Coachella Valley Mosquito and Vector Control District

43420 Trader Place, Indio, CA 92201 | (760) 342-8287 | cvmosquito.org

Board of Trustees Meeting

Tuesday, February 13, 2024

6:00 p.m.

AGENDA

The Board of Trustees will take action on all items on the agenda.

Materials related to an agenda item that are submitted to the Board of Trustees after distribution of the agenda packets are available for public inspection in the Clerk of the Board's office during normal business hours and on the District's website.

This meeting will be conducted by video and/or teleconference as well as in person at the District office located at the address listed above. To view/listen/participate in the meeting live, please join by calling 1-888-475-4499 (toll-free), meeting ID: 879 1516 1452, or click this link to join: https://us02web.zoom.us/j/87915161452.

Assistance for those with disabilities: If you have a disability and need an accommodation to participate in the meeting, please contact the Clerk of the Board at (760) 342-8287 at least 48 hours prior to the meeting to inform us of your needs and to determine if accommodation is feasible. The District will attempt to accommodate you in every reasonable manner.

Before entering the District's facilities, we request that you self-screen for COVID-19 symptoms. We want to work together to help limit the spread of COVID-19.

1. **Call to Order —** John Peña, President
   A. **Roll Call**

2. **Pledge of Allegiance**

3. Confirmation of Agenda

4. Public Comments

Members of the public may provide comments in person or remotely at the time of the meeting as set forth in the agenda. Public comments may also be sent by E-mail to the Clerk of the Board by 2:00 p.m. on February 13, 2024, at mtallion@cvmosquito.org. E-mails received prior to 2:00 p.m. on the day of the Board meeting will be made part of the record and distributed to the Board. This method is encouraged as it gives the Board of Trustees the opportunity to reflect upon your input. E-mails will not be read at the meeting.

A. **PUBLIC Comments — NON-AGENDA ITEMS:** This time is for members of the public to address the Board of Trustees on items of general interest (a non-agenda item) within the subject matter jurisdiction of the District. The District values your comments; however, pursuant to the Brown Act, the Board cannot take action on items not listed on the posted Agenda. **Comments are limited to a total of three (3) minutes per speaker for non-agenda items.**

B. **PUBLIC Comments — AGENDA ITEMS:** This time is for members of the public to address the Board of Trustees on agenda items (Open and Closed Sessions). **Comments are limited to three (3) minutes per speaker per agenda item.**

All comments are to be directed to the Board of Trustees and shall be devoid of any personal attacks. Members of the public are expected to maintain a professional, courteous decorum during public comments.

5. Announcements, Presentations, and Written Communications

None

6. Items of General Consent

The following items are routine in nature and may be approved by one blanket motion upon unanimous consent. The President or any member of the Board of Trustees may request an item be pulled from Items of General Consent for a separate discussion.

A. Minutes for January 9, 2024, Board Meeting **(Pg. 6)**

B. Approval of expenditures for January 5, 2024, to February 8, 2024 **(Pg. 13)**

C. Annual Statement of Economic Interests/Form 700 Annual Filing for the filing period of 2023/2024 **— Melissa Tallion, Executive Assistant/Clerk of the Board (Pg. 14)**

D. Informational Items:

- Financials **— David I'Anson, Administrative Finance Manager (Pg. 16)**
- Important Budget Meeting Dates **(Pg. 31)**
- Semi-annual research reports from the University of California, Davis, University of California, Riverside, Mount Sinai School of Medicine, and the USDA for 2023 **— Jennifer A. Henke, M.S., BCE, Laboratory Manager (Pg. 32)**
- Mosquito and Vector Control Association of California (MVCAC) Annual Conference, January 22-24, 2024, Monterey, CA **(Pg. 88)**
- California Society of Municipal Finance Officers (CSMFO) Annual Conference, January 30-February 2, 2024, Anaheim, CA **(Pg. 91)**
- Approval for Biologist to attend the American Mosquito Control Association Annual Conference, March 3-8, 2024, in an amount not to exceed $ 2000.00 from fund #7600.01.400.027, Professional Development **— Jennifer A. Henke, M.S., BCE, Laboratory Manager (Pg. 92)**

7. Business Session

A. Old Business — None

B. New Business

I. Discussion and/or approval to purchase two (2) Application Unmanned Aircraft System (UAS) Drones, training payload and battery systems in an amount not to exceed $138,000.00, from Frontier Precision - Capital Replacement Budget Fund #8415.13.300.000 – *Budgeted; Funds - Capital Replacement* **— Edward Prendez, Information Technology Manager, and Greg Alvarado, Operations Manager (Pg. 94)**

8. Committee and Trustee Reports

A. Executive Committee **— John Peña, Board President**

Executive Committee oral report and Executive Committee minutes from February 2, 2024 **(Pg. 97)**

B. Finance Committee **— Clive Weightman, Board Treasurer**

Finance Committee oral report and Finance Committee minutes from January 9, 2024 **(Pg. 101)**

C. Trustee Comments, Requests for Future Agendas Items, Travel, and/ or Staff Actions

The Board may not legally take action on any item presented at this time other than to direct staff to investigate a complaint or place an item on a future agenda unless (1) by a majority vote, the Board determines that an emergency exists, as defined by Government Code Section 54956.5, or (2) by a two-thirds vote, the board determines that the need for action arose subsequent to the agenda being posted as required by Government Code Section 54954.2(a). Each presentation is limited to no more than three minutes.

9. Reports

A. General Manager and Staff

i. General Manager's Report **— Jeremy Wittie, M.S., CSDM, General Manager**

Questions and/or comments from Trustees regarding the report

B. General Counsel

10. Closed Session

Closed Session (s):

A. **Conference with Labor Negotiators pursuant to Government Code Section 54957.6**

Agency Designated Representatives: Lena D. Wade, Crystal Moreno, and David I' Anson.

Employee Organizations: California School Employees Association and Teamsters Local 911.

11. Adjournment

At the discretion of the Board, all items appearing on this agenda, whether or not expressly listed for action, may be deliberated and may be subject to action by the Board.

Certification of Posting

I certify that on February 9, 2024, I posted a copy of the foregoing agenda near the regular meeting place of the Board of Trustees of the Coachella Valley Mosquito & Vector Control District and on the District's website, said time being at least 72 hours in advance of the meeting of the Board of Trustees (Government Code Section 54954.2)

Executed at Indio, California, on February 9, 2024

Melissa Tallion, Clerk of the Board

ITEMS OF GENERAL CONSENT

COACHELLA VALLEY MOSQUITO AND VECTOR CONTROL DISTRICT

Board of Trustees Meeting
Summary of Action Items and Future Tasks
January 9, 2024

Board Actions

- The Board of Trustees appointed the Abatement Hearing Committee members (Trustees Figueroa, Gardner, and Guitron).

- The Board of Trustees appointed the 2024 Slate of Officers:
  - President: Trustee Peña
  - Vice President: Trustee Guitron
  - Secretary: Trustee Kunz
  - Treasurer: Trustee Weightman

Tasks and Ownership

- Register and provide information about interested Trustees (by January 31, 2024) AMCA annual meeting, March 4-8, 2024, in Dallas, Texas.

COACHELLA VALLEY MOSQUITO AND VECTOR CONTROL DISTRICT

Board of Trustees Meeting
DRAFT-Minutes

MEETING TIME: 6:00 p.m., January 9, 2024

LOCATION: 43420 Trader Place, Indio, CA 92201

TRUSTEES PRESENT

PRESIDENT: John Peña	La Quinta
VICE PRESIDENT: Benjamin Guitron	Indio (joined after roll call)
SECRETARY: Dr. Doug Kunz	Palm Springs
Frank Figueroa	Coachella
Gary Gardner	Desert Hot Springs
Bito Larson	County at Large
Nancy Ross	Cathedral City
Doug Walker	Palm Desert

TRUSTEES ABSENT

Steve Downs	Rancho Mirage
TREASURER: Clive Weightman	Indian Wells

STAFF AND GENERAL COUNSEL PRESENT
Jeremy Wittie, General Manager
Lena D. Wade, Legal Counsel, SBEMP
David I'Anson, Administrative Finance Manager
Edward Prendez, Information Technology Manager
Jennifer Henke, Laboratory Manager
Tammy Gordon, Public Information Manager
Greg Alvarado, Operations Manager
Melissa Tallion, Executive Assistant/Clerk of the Board

Other staff members joined the meeting as well

MEMBERS OF THE PUBLIC PRESENT
No

1. Call to Order

President Peña called the meeting to order at 6:03 p.m.

A. Roll Call

At roll call seven (7) out of ten (10) Trustees were present.

2. Pledge of Allegiance

President Peña led the Pledge of Allegiance

3. **Confirmation of Agenda**
President Peña inquired if there were any agenda items to be shifted. Upon no objections by the Board of Trustees, the agenda was confirmed.

4. **Public Comments**
Mr. Anderson submitted written comments that were distributed to the Board of Trustees and Legal Counsel after the meeting.

5. **Announcements, Presentations, and Written Communications**
None

6. **Items of General Consent**

A. Minutes for December 12, 2023, Workshop and December 12, 2023, Board Meeting

B. Approval of expenditures for December 6, 2023, to January 4, 2024

C. Informational Items:
- Financials **— David I'Anson, Administrative Finance Manager**
- District Travel for the Board of Trustees
- Mosquito and Vector Control Association of California (MVCAC) Planning Meeting, December 5-7, 2023, Sacramento, CA
- Update: ClientFirst IT Master Plan

On a motion from Trustee Gardner, seconded by Trustee Figueroa, and passed unanimously, the Board of Trustees approved all items of General Consent.

Ayes: President Peña, Trustees Figueroa, Gardner, Kunz, Larson, Ross, Walker

Noes: None

Abstained: None

Absent: Trustees Downs, Guitron, Weightman

7. **Business Session**

A. Old Business — None

B. New Business

I. Discuss the appointment of the Abatement Hearing Committee **— John Peña, Board President**
President Peña introduced this agenda item. President Peña opened the floor for one more nomination. Trustee Figueroa agreed to volunteer to be on the Abatement Hearing Committee. The Abatement Hearing Committee members are Trustees Figueroa, Gardner, and Guitron (alternate).

On a motion from Trustee Figueroa, seconded by Trustee Garnder, and passed unanimously, the Board of Trustees approved the Abatement Hearing Committee.

Ayes: President Peña, Trustees Figueroa, Gardner, Kunz, Larson, Ross, Walker

Noes: None

Abstained: None

Absent: Trustees Downs, Guitron, Weightman

II. Discuss the Nomination for Two Special District Members (Regular and Alternate) of the Riverside Local Agency Formation Commission (LAFCO) – **Jeremy Wittie, M.S., CSDM, General Manager**
Jeremy Wittie introduced this agenda item and provided a summary. President Peña asked Melissa Tallion to send an email to the Board about the LAFCO nominations.

III. Nomination and Election of Board Officers for the 2024 Calendar Year **— ad hoc Nominations Committee**
President Peña introduced this agenda item and opened the floor for any other nominations. Hearing none, President Peña proceeded to ask for a motion to approve the 2024 slate as presented.
2024 Slate: President: Trustee Peña, Vice President: Trustee Guitron, Secretary: Trustee Kunz, Treasurer: Trustee Weightman

On a motion from Trustee Gardner, seconded by Trustee Walker, and passed unanimously, the Board of Trustees approved the slate of officers for 2024 as presented.

Ayes: President Peña, Trustees Figueroa, Gardner, Kunz, Larson, Ross, Walker

Noes: None

Abstained: None

Absent: Trustees Downs, Guitron, Weightman

8. Committee and Trustee Reports

A. Executive Committee **— John Peña, Board President**
Executive Committee oral report
President Peña did not have a report. The Executive Committee did not meet.

B. Finance Committee **— Clive Weightman, Board Treasurer**
Finance Committee oral report and Finance Committee minutes from December 12, 2023
Trustee Walker presented the Finance Committee report and discussed the operational cash flow chart.

C. Trustee Comments, Requests for Future Agendas Items, Travel, and/ or Staff Actions
President Peña mentioned the upcoming AMCA conference. He asked Melissa Tallion to send a reminder email with details to the Board of Trustees. President Peña and Jeremy Wittie mentioned the passing of former Trustee Nick Nigosian (1995-2008 and 2015-2017). President Peña asked that the meeting be adjourned in his honor.

9. Reports

A. General Manager and Staff

i. General Manager's Report **— Jeremy Wittie, M.S., CSDM, General Manager**
Jeremy Wittie gave an update regarding facilities the District's Parcel Map project and the Boardroom update/revitalization project. The staff is working on annual training courses and Jeremy is continuing his meetings with City Managers to build better relationships.

ii. Arbovirus Risk and Response update (as necessary) **— Jennifer A. Henke, M.S., BCE, Laboratory Manager, Greg Alvarado, Operations Manager, Tammy Gordon, MA, APR, MPIO, Public Information Manager**
No report

B. General Counsel
No comments

10. Closed Session

Closed Session (s):

A. **Conference with Labor Negotiators pursuant to Government Code Section 54957.6**
Agency Designated Representatives: Lena D. Wade, Crystal Moreno, and David I' Anson.

Employee Organizations: California School Employees Association and Teamsters Local 911.
No reportable action

B. **Conference with Labor Negotiators pursuant to Government Code Section 54957.6**
Agency Designated Representatives: President John Peña, Trustee Benjamin Guitron, and Trustee Nancy Ross

Unrepresented employee: General Manager
The Board unanimously voted to provide Jeremy Wittie, General Manager, with a $8,800 bonus based on his performance for 2023.
The Board confirmed his four (4) goals for 2024:

1. *Managing effectively the two (2) Union negotiations*
2. *District relationships with member agencies and the public:*
    a. *Continue to meet with City Managers to help them understand the District's mission and operations; and*
    b. *Continue to expand the visibility and public awareness of the District and its functions.*

3. *Continue to pursue the possible utilization of SIT and other alternative mosquito control measures.*
4. *Continue the efforts currently underway in Rancho Mirage to meet with the Director of Code Compliance for Rancho Mirage to review compliance with irrigation runoff requirements in the City and assist the City with the applicable amendment to the City's Municipal Code as applicable. After the template is created by the City of Rancho Mirage, the General Manager shall work to meet with the Directors of Code Compliance of member cities, review compliance with irrigation runoff requirements in the member cities, and assist with the applicable amendments to the Municipal Codes using the Rancho Mirage ordinance as the template.*

C. **Public Employee Performance Evaluation pursuant to Government Code Section 54957 (b)(1)**

Title: General Manager
Same as above

11. Adjournment

President Peña adjourned the meeting in honor of Nick Nigosian at 6:57 p.m.

John Peña President	Dr. Doug Kunz Secretary

Melissa Tallion

From: [redacted]
Sent: Tuesday, January 9, 2024 5:55 PM
To: Melissa Tallion; Jeremy Wittie
Subject: Public Comment - January 9, 2024 (6:PM) CVMVCD Board of Trustees meeting (Non-Agenda Public comment)

January 9, 2024

Coachella Valley Mosquito and Vector Control District (CVMVCD)
Indio, California
Attn: Clerk of the Board/District Manager/Board Members/General Public

Dear current CVMVCD organization Appointees,

Please allow this letter (email) to be submitted into your unique and unusual "Special District" official records that are retrievable to member's of the Public and or other agencies.

As you are well aware, the Current CVMVCD administration have gone to extremel lengths to reduce and or eliminate Public monitoring and partispation of it's organization operations.
It's reasonable to consider that the CVMVCD have limited its transparency due to having been compromised by its own empire building scheme and willingness to retain unqualified Individuals that continue to place the Coachella Valley at Increased risk of harm from diseases from uncontrolled Vectors.

Please correct your organizations most recent Board of Trustees meeting (December 2023) that incorrectly and incompletely recorded (minutes) of Brad Anderson public testimony on maters of that meetings written agenda.
It's clearly established that recorded CVMVCD meeting minutes have been used to limit the Public's "Free speech" and have set a chilling effect over the Publics abilities to be heard (recorded) by the CVMVCD organization.

Sincerely,

Brad Anderson | 37043 Ferber Dr. Rancho Mirage, CA. 92270
Ba4612442@gmail.com

Cc:

Coachella Valley Mosquito and Vector Control District
Checks Issued for the Period of:
January 5 - February 8, 2024

Check No	Payable To	Description	Check Amount	Total Amount
	Payroll Disbursement	January 5, 2024	235,187.45	
	Payroll Disbursement	January 19, 2024	247,264.76	
	Payroll Disbursement	February 2, 2024	241,855.06	
				724,307.27
Pre-Approved Expenditures Utilities/Benefits:				
45036	CalPERS Healthcare Acct	Cafeteria Plan	104,582.08	
45037	CalPERS - Retirement Acct	Retirement Contributions: 1/5/24PP, 1/19/24PP, 11/22/23PP, 12/8/23 PP	188,730.43	
45041	MissionSquare (Plan# 302318)	Deferred Compensation Contributions: 1/5/24PP, 1/19/24PP, 12/22/23PP	34,568.37	
45042	Imperial Irrigation District	District Electricity Usage	2,324.82	
45043	Imperial Irrigation Dist-Lab Acct	Lab Electricity Usage	5,458.39	
45044	Indio Water Authority	District Water Usage	1,118.15	
45045	Principal Life Insurance Co.	Cafeteria Plan	14,655.33	
45049	Burrtec Waste & Recycling Svcs.	District Wate Fees	481.81	
45050	Frontier Communications-Internet	IT Communications	445.98	
45051	Frontier Communications-Toll/POTS	IT Communications	214.04	
45052	SoCalGas	District Natural Gas Usage	1,338.21	
				353,917.61
Pre-Approved Expenditures less than $10,000.00:				
45035	Rick Klassen, Klassen Productions dba Black Forest K9 Train	Safety Expense	240.00	
45038	City of Indio Alarm Program	Permits, Licenses & Fees	93.00	
45039	Desert Alarm, Inc.	Burglar & Fire Alarm Monitoring Services	1,019.70	
45040	C & J Brown & Company, CPAS - An Accountancy Corporation	Professional Fees	4,041.00	
45046	Vector Control Joint Powers Agency	Employee Assistance Program	579.09	
45047	U.S. Bank	Calcard January Statement	6,739.16	
45053	Abila, Inc.	Cloud Computing Services	943.77	
45054	Advance Imaging Systems	Contract Services	788.48	
45055	Airgas USA, LLC	Lab Supplies & Expense	722.34	
45056	AvQuest Insurance Service	Property and Liability Insurance	6,866.00	
45057	CarQuest Auto Parts	Vehicle Parts & Supplies	167.78	
45059	Cintas Corporation #3	Uniform Expense	4,513.19	
45060	Clairemont Equipment	Equipment Rental	126.80	
45061	CleanExcel	Janitorial Services	8,384.00	
45062	ClientFirst Consulting Group LLC	Professional Services	872.50	
45063	CSI Ceja Security International	Contract Services	3,094.00	
45064	Desert Air Conditioning Inc.	Repair & Maintenance	1,084.01	
45065	Jennifer Henke	MVCAC Committee Assignments	326.53	
45066	Inova Holding III, LLC dba Inova Payroll of Southern CA LLC	HRIS Services: December 2023	487.57	
45067	Jernigan's Sporting Goods, Inc.	Safety Expense	65.24	
45068	Linde Gas & Equipment Inc.	Offsite Vehicle Maintenance & Repair	66.64	
45069	Marlin Leasing Corporation	Contract Services	803.14	
45070	Pitney Bowes Purchase Power	Contract Services	55.67	
45071	Quench USA Inc.	Employee Support	341.40	
45072	Refrigeration Supplies Distributor	Repair & Maintenance	246.53	
45073	Slovak Baron Empey Murphey & Pinkney LLP	Attorney Fees	8,248.00	
45074	SC Commercial LLC dba SC Fuels	Motor, Fuel & Oil	8,348.40	
45075	Veolia ES Technical Solutions, LLC	Lab Supplies & Expense	242.43	
45076	Gonzalo Valadez	Tuition Reimbursement	411.97	
45077	Verizon Wireless	IT Communications	2,928.33	
45078	WESCO, Western Scientific Company, Inc.	Maintenance & Calibration	895.00	
Cash - California Bank & Trust Checking				**63,741.67**
Cash - California Bank & Trust Checking				
45048	UMPQUA Bank Commercial Card OPS	Calcard January Statement	68,261.01	
Cash - California Bank & Trust Check Run Total to be Approved				**68,261.01**
Total Expenditures: January 4 - February 8, 2024				**1,210,227.56**

John Pena, President

Clive Weightman, Treasurer

	Coachella Valley Mosquito and Vector Control District **Staff Report**	**February 13, 2024**

Agenda Item: Consent Calendar

Annual Statement of Economic Interests/Form 700 Annual Filing for the filing period of 2023/2024 **— Melissa Tallion, Executive Assistant/Clerk of the Board**

Background:
The Political Reform Act of 1974 requires that any position designated in an agency's Conflict of Interest Code must file an annual Statement of Economic Interests (Form 700). All individuals listed in positions in our District's Conflict of Interest Code are required to file a Form 700 with the County of Riverside.

As the filing official for our District, I am responsible for distributing Form 700 to each designated filer and filing them with the County Clerk.

You will receive an email from me no later than Friday, February 16, 2024.

Please submit your completed Form 700 and schedules (if applicable) to Grace or Jeremy by _ **2 p.m. on Friday, March 15, 2024.**

You may complete/send the form (s) electronically to me, but I must receive your ***original signature*** on the paper form (Statement of Economic Interests Cover Page). If you will be mailing your form/paperwork to me, please allow sufficient time for mailing.

If you already file a Form 700 with another agency, city, and/or organization, you can submit copies of the paperwork that accompany the Form 700 Cover Page, but I still need an ***original signature*** on the Form 700 Cover Page.

Instructions are included with the form, but if you need more assistance in completing it, help is available on the Fair Political Practices Commission website www.fppc.ca.gov or by calling the toll-free helpline 1-866-ASK-FPPC.

The period covered by this annual statement is from January 1, 2023, through December 31, 2023.

Please contact me with any questions you may have.

FINANCE REPORTS

Coachella Valley Mosquito and Vector Control District
FINANCES AT A GLANCE
ALL FUNDS COMBINED
For the Month Ended January 31, 2024

	Beginning of the Month	Change During the Month	End of the Month
INVESTMENTS	12,841,591	3,845,391	16,686,982
CASH	182,942	110,102	293,045
INVESTMENTS & CASH	13,024,533	3,955,493	16,980,027
CURRENT ASSETS	1,775,001	1,166,253	2,941,254
FIXED ASSETS	9,167,979	-	9,167,979
OTHER ASSETS	6,629,504	-	6,629,504
TOTAL ASSETS	30,597,017	5,121,747	35,718,763
TOTAL LIABILITIES	6,177,683	(163,164)	6,014,519
TOTAL DISTRICT EQUITY	24,419,334	5,284,910	29,704,245
TOTAL LIABILITIES & EQUITY	30,597,017	5,121,747	35,718,763

RECEIPTS		$ 5,271,433
CASH DISBURSEMENTS		
Payroll	$ 482,452	
General Admin	$ 833,487	
Total Cash Disbursements		$ (1,315,939)
NON-CASH ENTRIES: Accrual Modifications - Changes in A/P, A/R & Pre-paid insurance		$ 1,166,253
Change during Month - Excess of Cash over Receipts & Non-Cash Adjustments		$ 5,121,747

CVMVCD

Cash Journal - deposits

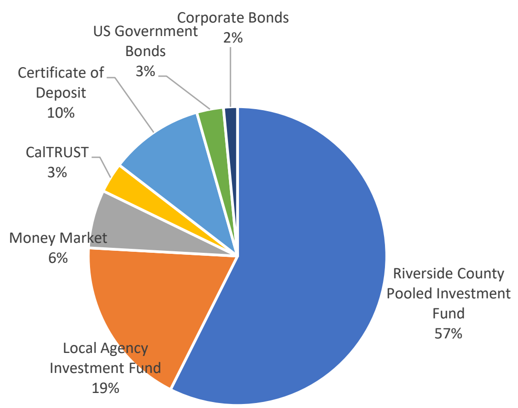
From 1/1/2024 Through 1/31/2024

Effective ...	Transaction Description	Deposits	Payee/Recipient Name
1/31/2024	January Receipts - CY Secured	1,166,715.45	Riverside County
1/31/2024	January Receipts - CY Supplemental	66,319.88	Riverside County
1/31/2024	January Receipts - LAIF Interest	29,406.45	Local Agency Investment Fund
1/31/2024	January Receipts - PY Supplememtal	67,944.32	Riverside County
1/31/2024	January Receipts - RDA Pass Thru	3,872,595.86	Riverside County
1/31/2024	January Receipts - SBE	67,404.90	Riverside County
1/31/2024	January Receipts Bank Interest	1,045.88	California Bank & Trust
Report Total		5,271,432.74	

COACHELLA VALLEY MOSQUITO AND VECTOR CONTROL DISTRICT
INVESTMENT FUND BALANCES AS OF JANUARY 31, 2024

INSTITUTION	IDENTIFICATION	Issue Date	Maturity Date	YIELD	General Fund	Thermal Capital Fund	Capital Equipment Replacement Fund	Capital Facility Replacement Fund	Capital Project Insectory Fund		BALANCE
LAIF	Common Investments			4.01%	2,211,084	25,185	91,628	483,757	144,889	$	2,956,542
Riverside County	Funds 51105 & 51115			4.33%	6,874,736	78,306	284,891	1,504,104	450,490	$	9,192,526
CalTRUST	Medium Term Fund			3.80%	389,368	4,435	16,136	85,189	25,515	$	520,642
CA Bank & Trust	Market Rate			1.69%	743,344	8,467	30,804	162,634	48,710	$	993,959
Pershing	Market Rate			0.00%	11,269	128	467	2,465	738	$	15,068
Federal Home Ln	US Government Bonds	11/24/2020	11/24/2025	0.63%		22,828	83,054	438,491	131,331	$	675,705
Federal Natl Mtg Assn	US Government Bonds	11/25/2020	11/25/2025	0.63%		22,978	83,597	441,358	132,190	$	680,123
Bank Amer Corp	Corporate Bonds	11/25/2020	11/25/2025	0.65%		15,120	55,009	290,426	86,985	$	447,540
US Treasury Securities	Treasury Note	1/17/2023	1/15/2026	3.88%		16,871	61,382	324,069	97,061	$	499,383
ALL IN American Cred	Certificate of Deposit	1/18/2023	1/19/2027	4.55%		8,194	29,810	157,383	47,137	$	242,524
Austin Telco	Certificate of Deposit	1/27/2023	1/27/2028	4.75%		7,501	27,290	144,077	43,152	$	222,020
Alaska USA Fed Cr	Certificate of Deposit	3/8/2023	3/8/2028	4.60%		8,140	29,617	156,363	46,832	$	240,952
	Total Investments				10,229,799	218,154	793,683	4,190,315	1,255,030	**$**	**16,686,982**

PORTFOLIO COMPOSITION AS OF JANUARY 31, 2024
WEIGHTED YIELD 3.69%



In compliance with the California Code Section 53646; the Finance Administrator of the Coachella Valley Mosquito and Vector Control District hereby certifies that sufficient liquidity and anticpated revenue are available to meet the District's budgeted expenditure requirements for the next six months.

Investments in the report meet the requirements of the Coachella Valley Mosquito and Vector Control District's adopted investment policy

Respectfully submitted

NOTED AND APPROVED

CVMVCD
Statement of Revenue and Expenditures
January 31, 2024

		Annual Budget	YTD Budget	**YTD Actual**	YTD Budget Variance	Current Period Budget	**Current Period Actual**	Current Period Variance	Annual Budget Variance	Percent Annual Budget
Revenues										
4000	Property Tax - Current Secured	4,850,314	2,522,021	**2,724,456**	202,435	1,117,238	**1,234,120**	116,883	(2,125,858)	(44)%
4010	Property Tax - Curr. Supplmntl	31,172	0	**66,320**	66,320	0	**66,320**	66,320	35,148	113 %
4020	Property Tax - Curr. Unsecured	203,698	197,689	**237,713**	40,024	0	**0**	0	34,015	17 %
4030	Homeowners Tax Relief	35,949	17,975	**5,565**	(12,409)	0	**0**	0	(30,384)	(85)%
4070	Property Tax - Prior Supp.	53,097	0	**67,944**	67,944	0	**67,944**	67,944	14,847	28 %
4080	Property Tax - Prior Unsecured	3,193	0	**0**	0	0	**0**	0	(3,193)	(100)%
4090	Redevelopment Pass-Thru	7,432,521	3,716,261	**3,977,280**	261,020	3,716,261	**3,872,596**	156,335	(3,455,241)	(46)%
4520	Interest Income - LAIF/CDs	275,000	137,500	**118,752**	(18,748)	0	**30,452**	30,452	(156,248)	(57)%
4530	Other Miscellaneous Receipts	63,000	36,750	**16,999**	(19,751)	5,250	**0**	(5,250)	(46,001)	(73)%
4551	Benefit Assessment Income	2,370,094	1,266,525	**1,285,328**	18,803	1,266,525	**1,285,328**	18,803	(1,084,766)	(46)%
	Total Revenues	15,318,038	7,894,720	**8,500,357**	605,637	6,105,273	**6,556,760**	451,487	(6,817,681)	(45)%
Expenditures										
Payroll Expenses										
5101	Payroll - FT	6,374,624	3,698,262	**3,429,695**	268,567	535,274	**480,184**	55,090	2,944,929	46 %
5102	Payroll Seasonal	142,020	89,520	**63,627**	25,893	10,500	**0**	10,500	78,393	55 %
5103	Temporary Services	14,900	8,692	**8,060**	632	1,242	**0**	1,242	6,841	46 %
5105	Payroll - Overtime Expense	30,120	16,910	**25,637**	(8,727)	1,850	**98**	1,752	4,483	15 %
5150	CalPERS State Retirement	877,051	592,814	**329,679**	263,135	56,848	**49,467**	7,380	547,371	62 %
5155	Social Security Expense	390,377	226,894	**218,525**	8,368	32,697	**30,066**	2,631	171,852	44 %
5165	Medicare Expense	91,298	53,064	**52,455**	609	7,647	**7,031**	615	38,843	43 %
5170	Cafeteria Plan	1,332,664	771,825	**840,399**	(68,574)	112,168	**224,715**	(112,547)	492,265	37 %
5172	Retiree Healthcare	439,420	237,580	**232,356**	5,224	40,370	**39,636**	734	207,064	47 %
5180	Deferred Compensation	133,945	77,370	**57,508**	19,861	11,315	**8,315**	3,000	76,437	57 %
5195	Unemployment Insurance	33,802	19,718	**23,935**	(4,217)	2,817	**10,958**	(8,141)	9,868	29 %
	Total Payroll Expenses	9,860,221	5,792,648	**5,281,875**	510,772	812,728	**850,472**	(37,744)	4,578,346	46 %

UNAUDITED

CVMVCD
Statement of Revenue and Expenditures
January 31, 2024

		Annual Budget	YTD Budget	**YTD Actual**	YTD Budget Variance	Current Period Budget	**Current Period Actual**	Current Period Variance	Annual Budget Variance	Percent Annual Budget
Administrative Expenses										
5250	Tuition Reimbursement	20,000	11,667	**234**	11,432	1,667	**0**	1,667	19,766	99 %
5300	Employee Incentive	16,500	9,625	**4,752**	4,873	1,375	**0**	1,375	11,748	71 %
5302	Wellness	5,600	3,267	**4,155**	(888)	467	**0**	467	1,445	26 %
5305	Employee Assistance Program	3,200	1,867	**1,223**	644	267	**579**	(312)	1,977	62 %
6000	Property & Liability Insurance	318,895	179,772	**172,239**	7,533	27,825	**26,621**	1,204	146,656	46 %
6001	Workers' Compensation Insurance	253,447	127,011	**135,314**	(8,303)	25,287	**25,085**	202	118,133	47 %
6050	Dues & Memberships	51,886	43,367	**34,637**	8,730	1,004	**140**	864	17,249	33 %
6060	Reproduction & Printing	27,950	14,263	**16,665**	(2,402)	288	**3,873**	(3,586)	11,285	40 %
6065	Recruitment/Advertising	10,000	5,833	**1,572**	4,262	833	**0**	833	8,428	84 %
6070	Office Supplies	19,385	11,308	**5,148**	6,160	1,615	**520**	1,095	14,237	73 %
6075	Postage	6,100	2,100	**1,958**	142	300	**223**	77	4,142	68 %
6080	Computer & Network Systems	13,399	7,816	**718**	7,098	1,117	**0**	1,117	12,681	95 %
6085	Bank Service Charges	500	292	**145**	146	42	**35**	7	355	71 %
6090	Local Agency Formation Comm.	3,500	3,500	**2,911**	589	0	**0**	0	589	17 %
6095	Professional Fees	92,500	65,958	**28,193**	37,765	3,708	**5,915**	(2,206)	64,307	70 %
6100	Attorney Fees	85,800	50,050	**37,675**	12,375	7,150	**10,136**	(2,986)	48,125	56 %
6105	Legal Services / Filing Fees	1,000	583	**0**	583	83	**0**	83	1,000	100 %
6106	HR Risk Management	5,210	5,210	**5,885**	(675)	0	**0**	0	(675)	(13)%
6110	Conference Expense	60,600	43,800	**12,495**	31,305	23,200	**327**	22,873	48,105	79 %
6115	In-Lieu	13,200	7,700	**7,732**	(32)	1,100	**1,241**	(141)	5,468	41 %
6120	Trustee Support	7,600	4,433	**3,768**	665	633	**588**	46	3,832	50 %
6200	Meetings Expense	26,060	15,202	**4,437**	10,765	2,172	**13**	2,159	21,623	83 %
6210	Promotion & Education	33,000	16,500	**13,221**	3,279	0	**2,555**	(2,555)	19,779	60 %
6220	Public Outreach Advertising	56,000	56,000	**22,928**	33,072	28,000	**0**	28,000	33,072	59 %
6500	Benefit Assessment Expenses	83,000	83,000	**82,843**	157	67,000	**65,731**	1,269	157	0 %
Total Administrative Expenses		1,214,332	770,123	**600,847**	169,275	195,131	**143,582**	51,550	613,484	51 %
Utilities										
6400	Utilities	137,783	80,373	**81,864**	(1,491)	11,482	**21,001**	(9,519)	55,919	41 %
6410	Telecommunications	1,824	1,064	**1,484**	(420)	152	**214**	(62)	340	19 %
Total Utilities		139,607	81,437	**83,349**	(1,911)	11,634	**21,215**	(9,581)	56,258	40 %

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CVMVCD
Statement of Revenue and Expenditures
January 31, 2024

		Annual Budget	YTD Budget	**YTD Actual**	YTD Budget Variance	Current Period Budget	**Current Period Actual**	Current Period Variance	Annual Budget Variance	Percent Annual Budget
Operating										
7000	Uniform Expense	60,025	35,423	**24,365**	11,058	5,260	**2,670**	2,591	35,660	59 %
7050	Safety Expense	36,520	21,270	**17,119**	4,151	3,010	**822**	2,188	19,401	53 %
7100	Physican Fees	7,000	4,083	**570**	3,513	583	**0**	583	6,430	92 %
7150	IT Communications	70,780	41,288	**26,525**	14,764	5,898	**3,542**	2,356	44,255	63 %
7200	Household Supplies	3,000	1,750	**1,798**	(48)	250	**185**	65	1,202	40 %
7300	Repair & Maintenance	47,000	27,417	**31,541**	(4,125)	3,917	**3,415**	501	15,459	33 %
7310	Maintenance & Calibration	6,800	6,800	**1,307**	5,493	6,800	**942**	5,858	5,493	81 %
7350	Permits, Licenses & Fees	8,522	6,497	**3,543**	2,954	105	**107**	(2)	4,979	58 %
7360	Software Licensing	33,512	13,540	**2,016**	11,524	0	**0**	0	31,496	94 %
7400	Vehicle Parts & Supplies	56,664	33,054	**17,436**	15,618	4,722	**1,493**	3,229	39,228	69 %
7420	Offsite Vehicle Maint & Repair	19,416	11,326	**6,023**	5,303	1,618	**65**	1,553	13,393	69 %
7450	Equipment Parts & Supplies	30,130	17,618	**9,528**	8,090	2,303	**323**	1,980	20,602	68 %
7500	Small Tools Furniture & Equip	4,700	2,742	**1,758**	984	392	**718**	(327)	2,942	63 %
7550	Lab Supplies & Expense	61,850	38,100	**17,940**	20,160	2,500	**1,493**	1,007	43,910	71 %
7570	Aerial Pool Surveillance	30,000	0	**0**	0	0	**0**	0	30,000	100 %
7575	Surveillance	128,810	104,331	**68,143**	36,188	4,176	**13,095**	(8,919)	60,668	47 %
7600	Staff Training	118,150	70,754	**45,651**	25,103	10,379	**8,938**	1,441	72,499	61 %
7650	Equipment Rental	1,500	875	**773**	102	125	**773**	(648)	727	48 %
7675	Contract Services	141,333	82,645	**67,856**	14,789	9,890	**6,815**	3,074	73,477	52 %
7680	Cloud Computing Services	135,260	33,338	**48,690**	(15,352)	5,482	**3,456**	2,026	86,569	64 %
7700	Motor Fuel & Oils	160,500	93,625	**68,618**	25,007	13,375	**0**	13,375	91,882	57 %
7750	Field Supplies	9,000	5,250	**8,079**	(2,829)	750	**3**	747	921	10 %
7800	Control Products	704,016	550,939	**590,622**	(39,683)	8,884	**44,383**	(35,499)	113,394	16 %
7850	Aerial Applications	251,600	167,000	**148,085**	18,915	18,800	**0**	18,800	103,515	41 %
7860	Unmanned Aircraft Application Servic	20,000	11,667	**2,723**	8,943	1,667	**2,128**	(462)	17,277	86 %
8415	Capital Outlay	75,720	62,720	**10,833**	51,887	2,600	**0**	2,600	64,887	86 %
8510	Research Projects	380,000	380,000	**302,139**	77,861	0	**155,590**	(155,590)	77,861	20 %
9000	Contingency Expense	110,000	64,167	**108,601**	(44,434)	9,167	**0**	9,167	1,399	1 %
Total Operating		2,711,808	1,888,218	**1,632,281**	255,937	122,652	**250,957**	(128,305)	1,079,527	40 %

CVMVCD
Statement of Revenue and Expenditures
January 31, 2024

		Annual Budget	YTD Budget	**YTD Actual**	YTD Budget Variance	Current Period Budget	**Current Period Actual**	Current Period Variance	Annual Budget Variance	Percent Annual Budget
Contribution to Capital Reserves										
8900	Transfer to other funds	2,414,158	1,408,259	**1,408,259**	0	201,180	**201,180**	0	1,005,899	42 %
Total Contribution to Capital Reserves		2,414,158	1,408,259	**1,408,259**	0	201,180	**201,180**	0	1,005,899	42 %
Total Expenditures		16,340,126	9,940,685	**9,006,611**	934,074	1,343,325	**1,467,405**	(124,080)	7,333,515	45 %
Net revenue over/(under) expenditures		(1,022,088)	(2,045,965)	**(506,254)**	1,539,711	4,761,948	**5,089,356**	327,407		

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CVMVCD

Balance Sheet - Unposted Transactions Included In Report

As of 1/31/2024

		Current Year
	Assets	
	Cash and Investments	
1000	Cash - Investments	16,686,982.02
1010	Cash - Co of Riverside 51115	0.00
1012	Cash - Clearing Account	0.00
1016	Petty Cash	500.00
1017	Petty Cash Checking	1,500.00
1025	First Foundation - General	0.00
1026	First Foundation - Payroll	0.00
1035	CB&T General Checking	(99,361.89)
1036	CB&T Payroll Checking	390,406.42
	Total Cash and Investments	16,980,026.55
	Current Assets	
1050	Accounts Receivable	1,227,440.88
1051	Lease Payments Receivable	29,910.24
1055	Fundware AR Clearing	0.00
1080	Interest Receivable	3,254.44
1085	Inventory	458,639.66
1166	Prepaid IT Service	3,274.61
1167	Prepaid Research Proposals	0.02
1168	Prepaid Expenses	258,530.00
1169	Deposits	960,204.00
	Total Current Assets	2,941,253.85
	Fixed Assets	
1170	Construction in Progress	61,542.43
1201	Leased Copier Asset #1 Ops Copier	14,694.42
1202	Leased Copier Asset #2 Admin Copier	19,670.89
1300	Equipment/Vehicles	2,171,814.40
1310	Computer Equipment	763,203.49
1311	GIS Computer Systems	301,597.91
1320	Office Furniture & Equipment	1,307,594.90

CVMVCD

Balance Sheet - Unposted Transactions Included In Report

As of 1/31/2024

		Current Year
1330	Land	417,873.30
1335	Oleander Building	5,665,861.83
1336	Signage	23,651.39
1340	Structures & Improvements	3,460,397.50
1341	Bio Control Building	6,923,882.74
1342	Bio Control Equip/Furn	43,986.77
1398	Amortization Leased Equipment	(34,365.30)
1399	Accumulated Depreciation	(11,973,428.02)
	Total Fixed Assets	9,167,978.65
	Other Assets	
1520	Resources to Be Provided	3,514,102.32
1525	Deferred Outflows of Resources	1,869,053.98
1530	Deferred Outflows of Resources - OPEB	1,246,348.00
1900	Due to/from	0.12
	Total Other Assets	6,629,504.42
	Total Assets	35,718,763.47
	Liabilities	
	Short-term Liabilities	
	Accounts Payable	
2015	Credit Card Payable	37,597.07
2017	Petty Cash Payable	0.00
2020	Accounts Payable	182,571.53
2030	Accrued Payroll	155,647.77
2035	Fundware AP Clearing	0.00
2040	Payroll Taxes Payable	74,413.85
2175	Claims/Judgements Payable	139.82
2185	Employee Dues	7,381.35
2401	Leased Copier Asset # 1	0.00
2402	Leased Copier Asset # 2	0.00
	Total Accounts Payable	457,751.39

CVMVCD

Balance Sheet - Unposted Transactions Included In Report

As of 1/31/2024

		Current Year
	Deferred Revenue	
2025	Deferred Revenue	0.00
	Total Deferred Revenue	0.00
	Total Short-term Liabilities	457,751.39
	Long-term Liabilities	
2100	Pollution Remediation Obligation	2,100,000.00
2110	OPEB Obligation	0.00
2200	Net Pension Liability	1,287,083.36
2210	Deferred Inflows of Resources	0.00
2230	Deferred Inflows - OPEB	367,983.00
2235	Deferred Inflow of Resources - Leases	29,910.25
2300	Net OPEB Liaibility	882,616.00
2500	Compensated Absences Payable	889,174.76
	Total Long-term Liabilities	5,556,767.37
	Total Liabilities	6,014,518.76
	Fund Balance	
	Non Spendable Fund Balance	
3920	Investment in Fixed Assets	10,673,170.66
3945	Reserve for Prepaids & Deposit	1,041,259.68
3960	Reserve for Inventory	459,270.86
	Total Non Spendable Fund Balance	12,173,701.20
	Committed Fund Balance	
3965	Public Health Emergency	4,851,276.00
	Total Committed Fund Balance	4,851,276.00
	Assigned Fund Balance	
3910	Reserve for Operations	5,800,000.00
3925	Reserve for Future Healthcare Liabilities	453,746.00
3955	Thermal Remediation Fund	63,688.00
3970	Reserve for Equipment	726,018.00
3971	Reserve for Facility & Vehicle Replacement	2,659,312.00

CVMVCD

Balance Sheet - Unposted Transactions Included In Report

As of 1/31/2024

		Current Year
3985	Reserve for Facility Capital Improvements	0.00
3990	Reserve for Future Constructio	0.00
	Total Assigned Fund Balance	9,702,764.00
	Unassigned Fund Balance	
3900	Fund Equity	(568,650.76)
3991	Prior Year Adjustment GASB87	20,909.82
3999	P&L Summary	2,675,725.04
	Total Unassigned Fund Balance	2,127,984.10
	Current YTD Net Income	
4531	Lease Income	0.00
8310	Amortization	0.00
8320	Interest Expense	0.00
	Other	848,519.41
	Total Current YTD Net Income	848,519.41
	Total Fund Balance	29,704,244.71
	Total Liabilities and Net Assets	35,718,763.47

Finance

The financial reports show the balance sheet, receipts, and revenue and expenditure reports for the month ending January 31, 2024. The revenue and expenditure report shows that the operating budget expenditure for July 1, 2023, to January 31, 2024, is $9,006,611 total revenue is $8,500,357 resulting in excess revenue over (under) expenditure for the year to January 31, 2024, of ($506,254).

Three Year Financials

	Actual	Budget	Actual	Actual
	1/31/2024	Budget	1/31/2023	1/31/2022
Revenue	8,500,357	7,894,720	7,588,526	6,772,205
Expenses				
Payroll	5,281,875	5,792,648	5,264,053	5,889,914
Administrative Expense	600,847	770,123	548,468	468,253
Utility	83,349	81,437	74,184	62,710
Operating Expense	1,632,281	1,888,218	1,207,206	1,089,447
Contribution to Capital Reserves	1,408,259	1,408,259	1,709,343	280,758
Total Expenses	9,006,611	9,940,685	8,803,254	7,791,082
Profit (Loss)	(506,254)	(2,045,965)	(1,214,728)	(1,018,877)

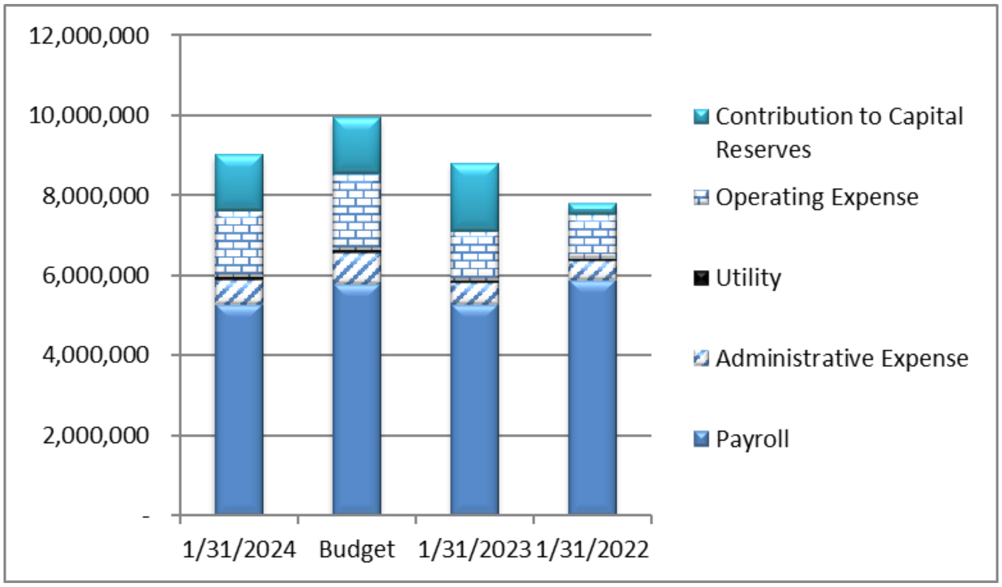


Figure 1 - Three Year Expenditure

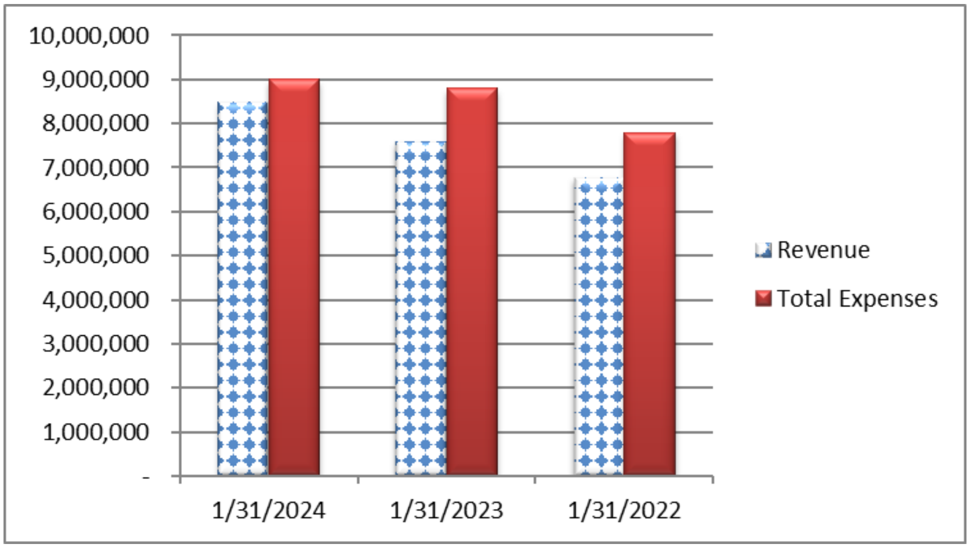


Figure 2 - Three-Year Revenue & Expenditure

THREE-YEAR CASH BALANCE

Cash Balances	1/31/2024	1/31/2023	1/31/2021
Investment Balance	16,686,982	14,213,937	13,301,658
Checking Accounting	(99,362)	(158,611)	(202,512)
Payroll Account	390,406	357,085	136,190
Petty Cash	2,000	2,000	2,000
Total Cash Balances	16,980,027	14,414,411	13,237,336

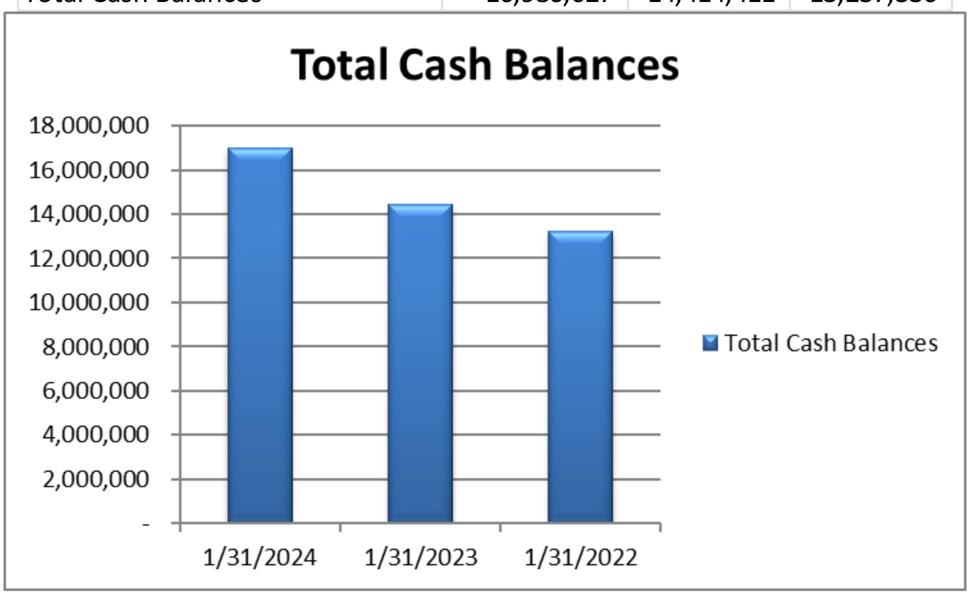


Figure 3 - Cash Balances

DISTRICT INVESTMENT PORTFOLIO 1/31/2024

The District's investment fund balance for the period ending January 31, 2024, is $16,686,982. The portfolio composition is shown in the pie chart. Local Agency Investment Fund (LAIF) accounts for 19% of the District's investments; the Riverside County Pooled Investment Fund is 57% of the total. The LAIF yield for the end of January was 4.01% and the Riverside County Pooled Investment Fund was 4.33 %. This gives an overall weighted yield for District investments of 3.69%.

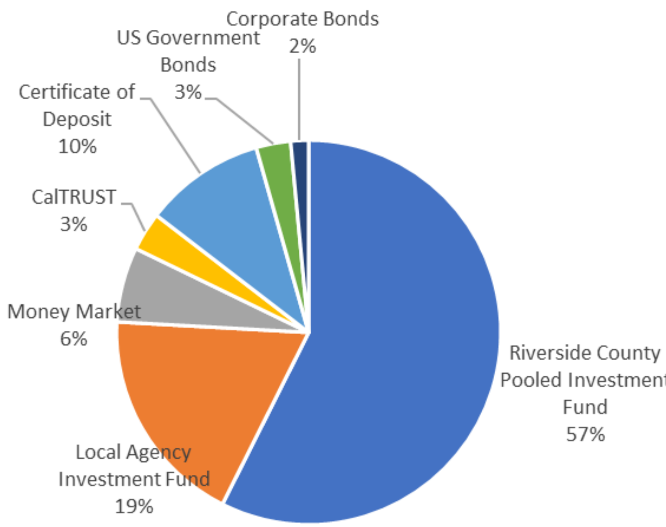


Figure 4 - Investment Portfolio 1/31/24

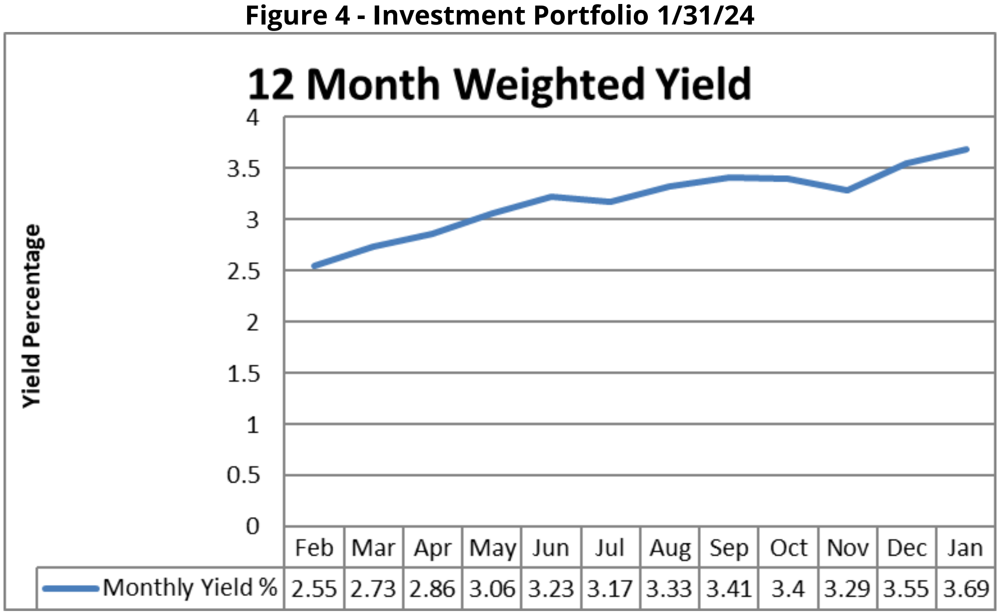
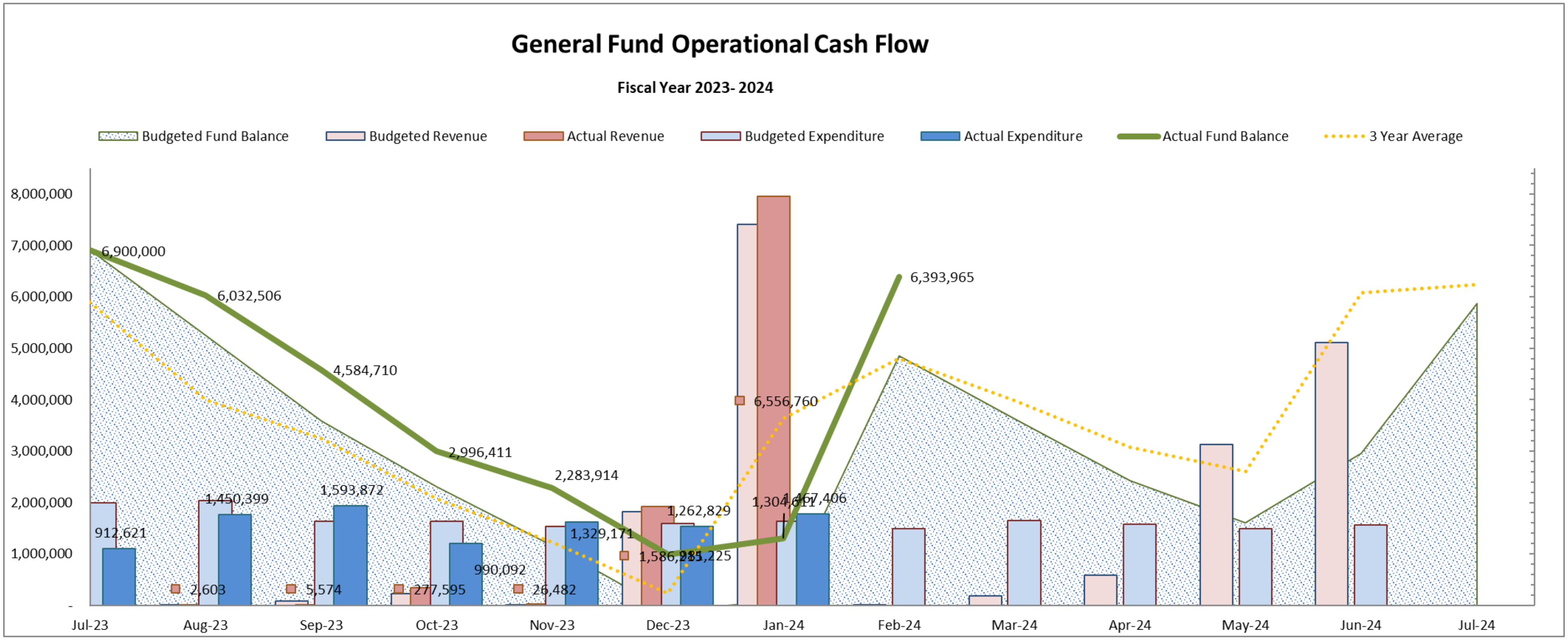


Figure 5 - District Investments Weighted Yield



The **General Fund Operational Cash Flow** graph outlines the District's working capital for the fiscal year July 1, 2023, to June 30, 2024. The beginning fund balance is $6.9 million and the ending fund balance is $5.9 million. Expenditure is approximately divided by 12 equal months, with some differences accounting for the seasonality of the program for example control products and seasonal employment which are greater in the mosquito breeding season. July expenditure is higher than average because of the prefunding lump sum of $0.2 million for CalPERS unfunded liability. The budget also accounts for prepayments. The revenue follows a different pattern, Riverside County distributes the property tax revenue in January and May with advancements in December and April. The *shaded area* represents the **Budgeted Fund Balance** which has a formula of (beginning) **Fund Balance** plus **Revenue** minus **Expenditure**. The *green line* represents the **Actual Fund Balance** and is graphed against the *shaded area* **Budgeted Fund Balance**. The *three-year average* Fund Balance is the orange dash line.

The graph shows a $6.9 million **Fund Balance** plus total Revenue for July 1 to January 31, 2024, of $8,500,357 minus total Expenses of $9,006,611 is $6,393,965. Revenue shows a favorable variance of $605,637 this is due distribution of redevelopment agency assets not budgeted, property taxes compared with last year are approximately 7% higher, budget forecast 5% higher. Payroll expenses show a favorable variance of $510,772, this is due to timing, $200,000 is earmarked for prefunding in Section 115 trust for pension liabilities, Administrative Expenses show a favorable variance of $169,275, $40,000 is budgeted for IT strategic plan, only $6k has been expensed for this item, Operations has a favorable variance of $255,937. Total favorable variance is $1,539,711. For planning purposes, the District is under budget. As long as the green line stays out of the shaded area the District is within budget, as of January 31, 2024, the line is outside the shaded area.

	Coachella Valley Mosquito and Vector Control District Staff Report	February 13, 2024

Agenda Item: Informational Item

Important Budget Meeting Dates

Background:
The Finance Committee and staff have scheduled the following meetings in preparation for the development of FY 2023-24 Budget. Please mark your calendars. We hope you can join us at these meetings as your input is very important.

- Tuesday, April 9, 2024 - **Finance Committee Meeting** 1:00 p.m. to 2:30 p.m. to discuss Budget draft #1
- Friday, May 3, 2024 - **Finance Committee Meeting** 1:00 p.m. to 3:00 p.m. to review the final Budget draft
- Tuesday, May 14, 2024 - Budget workshop with Board 4:30 p.m. to 5:30 p.m. *(Regular Finance Committee meeting: 3:30 p.m. to 4:30 p.m.)*
- Tuesday, June 11, 2024 - Regular Board meeting – Approval of FY 2024-25 Budget
- Tuesday, July 9, 2024 – Regular Board meeting and Public Hearing – Adopt Resolution approving Engineer's Report, Confirming Diagram and Assessment, and Ordering the Levy of Assessments for fiscal year 2024-25

	Coachella Valley Mosquito and Vector Control District **Staff Report**	**February 13, 2024**

Agenda Item: Informational Item

Semi-annual research reports from the University of California, Davis; University of California, Riverside; Mount Sinai School of Medicine; and the USDA for 2023 **— Jennifer A. Henke, M.S., BCE, Laboratory Manager**

Background:

The Research Department (Department 600) supports cooperative work with the University of California system and other research institutions for conducting mosquito-borne disease and vector research, optimizing control measures for vectors, and understanding vector biology. The proposals include examining control interventions to predict when to better time future applications; using mosquito excreta as another method of virus testing for remote locations; using biological control organisms to target adult mosquitoes in storm water systems; examining control strategies for house flies; and examining native ant populations that may interact with red imported fire ants. Each of the proposals was approved by the Research Committee and later approved by the full Board of Trustees at a November Board Meeting. The work is part of the 2022 Strategic Plan goal 5.2.

As described in the District's Research Funding Policy and Procedure, researchers are to provide semiannual progress reports. The projects below were approved for funding at the November 2022 board meeting. The reports are from the following proposals:

1. **Icahn School of Medicine at Mount Sinai (Dr. N. DeFelice)**
   - Forecasting West Nile Virus under extreme conditions
2. **UC Davis (Dr. L. Coffey)**
   - Evaluating metagenomic arbovirus detection using nanopore sequencing: a field-forward sequencing approach
3. **UC Riverside (Dr. A. Gerry)**
   - Attractive toxic sugar baits to control house flies near crop fields
4. **UC Riverside (Dr. A. Gerry and Mr. D. Popko)**
   - Attractive toxic sugar bait stations and integrated mosquito management in underground storm drain systems in the Coachella Valley
5. **USDA (Dr. D. Oi)**
   - Determining fire ant bait specificity to extend fire ant control by conserving non-target ants

An additional report from Dr. Oi of the USDA is for an earlier funded project that was initially delayed due to travel restrictions as part of COVID-19. A no-cost extension was granted, and that project is now complete.

Recommendation:

To accept the reports as presented

Attachments:

Reports from Dr. DeFelice, Dr. Coffey, Dr. Gerry, Mr. Popko, and Dr. Oi

Strategic Business Plan Alignment:

Goal 5 – Research leads to ongoing improvements in the District's performance

Strategic Response – Validate and improve vector control programs through applied scientific research.

Forecasting West Nile Virus under extreme conditions

Nicholas DeFelice, Meytar Sorek-Hamer, Aman Patel, Matthew J. Ward

Narrative

We are at an exciting juncture in infectious disease modeling: the point at which forecasting disease outbreak characteristics has evolved from an idea to an achievable reality. West Nile virus (WNV) is the leading domestically acquired arbovirus in the United States and ecologically informed forecast tools of WNV transmission hold promise for improving management decisions for abatement and public health interventions. We are expanding our current research developing a WNV forecast system, by tailoring it to the unique desert climate and extreme temperatures in Coachella Valley (CV). Recently we developed an environmentally forced forecast for CV substantiating cooler July's are associated with greater WNV risk. Here we aim to combine our environmentally forced forecast for CV with our compartmental vector-borne disease models describing WNV to more appropriately account for high temperatures and provide more robust spatially refined forecasts.

Integrating both real-time environment and mosquito monitoring data and their association with WNV amplification along with a biologically informed mathematical model describing the interactions between birds, mosquitoes and humans will allow for more certainty in the development of spatial/temporal risk predictions of WNV. This greater certainty will in turn allow for improved mosquito management decisions. We are building off current mosquito monitoring and aligning monitoring data with real-time environmental modeling data. This provides fine spatial resolution of the variability in the physical environmental factors (e.g., temperature and hydrology), which influence mosquito development, WNV transmission dynamics, and the potential risk of zoonotic events. This high resolution will allow us to identify groupings and relationships between trap data and environmental indicators of viral activity over time. Such high-resolution monitoring at the watershed and micro-climate level will enable a more comprehensive depiction of the fine-scale hydrologic variability associated with focal and sporadic WNV amplification and transmission. Better understanding fine-scale hydrologic variability will potentially allow focal transmission to be detected and eventually predicted.

We are using these techniques to develop spatially refined risk maps of WNV for public health and vector abatement districts. These maps will provide additional data to understand the process of how arboviruses amplify at a fine spatial scale. Highly resolved maps will further allow for appropriately timed interventions, such as public health warnings, or more intense and targeted mosquito control efforts in the areas of concern. More targeted interventions will allow the Coachella Valley Mosquito and Vector Control District to reduce the amount of pesticide it needs to put into the environment while maximizing its impact on disrupting the WNV transmission cycle.

Aim 1. Develop a parsimonious model to include an environmental factor and a temperature-forcing parameter that modulates the zoonotic transmission of WNV between mosquito vectors and avian hosts under extreme conditions.

Aim 2. Develop an ensemble model that combines our extreme temperature forced model with our environmentally informed statistical model to make real-time spatially refined WNV forecasts.

Aim 3. Integrate the high-resolution risk maps of the probability of WNV infected mosquitoes into a web-based platform to better communicate the spatial risk of WVN and skill of WNV forecasts. This will help guide the timing of two key mosquito control interventions: larviciding—insecticide applications targeting mosquito larvae, and adulticiding— insecticide applications targeting adult mosquitoes.

<u>Status</u>

Aim 1. Develop a parsimonious model to include an environmental factor and a temperature-forcing parameter that modulates the zoonotic transmission of WNV between mosquito vectors and avian hosts under extreme conditions.

The *Culex* mosquito population, when normalized by trap night, exhibits a pronounced bimodal structure. The overall population peaks in late spring to early summer (~CDC week 16) before drastically declining during the summer (~CDC week 30) before it rebounds during the fall (~CDC week 40) (Figure 1). The bi-modal structure is driven by the extreme heat of the summer (Figure 1) and is primarily composed of *Cx. tarsalis* in the Southern agricultural portion of the Coachella Valley (Figure 2). In contrast, *Cx. quinquefasciatus* in the South do not appear to recover to the same degree following the high heat events of the summer and neither species recovers in the Northern portion of the valley (Figure 2). Conversely, the infection rate per 1,000 mosquitoes tested (I_M) peaks during the summer (~CDC week 30) corresponding to the peak in average minimum daily temperature (Figure 1). The bimodal trend is also notable when comparing mosquito population to relative humidity (RH) (Figure 3) where the drop in RH is associated with the initial drop in mosquito populations in early summer. Further work is needed to fully understand the relationship humidity and temperature have on vector abundance and infection rates at the county level.

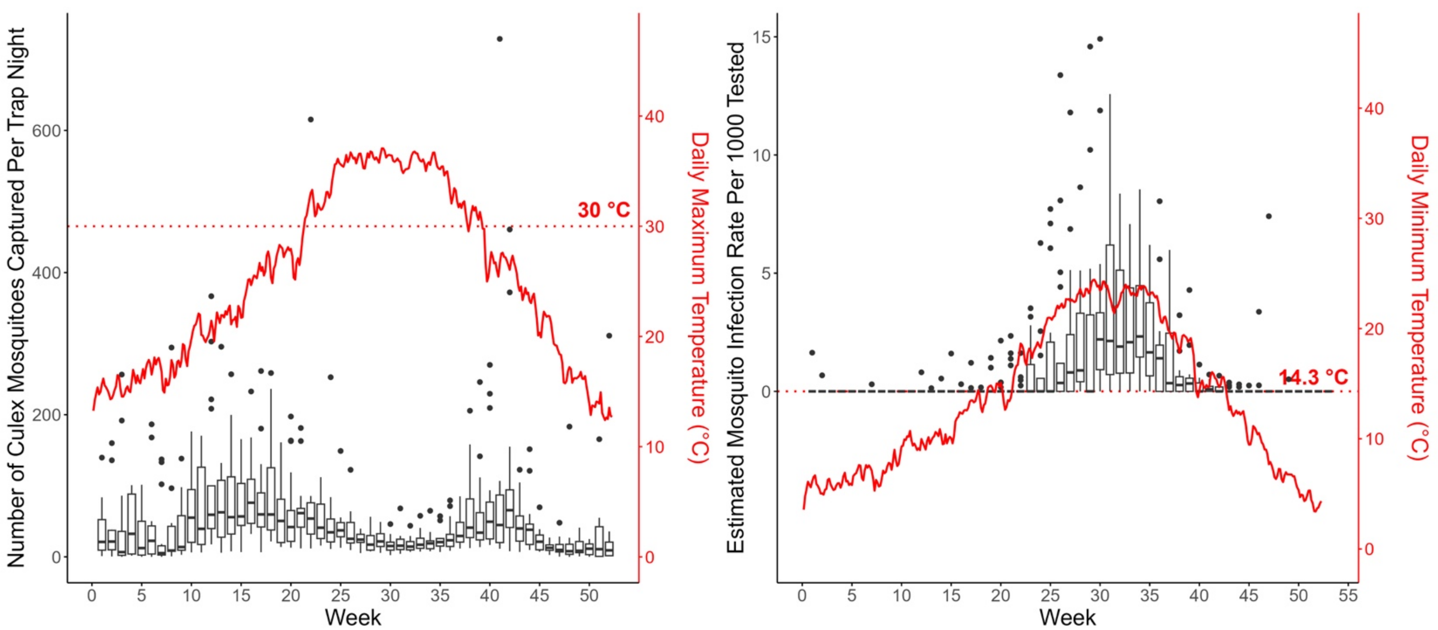


Figure 1. Historical *Culex* mosquito abundance in the Coachella Valley, number of infected mosquitoes per 1,000 tested, and ATMP from 2006 - 2022. Left: Weekly mean number of mosquitoes trapped per night (boxplot, dots = outliers > 1.5 x interquartile range (IQR) higher than the 75th percentile), maximum daily ATMP (red line), and temperature threshold for mosquito population decline (30 ºC, red dotted line). Right: Average weekly I_M (boxplot, dots = outliers > 1.5 x IQR higher than the 75th percentile), minimum daily ATMP (red line), and temperature threshold for viral amplification (14.3 ºC, red dotted line) (Reisen et al., 2006).

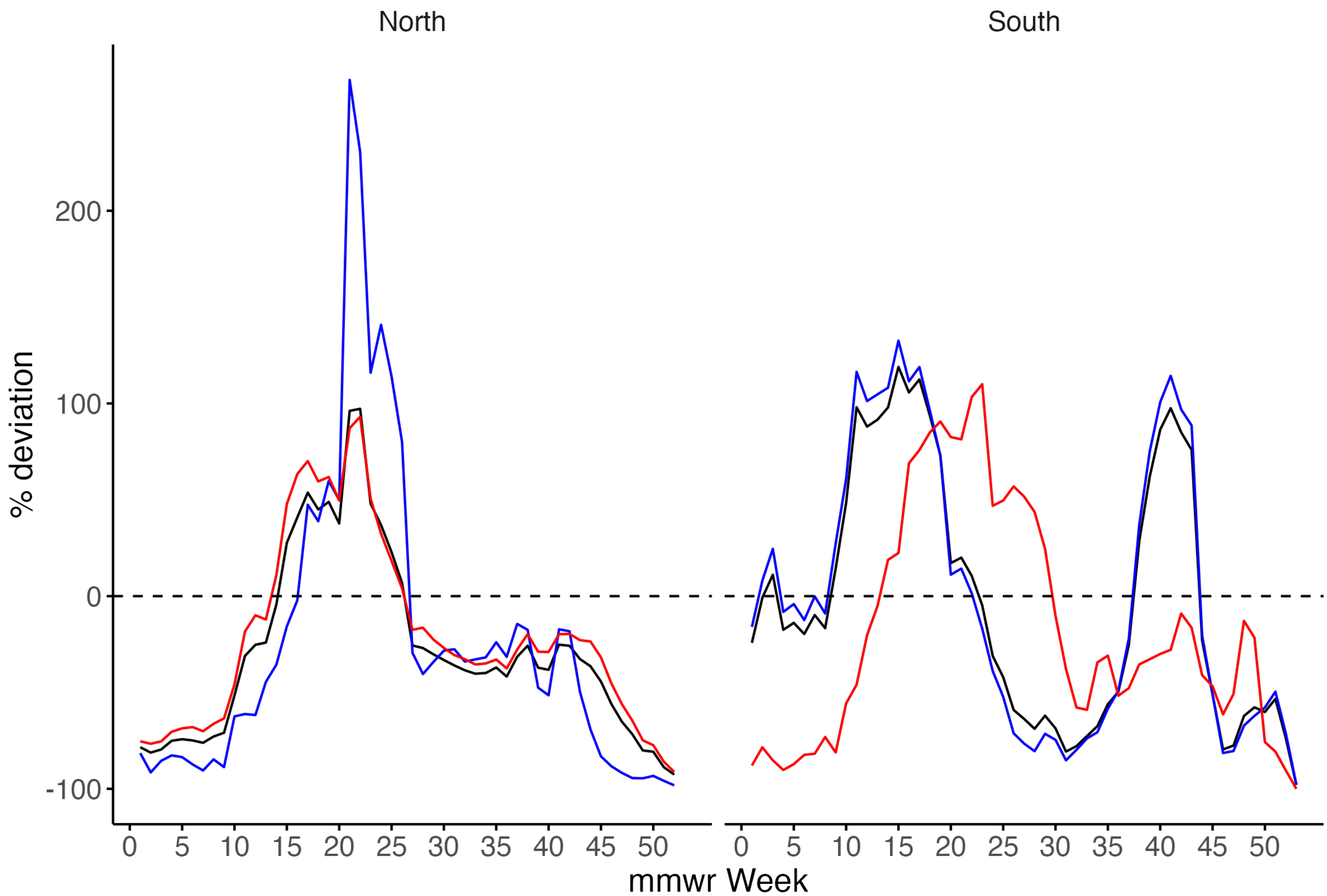


Figure 2. Percent deviation of the two-week rolling mean of mosquitoes per trap night from the five-year historical mean in the North and South of Coachella Valley for 2006 – 2023 (all *Culex* – black, *Cx. tarsalis* – blue, *Cx. quinquefasciatus* – red). Only traps with at least ten years of data and at least five weeks of data per year were included.

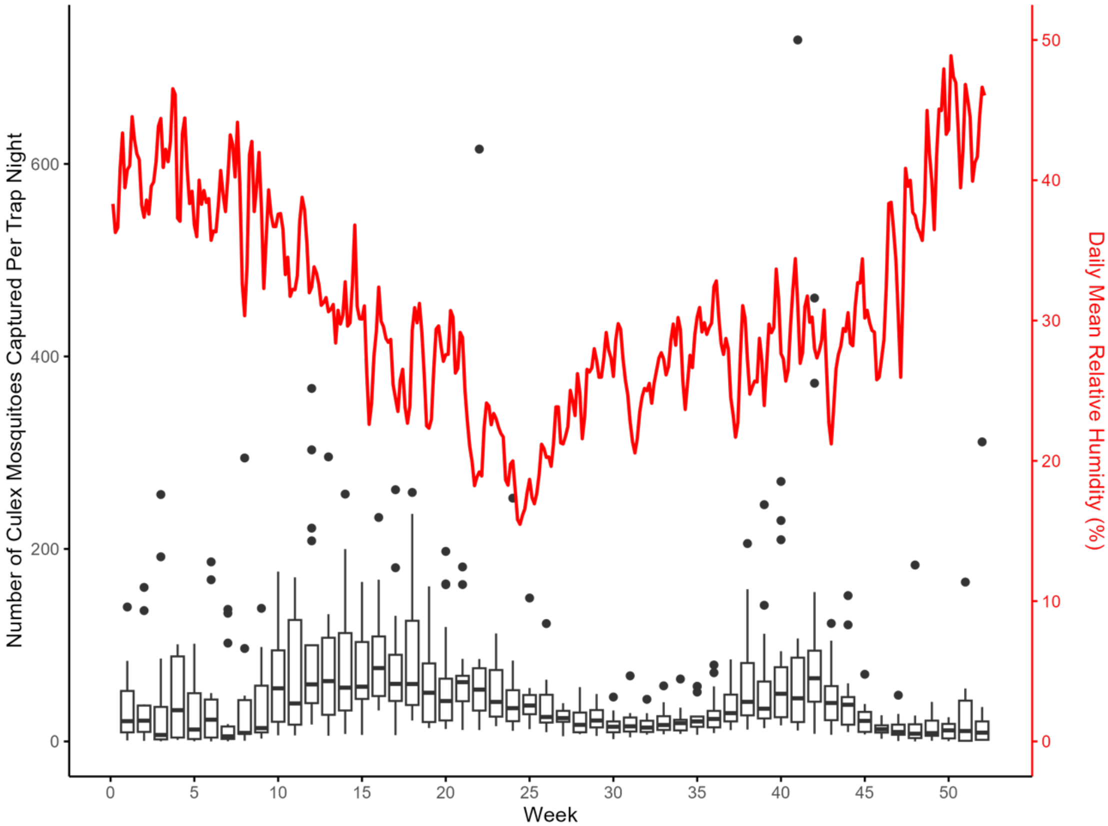


Figure ~~3~~4. Historical CV *Culex* mosquito abundance between 2006 - 2022. Weekly mean number of mosquitoes trapped per night (boxplot, dots = outliers > 2*SD), daily relative humidity (red line).

Aim 2. Develop an ensemble model that combines our extreme temperature forced model with our environmentally informed statistical model to make real time spatially refined WNV forecasts.

Building on Aim 1, we generated environmental groupings from a combination of hydrology and meteorological conditions to identify the most relevant combination of environmental conditions for viral amplification. We used these to develop a robust inference system able to improve our current understanding of how meteorological and hydrological conditions over time influence WNV activity. Mosquito trapping data was used to calculate the WNV infection rate at the annual time step using the maximum likelihood estimate (MLE) and different remote sensing platform scales (NLDAS 13km^2, Figure 4). Model testing is currently underway using remote sensing variables including surface temperature and evapotranspiration from the ECOSTRESS platform (70m resolution) to develop even higher resolution risk predictions of when a trap 1st tests positive. Here we present our results at the larger spatial scale NLDAS (13km^2) using evapotranspiration (ET) and atmospheric temperature (ATMP). While historically we see *Cx. tarsalis* in greater overall abundance than *Cx. quinquefasciatus* (Figure 5), this model currently uses an aggregate of both species. We employed a multi-model average prediction of different combinations of meteorological and hydrological data (i.e., temperature and evapotranspiration). By developing a multi-model inference system, we provide a formal probabilistic interpretation across the disparate individual model predictions. This allows us to determine which models align with the ensemble, indicating an association between environmental conditions and the increased risk of WNV infection rates. The model results demonstrate that a cool, dry winter, followed by a warm, wet spring, followed by a cooler than normal summer, is associated with an increased risk of WNV (Figure 6).

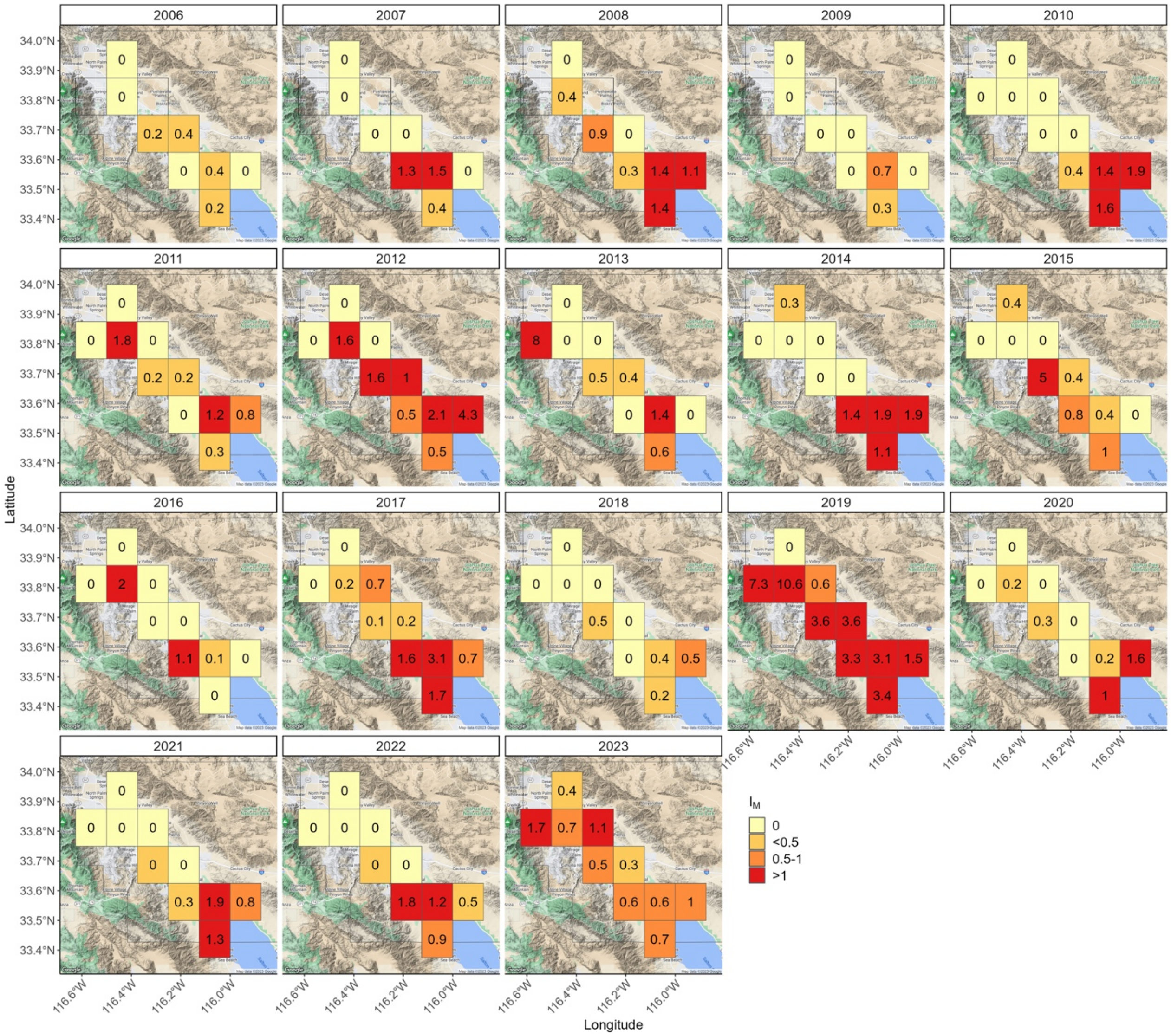


Figure 4. Annual WNV infection rate per 1,000 *Culex* mosquitoes tested (I_M) at the NLDAS scale (13 km^2 grid) in the Coachella Valley, CA.

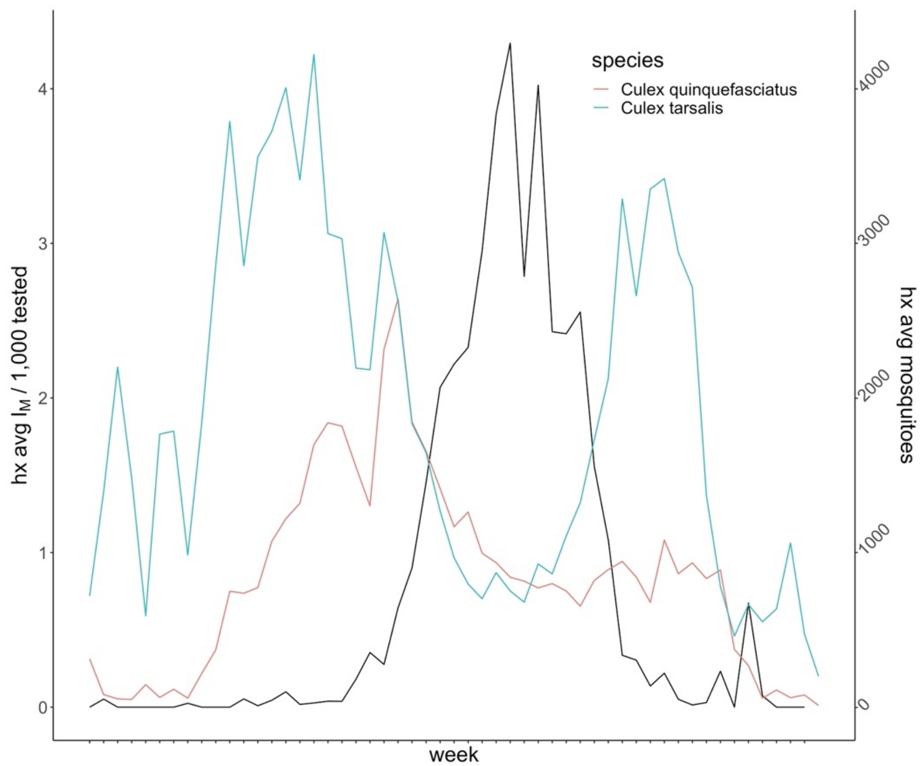


Figure 5. Weekly infections per 1,000 of *Culex* mosquitoes tested (black), the number of female *Culex quinquefasciatus* (red). *and Culex tarsalis* (green) mosquitoes trapped in the Coachella Valley, CA; 2006 - 2022. *Cx. quinquefasciatus* and *Cx. tarsalis* are combined for the infection rate (black).

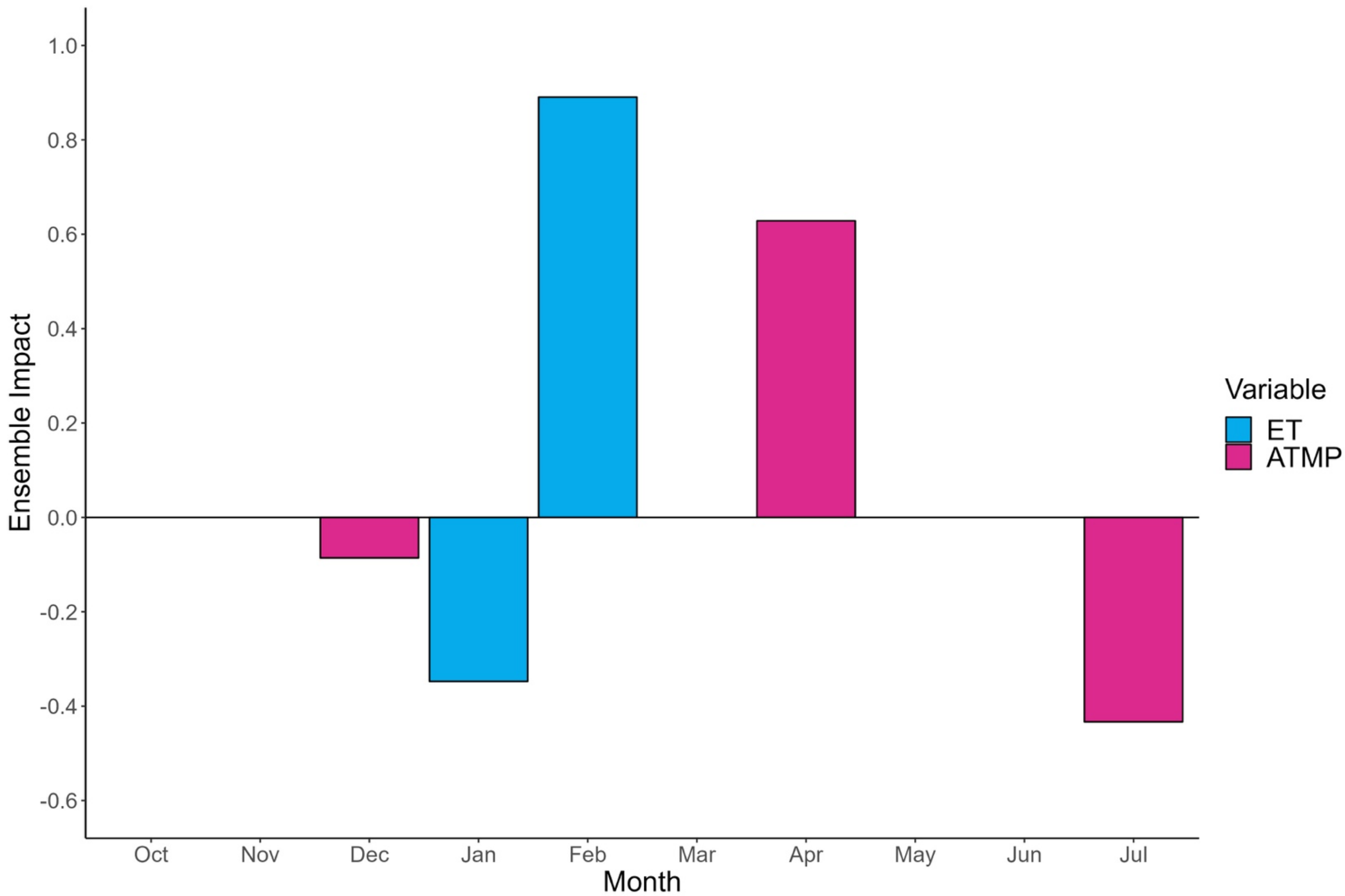


Figure 6. Effect and contribution of ET and ATMP to the ensemble model associated with the estimated change of $\mathbf{I_M}$ at the monthly NLDAS grid scale (0.125° or ~ 13 km^2) for 2006 - 2021. Bars indicate the weight and direction of deviation of ATMP and ET in the ensemble from the average that increases $\mathbf{I_M}$ ($^{+Blue}/_{-Red}$).

Aim 3. Integrate the high-resolution risk maps of the probability of WNV infected mosquitoes into a web-based platform to better communicate the spatial risk of WVN and skill of WNV forecasts. This will help guide the timing of two key mosquito control interventions: larviciding—insecticide applications targeting mosquito larvae, and adulticiding— insecticide applications targeting adult mosquitoes.

Building on Aims 1 & 2 we have used our ensemble model results and both seasonal and geographical (NLDAS) scales to map the infection rate of WNV in the CV (Figures 6 and 7 were seasonal spatial forecasts). Generally, these models indicate that a dry winter followed by a wetting period and a warm spring followed by a cooler-than-normal summer increase the risk of WNV and are the best predictors of WNV rates in CV. Furthermore, we have mapped these forecasts and their prediction rates for NLDAS and evaluated the forecast accuracy by grid cell for 2023 (Figure 7). Forecasts were deemed accurate if a prediction was above or below 1 infected mosquito per 1,000 tested in each grid cell. One infected mosquito per 1,000 tested annually represents around the 75^{th} percentile and what we defined as high risk for transmission.

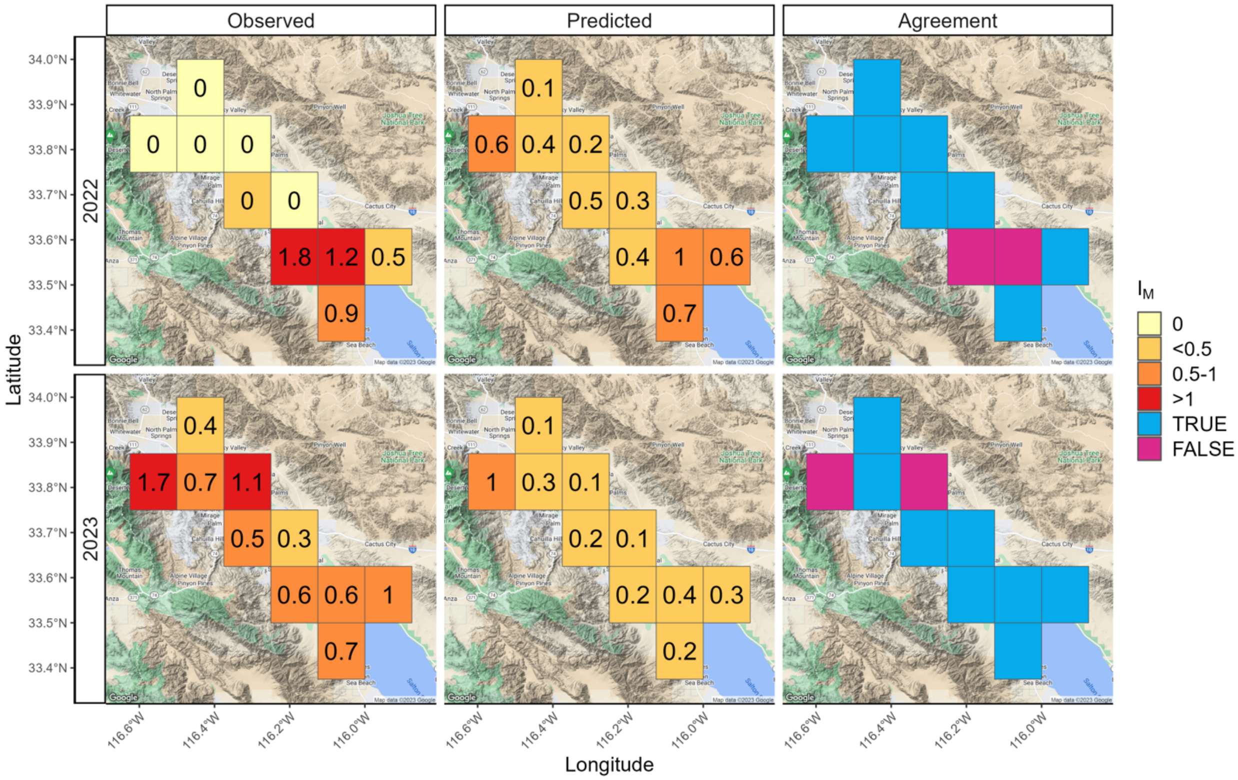


Figure 7. Left; observed infection rate (infected mosquitoes/1,000 mosquitoes tested) in 2022 and 2023. Center; predicted infection rate of mosquitoes in 2022 and 2023 using a four-predictor model. Right; Cells agreeing with 4-predictor ensemble model using a ≤ 1 mosquito/1000 tested cutoff at the NLDAS spatial scale for the Coachella Valley, CA.

Real-Time Forecast for 2023

Here we present an environmentally informed ensemble forecast of the annual *Culex* mosquito West Nile virus (WNV) annual infection rates at a 13 km^2 resolution for 2023 generated in June of 2023. This forecast was generated for Coachella Valley, CA using a multi-model inference system that was calibrated using data from 2006 to 2021.

The multimodal inference system was generated using a 4-parameter model, which accounted for all monthly combinations of evapotranspiration and atmospheric temperature from November to July. We used a combination of the best fitting models based on their goodness of fit (Akaike Information Criteria [AICc]), where all models with all parameters statistically significant were included. The Akaike weights are calculated to include the top 95% of models. Four models were identified to provide a combination of environmental events to help explain the environmental factors that are associated with WNV mosquito infection rate amplification. These factors were a cooler than normal December, a drier than normal January, followed by a wetter than normal February, a warm April, and a cooler July. This inference system was calibrated using data from 2006 to 2021, then forecasts were generated to identify areas of concern in 2022 & 2023. Areas of concern were defined as an annual infection rate greater than 1 infectious mosquito per 1,000 tested. Retrospectively, this 4-predictor ensemble forecast was able to correctly predict if the area was above or below the annual infection rate greater than 1 infectious mosquito per 1,000 tested 80% of the time in 2022 & 2023. Here we generated environmentally informed forecasts monthly using environmental data through August 2023, Figure 8.

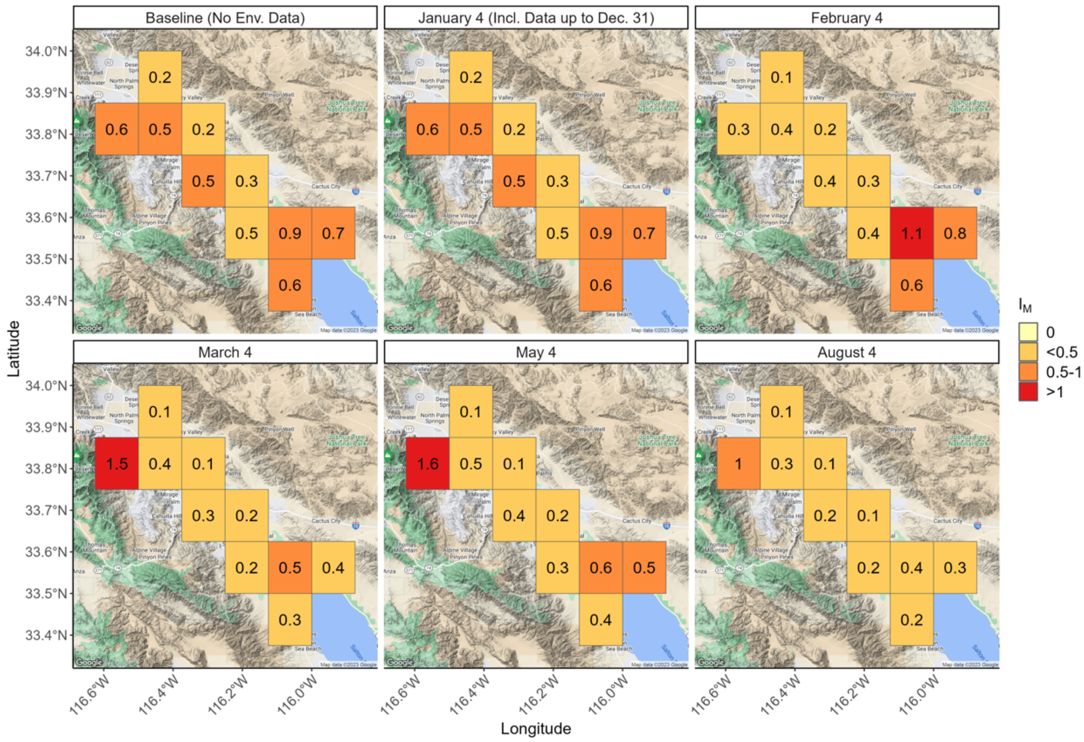


Figure 8. A 13 km^2 forecast of annual infectious mosquitoes for 2023, generated monthly on denoted forecast dates using available NLDAS data from November 2022 to August 2023. Monthly forecasts include all environmental data prior to the forecast date.

Web Application for Data and Forecast Visualization

We are currently finalizing an R Shiny App for mosquito and environmental data visualization, as well as WNV forecast visualizations at county, NLDAS, and ECOSTRESS spatial scales. Users will be able to simulate how future environmental conditions will affect the annual WNV infection rate prediction (Figures 9 & 10). The application is undergoing final testing and should be available online for end-user testing in the spring of 2024.

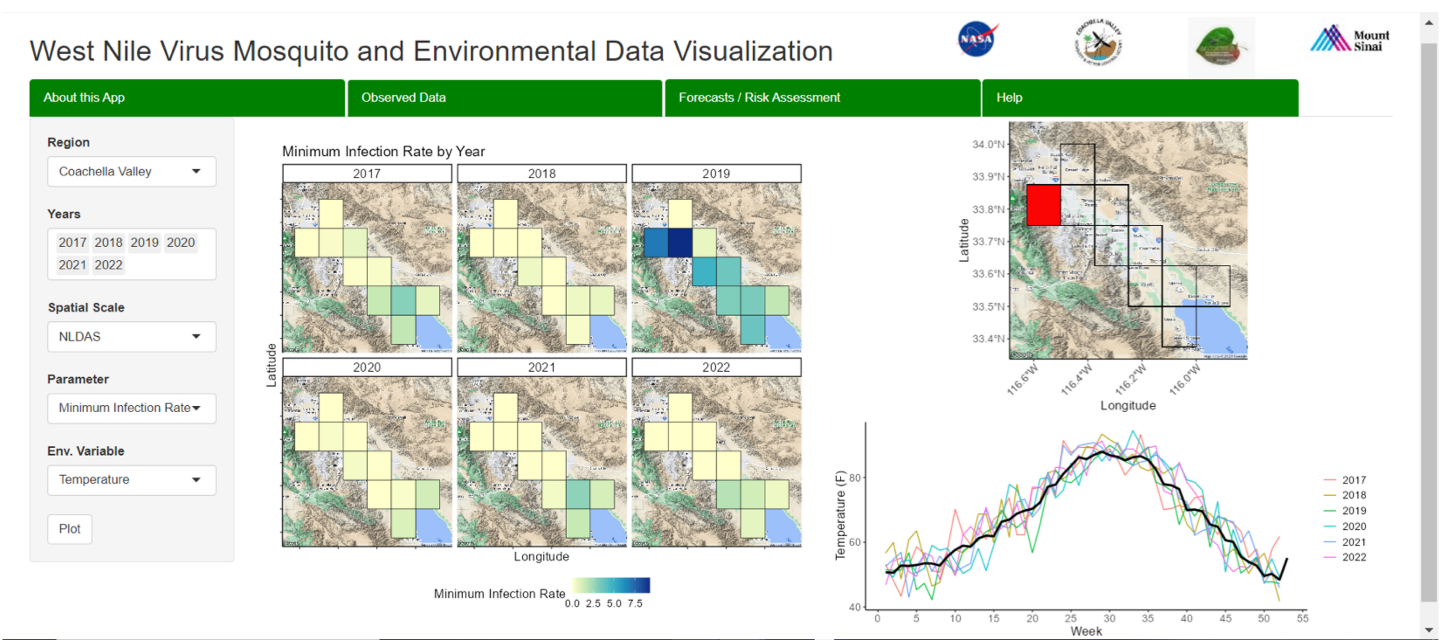


Figure 9. Mosquito and environmental data visualization at NLDAS spatial scale. **Left:** Sidebar with user inputs for plot generation. **Center:** Mosquito WNV minimum infection rates by NLDAS cell for 2017 - 2022. **Right:** Weekly mean 2-meter atmospheric temperature in 2017 - 2022 for the selected NLDAS cell (red) and overall weekly mean atmospheric temperature for the selected NLDAS cell (black line).

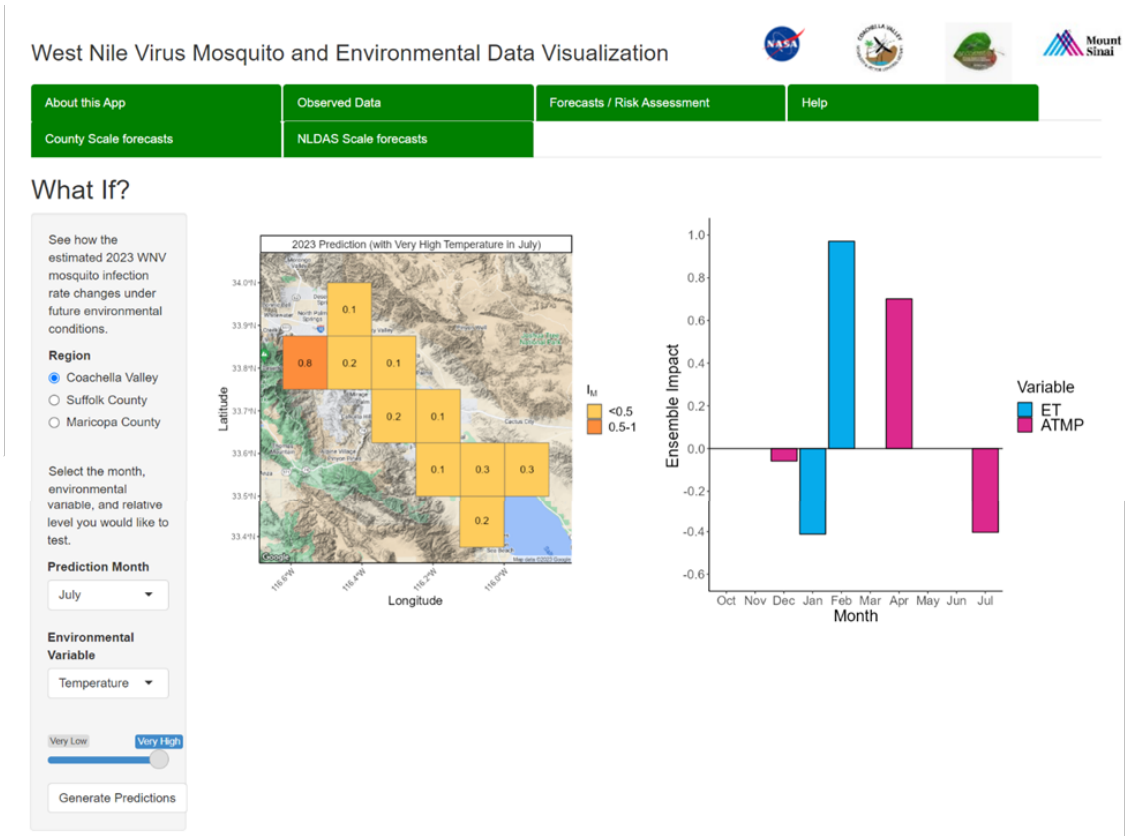


Figure 10. Real-time 2023 forecast of mosquito WNV infection rates at NLDAS spatial scale. **Left:** Sidebar with user inputs for plot generation. **Center:** Forecast map of 2023 predicted mosquito WNV infection rate by NLDAS cell. **Right:** Effect and contribution of ET and ATMP to the ensemble model associated with the estimated change of $\mathbf{I_M}$ at the monthly NLDAS grid scale (0.125° or ~ 13 km^2) for 2006 - 2021. Bars indicate the weight and direction of deviation of ATMP and ET in the ensemble from the average that increases $\mathbf{I_M}$ ($^{+Blue}/_{-Red}$).

General Outcomes

In the first year, this project has resulted in two conference presentations, the development of a prototype version of web-based application for WNV infection forecasting in mosquitoes, and a manuscript published in AGU's GeoHealth.

Deliverables and accomplishments
Year 3:

- Downloaded and processed 925 overpasses (through December 2021) for Coachella Valley, CA
- Downloaded and processed 512 best observations for Coachella Valley, CA during the West Nile virus season
- Processed mosquito trapping and pesticide data
- Presented at ESA-ESRIN, Italy

- Presented at ISEE, Oregon
- Develop 13 km^2 environmentally informed forecasts and compared to annual WNV infection observations in real time in 2023 for months available
- The forecast model was accurate for 80% of predictions from 2022 to 2023
- Manuscript published in AGU's GeoHealth
- Developed prototype Shiny application

<u>Publications, Submitted Manuscripts, Manuscripts in Preparation, Presentations</u>

- Ward MJ, Sorek-Hamer M, Henke JA, Little E, Patel A, Shaman J, Vemuri K, DeFelice NB. A Spatially Resolved and Environmentally Informed Forecast Model of West Nile Virus in Coachella Valley, California. Geohealth. 2023 Dec 7;7(12):e2023GH000855. doi: 10.1029/2023GH000855. PMID: 38077289; PMCID: PMC10702611.
- Ward, Matthew J., Meytar Sorek-Hamer, Yuxuan Chen, Jennifer Henke, Aman Patel, Nicholas DeFelice. *Disparities in risk of West Nile virus transmission in Coachella Valley, CA.* Poster Presentation. International Society for Environmental Epidemiology. OSU, Corvallis, Oregon. June 20, 2023.
- Ward, Matthew J., Meytar Sorek-Hamer, Yuxuan Chen, Jennifer Henke, Aman Patel, Nicholas DeFelice. *Disparities in risk of mosquito-borne arbovirus transmission in Coachella Valley, CA.* Poster Presentation. International Workshop on High-Resolution Thermal EO. ESA-ESRIN, Frascati, Italy. May 10 - 12, 2023.
- Ward, M.J., Sorek-Hamer, M., Vemuri, K.K., DeFelice, N.B. (2023). Statistical Tools for West Nile Virus Disease Analysis. In: Bai, F. (eds) West Nile Virus. Methods in Molecular Biology - Springer Nature, vol 2585. Humana, New York, NY. https://doi.org/10.1007/978-1-0716-2760-0_16. November 5, 2022.
- Holcomb, K. M., Mathis, S., Staples, J. E., Fischer, M., Barker, C. M., Beard, C. B., DeFelice, N., ... & Johansson, M. A. 2022. Evaluation of an open forecasting challenge to assess skill of West Nile virus neuroinvasive disease prediction.
- DeFelice, N. B. M. Sorek-Hamer, MJ. Ward, K. Vemuri, J. Henke,. An ECOSTRESS environmentally informed statistical model for West Nile virus infection rates among mosquitoes in the Coachella Valley, CA. ESA. Montreal CA, August 18, 2022.
- Ward, Matthew J., Meytar Sorek-Hamer, Jennifer Henke, Krishna Vemuri, Nicholas DeFelice. *Developing high-resolution risk maps of West Nile virus in Coachella Valley using ECOSTRESS data.* AMCA Annual meeting. March 5, 2021.
- Ward, Matthew J., Meytar Sorek-Hamer, Jennifer Henke, Krishna Vemuri, Nicholas DeFelice. *Developing high-resolution risk maps of West Nile virus in Coachella Valley using ECOSTRESS data.* PacVec Annual meeting. February 17, 2021.
- Ward, Matthew J., Meytar Sorek-Hamer, Jennifer Henke, Krishna Vemuri, Nicholas DeFelice. *Developing high-resolution risk maps of West Nile virus in Coachella Valley using ECOSTRESS data.* MVCAC Annual meeting. February 1, 2021.
- Keyel, Alexander C., Morgan E. Gorris, Ilia Rochlin, Johnny A. Uelmen, Luis F. Chaves, Gabriel L. Hamer, Imelda K. Moise, Marta Shocket, A. Marm Kilpatrick, Nicholas B. DeFelice, Justin K. Davis, Eliza Little, Patrick Irwin, Andrew J. Tyre, Kelly Helm Smith, Chris L. Fredregill, Oliver Elison Timm, Karen M. Holcomb, Michael C. Wimberly, Matthew J. Ward, and Rebecca L. Smith. *A qualitative evaluation of West Nile virus models and their application to local public health decision-making.* Accepted, PNTD. August 2021.
- Ward, Matthew J., Meytar Sorek-Hamer, Jennifer Henke, Krishna Vemuri, Nicholas DeFelice. *Using space based high resolution remote sensing data to forecast WNV in Coachella Valley, CA.* PacVec Fall seminar seeries. November 9, 2021.
- DeFelice N.B., 2021 Forecasting West Nile Virus AMCA Annual meeting. March 3, 2021.
- DeFelice, N; Sorek-Hamer, M; Ward, M; Vemuri, K; Henke, J; Campbell, S; Romano, C; Santoriello M. An environmentally informed statistical model and forecast system for West Nile virus infection rates among mosquitoes in the Coachella Valley, CA. AGU Fall Meeting 12/15/2021.
- Ward, Matthew J., Meytar Sorek-Hamer, Jennifer Henke, Krishna Vemuri, Nicholas DeFelice. *Developing high-resolution risk maps of West Nile virus in Coachella Valley using ECOSTRESS data.* Proceedings and Papers of the Mosquito and Vector Control Association of California, 89(1):000–000.

Prospects

We are in the final phase of running models to developing an environmentally forced forecasts system for WNV that maximizes our understanding how meteorological conditions are most appropriate for WNV amplification in Coachella Valley. Over the next year (Table 1) we will finalize our probabilistic models using environmental indicators, specifically shifting to incorporate ECOSTRESS data at the hyper-fine spatial scale of 70m. We will use this fine-scale to develop an understanding of the temporal role climatic and hydrological parameters influence WNV transmission at a micro-climate scale. We will then generate environmentally informed early season risk forecast maps at this fine scale. Additionally, we will continue development of a web-based tool allowing for real time visualization of risk driven by our ensemble model system.

Table 1. Project timeline.

	Year 1			
	Q1	Q2	Q3	Q4
Task #1				
Develop Model-EAKF system for extreme temperature	■	■	■	■
Task #2				
Develop downscaled weights for NLDAS grid and Model-EAKF		■	■	■
Feasibility study		■	■	■
Feasibility study complete				
Task #3				
Forecast at fine spatial scale				■
Verify decision support system				■
Verify decision support system complete Implement in real time Integrate into Shiny Application				

January 23, 2024
Progress Report
Lark L. Coffey, Rochelle Leung
University of California, Davis

This report details progress on our project *Evaluating metagenomic arbovirus detection using nanopore sequencing: a field-forward sequencing approach*. The objective of this project is to evaluate and optimize a system for unbiased metagenomic arbovirus detection using hand-held low-cost nanopore sequencers from samples collected for arbovirus surveillance using mosquito pool excreta in locations around the Salton Sea in the Coachella Valley.

Our progress was significantly delayed with the departure of our medical entomologist, Dr. Ana Ramirez. Dr. Ramirez accepted a job as a science writer at Jackson Laboratories in January 2023. (Her departure reflects the increasing exodus of talent from academia for higher paying industry jobs). Unfortunately, Dr. Ramirez was not able to fully train our lab assistant Rochelle Leung, BS, who is now leading the project. Our efforts have therefore centered on training Ms. Leung to achieve laboratory and biosafety proficiency for all project components. Ms. Leung completed some aspects of the project, including validation of mosquito excreta processing and testing protocols. She also validated qRT-PCR protocols for detecting St. Louis encephalitis virus (SLEV) and West Nile virus (WNV) RNA in samples using known positive and negative controls, and tested mosquito excreta samples provided by CVMVCD. These latter methods and results are detailed below:

Methods: CVMCVD deployed and collected 4 FTA cards from each of 4 mosquito traps set weekly from September-December 2022 and March-November 2023. Cards were sent to UC Davis where they were cut into 5-6 strips and submerged in 1 ml of sterile water, incubated for 20 minutes, and vortexed every 5 minutes to ensure that the strips were thoroughly soaked. Then, the strips were removed and inserted into a sterile 5 ml syringe using forceps. Water was squeezed out of the strips into a 2 ml tube. Approximately 375-600 μl of water was eluted from each card. Nucleic acids were extracted from the eluates using an AM1836 Viral RNA Isolation or MagMax express kit, where extracted RNA was eluted in 65-90 μl of elution buffer. Residual eluate was archived in case of need for later use. Extractions were tested for viral RNA in triplicate by RT-qPCR using an established and validated SLEV, WNV, WEEV triplex assay.

Results: Nucleic acids were extracted from 299 FTA cards collected between 9/9/2022 and 8/18/2023. Of these 299 cards, 8 (2.7%) had a detectable SLEV or WNV RNA (**Table 1**). The positive detections occurred in both summers from early September to the end of October and at 3 different sites. Both SLEV and WNV RNA were detected at site 35 in different weeks in October 2022.

Table 1. FTA Cards with detectable WNV or SLEV RNA.

Cards	Trap Set Date	Pick-up Date	Sites	Virus species detected
A1.11	9/2/2022	9/9/2022	121	WNV
A1.12	9/2/2022	9/9/2022	121	WNV
D1.5	9/16/2022	9/23/2022	131	SLEV
D1.6	9/16/2022	9/23/2022	131	SLEV
B2.5	9/23/2022	9/30/2022	35	SLEV
B3.3	9/30/2022	10/7/2022	35	WNV
B2.14	10/21/2022	10/28/2022	35	SLEV
B2.16	10/21/2022	10/28/2022	35	SLEV

Data from vectorsurv.org shows 14 instances where mosquito pools tested positive for either WNV or SLEV RNA (**Table 2**), all of which originate from the same regions the FTA cards were placed throughout the duration of this study. There was no overlap in time between FTA card detections and mosquito pool positives. Sites 35 and 121 had detectable WNV or SLEV RNA in FTA cards and mosquito pools, although not in the same weeks; for these 2 sites, sometimes mosquito pool detections preceded FTA card detections, and sometimes FTA detections occurred earlier in time than mosquito pool detections.

Table 2. CVMVCD SLEV and WNV RNA detections in mosquito pools in the same locations and period FTA cards were used.

Sites	Trap Code	Date Collected	Virus species detected	Corresponding FTA Card
35	B	9/13/2022	SLEV	n/a
35	B	9/15/2022	SLEV	n/a
121	A	9/20/2022	SLEV	n/a
131	D	11/4/2022	WNV	n/a
121	A	6/6/2023	SLEV	n/a
610	D	7/6/2023	SLEV	n/a
131	D	7/6/2023	SLEV	n/a
121	A	7/11/2023	SLEV	n/a
35	B	8/2/2023	WNV	No data yet
121	A	9/19/2023	WNV	No data yet
610	D	9/12/2023	SLEV	No data yet
610	D	10/11/2023	WNV	No data yet
35	B	10/24/2023	SLEV	No data yet
121	A	10/31/2023	WNV	No data yet

Interpretations: Detection of SLEV and WNV RNA in FTA cards from mosquito cages validates this approach as a complement to routine mosquito surveillance activities in that it can detect arboviruses in mosquitoes at non-overlapping times compared to mosquito surveillance.

Future Directions: We have not performed project Aim 1, which is focused on developing a protocol for metagenomic arbovirus detection from mosquito pools and excreta samples collected in remote and arid locations using nanopore sequencing. The first step of this aim involves validating the protocol with experimentally WNV-infected mosquitoes. Ms. Leung is in the process of gaining BSL-3 proficiency to enable her completion of this work. She is attending the BSL-3 training course at UC Irvine in January 2024 and will begin a period of supervised training with other members of the laboratory who have BSL-3 mosquito studies in progress. Once she is approved as a user, Ms. Leung will perform the laboratory validation protocols to enable and use the sequence approach proposed (**Figure 1**).

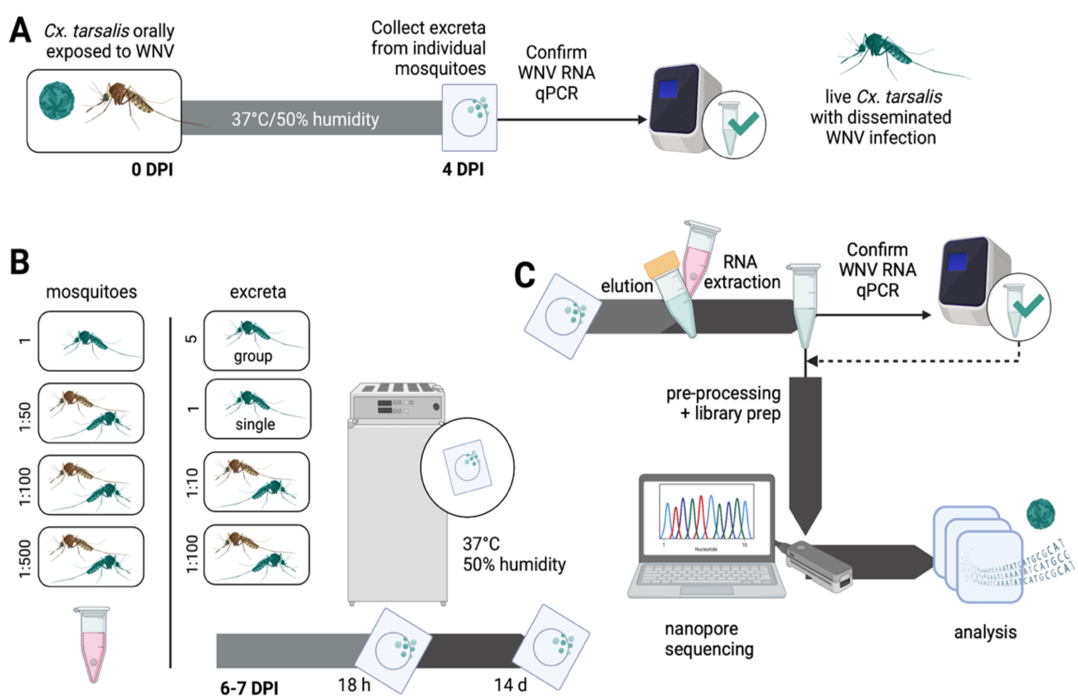


Figure 1. Evaluation of metagenomic arbovirus detection from mosquito excreta in arid conditions. **A**) Production of *Culex tarsalis* mosquitoes with disseminated WNV infection, confirmed on day four post-exposure to oral WNV by testing their excreta by qRT-PCR. **B**) Experimental design for generating WNV+ pools and excreta samples in arid conditions. Each experiment will be conducted in duplicate. **C**) Sample processing, sequencing, and analyses to generate WNV genomes.

Annual Report (December 2023): Attractive Toxic Sugar Bait (ATSB) to Control House Flies near Crop Fields

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Project Aims

Develop attractive toxic bait stations (ATSB) for targeted control of house flies associated with agricultural crop fields, particularly for use to reduce dispersal of house flies from agricultural fields to surrounding properties.

This project aims to 1) test various fermented attractants in the laboratory to identify the most attractive material to house flies that could be coupled with commercial bait formulations, 2) test commercial bait with or without attractant under field conditions to determine if attractant increases fly capture under these conditions, and 3) evaluate use of ATSB stations (commercial bait + attractant) arranged in a trap barrier to reduce fly dispersal beyond the barrier.

Background and Significance

Animal agricultural facilities control house flies through cultural practices (e.g., manure removal) and/or through the application of insecticides as sprays, fogs, or toxic baits. However, these practices are not applicable for control of flies associated with human food crop fields. Instead, methods are needed to selectively target house flies while limiting exposure of crops and field workers to insecticides. In recent years, there has been increased interest in the use of attractive toxic sugar baits (ATSB) for controlling flies of medical importance (e.g., Schlein and Muller 2010) including eye gnats (Jiang and Mulla 2006). ATSB employs a strong attractant (often a fermenting fruit juice) coupled with a sugar-based food source containing a toxicant material to kill insects feeding on this food source. A nice review of ATSB formulations, including toxicants, tested for control of mosquitoes and other important Diptera is provided by Fiorenzano (2017).

Attractive Toxic Sugar Bait (ATSB) stations rely on the use of volatile compounds (attractive odors) to draw pest flies to a food source containing sugar (bait) and an insecticide (or toxicant) to kill flies feeding on the bait. ATSB methods have been explored primarily for control of blood-feeding insects such as mosquitoes and sandflies but may be applicable for control of a range of pest insects, including the house fly (*Musca domestica*). Sugar baits containing an insecticide have been commercially available and used to manage flies for over 40 years. These “fly baits” are typically dry granular formulations comprised of sucrose, an insecticide, and often a putative fly sex pheromone.

Following many years of personal experience using commercial fly baits, it is evident that dry granular fly baits are not attractive to house flies over any substantial distance. Flies do not appear to make directed movements toward fly baits even over short distances of a meter or so. Rather, flies simply encounter the insecticidal bait as they move about foraging for food. Once encountered, flies readily feed on the bait (unless they are behaviorally resistant) due to the presence of sucrose with fly death due to ingestion of the insecticide formulated into the bait. Fly bait efficacy could therefore be improved by increasing the distance of volatile attraction to house flies to increase the number of house flies encountering and feeding on the bait.

Previous Work Reported:

During the first year of the project, several sugar-based fermentation products were tested for house fly attraction in laboratory assays. These studies were reported in the 2022 Annual Project Report. Attractants tested were fruit juice (mango, guava, or peach) or blackstrap fermented for 96 hours after adding brown sugar (10% w/v; C&H Brown Cane Sugar) and Active Dry Yeast (0.4% w/v; Fleishmann's).

Using an experimental assay arena (Figure 1), the fermented guava juice was demonstrated to be the most attractive of the tested products (Figure 2). This was presented in more detail in the 2022 Final Report for this project. Based on these results, fermented guava juice was selected for use in ATSB field trials.

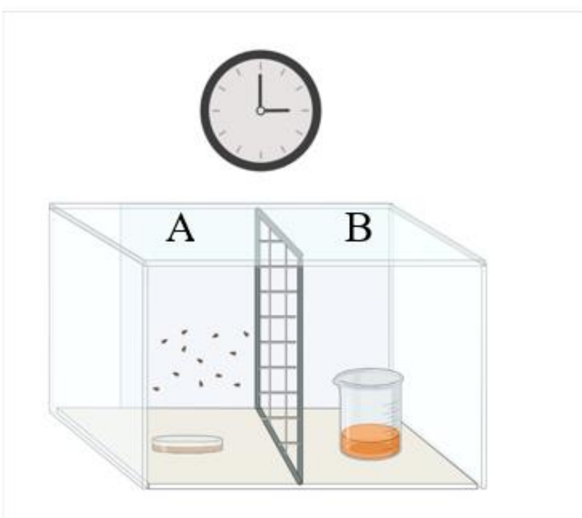

Figure 1: An experimental cage fitted with a screen partition dividing the cage in two was utilized to examine the attractiveness of each fruit juice solution. Flies were placed into Side A of the cage, and the test liquid was placed into Side B. The number of flies on Side B at each time point was used as a proxy for the attractiveness of each solution.

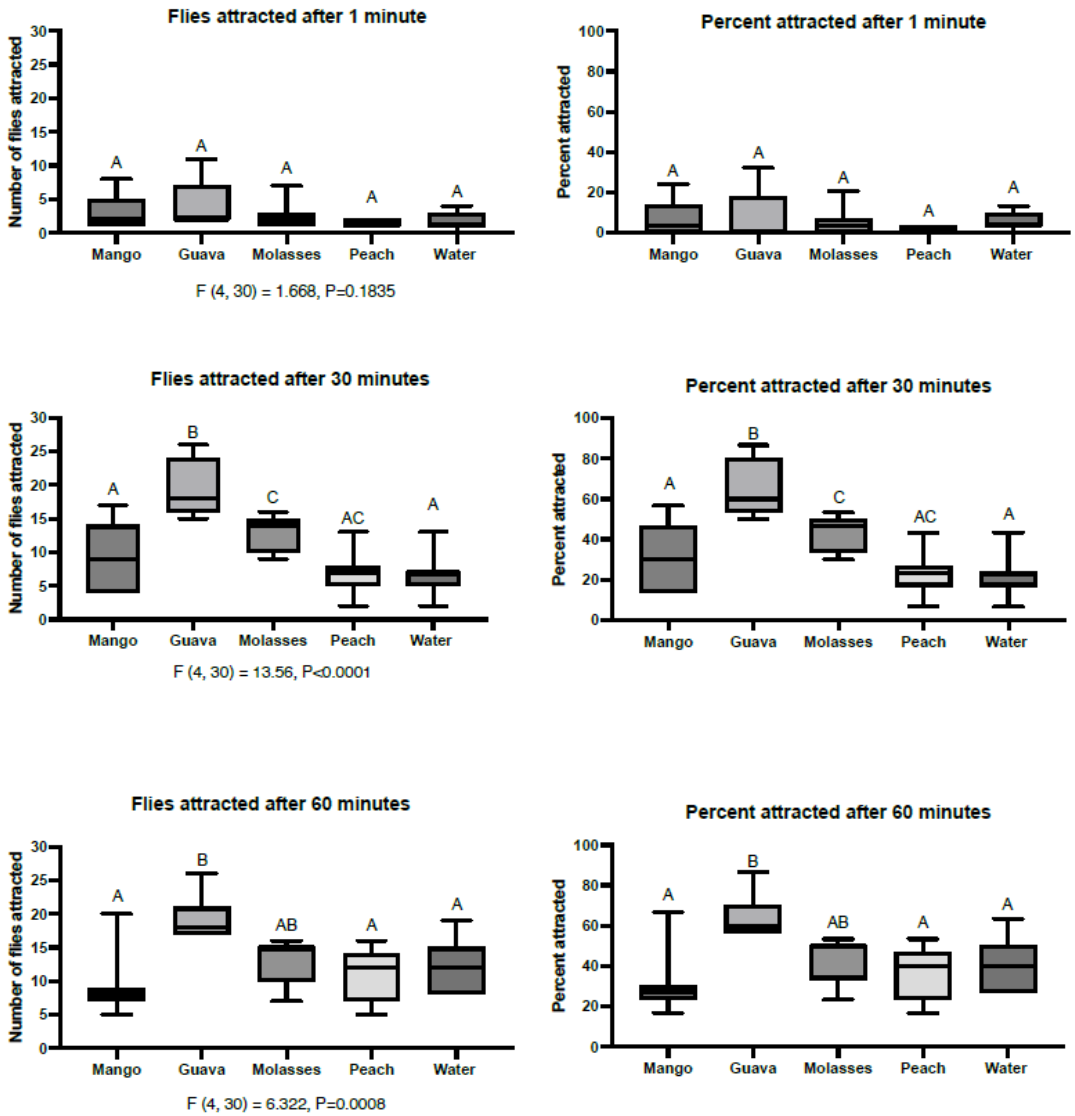

Figure 2. Number (or percent) of house flies on Side B of the test cage by time post-release (1, 30, 60 min) according to tested material fermented fruit juice (mango, guava, peach), molasses, or water control.

New Work in 2023:

During the 2023 year, following Consultation with District Staff and the management of the commercial pepper production company, the field study site was moved to a new location (pepper field) in Coachella Valley near the intersection of Cleveland and Hwy 111. This location is just north of the Salton Sea State Park and is a mixed-use agricultural area with fields planted primarily with peppers or corn. Peppers were planted in mid-April and were anticipated to be harvested through mid-July.

Field Test - Fermented Attractant

Attraction of the fermented guava juice (attractant) under field conditions was evaluated using bucket traps (5 G orange buckets; Home Depot) containing either commercial fly bait (Quikstrike; a.i. dinotefuran) applied at label rate (Control: CON) or commercial fly bait plus the fermented attractant (Attractant: ATSB). Traps were placed along the north and south edge of one of the pepper fields just south of Hwy 111, with traps arranged in 17 trap pairs (34 total traps) along the field edge. Each trap pair was separated by 5 m distance from the neighboring trap pair. In each ATSB trap, fermented guava juice was held within a plastic 16 oz (473 ml) deli food container placed at the bottom of the bucket trap (Figure 3). Trapping was conducted for 24 hours on two consecutive days each week for three weeks (6 separate trap dates) in June 2023 for a total of 102 replicate traps for each treatment (ATSB or Control).

Figure 3. Paired 5 G bucket traps containing commercial fly bait (Quikstrike) with or without fermented guava juice attractant. Flies attracted to either the commercial fly bait or the commercial fly bait PLUS attractant were killed by feeding on the commercial fly bait in either trap bucket. Buckets were held in place using a rebar pole with eyelet screws in each bucket to hold the bucket to the rebar.

The mean per trap capture was 94.37 flies in Attractant traps versus 17.92 flies for Control traps. Data was analyzed using a mixed-effects model with the following predictors: treatment (ATSB vs CON), trap day, trap location relative to the pepper field (North vs. South), and interactions among these predictors. Data was log (N+1) transformed prior to analysis.

There was a significant effect of treatment with traps containing attractant substantially outperforming control traps ($P < 0.0001$) ($N=102$; $W = 0.0$; $P<0.0001$) (Table 1, Figure 4). There was also a significant effect of trapping day ($P < 0.0001$), and a significant interaction between day and treatment. There were no other significant effects and no interactions ($P>0.05$).

Table 1: Mixed-effects model of fly trap counts including the following factors: Date of trapping, Treatment (No Attractant vs Attractant), Location of trap (Northside vs. Southside).

Fixed effects	P value	P value summary	Statistically significant (P < 0.05)	F (DFn, DFd)
Day	<0.0001	****	Yes	F (5, 90) = 16.77
Treatment	<0.0001	****	Yes	F (1, 90) = 528.3
Location	0.0567	ns	No	F (1, 90) = 3.726
Day x Treatment	0.0001	***	Yes	F (5, 90) = 5.817
Day x Location	0.8449	ns	No	F (5, 90) = 0.4039
Treatment x Location	0.8686	ns	No	F (1, 90) = 0.02753
Day x Treatment x Location	0.228	ns	No	F (5, 90) = 1.411

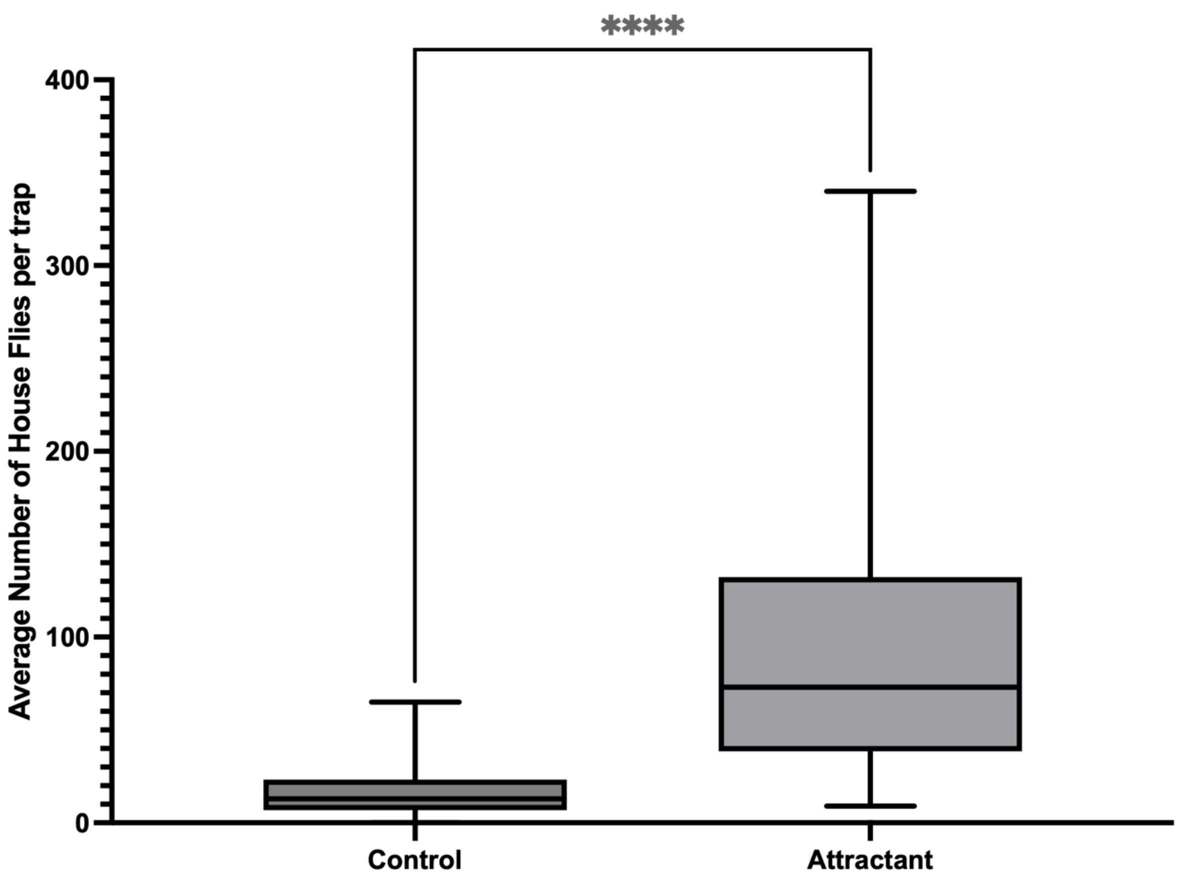

Figure 4. Mean number of flies captured per bucket trap. “Control” are bucket traps without attractant while “Attractant” indicates bucket traps containing attractant. **** indicates a highly significant difference at P<0.0001)

With no significant differences in trap capture by trap location (north vs south) (Figure 5), trapping data was combined for trap locations for further analysis by trap date. ATSB traps substantially outperformed CON traps on all trapping dates (Figure 6).

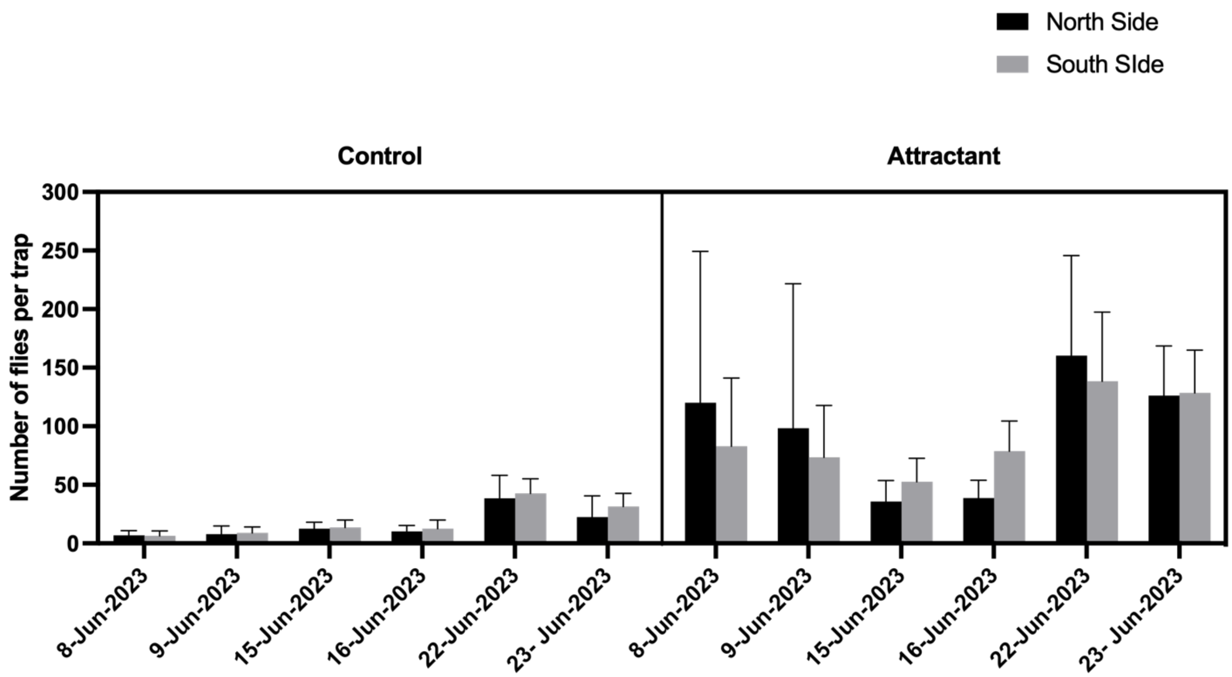

Figure 5. Mean number of flies captured in bucket traps containing commercial fly bait only (Control) or commercial fly bait plus fermented guava juice (Attractant) on each trap date. Data are separated by trap location relative to the pepper field (black columns = traps on northside of field; grey columns = traps on southside of field).

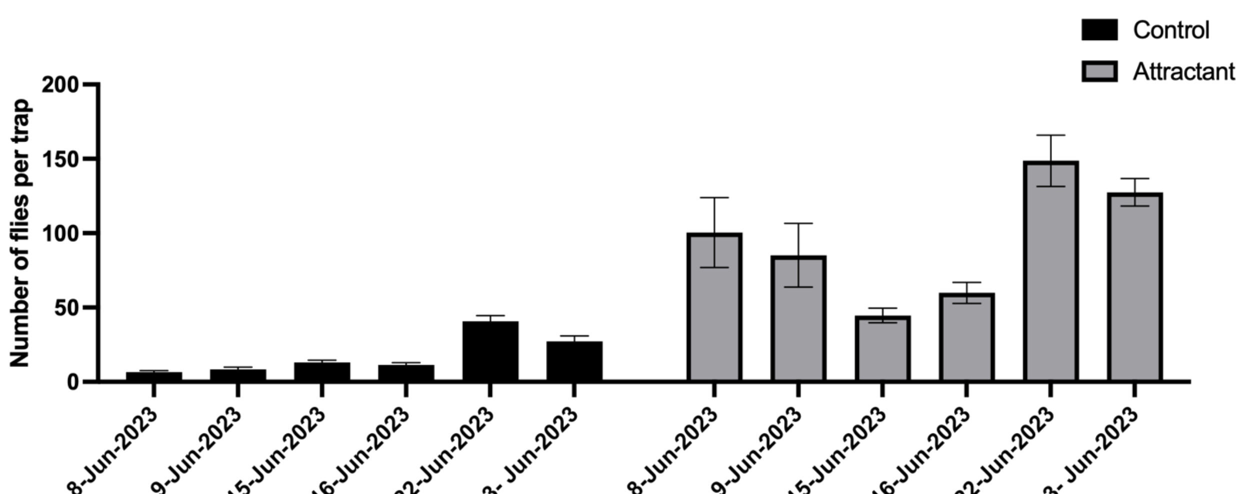

Figure 6. Mean number of flies captured in bucket traps containing commercial fly bait only (No Attractant) or commercial fly bait plus fermented guava juice (Attractant) on each trap date. Data is combined for both trap locations since there was no effect of trap location on fly capture.

Field Test – Reducing Fly Dispersal

It was intended that tests to evaluate ATSB traps to reduce fly dispersal would be conducted near the pepper fields in the Coachella Valley. However, we had some difficulty identifying suitable test locations near these pepper fields. Test locations either were impacted by field management operations or were too far from fly production sources to provide enough flies. Eventually, we moved our test site to an active commercial dairy facility in the city of San Jacinto where fly numbers were suitably high to evaluate whether ATSB traps placed in trap lines could reduce fly dispersal.

At the commercial dairy, two sites (North, West) were selected for testing use of ATSB to impact dispersal (Figure 7). Both sites were located adjacent to the dairy facility and within 250 m of animal pens. At each site, two paired testing locations were identified with each location separated by ≥50 m but otherwise positioned similarly relative to animal pens. At each test location, a circular line of 20 m diameter was marked with positions indicated for 13 ATSB bucket traps placed at 5 m intervals along the circumference. ATSB bucket traps contained a commercial fly bait (Dinotefuran) applied loosely at label rate to the bottom of the bucket and fermented guava juice (described above) in a food dish with mesh top to allow aeration also placed in the bottom of the bucket trap (Figure 8).

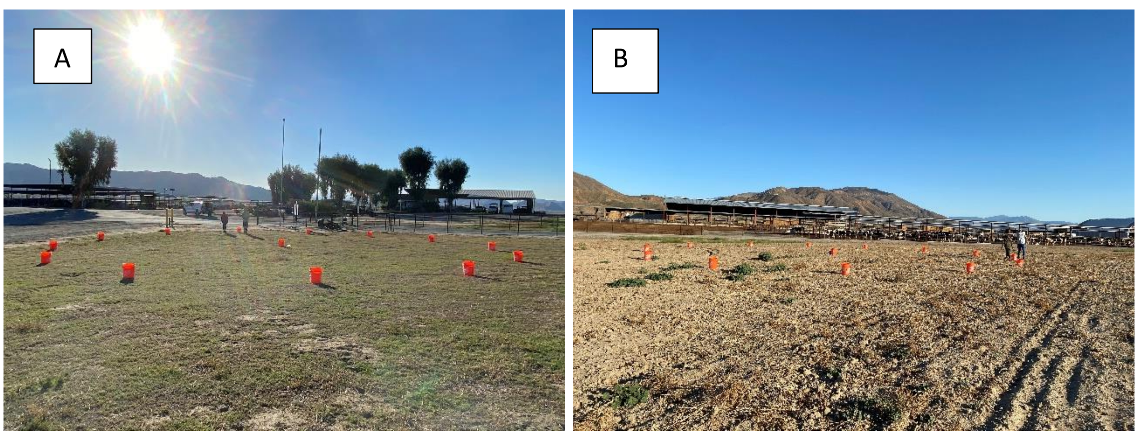

Figure 7. Trap sites (A- North, B-West) at a commercial dairy in San Jacinto, CA. Note the proximity to animal pens on one side of the trap circle (to the south of the North site and to the east of the West site)

At the start of a dispersal trial, one trap circle was randomly assigned as the Treatment circle and 13 ATSB traps were placed at the pre-marked positions along the circumference, while the other trap circle was assigned as the Control circle and received no ATSB traps along the circumference. A single ATSB trap was placed at the center of each trap circle to measure fly numbers within each trap circle. Flies reaching the center trap in the Treatment circle would have to pass one or more ATSB traps along the circumference of the trap circle, while flies reaching the center trap in the Control circle would encounter no ATSB traps prior to reaching the center of the circle.

Trapping was conducted for 90 minutes after which flies and bait were removed from each ATSB bucket and placed into a labeled plastic food dish to be counted after returning to the laboratory. Treatment and Control trap circles were then switched, with ATSB traps moved to the new Treatment circle were each ATSB trap was again set up with fermented guava juice attractant and new fly bait. A second trial was then run for another 90-minute period to complete a full trial replicate with the Treatment and Control having been in each trapping location. Six paired trials were conducted at each of the two trap sites over two separate days (total of 12 separate trials).

Figure 8. ATSB trap bucket containing fermented guava juice in a plastic food dish with mesh top and surrounded by commercial fly bait applied at label rate.

ATSB traps placed along the circumference were numbered 1-13, starting with the southernmost trap. This allowed for some evaluation of fly dispersal activity by direction from animal pens. Indeed, when all trap data was combined, it was clear that at the West trial site, flies were primarily entering the trap circle on the eastern side (closest to the animal pens) (Figure 9A). Similarly, at the North trial site, flies were primarily entering the trap circle on the southern side (closest to animal pens) (Figure 9B) though the magnitude of this directionality of fly capture was reduced compared to the West trial site.

Impacts to fly dispersal were evaluated in two ways. First the mean number of flies captured at center ATSB traps was compared to mean number of flies captured at peripheral traps along the trap circle separately for North and West trapping locations (Figure 10). Second, mean trap capture at center ATSB traps was compared for paired Treatment and Control trap circles with separate analysis for North and West trapping locations (Figure 11). In each case, differences in mean trap capture were determined by conducting non-parametric Wilcoxon signed-rank tests.

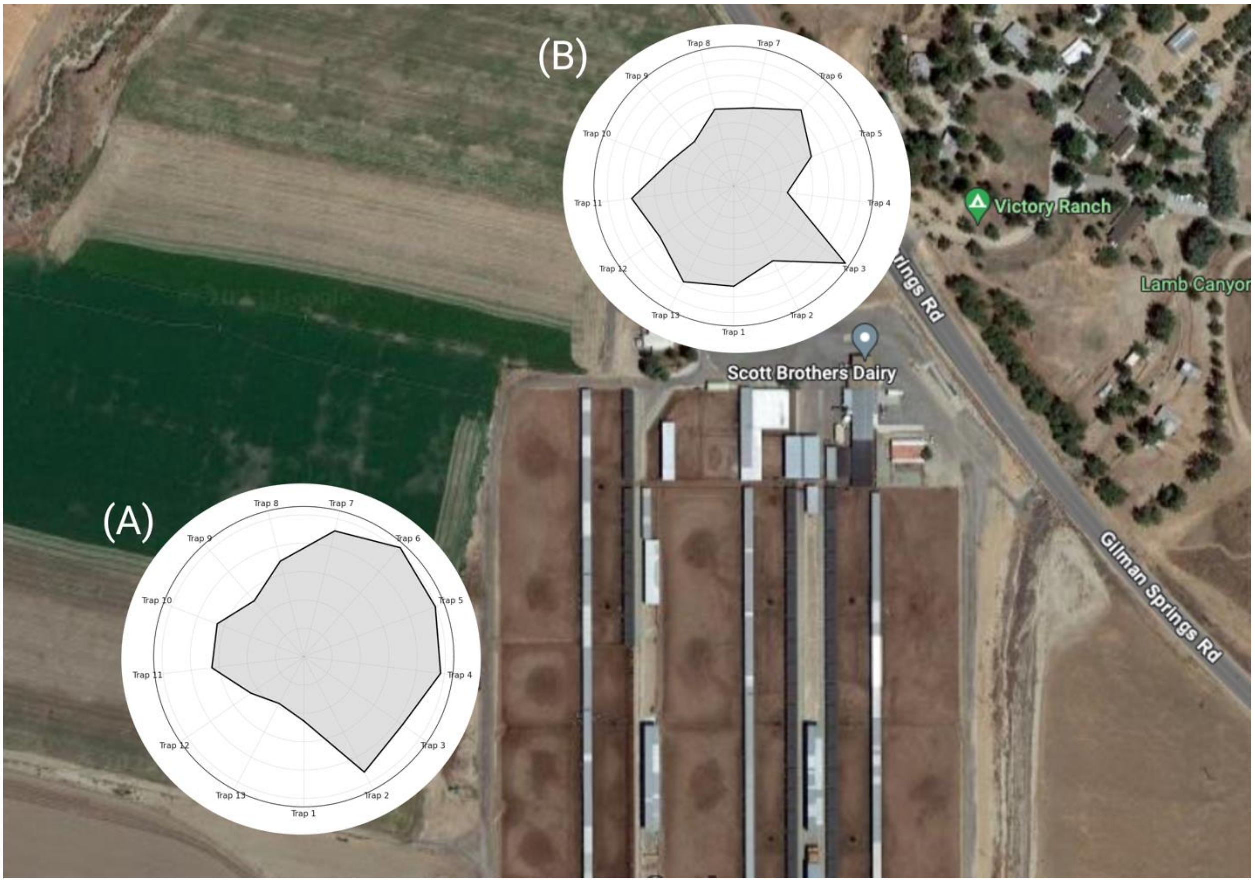

Figure 9: To visualize the spatial distribution of fly activity around the dairy, a polar plot was constructed for each trapping location (West-A, North-B). Each point on the plot represents the average number of flies captured per trap, with the radial distance from the center reflecting the average catch size, while the angular position corresponds to the traps' spatial arrangement.

The mean per trap capture for central traps in the North and the West locations were 7.33 and 11.50 flies respectively, with mean per trap capture for peripheral traps being 11.15 and 18.77 flies respectively. Significant differences in trap capture between central and peripheral traps were observed at both trapping locations (N=6; W=0.0; P=0.031) (Figure 10).

The mean per trap capture for Treatment traps in the North and the West locations was 7.33 and 11.5 flies respectively, with mean per trap capture for Control traps being 15.17 and 29.17 flies respectively. No significant differences were observed in the North trapping location between Treatment and Control traps (N=6; W=2.0; P= 0.094), but there was a significant difference between Treatment and Control traps at the West trapping location (N=6; W=0.0; P=0.031) (Figure 11).

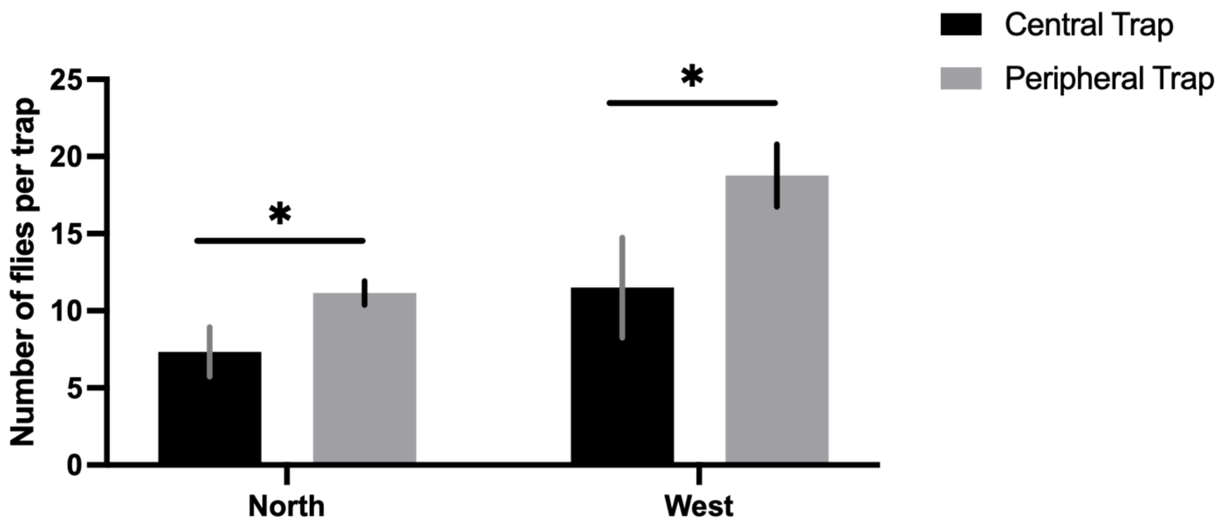

Figure 10: Mean number of flies captured in central vs peripheral bucket traps for each of our trapping locations (North and West). Each bucket contained commercial fly bait plus fermented guava juice (Attractant). * indicates a significant difference at P<0.05)

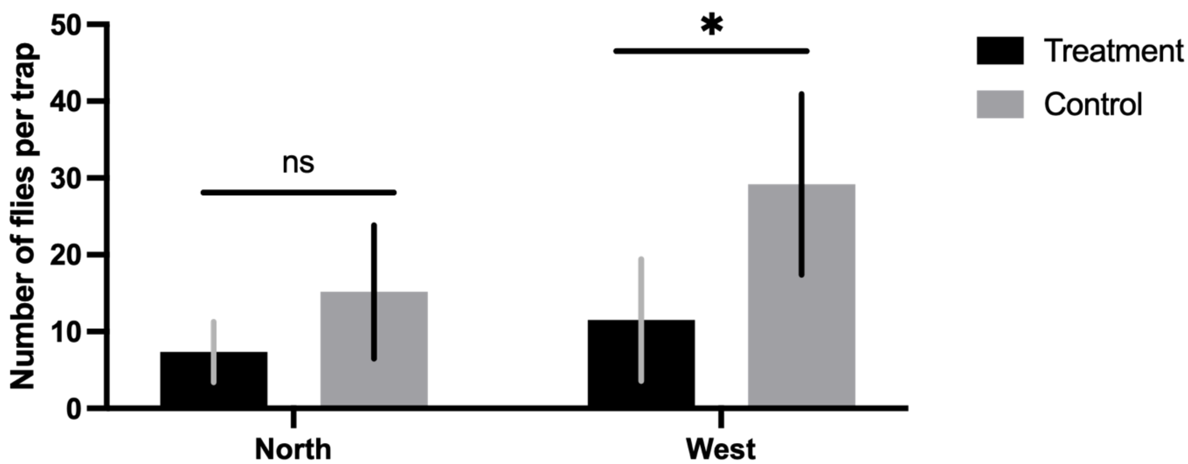

Figure 11: Mean number of flies captured in Treatment vs Control bucket traps for each of our trapping locations (North and West). Each bucket contained commercial fly bait plus fermented guava juice (Attractant). * indicates a significant difference at P<0.05)

Conclusions and Discussion

The attractiveness of commercial fly bait is increased by addition of a fermented attractant such as guava juice. When attractant was added to fly bait, the number of flies killed by the bait was increased 5-fold. While this effect was tested over a 24-hour period, it is likely that the increased mortality caused by addition of attractant to the bait would persist for at least several days as the attractant continues to ferment under field conditions. In fact, the increasing number of dead flies over time for the bait with attractant would likely further amplify the difference between this treatment and the commercial bait alone given that the presence of flies (alive or dead) serves to attract more flies to the area where the fly bait has been applied.

Placing the ATSB traps in a trap line (circular trap line in these studies) reduced the number of dispersing flies that traveled beyond the trap line. This reduction in fly dispersal was noted regardless of the location tested, with approx. 50% fewer flies reaching dispersing beyond the trap line relative to a paired location without the trap line. While this reduction in fly dispersal was modest and likely insufficient to achieve a desired level of control when fly activity is high, greater efficacy of the trap line might be achieved by increasing trap density along the trap line, by adding additional layers of trap lines, or through additional research into trap design and trap attractiveness to draw in a greater number of dispersing flies to each trap.

This study demonstrated the potential use of ATSB for managing fly dispersal from fly development sites, perhaps has a management tool to reduce fly movement into sensitive sites such as residential communities, schools, or other urban areas. However, more work is needed to develop this concept and improve trap line efficiency.

Annual Report, December 2023: Attractive Toxic Bait Station for Mosquito Control in Underground Storm Drain Systems of the Coachella Valley

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Objectives: The goals of this project are to investigate the efficacy of attractive toxic sugar bait (ATSB) stations to transmit and promote mosquito-propagated (autodissemination) transmission of chemical and biological control agents against mosquitoes inhabiting underground storm drain systems (USDS). We proposed (i) to develop an ATSB design that effectively attracts adult *Culex quinquefasciatus* mosquitoes and exposes them to control agents via ingestion and/or contact under laboratory conditions, **and** (ii) to determine the efficacy of ATSB-based control agents against mosquito adults and immature stages at developmental sites under laboratory and field conditions.

Previous USDS Field Trial: Spring 2023

The field efficacy of an ATSB station with a unique bait delivery system was tested in USDS chambers from two HOA properties in Palm Desert, CA. Stations were comprised of a bait-saturated sheet stretched horizontally between two bait-filled buckets hanging from rebar. The sheet system provided greater accessibility, total surface area, and moisture retention than previous bait station designs. ATSB formula was similar to previous experiments, except the fermented attractant was kept in a separate container on top of the bait reservoir, rather than being mixed into bait since laboratory evidence indicated reduced adult mosquito feeding when attractant was combined into the bait. Three treatments that included either ATSB, ASB (attractant, sugar bait, no toxicant), or Control (no bait station) were arbitrarily assigned among 12 USDS chambers and adult mosquitoes collected before, during, and after station deployment over a five-week study period. Once each week, adult mosquito abundance and the proportion of bait-fed mosquitoes (bait color presence in abdomen) was assessed by overnight deployment of a CDC trap with UV light in each USDS chamber and manual sweep net collection the afternoon before and the morning after deployment of the CDC trap. Within chambers containing bait stations, 20-40% of adult mosquitoes had evidence of bait consumption, with similar evidence of bait consumption of up to 10% of mosquitoes in Control USDS. Despite significant feeding rates on ATSB, adult mosquito abundance in treated USDS chambers was not reduced, and perhaps even increased slightly, relative to the other treatments over time. The lack of mosquito control in treated USDS could be explained as either 1) the ATSB station drew mosquitoes from the surrounding area thereby increasing mosquito numbers in treated USDS relative to non-treated USDS chambers, or 2) failure of bait treatment to rapidly kill mosquitoes and/or prevent oviposition in treated USDS chambers. Autumn field trials were planned to test option #1 above by placement of ATSB stations at all accessible mosquito production sites within a treated community for comparison to a Control community lacking ATSB.

A full report on the spring 2023 field trial can be reviewed with the June 2023 Mid-Season Report.

USDS Field Trial: Autumn 2023

Methods

ATSB Deployment and Design

Two adjacent communities were used in these studies: Brenna HOA and Amatista HOA (Figure 1). The ATSB treatment was assigned to the Brenna community due to historically higher adult mosquito numbers in this community. The treatment community received 18 ATSB stations, with one station deployed in every USDS chamber in this community. The Control treatment was assigned to the Amatista community with no bait stations deployed in USDS chambers in this community. The trial period was Oct 5 – Nov 9, 2023.

The ATSB design was as deployed this past spring (Mid-season Report 2023), except absorbent sheeting saturated with ATSB formed a hammock-like structure hanging down from a single reservoir. Both ends of the sheet were immersed in the same 6 L of bait and secured with the bucket lid, with the remaining bulk hanging down in a loop. The lowest point of the loop contained an additional 500 mL of ATSB in an open trench-like reservoir created by folding and securing each end of the absorbent sheeting to the lip of the bucket using a binder clip. This small bait reservoir assisted to keep the absorbent sheeting moist and thus increased movement of bait out of the top (sealed) reservoir to the exposed sheeting where the bulk of bait feeding was expected to occur.

Following deployment within USDS chambers in the Treatment community, ATSB were present continuously for three weeks. Weekly inspections were as performed in the previous spring season trial. ATSB inspection and maintenance occurred before UV light traps were deployed in the afternoon hours. Bait reservoirs were replenished with freshly prepared ATSB as needed to maintain bait volume and absorbent sheeting was replaced when sheeting was no longer moist. A single container of fermented attractive solution was placed on top of each bait bucket and replenished as needed or replaced altogether when mold growth was evident.

Both the composition of ATSB and attractive fermentation were as used in the previous trial. ATSB was boric acid (1% w/v), table sugar (25% w/v), and green dye (1% v/v) in tap water. The fermented attractant was brown sugar (10% w/v) and brewer’s yeast (0.4% w/v) in guava nectar (25% juice) fermented at 37°C for 3 days. The guava mixture was placed in a separate container on top of ATSB stations to provide a potential attractive cue for mosquitoes and avoid negative impacts on bait feeding as discussed in the previous report.

Environmental Conditions within USDS

HOBO sensor units (Onset Computer Corp., Bourne, MA) measured hourly temperature and humidity inside five USDS chambers during the trial period. Each probe was hung from the concrete wall with an access ladder running down from the manhole opening and rested at its approximate vertical and horizontal center. The position of each probe relative to the street above and water surface below was unique because chamber size and water depth varied from site to site. Probes were deployed in three USDS chambers within the Treatment community and two USDS chambers in the Control community. Daily and seasonal variation in aboveground weather was also acquired from a weather station close to both communities (CIMIS: La Quinta II, www.cimis.water.ca.gov).

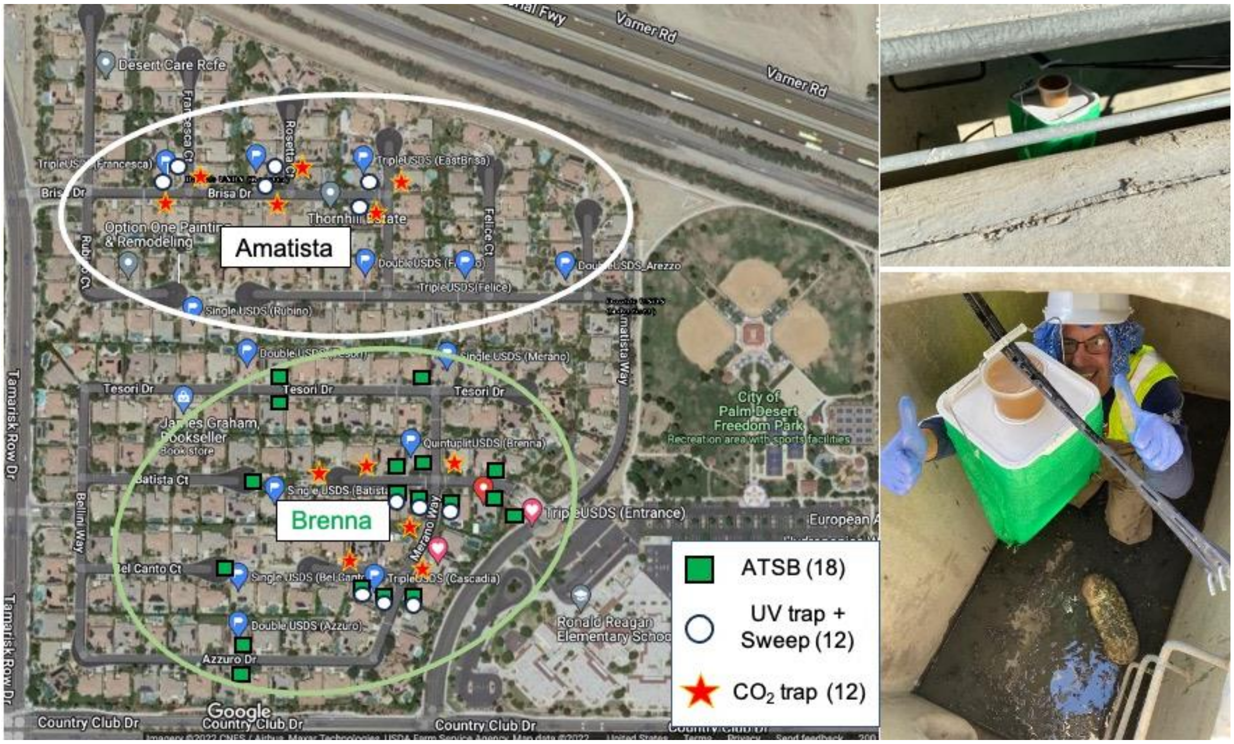

Figure 1. ATSB and Control treatment areas (left) with adult mosquito sampling scheme at two HOA sites in Palm Desert, CA during autumn 2023. Street and manhole views of an ATSB inside a USDS chamber are on the right.

Adult Mosquito Monitoring

Adult mosquito abundance was monitored in six USDS chambers in both the Treatment and Control communities (12 total chambers sampled). Abundance was assessed in each chamber using a battery-powered CDC trap with a UV light operated ~18 h overnight and also by manual sweep net sampling performed the morning after trap removal. Methods of light trap and sweep net sampling were the generally the same as described in the Mid-season Report 2023, with several notable differences. For one, soapy water was added to collection containers to better preserve evidence of ATSB feeding in adults until microscope examination. In light traps, about 200 mL of soapy water was added to a 500 mL plastic catering container to replace the standard mesh collection container used for live specimens. Adults drowned in the soapy water retained the green dye of ingested ATSB for several weeks when refrigerated (Figure 2). Adult mosquitoes captured by sweep net were killed on dry ice and then placed into vials with soapy water for adult preservation.

In addition to monitoring mosquito abundance within USDS chambers, community-wide abundance of host-seeking mosquitoes was monitored using 12 CDC-style suction traps baited with dry ice placed throughout each community with traps typically 30-100m from USDS chambers. Mosquitoes captured by these above ground traps were captured into a container with soapy water as for other traps.

Adult mosquitoes were collected once each week before, during, and after ATSB deployment. Collected mosquitoes were identified by dissection microscope to species, sex, female reproductive state, and for the presence and amount (partial vs. full) of green dye indicating feeding on bait stations. Large samples (>500 mosquitoes) were subsampled using grid-partitioned petri dishes. Subsamples consisted of a fraction of the parent sample from a selected area in the petri dish containing at least 50 specimens.

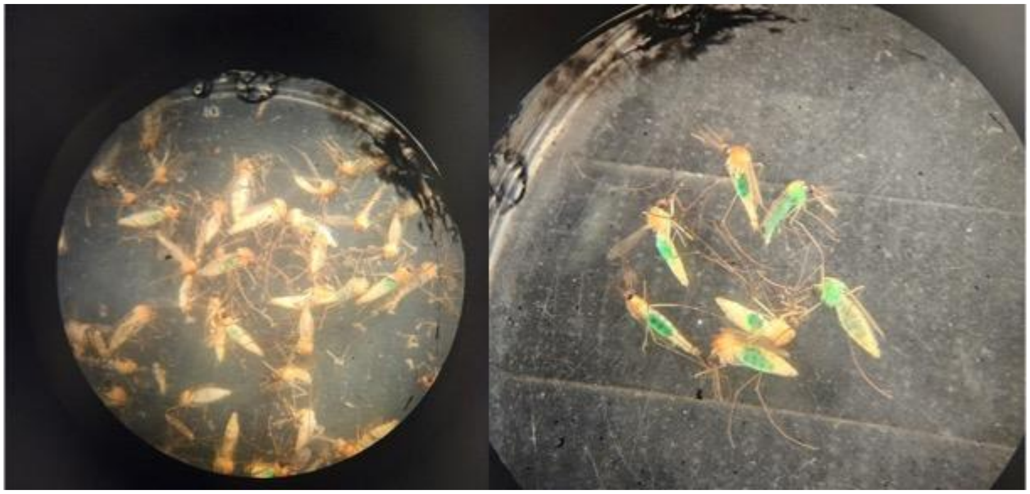

Figure 2. *Culex quinquefasciatus* adults with bait coloring from a raw sample (left) and an isolated collection (right) from CDC-UV traps.

Descriptive statistical analyses illustrated means and standard variances of adult mosquito abundance in ATSB and Control communities before, during, and after ATSB station deployment. Data sets from UV light traps, CO_2 traps, sweep net sampling, HOBO sensors, an aboveground weather station, and weekly underground surveys were compiled as the main points of comparison.

Results:

Environmental Conditions

Air temperature in USDS averaged 22-28 °C among the 5 USDS chambers sampled. The highest and lowest temperatures were recorded in separate underground chambers, both located within the Control community and with comparatively shallow water reservoirs related to significant sediment deposition (Table 1). USDS chambers in the Treatment community were slightly warmer on average and had less variability (mean = 26.6 °C, max/min = 31.3/18.6) compared to USDS chambers in the to Control community (25.3 °C, 36.9 /16.1). Temperatures declined by an average of 4-8 °C throughout the study.

Mean relative humidity in USDS ranged 34-72% among the 5 USDS chambers sampled with humidity varying most at one of the USDS chambers in the Treatment community. Peak humidity within USDS chambers was ca. 20% higher in the treatment community than in the Control community while low humidity was lowest in the Control community (12%) compared to the Treatment community (19%). Other than these trends, relative humidity varied substantially throughout the study with little obvious pattern.

Weather conditions aboveground were on average 3°C cooler with had 12% lower relative humidity than was recorded within USDS chambers. Air temperature aboveground dipped below 10°C for 7 consecutive nights near the end of the study, while air temperature within USDS never fell below 13°C during this period. Relative humidity aboveground peaked at near 75%, while relative humidity within USDS chambers often exceeded 80%.

Table 1. Environmental characteristics of USDS chambers in autumn 2023. Predominate debris types: O = open water, F = floating foliage, S = sediment at bottom; lower cases indicate subtype. Means and variance were calculated over all sample dates.

Treatment	USDS	Total Mosquitoes per UV trap-night		Orientation / Size of chamber			Water Depth (cm)		Debris		HOBO (USDS wall) Air Temperature (°C)		HOBO (USDS wall) Relative Humidity (%)		CIMIS daily (La Quinta weather station)	
		Mean	SE	Direction to Street	Volume (m^3)	Height (m)	Mean	SD	Type	Mean Amt. (1-5)	Mean	MAX / MIN	Mean	MAX / MIN	Mean	MAX / MIN
ATSB (Brenna)	H3	152	4	North	5.8	1.8	28.8	2.6	O	2.1					Air Temperature °C	
	H4	2732	1967	East	3.3	2.3	24.8	1.0	O, f	2.4	26.1	32 / 21	72.2	87 / 27		
	H5	429	85	West	2.5	2.4	37.2	2.0	O	1.9					23.5	41 / 8
	H6	166	95	North	2.5	2.2	30.2	0.4	O, f	2.4					Relative Humidity (%)	
	H7	522	107	East	4.5	2.5	29.3	0.5	O	1.9	24.5	29 / 18	50.2	87 / 20		
	H8	243	13	West	4.5	1.8	34.3	1.2	O	1.9	23.6	34 / 16	46.5	96 / 11	35.1	76 / 8
Control (Amatista)	L2	325	224	South	5	2.5	31.8	1.5	O	2.5					Wind speed (m/s)	
	L3	264	92	East	3.3	1.7	16.3	2.4	S	5.0	28.2	42 / 19	34.2	60 / 10		
	L4	259	146	South	n/a	2.0	21.3	1.2	O, s, f	3.2					1.6	3 / 0.8
	L5	44	11	East	n/a	2.2	27.7	0.8	O, s	2.6					Precipitation Total = 1 mm	
	L6	41	25	North	2.5	2.8	10.0	1.1	S	5.0	22.4	32 / 13	41.6	83 / 14		
	L7	610	284	South	3.3	2.3	23.3	0.8	F, s	4.3						

Adult Mosquitoes in USDS: CDC-UV Traps

UV light traps captured nearly 35,000 adult mosquitoes (ca. 50% of each sex) with >480 mosquitoes per trap-night. *Culex quinquefasciatus* comprised 99% of all identified species, although *Culex stigmatosoma* (*n* = 47) *Culiseta inornata* (*n* = 35), *Culex tarsalis* (*n* = 19), and *Aedes aegypti* (*n* = 10) were also present. Most females (>93%) were non-gravid and lacked a bloodmeal, while 6% were gravid and 1% contained a recent bloodmeal.

Mosquito numbers were quite variable among individual USDS chambers, with averages ranging from 41 to over 2,700 adults per UV trap-night (Table 1). However, average mosquito abundance was consistently greater within the Treatment community relative to the Control community whether abundance was recorded within USDS chambers (UV trap or sweep net) or aboveground (CO2 trap) in each community (Figure 3). The proportional difference in abundance of adult mosquitoes was most notable within USDS chambers, but the pattern for abundance was similar for all monitoring methods used.

Using the current trap design increased bait feeding considerably, with >3,500 mosquitoes having evidence of bait feeding. Bait-fed mosquitoes were 58% male and 42% female. Nearly all bait-positive adults were collected during from the Treatment community during the period when

ATSB stations were deployed. Up to 30% of mosquitoes captured from the Treatment community had evidence of bait feeding. No bait-colored adults were captured the week before ATSB deployment. Three bait-fed mosquitoes were captured in the Treatment community in the week after ATSB stations were removed, suggesting some longevity of bait dye within fed mosquitoes. Two bait-fed mosquitoes were captured in the Control community suggesting dispersal of these mosquitoes from the treatment sites.

Adult Mosquitoes in USDS: Net Sweeps

Sweep net sampling captured >5,000 adult mosquitoes (mean of 90/sample) with a 60:40 M:F sex ratio. Females were 92% non-gravid and unfed, 7% gravid, and 1% recently bloodfed. All mosquitoes were *Culex quinquefasciatus* except for one each of *Culex stigmatosoma, Culiseta inornata,* and *Aedes aegypti*. Mosquito abundance by sweep net sampling was consistently greater in the Treatment community relative to the Control community after deployment of ATSB stations on 11 October. (Figure 3).

Bait color was found in 16% of mosquitoes in the Treatment community during the three-week ATSB deployment period, with nearly all bait-fed mosquitoes (96%) captured from the Treatment community. Bait-fed mosquitoes were 60% female and 40% male. No bait-fed adults were captured the week before ATSB deployment. Two bait-fed mosquitoes were captured in sweep nets from the Control community.

Adult Mosquitoes in Aboveground Traps

A total of >9,200 adult mosquitoes were captured in CO2 traps aboveground (128 mosquitoes/trap-night). Mosquitoes captured were largely *Culex quinquefasciatus* (97% of the total) and four other species also captured including *Culiseta inornata* (*n* = 179), *Aedes aegypti* (*n* = 54), *Culex tarsalis* (*n* = 39), and *Culex stigmatosoma* (*n* = 15). Mosquitoes were 94% non-gravid and unfed females, 5% males, 1% bloodfed females, and a very small number of gravid females.

Mosquito abundance in aboveground traps within the Treatment community was greater than in the Control community during and after ATSB deployment (Figure 3). Some bait-fed females (2% of total) were collected in the Treatment community during the period of ATSB deployment. A very small number of bait-fed females (n=8) were also captured in CO2 traps in the Control community. No bait-fed females were captured before and after ATSB station deployment.

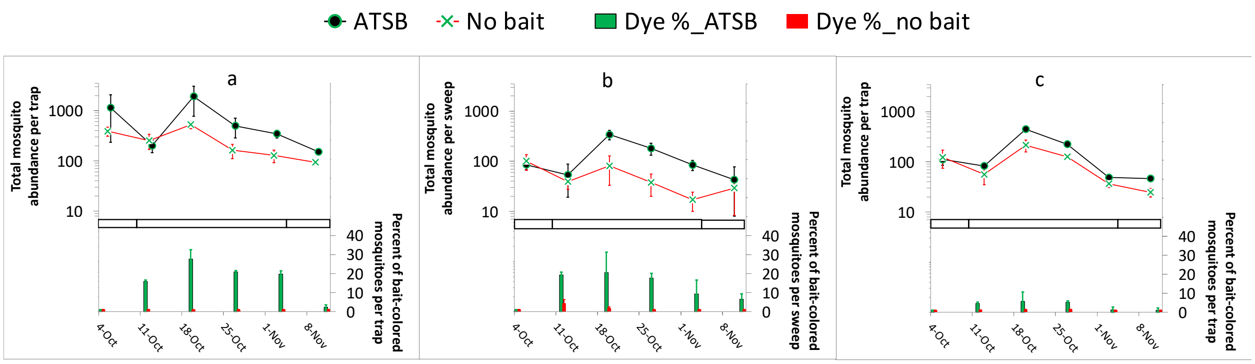

Figure 3. Total adult mosquito abundance and percentage of bait-colored adults (Mean ±SE) in ATSB and Control treatments. Samples inside USDS were (a) UV light traps and (b) sweep nets and those aboveground were (c) CO_2-baited traps. Total mosquito abundance on log10 scale is each upper line graph with a left-sided y-axis and percentage of bait-colored is each bottom bar graph with right-sided y-axis. Each shaded horizontal bar between the upper and lower graphs indicates when bait stations were present (red) or absent (white) in USDS.

Conclusion and Discussion

The single-reservoir sheet station design performed comparably to the previous double-reservoir version (Mid-season Report 2023), with near 20% of mosquitoes captured in UV light traps within USDS chambers showing evidence of bait feeding. The new single reservoir bait station design was more practical than the previous design and required less bait volume. Weekly replacement of the bait-saturated sheets was the most time-consuming aspect of station inspections and could be greatly streamlined with similar surface-based methods. Replacement of bait, attractant, and absorbent sheeting was often required each week due to the arid conditions of the Coachella valley. In the lab, mosquitoes were shown to preferentially feed on liquid sugar over dry sugar and mortality was low when mosquitoes were provided only dry sugar.

Unexpectedly, community-wide application of ATSB within USDS chambers appears to have resulted in greater mosquito abundance within the Treatment community relative to the Control community. Prior to deployment of ATSB in the Treatment community, mosquito abundance as determined using all three monitoring methods (UV traps and sweep net collections in USDS chambers, and aboveground CO2 traps) was similar in the Treatment and Control communities. However, in the week following ATSB deployment, mosquito abundance increased more rapidly in the Treatment community than in the Control community followed by a similar proportional decrease in mosquito abundance in both communities through the remainder of the study likely related to cooling temperatures. While we cannot discount that the greater abundance in the Treatment community could be due to the presence of unrecognized mosquito development sites within or near the Treatment community that were not treated with ATSB stations, no such development sites are evident from aerial views provided by online mapping (Google maps) or during our on-the-ground assessments in the area.

The capture of bait-fed female mosquitoes in aboveground CO2 traps was unexpected. In the lab, mosquitoes fed ATSB with 1% boric acid can survive up to 4-5 days. It was previously assumed that bait-fed females would be unable to perform host-seeking behaviors due to intoxication after feeding on the bait. However, the capture of bait-fed females in CO2 traps suggests that even after consuming the toxic bait, mosquitoes can perform normal behaviors such as host-seeking.

Whether these bait-fed mosquitoes had fed on bait immediately before host-seeking or in the days prior to host-seeking is not known. In the lab, gravid females fed ATSB with 1% boric acid were also shown to successfully oviposit and produce viable eggs.

Collectively, lab and field studies suggest that boric acid may be too slow acting to provide control of mosquitoes when used in ATSB stations. While the most recent ATSB design resulted in substantial mosquito feeding rates, control of mosquitoes was not achieved in the Treatment community and in fact mosquito abundance may have paradoxically increased in the Treatment community suggesting that mosquitoes benefited from the provided sugar meal before any negative impacts occurred from boric acid consumption. A faster acting toxicant formulated with ATSB, that is similarly safe to aquatic environments, might provide better control in USDS chambers and in treated communities.

Semiannual Research Progress Report #4 (Final) for CVMVCD grant:

Determining fire ant bait specificity to extend fire ant control by conserving non-target ants.

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December 31, 2023

Summary of Activity January 2022 through December 2023.

The goal of the proposed 2022-23 research is to extend red imported fire ant (RIFA) control by conserving non-target ants. Maintaining populations of non-RIFA ants should provide biotic resistance to RIFA reinfestation in areas cleared of fire ants. Specific aims are to determine which fire ant baits are not foraged upon by non-RIFA ant species found in the Coachella Valley.

Year 1: Identify fire ant baits that are not accepted, or foraged, by non-RIFA ants in FL in anticipation they will be indicators of bait specificity applicable to ants in the Coachella Valley.

Methods. Bait acceptance tests were conducted with laboratory colonies of bicolor trailing ants, *Monomorium floricola*, and field colonies of pyramid ants, *Dorymyrmex bureni*; big-headed ants, *Pheidole megacephala*; harvester ants, *Pogonomyrmex badius*; and rover ants *Brachymyrmex sp.* Each species was tested for bait acceptance among eight, commercial fire ant baits containing various active ingredients (Table 1).

Table 1. Commercial fire ant baits used in non-target ant bait acceptance tests in Florida.

Bait	**% Active Ingredient**	**Manufacturer**
Advion	0.045 % indoxacarb	Syngenta
Siesta	0.063% metaflumizone	BASF
Clinch	0.011% abamectin	Syngenta
Antixx	0.015% spinosad	Neudorff
Amdro Pro	0.73% hydramethylnon	BASF
Esteem	0.5% pyriproxyfen	Valent
Extinguish Pro	0.5% (S)-methoprene	Zoecon
Extinguish Plus	0.0365% hydramethylnon, 0.250% (S)-methoprene	Wellmark

For the first replicate of the laboratory bait acceptance conducted on *M. floricola*, colony fragments (≥2000 workers + a small amount of brood) from 1 lab colony, were separated into shoebox-sized trays, starved for 48 hr and then given access to 0.5 g (~1 tsp) of one of each of the 8 baits. Number of ants at bait were counted every 10 minutes up to 60 minutes. For reps 2 and 3, tests were conducted in full-size trays, thus allowing greater spatial separation of the baits. In addition, sausage lures were placed adjacent to baits with low recruitment after 60 min and ants at sausage were counted after 10 minutes to demonstrate that the ants would forage to a readily accepted lure.

For the field bait acceptance tests with *Dorymyrmex bureni* (6 reps), *Pogonomyrmex badius* (3 reps) and *Pheidole megacephala* (3 reps). We located 3 colonies (reps) and placed 0.5 g (~ 1 tsp) of each bait in a circle about 3 ft apart and about 4.5 ft from the nest entrance. Each bait was placed in a large weigh boat with 1 side cut off to facilitate ant access to baits and counting ants (Fig. 1). The number of ants on a bait were counted every 10 minutes for up to 60 minutes. Sausage lures were placed at baits with low recruitment after 60 minutes and the number of ants at a sausage was counted at 10 minutes.

Fig. 1 Field bait acceptance test. Pink flag marks a *P. megacephala* nest entrance encircled by bait in weigh boats.

Potential non-target ants to be tested in Coachella Valley that were collected in Palm Desert Greens and the Eldorado wash area were identified as *Dorymyrmex bicolor*, *Pogonomyrmex californicus* spp. group, *Brachymyrmex patagonicus*, and *Pheidole* spp.

Results. Most of the baits were accepted by the ants tested in Florida. However, the Siesta and the Extinguish Pro baits had very low counts of *P. megacephala* which suggests they should be tested further on non-target ants found in the Coachella Valley. Laboratory and field tests (3 reps total) with *Brachymyrmex sp.* had extremely low counts for all baits, but test colony fragments were very small and may had limited foraging.

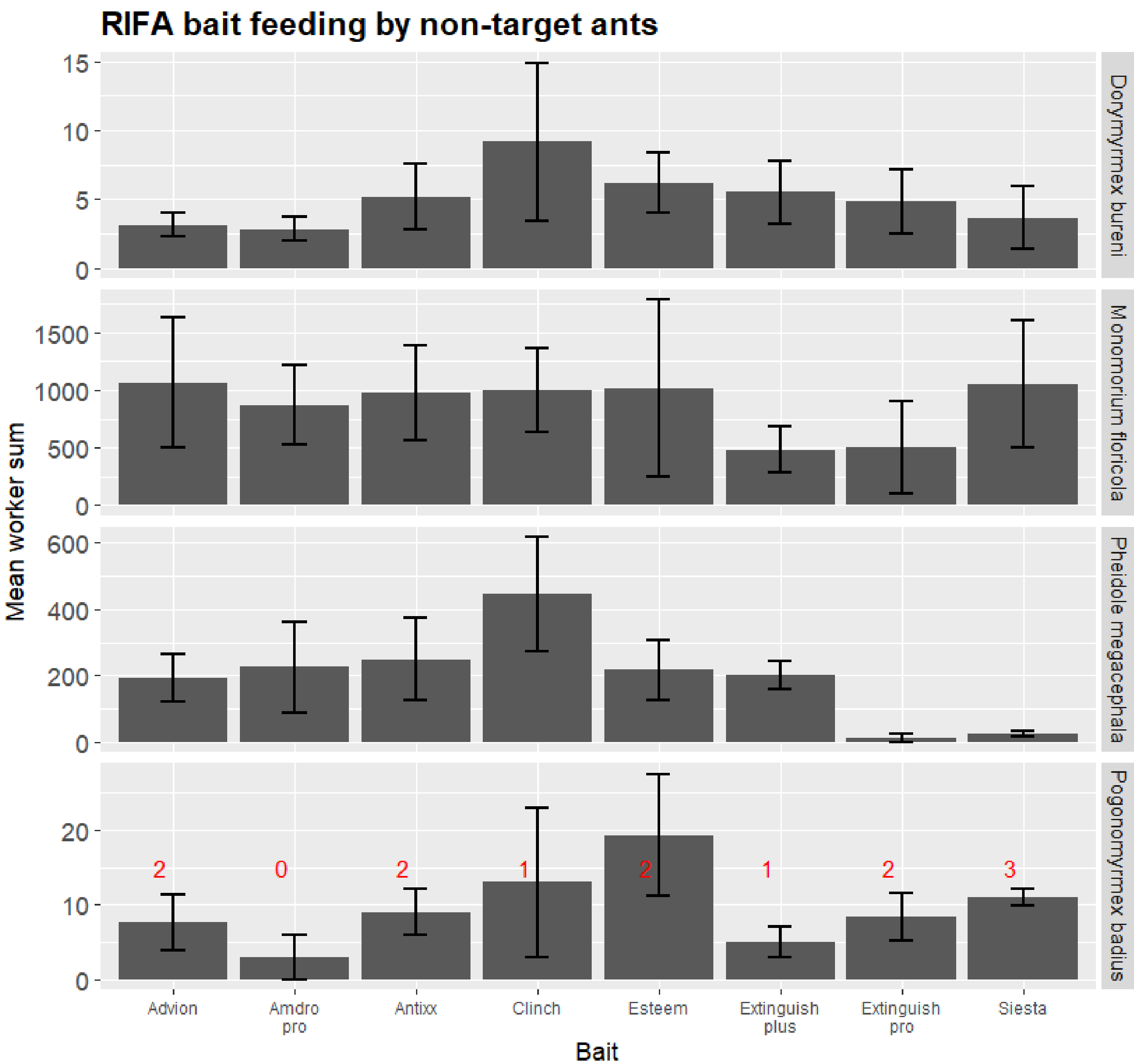

Fig. 2. Total sum of workers feeding on baits by species. Workers were counted every 10 minutes for 1 hour. Numbers in red for *Pogonomyrmex badius* indicate the number of reps (out of 3) where all the bait was consumed. Error bars are +/- 1 SEM. Data represents means across 3 reps, except *Dorymyrmex bureni* for which 6 reps were completed.

Year 2: Identify fire ant baits that are not accepted by non-RIFA ants in the Coachella Valley.

Methods. Bait acceptance tests were conducted in the field in Indio (CVMVCD headquarter grounds), Palm Desert (Palm Desert Greens Country Club golf course), and La Quinta (La Quinta Medical Center) on June 5-8, 2023. Nest entrances of field colonies of California harvester ants, *Pogonomyrmex californicus*; big-headed ants, *Pheidole crassicornis* group; a honeypot ant, Myrmecocystus sp.; and two pyramid ants, that key to *Dorymyrmex bicolor* but were designated as either "large" or "small" in size and they had different bait preferences. Each species was tested for bait acceptance among five, commercial fire ant baits containing various active ingredients (Table 2). The tested baits were selected based on bait acceptance tests conducted on ants in Florida and baits used by the District.

Table 2. Commercial fire ant baits used in non-target ant bait acceptance tests conducted in the the Coachella Valley, California.

Bait	% Active Ingredient	Manufacturer
Advion*	0.045 % indoxacarb	Syngenta
Siesta*	0.063% metaflumizone	BASF
Esteem	0.5% pyriproxyfen	Valent
Extinguish Pro	0.5% (S)-methoprene	Zoecon
Extinguish Plus*	0.0365% hydramethylnon, 0.250% (S)-methoprene	Wellmark

*bait used by the CVMVCD

The bait acceptance was determined by placing ¼ teaspoon of each bait on filter paper (4.25 cm dia., Whatman #1) that was positioned generally in a semi-circle around a nest entrance with adjustments to allow access relative to ground features (e.g., tree roots). Depending on species, baits were placed equidistant from the nest entrance (7 – 43 cm) and baits were 5 – 14 cm apart. Tests were conducted when ants were active in mornings and very late afternoon, generally when temperatures were between 80 – 95 °F. The total number of ants that removed bait particles from the filter paper were counted for 30 minutes for each bait. Tests were replicated at separate nest entrances and the ant totals were averaged among the baits and species to quantify bait acceptance. There were 2 – 3 replicates per species except for *Myrmecocystus* sp. which had only 1 replicate. Because we observed ants exploring bait particles during all tests, it was not necessary to confirm foraging activity with sausage lures.

Results. Two non-target ants readily accepted all 5 fire ant baits presented (Fig. 3). The California harvester ant even removed all the bait granules at least once for each bait product. The large bicolor pyramid ant also consistently removed bait granules across all products with the Siesta bait being completely depleted in one replicate (Table 3). While the small and large bicolor pyramid ants, keys to the same species, *Dorymyrmex bicolor*, only 0 – 7 small *D. bicolor* removed bait particles, while some antennated the bait then cleaned their antennae. The consistently different bait acceptance behavior, plus the large and small forms were each found in separate sites (La Quinta Medical and CVMVCD, respectively) suggests a *Dorymyrmex* taxonomist may need to be consulted and/or more replicates conducted.

Bait removal by *Forelius pruinosus* was limited to 0 – 10 ants with inconsistent acceptance among the baits. There were several observations of this species feeding in place on the Advion and Siesta baits (15 and 25, respectively). In addition, *F. pruinosus* was seen carrying away bait if it was placed on their trail (Extinguish Plus and Extinguish Pro), and they fed in place and removed bait across all products in replicates 2 and 3 of the California harvester ant tests.

The big-headed ant, *Pheidole crassicornis* group, had 0 – 16 ants removing bait granules among all products. In addition, 0 to at least 8 ants were feeding in place on all the baits. The honeypot ant species explored all baits but did not remove any bait nor were any of the ants feeding in place on the baits.

In summary, analysis of fire ant bait acceptance by ants in the Coachella Valley, suggested that non-target ant species tested either readily accepted all bait products (California harvester ants, large bicolor pyramid ants), did not accept any baits (honeypot ant), or had limited bait acceptance among all baits (small *D. bicolor*, *F. pruinosus*, *P. crassicornis*). Thus, none of the fire ant bait products tested seemed to exhibit obvious distinguishable non-acceptance by non-target ant species.

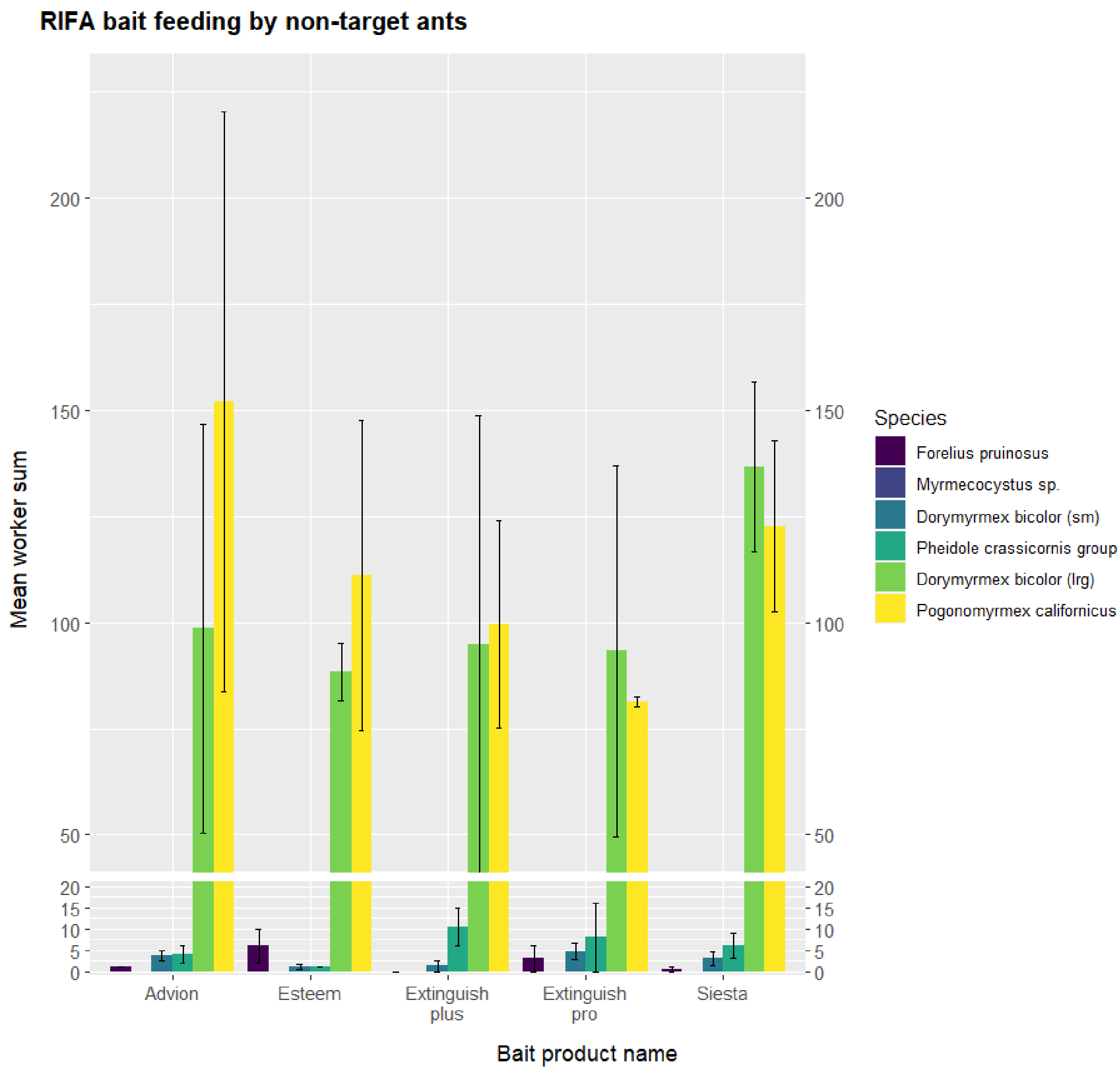

Fig. 3 Average (±SEM) total count of ants by species that removed each bait over the course of 30 minutes. N=3 for all species except: *F. pruinosus* (N=2), *P. crassicornis* group (N=2), *Myrmecocystus* sp. (N=1). Note that some species did not remove many bait particles but were feeding in place on baits (see text).

Table 3. Corresponding values for Fig. 3, with an additional column denoting how may reps out of 3 (N=2 for *Pheidole* sp. and N=1 for *Myrmecocystus* sp.) ants removed all the bait granules.

Species	Bait_Type	mean_sum	sem	Bait_depleted
Forelius pruinosus	Advion	1.0	0.0	0
Forelius pruinosus	Esteem	6.0	4.0	0
Forelius pruinosus	Extinguish Plus	0.0	0.0	0
Forelius pruinosus	Extinguish Pro	3.0	3.0	0
Forelius pruinosus	Siesta	0.5	0.5	0
Myrmecocystus sp.	Advion	0.0	*NA*	0
Myrmecocystus sp.	Esteem	0.0	*NA*	0
Myrmecocystus sp.	Extinguish Plus	0.0	*NA*	0
Myrmecocystus sp.	Extinguish Pro	0.0	*NA*	0
Myrmecocystus sp.	Siesta	0.0	*NA*	0
Dorymyrmex bicolor (sm)	Advion	3.7	1.2	0
Dorymyrmex bicolor (sm)	Esteem	1.0	0.6	0
Dorymyrmex bicolor (sm)	Extinguish Plus	1.3	1.3	0
Dorymyrmex bicolor (sm)	Extinguish Pro	4.7	1.9	0
Dorymyrmex bicolor (sm)	Siesta	3.0	1.7	0
Pheidole crassicornis group	Advion	4.0	2.0	0
Pheidole crassicornis group	Esteem	1.0	0.0	0
Pheidole crassicornis group	Extinguish Plus	10.5	4.5	0
Pheidole crassicornis group	Extinguish Pro	8.0	8.0	0
Pheidole crassicornis group	Siesta	6.0	3.0	0
Dorymyrmex bicolor (lrg)	Advion	98.7	48.2	0
Dorymyrmex bicolor (lrg)	Esteem	88.3	6.7	0
Dorymyrmex bicolor (lrg)	Extinguish Plus	95.0	53.9	0
Dorymyrmex bicolor (lrg)	Extinguish Pro	93.3	43.7	0
Dorymyrmex bicolor (lrg)	Siesta	136.7	20.1	1
Pogonomyrmex californicus	Advion	152.0	68.3	2
Pogonomyrmex californicus	Esteem	111.0	36.5	2
Pogonomyrmex californicus	Extinguish Plus	99.7	24.5	1
Pogonomyrmex californicus	Extinguish Pro	81.3	1.2	1
Pogonomyrmex californicus	Siesta	122.7	20.2	3

Due to COVID-19 restrictions at USDA-ARS labs were in place through March 2022. First quarter objectives were rescheduled to the third and fourth quarters.

Revised milestones for fire ant bait acceptance studies on non-target ants.

Year / Quarter	FL bait acceptance tests	CA bait acceptance tests
2022 Jan-Mar	~~Lab acceptance tests~~	
2022 Apr-Jun	Field surveys & lab acceptance tests	
2022 Jul-Sep	Field surveys &lab acceptance tests	
2022 Oct-Dec	Field surveys & tests: in progress	
2023 Jan-Mar	Field surveys & tests: completed	Field surveys & tests: field survey initiated
2023 Apr*-Jun		Field surveys & tests: completed
2023 Jul-Sep		
2023 Oct-Dec		

*avoid Coachella and Stagecoach Festivals in April

Semiannual Research Progress Report #8 (Final) for CVMVCD grant:

Improving fire ant IPM in the Coachella Valley: Effects of irrigation on bait efficacy. mating flight phenology, and the status of biocontrol agents.

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December 30, 2023

Summary of Activity January 2020 through December 2023.

The objective of the proposed research for 2020-2021 is to improve the integrated pest management (IPM) of fire ants in the Coachella Valley by: 1). Evaluating the effect of irrigation on bait efficacy to determine the need to withhold irrigation after bait application; 2) Identifying periods of peak mating flight activity to improve timing of bait applications; and 3) Determining the spread of fire ant biocontrol agents released in the Coachella Valley to assess their further utilization for fire ant IPM. Due to COVID-19 restrictions, a 1-year no-cost extension (ending March 31, 2023) was granted to provide more time to complete the objectives. USDA-ARS travel restrictions for COVID-19 were eased in the spring of 2022 which allowed Rachel Atchison (Biological Science Technician) and David Oi to make three trips to the District which resulted in significant progress on the proposed research.

1) To evaluate the effect of irrigation on fire ant bait efficacy in the field, two field sites, located at Lake Cahuilla Veterans Regional Park and Lake La Quinta Recreation Area, were surveyed for red imported fire ants on Feb. 25-26, 2020, and were determined to be suitable for the study. However, because the study was suspended for over 2 years due to COVID, a new study site was located by the CVMVCD (District) staff. With significant support from the District, the field study to evaluate effect of irrigation on fire ant bait efficacy was conducted in May and June 2022 at the Palm Desert Greens Country Club. Initial data analysis indicated that reductions in fire ant activity was not significantly different when bait was applied regardless of whether irrigation was withheld or not withheld (i.e., normal irrigation schedule was maintained). Fire ant activity after bait applications under both irrigation regimes was significantly lower than the untreated controls.

2) Research on monitoring fire ant mating flight activity resumed in May 2022. The prototype fire ant alate traps that successfully caught alates in Gainesville, Florida and in Palm Desert, CA in 2021 was partially redesigned to simplify transport and assembly. Eight traps were installed with District assistance in May 2022 at two sites (4 traps each at the Eldorado wash and at Arnold Palmer Restaurant). In addition, temperature and humidity sensors were installed at both trap sites to correlate weather conditions to mating flights. Alates were trapped at both of these irrigated sites in 2022 (May through October, but none in November and December). In 2023, alates were not trapped in January; while alates were caught from February to August 16 when trapping was stopped due the tropical storm that damaged most of the traps. Over the 2022 and 2023 trapping, the most intensive alate flights, indicated by $\geq$10 alates captured per trap, occurred from May through August.

3) Surveys for the spread of fire ant biocontrol agents released and established in Palm Desert and La Quinta in 2014/2015 were conducted in May and June 2002 and in February and June 2023. In 2022, fire ant decapitating phorid flies were collected on sticky traps at the Monterey Country Club release site as well as 748.95 meters (ca. 0.46 miles) west and 650.14 meters (0.4 miles) east of the release site. A total of 41 flies were collected within the wash area. Both released species, *Pseudacteon curvatus* and *P. obtusus* were found. In 2023, the *P. obtusus* was collected 420 meters (0.261 miles) north of the release site/wash and 457 meters (0.284 miles) south of the release site. *P. curvatus* was collected 921 meters (0.572 miles) north of the release site.

   The fire ant virus, Solenopsis invicta virus 3 (SINV-3) was detected in the Eldorado wash area where it was introduced into fire ant nests in 2014. Of the 19 nests sampled, five (26%) were infected with the farthest detection about 0.26 miles east of the release site. SINV-3 was not detected (n=7) at the successful, 2015 inoculation at the La Quinta Medical Center.

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Due to the COVID-19 pandemic, USDA-ARS labs were closed on March 19, 2020 and all personnel were placed in mandatory telework status. In July 2020, the CVMVCD project was approved for limited research activity to allow progress toward meeting objectives of extramural agreements. However, the pace of research was slow as the USDA labs were only permitted 25% occupancy (1 person per lab) and air travel was prohibited. In late March 2022 USDA labs began to transition to full occupancy and domestic air travel was allowed in mid-April 2022.

1) Irrigation effects on bait efficacy.

We proposed to compare the efficacy of standard fire ant bait on fire ant populations in field sites where irrigation is withheld after baiting and in sites that follow a normal, daily irrigation schedule. We hypothesized that fire ant bait efficacy will be similar at the irrigated and non-irrigated sites, based on the results of the 2019 Coachella Valley field study and observations of fire ants foraging on wet bait (Oi et al. 2022).

Site selection and preliminary fire ant sampling was completed on February 25-26, 2020. Two field sites, located at Lake Cahuilla Veterans Regional Park and Lake La Quinta Recreation Area, were determined to be suitable for the study. Because the study was suspended for over 2 years due to COVID restrictions, a new site was located by the CVMVCD (District) staff. With significant support from the District, the field study was conducted in May and June 2002 at Palm Desert Greens Country Club. The course was previously treated with Extinguish Plus fire ant bait about a year ago and standard fire ant surveillance by the district indicated 61% of the hotdog lures had fire ants on May 20, 2022.

Eight golf course holes and an alcove off the #4 hole fairway, which was used as a practice chipping area and dog park, were used in the study. Hole #1, #2, #4, #6, and the alcove received the standard withholding of irrigation the night before the day of fire ant bait application, and the resumption of irrigation in the evening of the day, bait was applied. Hole #10, #12, #14, and #16 received bait application the morning after evening irrigation was resumed. Overnight/early morning irrigation was measured with rain gauges at 7 holes and averaged 1.1 cm (range, 0.9 – 1.4). All holes received the label rate of Avion® Fire Ant Bait (0.045% indoxacarb), except holes

#1, #16, and the alcove, which were untreated controls. Bait was applied in the mornings of May 24 and 25, 2022 by the District Operations personnel using a herd seeder (Fig. 1.). Hence, treatment applications reflected District bait application methods.

Fig. 1. CVMVCD fire ant bait application equipment and operator.

The study utilized a completely randomized design with each course hole serving as a replicate. Thus, there were three treatments (a) bait-with irrigation, (b) bait with irrigation withheld, and (c) a control without bait [1 hole each with and withheld irrigation, plus the alcove where irrigation was withheld]. Assessment of fire ant activity was determined by counting the number of fire ants on nickel diameter-sized dollops of peanut butter lures (21 mm, ≈1 – 1.5 ml) placed on three transects per hole that were located along the edge of tee boxes, along one side of a fairway rough, and along the edge around a putting green. For the alcove, three transects were set about 50 ft apart. Ten lures per transect were placed at ≈15 ft intervals and examined for ants 45 – 60 minutes after lures were applied. Peanut butter was dispensed directly onto the turf using syringes (60, 100 ml). Sun exposed lures were shaded with a wooden placard (≈3 x 4 in.) supported by a landscape staple. Sampling was conducted at 0 (pretreatment), 2, and 4 weeks after bait application. For each sampling date, the number of fire ants per lure was averaged across each tee, fairway, and green transect per hole (n=90 lures) then compared among treatments by analysis of variance and Tukey's HSD test

Results. Initial data analysis indicated that the reduction in fire ant activity was not significantly different when bait was applied with irrigation (i.e., normal irrigation schedule was maintained) or without irrigation. Fire ant activity after bait applications under both irrigation regimes was significantly lower than the untreated controls (Table 1). These results are consistent with reports of fire ant bait efficacy not being negatively affected when applied in the presence heavy dew that dries during the day (Collins et al. 1993), and baits wetted after application in field plots in the Coachella Valley (Oi et al. 2022). Fire ants will feed on wet bait and water-soaked baits that have dried (Oi et al. 2022). It is likely that fire ant baits applied before or after irrigation in the arid climate of the Coachella Valley will not be compromised and will be foraged by fire ants if the baits are accessible (i.e., not washed away or submerged in standing water).

Table 1. Average number of fire ants per peanut butter lure (n=90 lures per hole) from golf course holes (n=3 per treatment) at specified weeks after application of Advion Fire Ant Bait (0.045% indoxacarb) with or without irrigation.

	Average (± SEM, n=3) number of fire ants		
Treatment	**Week 0 (pretrt.)**	**Week 2**	**Week 4**
Irrigation & bait	44.4 (± 9.6) a	21.1 (± 7.6) a	41.8 (± 9.8) a
Irrigation withheld & bait	32.5 (± 3.0) a	21.0 (± 5.6) a	35.5 (± 8.3) a
Control (no bait)[a]	32.6 (± 8.4)[b] a	50.8 (± 7.2) b	81.3 (± 5.1) b

Averages followed by the same letter within a column are not significantly different ($P > 0.05$) by analysis of variance and Tukey's HSD test.

[a] Control had 1 hole each with or withheld irrigation plus the alcove with irrigation.

[b] n=2 holes.

2) **Peak mating flight activity.**

With the resumption of limited research activity in July 2020 at CMAVE, we focused on the development of equipment (traps/cameras) for fire ant alate flight monitoring. Wildlife cameras partially recorded alate flights but were difficult to deploy and did not provide consistent, useable surveillance footage. Thus, we redesigned alate traps used in the past (Morrill and Whitcomb 1972) to make them less cumbersome to transport and service. More recent trap modifications (J. Oliver TN State Univ.) utilized an inverted root ball basket with screening to collect alates in a covered bunt pan (Fig. 2). Utilizing the fire ant alate behavior of crawling up blades of grass or other elevated perches from a nest before taking flight, the trap was redesigned with the following modifications (Fig. 3):

1) Dowel rods are used to guide alates into the covered collecting pan. Alates will crawl to the top of the rods and then take flight. The cover confines the alates which drop into the collecting pan filled with liquid preservative (propylene glycol solution).
2) Screening is not used since the dowel rod technique collects enough alates.
3) Root ball baskets were replaced with legs that can be disassembled from the collecting pan which allows for easier transport.

Fig. 2. Previous fire ant alate trap with inverted wire basket and screening that funnels alates initiating flights into a pan filled with collecting fluid.

Fig. 3. Redesigned fire ant alate trap with dowel rods that guide alates into a collecting pan. Alates typically crawl to a high perch when they initiate mating flights.

Traps were sent in March 2021 to the District for field testing under Coachella Valley conditions. Alates were caught in traps set in Gainesville, FL and Palm Desert, CA (Table 2.) Below is a link for a video of fire ant alates being trapped in Gainesville:

https://drive.google.com/file/d/1KQGp2oP86L-PP6gpfcQFQShrdqDBjfr0/view?usp=sharing

Table 2. Number and month fire ant alates caught in traps set in Gainesville, FL and Palm Desert, CA 2021.

Location	Trap 1	Trap 2	Trap 3	Trap 4	Trap 5
Gainesville, FL	57, April	35, May	37, May	49, June	548, June
Palm Desert, CA	87, June	–	–	–	–

Fig. 4. Dec.2021 trap design with a plywood base that provided more secure attachment points for the legs.

The trap design was later modified in Dec.2021 with a plywood base that simplified assembly and made the traps easier to ship (Fig. 4).

To correlate temperature and humidity with the occurrence of alate flights, radiation shields were constructed to protect temperature and humidity recorders (iButtons) that were installed near alate traps (Fig. 5.).

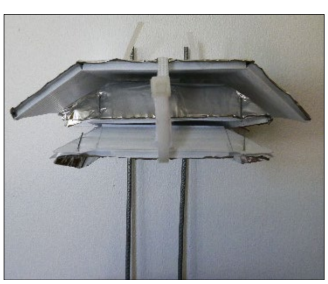

Fig. 5. Interior view of a radiation shield that houses temperature and humidity recorders.

Eight traps (Dec. 21 design) were installed with District assistance on May 26, 2022. Individual traps were installed over four nests in the irrigated, stormwater wash of the Whitewater River located near El Dorado Drive and Fred Waring Drive (Eldorado wash) in Indian Wells, CA. Most of the traps were placed over large nests adjacent to the concrete bases of irrigation gun sprinklers. The other four traps were placed over nests located on the grounds of Arnold Palmer Restaurant in La Quinta. In addition, temperature and humidity sensors were installed at both trap sites to correlate weather conditions to mating flights. All the colonies in the initial traps were the polygyne social form as determined by Gp-9 genotyping (Valles and Porter 2003). The District graciously serviced the alate traps weekly and downloaded the weather data.

Results. Table 3 shows the number of alates captured through Aug. 16, 2023. Alates were caught in all traps at both irrigated sites from May through October 2022 and February through August 2023. Flight activity, indicated by the frequency of at least one alate caught per trap, was more prevalent from June through September with 10 – 30 occurrences of flights per month (Table 4). If 10 trapped alates is an indication of an intensive flight (Morrill 1974), five nests (A, B, E, G, H) had more than one intensive flight in June and July 2022. Each nest flew a minimum of 1-9 times May through August 2023 (Table 5). Average (±SD) minimum and maximum daily temperatures and relative humidities for the weeks (May – August) when 10 or more alates were trapped suggest that intensive flight activity occurs during hot summer conditions (Table 6). Relative humidities did not seem to be associated with flights and may have reflected the occurrence of irrigation. Data collection ended in August 2023 due to a tropical storm in the Coachella Valley where 6 of the 8 traps were damaged. The seasonal flight activity obtained in this study are similar to fire ant alate flight activity reported by Morrill (1974) in studies conducted in unirrigated, northern Florida sites.

Table 3. The number and gender of red imported fire ant alates caught in traps placed over eight nests at sites in the El Dorado wash (traps A – D) and Arnold Palmer Restaurant (traps E – H) in the Coachella Valley, CA. Traps were examined weekly 31 May 2022– 16 Aug 2023.

	2022 May		Jun		Jul		Aug		Sep		Oct		Nov		Dec		2023 Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		**Sum by trap**		
Trap	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀+♂
A	0	0	30	4	36	16	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	3	3	16	9	45	14	10	4	23	12	**165**	**64**	**229**
B	25	6	32	56	87	114	17	9	83	51	0	0	0	0	0	0	0	0	0	1	2	1	1	3	9	4	20	8	9	2	0	0	**285**	**255**	**540**
C	8	0	0	0	0	0	1	0	38	7	0	2	0	0	0	0	0	0	1	0	2	1	4	0	13	4	21	7	0	0	14	15	**102**	**36**	**138**
D	1	0	0	0	3	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	20	38	16	1	11	9	3	**66**	**53**	**119**
E	0	0	41	5	45	0	0	0	3	0	0	0	0	0	0	0	0	0	3	2	5	8	3	1	4	6	9	19	2	0	3	0	**118**	**41**	**159**
F	0	0	3	0	0	2	1	1	8	5	0	0	0	0	0	0	0	0	4	1	2	0	1	1	14	6	25	20	28	15	0	1	**86**	**52**	**138**
G	0	0	125	8	18	4	4	0	2	2	2	2	0	0	0	0	0	0	1	0	0	6	2	1	41	31	44	21	33	15	29	39	**301**	**129**	**430**
H	0	0	117	25	5	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	8	15	70	35	3	9	11	16	**216**	**103**	**319**
SUM	**34**	**6**	**348**	**98**	**194**	**139**	**24**	**11**	**134**	**65**	**2**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**11**	**4**	**11**	**19**	**16**	**10**	**118**	**95**	**272**	**140**	**86**	**56**	**89**	**86**	**1339**	**733**	**2072**

Traps were not examined the week of Oct. 24, 2022, and Jan. 25, Mar. 22, and July 5, 2023.

Table 4. Potential mating flight activity as indicated by the frequency of **≥1 red imported fire ant alate** (female or male) caught in traps placed over eight nests at sites in the El Dorado wash (traps A – D) and Arnold Palmer Restaurant (traps E – H) in the Coachella Valley, CA. Traps were examined weekly from 31 May 2022– 16 Aug 2023.

	2022 May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2023 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	**Sum by trap**
Trap	♀♂	♀♂	♀♂	♀♂	♀♂	♀♂	♀♂	♀♂	♀♂	♀♂	♀♂	♀♂	♀♂	♀♂	♀♂	♀♂	♀♂
A	--	2	4	--	--	--	--	--	--	1	1	3	4	4	1	3	**23**
B	1	4	3	3	2	--	--	--	--	1	1	2	3	4	3	--	**27**
C	1	--	--	1	2	2	--	--	--	1	2	3	3	4	--	2	**21**
D	1	--	2	1	--	--	--	--	--	--	--	--	4	3	2	2	**15**
E	--	1	2	--	1	--	--	--	--	1	3	2	5	3	2	2	**22**
F	--	1	2	2	3	--	--	--	--	1	1	2	5	4	3	1	**25**
G	--	2	2	2	2	2	--	--	--	1	3	2	3	4	3	3	**29**
H	--	4	2	1	--	--	--	--	--	--	1	2	3	4	3	3	**23**
SUM	**3**	**14**	**17**	**10**	**10**	**4**	**0**	**0**	**0**	**6**	**12**	**16**	**30**	**30**	**17**	**16**	**185**

Traps were not examined the week of Oct. 24, 2022, and Jan. 25, Mar. 22, and July 5, 2023.

Table 5. Number of potential mating flights where **≥10 red imported fire ant alates** (female or male combined) caught in traps placed over eight nests at sites in the Eldorado wash (traps A – D) and Arnold Palmer Restaurant (traps E – H) in the Coachella Valley, CA. Traps were examined weekly from 31 May 2022– 16 Aug 2023.

	2022 May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2023 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	**Sum by trap**
Trap	♀♂	♀♂	♀♂	♀♂	♀♂	♀♂	♀♂	♀♂	♀♂	♀♂	♀♂	♀♂	♀♂	♀♂	♀♂	♀♂	♀♂
A	--	1	2	--	--	--	--	--	--	--	--	--	1	2	1	1	**8**
B	1	2	3	1	1	--	--	--	--	--	--	--	1	1	--	--	**10**
C	--	--	--	--	1	--	--	--	--	--	--	--	1	2	--	2	**6**
D	--	--	--	--	--	--	--	--	--	--	--	--	2	2	--	--	**4**
E	--	1	1	--	--	--	--	--	--	--	1	--	--	1	--	--	**4**
F	--	--	--	--	1	--	--	--	--	--	--	--	1	2	1	--	**5**
G	--	2	1	--	--	--	--	--	--	--	--	--	2	2	2	3	**12**
H	--	2	--	--	--	--	--	--	--	--	--	--	1	2	1	1	**7**
SUM	**1**	**8**	**7**	**1**	**3**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**9**	**14**	**5**	**7**	**56**

Traps were not examined the week of Oct. 24, 2022, and Jan. 25, Mar. 22, and July 5, 2023.

Table 6. Mean (±SD) daily minimum and maximum temperatures and relative humidities per week that **≥10 red imported fire ant alates** (female or male combined) were trapped by at least 1 trap at each of the Eldorado wash and Arnold Palmer Restaurant sites (May 26, 2022 – Aug 16, 2023). Also shown are temperature and humidities when alates were **not** caught.

	≥10 red imported fire ant alates caught[1]				Zero alates caught[2]			
	Temp. °C ($\bar{x}$ ±SD)		RH % ($\bar{x}$ ±SD)		Temp. °C ($\bar{x}$ ±SD)		RH % ($\bar{x}$ ±SD)	
Site (traps)	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Eldorado wash (A–D)	20.3 (2.9)	41.4 (3.4)	22.3 (8.0)	83.1 (4.4)	8.7 (7.9)	25.8 (8.9)	28.2 (8.0)	85.9 (7.1)
Arnold Palmer (E–H)	21.4 (4.3)	39.5 (5.6)	17.4 (7.5)	67.7 (7.7)	8.4 (6.5)	24.6 (6.2)	25.1 (8.8)	77.5 (10.6)

[1]N= 19 weeks for the Eldorado wash site and 20 weeks for the Arnold Palmer site, with the following caveats: temperature data are missing for 2 weeks and humidity data are missing for 4 weeks for the Eldorado wash site.
[2]N=20 weeks for the Eldorado wash site and 19 weeks for the Arnold Palmer site, with the following caveats: seven weeks of humidity data are missing for the Eldorado wash site and four weeks of temperature and humidity data are missing for the Arnold Palmer site.

3) **Status of fire ant biocontrol agents.**

Surveys were conducted in 2022 (May 23, 24, & 26; June 8, 22 & 23) and in 2023 (February 7–9; June 7 & 8) to determine the spread of fire ant biocontrol agents, released in 2014/2015. The 2022 surveys focused mainly on the irrigated wash areas that run East – West, while the surveys in 2023 targeted areas north and south of the wash.

Phorid flies. In 2022, two species of fire ant decapitating phorid flies, *Pseudacteon obtusus* and *Pseudacteon curvatus*. were collected on sticky traps at the Monterey Country Club release site as well as 749 meters (ca. 0.46 miles) west and 650 meters (0.4 miles) east of the release site (Figs. 6 & 7 N-S surveys). A total of 41 flies (30 female *P. curvatus*; 6 female *P. obtusus*; 5 unidentified - possibly males) were collected and all were trapped within the wash area. Out of a total of 62 traps that were set, flies were caught at 14 traps (23%)

In Feb. 2023, eight *P. obtu*sus (7 females, 1 male) were collected as far as 420 meters (0.261 miles) north of the release site/wash and 457 meters (0.284 miles) south of the release site. In addition, 6 possibly male *P. obtusus* were trapped. In June 2023, one *P. cur*vatus female was trapped 921 meters (0.572 miles) north of the release site. Winds were high in the June survey, thus trapping was limited to 17 traps.

Solenopsis invicta virus 3. The fire ant virus, Solenopsis invicta virus 3 (SINV-3) was detected in the Eldorado wash area where it was introduced into fire ant nests in 2014. Of the 19 nests sampled, five (26%) were infected with the farthest detection about 417 m (0.26 miles) east of the release site. This was farther than the detection from the May 2017 survey where it was detected 103 m away. At the other successful 2015 inoculation located at the La Quinta Medical Center, SINV-3 was not detected (n=7). Part of the La Quinta site is undergoing construction, and an adjacent natural garden area is not being maintained. Thus, fire ant habitat was diminished which limited sampling.

Additional fire ant samples for SINV-3 were obtained at the phorid fly and fire ant alate traps at Palm Desert Greens (dog walk area off hole #4 fairway), Monterey and Rancho Las Palmas Country Clubs wash area, and Arnold Palmer Restaurant. SINV-3 was detected at Monterey (2/2), Las Palmas (1/4), and Arnold Palmer (3/4). SINV-3 was not detected at Palm Desert Greens (0/6). While SINV-3 has been reported from other locations in the Coachella Valley (Oi et al. 2019), we wanted to use the opportunity to obtain an indication of prevalence at other sites. For all samples collected in May and June 2022, SINV3 was found in 24% of the samples (11/45).

It may be of interest to the District that the first documentation of a fire ant virus eliminating fire ant colonies under field conditions was published in Valles et al. (2022). In this small field study conducted in Florida, field introductions of this virus into fire ant nests (n=12) resulted in significant reductions of 57% in the size of nests and in the number of nests (7-fold decrease compared to controls) after 77days. SINV-3 also persisted for over 20 months and spread to adjacent uninoculated colonies.

Fig. 6. Phorid fly and SINV3 sampling sites in the wash area near the 2014 phorid fly release site in the Monterey Country Club (just east of Monterey Ave.). Red squares are phorid trap and SINV3 locations sampled in May and June 2022. Additional SINV3 sampling site are indicated by the red teardrops. Traps with phorid flies are indicated by red squares with a black "fly" shape, and SINV3 positive samples have the blue and white "virus" symbol. Figures are the irrigated wash area west (top) and east (bottom) of Monterey Ave.

Revised milestones for fire ant bait efficacy in irrigated landscapes, mating flight activity, and determining the spread of fire ant biocontrol agents in the Coachella Valley.

Year / Quarter	CA field efficacy test of irrigated bait	Mating flight activity:	Biocontrol spread
2022 Jan-Mar	~~Site re-selection; Treat & sample~~	~~Site selection; Install alate traps~~	~~Sample & map~~
2022 Apr-Jun*	Site re-selection; Treat & sample Completed	Alate traps installed; Trapping In Progress	Sample & map Completed for June
2022 Jul-Sep		Completed	
2022 Oct-Dec		Completed	Postponed (weather)
2023 Jan-Mar		In Progress	Completed
2023 Apr-Aug		Completed	Completed

*avoid Coachella Fest 2022 April 15-24; Stagecoach April 29-May 1.

References Cited.

Collins, H., A. Ladner, A.-M. Callcott, L. McAnally, and R. Cuevas. 1993. Influence of dew on efficacy of Award fire ant bait, pp. 141–143. In A.-M. Callcott and H. Collins (eds.), 1993 Annual Report Imported Fire Ant Station, PPQ, APHIS, USDA, Gulfport, Mississippi.

Morrill, W. L. 1974. Production and flight of alate red imported fire ants. Environmental Entomology 3: 265-271.

Morrill, W. L. and W. H. Whitcomb. 1972. A trap for alate imported fire ants. Journal of Economic Entomology 65(4): 1194-1195.

Oi, D., S. Valles, S. Porter, C. Cavanaugh, G. White, and J. Henke. 2019. Introduction of fire ant biological control agents into the Coachella Valley of California. Florida Entomologist 102: 284-286.

Oi, D. H., R. A. Atchison, G. Chuzel, J. Chen, J. A. Henke, and R. D. Weeks. 2022. Effect of irrigation on the control of red imported fire ants (Hymenoptera: Formicidae) by water-resistant and standard fire ant baits. Journal of Economic Entomology 115: 266-272.

Valles, S. M., and S. D. Porter. 2003. Identification of polygyne and monogyne fire ant colonies (*Solenopsis invicta*) by multiplex PCR of Gp-9 alleles. Insectes Sociaux 50(2): 199-200.

Valles, S. M., D. H. Oi, R. D. Weeks, K. M. Addesso, and J. B. Oliver. 2022. Field evaluation of Solenopsis invicta virus 3 against its host *Solenopsis invicta*. J Invertebr Pathol 191: 107767.

	Coachella Valley Mosquito and Vector Control District **Staff Report**	**February 13, 2024**

Agenda Item: Informational Item

Mosquito and Vector Control Association of California (MVCAC) Annual Conference, January 22-24, 2024, Monterey, CA

Report:

The annual meeting of the Mosquito and Vector Control Association of California (MVCAC) is an opportunity for District trustees and employees to meet with leading mosquito researchers and professionals from across the state. The Association held the meeting in Monterey, CA. Attendees heard presentations on mosquitoes in natural and agricultural settings; releasing sterilized mosquitoes; cybersecurity; preparedness and planning; unmanned aerial systems (drones); and a panel reflecting on mosquito control response to the first two human cases of dengue in California.

The first day included a workshop on 3D printing which was organized by **Kim Hung** in her role as Laboratory Technologies Committee Chair. Because of such an innovative tool, this workshop sold out. The meeting ended with the Board Meeting of MVCAC, where several District employees participated as part of their committee responsibilities.

District employees who participated are listed below. Congratulations to Lead Vector Control Technician **Gonzalo Valadez** for winning the poster competition. A note of special thanks also went to Finance Manager **David I'Anson** for a Service with Distinction accolade for his years of service as the MVCAC Treasurer.

Presentations
Marco Medel – From Common to Cryptic: Finding *Aedes aegypti* sources in the Coachella Valley
Gregorio Alvarado – Aerial and ground larvicide applications for *Aedes aegypti* in the Coachella Valley
Tony Molina – Evaluation of the OPS application: Adapting to the modern landscape of mosquito control in the Coachella Valley
Rick Ortiz – Implementation of Unmanned Aircraft System (UAS) into a Vector Control Program
Symposium and Workshop lead
Kim Hung
Posters
Fernando Gutierrez
Oscar Guerrero
Gonzalo Valadez – **Poster winner!**
Special accolade
David I'Anson – Service with Distinction

ATTENDEES:
Jeremy Wittie, General Manager
Jennifer Henke, Laboratory Manager
Crystal Moreno, Human Resources Manager
Tammy Gordon, Public Information Manager
David I'Anson, Administrative Finance Manager
Edward Prendez, Information Technology Manager
Greg Alvarado, Operations Manager
Rick Ortiz, UAS Coordinator
Kim Hung, Vector Ecologist
Gabriela Perezchica-Harvey, Vector Ecologist
Tony Molina, Field Supervisor
Fernando Gutierrez, Community Liaison
Robert Gaona, Community Liaison
Gonzalo Valadez, Lead Vector Control Technician
Marco Medel, Vector Control Technician I
Oscar Guerrero, Facilities Maintenance Technician I

Trustees:
Bito Larson, County at Large

	Coachella Valley Mosquito and Vector Control District Staff Report	February 13, 2024

Agenda Item: Informational Item

California Society of Municipal Finance Officers (CSMFO) Annual Conference, January 30-February 2, 2024, Anaheim, CA

Report:

The annual meeting was held in Anaheim, included 70 concurrent and general sessions over two and a half days. There were presentations on controlling pension liabilities, fiduciary responsibilities with regards to 457 401(a) plans, internal controls, financial reporting, IT cybercrime, government procurement, and tools on how to calculate cost of labor contracts. On the final day Christopher Thornberg from Beacon Economics gave a presentation on the economy showing that its not all doom and gloom for California.

ATTENDEES:

David I'Anson
Crystal Moreno
Rosendo Ruiz

COACHELLA VALLEY MOSQUITO & VECTOR CONTROL DISTRICT	**Coachella Valley Mosquito and Vector Control District** **Staff Report**	**February 13, 2024**

Agenda Item: Informational Item

Approval for Biologist to attend the American Mosquito Control Association Annual Conference, March 3-8, 2024 in an amount not to exceed $2000.00 from fund #7600.01.400.027, Professional Development **— Jennifer A. Henke, M.S., BCE, Laboratory Manager**

BACKGROUND:

The 90th Annual Meeting of the American Mosquito Control Association will be held in Dallas, Texas from March 4-8, 2024. The meeting will consist of presentations and exhibits that illustrate and highlight the latest science, technology, and products used to conduct research and control mosquitoes and other vectors. The meeting also provides ample opportunities to network with vector control professionals, researchers, and educators from around the world.

Biologist Gerald Chuzel was selected to receive the Boyd Ariaz Grass Roots Award. This award recognizes excellence in non-supervisory field staff and technicians by supporting them to attend an annual meeting. AMCA has provided a complimentary registration and $500 to support Gerald's attendance at the conference with the rest of the travel to be covered by the District.

Gerald was nominated by his supervisor, *Vector Ecologist Kim Hung, Ph.D., BCE.* Kim highlighted Gerald's years of service developing our mosquitofish program; his work with the California Department of Fish and Wildlife to examine desert pupfish habitats; and his work with mosquito larvicides, including the evaluation of larvicide applications for *Aedes* mosquitoes. The Award is typically given to no more than four individuals in mosquito control from across the country in a single year. Gerald joins a number of other excellent District employees who have received this award.

STAFF RECOMMENDATION:

Approve funding for the Biologist to attend the AMCA Annual Conference, March 4-8, 2024 in Dallas, Texas.

Strategic Business Plan Alignment:

Goal 2 Strong culture supports the Board and Staff Team that grows in skill, teamwork, and experience

Strategic Response – 2.1 Create a staff culture and a safe working environment to promote effective communication, collaboration, creativity, and employee satisfaction.

NEW BUSINESS

	Coachella Valley Mosquito and Vector Control District **Staff Report**	**February 13, 2024**

Agenda Item: New Business

Discussion and/or approval to purchase two (2) Application Unmanned Aircraft System (UAS) Drones, training payload and battery systems in an amount not to exceed $138,000.00, from Frontier Precision - Capital Replacement Budget Fund #8415.13.300.000 – *Budgeted; Funds - Capital Replacement* — **Edward Prendez, Information Technology Manager, and Greg Alvarado, Operations Manager**

Background:

In 2022, the Board of Trustees approved the acquisition of one (1) application UAS Drone, a Precision Vision 35X application drone to assist control efforts along the Shoreline. In 2023, The District recorded 140 hours of flight, 53 applications covering 904.6 acreage. The District also invested in a trailer enclosure, generators, and power banks to support the new application method, which has been shown to provide a low environmental impact, reduce personnel fatigue, target applications, and new recording methods.

The District's UAS Program also received approval from the Federal Aviation Administration (FAA) in 2022 to operate under a Certification of Authorization (COA) which allows the District to operate UAS Drones for reconnaissance and application activities. Each UAS Application Pilot is required to obtain an FAA's Aeronautical Knowledge Test also called Part 107 Certification, and an Unmanned Pest Control Aircraft Pilot Certificate from the California Department of Pesticide Regulations (DPR) to apply pesticides using a District UAS Drone.

UAS Drone has allowed the Operations Department to re-organize and reallocate activities along the reseeding shoreline. The District continues to move forward with Resolution No. 2018-18 and incorporating drone applications as a mode of action to control vector populations.

The District's UAS Program is in the process of hiring an additional UAS Application Pilot, evaluating granular and liquid application products, and monitoring new UAS Drone Technologies, for example, Beyond the Visual Line of Sight (BVLOS) – where drones can be flown beyond the pilot's line of sight and Drone Swarming - where a set drones work together to achieve a specific goal.

Staff Recommendation: Authorize the approval purchase of two (2) Application Unmanned Aircraft System (UAS) Drone, training payload, and battery systems in an amount not to exceed $138,000.00, from Frontier Precision - Capital Replacement Budget Fund #8415.13.300.000 – Budgeted; Funds- Capital Replacement
Fiscal Impact:

FY2023-24 Budget GL # 8415.14.300.000	Current Available Funds	Proposed Expense Fiscal Year 2023/24	Remaining Available Funds
$321,256	**$244,955**	**$138,000**	**$106,955**

COMMITTEE AND TRUSTEE REPORTS

Coachella Valley Mosquito and Vector Control District

Executive Committee Meeting

DRAFT - Minutes

TIME AND DATE: 1:30 p.m., Friday, February 2, 2024

LOCATION: 43420 Trader Place, Indio, CA 92201

TRUSTEES PRESENT:

PRESIDENT: John Peña — La Quinta
VICE PRESIDENT: Benjamin Guitron — Indio – Joined after roll call
SECRETARY: Dr. Doug Kunz — Palm Springs
TREASURER: Clive Weightman — Indian Wells

ABSENT:
None

Members of the Public present:
Yes

OTHERS PRESENT:
Jeremy Wittie, M.S., CSDM, General Manager – Via Zoom
Jennifer Henke, M.S., BCE, Laboratory Manager
Melissa Tallion, Clerk of the Board

TASKS AND OWNERSHIP

Task	Owner(s)	Report Back (Executive Committee)
Full list of needs; broken into phases; the best path forward	**Jennifer Henke**	**Bring to full Board – when available**

1. **Call to Order**
   President Peña called the meeting to order at 1:40 p.m.

2. **Roll Call**
   Roll Call indicated three (3) of the four (4) Committee members were present.

3. **Confirmation of Agenda**
   President Peña inquired if there were any agenda items to be shifted. Upon no objections by the Committee, the agenda was confirmed.

4. **Public Comments**
   Mr. Anderson submitted written public comments for non-agenda and agenda items during the meeting. The comments were distributed to the Committee and Legal Counsel after the meeting. The written comments are attached for the record.

5. **Review of February 13, 2024, draft Board meeting agenda**
   The February draft Board meeting agenda was reviewed. The Committee did not have any questions, comments, or revisions.

6. **Old Business**
   A. Discussion/Update: Sterile Insect Technique (SIT) **— Jennifer A. Henke, M.S., BCE, Laboratory Manager**
   Jennifer Henke introduced this agenda item and provided an update on the District's Sterile Mosquito Program and space needs for this program.

7. **New Business**
   None

8. **Trustee/staff comments**
   None

9. **Confirmation of next meeting**
   The next Executive Committee meeting is scheduled for Friday, March 1, 2024, at 3:00 p.m.

10. **Adjournment**
    President Peña adjourned the meeting at 2:18 p.m.

February 2, 2024

Coachella Valley Mosquito and Vector Control District (CVMVCD)

43420 Trader Pl.

Indio, CA. 92201

(760) 342-8287

Attn: Clerk of the Board / Trustees / General Manager / General Public

Re: Written letter to be entered in the Public record and made available for public Inspection for the February 2, 2024 - CVMVCD Executive committee meeting

Dear current CVMVCD appointees,

Please review my written statements listed below prior to the consideration of each agenda Item.

1) Agenda Item: 4. A. (Non-Agenda Public comment)

As this unique and unusual small group of appointees are well aware, the CVMVCD administration have taken radical political maneuvers to reduce and or eliminate Public testimony at its precived open Public meetings held within its boundaries (Coachella Valley, Riverside County California.) Along with NOT recording Public speakers verbal testimony in an accurate fashion - if at all (meeting minutes). Furthermore CVMVCD Board of Trustees decided to reduce the number of members that could participate on its committees under the "pretext" statement of retaining a quorum. Best practices protocol would clearly discouraged that narrow self-interest narrative to subvert the complete Board of Trustees potential Involvement within the CVMVCD organizations operations (Committee assignments).

The newly established entitlement program "Golden Handshake" which may encourage CVMVCD staff members to seek CalPERS retirement earlier and or as a financial incentive to have employees leave CVMVCD employment is unique to Governmental State agencies.

Please encourage long -term entrenched operation administrators (Supervisors/Lead personal) that have performed poorly over there length of employment and have demonstrated documented bad judgment (ethical malfeasance/criminal behavior) while enjoying their freedom to discriminate against others while subverting the Public's trust the GRAND opportunity to once again be financially rewarded by the citizens of the Great State of California by leaving CVMVCD employment. Having CVMVCD administrators (Bad actors) removed from CVMVCD employment will help safeguard our Community from continue status-quo (business as usual) political elements that have damaged the Illusion of Public safety in our Coachella Valley.

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2) Agenda Item: 4. B. In regards to Item: 6. A (SIT progressive program)
Opposed

Sterile Insect (Mosquito) Technique (SIT) progressive program should be disbanded and all resources should be refunded to benefit assessed taxpayer's that are forced to fund the CVMVCD organization.

Mosquito of current Intrested (Aedes aegypti) here in the Coachella Valley, Riverside County California have been mismanaged by the CVMVCD to the point of grave concern. It's been repeatedly demonstrated that CVMVCD administration have embraced that Vector as a potential ongoing revenue stream for its operations along with having other State and National organizations potentially involved to continue a "fear mongering" campaign narrative for organizational growth to "protect the Public".

Sincerely,

Brad Anderson | 37043 Ferber Dr. Rancho Mirage, CA. 92270 | ba4612442@gmail.com

Cc:

COACHELLA VALLEY MOSQUITO AND VECTOR CONTROL DISTRICT

Finance Committee Meeting
DRAFT - Minutes

TIME 4:30 p.m. **DATE:** January 9, 2024

LOCATION: 43420 Trader Place Indio, CA 92201

COMMITTEE MEMBERS PRESENT:

Indian Wells	Clive Weightman, Board Treasurer
Palm Desert	Doug Walker, Trustee
County at Large	Bito Larson, Trustee

COMMITTEE MEMBERS ABSENT:
None

OTHER TRUSTEES PRESENT:
None

STAFF PRESENT:
Jeremy Wittie, General Manager
David I'Anson, Administrative Finance Manager
Melissa Tallion, Executive Assistant/Clerk of the Board

MEMBERS OF THE PUBLIC PRESENT:
No

Tasks and Ownership

Task	**Owner(s)**	Report Back (Finance Committee)
Section 115 Comparison of all vendors	David	February

1. **Call to Order**
   Treasurer Weightman called the meeting to order at 4:31 p.m.

2. **Roll Call**
   Roll Call indicated that all three (3) Committee members were present.

3. **Confirmation of Agenda**
   Treasurer Weightman inquired if any agenda items needed to be shifted. Upon no objections from the Committee, the agenda was confirmed as presented.

4. **Public Comments**
   None

5. **Presentation**
    A. CalPERS CEPPT 115 Pension Stabilization Trust **— Darren Lathrop, CalPERS**
    Darren Lathrop and his colleague gave a presentation on section 115 trust solutions for pensions and answered questions from the Committee.

6. **Items of General Consent**
    A. Approval of Minutes from December 12, 2023, Finance Committee Meeting

On a motion from Trustee Walker, seconded by Trustee Weightman, and passed by the following vote, the Committee approved the minutes from December 12, 2023.

Ayes: Treasurer Weightman, Trustee Walker

Noes: None

Abstained: Trustee Larson

Absent: None

7. **Discussion, Review, and/or Update**
    A. Review of Check Report from Abila MIP for the period of December 7, 2023, to January 4, 2024
    The Check Report was reviewed by the Committee and staff.

    B. Credit Card Charges (Abila report & Microix Workflow Report) –CalCard Statement dated December 23, 2023, and Umpqua Statement dated December 31, 2023
    The monthly statements were reviewed by the Committee. Staff answered the questions to satisfy the Committee.

    C. Review of December 2023 Financials and Treasurers Report
    The Committee reviewed the financials and Treasurer's report.

8. **Old Business**
    A. 2024 Finance Committee Items
    The Committee reviewed the current list and discussed upcoming budget dates.

9. **New Business**
    A. Review of finance-related items on the January Board agenda
    The draft Board agenda was reviewed by the Committee.

10. **Schedule Next Meeting**
    The next Finance Committee meeting was scheduled for February 13, 2024, at 4:30 p.m.

11. **Trustee and/or Staff Comments/Future Agenda Items**
    None

12. Adjournment

Treasurer Weightman adjourned the meeting at 5:20 p.m.