

# 2023 ANNUAL REPORT

of the

SOUTH SALT LAKE VALLEY  
MOSQUITO ABATEMENT DISTRICT

Silvia Catten  
Chair of the Board of Trustees

Dan McBride  
District Manager

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# INTRODUCTION

South Salt Lake Valley Mosquito Abatement District conducted its 71<sup>st</sup> year of mosquito control in 2023. The following are notable occurrences.

1. Brian Hougaard retired and the Board appointed Dan McBride as the new District Manager, effective October 16, 2023.
2. West Nile virus activity in 2023 was higher than the previous year. Forty-six of 1,515 mosquito pools tested positive (see West Nile Virus Activity).
3. One human case was reported in the District (see West Nile Virus Activity).
4. The District area saw an incredibly wet winter and spring, which caused early and mid season influxes of mosquitoes.
5. The District participated in a joint study with Valient BioSciences in testing the efficacy of Vectobac WDG utilizing a side area larviciding system (WALS)
6. The District completed four distinct Bottle Bioassays, showing some resistance to a chemical used to control adult mosquitoes.
7. A continuing product trial was done with Sumilarv (Pyriproxyfen), which is a product used to treat catch basins. (See Efficacy)
8. Board of Trustee changes included one new appointee – Matt Holton- who replaced Doug Petersen, who sadly passed away in April.

# PERSONNEL

## BOARD OF TRUSTEES

The District is governed by a Board of Trustees consisting of one Trustee appointed from the District at large by the legislative body of Salt Lake County and one Trustee appointed by each municipal legislative body within the District (Utah Code 17B-2a-704).

Name	Office	Board Meeting Attendance	Date Appointed	Expiration of Current Term	Municipality Represented
Jeff Bossard	Trustee	7	1/2020	12/2023	Brighton
Ty Brewer	Trustee	9	6/2022	06/2026	Holladay
Tish Buroker	Vice Chair	10	1/2018	12/2023	Riverton
Silvia Catten	Chair	11	1/2017	12/2024	Millcreek
Don Christensen	Trustee	12	1/2020	12/2023	West Valley City
Gene Drake	Trustee	10	1/1997	12/2024	West Jordan
Jeff Gaston	Trustee	11	1/2020	12/2023	Bluffdale
Brad Gilson	Trustee	10	6/2019	6/2023	Draper
Paul Glover	Trustee	10	1/2018	12/2025	Midvale
LeAnn Huff	Trustee	7	1/2020	12/2025	South Salt Lake
Kristie Overson	Trustee	11	1/2012	12/2023	Taylorsville
Doug Petersen	Trustee	3	1/2022	Passed during term	Cottonwood Heights
Linda Price	Trustee	12	2/2017	12/2024	White City
Florence Reynolds	Trustee	11	1/2020	12/2023	Sandy
Ilene Risk	Treasurer	11	1/2009	12/2019*	Salt Lake County
Steve Shields	Trustee	9	3/2020	12/2023	Herriman
Laverne Snow	Trustee	12	1/2006	12/2025	Murray
Tamara Zander	Trustee	6	2/2016	12/2023	South Jordan
Matt Holton	Trustee	5	5/2023	12/2023	Cottonwood Heights

*\* a new appointment letter was never received from the County; she remains appointed until superseded*

SOUTH SALT LAKE VALLEY MOSQUITO ABATEMENT DISTRICT

# 2023 Board of Trustees



Chair—Silvia Catten (Millcreek)



Vice Chair—Tish Buroker (Riverton)



Treasurer—Ilene Risk (Salt Lake Cnty)



Jeffery Bossard (Brighton)



Ty Brewer (Holladay)



Don Christensen (West Valley)



Gene Drake (West Jordan)



Jeffrey Gaston (Bluffdale)



Brad Gilson (Draper)



Paul Glover (Midvale)



LeAnne Huff (South Salt Lake)



Mayor Kristie Overson (Taylorsville)



Doug Petersen (Cottonwood Heights)



Linda Price (White City)



Florence Reynolds (Sandy)



Steve Shields (Herriman)



Laverne Snow (Murray)



Tamara Zander (South Jordan)

REGULAR EMPLOYEES

Name	Position	Dates of Full-Time Employment	Additional Years in Mos. Control
Devin Belnap	GIS Analyst / IT Administrator	August 2006 - Present	2 Seasonal
Kassie Draper	Finance Manager	March 2010 - Present	-
Eric Gardner	Biologist / Safety Supervisor	October 2014 - Present	4 Seasonal
Brian Hougaard	District Manager (Retired)	January 2005 – October 2023	12.5 at SLCMAD
Dan McBride	Assistant Manager / Field Supervisor- District Manager	January 2018 - Present	3 Seasonal
Judd Mitchell	Fleet & Facilities Manager	November 2015 - Present	6 Seasonal

## SEASONAL EMPLOYEES

Name	Position	Original Hire Date	Total Summers Worked
Sydney Alexander	BF/O	April 2023	1
Cameron Hancock	M	May 2021	3
Arden Hansen	B	June 2020	4
Peter Jensen	B	March 2022	2
Jeremy Larsen	M	April 2022	2
Alex Lee	B	April 2023	1
Zachary Mickelsen	T	May 2023	1
Rhett Moody	M	May 2016	6
Alyssa Nielsen	B	June 2022	2
Tanner Nielsen	U	May 2023	1
Lance Risk	BF/M	May 2023	1
CJ Rubaclava	B	June 2023	1
Kaitlyn Seiter	B	June 2020	3
Sofia Skinner	B	June 2023	1
Elisabeth Smith	B	May 2023	1
Scott Sommer	M	June 2004	20
Thea Spigarelli	B	June 2021	2
Porter Williams	B, U, O	May 2021	3
Ben Winkel	M	June 2018	4

Position abbreviations and brief job descriptions:

- B Bicycle Crew – Treats catch basins and gutters
- BF Black Fly – Inspects, records data and treats black fly spots weekly
- ID Mosquito Identification – Help in mosquito identification, laboratory
- M Mosquito Crew – Inspects, records data and treats mosquito spots in the field weekly
- O Office – Answer phones, takes service requests, helps with computers/GPS units
- R Research
- T Traps/Surveillance – Deliver and collect CO<sub>2</sub> and Gravid traps
- U Urban Crew – Stock ornamental ponds with mosquito fish or briquets, maps and treats horse troughs and tree holes

# WEATHER CONDITIONS

2023 Temperatures		
Month	Mean Monthly Temp (in degrees Fahrenheit)	Departure from Average (in degrees Fahrenheit)
January	33.5	2.1
February	32.5	-4.1
March	39.4	-6.4
April	50.3	-1.5
May	67.2	5.7
June	71.4	-0.2
July	85.3	4.2
August	78.9	-.1
September	70.8	2.4
October	55.9	1.3
November	43.6	1.9
December	36.5	4.3

2023 Precipitation		
Month	Total for Month (in inches)	Departure from Average (in inches)
January	2.71	1.28
February	1.35	0.5
March	2.61	0.86
April	1.69	-0.47
May	0.52	-1.3
June	0.39	-0.6
July	0.06	-0.43
August	2.75	2.17
September	0.91	-0.15
October	1.97	0.71
November	1.74	.42
December	.94	-.46

(Source: National Weather Service, NOAA Data: <https://www.weather.gov/wrh/Climate?wfo=slc>)  
(Averages compiled from 1991-2020)

Average monthly temperatures for 2023 were .8° F above normal.  
Total annual precipitation for 2023 was .21 inches below normal.



# SURVEILLANCE

## LARVAL

Larval mosquito surveillance data come from information recorded by mosquito crew technicians as spots apparently capable of harboring larval mosquitoes are inspected each week. Inspection is accomplished using standard 350 mL dippers. At least three observations are made at each body of water inspected, with additional observations made based on the total area of suitable mosquito habitat. An average of one to seven observations are made for each 500 ft<sup>2</sup> of suitable larval mosquito habitat. The location, estimated density, and estimated age class of observed mosquito larvae are recorded by technicians in the field. A sample of larvae from each location in which mosquito larvae are found is collected and returned to the District laboratory for species identification.

Values in the following tables are counts of positive observations of mosquito larvae, and percentages and averages of those counts as indicated in individual tables.

### Individual Species by Month

<i>Aedes dorsalis</i>							
Month	2018	2019	2020	2021	2022	5 Year Average	2023
March	0	0	0	0	0	0	0
April	31	15	5	2	0	10.6	7
May	21	3	13	8	2	9.4	6
June	7	2	1	3	8	4.2	12
July	4	1	0	4	3	2.4	11
August	1	5	0	6	12	4.8	12
September	1	1	2	0	2	1.2	0
<b>Total</b>	<b>65</b>	<b>27</b>	<b>21</b>	<b>23</b>	<b>27</b>	<b>32.6</b>	<b>48</b>
% of Total	2.68%	1.40%	1.47%	1.35%	1.34%	1.71%	2.11%

<i>Aedes increpitus</i>							
Month	2018	2019	2020	2021	2022	5 Year Average	2023
March	6	0	3	14	0	4.6	0
April	41	51	9	18	3	24.4	0
May	14	12	2	9	1	7.6	0
June	0	2	5	1	1	1.8	0
July	0	1	3	0	1	1	0
August	0	1	0	0	0	0.2	0
September	0	0	0	0	0	0	0
<b>Total</b>	<b>61</b>	<b>67</b>	<b>22</b>	<b>42</b>	<b>6</b>	<b>39.6</b>	<b>0</b>
% of Total	2.51%	3.48%	1.54%	2.46%	0.30%	2.08%	0.00%

<i>Aedes nigromaculis</i>							
Month	2018	2019	2020	2021	2022	5 Year Average	2023
March	0	0	0	1	0	0.2	0
April	0	0	0	0	0	0	0
May	0	0	0	0	0	0	0
June	0	0	0	0	0	0	0
July	0	0	0	0	0	0	0
August	0	0	0	1	0	0.2	0
September	0	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0.4</b>	<b>0</b>
% of Total	0.00%	0.00%	0.00%	0.12%	0.00%	0.02%	0.00%

<i>Aedes vexans</i>							
Month	2018	2019	2020	2021	2022	5 Year Average	2023
March	0	0	0	0	0	0	0
April	5	2	0	0	0	1.4	0
May	23	13	7	26	14	16.6	13
June	5	8	10	15	23	12.2	17
July	4	4	9	14	18	9.8	11
August	16	4	2	17	19	11.6	15
September	1	0	0	1	1	0.6	0
<b>Total</b>	<b>54</b>	<b>31</b>	<b>28</b>	<b>73</b>	<b>75</b>	<b>52.2</b>	<b>56</b>
% of Total	2.22%	1.61%	1.97%	4.27%	3.71%	2.74%	2.46%

<i>Anopheles freeborni</i>							
Month	2018	2019	2020	2021	2022	5 Year Average	2023
March	0	0	0	0	0	0	0
April	0	0	1	0	0	0.2	0
May	15	4	10	26	4	11.8	13
June	29	19	3	48	13	22.4	30
July	50	17	10	60	34	34.2	35
August	44	13	9	33	44	28.6	26
September	10	0	3	7	20	8	2
<b>Total</b>	<b>148</b>	<b>53</b>	<b>36</b>	<b>174</b>	<b>115</b>	<b>105.2</b>	<b>106</b>
% of Total	6.09%	2.75%	2.53%	10.18%	5.69%	5.53%	4.66%

<i>Culex erythrorhax</i>							
Month	2018	2019	2020	2021	2022	5 Year Average	2023
March	0	0	0	0	0	0	0
April	0	0	0	0	0	0	0
May	0	0	0	1	0	0.2	0
June	0	0	0	0	1	0.2	0
July	0	0	0	0	7	1.4	0
August	0	0	0	0	10	2	0
September	0	0	0	0	1	0.2	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>19</b>	<b>4</b>	<b>0</b>
% of Total	0.00%	0.00%	0.00%	0.06%	0.94%	0.21%	0.00%

<i>Culex pipiens</i>							
Month	2018	2019	2020	2021	2022	5 Year Average	2023
March	0	0	0	0	0	0	0
April	3	0	2	0	0	1	0
May	38	35	42	47	44	41.2	41
June	202	174	195	234	193	199.6	279
July	425	312	238	332	278	317	364
August	429	243	220	239	347	295.6	181
September	105	25	74	47	43	58.8	26
<b>Total</b>	<b>1202</b>	<b>789</b>	<b>771</b>	<b>899</b>	<b>905</b>	<b>913.2</b>	<b>891</b>
% of Total	49.49%	40.94%	54.14%	52.57%	44.80%	48.01%	39.18%

<i>Culex tarsalis</i>							
Month	2018	2019	2020	2021	2022	5 Year Average	2023
March	0	0	0	0	0	0	0
April	2	7	4	0	0	2.6	0
May	34	35	29	12	19	25.8	41
June	84	65	30	59	85	64.6	134
July	133	81	52	86	149	100.2	196
August	132	42	50	30	154	81.6	149
September	22	9	17	6	28	16.4	15
<b>Total</b>	<b>407</b>	<b>239</b>	<b>182</b>	<b>193</b>	<b>435</b>	<b>291.2</b>	<b>535</b>
% of Total	16.76%	12.40%	12.78%	11.29%	21.53%	15.31%	23.53%

<i>Culiseta incidens</i>							
Month	2018	2019	2020	2021	2022	5 Year Average	2023
March	0	0	0	0	0	0	0
April	0	2	0	1	1	0.8	0
May	8	4	13	4	8	7.4	1
June	44	13	32	23	23	27	11
July	50	36	38	20	31	35	14
August	44	28	20	13	23	25.6	2
September	27	4	16	1	1	9.8	0
<b>Total</b>	<b>173</b>	<b>87</b>	<b>119</b>	<b>62</b>	<b>87</b>	<b>105.6</b>	<b>28</b>
% of Total	7.12%	4.51%	8.36%	3.63%	4.31%	5.55%	1.23%

<i>Culiseta inornata</i>							
Month	2018	2019	2020	2021	2022	5 Year Average	2023
March	0	0	0	0	1	0.2	0
April	17	37	18	2	8	16.4	22
May	69	130	66	52	90	81.4	143
June	63	164	41	67	104	87.8	222
July	38	174	35	45	58	70	135
August	36	69	31	27	50	42.6	72
September	24	12	24	20	19	19.8	8
<b>Total</b>	<b>247</b>	<b>586</b>	<b>215</b>	<b>213</b>	<b>330</b>	<b>318.2</b>	<b>602</b>
% of Total	10.17%	30.41%	15.10%	12.46%	16.34%	16.73%	26.47%

Other species							
Month	2018	2019	2020	2021	2022	5 Year Average	2023
March	0	0	0	0	1	0.2	0
April	2	9	0	0	1	2.4	0
May	53	12	0	4	1	14	1
June	16	10	29	24	18	19.4	4
July	1	16	1	0	0	3.6	3
August	0	1	0	0	0	0.2	0
September	0	0	0	0	0	0	0
<b>Total</b>	<b>72</b>	<b>48</b>	<b>30</b>	<b>28</b>	<b>21</b>	<b>39.8</b>	<b>8</b>
% of Total	2.96%	2.49%	2.11%	1.64%	1.04%	2.09%	0.35%

## Individual Species by City

Alta							
Species	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	0	0	0	0	0	0	0
<i>Aedes increpitus</i>	0	0	0	0	0	0	0
<i>Aedes nigromaculus</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	0	0	0	0	0	0	0
<i>Anopheles freeborni</i>	0	0	0	0	0	0	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	2	1	0	1	0	0.8	0
<i>Culex tarsalis</i>	5	1	0	0	0	1.2	0
<i>Culiseta incidens</i>	23	5	11	2	0	8.2	4
<i>Culiseta inornata</i>	16	2	3	2	0	4.6	2
Other	9	2	5	2	0	3.6	0
<b>Total</b>	<b>55</b>	<b>11</b>	<b>19</b>	<b>7</b>	<b>0</b>	<b>18.4</b>	<b>6</b>

Bluffdale							
Species	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	2	2	2	1	1	1.6	3
<i>Aedes increpitus</i>	0	1	0	0	0	0.2	0
<i>Aedes nigromaculus</i>	0	0	0	1	0	0.2	0
<i>Aedes vexans</i>	1	0	0	2	4	1.4	3
<i>Anopheles freeborni</i>	64	20	15	63	39	40.2	41
<i>Culex erythrothorax</i>	0	0	0	0	1	0.2	0
<i>Culex pipiens</i>	68	40	46	110	78	68.4	62
<i>Culex tarsalis</i>	70	22	19	40	99	50	92
<i>Culiseta incidens</i>	3	2	6	4	3	3.6	0
<i>Culiseta inornata</i>	22	45	18	38	64	37.4	69
Other	0	0	0	0	0	0	0
<b>Total</b>	<b>230</b>	<b>132</b>	<b>106</b>	<b>259</b>	<b>289</b>	<b>203.2</b>	<b>270</b>

Brighton (unincorporated)							
Species	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	0	0	0	0	0	0	0
<i>Aedes increpitus</i>	0	0	0	0	0	0	0
<i>Aedes nigromaculus</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	0	0	0	0	0	0	0
<i>Anopheles freeborni</i>	0	0	0	0	0	0	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	0	0	0	0	0	0	1
<i>Culex tarsalis</i>	0	0	0	0	0	0	2
<i>Culiseta incidens</i>	0	2	7	1	0	2	1
<i>Culiseta inornata</i>	3	10	20	7	0	8	15
Other	61	13	25	26	18	28.6	0
<b>Total</b>	<b>64</b>	<b>25</b>	<b>52</b>	<b>34</b>	<b>18</b>	<b>38.6</b>	<b>19</b>

Cottonwood Heights							
Species	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	0	0	0	0	0	0	0
<i>Aedes increpitus</i>	5	1	2	0	0	1.6	1
<i>Aedes nigromaculus</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	0	0	2	0	0	0.4	0
<i>Anopheles freeborni</i>	1	0	0	0	0	0.2	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	55	29	14	9	8	23	14
<i>Culex tarsalis</i>	4	1	1	0	1	1.4	3
<i>Culiseta incidens</i>	19	13	6	4	8	10	4
<i>Culiseta inornata</i>	9	12	1	3	2	5.4	7
Other	0	2	0	0	0	0.4	0
<b>Total</b>	<b>93</b>	<b>58</b>	<b>26</b>	<b>16</b>	<b>19</b>	<b>42.4</b>	<b>29</b>

Draper							
Species	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	9	2	5	9	15	8	13
<i>Aedes increpitus</i>	8	10	1	8	2	5.8	3
<i>Aedes nigromaculus</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	15	2	3	9	11	8	7
<i>Anopheles freeborni</i>	7	2	2	10	6	5.4	5
<i>Culex erythrothorax</i>	0	0	0	0	2	0.4	0
<i>Culex pipiens</i>	130	108	67	131	101	107.4	84
<i>Culex tarsalis</i>	54	42	19	38	77	46	72
<i>Culiseta incidens</i>	14	10	5	6	3	7.6	1
<i>Culiseta inornata</i>	29	98	20	21	32	40	93
Other	0	1	0	0	0	0.2	0
<b>Total</b>	<b>266</b>	<b>275</b>	<b>122</b>	<b>232</b>	<b>249</b>	<b>228.8</b>	<b>278</b>

Herriman							
Species	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	0	0	0	0	0	0	0
<i>Aedes increpitus</i>	0	0	0	0	0	0	0
<i>Aedes nigromaculus</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	0	0	0	0	0	0	0
<i>Anopheles freeborni</i>	1	0	0	0	1	0.4	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	20	1	2	6	11	8	0
<i>Culex tarsalis</i>	4	0	3	0	3	2	1
<i>Culiseta incidens</i>	0	0	1	1	1	0.6	0
<i>Culiseta inornata</i>	2	1	4	2	4	2.6	1
Other	0	0	0	0	0	0	0
<b>Total</b>	<b>27</b>	<b>2</b>	<b>10</b>	<b>9</b>	<b>20</b>	<b>13.6</b>	<b>2</b>



Holladay							
Species	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	0	0	0	0	0	0	0
<i>Aedes increpitus</i>	0	0	0	0	0	0	0
<i>Aedes nigromaculus</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	0	0	0	0	0	0	0
<i>Anopheles freeborni</i>	1	0	0	0	0	0.2	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	44	14	9	7	5	15.8	5
<i>Culex tarsalis</i>	13	0	2	2	3	4	0
<i>Culiseta incidens</i>	10	3	1	3	4	4.2	0
<i>Culiseta inornata</i>	3	1	2	4	0	2	1
Other	0	0	0	0	0	0	0
<b>Total</b>	<b>71</b>	<b>18</b>	<b>14</b>	<b>16</b>	<b>12</b>	<b>26.2</b>	<b>6</b>

Midvale							
Species	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	0	0	0	0	0	0	0
<i>Aedes increpitus</i>	0	0	0	0	0	0	0
<i>Aedes nigromaculus</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	0	0	0	0	3	0.6	2
<i>Anopheles freeborni</i>	2	0	0	0	0	0.4	0
<i>Culex erythrothorax</i>	0	0	0	0	2	0.4	0
<i>Culex pipiens</i>	34	38	21	10	16	23.8	21
<i>Culex tarsalis</i>	3	8	3	1	6	4.2	16
<i>Culiseta incidens</i>	5	1	2	1	0	1.8	0
<i>Culiseta inornata</i>	2	4	4	1	2	2.6	12
Other	0	0	0	0	0	0	0
<b>Total</b>	<b>46</b>	<b>51</b>	<b>30</b>	<b>13</b>	<b>29</b>	<b>33.8</b>	<b>51</b>

Millcreek							
Species	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	4	2	0	1	0	1.4	0
<i>Aedes increpitus</i>	25	20	8	22	2	15.4	12
<i>Aedes nigromaculus</i>	0	0	0	1	0	0.2	0
<i>Aedes vexans</i>	1	0	0	0	1	0.4	0
<i>Anopheles freeborni</i>	0	3	3	4	0	2	2
<i>Culex erythrothorax</i>	0	0	0	0	1	0.2	0
<i>Culex pipiens</i>	88	60	94	65	85	78.4	35
<i>Culex tarsalis</i>	22	5	17	2	13	11.8	10
<i>Culiseta incidens</i>	21	10	31	3	19	16.8	4
<i>Culiseta inornata</i>	29	55	33	13	59	37.8	34
Other	0	0	0	0	0	0	0
<b>Total</b>	<b>190</b>	<b>155</b>	<b>186</b>	<b>111</b>	<b>180</b>	<b>164.4</b>	<b>97</b>

Murray							
Species	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	0	0	1	0	0	0.2	0
<i>Aedes increpitus</i>	1	0	1	0	0	0.4	0
<i>Aedes nigromaculus</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	10	6	6	2	14	7.6	8
<i>Anopheles freeborni</i>	9	1	3	4	0	3.4	2
<i>Culex erythrothorax</i>	0	0	0	0	3	0.6	0
<i>Culex pipiens</i>	68	67	66	60	95	71.2	72
<i>Culex tarsalis</i>	19	7	12	6	17	12.2	20
<i>Culiseta incidens</i>	14	9	15	10	9	11.4	2
<i>Culiseta inornata</i>	9	32	14	5	21	16.2	42
Other	0	3	0	0	0	0.6	0
<b>Total</b>	<b>130</b>	<b>125</b>	<b>118</b>	<b>87</b>	<b>159</b>	<b>123.8</b>	<b>146</b>

Riverton							
Species	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	4	1	0	1	1	1.4	4
<i>Aedes increpitus</i>	1	1	0	1	1	0.8	0
<i>Aedes nigromaculus</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	4	0	2	8	5	3.8	2
<i>Anopheles freeborni</i>	15	6	4	21	22	13.6	21
<i>Culex erythrothorax</i>	0	0	0	0	1	0.2	0
<i>Culex pipiens</i>	76	60	54	70	99	71.8	100
<i>Culex tarsalis</i>	38	21	21	25	66	34.2	69
<i>Culiseta incidens</i>	5	2	6	2	6	4.2	3
<i>Culiseta inornata</i>	18	51	17	23	22	26.2	81
Other	0	0	0	0	0	0	0
<b>Total</b>	<b>161</b>	<b>142</b>	<b>104</b>	<b>151</b>	<b>223</b>	<b>156.2</b>	<b>280</b>

Sandy							
Species	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	1	0	0	0	0	0.2	0
<i>Aedes increpitus</i>	0	1	1	0	0	0.4	0
<i>Aedes nigromaculus</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	3	4	8	3	10	5.6	11
<i>Anopheles freeborni</i>	5	3	2	6	8	4.8	9
<i>Culex erythrothorax</i>	0	0	0	0	1	0.2	0
<i>Culex pipiens</i>	68	88	53	63	69	68.2	34
<i>Culex tarsalis</i>	7	16	7	5	19	10.8	18
<i>Culiseta incidens</i>	22	14	11	9	15	14.2	1
<i>Culiseta inornata</i>	12	41	17	8	34	22.4	27
Other	0	1	0	0	0	0.2	0
<b>Total</b>	<b>118</b>	<b>168</b>	<b>99</b>	<b>94</b>	<b>156</b>	<b>127</b>	<b>100</b>

South Jordan							
Species	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	3	1	2	1	4	2.2	5
<i>Aedes increpitus</i>	1	0	0	1	0	0.4	3
<i>Aedes nigromaculus</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	4	7	1	16	21	9.8	9
<i>Anopheles freeborni</i>	16	8	6	51	38	23.8	22
<i>Culex erythrothorax</i>	0	0	0	0	2	0.4	0
<i>Culex pipiens</i>	120	54	107	162	121	112.8	118
<i>Culex tarsalis</i>	53	16	30	42	70	42.2	76
<i>Culiseta incidens</i>	7	4	7	5	4	5.4	1
<i>Culiseta inornata</i>	25	55	14	33	31	31.6	64
Other	1	2	0	0	0	0.6	0
<b>Total</b>	<b>230</b>	<b>147</b>	<b>167</b>	<b>311</b>	<b>291</b>	<b>229.2</b>	<b>298</b>

South Salt Lake							
Species	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	5	0	3	1	0	1.8	5
<i>Aedes increpitus</i>	1	0	1	1	0	0.6	1
<i>Aedes nigromaculus</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	1	0	1	1	0	0.6	0
<i>Anopheles freeborni</i>	4	0	0	1	0	1	1
<i>Culex erythrothorax</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	78	20	36	43	21	39.6	49
<i>Culex tarsalis</i>	27	9	12	8	10	13.2	21
<i>Culiseta incidens</i>	3	0	1	0	1	1	0
<i>Culiseta inornata</i>	7	13	3	4	6	6.6	16
Other	0	0	0	0	0	0	0
<b>Total</b>	<b>126</b>	<b>42</b>	<b>57</b>	<b>59</b>	<b>38</b>	<b>64.4</b>	<b>93</b>

Taylorsville							
Species	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	0	0	2	1	0	0.6	0
<i>Aedes increpitus</i>	2	19	6	5	0	6.4	2
<i>Aedes nigromaculus</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	0	0	1	2	1	0.8	2
<i>Anopheles freeborni</i>	4	2	0	2	1	1.8	0
<i>Culex erythrothorax</i>	0	0	0	0	3	0.6	0
<i>Culex pipiens</i>	82	48	50	31	62	54.6	95
<i>Culex tarsalis</i>	15	13	14	4	14	12	27
<i>Culiseta incidens</i>	4	2	4	2	5	3.4	1
<i>Culiseta inornata</i>	13	31	13	10	16	16.6	49
Other	0	1	0	0	0	0.2	0
<b>Total</b>	<b>120</b>	<b>116</b>	<b>90</b>	<b>57</b>	<b>102</b>	<b>97</b>	<b>176</b>

West Jordan							
Species	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	0	0	0	0	0	0	0
<i>Aedes increpitus</i>	1	0	0	0	1	0.4	1
<i>Aedes nigromaculus</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	2	5	0	7	2	3.2	8
<i>Anopheles freeborni</i>	5	0	1	8	0	2.8	0
<i>Culex erythrothorax</i>	0	0	0	0	1	0.2	0
<i>Culex pipiens</i>	161	55	83	74	70	88.6	80
<i>Culex tarsalis</i>	26	8	6	6	6	10.4	19
<i>Culiseta incidens</i>	14	3	2	1	5	5	3
<i>Culiseta inornata</i>	10	30	10	10	5	13	26
Other	0	4	0	0	0	0.8	0
<b>Total</b>	<b>219</b>	<b>105</b>	<b>102</b>	<b>106</b>	<b>90</b>	<b>124.4</b>	<b>137</b>

West Valley City							
Species	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	37	19	6	8	6	15.2	18
<i>Aedes increpitus</i>	16	14	2	4	0	7.2	1
<i>Aedes nigromaculus</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	11	7	4	23	3	9.6	4
<i>Anopheles freeborni</i>	14	8	0	3	0	5	3
<i>Culex erythrothorax</i>	0	0	0	1	2	0.6	0
<i>Culex pipiens</i>	100	86	57	45	54	68.4	99
<i>Culex tarsalis</i>	47	69	15	9	31	34.2	78
<i>Culiseta incidens</i>	4	4	2	0	3	2.6	2
<i>Culiseta inornata</i>	35	102	22	23	30	42.4	58
Other	10	19	0	0	3	6.4	0
<b>Total</b>	<b>274</b>	<b>328</b>	<b>108</b>	<b>116</b>	<b>132</b>	<b>191.6</b>	<b>263</b>

White City							
Species	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	0	0	0	0	0	0	0
<i>Aedes increpitus</i>	0	0	0	0	0	0	0
<i>Aedes nigromaculus</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	0	0	0	0	0	0	0
<i>Anopheles freeborni</i>	0	0	0	0	0	0	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	12	20	11	8	10	12.2	10
<i>Culex tarsalis</i>	0	1	0	1	0	0.4	1
<i>Culiseta incidens</i>	5	3	1	1	1	2.2	0
<i>Culiseta inornata</i>	2	3	0	2	2	1.8	3
Other	0	0	0	0	0	0	0
<b>Total</b>	<b>19</b>	<b>27</b>	<b>12</b>	<b>12</b>	<b>13</b>	<b>16.6</b>	<b>14</b>

## ADULT

Surveillance of adult mosquitoes is conducted to collect information about the population size and distribution of mosquitoes and to monitor the mosquito population for disease agents.

Data obtained from surveillance of adult mosquitoes are used to make informed decisions regarding control efforts directed toward both larval and adult mosquitoes.

In 2023 the District utilized three types of traps in adult mosquito surveillance: an ABC Trap with CO<sub>2</sub> (dry ice) from Clarke, a Frommer Updraft Gravid Trap from the John W. Hock Company, and the Biogents Sentinel 2 trap. All traps were deployed weekly from May through September. Trapping sessions extended for a period of approximately 18 to 20 hours, including all hours between dusk and dawn.

ABC Traps with CO<sub>2</sub> (in the form of dry ice) as an attractant were placed at each of the 32 trapping stations throughout the area serviced by the District. CO<sub>2</sub>-baited ABC traps attract host-seeking female mosquitoes and so can provide a useful comparison of the relative number of host-seeking nuisance or disease vector mosquitoes from a wide range of species among trapping stations and among trapping periods.

Frommer Updraft Gravid Traps were deployed at 16 locations in the area serviced by the District. Gravid traps use a water-based hay infusion to attract gravid female mosquitoes seeking an oviposition site. Because mosquitoes can become infected with disease organisms while blood feeding, sampling gravid females is useful in detecting the presence of disease organisms in the mosquito population. Gravid female mosquitoes have likely obtained at least one blood meal and thus, the incidence of disease may be higher in the gravid female demographic than among host-seeking females. Frommer Updraft Gravid Traps are biased towards container-breeding mosquitoes, primarily *Culex pipiens* L., in the area serviced by the District. As *Cx. pipiens* is a competent vector of West Nile virus (see West Nile Virus section, this report), and an abundant mosquito species within the boundaries of the District (see trap results below), sampling gravid females of this species provides relevant and useful information.

Surveillance for *Aedes albopictus* (Skuse) and *Aedes aegypti* (L.) was primarily conducted using Biogents Sentinel 2 Traps at 6 trapping locations. Range expansions have been observed in these mosquito species elsewhere in North America in recent years, and both are competent vectors of multiple diseases. Trapping locations were established in areas where the introduction or establishment of the target species seemed most likely, including locations near freight transportation and close to suitable habitats such as treeholes and artificial containers. These traps utilize multiple attractants, including CO<sub>2</sub> in the form of dry ice, a BG-Lure scent, and a visual pattern designed to attract some species of *Aedes* mosquitoes. No *Ae. albopictus* or *Ae. aegypti* were detected, but many other species were observed.

In 2023 overall mosquito numbers were above average, largely attributable to more *Culex tarsalis* observations per trapping event than have been observed since at least 2005.





<i>Aedes sierrensis</i>							
Month	2018	2019	2020	2021	2022	5 Year Average	2023
May	24	12	22	6	2	13.2	1
June	24	61	22	19	9	27	7
July	3	14	6	9	3	7	1
August	1	2	0	0	0	0.6	1
September	0	0	0	3	2	1	3
<b>Total</b>	<b>52</b>	<b>89</b>	<b>50</b>	<b>37</b>	<b>16</b>	<b>48.8</b>	<b>13</b>
% of Total	0.11%	0.19%	0.07%	0.08%	0.03%	0.10%	0.01%

<i>Aedes vexans</i>							
Month	2018	2019	2020	2021	2022	5 Year Average	2023
May	9	3	5	9	0	5.2	66
June	40	196	135	153	457	196.2	167
July	501	198	168	419	1148	486.8	261
August	198	76	164	485	1097	404	802
September	126	26	1	129	181	92.6	193
<b>Total</b>	<b>874</b>	<b>499</b>	<b>473</b>	<b>1195</b>	<b>2883</b>	<b>1184.8</b>	<b>1489</b>
% of Total	1.83%	1.06%	0.67%	2.69%	5.92%	2.43%	1.54%

<i>Anopheles freeborni</i>							
Month	2018	2019	2020	2021	2022	5 Year Average	2023
May	21	17	86	193	8	65	84
June	153	81	166	1792	159	470.2	156
July	643	254	805	1933	709	868.8	658
August	282	163	942	379	313	415.8	296
September	20	32	51	20	50	34.6	12
<b>Total</b>	<b>1119</b>	<b>547</b>	<b>2050</b>	<b>4317</b>	<b>1239</b>	<b>1854.4</b>	<b>1206</b>
% of Total	2.35%	1.17%	2.91%	9.71%	2.54%	3.74%	1.24%

<i>Coquillettidia perturbans</i>							
Month	2018	2019	2020	2021	2022	5 Year Average	2023
May	0	0	0	0	0	0	0
June	26	16	26	46	16	26	10
July	87	282	202	467	453	298.2	141
August	1	33	29	2	28	18.6	22
September	0	3	0	0	0	0.6	0
<b>Total</b>	<b>114</b>	<b>334</b>	<b>257</b>	<b>515</b>	<b>497</b>	<b>343.4</b>	<b>173</b>
% of Total	0.24%	0.71%	0.37%	1.16%	1.02%	0.70%	0.18%

<i>Culex erythrothorax</i>							
Month	2018	2019	2020	2021	2022	5 Year Average	2023
May	0	0	0	0	0	0	0
June	0	0	0	0	3	0.6	1
July	0	0	0	0	32	6.4	0
August	0	0	0	0	6	1.2	3
September	0	0	0	0	219	43.8	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>260</b>	<b>52</b>	<b>4</b>
% of Total	0.00%	0.00%	0.00%	0.00%	0.53%	0.11%	0.00%

<i>Culex pipiens</i>							
Month	2018	2019	2020	2021	2022	5 Year Average	2023
May	156	289	213	78	104	168	173
June	1449	957	956	1200	1255	1163.4	2407
July	6851	8208	4897	6518	4202	6135.2	7502
August	6844	5645	9914	7810	9565	7955.6	11306
September	1388	2478	2231	1664	2337	2019.6	2068
<b>Total</b>	<b>16688</b>	<b>17577</b>	<b>18211</b>	<b>17270</b>	<b>17463</b>	<b>17441.8</b>	<b>23456</b>
% of Total	35.00%	37.50%	25.86%	38.84%	35.84%	34.61%	24.21%

<i>Culex tarsalis</i>							
Month	2018	2019	2020	2021	2022	5 Year Average	2023
May	669	630	390	488	470	529.4	1621
June	4214	3120	5525	4776	5459	4618.8	23895
July	10306	9860	20771	5857	7200	10798.8	22608
August	10849	9255	16191	5823	7505	9924.6	16098
September	1047	1827	3094	526	3290	1956.8	1519
<b>Total</b>	<b>27085</b>	<b>24692</b>	<b>45971</b>	<b>17470</b>	<b>23924</b>	<b>27828.4</b>	<b>65741</b>
% of Total	56.80%	52.67%	65.29%	39.29%	49.10%	52.63%	67.85%

<i>Culiseta incidens</i>							
Month	2018	2019	2020	2021	2022	5 Year Average	2023
May	21	5	17	13	4	12	1
June	115	20	73	44	108	72	9
July	313	172	163	272	163	216.6	19
August	205	88	167	96	102	131.6	16
September	143	89	126	79	99	107.2	30
<b>Total</b>	<b>797</b>	<b>374</b>	<b>546</b>	<b>504</b>	<b>476</b>	<b>539.4</b>	<b>75</b>
% of Total	1.67%	0.80%	0.78%	1.13%	0.98%	1.07%	0.08%

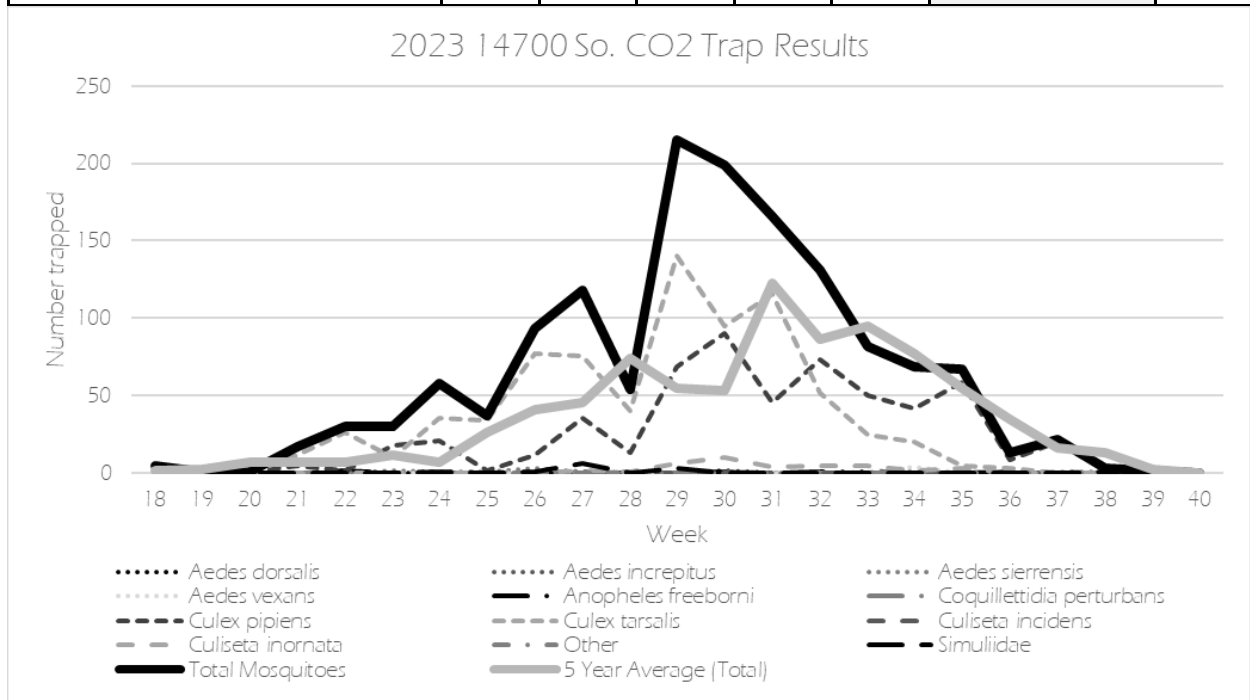
<i>Culiseta inornata</i>							
Month	2018	2019	2020	2021	2022	5 Year Average	2023
May	35	66	122	42	35	60	128
June	92	259	226	199	251	205.4	384
July	246	1351	763	990	276	725.2	710
August	55	429	634	79	182	275.8	489
September	11	71	33	17	58	38	48
<b>Total</b>	<b>439</b>	<b>2176</b>	<b>1778</b>	<b>1327</b>	<b>802</b>	<b>1304.4</b>	<b>1759</b>
% of Total	0.92%	4.64%	2.53%	2.98%	1.65%	2.54%	1.82%

Total							
Month	2018	2019	2020	2021	2022	5 Year Average	2023
May	979	1088	954	867	647	907	2195
June	6154	4909	7611	9339	7948	7192.2	27454
July	18986	20462	28136	16630	14353	19713.4	33063
August	18501	15761	28113	14851	19122	19269.6	30021
September	3063	4610	5595	2782	6657	4541.4	4165
<b>Total</b>	<b>47683</b>	<b>46830</b>	<b>70409</b>	<b>44469</b>	<b>48727</b>	<b>51623.6</b>	<b>96898</b>

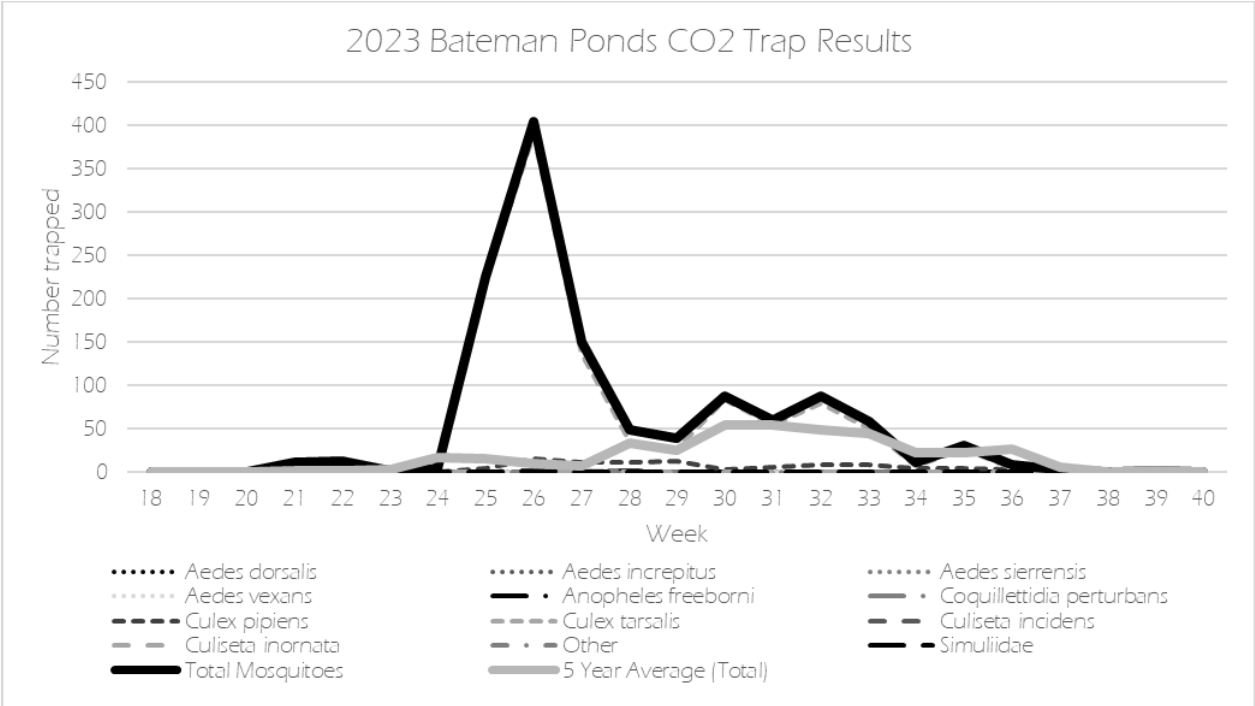
## CO<sub>2</sub> Individual Species by Trap Location

\* Indicates a change in trap location from the previous year

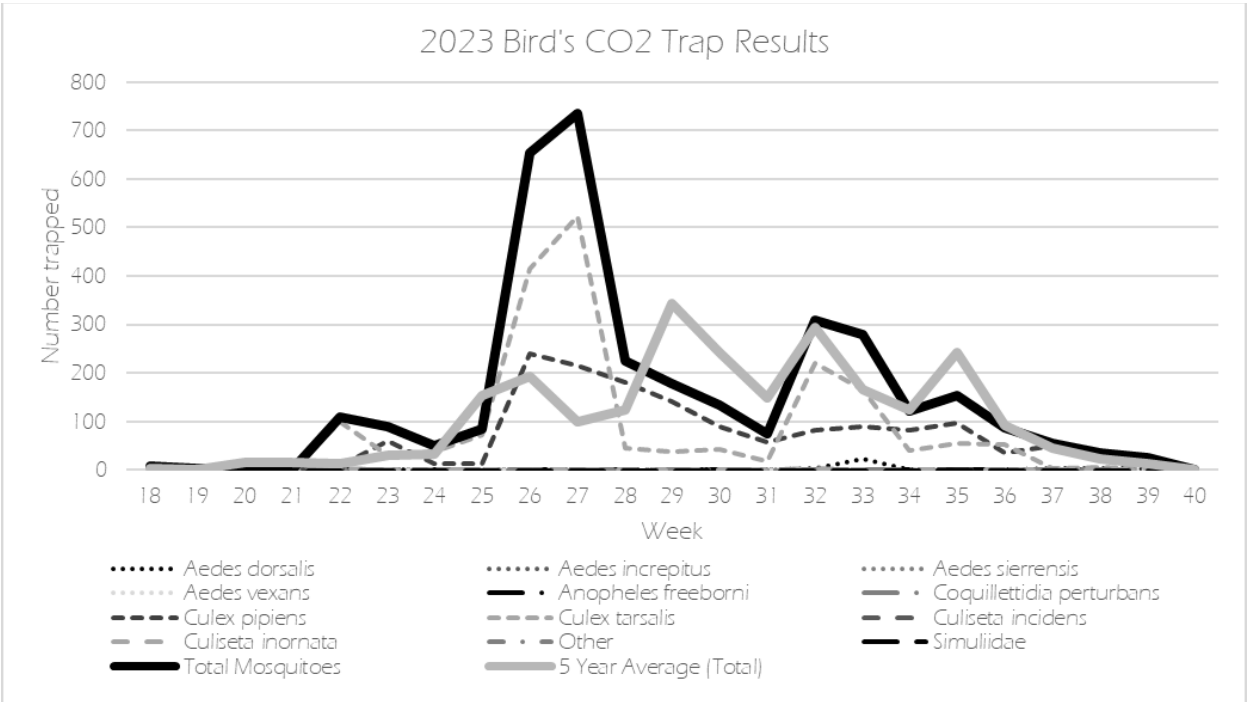
14700 South							
14700 South 1463 West							
	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	2	2	0	3	5	2.4	5
<i>Aedes increpitus</i>	0	2	0	1	0	0.6	1
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	1	2	8	13	8	6.4	10
<i>Aedes vexans</i>	5	1	1	2	2	2.2	6
<i>Anopheles freeborni</i>	43	15	13	37	4	22.4	6
<i>Coquillettidia perturbans</i>	2	8	2	0	1	2.6	2
<i>Culex erythrothorax</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	430	229	151	329	249	277.6	576
<i>Culex tarsalis</i>	658	840	453	235	337	504.6	768
<i>Culiseta incidens</i>	0	0	0	0	0	0	0
<i>Culiseta inornata</i>	5	51	13	11	28	21.6	39
<b>Total # trapped</b>	<b>1146</b>	<b>1150</b>	<b>641</b>	<b>631</b>	<b>634</b>	<b>840.4</b>	<b>1413</b>
Total nights trapped	21	20	18	21	21	20.2	22
Average # trapped per night	54.57	57.50	35.61	30.05	30.19	41.58	64.23
Max # trapped on one night	196	381	78	114	116	177	215
Min # trapped on one night	0	0	0	0	0	0	1



Bateman's Ponds							
6900 South 1200 West							
	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	2	2	1	1	2	1.6	1
<i>Aedes increpitus</i>	0	0	0	0	0	0	0
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	0	0	0	0	0	0	0
<i>Anopheles freeborni</i>	1	2	4	0	3	2	3
<i>Coquillettidia perturbans</i>	0	0	0	0	0	0	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	36	117	44	83	48	65.6	100
<i>Culex tarsalis</i>	213	312	681	162	244	322.4	1141
<i>Culiseta incidens</i>	1	4	2	1	1	1.8	0
<i>Culiseta inornata</i>	2	1	3	0	0	1.2	4
<b>Total # trapped</b>	<b>255</b>	<b>438</b>	<b>735</b>	<b>247</b>	<b>298</b>	<b>394.6</b>	<b>1249</b>
Total nights trapped	21	21	20	22	22	21.2	22
Average # trapped per night	12.14	20.86	36.75	11.23	13.55	18.90	56.77
Max # trapped on one night	47	132	170	60	65	94.8	404
Min # trapped on one night	0	0	0	0	0	0	0



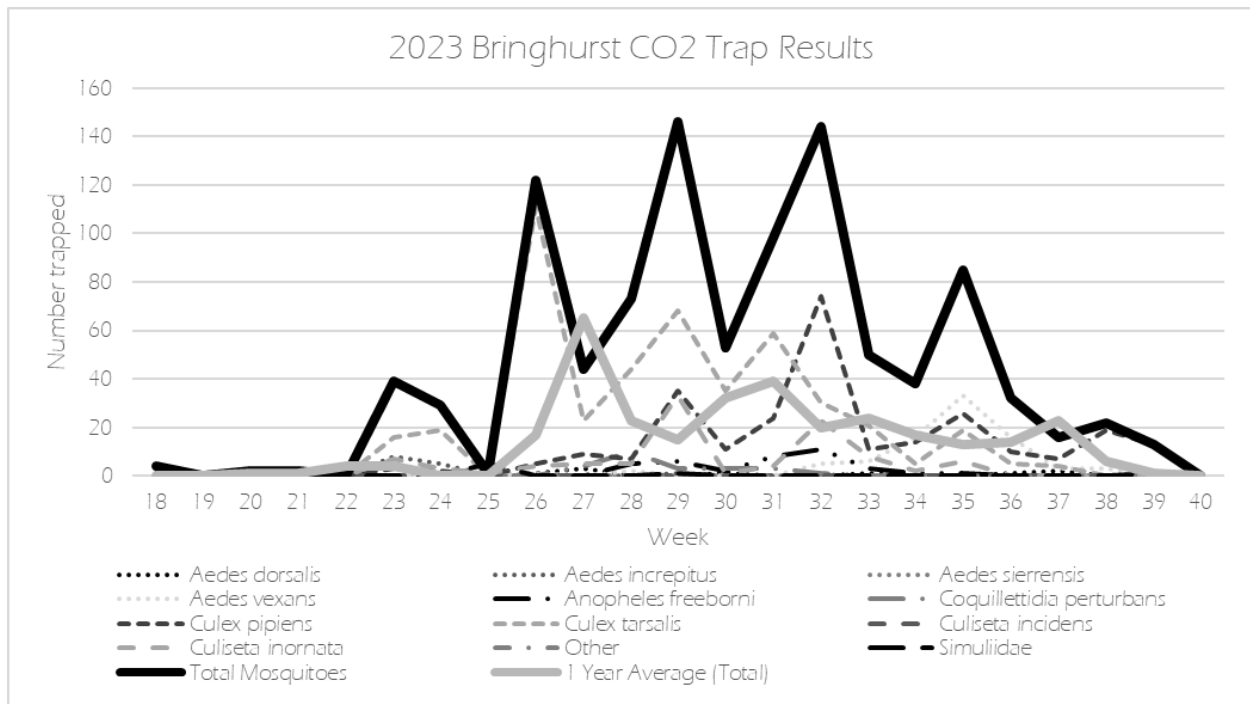
Bird's							
3300 South 2055 West							
	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	3	2	4	28	26	12.6	37
<i>Aedes increpitus</i>	0	0	0	1	0	0.2	0
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	0	1	2	2	1	1.2	1
<i>Aedes vexans</i>	5	1	2	1	0	1.8	0
<i>Anopheles freeborni</i>	1	1	3	4	3	2.4	0
<i>Coquillettidia perturbans</i>	0	0	0	0	0	0	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	1077	2189	782	788	1250	1217.2	1504
<i>Culex tarsalis</i>	1533	571	2457	394	821	1155.2	1865
<i>Culiseta incidens</i>	17	16	17	7	4	12.2	0
<i>Culiseta inornata</i>	4	33	2	4	3	9.2	8
<b>Total # trapped</b>	<b>2640</b>	<b>2814</b>	<b>3269</b>	<b>1229</b>	<b>2108</b>	<b>2412</b>	<b>3415</b>
Total nights trapped	22	22	20	20	22	21.2	22
Average # trapped per night	120.00	127.91	163.45	61.45	95.82	113.73	155.23
Max # trapped on one night	490	538	674	209	327	447.6	736
Min # trapped on one night	0	3	0	3	0	1.2	0



# Bringhurst

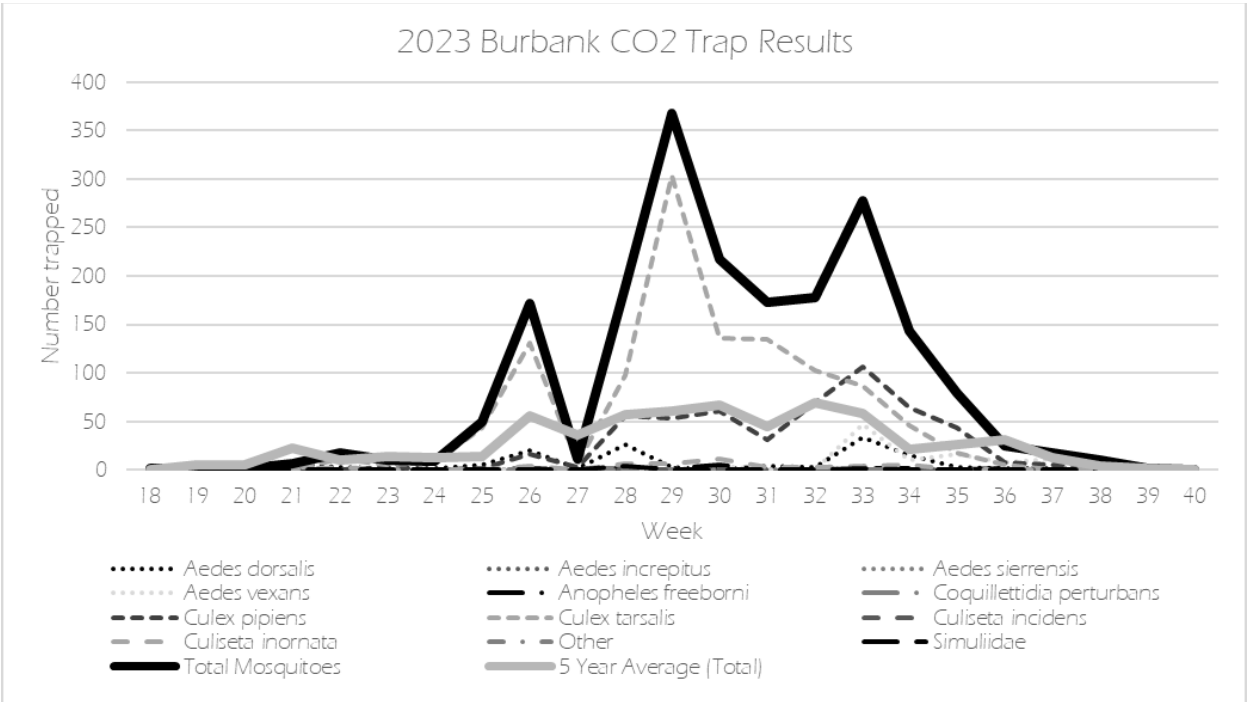
16470 So 1800 W

	2018	2019	2020	2021	2022	1 Year Average	2023
<i>Aedes dorsalis</i>					4	4	10
<i>Aedes increpitus</i>					0	0	14
<i>Aedes nigromaculis</i>					0	0	0
<i>Aedes sierrensis</i>					0	0	0
<i>Aedes vexans</i>					7	7	85
<i>Anopheles freeborni</i>					25	25	42
<i>Coquillettidia perturbans</i>					55	55	24
<i>Culex erythrothorax</i>					1	1	0
<i>Culex pipiens</i>					98	98	270
<i>Culex tarsalis</i>					87	87	464
<i>Culiseta incidens</i>					0	0	0
<i>Culiseta inornata</i>					42	42	104
<b>Total # trapped</b>					<b>319</b>	<b>319</b>	<b>1013</b>
Total nights trapped					20	20	22
Average # trapped per night					15.95	15.95	46.05
Max # trapped on one night					65	65	146
Min # trapped on one night					0	0	0





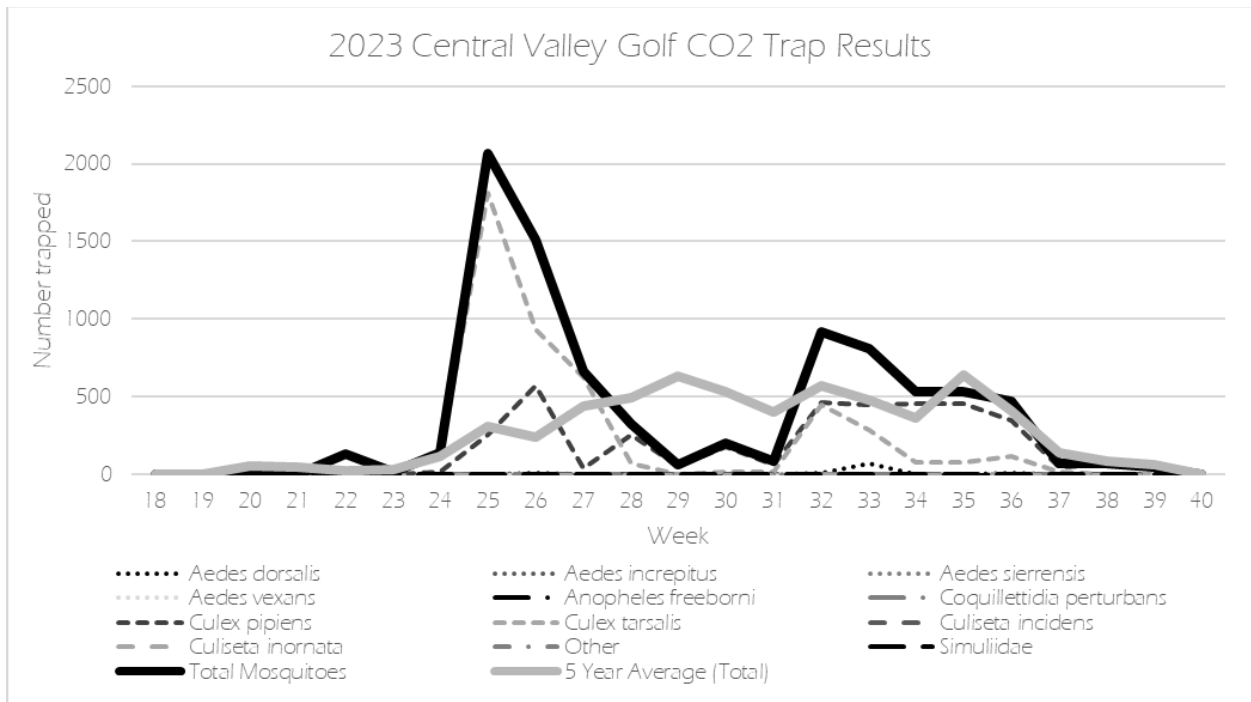
Burbank							
13717 South 1100 West							
	2018	2019	2020	2021*	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	2	0	1	19	26	9.6	129
<i>Aedes increpitus</i>	16	12	26	0	0	10.8	0
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	33	41	24	0	0	19.6	0
<i>Aedes vexans</i>	34	0	26	22	5	17.4	103
<i>Anopheles freeborni</i>	17	23	38	78	9	33	15
<i>Coquillettidia perturbans</i>	0	0	0	0	0	0	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	96	78	68	153	105	100	527
<i>Culex tarsalis</i>	459	617	547	268	221	422.4	1138
<i>Culiseta incidens</i>	13	3	1	0	4	4.2	0
<i>Culiseta inornata</i>	9	17	4	6	4	8	48
<b>Total # trapped</b>	<b>679</b>	<b>791</b>	<b>735</b>	<b>546</b>	<b>374</b>	<b>625</b>	<b>1960</b>
Total nights trapped	22	18	20	22	20	20.4	22
Average # trapped per night	30.86	43.94	36.75	24.82	18.70	31.02	89.09
Max # trapped on one night	102	172	132	95	68	113.8	367
Min # trapped on one night	0	0	0	0	0	0	1



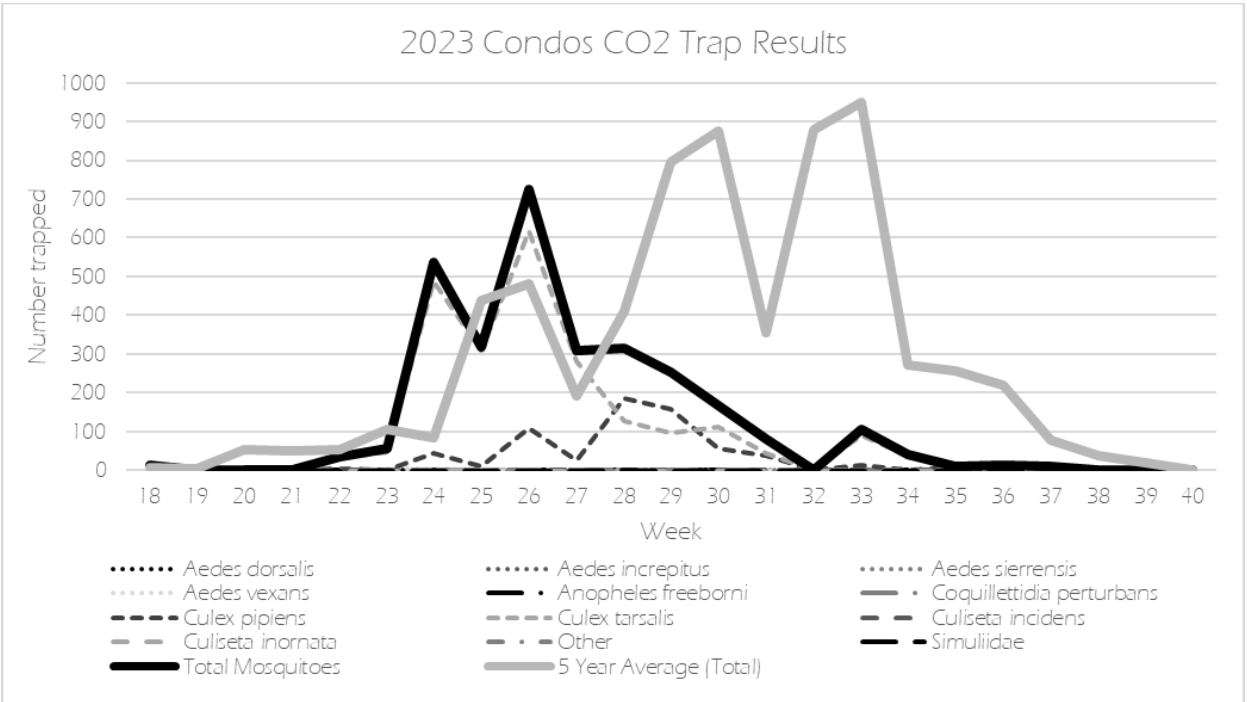
# Central Valley Golf

3300 South 500 West

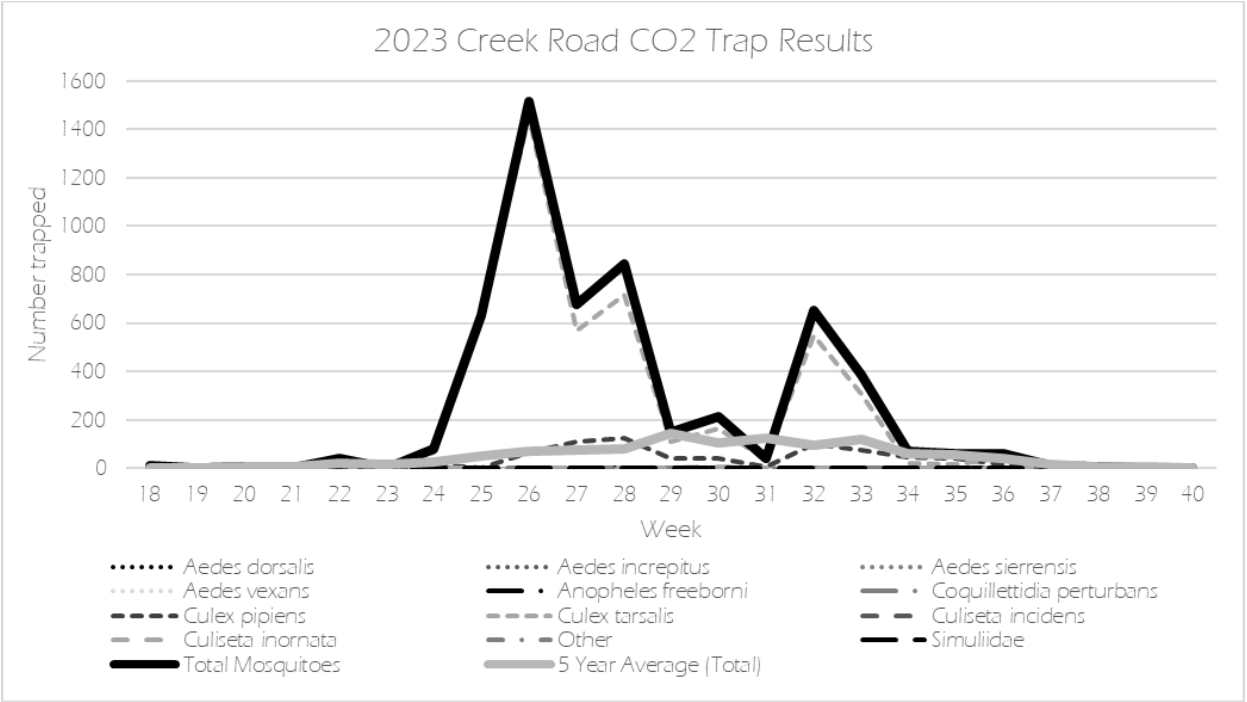
	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	84	25	33	23	70	47	116
<i>Aedes increpitus</i>	0	7	3	0	0	2	7
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	1	1	0	0	1	0.6	0
<i>Aedes vexans</i>	2	8	2	23	5	8	2
<i>Anopheles freeborni</i>	5	5	1	6	1	3.6	2
<i>Coquillettidia perturbans</i>	0	0	0	0	0	0	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	5164	3792	4494	1905	1855	3442	3793
<i>Culex tarsalis</i>	4659	1176	4811	1120	1087	2570.6	4761
<i>Culiseta incidens</i>	2	8	2	4	1	3.4	0
<i>Culiseta inornata</i>	10	33	5	6	8	12.4	6
<b>Total # trapped</b>	<b>9927</b>	<b>5055</b>	<b>9351</b>	<b>3087</b>	<b>3028</b>	<b>6089.6</b>	<b>8687</b>
Total nights trapped	22	22	20	22	21	21.4	22
Average # trapped per night	451.2	229.8	467.6	140.3	144.2	286.6	394.9
Max # trapped on one night	1487	1232	1704	583	484	1098	2069
Min # trapped on one night	2	2	3	0	0	1.4	2



Condos							
2900 South 1407 West							
	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	15	19	17	27	60	27.6	7
<i>Aedes increpitus</i>	0	0	2	0	0	0.4	0
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	0	0	0	0	1	0.2	0
<i>Aedes vexans</i>	2	13	5	0	3	4.6	10
<i>Anopheles freeborni</i>	38	38	18	25	8	25.4	0
<i>Coquillettidia perturbans</i>	0	0	0	0	0	0	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	1550	3588	1135	518	855	1529.2	658
<i>Culex tarsalis</i>	5317	3069	10051	2142	3954	4906.6	2313
<i>Culiseta incidens</i>	8	1	1	1	8	3.8	0
<i>Culiseta inornata</i>	13	523	15	7	10	113.6	5
<b>Total # trapped</b>	<b>6943</b>	<b>7251</b>	<b>11244</b>	<b>2720</b>	<b>4899</b>	<b>6611.4</b>	<b>2993</b>
Total nights trapped	22	22	20	22	20	21.2	20
Average # trapped per night	315.6	329.6	562.2	123.6	244.95	315.19	149.65
Max # trapped on one night	2392	1232	2511	558	902	1519	724
Min # trapped on one night	1	5	0	5	0	2.2	1



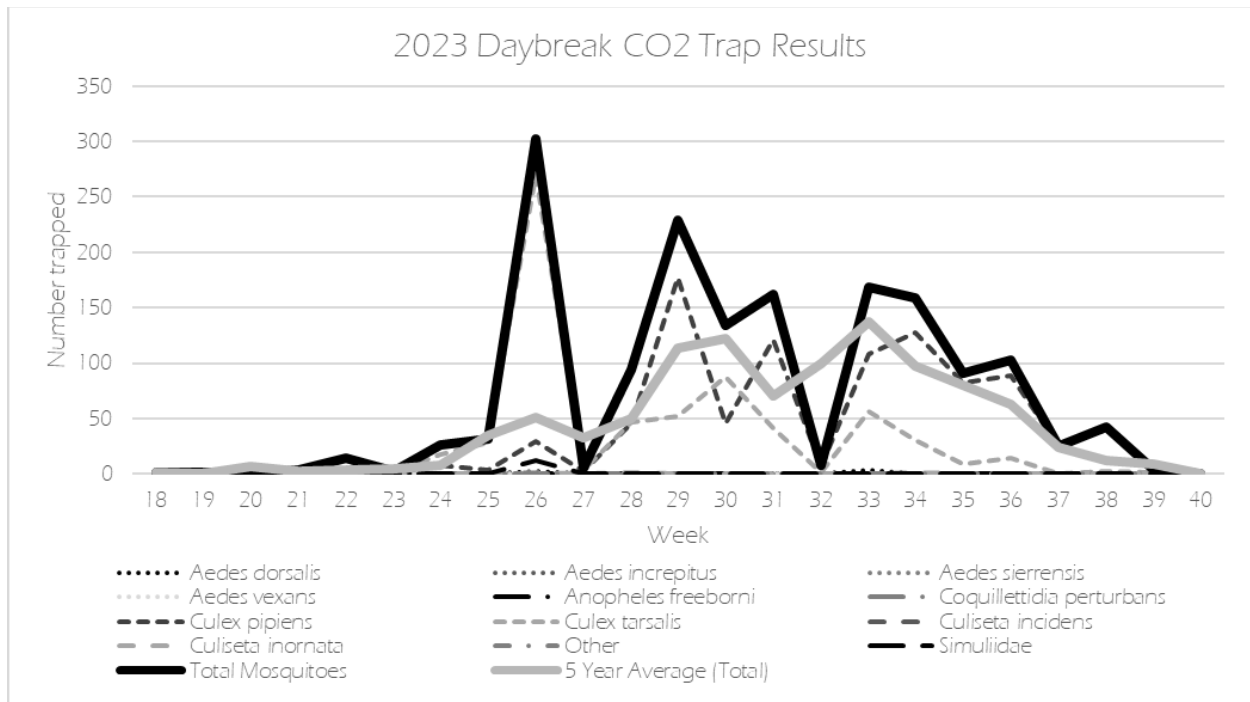
Creek Road 1700 East 7800 South							
	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	1	3	3	1	1	1.8	1
<i>Aedes increpitus</i>	0	0	0	0	0	0	1
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	11	24	6	18	1	12	1
<i>Aedes vexans</i>	0	0	1	0	8	1.8	1
<i>Anopheles freeborni</i>	0	0	0	0	1	0.2	0
<i>Coquillettidia perturbans</i>	0	0	0	0	0	0	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	175	233	260	123	128	183.8	696
<i>Culex tarsalis</i>	502	1142	1549	422	533	829.6	4727
<i>Culiseta incidens</i>	68	28	91	196	125	101.6	11
<i>Culiseta inornata</i>	12	9	0	5	5	6.2	19
<b>Total # trapped</b>	<b>769</b>	<b>1439</b>	<b>1910</b>	<b>765</b>	<b>802</b>	<b>1137</b>	<b>5457</b>
Total nights trapped	21	22	20	22	22	21.4	21
Average # trapped per night	36.62	65.41	95.50	34.77	36.45	53.75	259.86
Max # trapped on one night	137	268	353	107	95	192	1512
Min # trapped on one night	0	0	1	1	0	0.4	0



# Daybreak

11410 South 4280 West

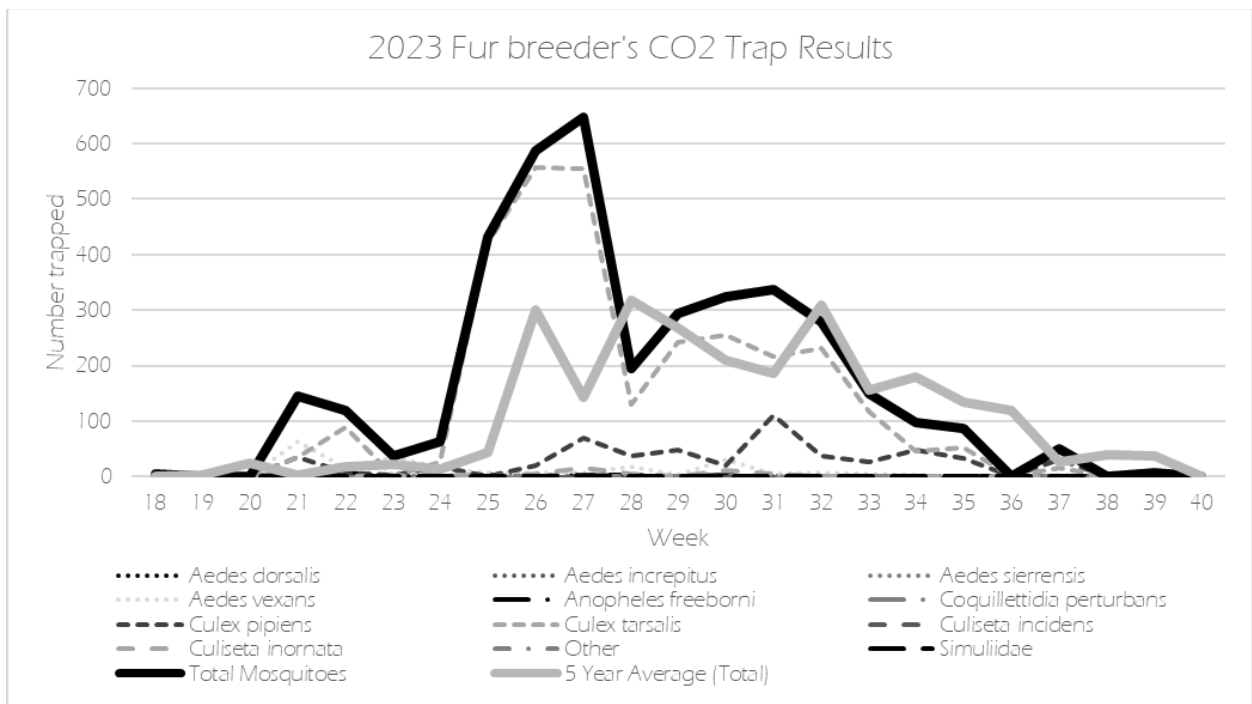
	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	14	1	1	3	0	3.8	6
<i>Aedes increpitus</i>	0	0	0	0	0	0	0
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	1	0	0	0	0	0.2	0
<i>Anopheles freeborni</i>	1	2	0	0	0	0.6	0
<i>Coquillettidia perturbans</i>	0	0	0	0	0	0	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	383	832	293	619	283	482	917
<i>Culex tarsalis</i>	615	625	940	291	201	534.4	679
<i>Culiseta incidens</i>	7	0	1	3	1	2.4	0
<i>Culiseta inornata</i>	1	6	0	2	2	2.2	3
<b>Total # trapped</b>	<b>1022</b>	<b>1466</b>	<b>1235</b>	<b>918</b>	<b>487</b>	<b>1025.6</b>	<b>1605</b>
Total nights trapped	22	22	20	22	22	21.6	22
Average # trapped per night	46.45	66.64	61.75	41.73	22.14	47.74	72.95
Max # trapped on one night	179	196	265	121	136	179.4	302
Min # trapped on one night	0	0	0	1	0	0.2	0



## Fur Breeders

8540 South 700 West

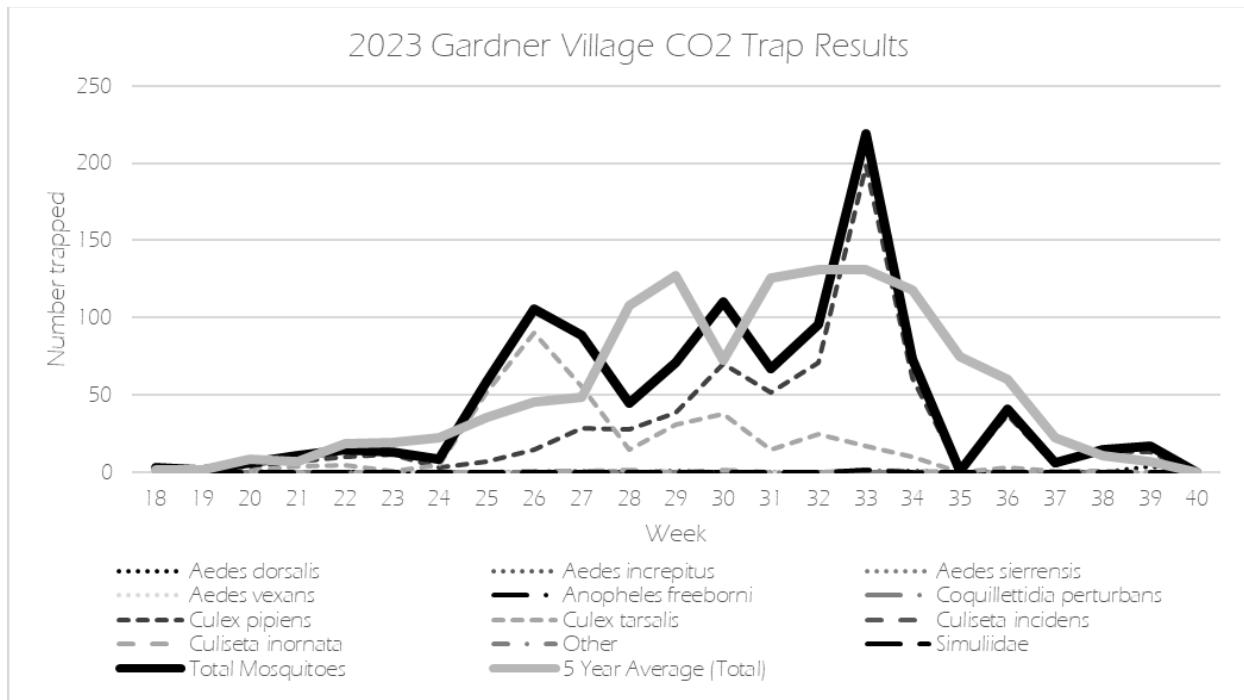
	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	4	3	0	3	7	3.4	7
<i>Aedes increpitus</i>	0	2	1	2	0	1	0
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	5	15	5	190	898	222.6	227
<i>Anopheles freeborni</i>	64	55	44	124	47	66.8	22
<i>Coquillettidia perturbans</i>	0	0	0	0	0	0	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	317	394	556	1565	1199	806.2	555
<i>Culex tarsalis</i>	997	1904	1106	808	926	1148.2	2991
<i>Culiseta incidens</i>	209	62	9	36	42	71.6	2
<i>Culiseta inornata</i>	11	265	79	713	87	231	49
<b>Total # trapped</b>	<b>1607</b>	<b>2700</b>	<b>1800</b>	<b>3441</b>	<b>3206</b>	<b>2550.8</b>	<b>3853</b>
Total nights trapped	22	22	21	21	20	21.2	19
Average # trapped per night	73.05	122.73	85.71	163.86	160.30	121.13	202.79
Max # trapped on one night	245	430	282	979	905	568.2	648
Min # trapped on one night	0	0	0	0	2	0.4	1



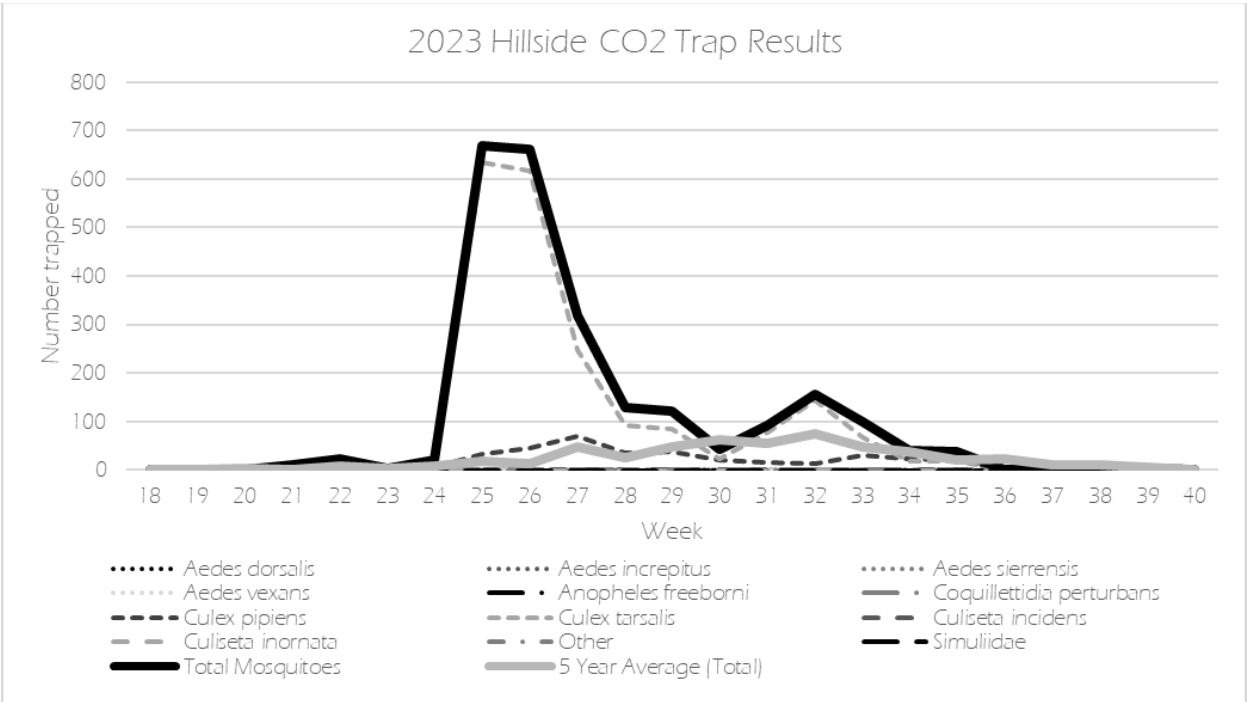
## Gardner Village

7700 South 1100 West

	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	4	2	2	2	3	2.6	10
<i>Aedes increpitus</i>	0	0	0	0	0	0	0
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	0	0	1	0	0	0.2	0
<i>Aedes vexans</i>	4	1	0	1	12	3.6	3
<i>Anopheles freeborni</i>	4	4	15	20	6	9.8	1
<i>Coquillettidia perturbans</i>	0	0	0	0	0	0	0
<i>Culex erythrothorax</i>	0	0	0	0	34	6.8	0
<i>Culex pipiens</i>	594	412	772	2161	629	913.6	680
<i>Culex tarsalis</i>	177	199	464	236	127	240.6	371
<i>Culiseta incidens</i>	1	2	4	2	6	3	0
<i>Culiseta inornata</i>	2	17	11	51	10	18.2	9
<b>Total # trapped</b>	<b>786</b>	<b>637</b>	<b>1269</b>	<b>2473</b>	<b>827</b>	<b>1198.4</b>	<b>1074</b>
Total nights trapped	21	20	21	21	20	20.6	22
Average # trapped per night	37.43	31.85	60.43	117.76	41.35	57.76	48.82
Max # trapped on one night	114	111	221	401	130	195.4	219
Min # trapped on one night	0	1	0	0	0	0.2	1



Hillside							
4060 South 1045 East							
	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	2	3	0	3	1	1.8	3
<i>Aedes increpitus</i>	0	1	1	0	0	0.4	0
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	1	0	0	1	0	0.4	0
<i>Aedes vexans</i>	0	0	0	1	0	0.2	0
<i>Anopheles freeborni</i>	0	1	4	7	3	3	2
<i>Coquillettidia perturbans</i>	0	0	0	0	0	0	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	84	128	345	84	90	146.2	352
<i>Culex tarsalis</i>	277	533	637	92	120	331.8	2068
<i>Culiseta incidens</i>	15	7	31	9	7	13.8	0
<i>Culiseta inornata</i>	2	25	31	9	71	27.6	3
<b>Total # trapped</b>	<b>381</b>	<b>698</b>	<b>1049</b>	<b>206</b>	<b>292</b>	<b>525.2</b>	<b>2428</b>
Total nights trapped	22	21	20	21	22	21.2	22
Average # trapped per night	17.32	33.24	52.45	9.81	13.27	25.22	110.36
Max # trapped on one night	55	180	262	34	40	114.2	668
Min # trapped on one night	0	0	0	0	0	0	0

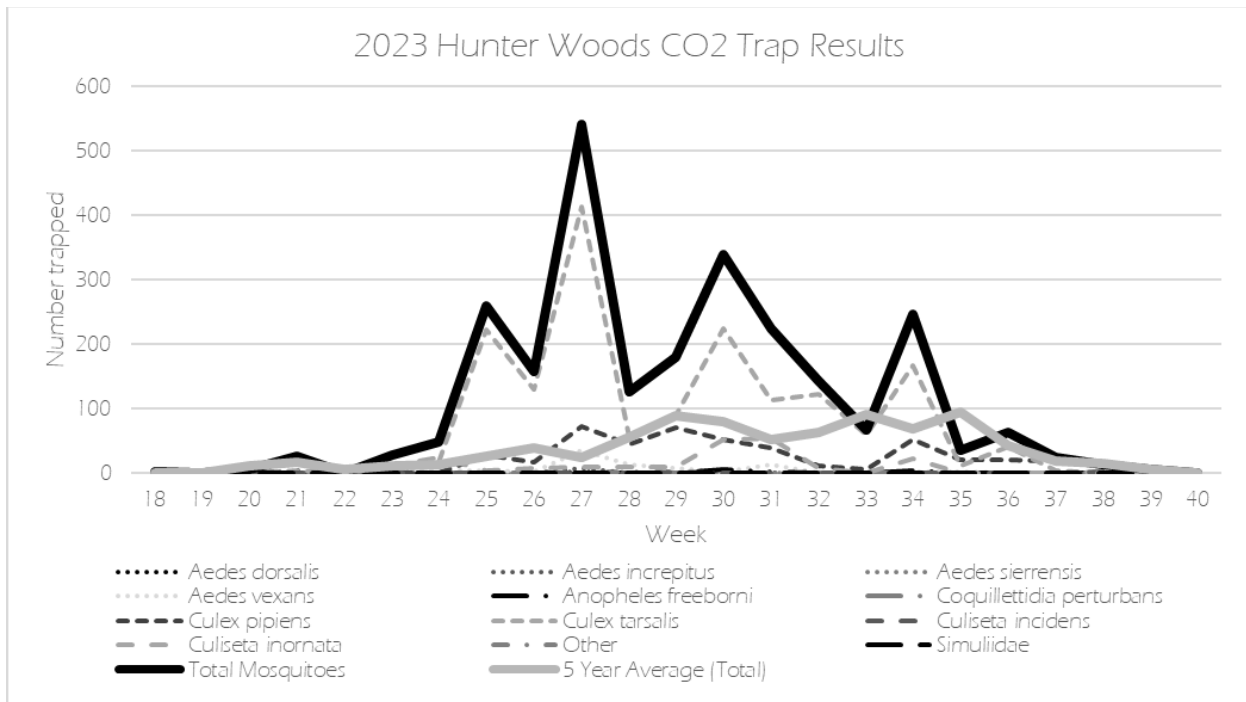




## Hunter Woods

4900 South 700 West (4940 South 550 West before 2016)

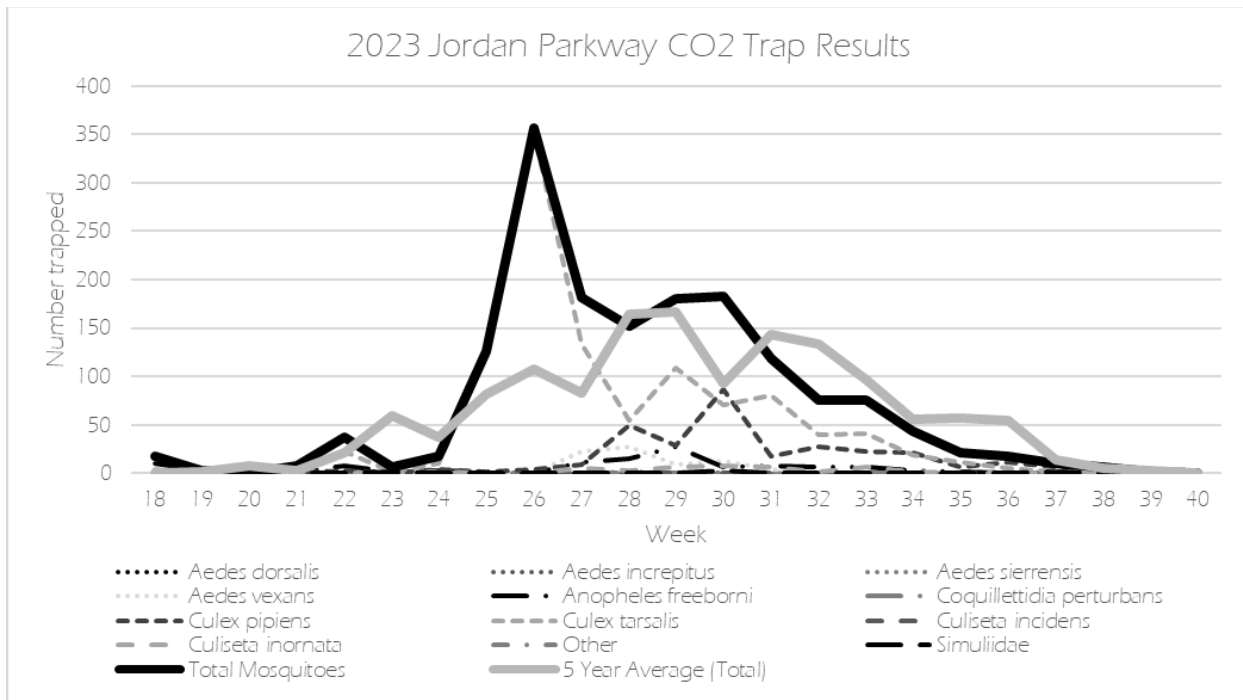
	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	6	0	1	3	2	2.4	0
<i>Aedes increpitus</i>	1	5	0	0	1	1.4	8
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	1	1	1	0	0	0.6	0
<i>Aedes vexans</i>	19	14	5	14	161	42.6	99
<i>Anopheles freeborni</i>	7	18	7	18	3	10.6	22
<i>Coquillettidia perturbans</i>	0	0	0	0	0	0	3
<i>Culex erythrothorax</i>	0	0	0	0	0	0	1
<i>Culex pipiens</i>	526	241	136	103	89	219	475
<i>Culex tarsalis</i>	884	375	845	190	169	492.6	1687
<i>Culiseta incidens</i>	54	33	41	27	35	38	7
<i>Culiseta inornata</i>	10	65	2	13	13	20.6	238
<b>Total # trapped</b>	<b>1508</b>	<b>752</b>	<b>1038</b>	<b>368</b>	<b>473</b>	<b>827.8</b>	<b>2540</b>
Total nights trapped	20	21	20	21	21	20.6	21
Average # trapped per night	75.40	35.81	51.90	17.52	22.52	40.63	120.95
Max # trapped on one night	232	101	201	90	63	137.4	540
Min # trapped on one night	0	2	0	0	1	0.6	1



## Jordan Parkway

10100 South Jordan River

	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	5	1	0	2	3	2.2	1
<i>Aedes increpitus</i>	0	0	14	0	2	3.2	7
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	0	2	1	0	1	0.8	0
<i>Aedes vexans</i>	173	105	37	270	199	156.8	84
<i>Anopheles freeborni</i>	248	68	459	569	126	294	112
<i>Coquillettidia perturbans</i>	0	0	0	0	0	0	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	1
<i>Culex pipiens</i>	365	122	149	478	379	298.6	309
<i>Culex tarsalis</i>	854	602	505	468	488	583.4	1086
<i>Culiseta incidens</i>	11	2	13	0	2	5.6	0
<i>Culiseta inornata</i>	45	24	115	14	20	43.6	39
<b>Total # trapped</b>	<b>1701</b>	<b>926</b>	<b>1293</b>	<b>1801</b>	<b>1220</b>	<b>1388.2</b>	<b>1639</b>
Total nights trapped	22	22	20	22	21	21.4	22
Average # trapped per night	77.32	42.09	64.65	81.86	58.10	64.80	74.50
Max # trapped on one night	434	149	284	292	238	279.4	356
Min # trapped on one night	0	0	0	1	1	0.4	0

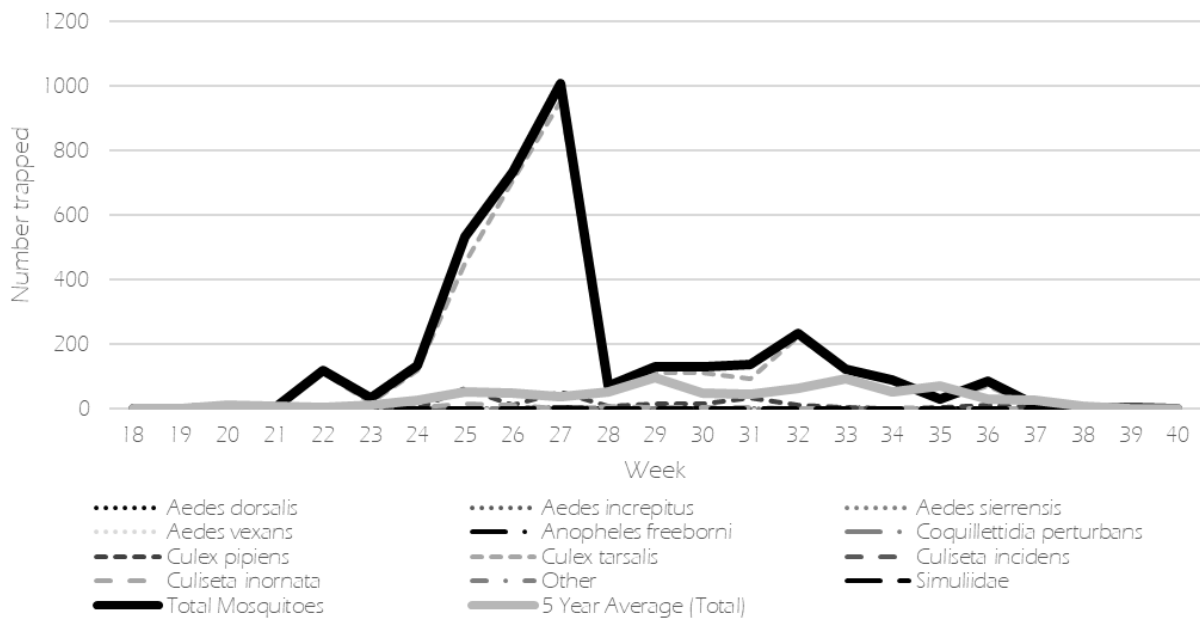


# Meadowbrook

4197 South 1300 West

	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	1	2	2	11	14	6	19
<i>Aedes increpitus</i>	8	34	3	1	0	9.2	2
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	3	5	3	19	9	7.8	7
<i>Anopheles freeborni</i>	15	33	4	6	9	13.4	9
<i>Coquillettidia perturbans</i>	0	0	0	0	0	0	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	76	71	70	48	137	80.4	250
<i>Culex tarsalis</i>	769	399	1068	380	657	654.6	3262
<i>Culiseta incidens</i>	5	2	4	5	5	4.2	1
<i>Culiseta inornata</i>	9	23	12	15	56	23	65
<b>Total # trapped</b>	<b>886</b>	<b>569</b>	<b>1166</b>	<b>485</b>	<b>887</b>	<b>798.6</b>	<b>3615</b>
Total nights trapped	22	21	20	22	22	21.4	21
Average # trapped per night	40.27	27.10	58.30	22.05	40.32	37.61	172.14
Max # trapped on one night	159	78	316	98	144	159	1008
Min # trapped on one night	0	1	0	0	0	0.2	0

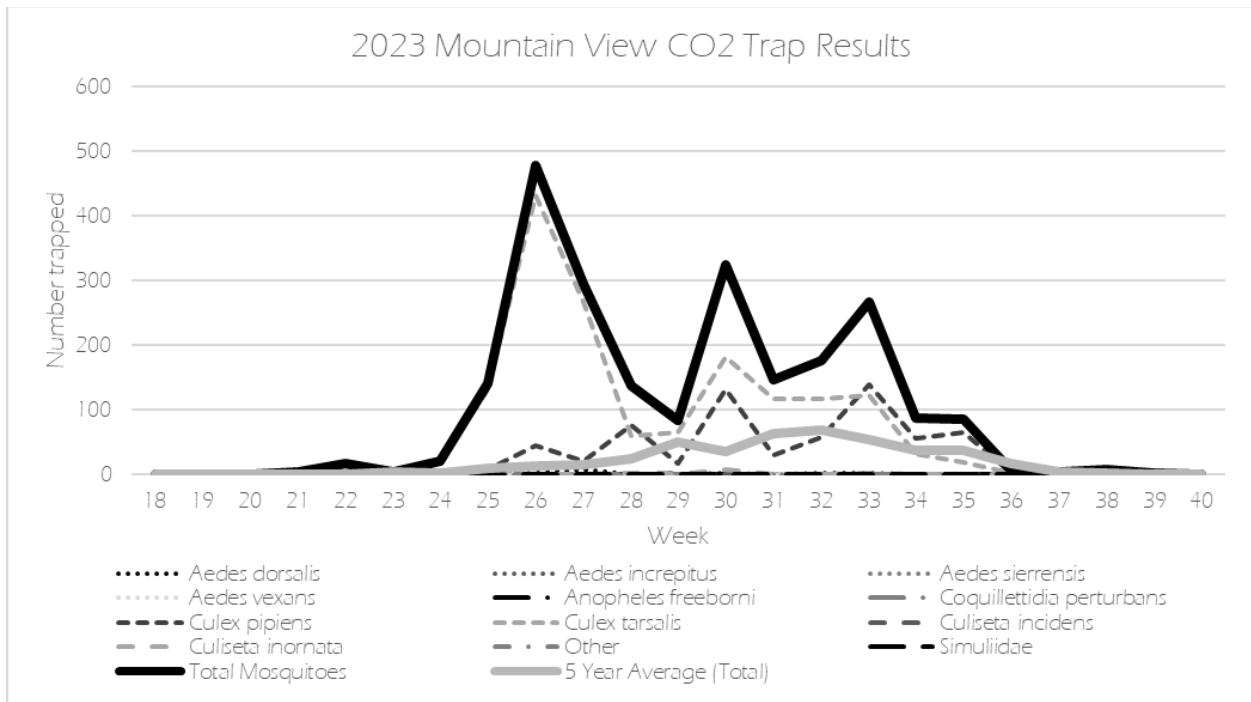
### 2023 Meadowbrook CO2 Trap Results



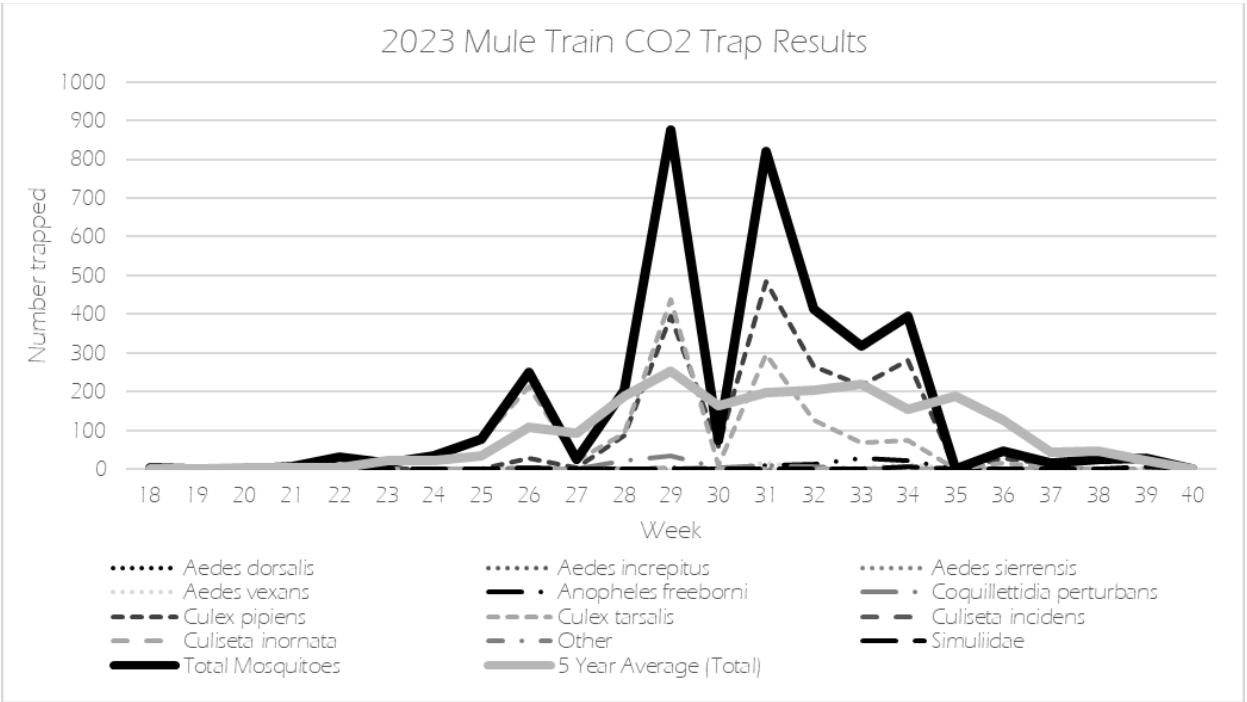
## Mountain View

8440 So 2380 W

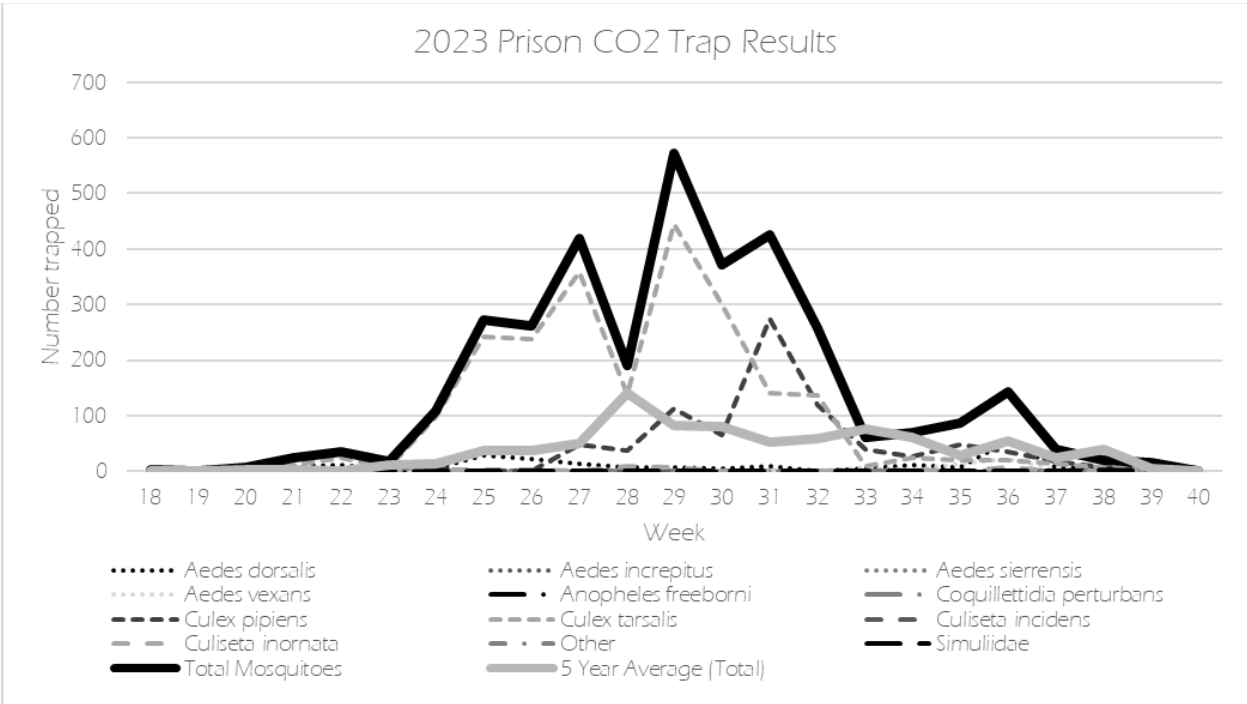
	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	2	1	2	2	6	2.6	23
<i>Aedes increpitus</i>	0	0	0	0	0	0	0
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	0	0	0	0	0	0	0
<i>Anopheles freeborni</i>	2	1	0	5	0	1.6	0
<i>Coquillettidia perturbans</i>	0	0	0	0	0	0	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	82	105	292	227	137	168.6	662
<i>Culex tarsalis</i>	180	225	597	112	120	246.8	1584
<i>Culiseta incidens</i>	10	4	6	4	6	6	2
<i>Culiseta inornata</i>	6	20	28	27	6	17.4	19
<b>Total # trapped</b>	<b>282</b>	<b>356</b>	<b>925</b>	<b>377</b>	<b>275</b>	<b>443</b>	<b>2290</b>
Total nights trapped	22	21	21	21	22	21.4	22
Average # trapped per night	12.82	16.95	44.05	17.95	12.50	20.85	104.09
Max # trapped on one night	82	88	173	87	57	97.4	478
Min # trapped on one night	0	0	0	0	0	0	0



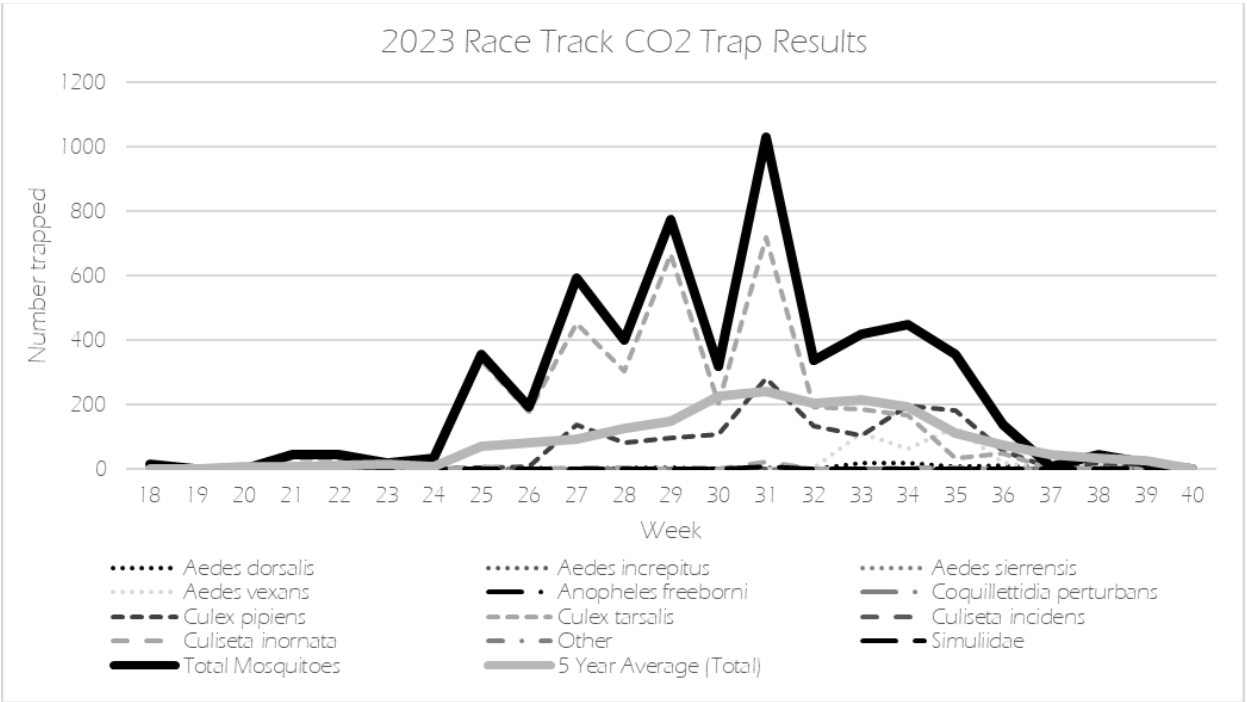
Mule Train							
15010 South 1690 West							
	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	14	6	0	1	3	4.8	4
<i>Aedes increpitus</i>	0	2	2	0	0	0.8	7
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	25	4	9	3	0	8.2	35
<i>Anopheles freeborni</i>	89	52	318	932	145	307.2	82
<i>Coquillettidia perturbans</i>	92	234	102	154	98	136	82
<i>Culex erythrothorax</i>	0	0	0	0	24	4.8	1
<i>Culex pipiens</i>	595	799	1673	998	582	929.4	1917
<i>Culex tarsalis</i>	693	1133	838	412	478	710.8	1531
<i>Culiseta incidens</i>	0	0	0	0	0	0	0
<i>Culiseta inornata</i>	4	6	10	20	3	8.6	11
<b>Total # trapped</b>	<b>1512</b>	<b>2236</b>	<b>2952</b>	<b>2520</b>	<b>1333</b>	<b>2110.6</b>	<b>3670</b>
Total nights trapped	21	22	20	22	20	21	21
Average # trapped per night	72.00	101.64	147.60	114.55	66.65	100.49	174.76
Max # trapped on one night	234	310	528	607	271	390	876
Min # trapped on one night	0	0	0	0	0	0	0



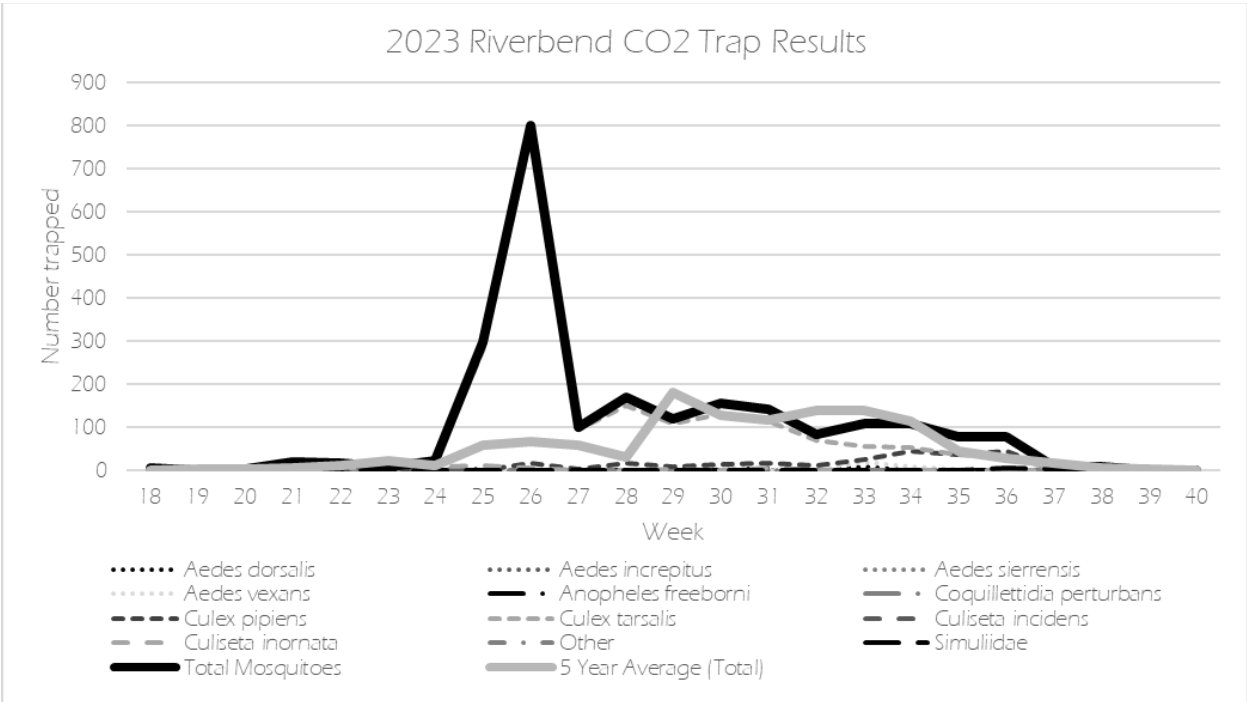
Prison 13800 South 490 West (13775 South 635 West before 2017)							
	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	35	16	86	36	50	44.6	217
<i>Aedes increpitus</i>	0	0	2	0	0	0.4	0
<i>Aedes nigromaculis</i>	0	0	0	1	0	0.2	0
<i>Aedes sierrensis</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	3	1	0	5	24	6.6	54
<i>Anopheles freeborni</i>	3	2	4	15	4	5.6	2
<i>Coquillettidia perturbans</i>	0	0	0	0	0	0	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	29	370	154	131	120	160.8	843
<i>Culex tarsalis</i>	160	1508	436	496	507	621.4	2239
<i>Culiseta incidens</i>	0	0	0	0	0	0	0
<i>Culiseta inornata</i>	2	68	7	11	10	19.6	44
<b>Total # trapped</b>	<b>232</b>	<b>1965</b>	<b>689</b>	<b>695</b>	<b>715</b>	<b>859.2</b>	<b>3399</b>
Total nights trapped	21	22	19	22	21	21	22
Average # trapped per night	11.05	89.32	36.26	31.59	34.05	40.45	154.50
Max # trapped on one night	37	378	231	134	193	194.6	572
Min # trapped on one night	0	0	0	0	0	0	1



Race Track							
13240 South 700 West							
	2018	2019*	2020	2021	2022	5 Year Average	2023*
<i>Aedes dorsalis</i>	14	36	26	84	70	46	101
<i>Aedes increpitus</i>	1	8	13	30	1	10.6	5
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	0	4	0	0	0	0.8	0
<i>Aedes vexans</i>	26	13	14	30	10	18.6	356
<i>Anopheles freeborni</i>	0	4	20	40	17	16.2	10
<i>Coquillettidia perturbans</i>	0	0	0	0	0	0	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	785	994	548	1046	488	772.2	1449
<i>Culex tarsalis</i>	880	1587	840	1276	745	1065.6	3608
<i>Culiseta incidens</i>	1	0	0	0	0	0.2	0
<i>Culiseta inornata</i>	0	49	4	9	5	13.4	72
<b>Total # trapped</b>	<b>1707</b>	<b>2695</b>	<b>1465</b>	<b>2515</b>	<b>1336</b>	<b>1943.6</b>	<b>5601</b>
Total nights trapped	20	21	19	22	21	20.6	21
Average # trapped per night	85.35	128.33	77.11	114.32	63.62	93.75	266.71
Max # trapped on one night	390	464	259	407	202	344.4	1028
Min # trapped on one night	0	0	0	0	0	0	2

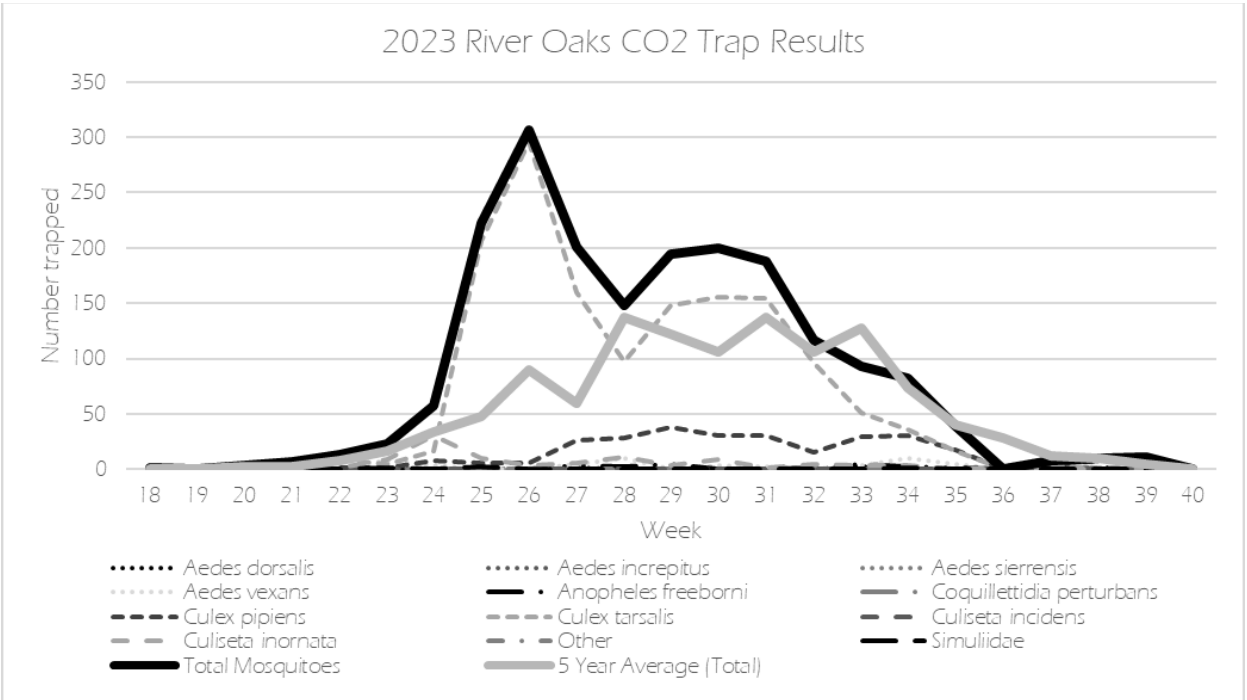


Riverbend							
12800 South 1040 West							
	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	2	0	1	1	2	1.2	17
<i>Aedes increpitus</i>	2	10	9	0	0	4.2	0
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	1	1	1	0	0	0.6	1
<i>Aedes vexans</i>	27	9	19	1	1	11.4	43
<i>Anopheles freeborni</i>	11	6	11	18	9	11	15
<i>Coquillettidia perturbans</i>	0	0	0	0	0	0	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	112	127	137	472	110	191.6	244
<i>Culex tarsalis</i>	750	1456	1203	993	380	956.4	1954
<i>Culiseta incidens</i>	7	2	1	1	0	2.2	0
<i>Culiseta inornata</i>	10	62	10	2	9	18.6	65
<b>Total # trapped</b>	<b>922</b>	<b>1673</b>	<b>1392</b>	<b>1488</b>	<b>511</b>	<b>1197.2</b>	<b>2339</b>
Total nights trapped	22	21	20	20	20	20.6	21
Average # trapped per night	41.91	79.67	69.60	74.40	25.55	58.23	111.38
Max # trapped on one night	153	309	277	253	82	214.8	798
Min # trapped on one night	1	0	1	0	1	0.6	2

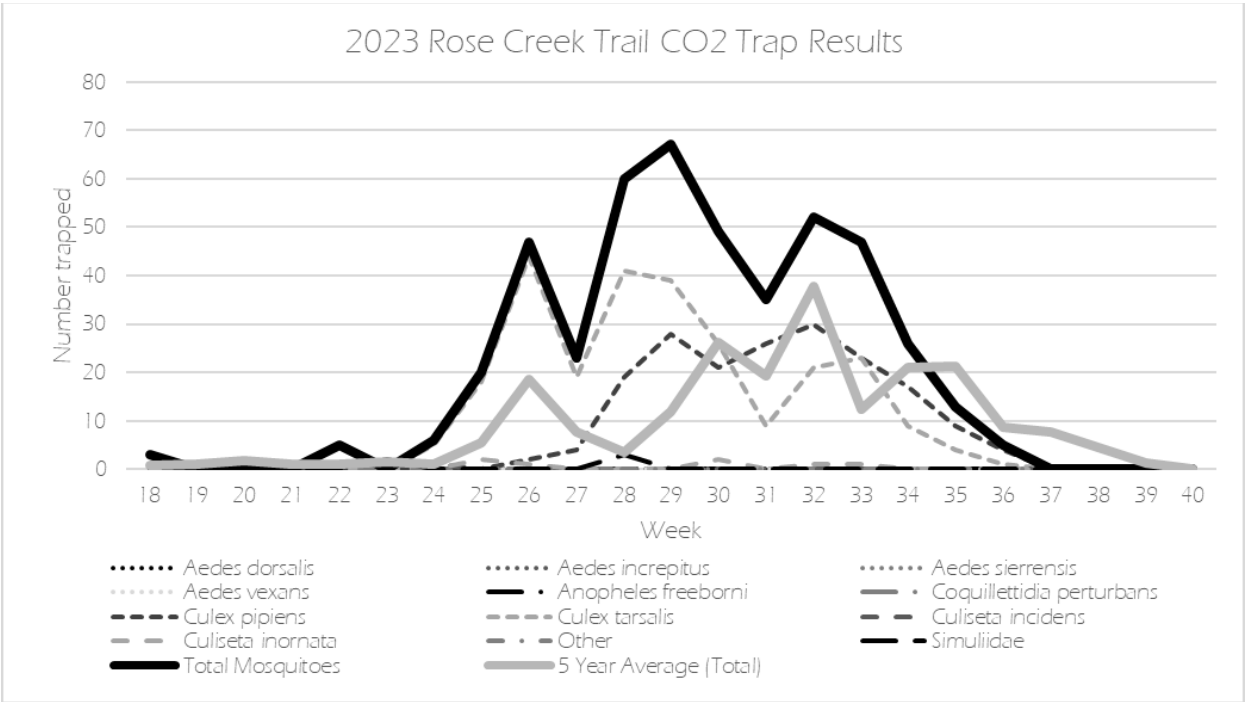




River Oaks							
9300 South 800 West							
	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	1	2	2	0	1	1.2	3
<i>Aedes increpitus</i>	0	2	4	0	0	1.2	0
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	111	210	55	59	351	157.2	54
<i>Anopheles freeborni</i>	43	11	97	47	36	46.8	24
<i>Coquillettidia perturbans</i>	0	1	0	0	0	0.2	0
<i>Culex erythrothorax</i>	0	0	0	0	2	0.4	0
<i>Culex pipiens</i>	1188	197	441	195	82	420.6	289
<i>Culex tarsalis</i>	463	561	847	186	319	475.2	1456
<i>Culiseta incidens</i>	29	10	12	8	9	13.6	0
<i>Culiseta inornata</i>	53	87	41	18	10	41.8	97
<b>Total # trapped</b>	<b>1888</b>	<b>1081</b>	<b>1499</b>	<b>513</b>	<b>810</b>	<b>1158.2</b>	<b>1923</b>
Total nights trapped	22	21	18	21	21	20.6	21
Average # trapped per night	85.82	51.48	83.28	24.43	38.57	56.71	91.57
Max # trapped on one night	430	184	274	113	121	224.4	306
Min # trapped on one night	0	0	0	0	0	0	0



Rose Creek Trail							
13825 So. 5500 W							
	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	2	2	0	1	0	1	0
<i>Aedes increpitus</i>	0	3	1	0	0	0.8	0
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	0	0	1	0	0	0.2	0
<i>Anopheles freeborni</i>	0	0	0	0	0	0	0
<i>Coquillettidia perturbans</i>	0	0	0	0	0	0	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	52	95	34	56	37	54.8	183
<i>Culex tarsalis</i>	141	221	257	70	54	148.6	267
<i>Culiseta incidens</i>	1	6	0	3	9	3.8	1
<i>Culiseta inornata</i>	0	23	0	2	4	5.8	7
<b>Total # trapped</b>	<b>196</b>	<b>350</b>	<b>293</b>	<b>132</b>	<b>104</b>	<b>215</b>	<b>458</b>
Total nights trapped	19	17	18	22	22	19.6	20
Average # trapped per night	10.32	20.59	16.28	6.00	4.73	11.58	22.90
Max # trapped on one night	45	112	84	21	15	55.4	67
Min # trapped on one night	0	0	0	0	0	0	0

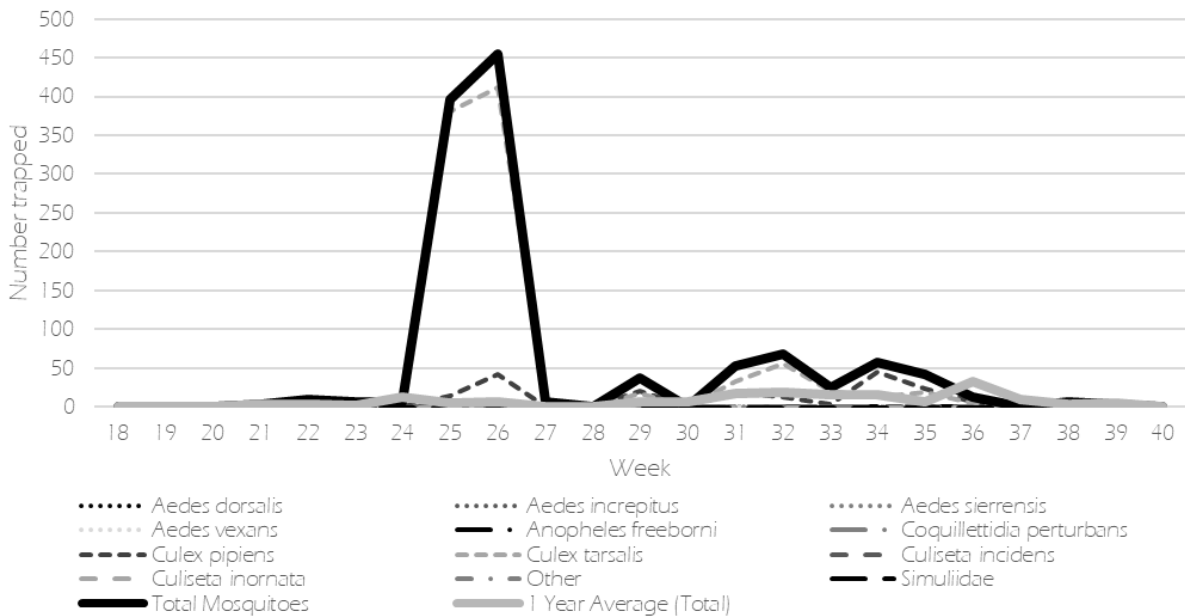


## Sandy Senior Center

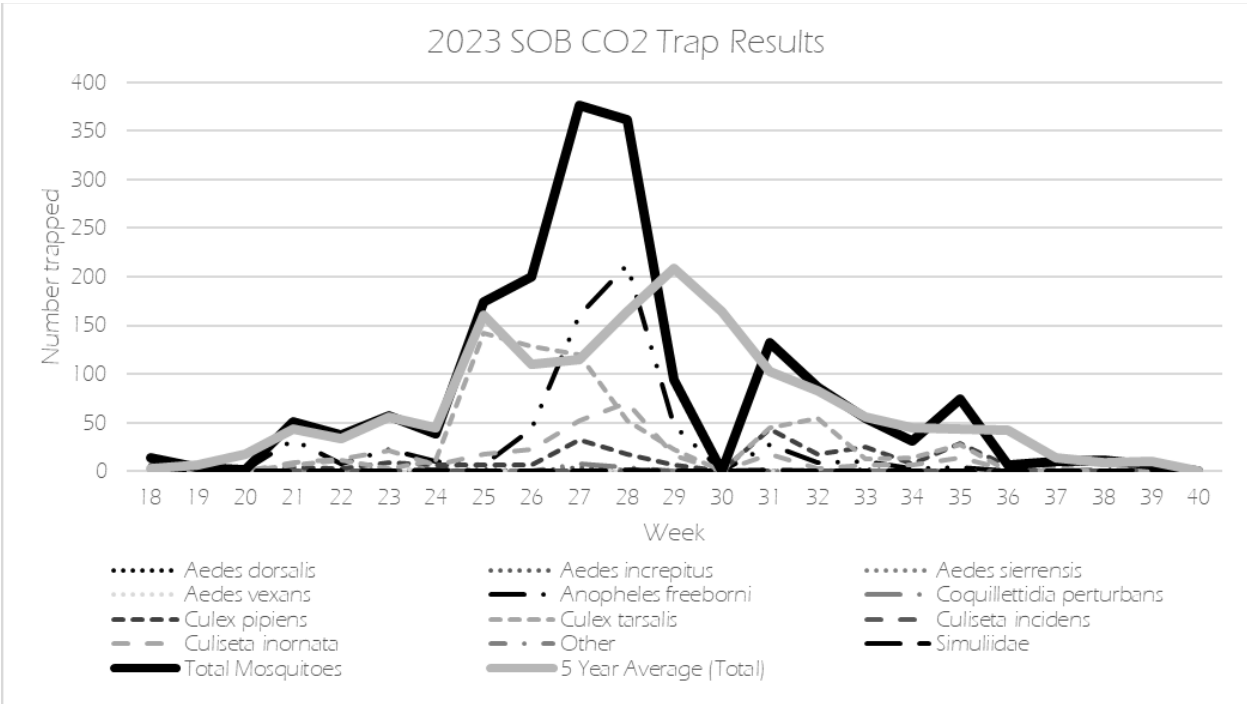
9310 S 1300 E

	2018	2019	2020	2021	2022	1 Year Average	2023
<i>Aedes dorsalis</i>					0	0	1
<i>Aedes increpitus</i>					0	0	0
<i>Aedes nigromaculis</i>					0	0	0
<i>Aedes sierrensis</i>					0	0	0
<i>Aedes vexans</i>					0	0	0
<i>Anopheles freeborni</i>					0	0	0
<i>Coquillettidia perturbans</i>					0	0	0
<i>Culex erythrothorax</i>					0	0	0
<i>Culex pipiens</i>					70	70	203
<i>Culex tarsalis</i>					95	95	983
<i>Culiseta incidens</i>					4	4	0
<i>Culiseta inornata</i>					2	2	1
<b>Total # trapped</b>					<b>171</b>	<b>171</b>	<b>1188</b>
Total nights trapped					20	20	20
Average # trapped per night					8.55	8.55	59.40
Max # trapped on one night					32	32	454
Min # trapped on one night					0	0	0

### 2023 Sandy Senior Center CO2 Trap Results



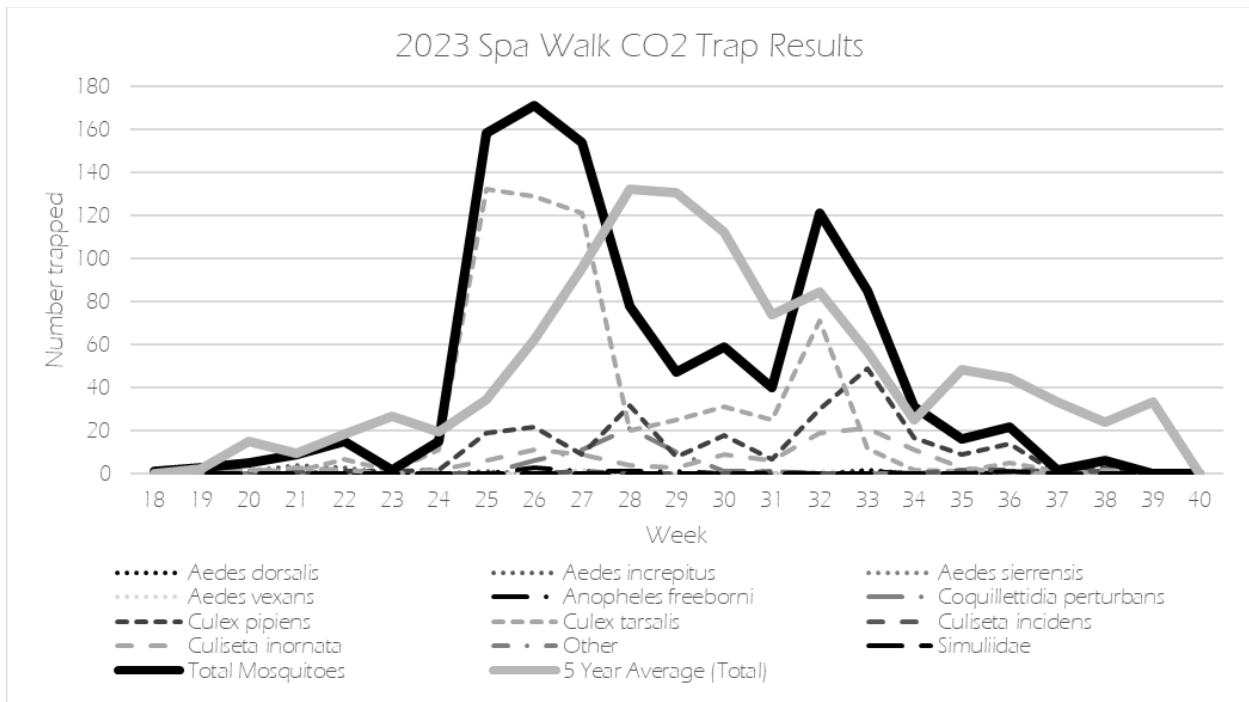
S.O.B.							
10810 South 500 West							
	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	0	0	0	1	0	0.2	3
<i>Aedes increpitus</i>	0	0	1	19	11	6.2	8
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	0	1	1	1	0	0.6	0
<i>Aedes vexans</i>	6	8	3	19	17	10.6	9
<i>Anopheles freeborni</i>	189	156	603	1574	661	636.6	608
<i>Coquillettidia perturbans</i>	7	2	13	3	2	5.4	12
<i>Culex erythrothorax</i>	0	0	0	0	19	3.8	0
<i>Culex pipiens</i>	695	70	377	568	258	393.6	247
<i>Culex tarsalis</i>	691	335	153	396	231	361.2	657
<i>Culiseta incidens</i>	9	23	0	1	3	7.2	0
<i>Culiseta inornata</i>	80	46	169	75	141	102.2	276
<b>Total # trapped</b>	<b>1677</b>	<b>641</b>	<b>1320</b>	<b>2657</b>	<b>1343</b>	<b>1527.6</b>	<b>1820</b>
Total nights trapped	22	21	21	22	21	21.4	21
Average # trapped per night	76.23	30.52	62.86	120.77	63.95	70.87	86.67
Max # trapped on one night	294	106	175	610	310	299	376
Min # trapped on one night	0	0	16	1	1	3.6	1



## Spa Walk

4750 South 1600 East

	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	0	0	0	0	2	0.4	3
<i>Aedes increpitus</i>	3	13	31	1	3	10.2	10
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	3	7	5	1	3	3.8	0
<i>Aedes vexans</i>	1	1	0	0	8	2	5
<i>Anopheles freeborni</i>	5	1	23	114	14	31.4	7
<i>Coquillettidia perturbans</i>	12	88	139	356	340	187	50
<i>Culex erythrothorax</i>	0	0	0	0	151	30.2	0
<i>Culex pipiens</i>	404	317	553	176	305	351	245
<i>Culex tarsalis</i>	138	191	333	147	116	185	597
<i>Culiseta incidens</i>	83	63	141	28	26	68.2	11
<i>Culiseta inornata</i>	92	489	331	73	79	212.8	112
<b>Total # trapped</b>	<b>741</b>	<b>1170</b>	<b>1556</b>	<b>896</b>	<b>1047</b>	<b>1082</b>	<b>1040</b>
Total nights trapped	21	22	21	22	22	21.6	22
Average # trapped per night	35.29	53.18	74.10	40.73	47.59	50.18	47.27
Max # trapped on one night	154	202	154	248	253	202.2	171
Min # trapped on one night	0	0	9	0	0	1.8	0

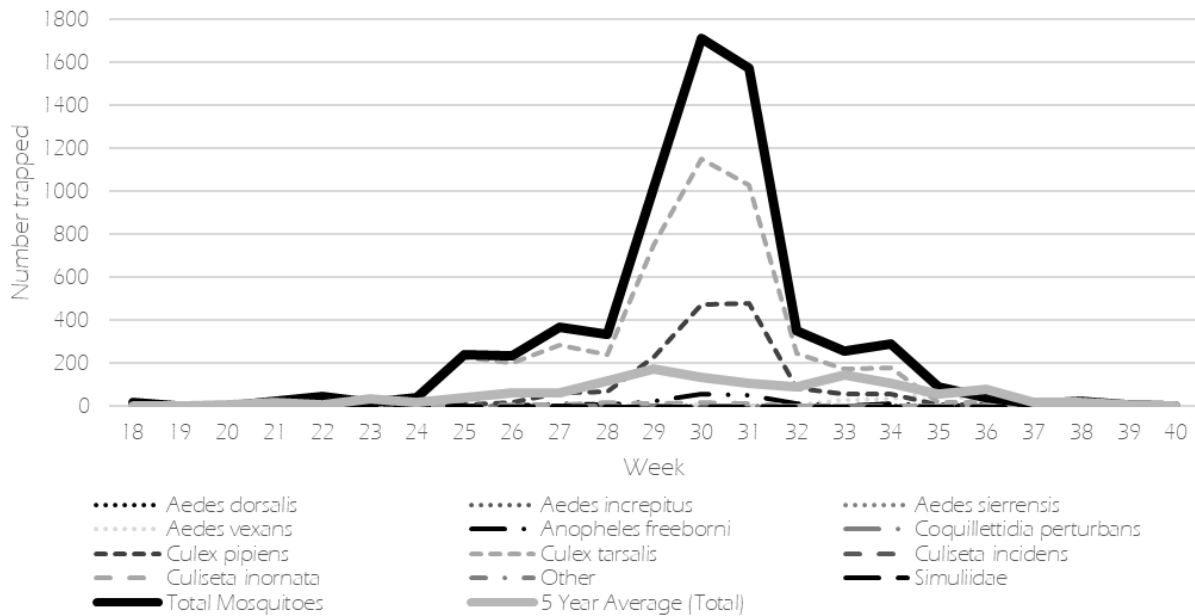


# Springview Farms

14400 South 1160 West

	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	1	1	1	3	3	1.8	14
<i>Aedes increpitus</i>	4	3	26	2	2	7.4	6
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	0	1	0	0	0	0.2	0
<i>Aedes vexans</i>	188	12	45	9	9	52.6	188
<i>Anopheles freeborni</i>	319	40	300	470	86	243	210
<i>Coquillettidia perturbans</i>	1	0	1	2	1	1	0
<i>Culex erythrothorax</i>	0	0	0	0	29	5.8	0
<i>Culex pipiens</i>	285	152	374	275	111	239.4	1566
<i>Culex tarsalis</i>	647	903	1053	723	348	734.8	4623
<i>Culiseta incidens</i>	0	0	2	0	0	0.4	1
<i>Culiseta inornata</i>	16	21	17	9	9	14.4	80
<b>Total # trapped</b>	<b>1461</b>	<b>1133</b>	<b>1819</b>	<b>1493</b>	<b>598</b>	<b>1300.8</b>	<b>6688</b>
Total nights trapped	22	21	18	22	21	20.8	22
Average # trapped per night	66.41	53.95	101.06	67.86	28.48	63.55	304.00
Max # trapped on one night	174	219	521	179	91	236.8	1708
Min # trapped on one night	0	0	0	0	0	0	0

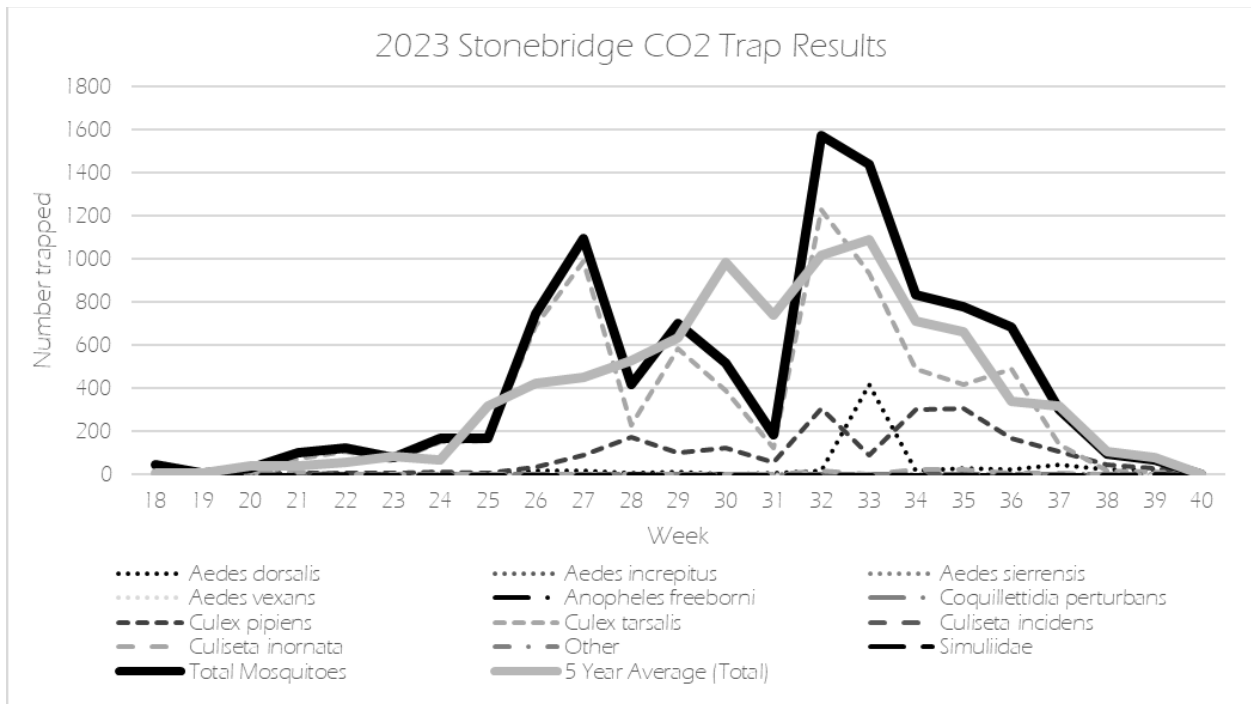
### 2023 Springview Farms CO2 Trap Results



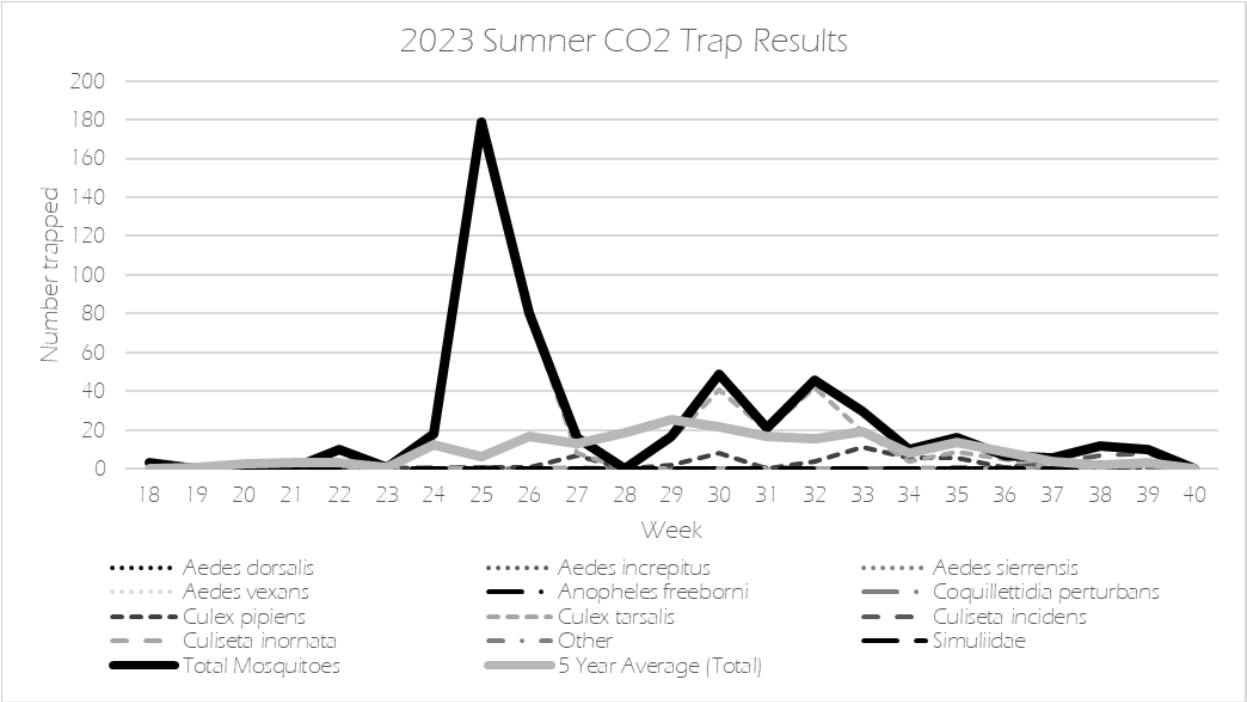
# Stonebridge

2400 South 4300 West

	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	246	109	137	276	437	241	699
<i>Aedes increpitus</i>	2	0	5	1	0	1.6	5
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	14	19	11	6	3	10.6	3
<i>Anopheles freeborni</i>	2	3	2	0	1	1.6	2
<i>Coquillettidia perturbans</i>	0	0	0	0	0	0	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	838	1206	3605	2992	6448	3017.8	1989
<i>Culex tarsalis</i>	3571	2276	9527	2852	8070	5259.2	7316
<i>Culiseta incidens</i>	1	1	4	1	0	1.4	0
<i>Culiseta inornata</i>	9	34	613	4	56	143.2	117
<b>Total # trapped</b>	<b>4683</b>	<b>3648</b>	<b>13904</b>	<b>6132</b>	<b>15015</b>	<b>8676.4</b>	<b>10131</b>
Total nights trapped	22	22	20	22	22	21.6	22
Average # trapped per night	212.9	165.8	695.2	278.7	682.5	407.02	460.5
Max # trapped on one night	1139	605	2454	932	1870	1400	1572
Min # trapped on one night	1	3	1	0	2	1.4	5

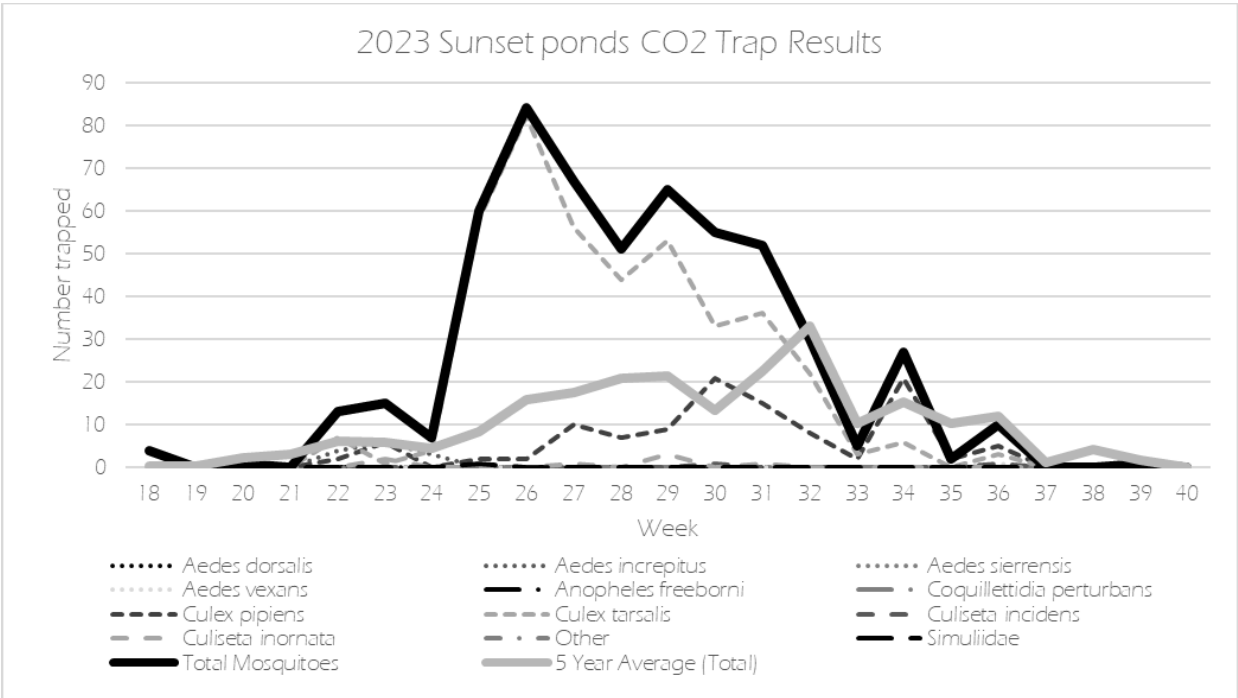


Sumner's							
2660 Walker Lane							
	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	2	1	0	1	0	0.8	1
<i>Aedes increpitus</i>	0	0	1	0	0	0.2	0
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	0	2	0	0	0	0.4	0
<i>Aedes vexans</i>	0	0	0	0	0	0	0
<i>Anopheles freeborni</i>	0	0	0	0	0	0	0
<i>Coquillettidia perturbans</i>	0	1	0	0	0	0.2	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	32	17	12	30	20	22.2	55
<i>Culex tarsalis</i>	109	159	171	67	75	116.2	450
<i>Culiseta incidens</i>	118	45	50	75	84	74.4	22
<i>Culiseta inornata</i>	4	1	0	1	1	1.4	3
<b>Total # trapped</b>	<b>265</b>	<b>226</b>	<b>234</b>	<b>174</b>	<b>180</b>	<b>215.8</b>	<b>531</b>
Total nights trapped	22	21	20	22	20	21	21
Average # trapped per night	12.05	10.76	11.70	7.91	9.00	10.28	25.29
Max # trapped on one night	46	38	45	28	24	36.2	179
Min # trapped on one night	0	0	0	0	0	0	0





Sunset Ponds							
11746 South 860 East							
	2018	2019	2020	2021	2022	4 Year Average	2023
<i>Aedes dorsalis</i>	0	0	0	0	0	0	0
<i>Aedes increpitus</i>	0	3	2	0	3	2	13
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	0	3	0	0	0	0.75	1
<i>Anopheles freeborni</i>	0	1	1	1	0	0.75	0
<i>Coquillettidia perturbans</i>	0	0	0	0	0	0	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	0	85	89	39	87	75	113
<i>Culex tarsalis</i>	0	264	74	41	96	118.75	413
<i>Culiseta incidens</i>	0	1	8	4	13	6.5	2
<i>Culiseta inornata</i>	0	79	15	8	23	31.25	7
<b>Total # trapped</b>	<b>0</b>	<b>436</b>	<b>189</b>	<b>93</b>	<b>222</b>	<b>235</b>	<b>549</b>
Total nights trapped	0	22	21	21	22	21.5	21
Average # trapped per night	#DIV/0!	19.82	9.00	4.43	10.09	10.83	26.14
Max # trapped on one night	0	71	31	15	37	38.5	84
Min # trapped on one night	0	0	0	0	0	0	0

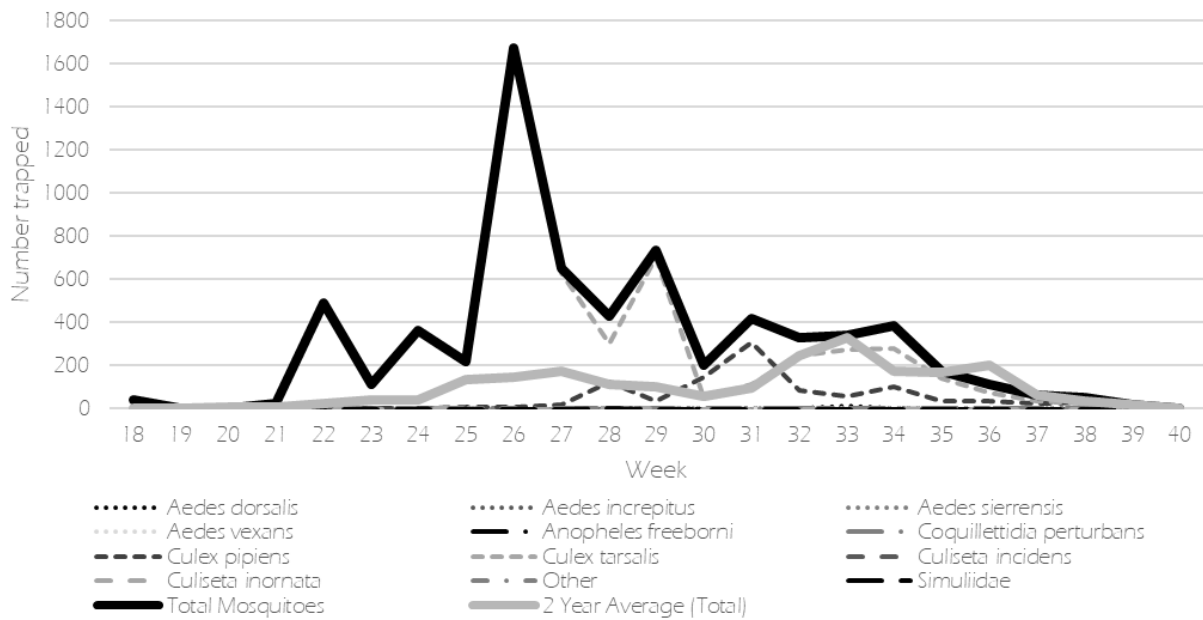


# Sycamore

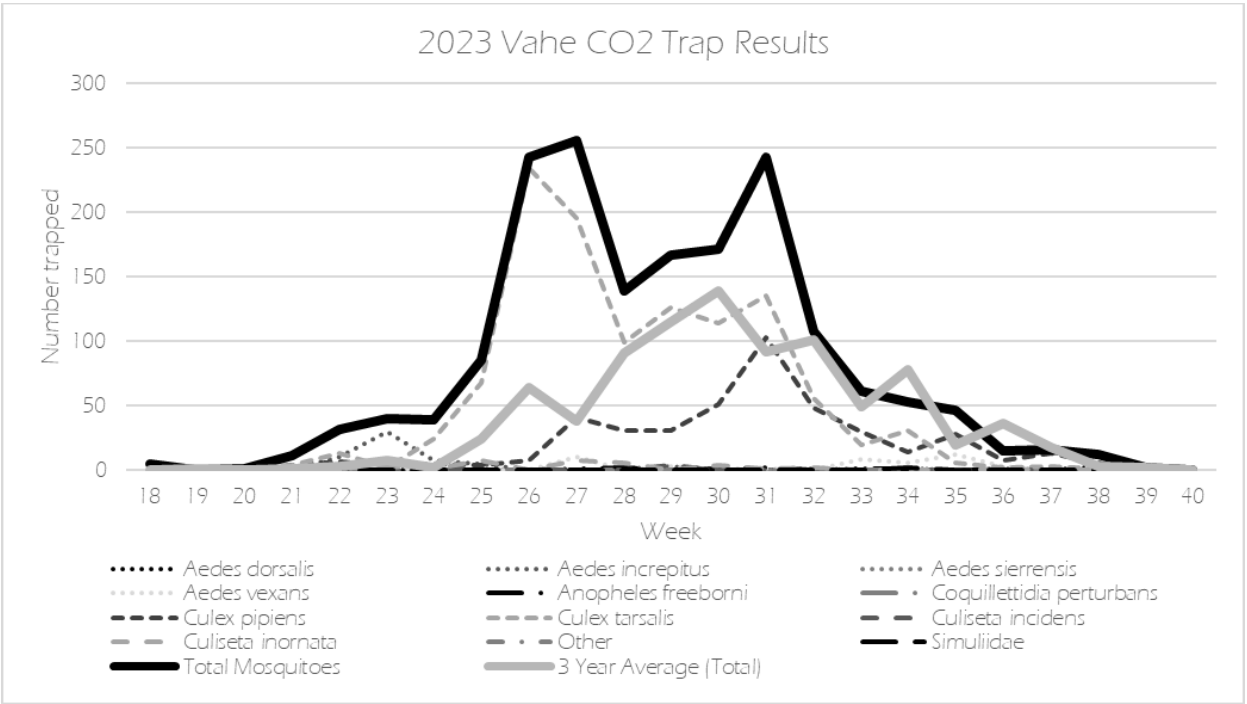
7855 South 7025 West

	2018	2019	2020	2021	2022	2 Year Average	2023
<i>Aedes dorsalis</i>				53	33	43	34
<i>Aedes increpitus</i>				1	0	0.5	0
<i>Aedes nigromaculis</i>				0	0	0	0
<i>Aedes sierrensis</i>				0	0	0	0
<i>Aedes vexans</i>				1	0	0.5	0
<i>Anopheles freeborni</i>				0	0	0	1
<i>Coquillettidia perturbans</i>				0	0	0	0
<i>Culex erythrothorax</i>				0	0	0	0
<i>Culex pipiens</i>				440	692	566	1014
<i>Culex tarsalis</i>				1421	1674	1547.5	5753
<i>Culiseta incidens</i>				4	5	4.5	1
<i>Culiseta inornata</i>				4	7	5.5	9
<b>Total # trapped</b>				<b>1924</b>	<b>2411</b>	<b>2167.5</b>	<b>6812</b>
Total nights trapped				17	21	19	22
Average # trapped per night				113.18	114.81	113.99	309.64
Max # trapped on one night				427	366	396.5	1672
Min # trapped on one night				0	0	0	1

### 2023 Sycamore CO2 Trap Results



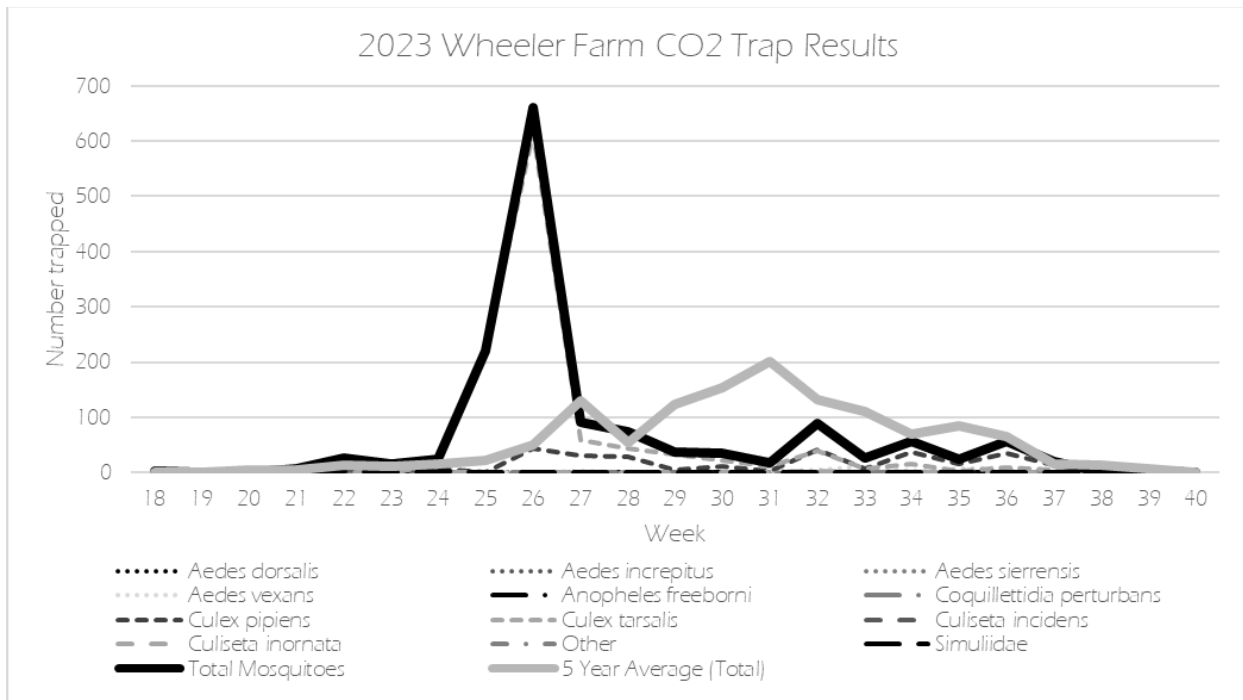
Vahe							
12100 South 1000 West							
	2018	2019	2020	2021	2022	3 Year Average	2023
<i>Aedes dorsalis</i>			1	0	3	1.33	10
<i>Aedes increpitus</i>			14	2	2	6	58
<i>Aedes nigromaculis</i>			0	0	0	0	0
<i>Aedes sierrensis</i>			0	0	0	0	0
<i>Aedes vexans</i>			46	6	41	31	49
<i>Anopheles freeborni</i>			58	200	15	91	9
<i>Coquillettidia perturbans</i>			0	0	0	0	0
<i>Culex erythrothorax</i>			0	0	0	0	0
<i>Culex pipiens</i>			216	388	333	312.33	438
<i>Culex tarsalis</i>			510	238	251	333	1138
<i>Culiseta incidens</i>			9	1	3	4.33	4
<i>Culiseta inornata</i>			140	126	51	105.67	35
<b>Total # trapped</b>			<b>994</b>	<b>961</b>	<b>699</b>	<b>884.67</b>	<b>1741</b>
Total nights trapped			14	22	22	19.33	22
Average # trapped per night			71.00	43.68	31.77	48.82	79.14
Max # trapped on one night			170	307	134	203.67	255
Min # trapped on one night			1	0	0	0.33	0



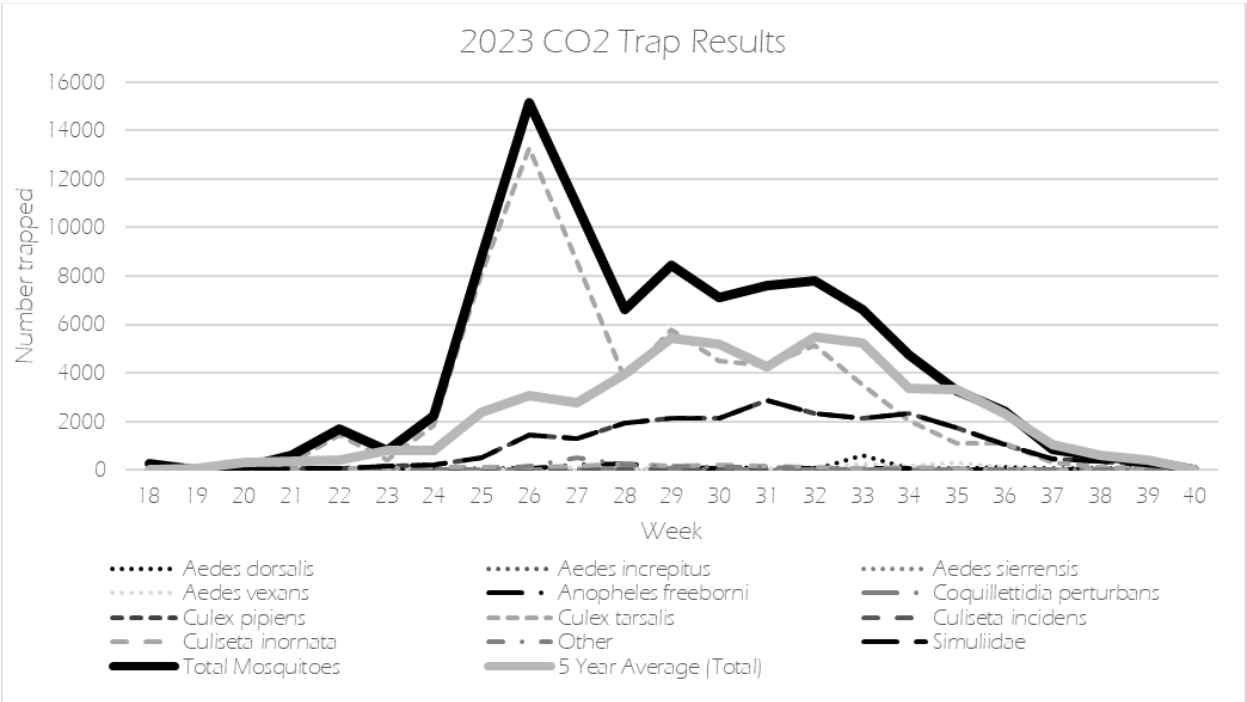
# Wheeler Farm

6300 South 900 East

	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	2	0	1	3	5	2.2	4
<i>Aedes increpitus</i>	1	1	1	0	0	0.6	0
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	213	56	183	513	1109	414.8	65
<i>Anopheles freeborni</i>	3	1	1	5	1	2.2	0
<i>Coquillettidia perturbans</i>	0	0	0	0	0	0	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	1
<i>Culex pipiens</i>	325	372	401	255	182	307	286
<i>Culex tarsalis</i>	224	447	1125	335	228	471.8	1123
<i>Culiseta incidens</i>	60	32	83	50	64	57.8	5
<i>Culiseta inornata</i>	3	80	5	23	10	24.2	4
<b>Total # trapped</b>	<b>831</b>	<b>989</b>	<b>1800</b>	<b>1184</b>	<b>1599</b>	<b>1280.6</b>	<b>1488</b>
Total nights trapped	21	21	21	22	22	21.4	22
Average # trapped per night	39.57	47.10	85.71	53.82	72.68	59.78	67.64
Max # trapped on one night	146	212	310	289	465	284.4	660
Min # trapped on one night	0	0	0	0	0	0	0



Total							
	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	471	239	324	593	839	493.2	1487
<i>Aedes increpitus</i>	40	109	163	61	28	80.2	156
<i>Aedes nigromaculis</i>	0	0	0	1	0	0.2	0
<i>Aedes sierrensis</i>	52	89	50	37	16	48.8	13
<i>Aedes vexans</i>	874	499	473	1195	2883	1184.8	1489
<i>Anopheles freeborni</i>	1119	547	2050	4317	1239	1854.4	1206
<i>Coquillettidia perturbans</i>	114	334	257	515	497	343.4	173
<i>Culex erythrothorax</i>	0	0	0	0	260	52	4
<i>Culex pipiens</i>	16688	17591	18211	17270	17463	17444.6	23456
<i>Culex tarsalis</i>	27085	24716	45971	17470	23924	27833.2	65741
<i>Culiseta incidens</i>	797	374	546	504	476	539.4	75
<i>Culiseta inornata</i>	439	2177	1778	1327	802	1304.6	1759
<b>Total # trapped</b>	<b>47679</b>	<b>46675</b>	<b>69823</b>	<b>43290</b>	<b>48427</b>	<b>51178.8</b>	<b>95559</b>
Total nights trapped	649	633	661	702	713	671.6	721
Average # trapped per night	73.47	73.74	105.6	61.67	67.92	76.48	132.54
Max # trapped on one night	6866	5536	10856	4391	6606	6851	15166
Min # trapped on one night	6	47	70	27	23	34.6	36

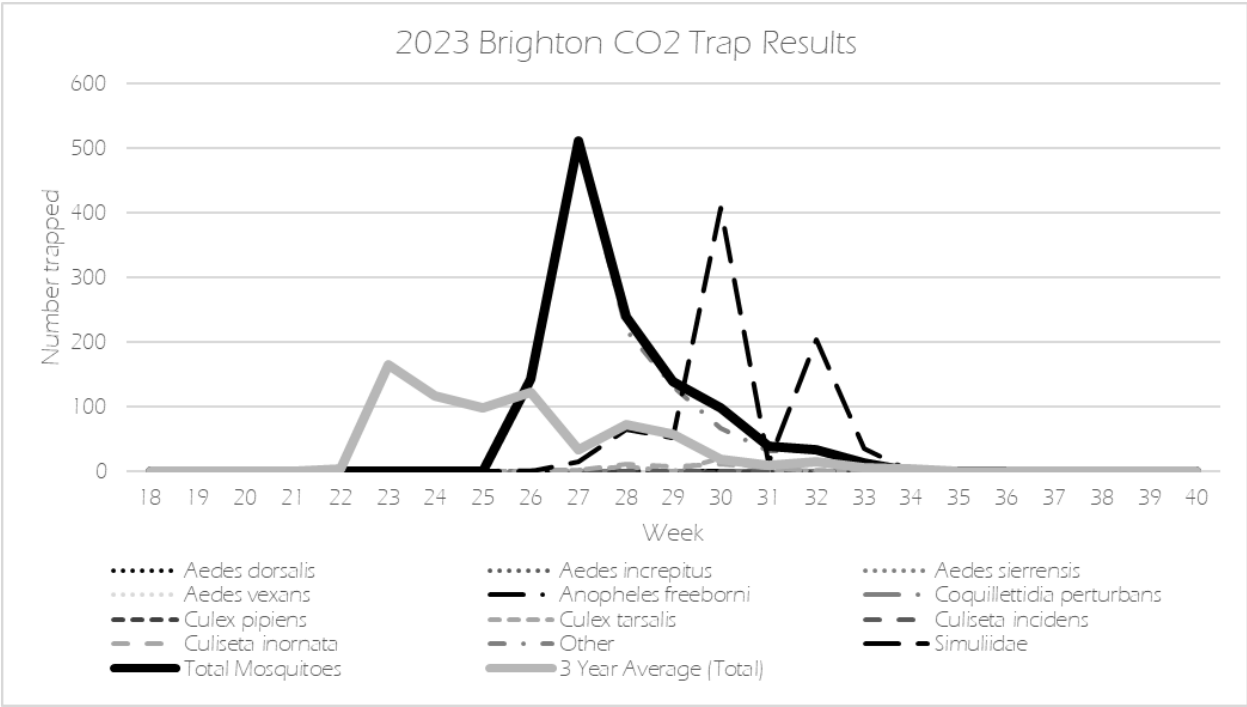


In addition to regular surveillance traps, 2 CO<sub>2</sub>-baited traps were placed in Big Cottonwood Canyon and 2 in Little Cottonwood Canyon. These traps were active once per week starting in early June and extending through early August. Mosquitoes categorized as "Other" were of the genus *Aedes* and primarily included *Ae. implicatus*, *Ae. hexodontus*, *Ae. intrudens*, and *Ae. cataphylla*.

Alta							
10520 E Day Lodge Rd							
	2018	2019	2020	2021	2022	3 Year Average	2023
<i>Aedes dorsalis</i>			1	0	0	0.33	0
<i>Aedes increpitus</i>			0	0	0	0	0
<i>Aedes nigromaculis</i>			0	0	0	0	0
<i>Aedes sierrensis</i>			0	0	0	0	0
<i>Aedes vexans</i>			0	0	0	0	0
<i>Anopheles freeborni</i>			0	0	0	0	0
<i>Coquillettidia perturbans</i>			0	0	0	0	0
<i>Culex erythrothorax</i>			0	0	0	0	0
<i>Culex pipiens</i>			5	3	0	2.67	10
<i>Culex tarsalis</i>			468	148	37	217.67	195
<i>Culiseta incidens</i>			1	2	6	3	4
<i>Culiseta inornata</i>			11	21	3	11.67	70
<i>Other</i>			566	252	128	315.33	481
<b>Total # trapped</b>			<b>1052</b>	<b>426</b>	<b>174</b>	<b>550.67</b>	<b>760</b>
Total nights trapped			14	9	9	10.67	8
Average # trapped per night			75.14	47.33	19.33	47.27	95.00
Max # trapped on one night			131	71	19	73.67	99
Min # trapped on one night			0	2	1	0.6	12



Brighton							
8000 S Brighton Loop Rd							
	2018	2019	2020	2021	2022	3 Year Average	2023
<i>Aedes dorsalis</i>			0	0	0	0	0
<i>Aedes increpitus</i>			0	0	1	0.33	3
<i>Aedes nigromaculis</i>			0	0	0	0	0
<i>Aedes sierrensis</i>			0	0	0	0	0
<i>Aedes vexans</i>			0	0	0	0	0
<i>Anopheles freeborni</i>			0	0	0	0	0
<i>Coquillettidia perturbans</i>			0	0	0	0	0
<i>Culex erythrothorax</i>			0	0	0	0	0
<i>Culex pipiens</i>			1	0	1	0.67	1
<i>Culex tarsalis</i>			161	42	21	74.67	34
<i>Culiseta incidens</i>			0	0	3	1	0
<i>Culiseta inornata</i>			73	29	11	37.67	42
<i>Other</i>			1217	2289	509	1338.33	2354
<b>Total # trapped</b>			<b>1452</b>	<b>2360</b>	<b>546</b>	<b>1452.67</b>	<b>2434</b>
Total nights trapped			16	9	9	11.33	8
Average # trapped per night			90.75	262.22	60.67	137.88	304.25
Max # trapped on one night			193	494	122	269.67	510
Min # trapped on one night			0	4	5	3	14



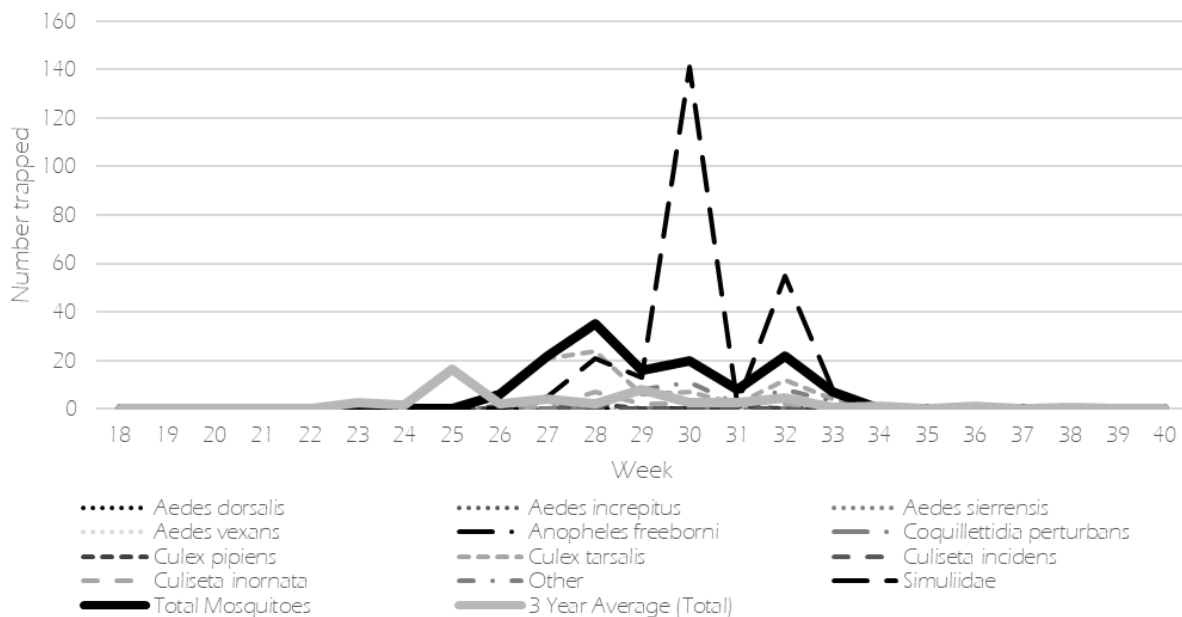


## Snowbird

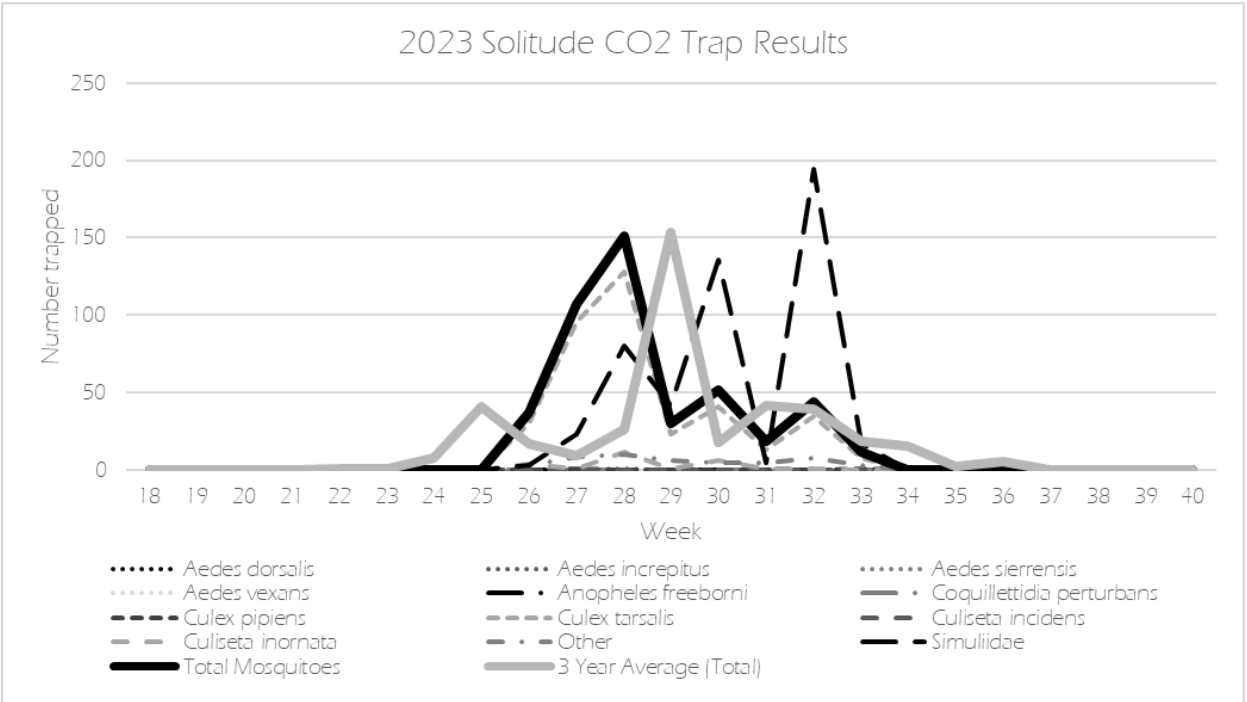
9200 E Snowbid Center Dr

	2018	2019	2020	2021	2022	3 Year Average	2023
<i>Aedes dorsalis</i>			0	0	0	0	0
<i>Aedes increpitus</i>			1	0	0	0.33	0
<i>Aedes nigromaculis</i>			0	0	0	0	0
<i>Aedes sierrensis</i>			0	0	0	0	0
<i>Aedes vexans</i>			0	0	0	0	0
<i>Anopheles freeborni</i>			0	0	0	0	0
<i>Coquillettidia perturbans</i>			0	0	0	0	0
<i>Culex erythrothorax</i>			0	0	0	0	0
<i>Culex pipiens</i>			19	0	0	6.33	3
<i>Culex tarsalis</i>			33	52	15	33.33	81
<i>Culiseta incidens</i>			4	2	0	2	1
<i>Culiseta inornata</i>			7	1	2	3.33	17
<i>Other</i>			78	69	23	56.67	170
<b>Total # trapped</b>			<b>142</b>	<b>124</b>	<b>40</b>	<b>102</b>	<b>272</b>
Total nights trapped			16	9	9	11.33	8
Average # trapped per night			8.88	13.78	4.44	9.03	34.00
Max # trapped on one night			21	46	6	24.33	35
Min # trapped on one night			0	0	1	0.33	6

### 2023 Snowbird CO2 Trap Results



Solitude							
12000 Big Cottonwood Canyon Rd							
	2018	2019	2020	2021	2022	3 Year Average	2023
<i>Aedes dorsalis</i>			0	0	0	0	0
<i>Aedes increpitus</i>			0	0	2	0.67	1
<i>Aedes nigromaculis</i>			0	0	0	0	0
<i>Aedes sierrensis</i>			0	1	0	0.33	0
<i>Aedes vexans</i>			0	0	0	0	0
<i>Anopheles freeborni</i>			0	0	1	0.33	0
<i>Coquillettidia perturbans</i>			0	0	0	0	0
<i>Culex erythrothorax</i>			0	0	0	0	0
<i>Culex pipiens</i>			3	0	0	1	2
<i>Culex tarsalis</i>			869	178	83	376.67	374
<i>Culiseta incidens</i>			0	1	0	0.33	0
<i>Culiseta inornata</i>			4	4	1	3	26
<i>Other</i>			924	214	117	418.33	501
<b>Total # trapped</b>			<b>1800</b>	<b>398</b>	<b>204</b>	<b>800.67</b>	<b>904</b>
Total nights trapped			16	8	9	11	8
Average # trapped per night			112.50	49.75	22.67	61.64	113.00
Max # trapped on one night			450	123	30	201	151
Min # trapped on one night			0	4	1	1.67	12



## Gravid Traps Monthly Totals by Trap Location

\* Indicates a change in trap location from the previous year

Bluffdale (14350 South 2200 West)							
	2018	2019	2020	2021	2022	5 Year Average	2023
May	1	0	0	0	0	0.20	2
June	28	4	15	33	6	17.2	10
July	37	64	53	134	23	62.2	36
August	67	31	90	67	42	59.4	59
September	39	29	44	43	28	36.6	33
October				5		5	
<b>Total</b>	<b>172</b>	<b>128</b>	<b>202</b>	<b>282</b>	<b>99</b>	<b>176.6</b>	<b>140</b>

Cottonwood Heights (7635 South 3125 East)							
	2018	2019	2020	2021	2022	5 Year Average	2023
May	0	0	1	1	1	0.60	1
June	13	1	3	10	10	7.4	3
July	81	29	241	12	27	78	24
August	104	49	96	12	8	53.8	55
September	33	18	39	31	46	33.4	28
October				4		4	
<b>Total</b>	<b>231</b>	<b>97</b>	<b>380</b>	<b>70</b>	<b>92</b>	<b>174</b>	<b>111</b>

Draper (13200 South 1285 East)							
	2018	2019	2020	2021	2022	5 Year Average	2023
May	0	0	0	2	0	0.40	0
June	17	11	7	12	5	10.4	2
July	72	96	45	27	23	52.6	135
August	74	106	66	24	41	62.2	65
September	45	20	41	45	43	38.8	13
October				20		20	
<b>Total</b>	<b>208</b>	<b>233</b>	<b>159</b>	<b>130</b>	<b>112</b>	<b>168.4</b>	<b>215</b>

Glenmoor (9756 South 4420 West)							
	2018	2019	2020	2021	2022	5 Year Average	2023
May	0	0	0	1	0	0.20	1
June	5	3	2	6	4	4	7
July	56	50	33	19	28	37.2	17
August	29	15	25	28	34	26.2	52
September	18	16	9	19	15	15.4	21
October				11		11	
<b>Total</b>	<b>108</b>	<b>84</b>	<b>69</b>	<b>84</b>	<b>81</b>	<b>85.2</b>	<b>98</b>

Herriman Library (5380 W Main St.) (14200 South 6400 West before 2022)							
	2018	2019	2020	2021	2022*	5 Year Average	2023
May	0	1	0	0	0	0.20	0
June	1	1	0	28	4	6.8	2
July	13	5	4	20	10	10.4	19
August	4	5	21	13	20	12.6	26
September	10	12	11	13	11	11.4	50
October				13		13	
<b>Total</b>	<b>28</b>	<b>24</b>	<b>36</b>	<b>87</b>	<b>45</b>	<b>44</b>	<b>97</b>

Holladay (4580 South 2300 East)							
	2018	2019	2020	2021	2022	5 Year Average	2023
May	0	0	0	0	0	0.00	0
June	1	0	0	9	2	2.4	9
July	14	5	47	0	2	13.6	9
August	6	8	15	1	6	7.2	44
September	6	2	7	8	21	8.8	14
October				10		10	
<b>Total</b>	<b>27</b>	<b>15</b>	<b>69</b>	<b>28</b>	<b>31</b>	<b>34</b>	<b>76</b>

Midvale (7800 South 600 West)							
	2018	2019	2020	2021	2022	5 Year Average	2023*
May	2	4	0	1	0	1.40	0
June	112	70	29	9	16	47.2	24
July	140	167	213	38	50	121.6	2
August	110	207	68	88	80	110.6	5
September	94	63	83	170	163	114.6	2
October				89		89	
<b>Total</b>	<b>458</b>	<b>511</b>	<b>393</b>	<b>395</b>	<b>309</b>	<b>413.2</b>	<b>33</b>

Murray (5025 South State Street)							
	2018	2019	2020	2021	2022	5 Year Average	2023
May	0	0	0	0	0	0.00	1
June	12	0	4	18	11	9	7
July	18	10	25	22	7	16.4	12
August	8	6	13	27	16	14	11
September	81	20	25	75	25	45.2	57
October				8		8	
<b>Total</b>	<b>119</b>	<b>36</b>	<b>67</b>	<b>150</b>	<b>59</b>	<b>86.2</b>	<b>88</b>

Riverton (13000 So 2700 W)							
	2018	2019	2020	2021	2022*	5 Year Average	2023*
May	2	1	1	0	0	0.80	0
June	90	6	20	76	3	39	7
July	348	420	237	185	3	238.6	50
August	219	182	523	231	20	235	64
September	113	88	109	161	31	100.4	43
October	0	0	0	7		7	
<b>Total</b>	<b>772</b>	<b>697</b>	<b>890</b>	<b>660</b>	<b>57</b>	<b>615.2</b>	<b>164</b>

Sandy (10340 South 1472 East)							
	2018	2019	2020	2021	2022	5 Year Average	2023
May	0	1	1	0	0	0.40	1
June	15	3	2	69	34	24.6	23
July	40	18	201	63	121	88.6	156
August	20	31	105	14	105	55	80
September	17	15	20	82	47	36.2	54
October				14		14	
<b>Total</b>	<b>92</b>	<b>68</b>	<b>329</b>	<b>242</b>	<b>307</b>	<b>207.6</b>	<b>314</b>

South Jordan (11010 South 1700 West)							
	2018	2019	2020	2021	2022	5 Year Average	2023
May	4	1	0	0	3	1.60	4
June	59	27	16	23	55	36	42
July	390	259	156	87	131	204.6	230
August	172	188	161	68	96	137	87
September	151	78	99	84	131	108.6	109
October				32		32	
<b>Total</b>	<b>776</b>	<b>553</b>	<b>432</b>	<b>294</b>	<b>416</b>	<b>494.2</b>	<b>472</b>

South Salt Lake (2475 South 195 West)							
	2018	2019	2020	2021	2022	5 Year Average	2023
May	0	0	0	0	0	0.00	0
June	5	1	3	49	8	13.2	8
July	15	11	29	17	26	19.6	61
August	20	13	22	26	29	22	11
September	57	39	13	86	25	44	38
October				30		30	
<b>Total</b>	<b>97</b>	<b>64</b>	<b>67</b>	<b>208</b>	<b>88</b>	<b>104.8</b>	<b>118</b>

SSLVMAD (7308 South Airport Road)							
	2018	2019	2020	2021	2022	5 Year Average	2023
May	0	0	2	0	1	0.60	0
June	1	2	0	3	3	1.8	3
July	5	15	15	2	8	9	10
August	11	20	8	10	8	11.4	29
September	12	3	11	36	11	14.6	13
October				5		5	
<b>Total</b>	<b>29</b>	<b>40</b>	<b>36</b>	<b>56</b>	<b>31</b>	<b>38.4</b>	<b>55</b>

Taylorsville (5350 South 2600 West)							
	2018	2019	2020	2021	2022	5 Year Average	2023
May	0	0	0	0	0	0.00	0
June	32	0	2	83	8	25	11
July	51	56	81	27	15	46	28
August	23	2	43	44	24	27.2	35
September	44	14	30	69	13	34	49
October				6		6	
<b>Total</b>	<b>150</b>	<b>72</b>	<b>156</b>	<b>229</b>	<b>60</b>	<b>133.4</b>	<b>123</b>

West Jordan (8000 South 1700 West)							
	2018	2019	2020	2021	2022	5 Year Average	2023
May	1	2	1	2	5	2.20	0
June	49	12	26	10	24	24.2	17
July	31	68	72	29	29	45.8	89
August	37	59	46	25	32	39.8	65
September	30	7	21	32	27	23.4	21
October				19		19	
<b>Total</b>	<b>148</b>	<b>148</b>	<b>166</b>	<b>117</b>	<b>117</b>	<b>139.2</b>	<b>192</b>

West Valley (2855 South 3600 West)							
	2018	2019	2020	2021	2022	5 Year Average	2023
May	4	4	1	1	0	2.00	1
June	31	26	6	10	16	17.8	26
July	50	224	36	15	22	69.4	25
August	14	103	69	108	40	66.8	59
September	76	134	42	73	49	74.8	91
October				26		26	
<b>Total</b>	<b>175</b>	<b>491</b>	<b>154</b>	<b>233</b>	<b>127</b>	<b>236</b>	<b>202</b>

Average per trap night							
	2018	2019	2020	2021	2022	5 Year Average	2023
May	0.22	0.21	0.11	0.13	0.16	0.13	0.16
June	6.54	2.69	1.96	6.49	2.68	4.07	2.87
July	19.44	21.39	20.67	11.24	8.47	16.24	14.98
August	13.70	14.44	21.76	11.07	8.59	13.91	9.83
September	13.77	8.72	11.62	15.33	9.53	11.79	10.43
<b>Total</b>	<b>10.56</b>	<b>9.59</b>	<b>11.37</b>	<b>8.66</b>	<b>5.87</b>	<b>9.21</b>	<b>7.45</b>

### Biogents Sentinel 2 Traps Monthly Totals by Month

Holladay (4750 South 1980 East)							
	2018	2019	2020	2021	2022	5 Year Average	2023
May	4	4	2	8	3	4.2	8
June	31	36	19	14	56	31.2	693
July	23	71	36	42	35	41.4	234
August	66	97	63	34	87	69.4	154
September	10	19	14	32	33	21.6	6
<b>Total</b>	<b>134</b>	<b>227</b>	<b>134</b>	<b>130</b>	<b>214</b>	<b>167.8</b>	<b>1095</b>



Murray Cemetery (5490 South 725 East)							
	2018	2019	2020	2021	2022	5 Year Average	2023
May	4	13	8	11	25	12.2	15
June	434	170	49	124	192	193.8	1779
July	139	167	287	80	78	150.2	444
August	221	252	234	101	169	195.4	247
September	37	65	51	47	81	56.2	54
<b>Total</b>	<b>835</b>	<b>667</b>	<b>629</b>	<b>363</b>	<b>545</b>	<b>607.8</b>	<b>2539</b>

Roper North (2775 South 900 West)							
	2018	2019	2020	2021	2022	5 Year Average	2023
May	51	104	29	125	85	78.8	16
June	466	270	352	413	549	410	484
July	1129	817	760	920	836	892.4	751
August	1102	1058	958	745	803	933.2	442
September	355	299	199	494	286	326.6	101
<b>Total</b>	<b>3103</b>	<b>2548</b>	<b>2298</b>	<b>2697</b>	<b>2559</b>	<b>2641</b>	<b>1794</b>

South Jordan Cemetery (10601 South 1055 West)							
	2018	2019	2020	2021	2022	4 Year Average	2023
May	0	2	0	0	2	1	3
June	57	28	0	21	37	35.75	668
July	294	419	0	95	56	216	478
August	607	1052	0	121	101	470.25	168
September	62	74	0	25	96	64.25	17
<b>Total</b>	<b>1020</b>	<b>1575</b>	<b>0</b>	<b>262</b>	<b>292</b>	<b>787.25</b>	<b>1334</b>

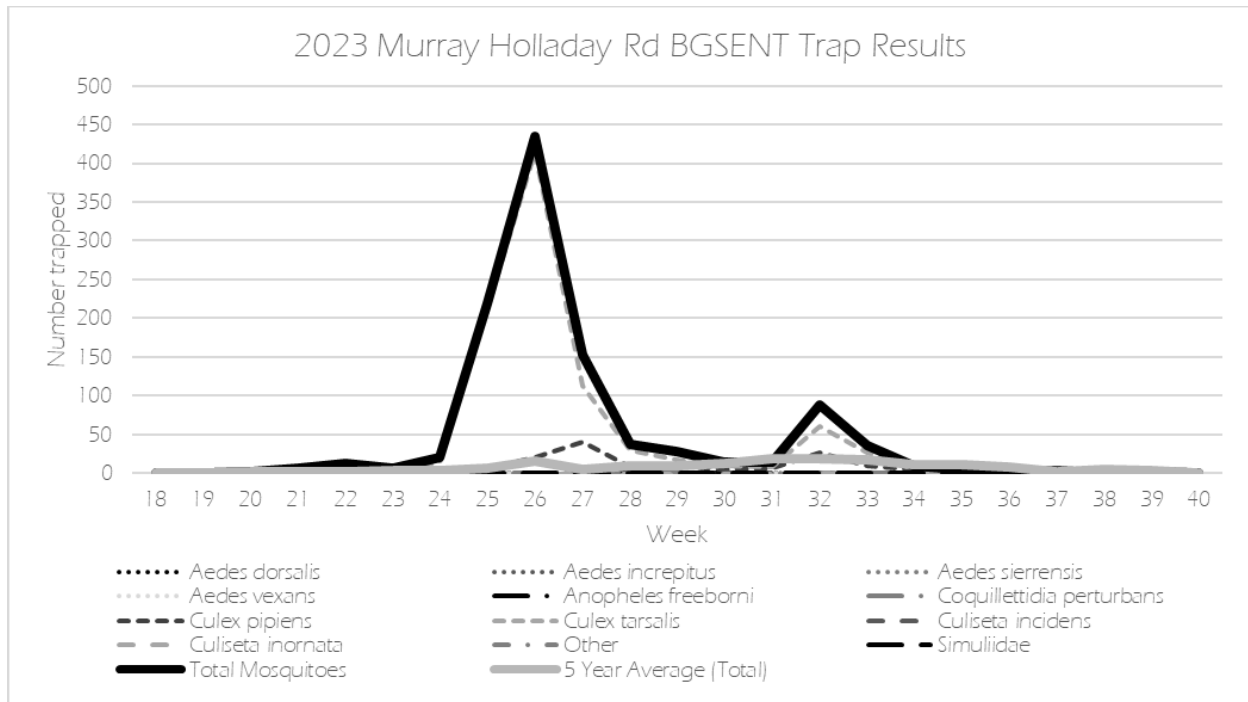
Truckers North (2900 South 2255 West)							
	2018	2019	2020	2021	2022	5 Year Average	2023
May	58	136	28	107	52	76.2	150
June	289	690	476	229	279	392.6	943
July	791	830	1739	513	434	861.4	424
August	770	2344	1526	1005	1766	1482.2	2087
September	450	249	236	338	526	359.8	338
<b>Total</b>	<b>2358</b>	<b>4249</b>	<b>4005</b>	<b>2192</b>	<b>3057</b>	<b>3172.2</b>	<b>3942</b>

UPS (2555 South 2140 West)							
	2018	2019	2020	2021	2022	5 Year Average	2023
May	9	18	8	8	9	10.4	17
June	37	27	75	13	34	37.2	83
July	82	39	76	13	53	52.6	53
August	88	29	129	105	797	229.6	330
September	83	24	31	99	186	84.6	53
<b>Total</b>	<b>299</b>	<b>137</b>	<b>319</b>	<b>238</b>	<b>1079</b>	<b>414.4</b>	<b>536</b>

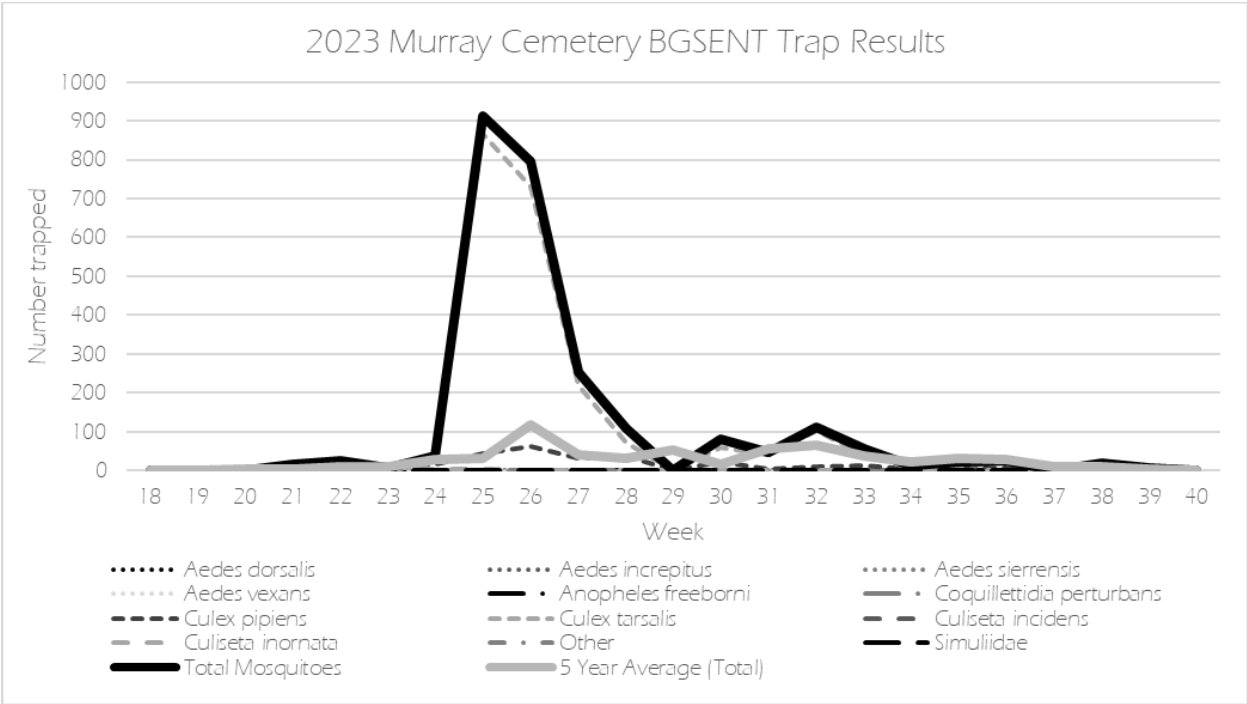
Total							
	2018	2019	2020	2021	2022	5 Year Average	2023
May	126	277	75	259	176	182.6	209
June	1314	1221	971	814	1147	1093.4	4650
July	2458	2343	2898	1663	1492	2170.8	2384
August	2854	4832	2910	2111	3723	3286	3428
September	997	730	531	1035	1208	900.2	569
<b>Total</b>	<b>7749</b>	<b>9403</b>	<b>7385</b>	<b>5882</b>	<b>7746</b>	<b>7633</b>	<b>11240</b>

## Biogents Sentinel 2 Traps Individual Species by Trap Location

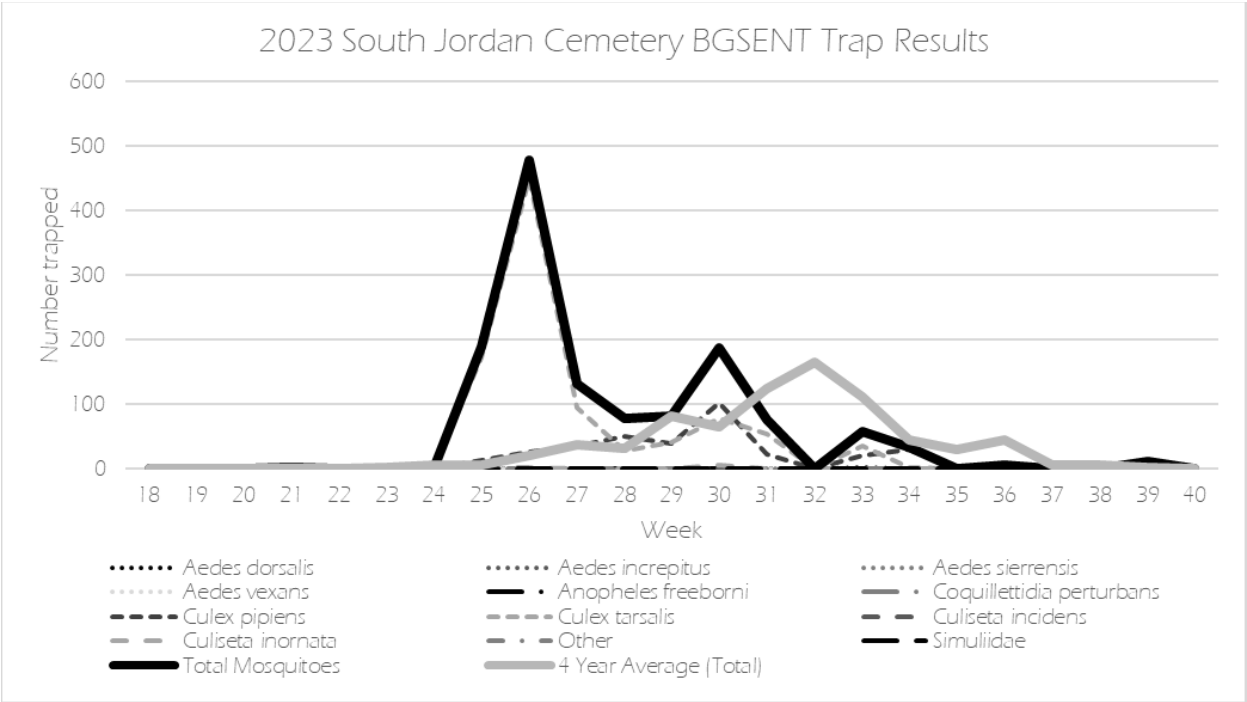
Holladay							
1980 E 4750 So.							
	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	0	0	0	0	2	0.4	0
<i>Aedes increpitus</i>	0	0	0	0	0	0	0
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	2	6	0	1	3	2.4	0
<i>Aedes vexans</i>	0	0	0	0	0	0	0
<i>Anopheles freeborni</i>	0	1	0	1	0	0.4	0
<i>Coquillettidia perturbans</i>	0	1	0	2	0	0.6	0
<i>Culex erythrorhox</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	57	94	60	84	133	85.6	158
<i>Culex tarsalis</i>	57	109	63	35	68	66.4	934
<i>Culiseta incidens</i>	16	6	8	7	7	8.8	2
<i>Culiseta inornata</i>	2	8	3	0	1	2.8	1
Black Fly	0	1	0	0	3	0.8	0
<b>Total # trapped</b>	<b>134</b>	<b>226</b>	<b>134</b>	<b>130</b>	<b>217</b>	<b>168.2</b>	<b>1095</b>
Total nights trapped	22	20	21	21	21	21	22
Average # trapped per night	6.09	11.3	6.38	6.19	10.33	8.06	49.77
Max # trapped on one night	30	39	19	16	35	27.8	435
Min # trapped on one night	0	0	0	0	0	0	0



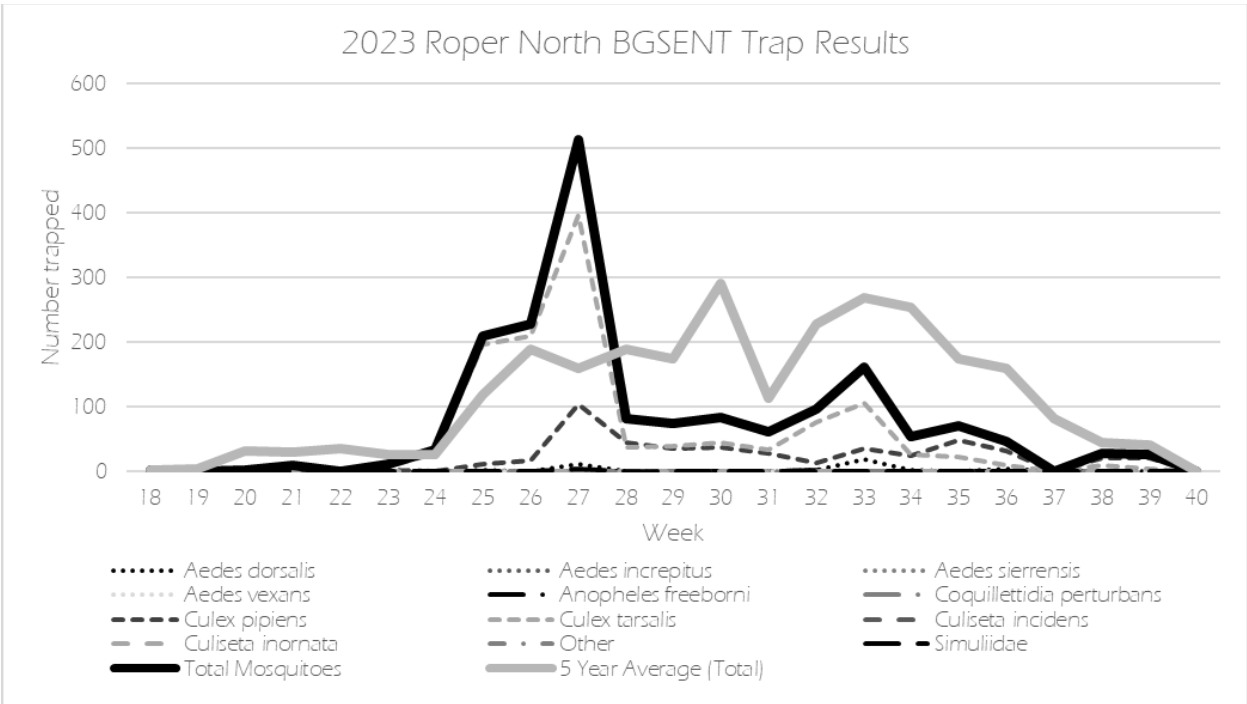
Murray Cemetery							
725 E 5490 So.							
	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	11	1	1	2	0	3	1
<i>Aedes increpitus</i>	0	0	0	0	0	0	0
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	8	0	0	1	5	2.8	2
<i>Anopheles freeborni</i>	0	0	0	0	0	0	0
<i>Coquillettidia perturbans</i>	0	0	0	0	1	0.2	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	159	161	99	185	206	162	289
<i>Culex tarsalis</i>	535	444	551	155	316	400.2	2226
<i>Culiseta incidens</i>	115	37	21	20	12	41	2
<i>Culiseta inornata</i>	6	10	2	0	5	4.6	19
Black Fly	3	4	0	0	1	1.6	0
<b>Total # trapped</b>	<b>837</b>	<b>657</b>	<b>674</b>	<b>363</b>	<b>546</b>	<b>615.4</b>	<b>2539</b>
Total nights trapped	22	20	21	22	22	21.4	20
Average # trapped per night	38.05	32.85	32.10	16.5	24.82	28.86	126.95
Max # trapped on one night	362	135	103	56	72	145.6	914
Min # trapped on one night	0	0	0	0	1	0.2	0



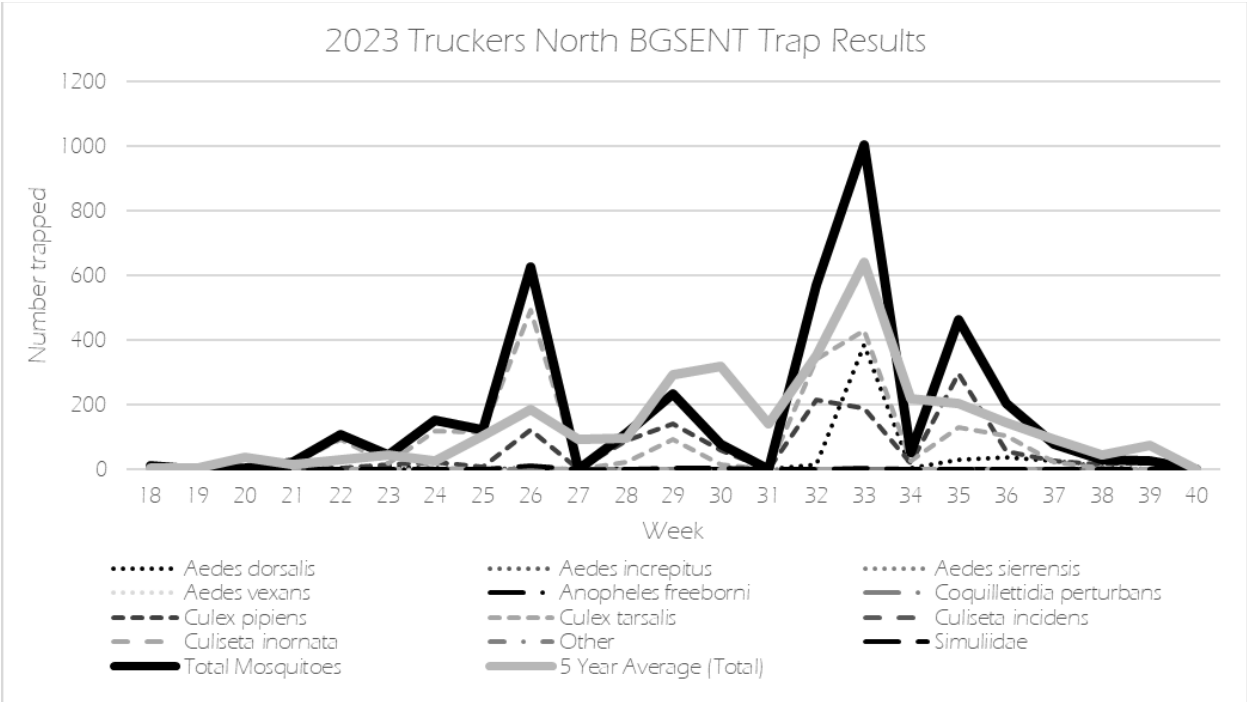
South Jordan Cemetery							
1055 W 10601 So.							
	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	0	0	0	0	4	1	3
<i>Aedes increpitus</i>	0	0	0	0	0	0	0
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	0	6	0	0	0	1.5	0
<i>Aedes vexans</i>	0	0	0	1	1	0.5	0
<i>Anopheles freeborni</i>	0	0	0	2	1	0.75	0
<i>Coquillettidia perturbans</i>	0	0	0	0	0	0	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	434	590	0	175	151	337.5	349
<i>Culex tarsalis</i>	555	919	0	83	128	421.25	966
<i>Culiseta incidens</i>	5	9	0	0	0	3.5	0
<i>Culiseta inornata</i>	0	16	0	1	7	6	16
Black Fly	5	17	0	2	0	6	0
<b>Total # trapped</b>	<b>999</b>	<b>1557</b>	<b>0</b>	<b>264</b>	<b>292</b>	<b>778</b>	<b>1334</b>
Total nights trapped	21	20	2	21	21	20.75	17
Average # trapped per night	47.57	77.85	0	12.57	13.90	37.97	78.47
Max # trapped on one night	232	383	0	68	77	190	478
Min # trapped on one night	0	0	0	0	0	0	0



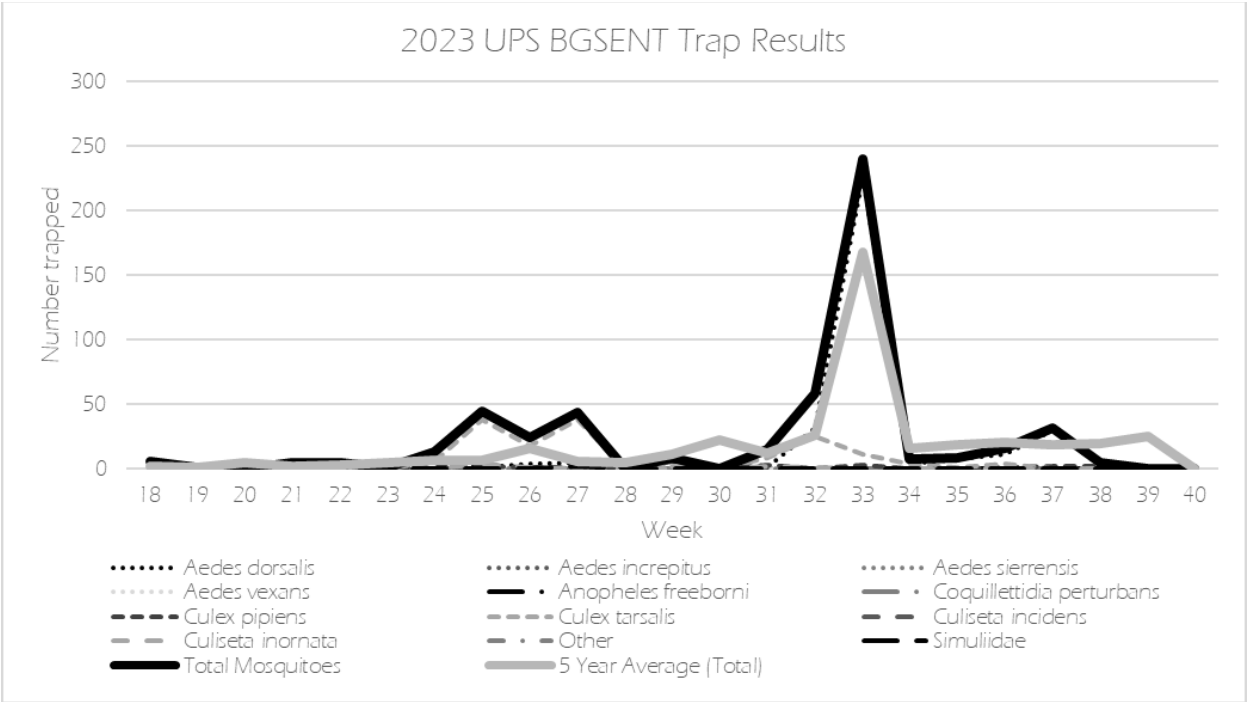
Roper North							
900 W 2775 So.							
	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	58	30	44	98	47	55.4	51
<i>Aedes increpitus</i>	2	3	1	2	1	1.8	0
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	36	7	306	58	13	84	4
<i>Anopheles freeborni</i>	35	16	9	5	5	14	2
<i>Coquillettidia perturbans</i>	0	0	3	1	0	0.8	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	1720	1499	1089	1778	1535	1524.2	475
<i>Culex tarsalis</i>	1235	961	770	746	949	932.2	1258
<i>Culiseta incidens</i>	2	2	16	2	0	4.4	0
<i>Culiseta inornata</i>	6	26	49	6	9	19.2	4
Black Fly	5	1	4	2	1	2.6	4
<b>Total # trapped</b>	<b>3099</b>	<b>2545</b>	<b>2291</b>	<b>2698</b>	<b>2560</b>	<b>2638.6</b>	<b>1798</b>
Total nights trapped	22	21	19	21	22	21	20
Average # trapped per night	140.86	121.19	120.58	128.48	116.36	125.49	89.9
Max # trapped on one night	464	364	347	346	391	382.4	512
Min # trapped on one night	1	4	2	2	0	1.8	0



Truckers North							
2900 W 2255 So.							
	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	325	97	99	244	353	223.6	549
<i>Aedes increpitus</i>	0	0	0	0	0	0	1
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	1
<i>Aedes sierrensis</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	4	1	3	1	2	2.2	1
<i>Anopheles freeborni</i>	0	3	1	1	0	1	0
<i>Coquillettidia perturbans</i>	0	0	5	0	0	1	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	3
<i>Culex pipiens</i>	864	2702	991	1273	1768	1519.6	1320
<i>Culex tarsalis</i>	1128	1257	2868	662	929	1368.8	2051
<i>Culiseta incidens</i>	2	2	1	0	0	1	2
<i>Culiseta inornata</i>	2	124	2	2	3	26.6	14
Black Fly	10	12	14	2	4	8.4	22
<b>Total # trapped</b>	<b>2335</b>	<b>4198</b>	<b>3984</b>	<b>2185</b>	<b>3059</b>	<b>3152.2</b>	<b>3964</b>
Total nights trapped	22	22	19	21	22	21.2	20
Average # trapped per night	106.13	190.82	209.68	104.05	139.05	149.95	198.2
Max # trapped on one night	366	1359	893	400	733	750.2	1002
Min # trapped on one night	0	2	0	2	0	0.8	1

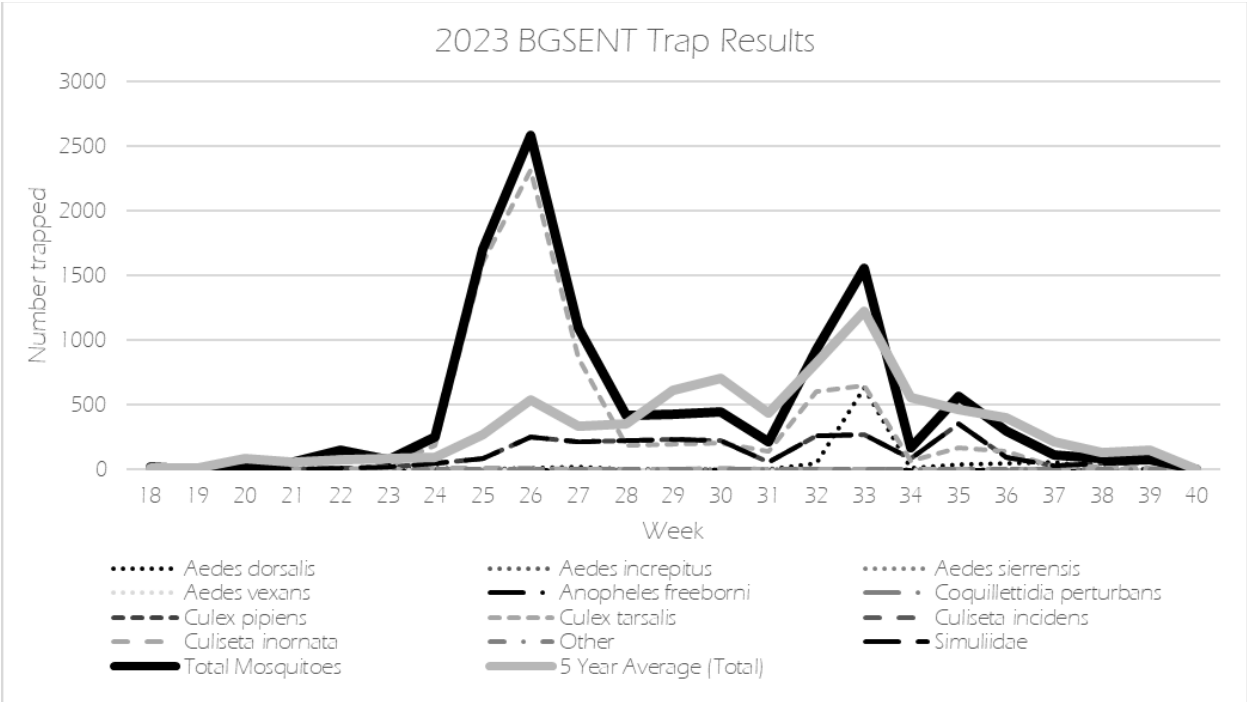


UPS							
2555 So. 2100 W							
	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	68	49	45	182	955	259.8	339
<i>Aedes increpitus</i>	0	0	1	0	0	0.2	0
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	0
<i>Aedes sierrensis</i>	0	0	0	0	0	0	0
<i>Aedes vexans</i>	2	1	0	2	3	1.6	0
<i>Anopheles freeborni</i>	3	2	2	0	0	1.4	0
<i>Coquillettidia perturbans</i>	0	0	0	0	0	0	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	0
<i>Culex pipiens</i>	147	34	148	34	49	82.4	22
<i>Culex tarsalis</i>	75	22	83	17	68	53	161
<i>Culiseta incidens</i>	0	3	0	0	0	0.6	0
<i>Culiseta inornata</i>	3	13	3	2	4	5	11
Black Fly	4	0	0	0	0	0.8	2
<b>Total # trapped</b>	<b>302</b>	<b>124</b>	<b>282</b>	<b>237</b>	<b>1079</b>	<b>404.8</b>	<b>535</b>
Total nights trapped	21	22	18	22	22	21	18
Average # trapped per night	14.38	5.64	15.67	10.77	49.05	19.10	29.72
Max # trapped on one night	53	28	84	46	751	192.4	240
Min # trapped on one night	0	0	1	0	0	0.2	1





Total							
2555 So. 2100 W							
	2018	2019	2020	2021	2022	5 Year Average	2023
<i>Aedes dorsalis</i>	462	177	189	526	1361	543	943
<i>Aedes increpitus</i>	2	3	2	2	1	2	1
<i>Aedes nigromaculis</i>	0	0	0	0	0	0	1
<i>Aedes sierrensis</i>	2	12	0	1	3	3.6	0
<i>Aedes vexans</i>	50	9	309	63	24	91	7
<i>Anopheles freeborni</i>	38	22	12	9	6	17.4	2
<i>Coquillettidia perturbans</i>	0	1	8	3	1	2.6	0
<i>Culex erythrothorax</i>	0	0	0	0	0	0	3
<i>Culex pipiens</i>	3381	5080	2381	3529	3842	3642.6	2613
<i>Culex tarsalis</i>	3585	3712	4296	1698	2458	3149.8	7596
<i>Culiseta incidens</i>	140	59	46	29	19	58.6	6
<i>Culiseta inornata</i>	19	197	59	11	29	63	65
Black Fly	27	35	18	6	9	19	28
<b>Total # trapped</b>	<b>7706</b>	<b>9307</b>	<b>7320</b>	<b>5877</b>	<b>7753</b>	<b>7592.6</b>	<b>11265</b>
Total nights trapped	130	125	99	128	130	122.4	117
Average # trapped per night	59.28	74.46	73.94	45.91	59.64	62.644	96.284
Max # trapped on one night	464	1359	893	400	751	773.4	1002
Min # trapped on one night	0	0	0	0	0	0	0



# LARVAL CONTROL

## GENERAL MOSQUITO SOURCES

Controlling mosquito larvae is an essential part of the mosquito control program at the South Salt Lake Valley Mosquito Abatement District. In 2023 surveillance and treatment of the District's general larval mosquito sources were accomplished by two two-person crews, and one additional seasonal employee working individually, and the Assistant Manager/Field Supervisor, with additional support from other staff. More significant sites were assigned to one employee and a multi-person crew, while smaller sites were handled by one technician working individually. The Assistant Manager/Field Supervisor assisted the crews and individual technicians or worked alone as needed. Most large spots were inspected weekly, while smaller sites were checked bi-weekly. Sites were treated when mosquito larvae or pupae were observed.

Inspections, Treatments, and Acres Treated by City			
City	Inspections	Treatments	Acres Treated in 2023
Alta	25	5	.07
Bluffdale	908	163	60.52
Brighton	69	31	97.98
Copperton	27	12	.22
Cottonwood Heights	189	19	2.25
Draper	1422	220	331.52
Herriman	57	2	.02
Holladay	158	7	.47
Kearns	2	0	0
Midvale	96	30	11.44
Millcreek	1099	93	26.32
Murray	815	96	58.74
Riverton	978	134	37.69
Sandy	518	83	19.46
South Jordan	1371	242	224.81
South Salt Lake	532	48	14.61
Taylorsville	931	141	143.56
West Jordan	915	87	31.41
West Valley	1384	213	134.42
White City	33	13	.48
<b>Total</b>	<b>11529</b>	<b>1639</b>	<b>1195.99</b>

## TREE HOLE PROGRAM

In the early nineteen nineties, *Aedes sierrensis* was found in the Salt Lake Valley. This species lays its eggs in water trapped within various tree cavities. Thus, its common name is the Western Tree Hole Mosquito. This mosquito is significant for two reasons. First, *Aedes sierrensis* is a very aggressive biting mosquito that stays near where it hatched, usually near human habitations. Second, it is a vector of *Dirofilaria immitis*, dog heartworm – a disease that can kill dogs if left untreated.

The District uses three methods to control *Aedes sierrensis*. First, tree hole sources in problem areas are found and treated with a slow-release briquet containing Methoprene (a larval growth regulator). These briquets usually last up to 150 days. However, it appears that a single treatment in the small, confined area of a tree hole will last an entire year. The other two methods control adult tree hole mosquitoes in areas where tree hole mosquito sources cannot be found. A yard barrier spray is used in areas where many adult mosquitoes have been found in previous years. The other method of controlling adults is to use an Ultra-Low Volume spray or fog in the yard. This method is used when large quantities of adult mosquitoes have already hatched.

In 2023, tree hole mosquito inspections and treatments were done by the urban crew, who were also tasked to inspect and treat ornamental ponds and horse troughs. Due to a warm and dry Spring, adult tree-hole mosquito numbers were below average. A total of 173 tree hole larval spots were treated with only one 1 containing water and 1 containing mosquito larvae. (tree holes containing water, as well as tree holes with larvae, can vary depending on the time of the summer tree hole treatments were made)

No fogging was done in 2023 for tree hole mosquitoes.

2023 Tree Hole Summary by City			
City	Number Treated	Number Wet	Number with Larvae
Bluffdale	0	0	0
Copperton	6	4	1
Cottonwood	2	0	0
Draper	7	0	0
Holladay	11	2	1
Midvale	0	0	0
Millcreek	1	1	1
Murray	1	0	0
Riverton	0	0	0
Sandy	1	0	0
South Jordan	1	0	0
South Salt Lake	1	2	0
West Valley	2	1	0
Total		1	1

## MOSQUITO FISH

The District has a Memorandum of Agreement with the Division of Wildlife Resources and the Utah Department of Agriculture and Food, allowing the District to raise and distribute mosquito fish (*Gambusia affinis*). This memorandum explains the responsibilities of mosquito abatement districts to ensure responsible and environmentally safe placement of these fish in ornamental ponds found in homeowners' yards.

Each year, the District applies for a Certificate of Registration and submits data to the Division of Wildlife Resources concerning the number of fish raised, sources for obtaining fish, distribution locations, and the number of fish distributed. Also, each year, a fish disease lab in Washington State tests the fish. This testing ensures that the planted fish do not introduce disease into the environment.

In 2023, 595 ponds were stocked with mosquito fish, and 819 ponds were treated with Altosid. There were 217 ponds where mosquito larvae were present.

2023 Fish Distribution by City									
City	Total # of ponds	Total # of ponds delivered fish		# of fish delivered	# of ponds containing larva	Total # of Altosid-treated ponds		Total # of Altosid Briquet	Total # of over-wintered ponds
		1st	2nd			1st	2nd		
Bluffdale	58	1	0	78	3	36	1	28	2
Brighton	1								
Copperton	7	5	0	42	0	0	0	0	0
Cottonwood	158	52	0	345	27	53	4	102	2
Draper	116	26	0	183	15	45	1	58	1
Herriman	33	9	0	72	0	5	0	7	2
Holladay	215	45	0	387	17	70	27	143	4
Kearns	15	5	0	52	0	5	0	5	0
Midvale	45	19	0	160	5	18	4	37	2
Millcreek	160	44	0	299	22	49	12	93	6
Murray	211	61	0	366	30	74	27	122	11
Riverton	68	24	0	198	2	16	1	24	3
Sandy	410	140	0	957	48	139	12	188	13
South Jordan	147	36	1	289	17	41	16	71	2
South Salt Lake	34	19	1	168	1	9	5	33	2
Taylorsville	98	40	0	319	12	43	20	86	3
West Jordan	124	41	2	458	6	36	10	70	3
West Valley City	59	20	1	176	6	23	7	44	7
White City	19	3	0	17	6	5	5	12	3
<b>Total</b>	<b>1978</b>	<b>590</b>	<b>5</b>	<b>4566</b>	<b>217</b>	<b>667</b>	<b>152</b>	<b>1123</b>	<b>66</b>

*Note: Certain ornamental ponds fall into other categories not listed above. Examples: the pond is dry, the pond has running water going through it, the pond is chlorinated by the pond owner.*

## HORSE TROUGHS

One of the treatment programs in the District deals with mosquito larvae found in horse (livestock) watering troughs. Locations of watering troughs are mapped, and assigned employees visit with livestock owners, asking them to dump their watering troughs weekly or allow us to use treatment materials to control the larvae. Each location often has more than one trough.

In 2023, 93 troughs were treated with Altosid, with 4 having larvae present.

2023 Horse Troughs Checked							
City	Total # of Locations	Locations Maintained Weekly	Locations Access Denied	Locations Checked	Locations Treated	# Troughs Treated with Altosid	# Troughs with Larvae
Bluffdale	338	155	8	321	2	3	2
Cottonwood	13	11	1	13	1	1	1
Draper	249	183	9	243	7	8	1
Herriman	122	105	1	109	2	2	0
Holladay	11	6	0	11	1	1	0
Midvale	6	5	3	6	0	0	0
Millcreek	9	2	0	7	0	0	0
Murray	15	11	2	13	1	2	0
Riverton	235	157	7	222	3	21	19
Sandy	125	96	10	123	4	5	1
South Jordan	223	137	13	207	4	9	0
South Salt Lake	2	1	1	2	1	16	0
Taylorsville	24	19	2	21	1	3	0
West Jordan	168	99	7	162	7	16	0
West Valley City	65	49	11	58	4	6	0
White City	6	5	0	6	0	0	0
Total	1,637	1,027	78	367	128	93	4

*Note: Certain watering troughs fall into other categories not listed above. Some examples are troughs may have fish, they may have an automatic watering system, or they may have flowing water.*

## CATCH BASIN PROGRAM

Treatment of catch basins within the South Salt Lake Valley Mosquito Abatement District is undertaken primarily to control the container-breeding mosquito species *Culex pipiens* L. *Cx. pipiens* has been determined to be a competent vector of West Nile virus (see West Nile Virus section, this report), is often the most abundant mosquito in the District (see Surveillance section, Adult subsection, this report), and has been observed inhabiting catch basins during larval and pupal stages.

Control of *Cx. pipiens* (and other species) completing the early stages of their life cycle in catch basins is undertaken by technicians mounted on bicycles. In 2023, technicians were directed to traverse streets in the District that were safe and accessible to bicycles and where catch basins were likely to be located. As catch basins were encountered, technicians visually inspected each for water. The pesticide was applied to catch basins containing water at the time of inspection and to other small water impoundments but not to dry catch basins. As in previous years, each treatment was recorded by technicians using GPS on smartphones.

Total Number of Treatments by City					
City	Catch Basin Treatments	Other Treatments	Total treatments	Times treated	% of Total
Bluffdale	1499	0	3321	1	1.90
Copperton	20	0	24	1	0.03
Cottonwood	2177	58	2416	2	2.84
Draper	9590	117	10385	2	12.33
Herriman	7923	27	8684	2	10.10
Holladay	1146	71	753	1	1.55
Kearns	140	13	204	1	0.19
Midvale	3513	58	4127	2	4.54
Millcreek	2151	157	2522	2	2.93
Murray	4522	99	5737	2	5.87
Riverton	4524	58	7616	2	5.82
Sandy	9975	195	5634	2	12.92
South Jordan	4884	3	11752	1	6.21
South Salt Lake	1835	40	4043	2	2.38
Taylorsville	2518	26	3316	2	3.23
West Jordan	12902	350	11417	2	16.83
West Valley	7744	152	7610	2	10.03
White City	241	7	192	2	0.31
<b>TOTAL</b>	<b>88223</b>	<b>1530</b>	<b>89753</b>	<b>-</b>	<b>100</b>

Catch basins in South Jordan, Holladay and Bluffdale were treated once with Natular XRT, a product designed to be effective for 180 days. The remaining catch basins within each of the mentioned cities and all other cities were treated with Altosid Pellets WSP, Sumilarv WSP or Natular WSP. Because these products are not designed to provide mosquito control for as long as Natular XRT, catch basins were treated multiple times through the season.

## PRODUCTIVITY

Productivity, measured as actions (inspections or treatments) per employee per day, has been monitored since 2016, with more frequent monitoring and feedback provided to employees in 2017 and continuing through the present calendar year. Monitoring these data points daily helps inform management and technicians about the status of mosquito control work in the District, identifies areas needing inspection, and provides a measure of accountability regarding how well the District is meeting inspection goals.

Productivity (actions per employee per day)						
Crew	2018	2019	2020	2021	2022	2023
Catch Basin	245.71	239.84	361.66	368.48	317.77	326.24
Mosquito	20.53	20.06	37.71	34.67	35.31	23.93
Black Fly	15.84	17.25	24.22	18.24	10.99	12.28
Urban Crew	20.03	22.49	29.46	20.95	23.58	17.07

# ADULT CONTROL

Adulticiding (fogging) is essential for our integrated mosquito control program. Adult mosquitoes will always be present during summer since larval control is seldom 100 percent effective. Whenever carbon dioxide trap catches or service requests reach a minimum tolerance level, or an emergency health condition arises, ground or aerial adulticiding may be implemented. This implementation is done using ultra-low volume (ULV) spray equipment. This process forces a low volume of pesticide (between one-half and twelve ounces per acre) through a small opening where it is sheared into tiny droplets. These droplets remain suspended in the air for short periods. If a droplet attaches to the body of a mosquito, it causes death.

Adulticiding is done between sunset and midnight. High mosquito activity, cooler temperatures, and reduced human and non-target species activity justify this time. Adulticiding is done when conditions dictate its use. Because insecticides may drift over large areas and are not specific to mosquitoes, this procedure is used only when other methods cannot be used.

Most fogging is done with a ULV machine mounted in the back of a pick-up truck. This unit treats large areas, such as marshes and wetlands along the Jordan River, and sprays neighborhoods where West Nile virus is detected. The table below shows the city locations where truck fogging was used for adult control in 2023. A handheld ULV machine is sometimes used for smaller areas, like backyards. Treating with the hand foggers mainly targets tree-hole mosquitoes. In 2023 hand-held fogging was not utilized.

2023 Truck Fogging Applications by City and Month							
	April	May	June	July	Aug.	Sept.	Total
Bluffdale	0	0	0	0	0	0	0
Cottonwood	0	0	0	1	1	0	2
Draper	0	0	0	1	1	0	2
Herriman	0	0	0	0	0	0	0
Holladay	0	0	0	0	0	0	0
Midvale	0	0	0	0	1	0	1
Millcreek	0	0	0	0	1	0	1
Murray	0	0	0	0	0	0	0
Riverton	0	0	1	2	0	0	3
Sandy	0	0	0	0	1	0	1
South Jordan	0	0	0	2	0	0	2
South Salt Lake	0	0	0	0	2	0	2
Taylorsville	0	0	0	0	0	0	0
West Jordan	0	0	0	0	3	0	3
West Valley City	0	0	0	4	3	0	7
Total	0	0	1	10	13	0	24



# SERVICE REQUESTS

The District puts a major emphasis on the prompt handling of service requests. Our goal is to investigate each request within 24 hours of the original call. An investigation is considered complete after a solution to the request is determined and the individual making the request is contacted.

2022 Service Requests by City										
City	Feb.	March	April	May	June	July	August	Sept.	Oct.	Total
Alta	0	0	0	0	0	0	0	0	0	0
Bluffdale	0	0	1	2	4	4	6	0	0	17
Brighton	0	0	0	0	0	0	0	0	0	0
Copperton	0	0	0	0	0	0	0	0	0	0
Cottonwood	0	0	1	1	1	2	1	0	0	6
Draper	0	0	0	1		6	1	0	0	8
Herriman	0	0	0	1	1	2	1	0	0	5
Holladay	0	0	2	0	3	3	1	0	0	9
Kearns	0	0	0	0	1	0	0	0	0	1
Midvale	0	0	0	1	1	1	0	0	0	3
Millcreek	0	0	1	1	4	5	2	0	0	13
Murray	0	0	0	1	4	6	0	2	1	14
Riverton	0	0	0	0	8	2	2	0	0	12
Sandy	0	0	2	2	3	6	0	0	0	13
South Jordan	0	0	0	2	6	3	2	1	0	14
South Salt Lake	0	0	0	1	2	2	0	0	0	5
Taylorsville	0	0	0	0	0	3	1	0	0	4
West Jordan	0	0	0	0	4	1	1	0	0	6
West Valley	0	0	1	0	1	1	1	1	0	5
White City	0	0	0	0	0	0	0	0	0	0
Total	0	0	7	13	43	47	19	4	1	134

History of Service Requests by City							
City	2018	2019	2020	2021	2022	5 Year Average	2023
Alta	0	1	0	0	0	0.2	0
Bluffdale	12	12	19	14	7	12.8	17
Brighton	0	0	0	0	0	0	0
Copperton	0	0	1	0	0	0.2	0
Cottonwood	5	4	9	4	1	4.6	5
Draper	7	11	14	5	9	9.2	8
Herriman	2	3	5	3	4	3.4	5
Holladay	11	13	15	9	4	10.4	9
Kearns	0	1	0	0	0	0.2	1
Midvale	2	5	1	3	2	2.6	3
Millcreek	18	13	19	7	2	11.8	13
Murray	8	7	22	11	6	10.8	14
Riverton	6	7	24	4	6	9.4	12
Sandy	7	14	11	3	2	7.4	13
South Jordan	19	21	25	15	9	17.8	14
South Salt Lake	3	2	2	2	2	2.2	5
Taylorsville	4	5	9	1	0	3.8	4
West Jordan	11	12	21	12	6	12.4	6
West Valley City	7	13	10	3	5	7.6	5
White City	0	0	2	0	0	0.4	0
Total	122	144	209	96	65	127.2	134

## ARBOVIRUS ACTIVITY

Mosquito species in the genus *Culex* that occur within the boundaries of the South Salt Lake Valley Mosquito Abatement District are competent vectors of West Nile virus, Western Equine Encephalitis virus, and St. Louis Encephalitis virus. Western Equine Encephalitis and St. Louis Encephalitis have not been observed in the District in recent years, but, as displayed in the tables below, West Nile virus has been detected in the District and in other areas of the state several times since its introduction in 2003.

Mosquitoes may acquire West Nile virus from infected birds through blood feeding and can transfer the virus to birds or other animals at subsequent blood meals. In addition to birds, horses and humans are susceptible to West Nile virus, thus surveillance for the virus may include laboratory testing of birds, horses, humans, or pools of mosquito specimens. Mosquito pools consist of a group (usually 10-50) of adult female mosquitoes of a single species from a single trapping event (one trap at one location for one night).

2023 West Nile Virus Activity						
Types of Surveillance	South Salt Lake Valley Mosquito Abatement	District as % of the County	District as % of the State	Salt Lake County	County as % of the State	State of Utah
Humans	1	100%	14%	1	14%	7
Animals	0	0%	0%	0	0%	16
Mosquito Pools	46	45%	15%	102	34%	300

State History of West Nile Virus Activity							
	2018	2019	2020	2021	2022	5 Year	2023
Human	11	21	5	28	5	14	7
Animals	5	9	3	12	7	7.2	16
Mosquito Pools	180	272	44	654	144	258.8	300
Counties with Activity	10	15	8	11	8	10.4	15

At the South Salt Lake Valley Mosquito Abatement District, *Culex* mosquitoes observed in surveillance traps are pooled and tested for West Nile virus, Western Equine Encephalitis virus, and St. Louis Encephalitis virus using polymerase chain reaction tests conducted in the District laboratory. A summary of these tests is presented in the following tables.

SSLVMAD West Nile Virus Testing Summary							
	2018	2019	2020	2021	2022	5 year average	2023
Mosquitoes tested	43,460	42,076	44,622	38,880	45,780	42,963.60	59,659
Pools tested	824	809	1145	1101	1243	1024.4	1515
Positive pools	34	18	7	49	36	28.8	46
Percent positive	4.13%	2.22%	0.61%	4.45%	2.90%	2.86%	3.04%

2023 Pools Positive for West Nile Virus by Date				
Location	Date Trapped	Trap Type	Mosquito species	# of mosquitoes
Stonebridge	7/26	CO <sub>2</sub>	<i>Culex pipiens</i>	50
Sandy Senior Center	8/3	CO <sub>2</sub>	<i>Culex pipiens</i>	19
Bird's	8/8	CO <sub>2</sub>	<i>Culex pipiens</i>	33
Springview Farms	8/8	CO <sub>2</sub>	<i>Culex pipiens</i>	50
Central Valley Golf	8/8	CO <sub>2</sub>	<i>Culex pipiens</i>	50
Murray Cemetery	8/10	BGSENT	<i>Culex tarsalis</i>	50
Fur breeder's	8/10	CO <sub>2</sub>	<i>Culex tarsalis</i>	50
Fur breeder's	8/10	CO <sub>2</sub>	<i>Culex tarsalis</i>	50
Creek Road	8/10	CO <sub>2</sub>	<i>Culex pipiens</i>	48
Stonebridge	8/15	CO <sub>2</sub>	<i>Culex tarsalis</i>	50
Bird's	8/15	CO <sub>2</sub>	<i>Culex tarsalis</i>	50
Riverton Fire Station	8/15	GRVD	<i>Culex pipiens</i>	10
Creek Road	8/17	CO <sub>2</sub>	<i>Culex tarsalis</i>	50
Creek Road	8/17	CO <sub>2</sub>	<i>Culex tarsalis</i>	50
Spa Walk	8/17	CO <sub>2</sub>	<i>Culex pipiens</i>	49
Gardner Village	8/17	CO <sub>2</sub>	<i>Culex pipiens</i>	50
Gardner Village	8/17	CO <sub>2</sub>	<i>Culex pipiens</i>	50
Gardner Village	8/17	CO <sub>2</sub>	<i>Culex pipiens</i>	48
Mountain View	8/17	CO <sub>2</sub>	<i>Culex pipiens</i>	50
Mountain View	8/17	CO <sub>2</sub>	<i>Culex pipiens</i>	50
Mountain View	8/17	CO <sub>2</sub>	<i>Culex pipiens</i>	39
Mountain View	8/17	CO <sub>2</sub>	<i>Culex tarsalis</i>	50
Central Valley Golf	8/22	CO <sub>2</sub>	<i>Culex pipiens</i>	50
Sycamore	8/22	CO <sub>2</sub>	<i>Culex pipiens</i>	50
Bird's	8/22	CO <sub>2</sub>	<i>Culex pipiens</i>	50
Bird's	8/22	CO <sub>2</sub>	<i>Culex pipiens</i>	32
Bird's	8/29	CO <sub>2</sub>	<i>Culex pipiens</i>	50
Race Track	8/29	CO <sub>2</sub>	<i>Culex pipiens</i>	31
Central Valley Golf	8/29	CO <sub>2</sub>	<i>Culex pipiens</i>	50
Central Valley Golf	8/29	CO <sub>2</sub>	<i>Culex pipiens</i>	50
Taylorville City Hall	8/29	GRVD	<i>Culex pipiens</i>	12
West Valley Utility Building	8/29	GRVD	<i>Culex pipiens</i>	37

2023 Pools Positive for West Nile Virus by Date (continued)				
Location	Date Trapped	Trap Type	Mosquito species	# of mosquitoes
Sandy Senior Center	8/31	CO <sub>2</sub>	<i>Culex pipiens</i>	23
Central Valley Golf	9/6	CO <sub>2</sub>	<i>Culex pipiens</i>	50
Central Valley Golf	9/6	CO <sub>2</sub>	<i>Culex pipiens</i>	50
Central Valley Golf	9/6	CO <sub>2</sub>	<i>Culex pipiens</i>	50
Stonebridge	9/6	CO <sub>2</sub>	<i>Culex tarsalis</i>	50
Hunter Woods	9/6	CO <sub>2</sub>	<i>Culex pipiens</i>	20
Herriman Library	9/6	GRVD	<i>Culex pipiens</i>	11
West Jordan City Hall	9/8	GRVD	<i>Culex pipiens</i>	10
Stonebridge	9/12	CO <sub>2</sub>	<i>Culex tarsalis</i>	50
Central Valley Golf	9/12	CO <sub>2</sub>	<i>Culex pipiens</i>	50
Bird's	9/12	CO <sub>2</sub>	<i>Culex pipiens</i>	50
Sego Lily Gardens	9/14	GRVD	<i>Culex pipiens</i>	11
Truckers North	9/19	BGSENT	<i>Culex pipiens</i>	17
West Valley Utility Building	9/19	GRVD	<i>Culex pipiens</i>	35

# BLACK FLY REPORT

The Black Fly Crew is responsible for the inspection and treatment, when needed, of about 210 miles of rivers, canals, streams, and ditches. Inspection and treatment occur at 190 monitoring locations in the District.

A total of 31 treatments were made in 2023 using about 77.5 gallons of Vectobac 12AS at the cost of \$34.37 per gallon. The total cost for Black Fly treatments this season was about \$1,233.88. (The cost of VectoBac 12AS has increased. However, pesticide purchased in and left over from a previous season was used in 2023.)

In response to post-treatment inspections still positive for black fly larvae, the pesticide application rate was increased to the maximum allowed by the label in 2020 and continued at that rate in 2023. In an attempt to further improve efficacy, the duration of treatment was increased from 1 minute to 10 minutes in 2022 and continued in 2023. Technicians had previously reported that post-treatment inspections confirmed improved efficacy when treatments were applied for the longer 10-minute duration.

Less black fly work was accomplished in 2023 than in some of the previous years as crew members assigned that task were at times also assigned additional tasks that took precedence over black fly inspections and treatments.

Black Fly Treatment							
	2018	2019	2020	2021	2022	5 Year Average (3 year Average on Surveillance Data including Canyon Traps)	2023
Number of Spots Treated	144	156	380	53	31	152.8	52
Gallons of Pesticide Used	55	115	255.3	29.41	35.9	92.67	77.5
Total Cost of Pesticide	\$1,890	\$3,953	\$8,777	\$1,011	\$1,233.88	\$3,372.98	\$2,663.68
Black Flies In Surveillance Traps Excluding Canyon Traps	192	222	309	117	239	215.8	239
Black Flies In Surveillance Traps Including Canyon Traps*	-	-	447	394	479	440	2100

\*In 2023, surveillance data was amended to include Black Flies caught in Canyon Traps (Brighton, Solitude, Alta, and Snowbird CO<sub>2</sub>-baited traps). A 3-year average was calculated for accurate data analysis, coinciding with the initial data and trapping of Black Flies in Canyon Traps, which started in 2020. Please note that no control measures were taken for Black Flies in Big or Little Cottonwood Canyon and that surveillance data is included for informational purposes only.

# EDUCATION PROGRAM

Following the District's Pesticide Discharge Management Plan (PDMP), the District operates under the Integrated Pest Management (IPM) model. One of the control measures utilized under the IPM model is educational control, which the District applies by maintaining a robust education program.

The District education program in 2023 was focused on two primary areas: educational materials and information provided to the general public and employee training. In both focus areas, broad objectives included providing information to promote the public and District employees' health, safety, and welfare.

Educational material provided to the general public covered various mosquito-related topics, including life cycle and biology, source recognition and reduction, disease transmission, and bite prevention. Additionally, information was presented about the purpose of the District and the services provided.

In 2023, the District provided educational material to approximately 6,000 elementary school students. Staff delivered 51 in-class presentations, each approximately one hour in duration, in 31 schools to approximately 1,800 students. With changes in the administration of the District, a partial hold on the program was instituted at the end of 2023. Plans to continue the elementary school program in 2024 are in place.

In 2023, the District continued a program aiming to provide educational material to people over the age of 55 (chosen because of the increased danger West Nile virus poses to the age group). The District provided educational material to approximately 800 individuals over 55, distributed at Salt Lake County Active Aging Senior Centers.

In 2023 training was provided for 19 seasonal employees before fieldwork commenced. New utilization of technology allowed the employees to complete their safety-related training online. This training was designed to enable seasonal employees to safely, efficiently, and effectively perform tasks associated with their hired position. The online training included an emphasis on the District Safety Manual, Employee Handbook, Pesticide Discharge Management Plan, proper use of specific pesticides, specific training for each seasonal position, general characteristics of good employees, and mosquito-borne diseases. This instruction was intended to benefit and protect seasonal employees and provide practical information regarding interactions with the general public. Online training for dog bite prevention, safe driving, avoiding distracted driving, sun/heat protection, personal protective equipment, vehicle backing, and public relation were also completed. Per the District Respiratory Protection Program, respiratory protection training was provided for all employees required to wear respirators.

# EFFICACY

Investigations into the efficacy of mosquito control products and procedures were conducted in both laboratory and field conditions in an attempt to ensure that desired mosquito control was being achieved, and to identify any resistance to mosquito control products in the mosquito population. A summary of these investigations is presented below.

## ADULTICIDES

### Laboratory Trials

The susceptibility of mosquitoes to permethrin, the active ingredient in the mosquito adulticide used by the District in 2023 was assessed in the laboratory using bottle bioassay methods and reagents from the Centers for Disease Control and Prevention (CDC). Results are displayed in the table below. Guidelines from CDC indicate that mortality less than 90% at the diagnostic time suggests the development of resistance in the mosquito population. By that measure, resistance was detected in each bioassay conducted in 2023. Though low mortality among *Culex pipiens* mosquitoes collected from Gardner Village was observed at the diagnostic time, mortality appeared to increase by the end of the test. Twenty-four hours later, however, mortality decreased, suggesting the presence of knockdown resistance by which mosquitoes can recover from initial effects of exposure to pesticide. Though laboratory bioassays alone may not fully predict efficacy from field applications, resistance appears to be present among *Culex* mosquitoes in the District and should continue to be monitored.

Date	Trap location	Collection stage	Mortality*			Species composition		
			Diagnostic time	End of test	24 Hours	<i>Culex tarsalis</i>	<i>Culex pipiens</i>	Other
7/13	Fur Breeders	Adults	6.25%	31.25%	NA	83%	12%	5%
7/20	Race Track	Adults	15.20%	24.86%	27.59%	46%	52%	2%
8/4	Gardner Village	Eggs	2.15%	31.79%	NA	100%	0%	0%
8/14	Gardner Village	Eggs	9.71%	91.89%	39.98%	0%	100%	0%

\* Corrected using Abbott's formula to account for mortality attributable to causes other than pesticide as observed in untreated control bottles

## LARVICIDES

### Laboratory Trials

Larval bioassays were conducted following a protocol recommended by the Pacific Southwest Center of Excellence in Vector-borne Diseases (PacVec 2019) to determine baseline values of efficacy for several mosquito larvicides. Some informative comparisons can be made based on the data collected, but additional value is expected as deviations from observations this year may be observed in future years.

Mosquito larvae reared from egg rafts collected from surveillance trap locations specified in the table below were introduced into 100 ml of distilled water treated with a known concentration of mosquito larvicide. Mortality was assessed 24 or 48 hours later for mosquitoes exposed to products containing *Bacillus thuringiensis* subspecies *israelensis* (Bti) or

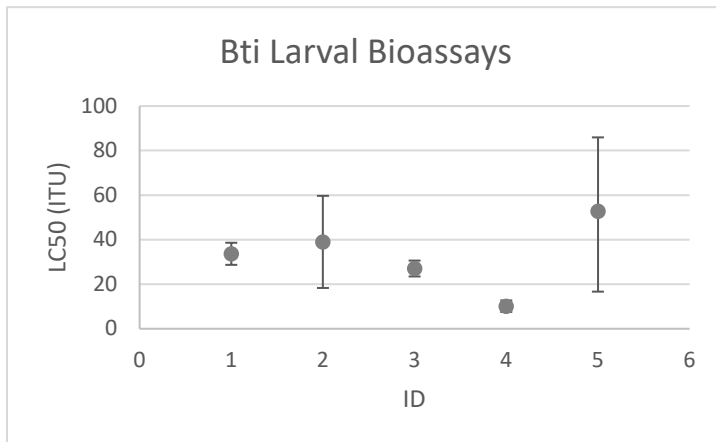


Spinosad. To assess efficacy of insect growth regulators pyriproxyfen and Methoprene, mortality was assessed after all mosquitoes had died or successfully emerged as adults. Each bioassay included 3 replicates of each concentration of pesticide and 3 untreated control replicates. Mortality in untreated control replicates was used to adjust mortality values in treated replicates using Abbott's formula (PacVec 2019b). Corrected values were used to determine the concentration of the larvicidal material lethal to 50% of test organisms (LC50). Data were analyzed using the R language and environment for statistical computing (R Core Team 2022) and a function to estimate lethal concentrations suggested by Pacheco and Rebelo (2013).

Larval Bioassays						
ID	Location	Species	Product	Active Ingredient	LC50 (95% confidence interval)	units
1	Gardner Village	<i>Cx. pipiens</i>	VectoBac 12AS	Bti	0.26 (0.23 - 0.30)	ppm product
2	Gardner Village	<i>Cx. pipiens</i>	VectoBac WDG	Bti	0.11 (0.07 - 0.14)	ppm product
3	SSLVMAD	<i>Cx. pipiens</i>	VectoBac 12AS	Bti	0.21 (0.18 - 0.24)	ppm product
4	SSLVMAD	<i>Cx. pipiens</i>	VectoBac WDG	Bti	0.04 (0.04 - 0.05)	ppm product
5	Gardner Village	<i>Cs. inornata</i>	VectoBac WDG	Bti	0.13 (0.09 - 0.17)	ppm product
6	Sumner	<i>Cs. incidens</i>	Altosid	Methoprene	0.14 (0.01 - 0.28)	ppb AI
7	Gardner Village	<i>Cx. tarsalis</i>	Altosid	Methoprene	2.50 (1.23 - 3.76)	ppb AI
8	Gardner Village	<i>Cx. pipiens</i>	Altosid	Methoprene	13.82 (8.54 - 19.11)	ppb AI
9	Truckers North	<i>Cx. pipiens</i>	Altosid	Methoprene	5.97 (3.24 - 8.71)	ppb AI
10	Sumner	<i>Cx. pipiens</i>	Altosid	Methoprene	12.41 (8.58 - 16.23)	ppb AI
11	SSLVMAD	<i>Cx. pipiens</i>	Altosid	Methoprene	10.43 (7.10 - 13.75)	ppb AI
12	Gardner Village	<i>Cx. pipiens</i>	Sumilarv	Pyriproxyfen	0.21 (0.15 - 0.26)	ppb AI
13	SSLVMAD	<i>Cx. pipiens</i>	Sumilarv	Pyriproxyfen	0.93 (0.49 - 1.37)	ppb AI
14	Gardner Village	<i>Cs. inornata</i>	Natular G30	Spinosad	0.83 (0.69 - 0.97)	ppm product
15	SSLVMAD	<i>Cx. pipiens</i>	Natular G30	Spinosad	0.90 (0.76 - 1.03)	ppm product

Larval mosquito control products containing Bti have been used for years at SSLVMAD. Despite widespread use, resistance to Bti has not been documented elsewhere (EPA 2023) and was not expected or observed here. Comparisons among bioassays including the active ingredient Bti may be more useful when LC50 values are converted to the estimated number of international toxic units (ITU) as product labels for VectoBac 12AS and VectoBac WDG indicate there is no direct relationship between intended activity (potency) and the percent active Ingredient (Valent BioSciences Corporation 2012, Valent BioSciences Corporation. 2017).

Bti Larval Bioassays						
ID	Location	Species	Product	Active Ingredient	LC50 (95% confidence interval)	units
1	Gardner Village	<i>Cx. pipiens</i>	VectoBac 12AS	Bti	33.65 (28.69-38.61)	ITU
2	Gardner Village	<i>Cx. pipiens</i>	VectoBac WDG	Bti	39.00 (18.31-59.68)	ITU
3	SSLVMAD	<i>Cx. pipiens</i>	VectoBac 12AS	Bti	27.04 (23.47-30.60)	ITU
4	SSLVMAD	<i>Cx. pipiens</i>	VectoBac WDG	Bti	10.12 ( 7.54-12.71)	ITU
5	Gardner Village	<i>Cs. inornata</i>	VectoBac WDG	Bti	52.79 (16.66-85.93)	ITU



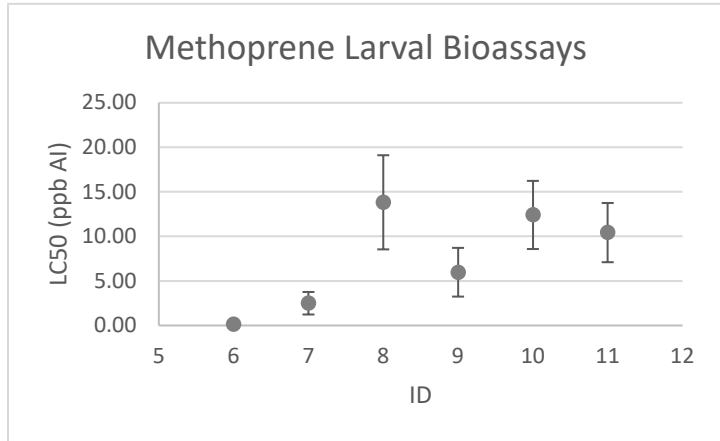
Though some variation in LC50 was observed among larval bioassays conducted using Bti, with the possible exception of a low LC50 from the *Cx. pipiens* population collected at SSLVMAD, any differences in response to Bti among the populations, products, or species tested do not seem to be significant. The lack of significant difference between Bti products tested is informative as it suggests similar efficacy despite the specific lot of VectoBac 12AS tested

being much older than the VectoBac WDG.

Bioassays using products containing the insect growth regulators Methoprene and pyriproxyfen were complicated by the requirement that mosquitoes be supported sufficiently to allow for survival and successful metamorphosis to adults unless inhibited by the pesticide. Greater mortality among untreated control replicates can be expected in such bioassays (PacVec 2019b) and was observed here ranging from 11% to 73% with an average mortality of 39%. Though mortality in treated replicates was corrected for mortality observed in untreated control replicates using Abbott's formula, the results are not as robust as desired and should be interpreted with caution.

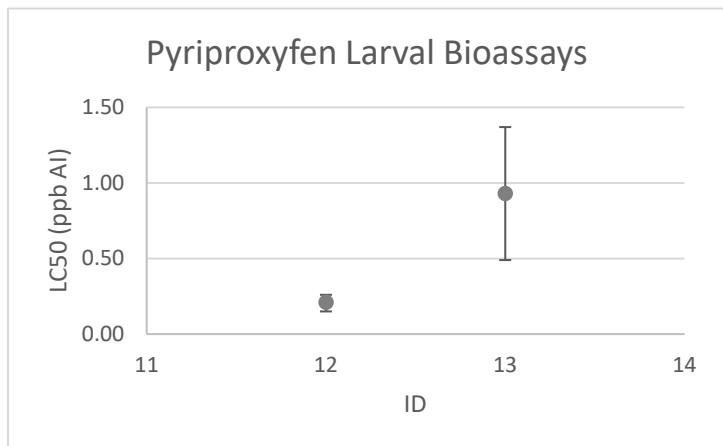
Methoprene has been used extensively at SSLVMAD to control mosquitoes developing in ornamental ponds, livestock watering troughs, and catch basins. Currently, *Culex pipiens* is the most frequently observed mosquito species in such habitat at SSLVMAD and was emphasized in the bioassays conducted. However, other species can inhabit containers and Methoprene has at times been used to treat non-container habitat where still other mosquito species could be expected. Thus, bioassays were also conducted using *Culiseta incidens* and *Cx. tarsalis* larvae.

Results suggest that the *Cs. incidens* and *Cx. tarsalis* populations may be more susceptible than the *Cx. pipiens* populations. Among populations of *Cx. pipiens*, that from the Truckers North surveillance location may be the most susceptible. That location has also likely had the least pressure from Methoprene products while historical use of Methoprene was greater at the Sumner and Gardner Village locations.

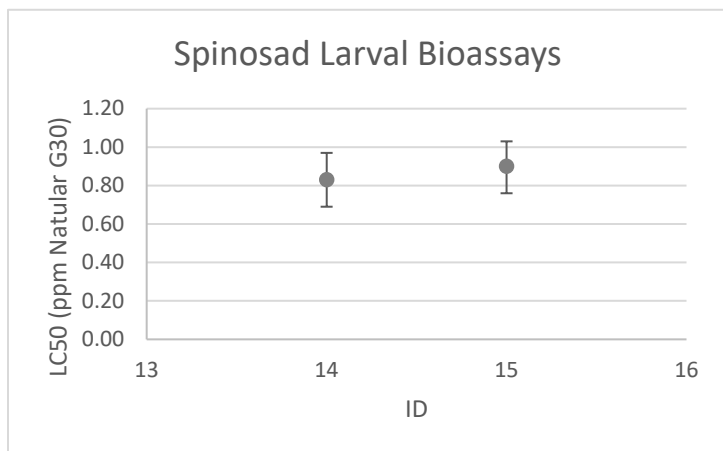


Though limited by high mortality in untreated controls, imprecise correlation with historical larvicide treatments, etc., these results suggest a potential difference in the level of susceptibility to Methoprene among *Cx. pipiens* populations that could benefit from further research and potential adjustment to treatment protocol to reduce development of resistance.

Sumilarv® 0.5G Sachets (WSP), with the active ingredient pyriproxyfen has not previously been used at SSLVMAD but was applied to catch basins in 2023 and included in two larval bioassays using *Cx. pipiens*, a mosquito species known to develop in catch basins within the District. Results of bioassays suggest that susceptibility may differ across the District, but additional research would be required to better define any differences.



Natular products with the active ingredient Spinosad have been used at SSLVMAD in some form most years since at least 2011 and have been applied in catch basins as well as non-container larval mosquito habitat. Two bioassays were conducted using Spinosad to establish baseline levels of susceptibility in *Cx. pipiens* and *Cs. inornata*. Subsequent tests could reveal deviations from observed results or patterns of resistance/susceptibility across the District.



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## Pyriproxyfen rate field trial

### Introduction

This report details a field trial of Sumilarv® 0.5G Sachets (WSP) (MGK, Minneapolis, MN), a mosquito control product new to use at SSLVMAD. Pyriproxyfen, the active ingredient in Sumilarv mosquito control products, is an insect growth regulator intended to inhibit emergence of adult mosquitoes by preventing development of larvae into normal pupae (MGK 2020). The product label for Sumilarv 0.5G (WSP) indicates that an application rate of 75 grams, or three sachets may provide effective mosquito control in stormwater catch basins for up to 6 weeks (MGK 2020). A lower application rate would be less expensive and would reduce the chemical introduction into the environment. If still effective at controlling mosquitoes, a lower application rate could potentially help SSLVMAD fulfil the mission of minimizing mosquito nuisance and disease while prioritizing ecological stewardship and cost efficiency. This trial was intended to examine the efficacy and duration of mosquito control following application of the product at three different rates, and thereby help inform decisions

about application rate selection and retreatment intervals.

## Materials and Methods

### Study site

Forty catch basins treated in June 2022 bounded by 4700 South, 5400 South, 3200 West, and Bangerter Highway and forty basins bounded by 6200 South, 2700 West, 3200 West, and approximately 6600 South were selected for inclusion in the trial. Treatment protocol for 2022 specified that all catch basins observed to hold standing water were treated while basins that were dry or otherwise provided unsuitable larval mosquito habitat were left untreated (Hougaard and Price 2022), thus catch basins treated in June 2022 provided the best available list of potentially suitable basins for inclusion in this trial.

### Treatment

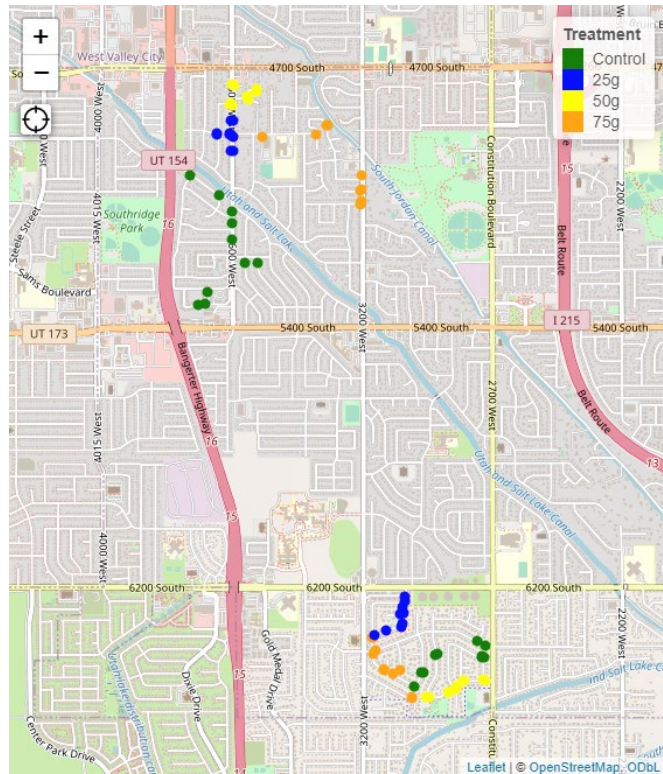
At each site, four clusters of 10 basins were identified then assigned randomly to one of 4 treatment groups: 25g, 50g, 75g, and untreated control. Sumilarv® 0.5G Sachets (WSP) was applied on June 19<sup>th</sup> at the north site and June 21<sup>st</sup> at the south site.

### Biological material

To obtain mosquito larvae for use in the trial, egg rafts were collected twice weekly from ovitraps deployed at a site in West Jordan (Gardner Village, 40.61, -111.926). Egg rafts were returned to the SSLVMAD laboratory and were placed in larval flats (large plastic clip boxes, Sterilite, Townsend, MA) containing one liter of distilled water with 0.2 g Skretting Starter Crumble fish food (Skretting, Tooele, UT). Larval flats were held at a temperature between 26° C and 28° C and photoperiod of 12 hours light, 12 hours dark and provided with an additional 0.2 g of fish food daily for one week (Kauffman et al. 2017).

### Monitoring efficacy

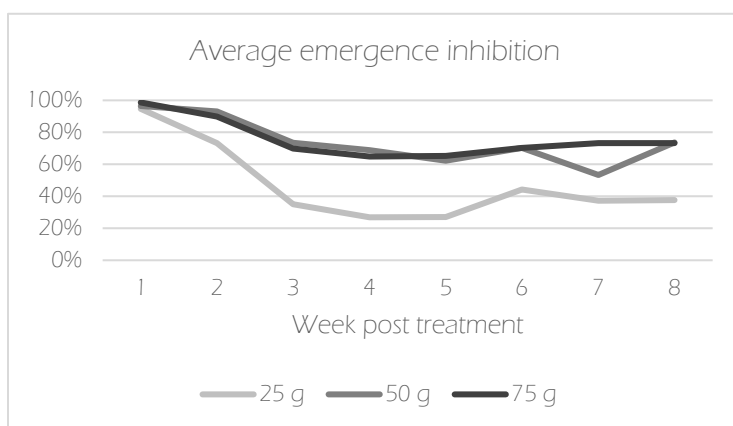
Because Sumilarv® 0.5G Sachets (WSP) does not directly kill mosquito larvae, recommendations to assess efficacy include monitoring treated habitat for adult mosquito emergence (MGK 2019). Similar to approaches to conducting larval mosquito bioassays recommended by the World Health Organization (WHO 2005) and the Pacific Southwest Center of Excellence in Vector-borne Diseases (PacVec 2019), efficacy was assessed by introducing 4<sup>th</sup> instar *Culex pipiens* larvae into samples returned to the SSLVMAD laboratory from each basin in the trial. Because pyriproxyfen has been observed to degrade rapidly in unamended water yet remain effective against mosquitoes in water amended with organic matter or sediment (Ohashi 2017), samples included 100 ml of water as well as sediment or



organic matter retrieved from catch basins using Whirl-Pak Write-On Bags (Nasco Education, Fort Atkinson, WI) attached to modified aquarium net frames and lowered into basins by use of an extendable aluminum rod. In the laboratory, samples were transferred to foam cups (Dart, Mason, MI) and between 5 and 15 4<sup>th</sup> instar *Culex pipiens* mosquito larvae were added to each sample. A small amount of Skretting Starter Crumble fish food was added to each sample to sustain the larvae to pupation. Foam cups were covered with 6-ounce plastic cups to contain any emerging adult mosquitoes and held at a temperature between 26° C and 28° C and photoperiod of 12 hours light, 12 hours dark until all larvae had died or successfully emerged as adults. Emergence inhibition (EI) was calculated using the formula  $EI(\%) = \left(\frac{C-T}{C}\right) * 100$ , where C is the percentage of emerging mosquitoes from control basins and T is the percentage of emerging mosquitoes from treated basins (MGK 2019).

## Results

Average emergence inhibition in samples taken from basins treated with 25 g of Sumilarv was 47% across the study period, beginning high at 95% one week after treatment and dropping to 38% eight weeks later. Average emergence inhibition in samples taken from basins treated with 50 g of Sumilarv was 74%, ranging from 96% one week after treatment through a low of 53% and ending at 74% eight weeks post treatment. In samples taken from basins treated with 75 g of Sumilarv, average emergence inhibition across the study period was 76%, ranging from 99% one week after treatment through a low of 65% and ending at 73% eight weeks post treatment.



Emergence inhibition by treatment and week post application								
Treatment	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
25 g	95%	73%	35%	27%	27%	44%	37%	38%
50 g	96%	93%	73%	69%	62%	70%	53%	74%
75 g	99%	90%	70%	65%	65%	70%	73%	73%

## Discussion

Results suggest similar mosquito control in basins treated with 50 grams or 75 grams of Sumilarv for 8 weeks. Both higher rates seem to have outperformed the 25-gram application rate. Questions remain as to how emergence inhibition observed in the laboratory may correlate with emergence inhibition that could be expected in a field setting, and whether differences in emergence inhibition may be observed between application rates beyond 8 weeks. Nevertheless, the results suggest that catch basin treatments using 50 g of Sumilarv may be as effective as treatments using 75 grams for at least 8 weeks. Thus, a recommendation to treat basins with two rather than three Sumilarv® 0.5G Sachets (WSP) may reduce cost and chemical introduction into the environment while still controlling

mosquitoes.

## References

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## APPENDIX A: PESTICIDE INFORMATION

2023 Pesticide Use				
Larvicides	Amount used	Units	Unit Price (\$)	Total Price (\$)
Agnique	1.5	Gallons	41.71	62.55
Altosid Briquets (30 Day)	0	Briquets	1.30	0
Altosid XR Briquets (150 Day)	2113	Briquets	4.00	8,452.00
Altosid WSP	41889	Packets	1.04	43,564.56
Altosid P35	385	Pounds	18.72	7,207.20
Natular G30	480.5	Pounds	16.75	8,048.38
Natular G30 WSP	12360	Packets	.98	12,112.80
Natular G	155	Pounds	7.03	90.30
Natular XRT	6826	Tablets	4.44	30,307.44
Natular DT	0	Tablets	.56	0
Sumilarv	26984	Packets	1.70	45,872.80
Vectobac 12 AS	77.5	Gallons	40.10	3,107.75
Vectobac GS	3560	Pounds	2.58	9,184.80
Vectobac GR	140	Pounds	2.78	389.20
Vectomax FG	835	Pounds	9.27	7,740.45
Vectobar WDG	4	Pounds	40.58	161.00
Cocobear MLO/BVA Oil	24	Gallons	27.74	665.76
BVA 2 Oil	75	Gallns	24.00	1800.00
Adulticide				0
Kontrol 4-4	55	Gallons	17.48	1096.70
Total				183,984.91



# APPENDIX B: DISTRICT POPULATION & SIZE

2023 Population and Areas		
Region	Population	Size (square miles)
State of Utah	3,380,800	82,376.85
Salt Lake County	1,185,236	742.07
District	927,755	561
Alta	218	4.1
Bluffdale	19,080	11.14
Brighton	320	15.8
Copperton	1,042	0.32
Cottonwood Heights	32,420	9.23
Draper	50,731	29.95
Herriman	59,179	21.63
Holladay	30,816	8.5
Kearns	37,249	4.63
Midvale	35,637	5.91
Millcreek	63,034	12.77
Murray	49,463	12.32
Riverton	44,599	12.58
Sandy	93,022	24.15
South Jordan	83,513	22.19
South Salt Lake	26,003	6.94
Taylorsville	57,879	10.85
West Jordan	116,664	32.33
West Valley City	136,650	35.83
White City	5,598	0.87
Unincorporated	11,454	296.4

(All populations are approximate)

U.S. Census Bureau QuickFacts: <https://www.census.gov/quickfacts/fact/table/>

World Population Review: <https://worldpopulationreview.com/us-cities/>

Census Reporter: <https://censusreporter.org/profiles/>

Greater Salt Lake Municipal Services District: <https://www.msd.utah.gov/>