision Vision 35X by Leading Edge
- 27-gallon bins (open capture area: 3.14 ft^2)
- Floating sentinel cages:
  - Modified BioQuip emergence cage bottoms
  - Screened sides
  - Lined with densely-woven polyester mesh

Larval sentinel cage

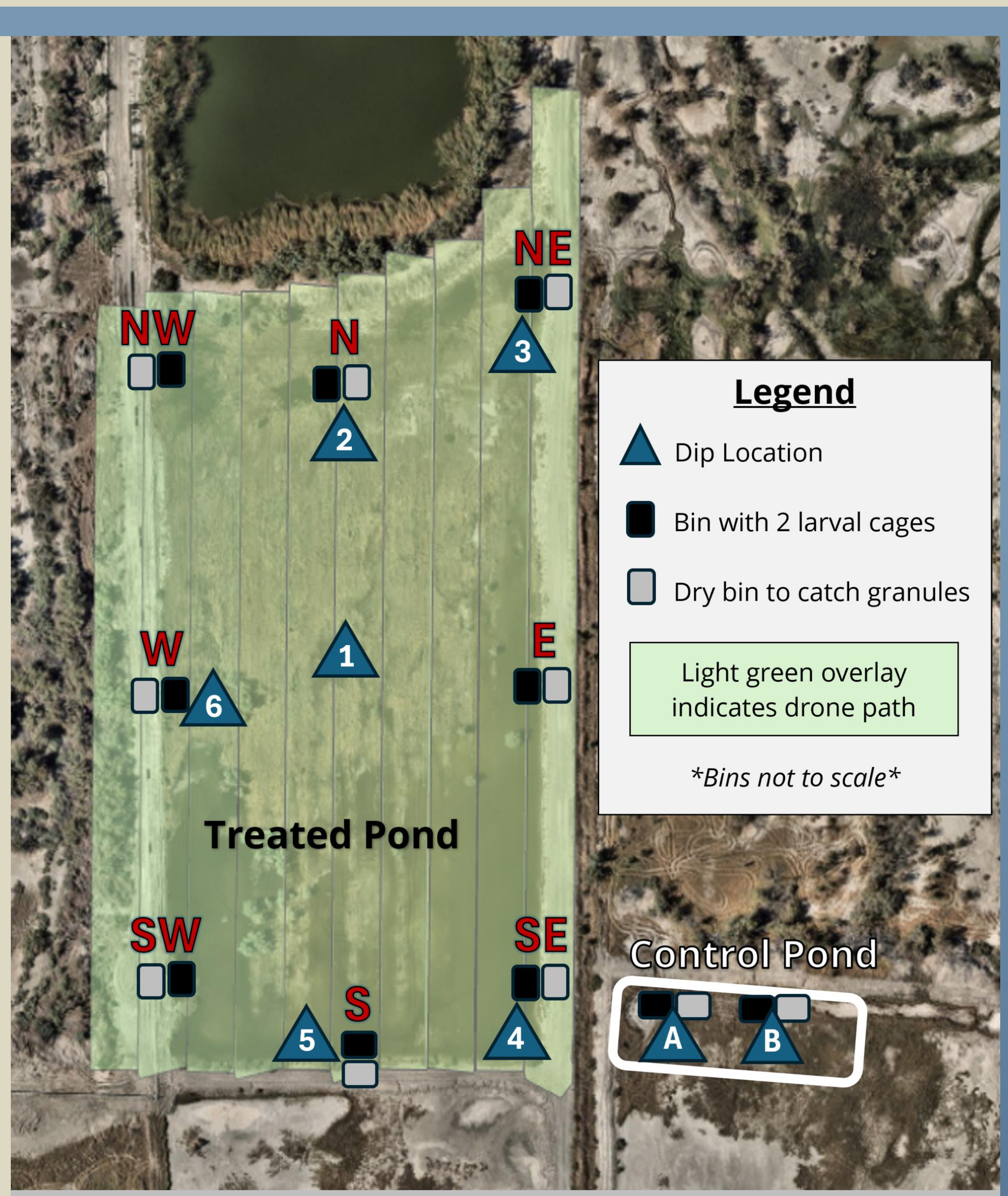
- Insulation foam squares for flotation
- Susceptible 3rd instar *Culex tarsalis* (Bakersfield) larvae – 15 per sentinel cage
- Mosquito dipper to collect wild larvae

METHODS:

- Pairs of bins were set around pond perimeter; one dry and one holding pond water with 2 floating larval cages.
- Obtained pre-treatment dip counts of wild larvae. (10 dips per location)
- Applied VectoBac FG+ at 5 lbs/acre.
  - Drone altitude: 40 ft, swath: 40 ft
- Weighed granules captured in dry bins.
- Obtained 24-hr post-treatment dip counts and mortality of lab-reared larvae in sentinel cages.

Sampling wild larvae at Dip Location 1

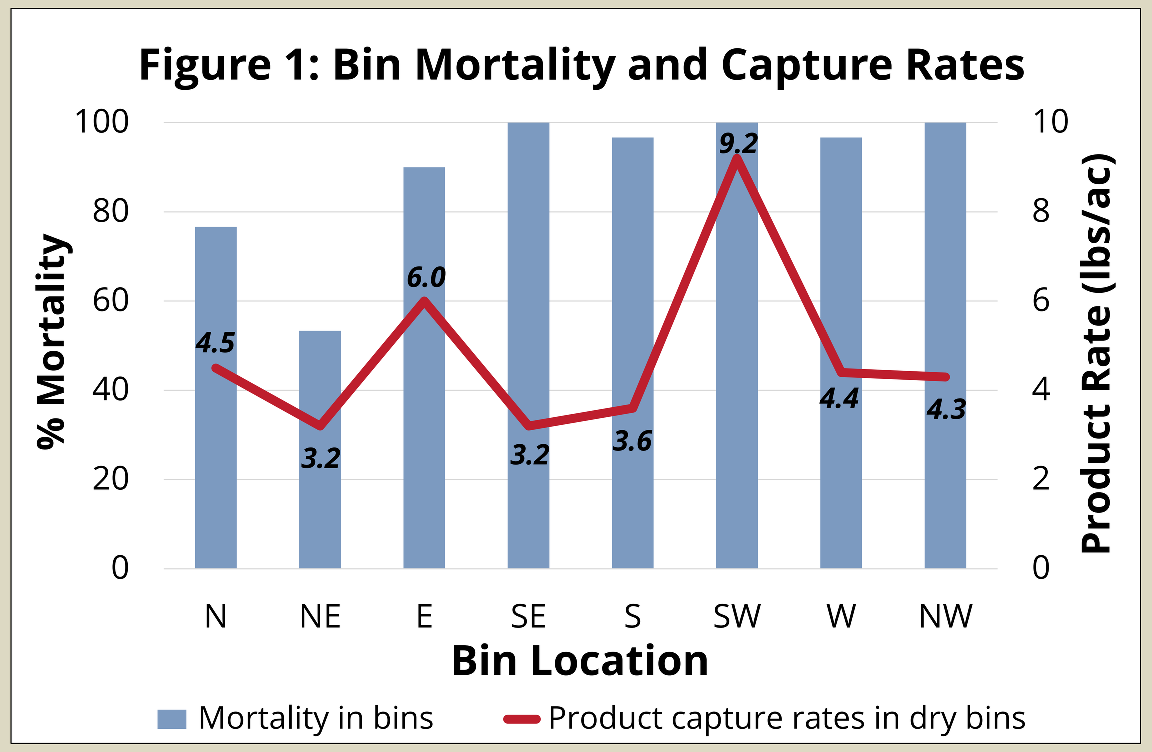
Bin holding sentinel cages staked inside pond

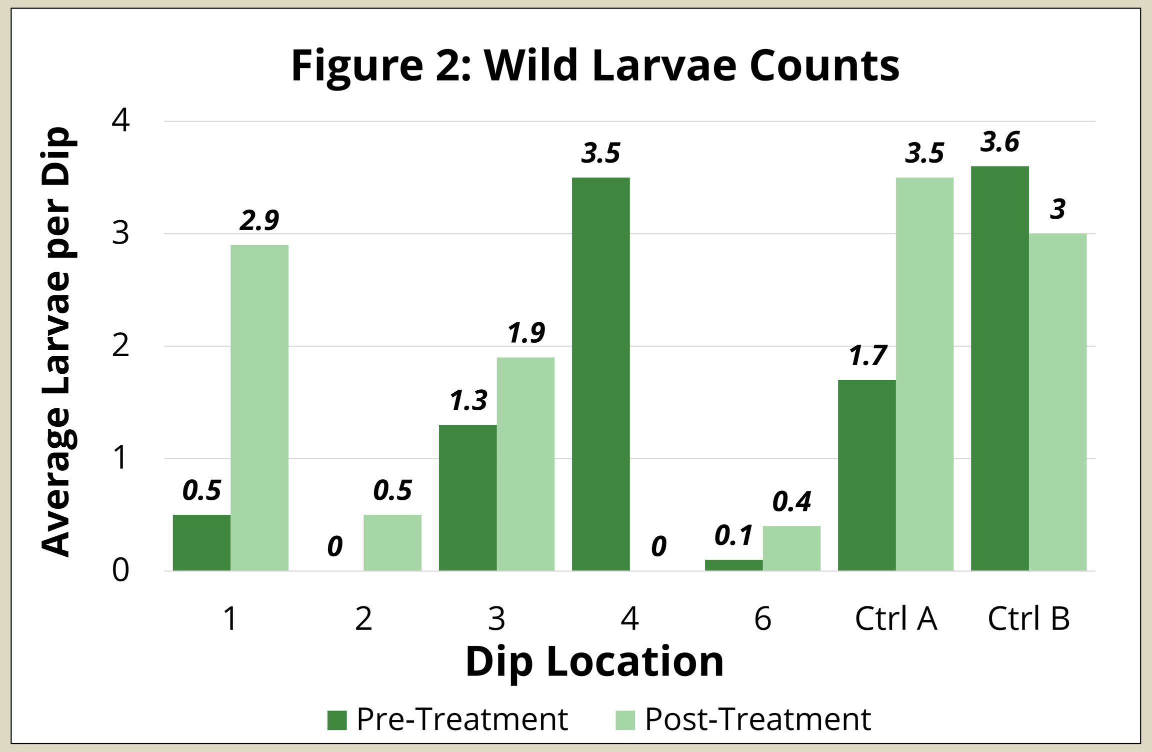


Map of treatment and control ponds with schematic of bins and wild dip locations

RESULTS:

- An isolated pool of water near the SE corner of the pond had the heaviest breeding before treatment (35 larvae/dip) and had no breeding after treatment.





- **Figure 1:** All bins in the treatment area captured granules, resulting in high mortality of lab-reared larvae. One sentinel cage in the NE bin did not catch granules, causing lower mortality. Untreated control bins had 95% survival.
  Granule capture rates in dry bins ranged from 3.2 - 9.2 lbs/ac (average 4.8 lbs/acre).
- **Figure 2:** Wild larvae were not reduced after treatment, except at dip location 4 which included the isolated pool. Location 5 had no larvae before or after treatment.

CONCLUSIONS:

- Based on the product captured in dry bins, the drone applied granules at the desired rate.
- VectoBac FG+ killed the lab-reared larvae in sentinel cages. Our novel method of placing larval cages in 27-gal bins worked well and will be used again for future field trials.
- This application did not reduce wild mosquito larvae in the pond as expected; however, breeding was scant before and after treatment and limited to densely vegetated areas, making it difficult to assess.
- VectoBac FG+ must land near mosquito larvae to be effective. We confirmed this by showing high mortality in sentinel cages where granules landed directly, and low mortality in a cage that did not capture any granules.

Areas in pond where wild larvae were found

- We saw 100% mortality of wild mosquito larvae in the isolated pool of water which had no vegetation or debris. VectoBac FG+ may be effective at a low rate in smaller water sources that contain fewer obstructions from plants and debris.

Isolated pool where treatment was effective

ACKNOWLEDGEMENTS:

Special thanks to Melissa Snelling for raising mosquito larvae, Marco Medel for taking photos, and Rich Everett who graciously allowed us to use Model-A Duck Club. We also thank Joe Iburg and John Holick (Valent BioSciences) and Dino Candito (Azelis) for their technical support.

For further information, contact Alex Echenberg at the Coachella Valley Mosquito and Vector Control District: aechenberg@cvmosquito.org

At the Larval Stage – Identifying and Processing Samples

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Coachella Valley Mosquito and Vector Control District

INTRODUCTION:

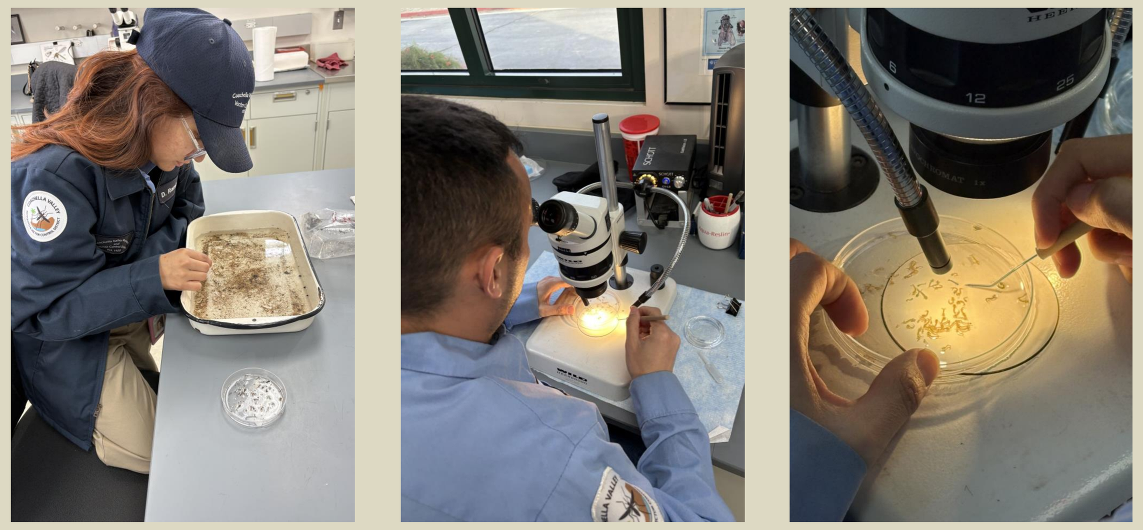
At the Coachella Valley Mosquito and Vector Control District, different departments collaborate in our fight against mosquitoes and the diseases they transmit. Much of that work hinges on the surveillance of mosquitoes, not just as adults, but at the larval stage as well.

With our Larval Surveillance Program, Lab staff can narrow down our findings to species, using key characteristics seen under a microscope. This information provides vital information across departments which helps shape our efforts to protect the Coachella Valley.

COLLECTING LARVAL SAMPLES:

The larval sample process begins with Vector Control Technicians who visit up to 50 sites a day. These can range from small French drains, to full 300-acre sites. A certain number of dips are performed and collected in a plastic sample bag, which is tied, labeled, and placed in an iced cooler for transport. The sample is then processed by Lab staff for identification.

Lab staff pour the sample into a pan and use a pipette to collect and place larvae into a petri dish. The petri dish is placed under a microscope to observe key characteristics in which to identify the species. Once completed, the information is entered in the Operations software.



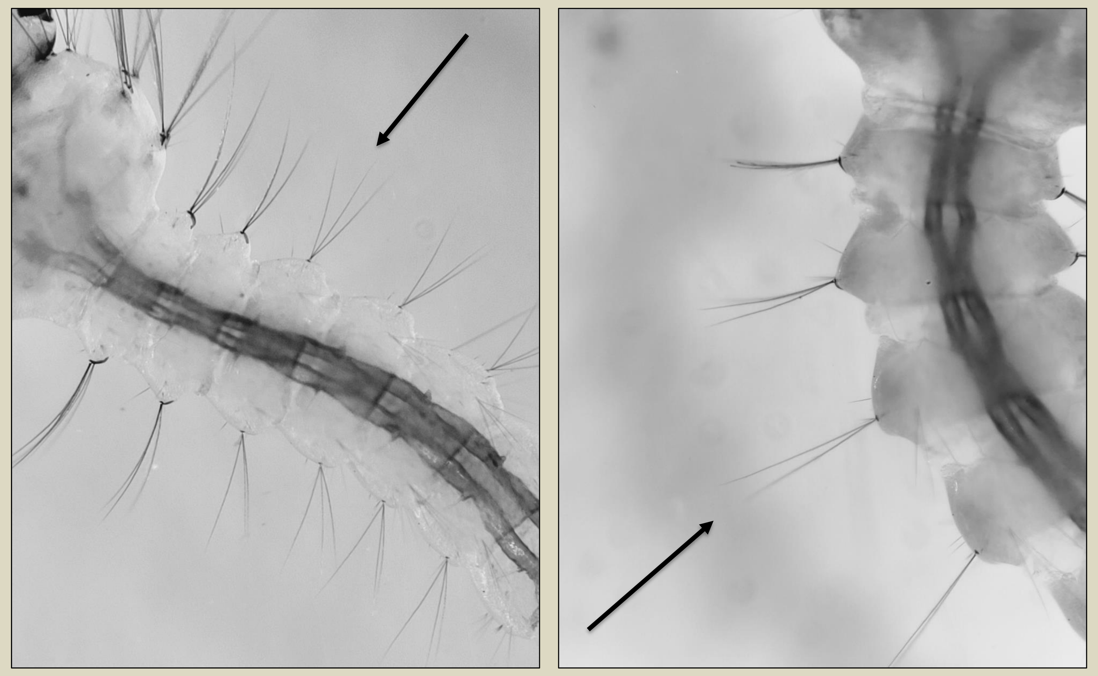
LARVAL IDENTIFICATION: Key identifiers attributed to species:

Number and Positioning of Siphon Hair Tufts

Cx. quinquefasciatus   *Cx. tarsalis*

With *Culex quinquefasciatus* we find 4 hair tufts affixed to the siphon, positioned offset from one another. With *Culex tarsalis* we find 5 hair tufts lined up in a straight row.

Lateral Abdominal Hairs



Cx. tarsalis   *Cx. quinquefasciatus*

Located at the 3rd abdominal segment, *Culex tarsalis* has 3 abdominal hairs, whereas *Culex quinquefasciatus* has 2 abdominal hairs.

Pecten Spines along the Siphon

Ae. aegypti   *Ae. vexans*

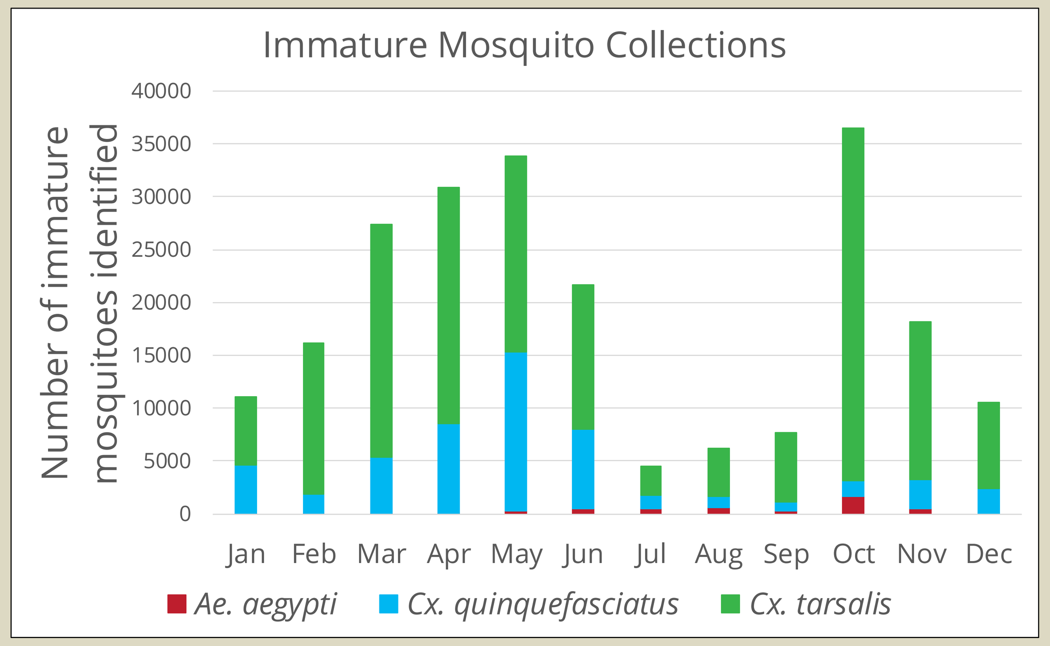
With *Aedes aegypti*, we have the row of pecten spines starting at the base of the siphon. With *Aedes vexans*, we have a similar row of spines but with a noticeable gap in between one or two of the spines.

Shape of the Siphon

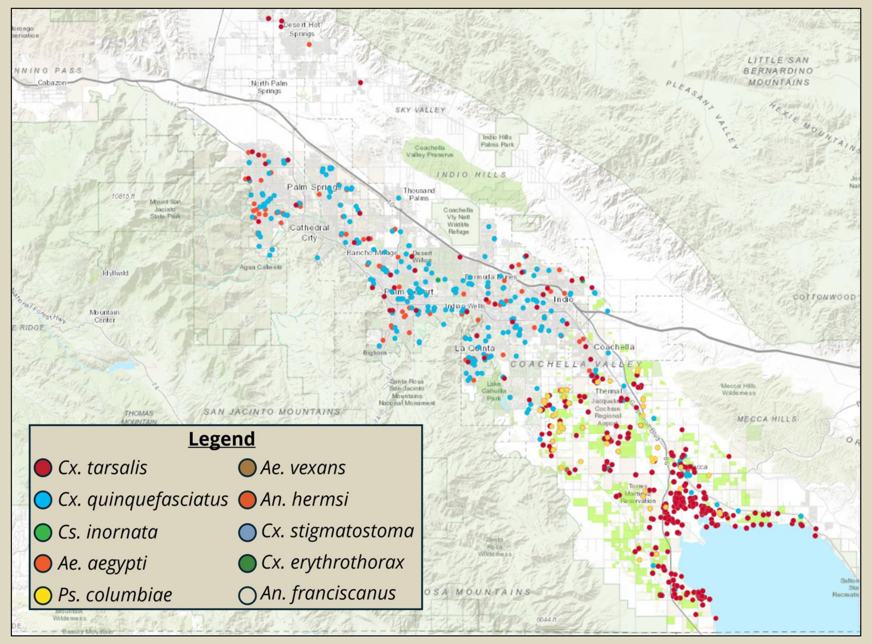
Cx. erythrothorax   *Cx. quinquefasciatus*

With *Culex erythrothorax*, the siphon is noticeably longer and thin compared to *Culex quinquefasciatus* and other Culex species.

In rare cases of damaged larvae, inspecting the comb scales or hairs on the head can help narrow down the species. Likewise, knowing location, habitat, and even past history can help inform what we have under our microscope. What we find throughout the year varies, and the story it tells is enlightening and incredibly valuable throughout our District.



Larval sample counts of disease vectors found in the Coachella Valley in 2024.



Mosquito species sampled throughout the Coachella Valley in 2024.

CONCLUSIONS:

Larval surveillance can establish the species, instar, breeding location, and population density. This information is dispersed throughout departments and used in a variety of ways.

- Creates an active and fluid map of disease vectors throughout the Coachella Valley.
- Prioritizes treatment zones and delegates technician rollout.
- Provides information needed to run targeted "Door-to-Door" response initiatives.
- Data gathered is used in planning large-scale drone, truck, and aerial applications.
- Assists in human case vector-borne disease investigations.
- Ensures that the chemical treatments are used in a safe and efficient way, and in a financially responsible manner.

With virus-positive mosquitoes, knowing the species is imperative to keeping the public safe. As a District, our mission is to respond quickly and protect our communities. We seek to encompass all aspects of our work, down to the smallest larva, which allows us to make the largest impact.

ACKNOWLEDGEMENTS:

This project would not have been possible without the insights and hard work of the following: Kim Hung, Melissa Snelling, Jacob Tarango, Alex Echenberg, Micheal Esparza, Marc Kensington, Arturo Gutierrez, Diana Ramirez, Rick Ortiz, Gregorio Alvarado, Gerardo Avalos, Christopher Vazquez, Marco Medel, Robert Gaona, Hugo Arcos, and Marisa Kelling.

For further information, contact Eric Ortiz at the Coachella Valley Mosquito and Vector Control District at eortiz@cvmosquito.org.

UAS Product Characterization

Iver Romero, Rick Ortiz, Kim Hung, Ph.D, BCE; Alex Echenberg, BCE

INTRODUCTION:

Unmanned Aircraft System (UAS) applications are becoming more abundant in our rural areas, where mosquito numbers excel in comparison to the urban areas. Drone calibrations are essential as they lay the foundation for efficient resource allocation and response time.

OBJECTIVES:

- Demonstrate proper drone calibration procedures.
- Ensure consistent and accurate product dispersion.
- To ensure proper treatments in order to prevent resource waste, adverse environmental effects, and pesticide resistance.

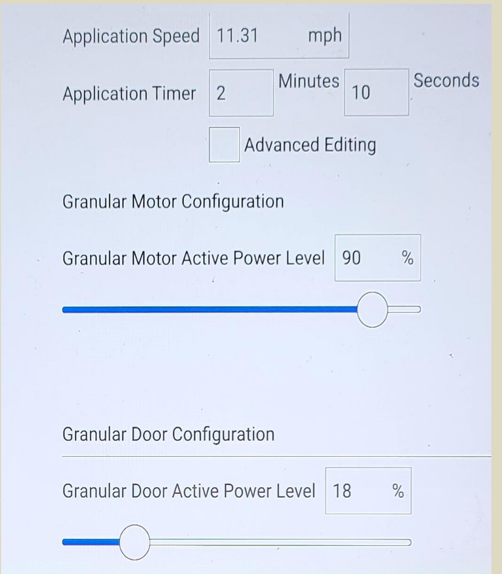
Hylio AG-230 flying through center of tubs during one of our calibrations.

Hylio AG-230 displayed east of our district where most drone calibrations take place.

Loading product into the Hylio AG-230, getting ready for an application.

PREPARATION:

- Check the weather for the expected calibration date.
- Position drone for product collection.
- Place collection container below the drone's spreader.
- Adjust spreader parameters in the drone's GCS (Ground Control Station) until desired output rate is reached.
- Repeat the collection process three times and average the results.
- Lab team sets up the weather station.
- Tubs are set every three feet over a 200 feet span. Each tub measuring 3.1445 ft².
- Place tubs perpendicular to wind direction.
- Smaller containers are placed inside tubs for product collection.



Parameters which allow us to change gate opening, motor power, and application speed. (Precision Vision Drone Application shown)

Equation to get speed of drone

$$\frac{\left[\frac{\text{output rate/min.}}{\text{target rate/acre}}\left(\frac{43{,}560}{\text{swath}}\right)60\right]}{5,280} = \text{Drone's MPH}$$

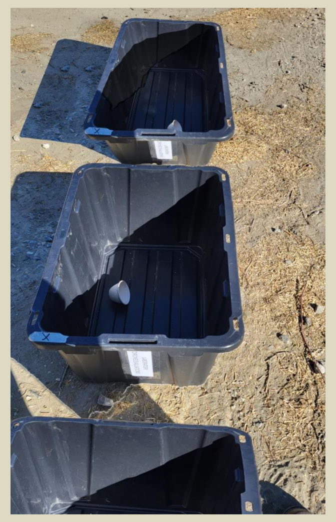
Where 60 is minutes in an hour and 5,280 is feet in a mile

Kestrel weather station used during calibrations.

Drone is calibrated with spinner off, product collection shows little impact with spinner off. (Hylio AG-230)

Drone shown above is calibrated with spinner on
Drone illustrated above is Leading Edge's Precision Vision 35 X

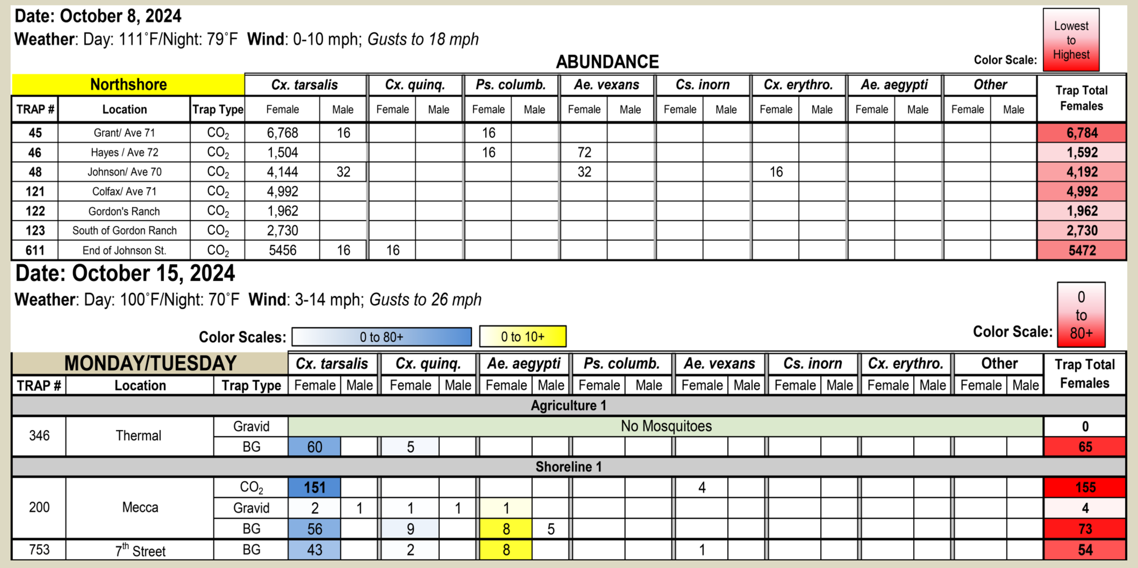
Team getting ready to collect product from tubs.



Tubs with product after drone's flight

Getting ready to pour collected product from tub into smaller container.

Kim at station preparing to weigh product collected from tubs



Date: October 8, 2024
Weather: Day: 111˚F/Night: 79˚F **Wind**: 0-10 mph; *Gusts to 18 mph*

Color Scale: Lowest to Highest

ABUNDANCE

Northshore			Cx. tarsalis		Cx. quinq.		Ps. columb.		Ae. vexans		Cs. inorn		Cx. erythro.		Ae. aegypti		Other		Trap Total Females
TRAP #	Location	Trap Type	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	
45	Grant/ Ave 71	CO_2	6,768	16			16												6,784
46	Hayes / Ave 72	CO_2	1,504				16		72										1,592
48	Johnson/ Ave 70	CO_2	4,144	32					32				16						4,192
121	Colfax/ Ave 71	CO_2	4,992																4,992
122	Gordon's Ranch	CO_2	1,962																1,962
123	South of Gordon Ranch	CO_2	2,730																2,730
611	End of Johnson St.	CO_2	5456	16	16														5472

Date: October 15, 2024
Weather: Day: 100˚F/Night: 70˚F **Wind**: 3-14 mph; *Gusts to 26 mph*

Color Scales: 0 to 80+ | 0 to 10+ Color Scale: 0 to 80+

MONDAY/TUESDAY			Cx. tarsalis		Cx. quinq.		Ae. aegypti		Ps. columb.		Ae. vexans		Cs. inorn		Cx. erythro.		Other		Trap Total Females
TRAP #	Location	Trap Type	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	
Agriculture 1																			
346	Thermal	Gravid	No Mosquitoes																0
		BG	60		5														65
Shoreline 1																			
200	Mecca	CO_2	151								4								155
		Gravid	2	1	1	1	1												4
		BG	56		9		8	5											73
753	7th Street	BG	43		2		8				1								54

Table showing the difference in mosquito numbers from our rural to urban areas. A higher intensity of red in the cells signifies elevated numbers in their respective areas.

METHODS:

Flight path is drawn and parameter values are uploaded into the GCS. Altitude for calibration is set to 40 feet. Three individual flight passes are performed. After each pass, product is collected, weighed, and averaged out.

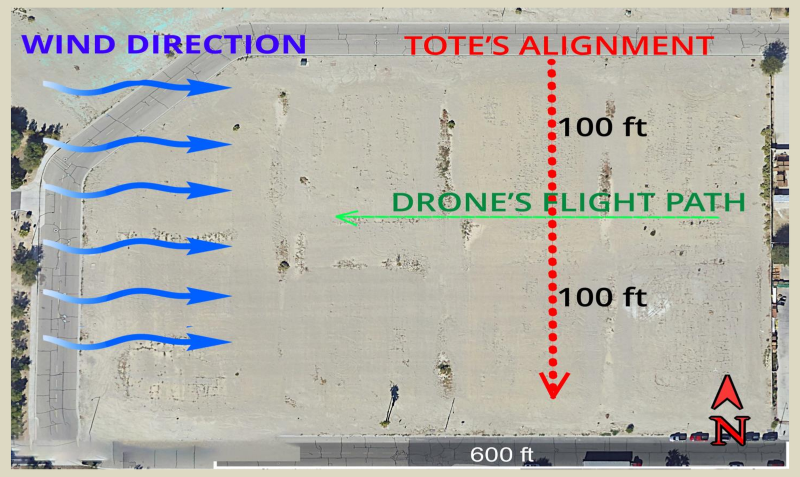
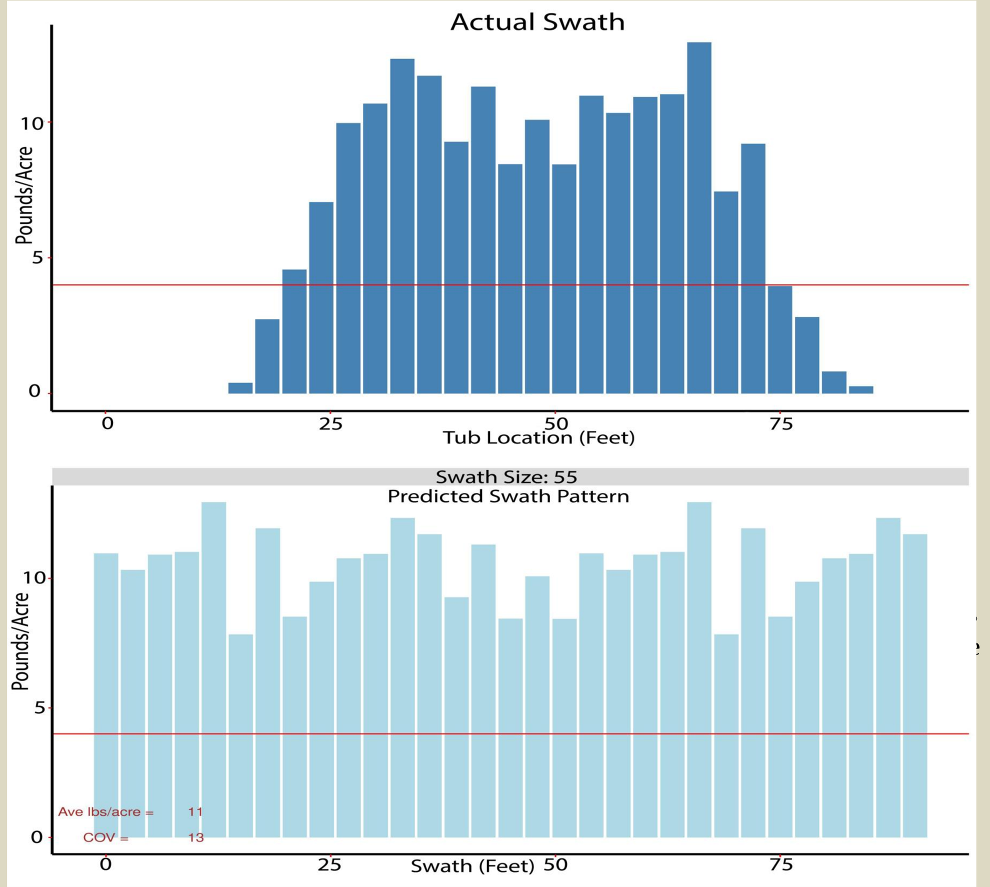


Illustration showing drones flight path in correlation with wind direction. (Green arrow also indicates how flight path is drawn in GCS)

RESULTS:

Once results are averaged, values are inputted into the *Valent Drone Calculator*, which converts the values into a graph and shows our predicted swath along with the average pounds per acre.



Large granule (5/8 mesh) calibration results, with swath of 55 and average lbs/acre of 11 (Using Valent's Drone Calculator). Bottom graph is the predicted swath and graph above is the actual swath pattern.

ACKNOWLEDGEMENTS:

Jacob Tarango & Valent Bioscience for drone calculator

For further information, contact Iver Romero at the Coachella Valley Mosquito and Vector Control District at iromero@cvmosquito.org

Optimizing Urban mosquito work: A mapping system for efficient mosquito source management in the Coachella Valley

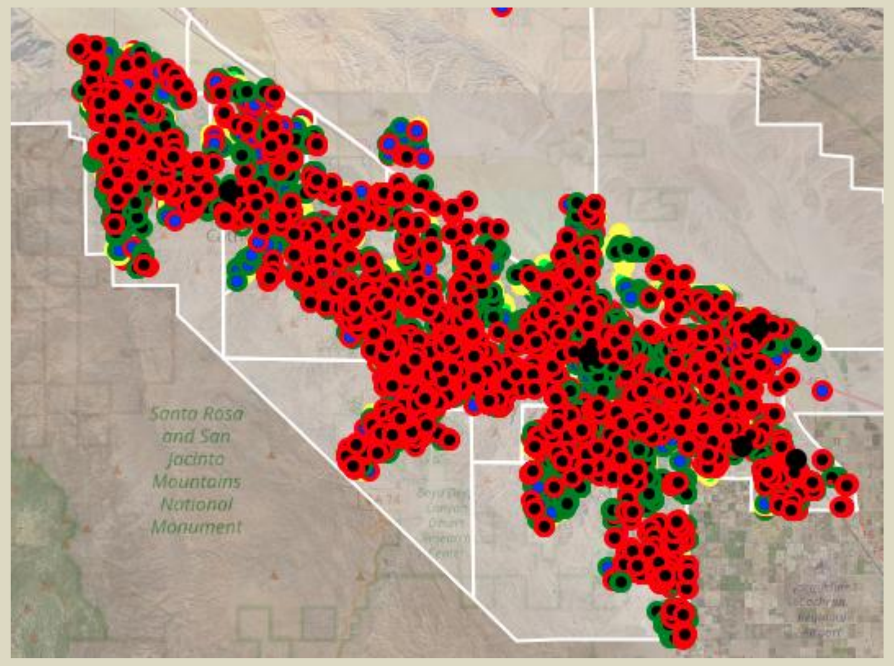
Jeff Rushing, Field Supervisor; Salvador Becerra, Field Supervisor; Antonio Molina, Field Supervisor; Gregorio Alvarado, Operations Manager; Edward Prendez, Information Technology Manager, Marko Petrovic, IT/GIS Specialist

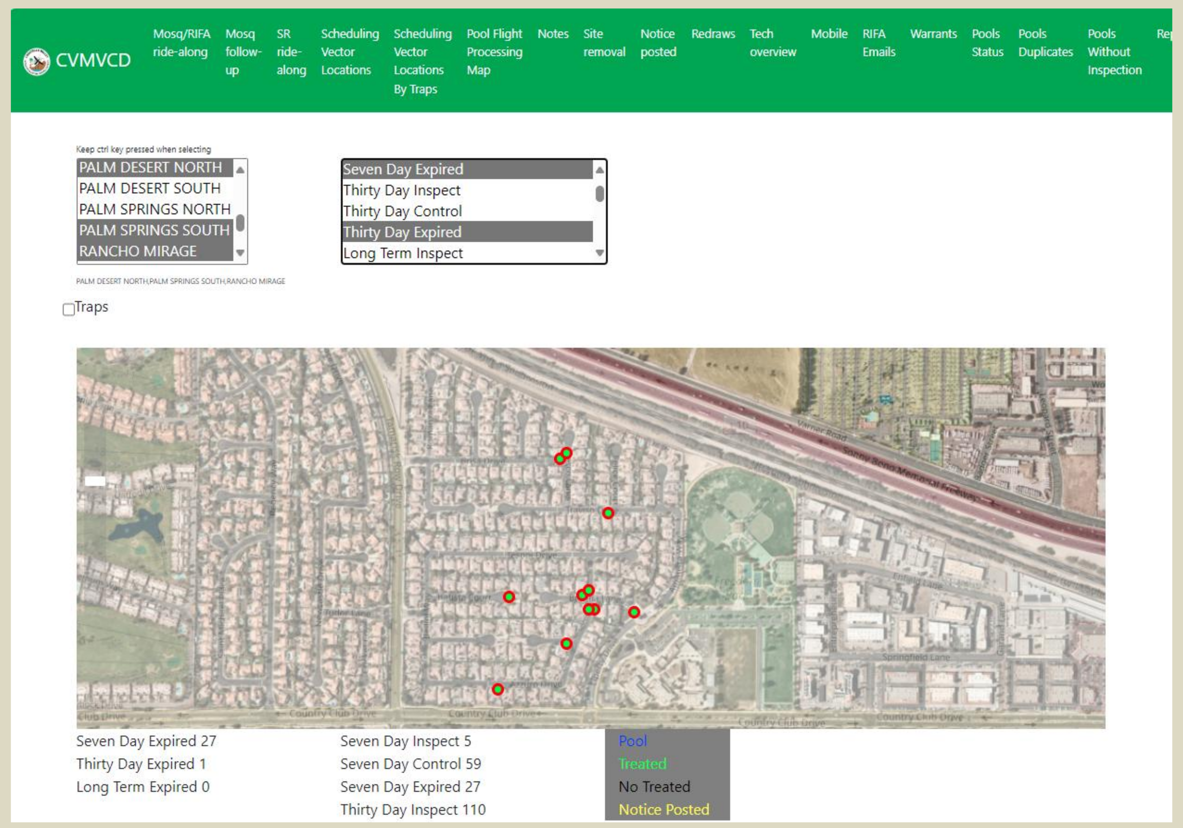
Abstract

Historically, urban mosquito work has been divided into zones, each overseen by a technician responsible for maintaining sites mapped in a Geographic Information System (GIS). The system allowed technicians to record and review actions at each source site, with the "History" feature displaying past entries. In zones with hundreds of mosquito source sites, tracking the residual effectiveness of chemical treatments became difficult. Manually reviewing source site histories was time consuming, making it challenging to prioritize follow-up efforts. To address these challenges, district personnel developed a mapping system. This system applies logic based on chemical types and expected residual durations, automatically flagging source sites where treatments have expired. Supervisors can toggle mapping layers to display source sites by category, allowing for efficient identification of those needing attention. The system enhances the ability to assign daily follow-up tasks to Field Technicians, improving operational efficiency and ensuring timely source site management across large urban zones.

Map facts

The Coachella Valley is divided into 13 urban zones across 9 cities. Technicians can be assigned to individual cities or groups of cities. From there, selections can be made from 24 categories, either individually or in combination.





Scheduling Map

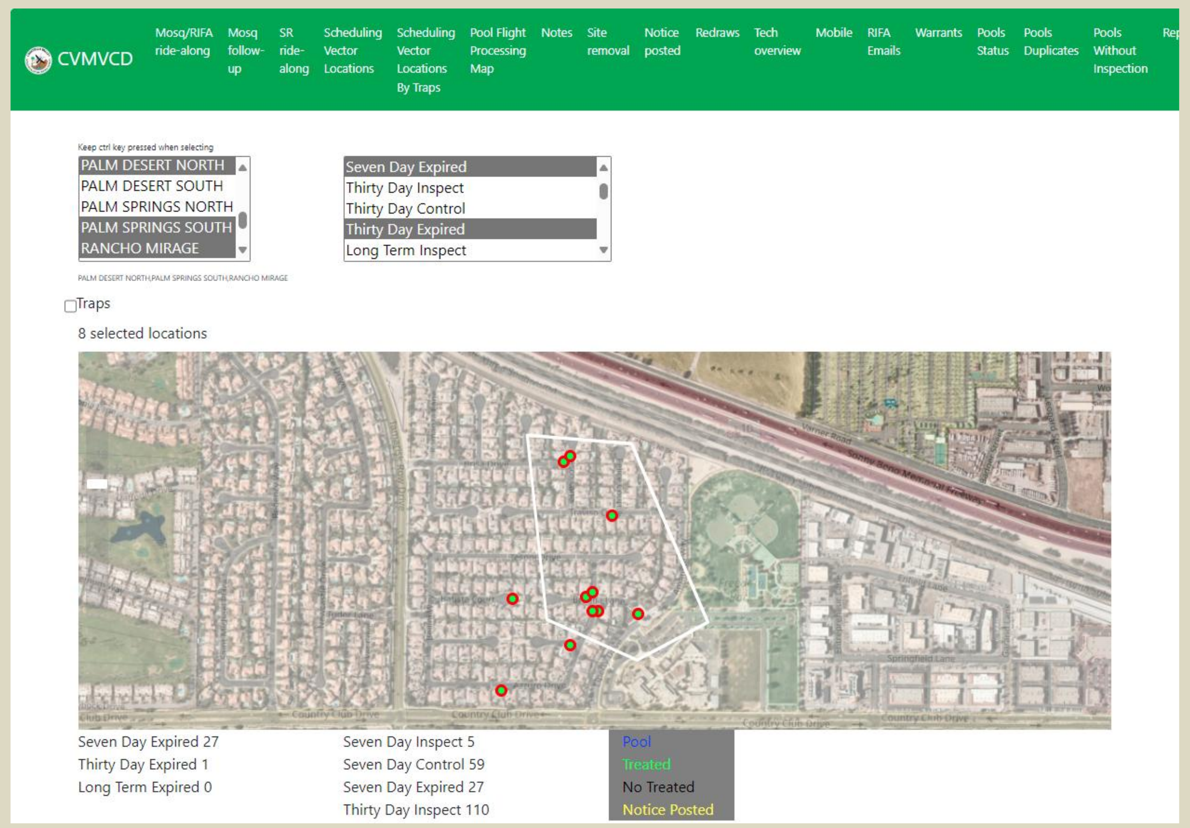
Visible are source sites due for follow-up inspections based on 7-day, 30-day, and long-term residuals expectations. Clicking on a source site reveals sub-habitat categories and inspection and treatment entry history.

Color Coding

The system uses color coding to indicate source site status. Neon green dots denote sites were treated during the last visit, with rings around the dots indicating the time elapsed since treatment. Red rings indicate that the treatment has exceeded its residual period.

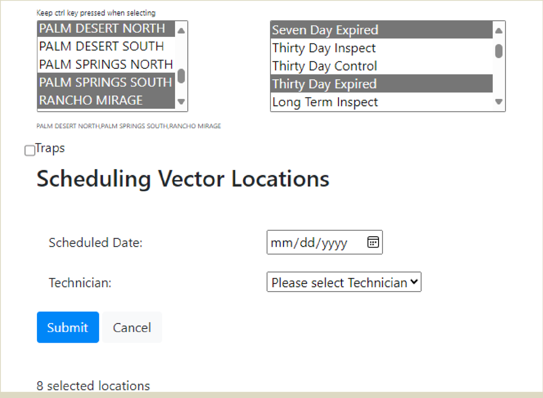
Neglected swimming pools are identified by blue dots.

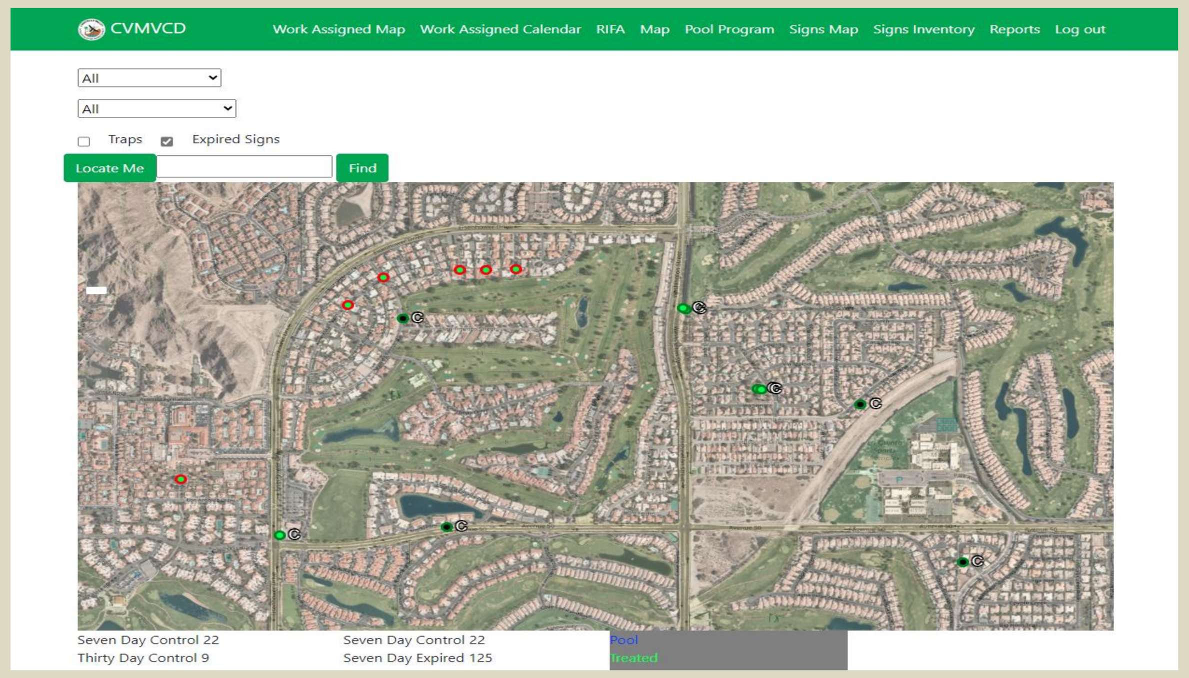
7-Day Residuals (Neon Green Dots)	30-Day Residuals (Neon Green Dots)	Long-term Residuals (Neon Green Dots)
7-Day Control Green Ring 1-6 Days after treatment	30-Day Control Green Ring 1-14 days after treatment	Long-tern Control Green Ring 1-29 Days after treatment
7-Day Inspect Yellow Ring On the 7th day after treatment	30-Day Inspect Yellow Ring 15-29 after treatment	Long-term Inspect Yellow Ring 30-149 days after treatment
7-Day Expired Red Ring 8th day or more after treatment	30-Day Expired Red Ring 30 days or more after treatment	Long-term Expired Red Ring 150 days or more after treatment
Active Pools (Blue Dots)	Mosquito Fish Pools (Blue Dots)	Dry Pools/Notice Posted (Blue Dots)
Active Pools Control Green Ring 1-89 days after inspection	Mosquito Fish Pools Control Green Ring 1-89 days after inspection	Dry Pools Compliance Green Ring 1-365 days after inspection
Active Pools Expired Red Ring 90 days after inspection	Mosquito Fish Pools Inspect Red Ring 90 days after inspection	Notice Posted Pools Yellow Ring Will remain yellow if the last inspection was 'Notice Posted"
		Dry Pools Inspect Red Ring 366 days after inspection



Scheduling Sources for Inspection

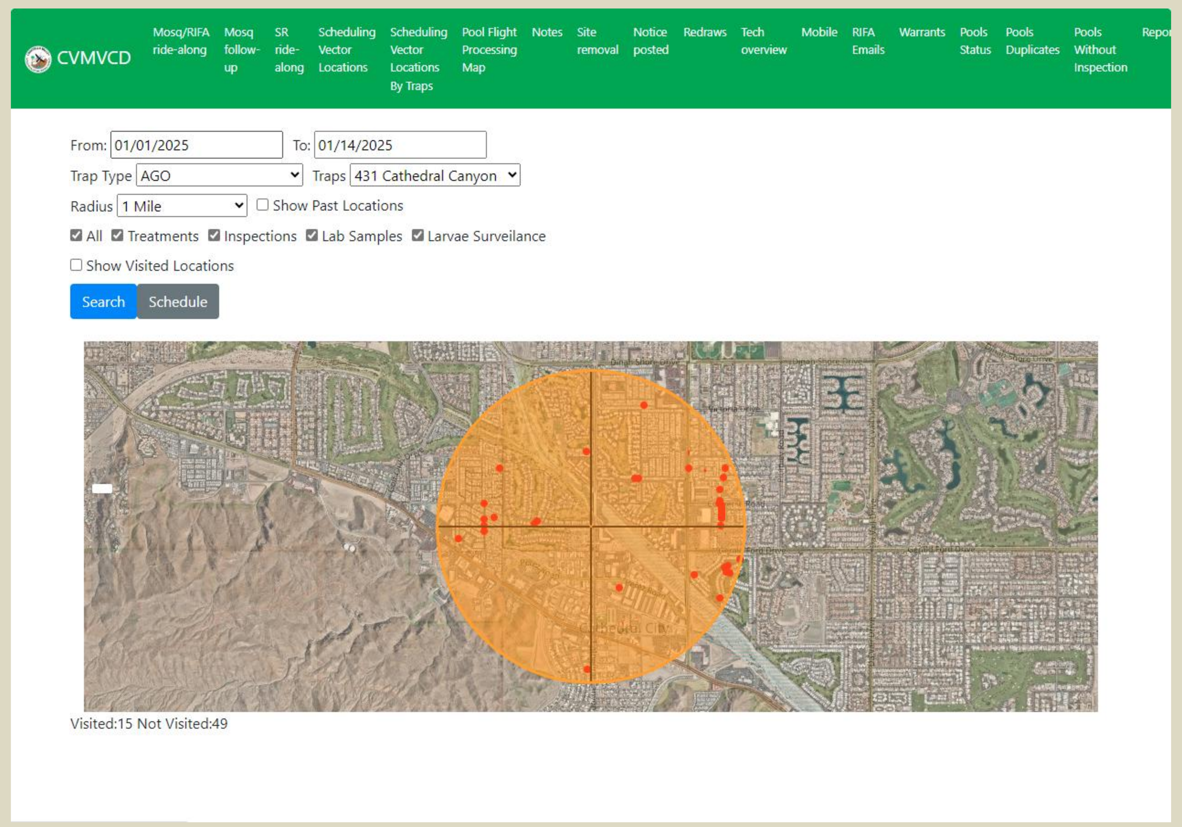
Assignments are scheduled at the end of each prior day. Source sites are selected and assigned by surrounding with a polygon using the mouse and ctrl key. Next a date and a technician's name are selected from a drop-down menu.





Maps are live

After technicians inspect and/or treat source sites, they submit them as "Complete." The corresponding source site points are instantly removed from their map, leaving only the source sites still needing inspection visible. Supervisors can monitor the progress of technicians individually, by supervisor group, or all at once on their "Work Assigned Map." A "C" indicates sites with completed entries.



Enhanced Surveillance

When there are high trap counts, or there is virus activity, enhanced surveillance work can be scheduled using a trap buffer. Technicians see the same assigned source sites on their map, but they are further directed as to which areas to work.

Summary

Advantages

- The ability to quickly identify source site status simplifies scheduling of work.
- Enhanced ability to assign and prioritize daily work.
- Efficient daily activity of technicians.
- Quick and accurate response to high mosquito trap counts or virus activity.
- Technicians gain experience in more zones.
- Prioritization of special areas of breeding concern.

Current Challenges

- Less familiarity by technicians of specific areas .
- Customer relations (e.g., neglected pool properties).
- Technician initiated collaboration with city personnel.
- Discovery of new source sites.
- Partitioning of source sites for enhanced surveillance
- Scheduling follow-ups for neglected pools.

For further information, contact Jeff Rushing at the Coachella Valley Mosquito and Vector Control District at jrushing@cvmosquito.org.

Control efforts in agriculture areas in the Coachella Valley

Michael Chylik, Vector Control Technician II; Salvador Becerra, Field Supervisor;
Antonio Molina, Field Supervisor; Gregorio Alvarado, Operations Manager

ABSTRACT: Agriculture in the Coachella Valley is the second largest industry in the local economy. The region's soil, landscape, favorable climate, and access to water from the Colorado River allow over 100 different crops to thrive. Scheduled flooding events during crop production and irrigation of fields and pastures are frequent in this area. This flooding can lead to an increase in mosquito activity from species such as *Psorophora columbiae, Culex tarsalis,* and *Aedes vexans,* which are all significant pests and can develop from egg to adult in as little as 4 days. These species can be a public health risk and nuisance to agriculture workers and residents of nearby communities. To address this issue, the Coachella Valley Mosquito and Vector Control District dedicates resources to controlling mosquito activity. The District's objectives are to maintain mosquito populations at levels that do not become a nuisance or a public health problem. In this poster we will discuss effective communication between caretakers and technicians, as well as selecting the proper control products and application equipment, for navigating various types of terrain that require off-road equipment.

Argo

- One driver, one applicator using Maruyama
- Has ability to go in water, through thick mud and dense vegetation

ATV

- Can be used for inspections or have an attached herd spreader for granular treatments.
- Only 1 tech needed to inspect and control.

UTV

- One driver, one applicator using power sprayer
- Can be used for inspections or treatments, can take technicians to sites difficult for trucks to access

Date Fields

- Argo, ATV, and UTV can be used here. Argo works best for treatments.
- Terrain has thick mud and typically will have 1-2 ft of water after flood.
- *Psorophora columbiae* and *Aedes vexans* are dominant in the summer, *Culex tarsalis* breed here year-round.
- Argo treatment can cover about 20 acres in a day.
- Flood water irrigation is most common. Some fields use drip irrigation.
- Many fields are organic, so we use OMRI listed products such as Natular G30 and Vectomax FG.

Okra

- Argo and UTV can be used.
- Some fields hold water only in-between rows, others dig trenches at bottom of row blocks to divert water.
- Okra requires constant water supply, often leading to fresh standing water for months at a time.
- *Culex tarsalis* is primary breeder due to constant fresh water supply.
- Okra can grow tall, some plants growing up to 6 ft or more.
- Single-brood larvicides work best due to incoming water supply.

Vineyards

- Due to narrow rows and low height clearance equipment use is limited, ATV use can be effective for inspections.
- Terrain is easy to navigate through, typically there is only puddles of standing water scattered throughout large fields. Inspections are the most time-consuming part of control.
- *Culex tarsalis* are primary mosquito in vineyards.
- Fields are usually irrigated by drip lines or sprinklers.
- Liquid single-brood products are most effective.

Moringa

- Argo is efficient and effective for inspections and treatments.
- Terrain is thick mud, 1-2 ft of standing water on top, and long rows.
- *Culex tarsalis*, *Culex quinquefasciatus* and *Psorophora columbiae* are most common to encounter.
- Fields are flood irrigated in summer due to weather conditions. In the cooler months, less frequent floods or drip irrigation are the common practice.

Strategic Planning

Date Fields: When we arrive at date fields, we inspect and collect larval samples while also surveying how much water is present so we know how much will need to be treated. We will often collect samples the afternoon prior to the treatment day so that we know exactly how much product we will need, and whether we will need off road equipment or just our Maruyamas.

Okra: These fields are often on large plots of agricultural land and always have standing water in the rows between crops or in trenches at the top or bottom of the blocks of okra. Upon arriving, we check to see how much water is present and where it is standing. If it is only between rows, we walk down the length of a row and use a Maruyama to treat as many rows as the swath will cover with each pass. When trenches are present, we utilize the Argo and apply product to the trenches and into the sections of rows closest to the dead-end where water settles.

Vineyards: Most vineyards use drip irrigation and some use sprinklers. There will be periodic puddles of water that breed within rows of vineyards. This presents a more tedious strategy, as you need to identify each row holding puddles of water and find the individual puddles that are breeding. Due to height and width restrictions in some fields, it is difficult to use off road equipment to speed up the process, so most inspections and treatments are done on foot.

Moringa Fields: Moringa tree fields are another problematic agriculture habitat to treat due to flooding similar to date fields. Long rows with thick mud and water make these fields a favored habitat for *Psorophora columbiae*. In the summer, these fields get watered on a bi-weekly basis. The rows are a decent width, so an Argo can be used to save time and wear on the body during the harsh heat of the summer.

Acknowledgements

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WHY CALIBRATE?
ENSURING ACCURACY IN MOSQUITO CONTROL

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ABSTRACT: The Coachella Valley Mosquito and Vector Control District's (CVMVCD) mission is to reduce the transmission of vector-borne diseases. The Coachella Valley provides various habitats for mosquitoes, including agricultural runoff, catch basins, duck clubs, drywells, and swimming pools. Our calibration practices allow us to protect humans, livestock, pets, wildlife, crops, and the environment by ensuring safe and accurate applications of pesticides. Application equipment calibration is a legal requirement and is done biannually. It is crucial for the success or failure of a pesticide treatment. Therefore, every time a vector control technician applies a pesticide, steps must be taken to ensure the correct amount of pesticide is applied. At the District, we calibrate urban equipment in the spring and equipment used for large, rural applications in the fall. The Operations department organizes a team event where all technicians use duck club ponds to establish accurate walking speeds during fall calibration. In this poster, I will explain why we calibrate, the principles of calibration, and the coordination involved in calibrating operations equipment.

1

Planning: Supervisors work with the stakeholders of duck club ponds to organize the date and location for our team calibration event.

Technicians are grouped into smaller teams to promote collaboration. Lead technicians assign equipment to each technician, and it is up to the individual to ensure their backpacks are ready for the mission.

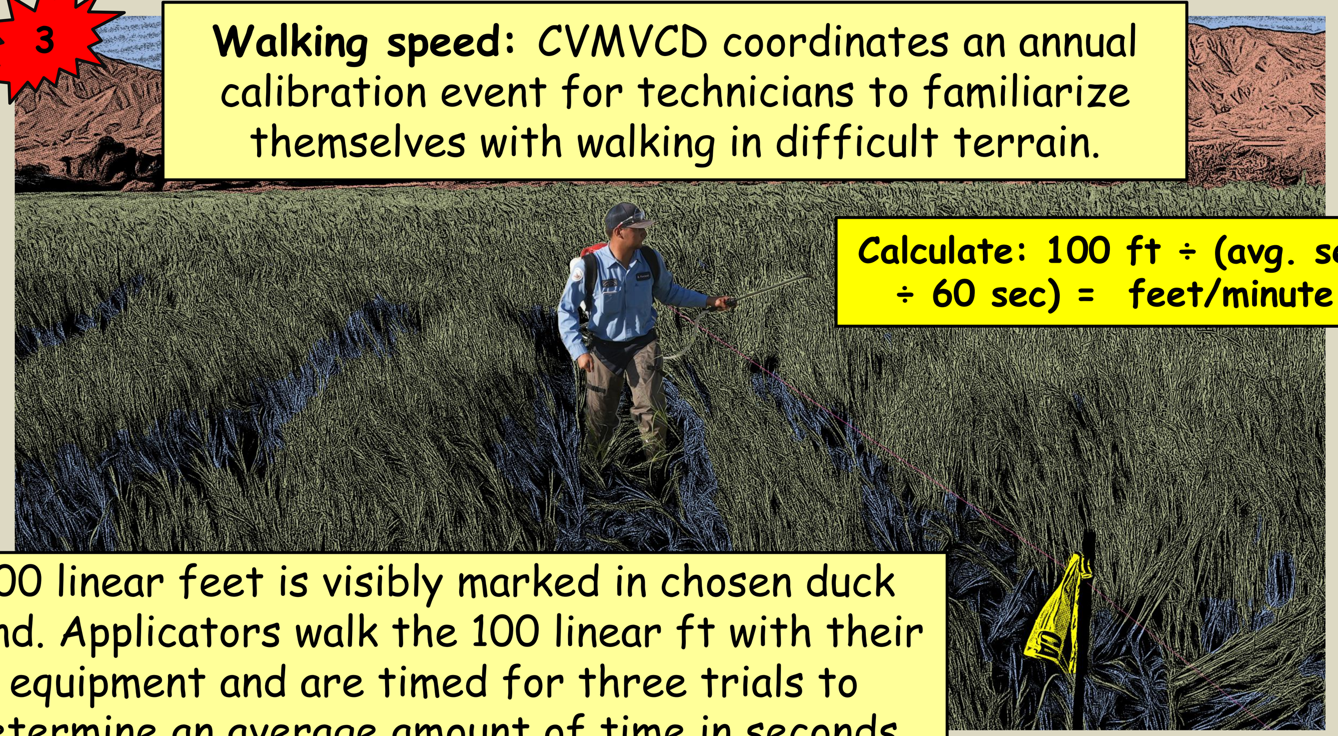
2

Materials Needed:

1. PPE & specialized gear 2. Measuring devices (liquids) 3. Nylon sock (granules) 4. Timer 5. Scale (granules) 6. Equipment 7. Product Blanks 8. Paperwork & forms

3

Walking speed: CVMVCD coordinates an annual calibration event for technicians to familiarize themselves with walking in difficult terrain.



Calculate: 100 ft ÷ (avg. sec ÷ 60 sec) = feet/minute

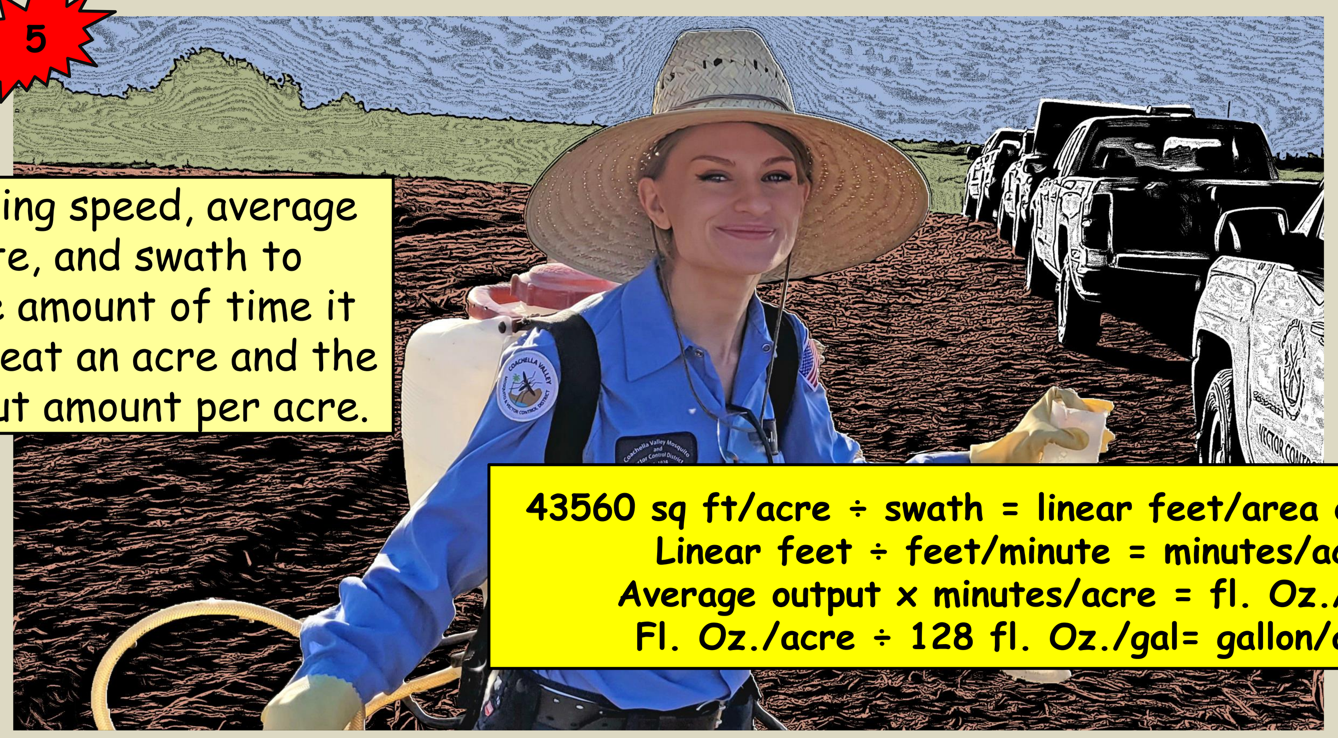
100 linear feet is visibly marked in chosen duck pond. Applicators walk the 100 linear ft with their equipment and are timed for three trials to determine an average amount of time in seconds.

4

Liquid backpacks: Fill backpack with water and consistently keep it pressurized for uniform results. Time 3 trials of 1-minute intervals for each spray nozzle type to determine the average output of mL/min.

5

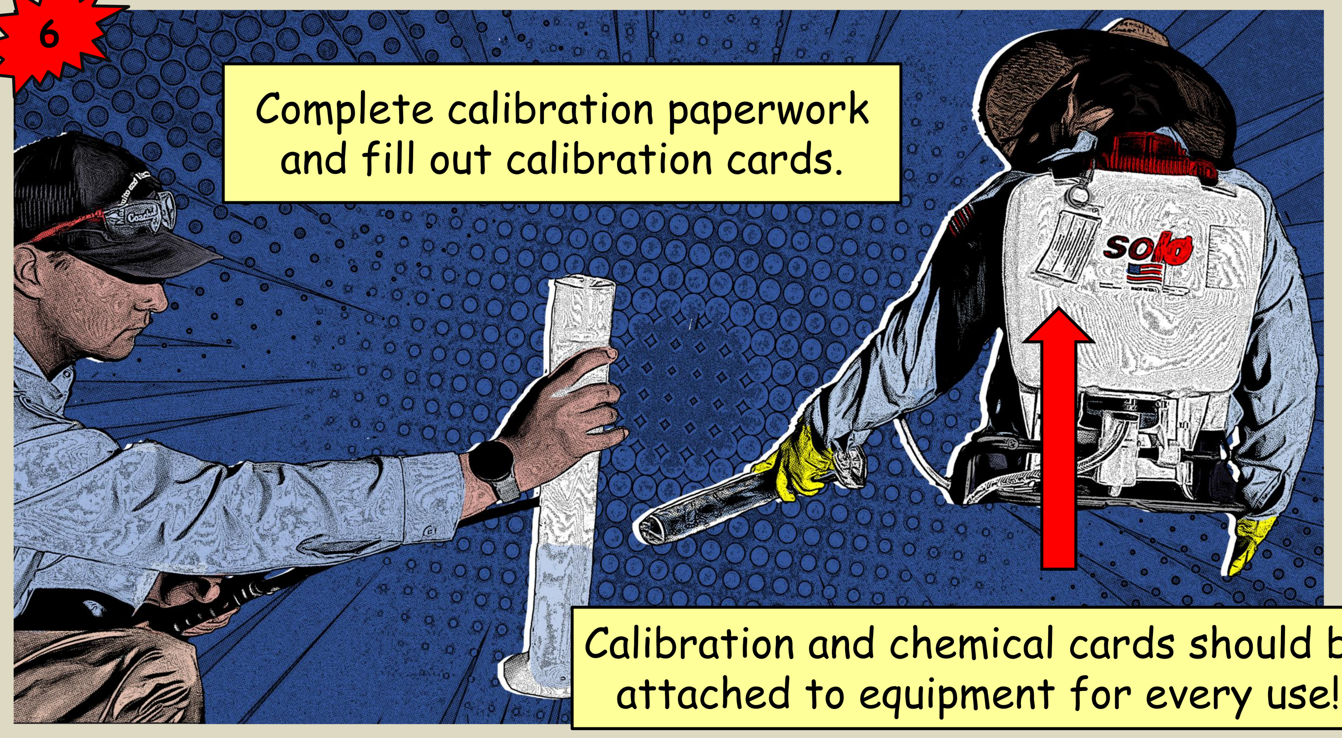
Use the walking speed, average output rate, and swath to calculate the amount of time it will take to treat an acre and the average output amount per acre.



43560 sq ft/acre ÷ swath = linear feet/area of an acre
Linear feet ÷ feet/minute = minutes/acre
Average output x minutes/acre = fl. Oz./acre
Fl. Oz./acre ÷ 128 fl. Oz./gal= gallon/acre

6

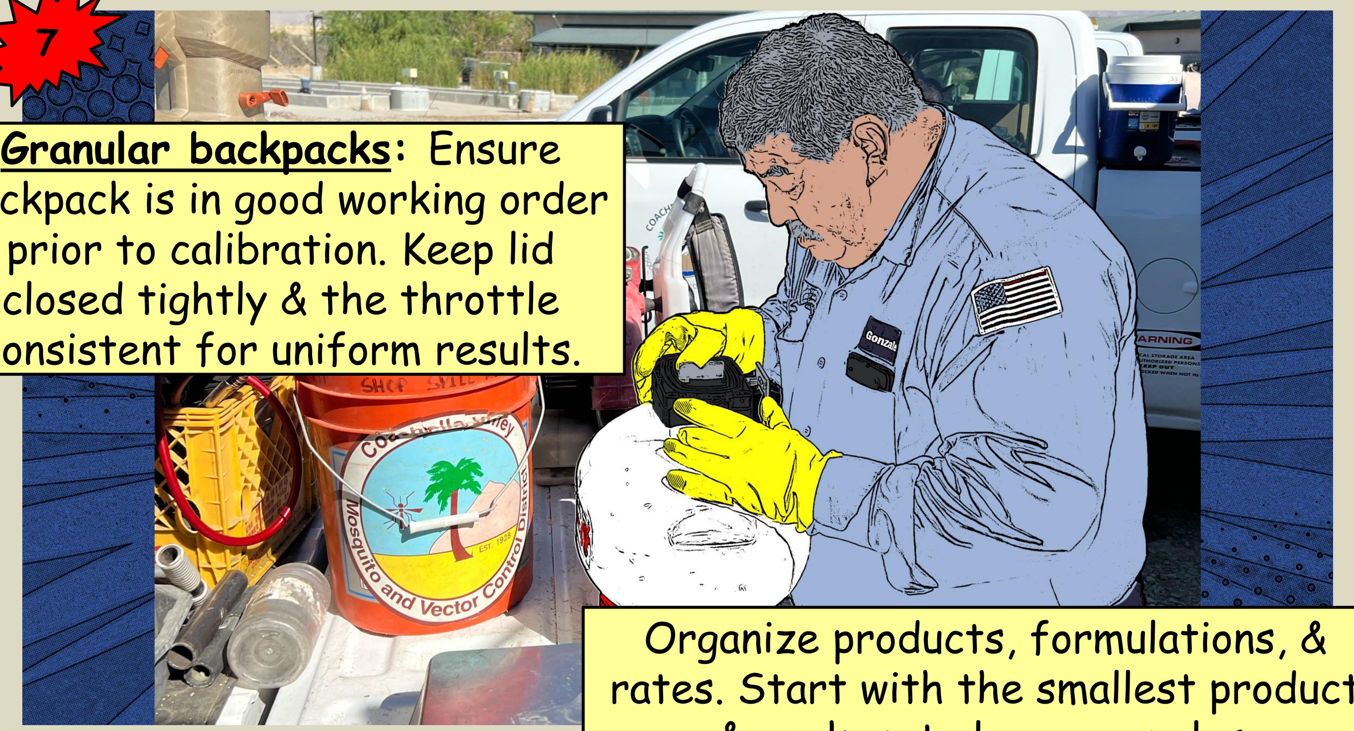
Complete calibration paperwork and fill out calibration cards.



Calibration and chemical cards should be attached to equipment for every use!

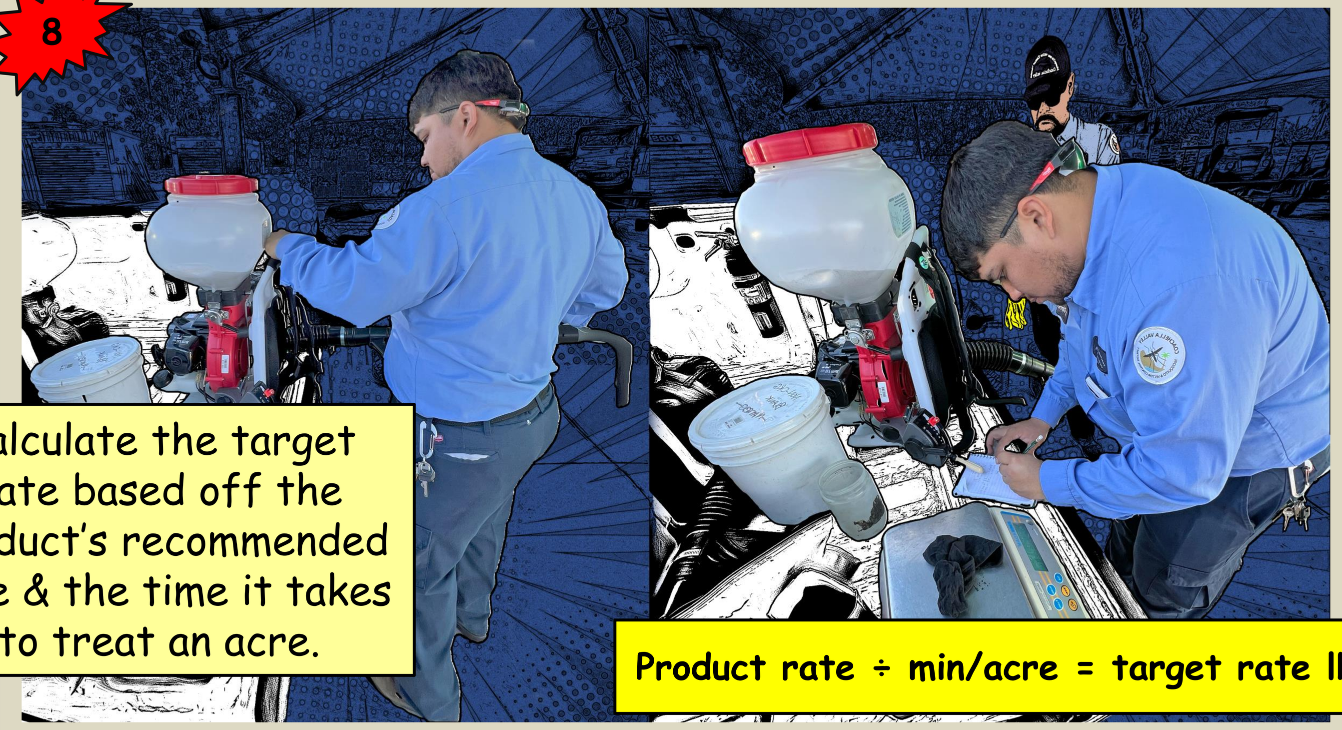
7

Granular backpacks: Ensure backpack is in good working order prior to calibration. Keep lid closed tightly & the throttle consistent for uniform results.



Organize products, formulations, & rates. Start with the smallest product & work up to large granules.

8

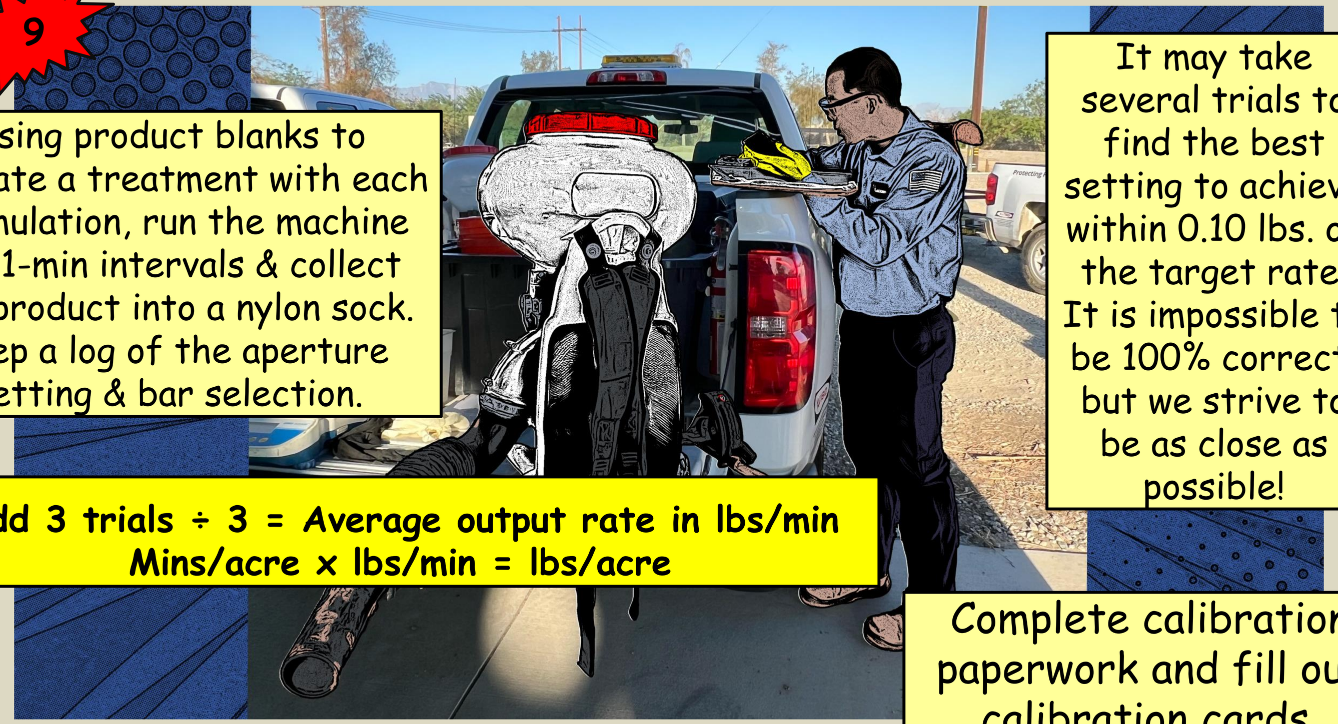


Calculate the target rate based off the product's recommended rate & the time it takes to treat an acre.

Product rate ÷ min/acre = target rate lb/min

9

Using product blanks to simulate a treatment with each formulation, run the machine for 1-min intervals & collect the product into a nylon sock. Keep a log of the aperture setting & bar selection.



It may take several trials to find the best setting to achieve within 0.10 lbs. of the target rate. It is impossible to be 100% correct, but we strive to be as close as possible!

Add 3 trials ÷ 3 = Average output rate in lbs/min
Mins/acre x lbs/min = lbs/acre

Complete calibration paperwork and fill out calibration cards.

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PHOTO CAPTIONS:

1. Eric Ortiz wading through a duck pond in Mecca, CA. Supervisors Antonio Molina and Jeffrey Rushing helping coordinate this year's calibration event. 3. Blake Forrest wading through a duck pond in Mecca, CA for a timed walking speed trial. 4. Mario Cipres, Blake Forrest, Gonzalo Arriaga, & Guillermo Rojo timing their Solo backpack output trials. 5. Marisa Kelling holding up a measuring beaker after recording output results. 6. Blake Forrest measuring and Mayra Espinoza draining liquid beakers. 7. Ramon Gonzalez ensuring his Maruyama backpack is free of debris before starting the calibrating process. 8. Mario Cipres running his Maruyama product formulation trials and recording his results while Jonathan Herrera overlooks. 9. Jonathan Leung recording his finished Maruyama results. 10. OPS department group photo in Mecca, CA.

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