

# MOSQUITO LARVAE MONITORING AND CONTROL – MADISON METRO AREA

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Prepared by Jeffery S. Lafferty, Environmental Epidemiologist

## Summary

The primary purpose of the mosquito monitoring and control activities of Public Health Madison and Dane County (PHMDC) is to understand and minimize the risk of West Nile Virus (WNV) infection in humans. In 2021, the percentage of sites producing high number of *Culex spp.* displayed a slightly elevated level of activity compared to levels reported in 2020. Important program findings include:

## Monitoring

- WNV vectors are present in the metropolitan area and create a potential WNV infection risk for humans in the area.
- Sixty-one (9.0%) of the water sources monitored for mosquito larvae produced high numbers of *Culex* larvae during the 2021 monitoring season.
- In the last 10 years (2012 – 2021), a total of 185 sites have produced high numbers of *Culex* larvae at least once.

- Thirty-seven (20.0%) of these sites produced high numbers of *Culex spp.* larvae in four or more of the past ten years; five of these sites (site nos. 243, 247, 465, 556 and 3922) have demonstrated high *Culex spp.* activity each year of this 10 year timeframe. Thirty-one of these 37 sites (83.8%) also reported high number of *Culex spp.* larvae in 2021.
- Ditches accounted for 65.6% of sites that produced high numbers of *Culex* larvae in 2021. The remaining problem sites were reported in retention/ detention ponds. The previous monitoring season also reported *Culex* activity in rain gardens and creeks but that was not observed in the current season.
- Larvicide treatment successfully reduced high numbers of *Culex* larvae in all treated sites. More work is needed to identify more permanent source reduction measures for areas that continually produce high numbers of mosquito larvae.
- Water sources on private property, especially small containers, likely exist and provide suitable breeding habitat for mosquitoes that may carry WNV. The identification and elimination of these sites continues to be an important component in the effort of minimizing WNV infection risks.

## Introduction

In 2021, PHMDC continued its partnership with the City of Middleton, City of Monona, City of Sun Prairie, Town of Madison, and University of Wisconsin to monitor and control the breeding activity of targeted mosquito species on public property. The primary targeted mosquito species of this annual surveillance is the *Culex* mosquito species due to its identification as the principal vector for human transmission of WNV and has accounted for the vast majority of WNV infected mosquitoes captured throughout the country. If present, other mosquito species that are potential vectors for WNV are also monitored; in Dane County, this primarily includes the *Aedes* mosquito species. Mosquito larvae sampling was performed by PHMDC staff from approximately late May through September to identify water sources producing large numbers of mosquito larvae. In 2021, the end of the mosquito season did not come until October when the area received its first frost/freeze. Larvicide applications were made as needed in water sources found to produce high levels of target mosquito larvae.

This report summarizes the results of mosquito monitoring and treatment in the metropolitan area. Maps of sampled areas and site-specific mosquito larvae surveillance results are provided in the results and discussion section of the current report. Some water sources in the metropolitan area were not monitored or treated because they were deemed inaccessible to PHMDC staff. Accessibility is determined based on several factors including land ownership, safety, and physical barriers.

## Methods

At each surface water source, PHMDC staff sampled for mosquito larvae along the water's edge by quickly skimming the surface of the water with a dipper (plastic cup on a pole). Samples at each location consisted of a composite of one to ten dips. The number of dips depended on the size of the water source and the number of larvae present. Larvae activity for each sample was measured as the number of larvae per dip. When three or more *Culex* larvae are found per dip, the site is treated with larvicide or other action is taken to reduce the number of mosquito larvae. Most mosquito monitoring is performed at surface water sources. On occasion, catch basins are sampled when there is additional concern in a given area. The table below lists the number of sites by community with high concentrations of *Culex* or *Aedes* larvae; all other sites tested reported either low concentrations of larvae or no larvae noted.

## Results and Discussion

### Mosquito larvae in surface water

During the summer of 2021, department staff made 2,199 inspections of 675 accessible sites in order to evaluate and treat, as necessary, *Culex* and *Aedes* populations at selected sites in the metro area. Approximately 30% of the 966 potential inspection sites in the metro area were not accessible for monitoring of mosquito activity due to ownership, safety, and/or physical or environmental barriers of the property.

The bulk of the inspections of accessible sites were conducted at ditches and detention/ retention ponds (48.3% and 39.7% respectively); however, other sites evaluated included, but not limited to, creeks, marshes, rivers, rain gardens, and flooded areas. In the metro area, 9.0% of all inspected sites produced high numbers of *Culex* larvae at least once during 2021 (Table 1); approximately 4.6% of the sites produced high numbers of *Aedes* larvae. The *Culex* mosquito activity reported during the current monitoring season slightly elevated compared to the 2020 season that reported 6.1% of sites produced high numbers of *Culex* and 2.7% reported elevated *Aedes* larvae activity. Despite the slight elevation *Culex* and *Aedes* activity in the current inspection season, this activity can be explained by seasonal variation and not an actual change in risk of exposure to mosquito-borne disease in Dane County.

Table 1. Summary results of 2021 mosquito larvae inspections of accessible sources in the Madison metropolitan area.

	City of Madison	Village of Maple Bluff	City of Middleton	City of Monona	Village of Shorewood Hills	City of Sun Prairie	Town of Madison	UW Madison	Total Metro Area
High <i>Culex</i>	46	1	3	0	0	10	0	1	61
High <i>Aedes</i>	20	0	1	1	0	5	4	0	31
# of inspected sites	416	3	72	22	1	115	14	29	675*
% High <i>Culex</i>	11%	33%	4.2%	0.0%	0.0%	8.7%	0.0%	3.4%	9.0%
% High <i>Aedes</i>	4.8%	0.0%	1.4%	4.5%	0.0%	4.3%	28.6%	0.0%	4.6%

\* Three additional sites were inspected in the Town of Burke included in total. No *Culex* or *Aedes* larvae were detected at these sites.

At the community level, the City of Madison reported approximately 11.0% of the 416 inspected sites demonstrated high numbers of *Culex* larvae. Other communities in the metro area that reported *Culex* activity included the University of Wisconsin-Madison campus and arboretum (3.4%), the Village of Maple Bluff (33.3%) and the Cities of Middleton (4.2%) and Sun Prairie (8.7%). High concentrations of *Aedes* larvae were reported in the Cities of Madison (4.8%), Middleton (1.4%), Monona (4.5%), and Sun Prairie (4.3%) and the Town of Madison (28.6%).

Table 2 provides the result of monitoring at sites that produced high numbers of *Culex* or *Aedes* larvae; all other inspected sites produced either no larvae or low larvae. Figures 2 – 11 (at the end of the report) identify the locations of the water sources and inspection result by the site number listed in Table 2 (on the next page).

<sup>1</sup> This report is available on the Public Health for Madison and Dane County website at [www.publichealthmdc.com](http://www.publichealthmdc.com). Figures 2–11 are provided in color, making it easier to identify and evaluate individual sites.

Table 2. Sites in the Madison Metropolitan Area that produced high numbers of *Culex* and *Aedes* larvae in 2021

Site Group Name	Total for site			High <i>Culex</i> in Site		High <i>Aedes</i> in site	
	# sites	# Inspections	# Acres*	# sites	# Acres	# sites	# Acres
City of Madison							
1 Acewood Park	5	15	16.6	1	16.1	0	0
2 Atlas Ave Retention Pon	1	15	1.2	1	1.2	0	0
3 Badger Mill Creek - Greenway	7	15	20.6	0	0	1	1.3
4 Brookline Pond	1	4	0.2	1	0.2	0	0
5 Cresent Oaks retention pond	1	3	0.7	0	0	1	0.7
6 Culvert drainage ditch – Ocean Rd	1	13	<0.1	1	<0.1	0	0
7 Dolphin Dr. ditch	1	3	1.3	0	0	1	1.3
8 East Badger Mill Creek Greenway	15	89	7.8	6	3.2	2	1.0
9 Elver Park Greenway	14	44	15.2	3	2.7	0	0
10 Franklin Field	5	13	0.7	0	0	1	0.2
11 Indian Springs Park ditch	2	5	0.1	0	0	1	<0.1
12 International Lane ditch	1	3	0.2	1	0.2	0	0
13 Kottke Drive detention area	1	13	0.2	1	0.2	0	0
14 Maple Grove Greenway	9	21	5.7	1	0.7	0	0
15 MATC TRAU parking lot	9	25	4.4	1	0.5	0	0
16 McClean Drive pond	1	3	0.7	1	0.7	0	0
17 Mendota – Pheasant Branch Greenway	26	96	30.1	6	5.3	0	0
18 Milwaukee Street Greenway	9	54	6.0	4	1.0	1	0.3
19 Nob Hill Ponds	7	25	16.8	1	<0.1	0	0
20 North Penito Creek Greenway	7	32	9.7	3	2.3	0	0
21 Odana Hills Golf Course	1	3	16.0	0	0	1	16.0
22 Owen Park Greenway	10	30	14.5	1	1.4	0	0
23 Reindahl Park ditch	1	15	0.8	1	0.8	1	0.8
24 Ridgewood Ponds	2	14	0.8	1	0.5	0	0
25 Rodefild Landfill Pond	1	3	0.9	1	0.9	0	0
26 Rodger's Park Greenway	1	3	0.3	0	0	1	0.3
27 Sayle St. ditch	1	3	0.3	0	0	1	0.3
28 Starkweather – Olbrich Greenway	10	42	11.8	3	5.7	0	0
29 Sycamore Avenue detention pond	1	13	0.5	1	0.5	0	0
30 University Bay ditches	1	3	<0.1	1	<0.1	0	0
31 UW Research Park ponds	7	19	13.4	1	0.4	0	0
32 Warner Park Lagoon	10	53	33.6	3	0.2	1	<0.1
33 West Badger Mill Creek Greenway	12	36		0	0	2	1.3

34	Westchester Garden Park	3	18	6.5	1	<0.1	0	0
35	Westerfield Ponds	1	3	0.9	0	0	1	0.9
36	Westerfield Retention ponds	3	9	2.8	0	0	2	0.3
37	Whitetail Ridge	1	17	2.0	0	0	1	2.0
38	William McFarland Park ditch	1	3	2.2	0	0	1	2.2
Village of Maple Bluff								
39	Maple Bluff Country Club	4	9	2.4	1	1.3	0	0
City of Middleton								
40	Lakeview Community Park	6	18	3.5	0	0	1	0.1
41	Stricker's Pond	5	25	22.5	1	0.1	0	0
42	Tiedman Pond	1	3	28.4	1	28.4	0	0
43	Whittlesey Road	1	2	0.7	1	0.7	0	0
City of Monona								
44	Winnequah Park	4	25	4.2	0	0	1	<0.1
City of Sun Prairie								
45	Connery Fedler Pond	2	6	1.0	1	0.6	0	0
46	Gateway retention pond	1	3	3.9	0	0	1	3.9
47	King Market Neighborhood	1	2	0.5	1	0.5	0	0
48	Park Street Apartments retention pond #2	1	3	0.1	0	0	1	0.1
49	Pebblebrook Trail ditch	1	3	<0.1	0	0	1	<0.1
50	Pine Street retention pond #1	1	3	1.6	1	1.6	0	0
51	Sheehan Park	1	14	0.9	1	0.9	0	0
52	Shonas Highlands	7	17	2.8	2	0.9	0	0
53	Stonehaven Drive Pond	1	3	<0.1	0	0	1	<0.1
54	Westwynde	6	17	3.8	2	2.0	0	0
55	Wetmore Park	1	3	3.0	0	0	1	3.0
56	Weybridge	3	9	2.2	1	1.4	0	0
57	Wyndham Hills Neighborhood	13	39	13.2	1	0.9	0	0
Town of Madison								
58	Alliant Energy Center	9	27	8.5	0	0	4	1.4
UW Madison								
59	UW Campus	2	18	<0.1	1	<0.1	0	0



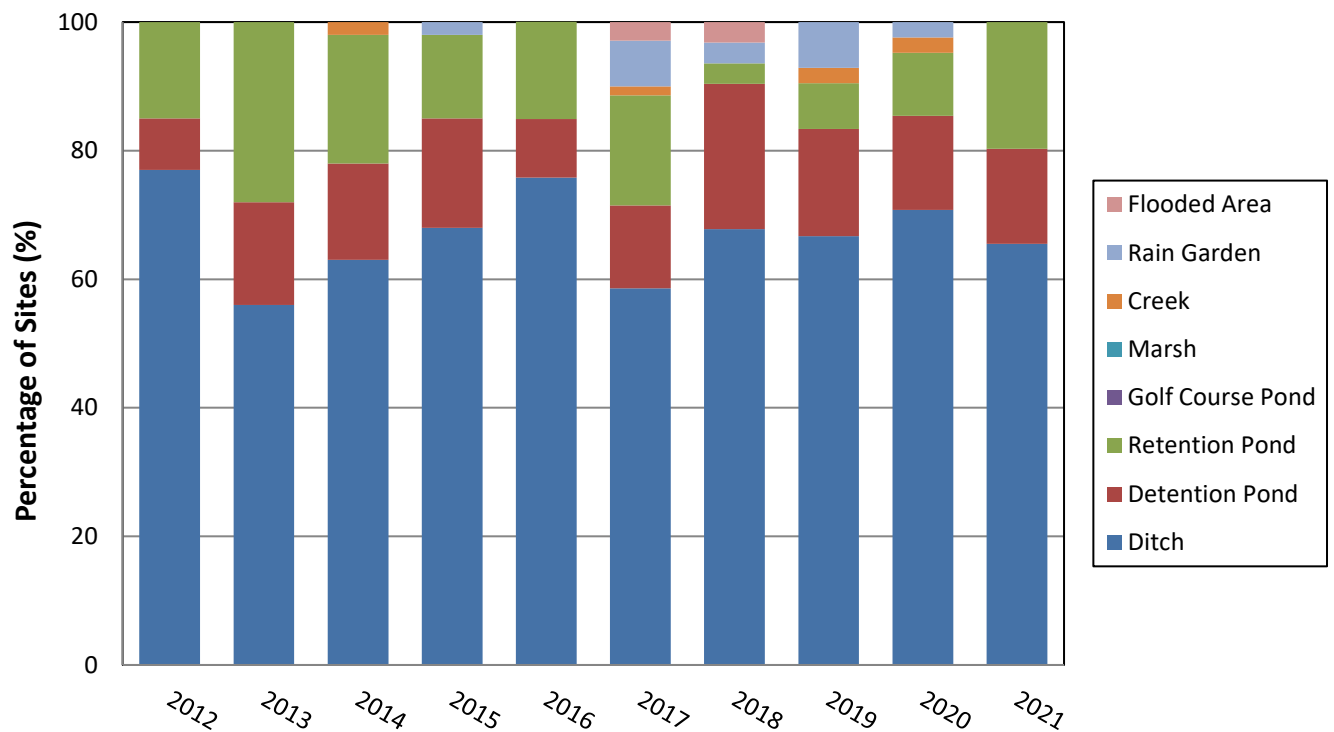
Over the past decade (2012 – 2021), a total of 185 sites have been found to produce high numbers of *Culex* larvae in at least one season during this time period. Thirty-seven (20.0%) of these sites have been found to produce *Culex* larvae repeatedly (four or more years) over the past ten years. Thirty-one of these 37 sites (83.8%) also produced *Culex* larvae during 2021.

The types of water sources that produced high numbers of larvae are generally consistent from year to year (Fig 1). Similar to previous monitoring seasons, ditches continue to be the most important source of mosquitoes in 2021 with 65.6% of all high *Culex* producing sites being classified as ditches. Detention and retention ponds (34.4%) were also sources of high *Culex* during the current monitoring season. In addition to these site categories, marshes, rain gardens, flooded areas, and creeks have also been common sources of the high *Culex* in previous years. Ditches were also the most common site to produce high numbers of *Aedes* during the 2021 monitoring season (54.8%); in addition to ditches, detention and retention ponds (35.5%), rain gardens (6.4%), and one flooded area site (3.2%) accounted for the remaining sites with *Aedes* activity. Unlike previous years, creeks and marshes did not report high numbers of *Aedes* activity during the current monitoring season.

Although no *Culex* was reported in 2021, marshes have also been shown capable of producing high numbers of this mosquito species over the past decade in the City of Madison metro area. However, *Culex* mosquito production near marshes is hard to predict because varying water levels and weather patterns are capable of creating suitable habitat in a short period of time. Another type of water source, rain gardens, is designed to manage these factors and should not be sources of *Culex* mosquitoes if designed and maintained properly. Although rain gardens were not a significant source of *Culex* mosquitoes during the current monitoring season they have periodically demonstrated high activity in past years; similar trends are also reported with *Aedes* mosquito activity at this type of site during previous monitoring seasons.

Several large, natural water sources, like Mud Lake, Nine Springs Marsh, the Yahara River, Lakes Mendota and Monona, and others, are not assessed because they are unlikely to produce *Culex* mosquitoes. Assessment of these areas would likely change the results for the floodwater mosquito (*Aedes vexans*) and increase the number of mosquito species identified.

Figure 1. Types of water sources producing high numbers *Culex* larvae, 2012 - 2021.



## Larvicide Applications

During the 2021 mosquito season, a total of 142 treatments were performed at 60 sites that reported high levels of mosquito larvae; twenty-four of these treatment sites were considered problematic and required treatment on 3 or more separate occasions. The remaining sites that reported elevated levels of *Culex* activity larvicidal treatment was deemed unnecessary due to weather and site conditions or the predominant species identified was not associated with WNV. All treatments were effective in reducing larvae numbers below the treatment threshold of 3 larvae per dip.



Figure 2. 2021 Mosquito larvae monitoring results – Middleton, WI

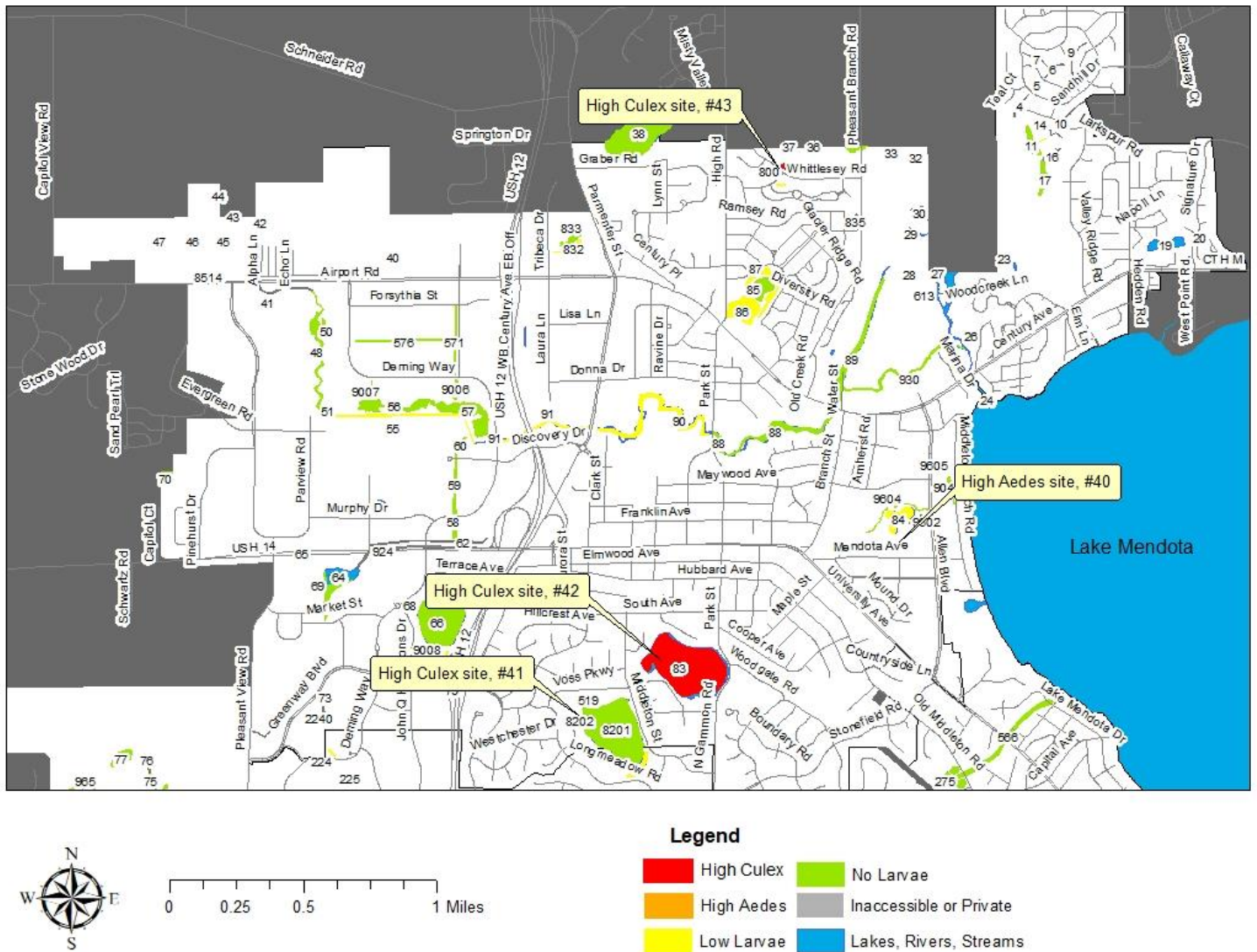


Figure 3. 2021 Mosquito larvae monitoring results –Madison, WI (northern west side)

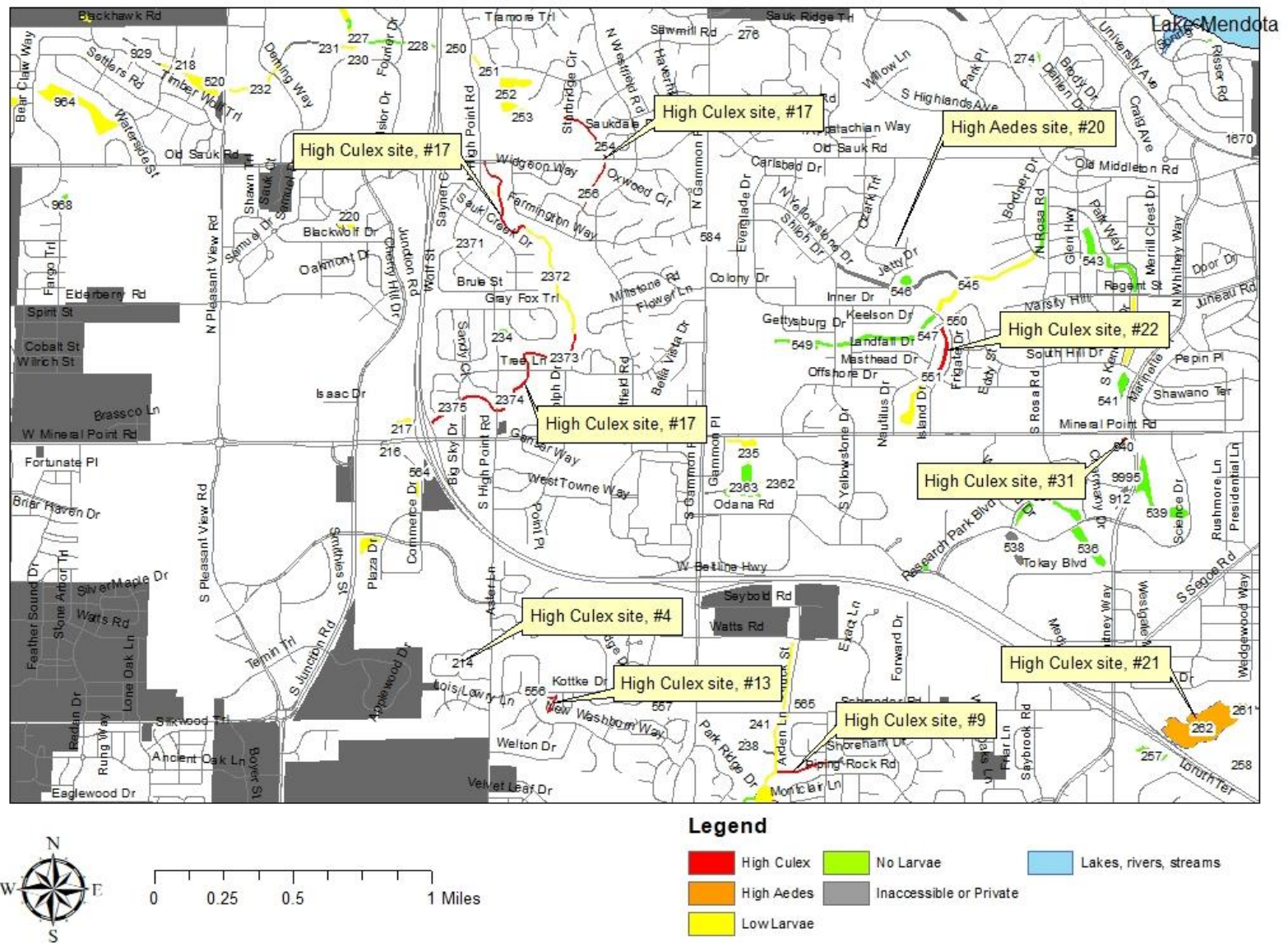




Figure 4. 2021 Mosquito larvae monitoring results –Madison, WI (southern west side)

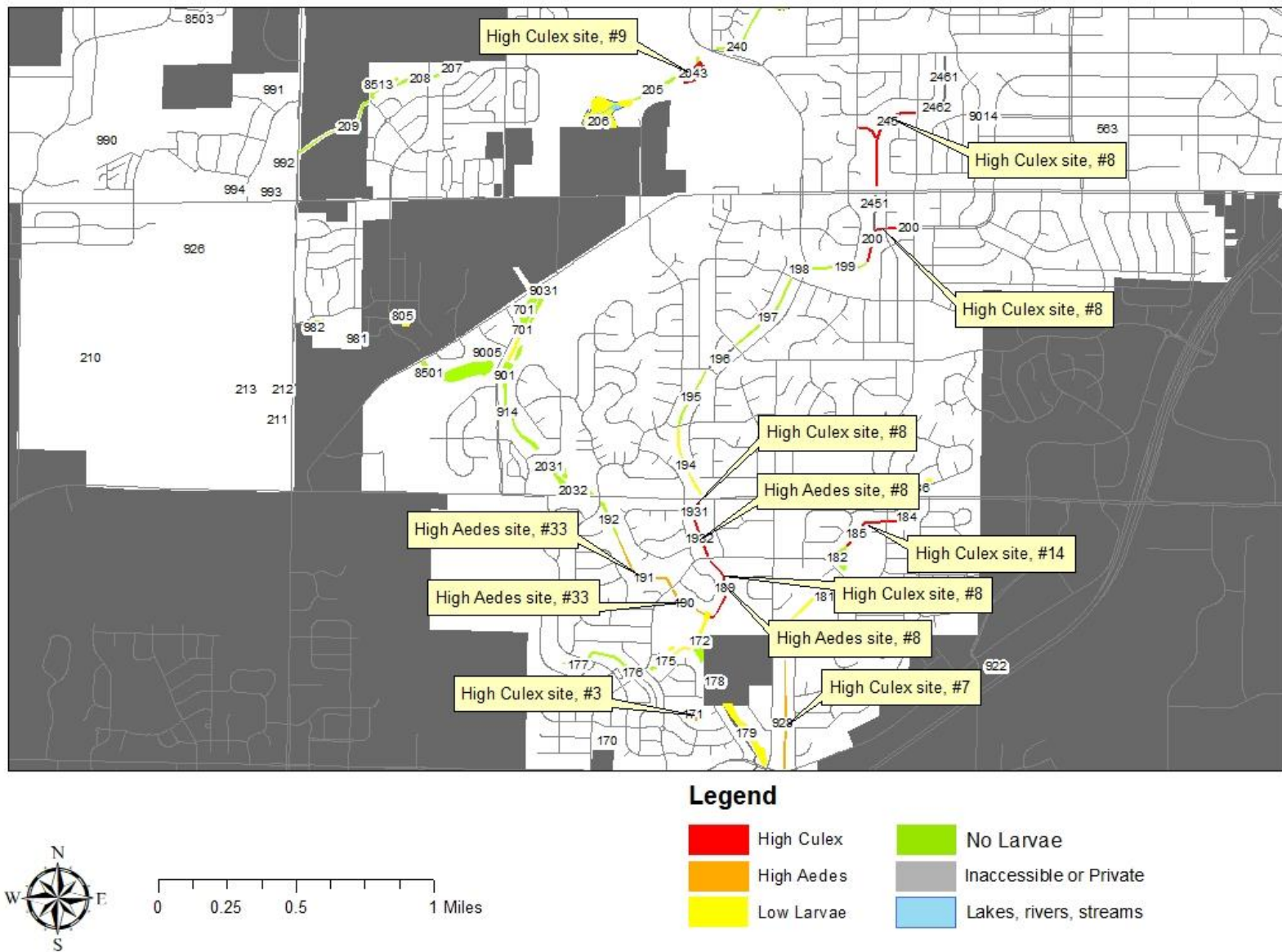


Figure 5. 2021 Mosquito larvae monitoring results –Madison (near west side), Village of Shorewood Hills, and Town of Madison, WI.

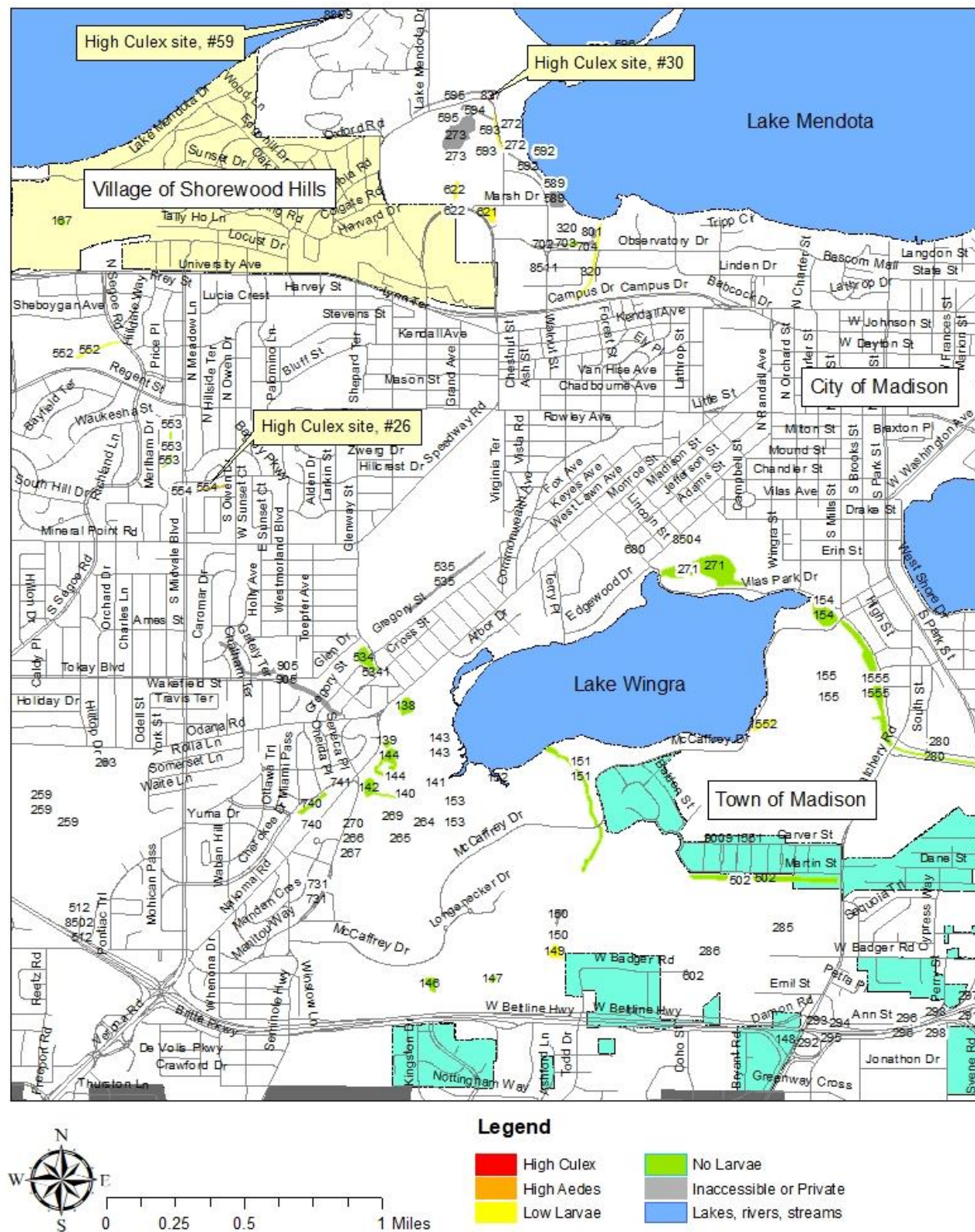




Figure 6. 2021 Mosquito larvae monitoring results –Madison (south side), City of Monona, and Town of Madison, WI.

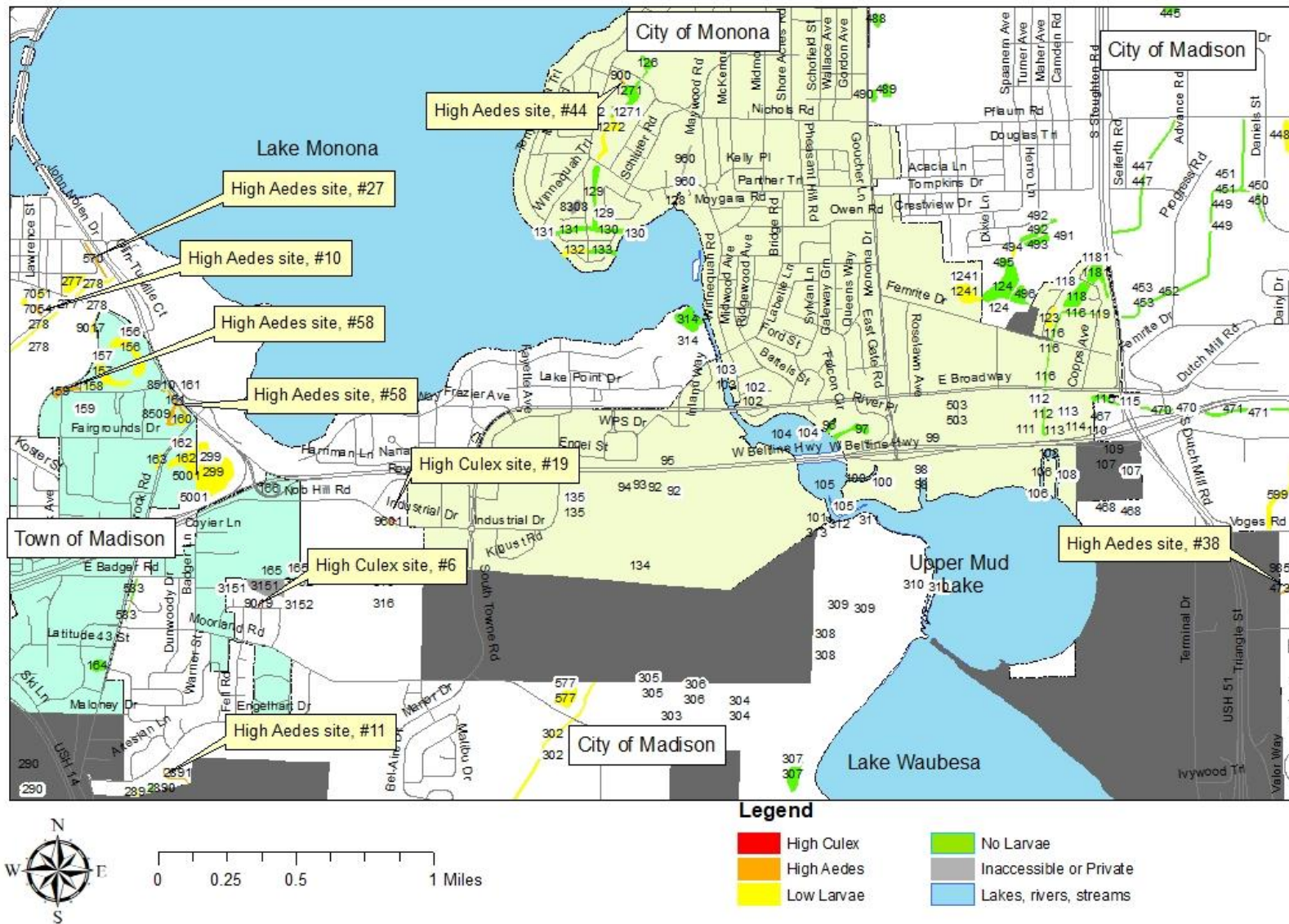


Figure 7. 2021 Mosquito larvae monitoring results –Madison (southeast) and City of Monona, WI.

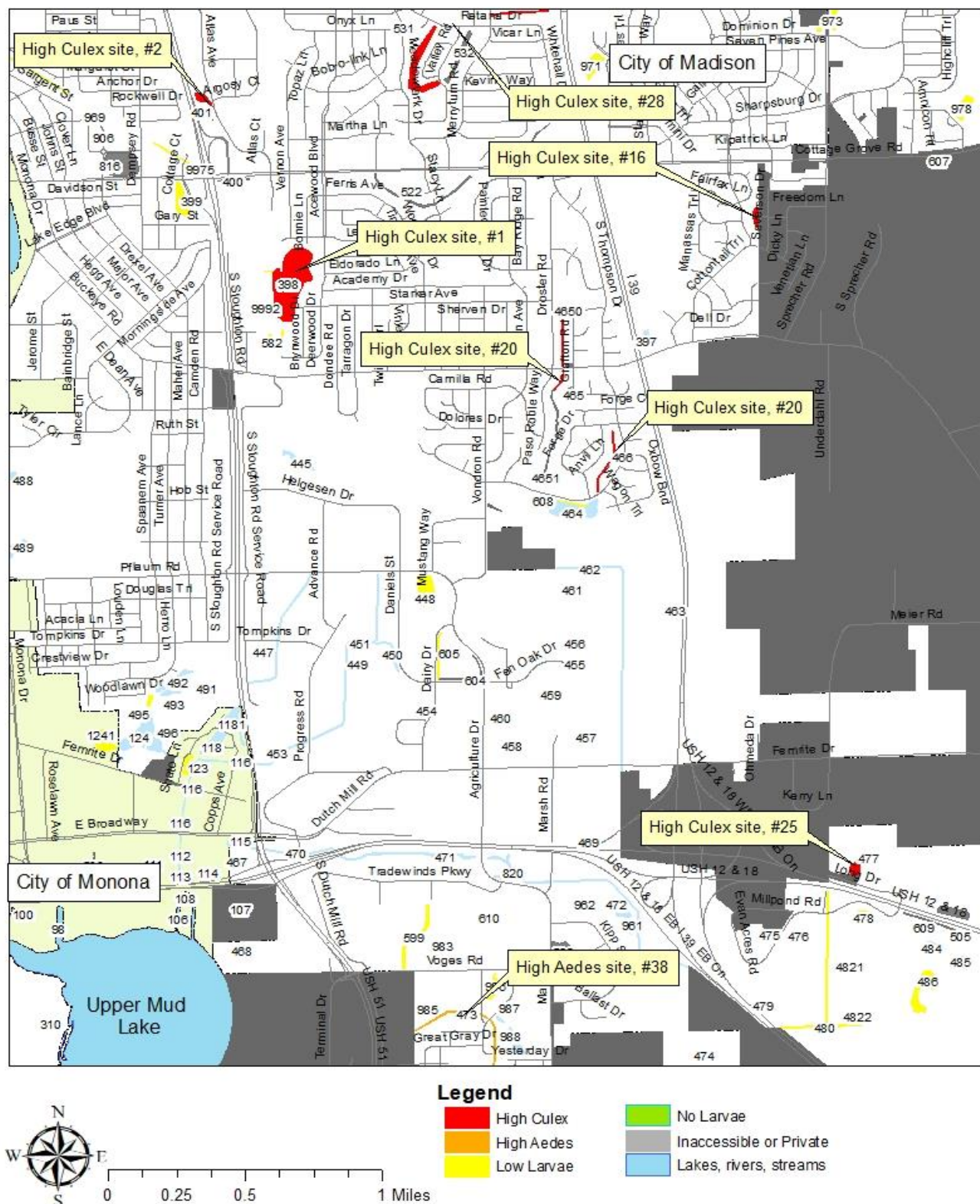




Figure 8. 2021 Mosquito larvae monitoring results –Madison (north), and Village of Maple Bluff, WI.

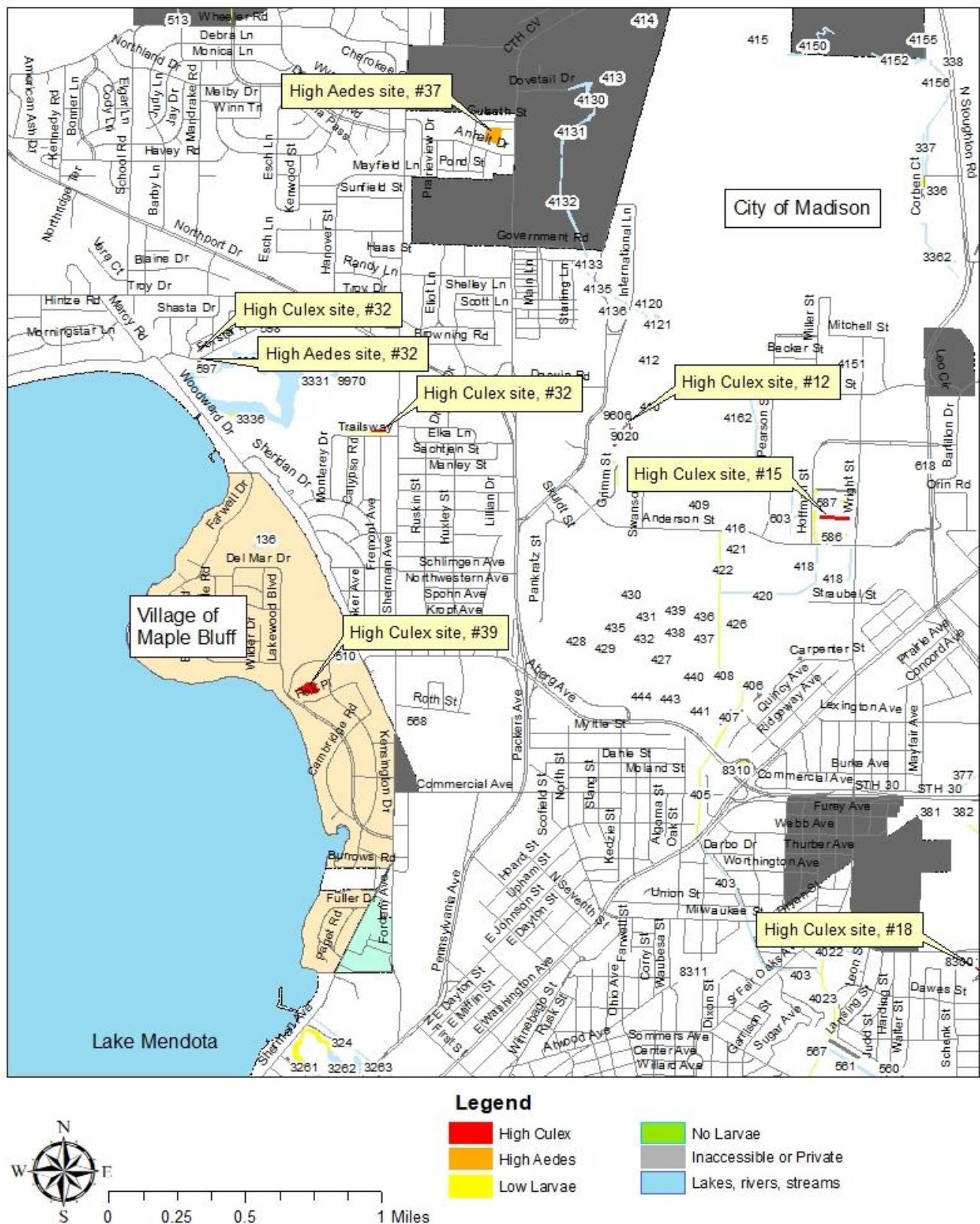




Figure 9. 2021 Mosquito larvae monitoring results –Madison (northeast), WI.

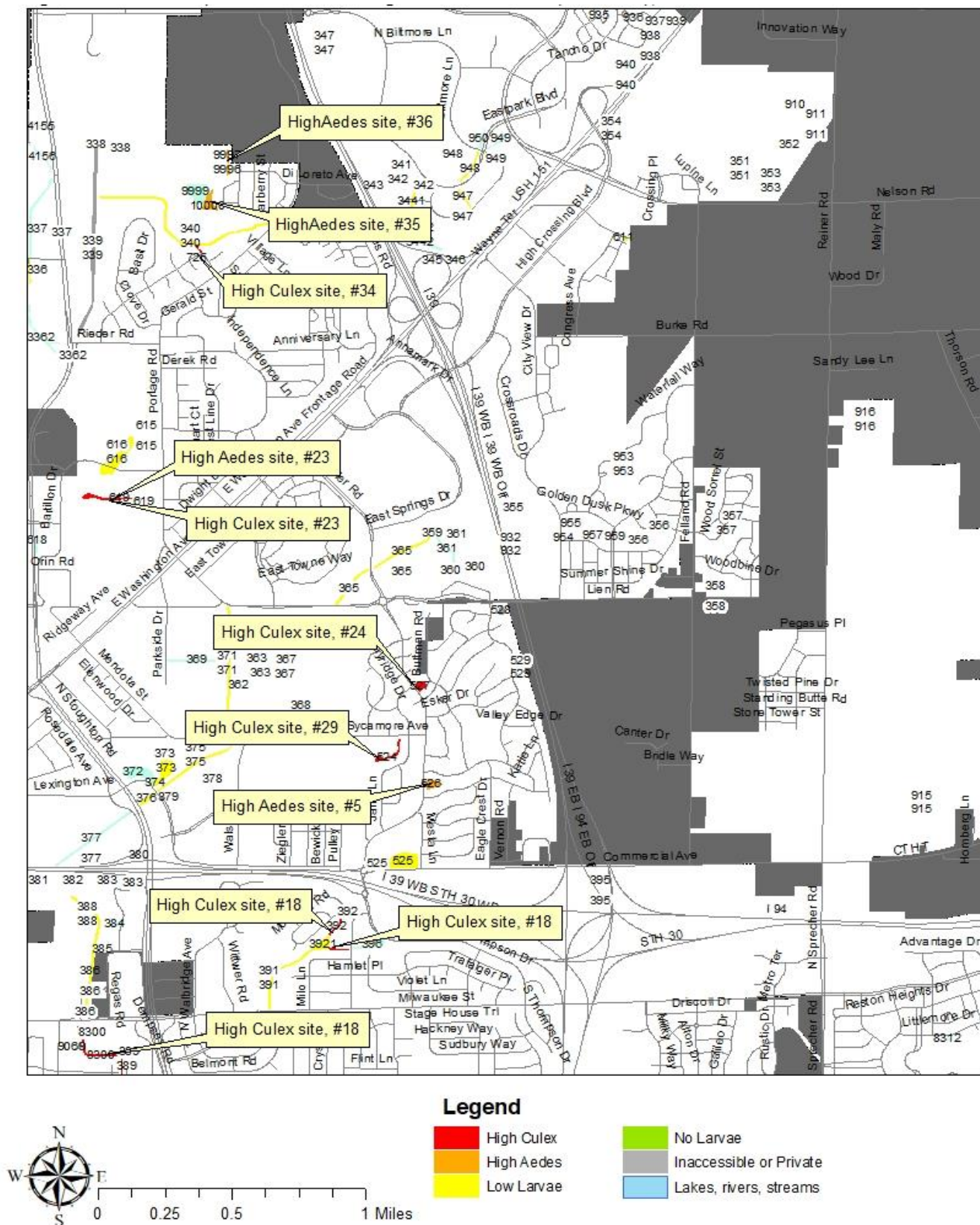


Figure 10. 2021 Mosquito larvae monitoring results –Sun Prairie (West), WI.

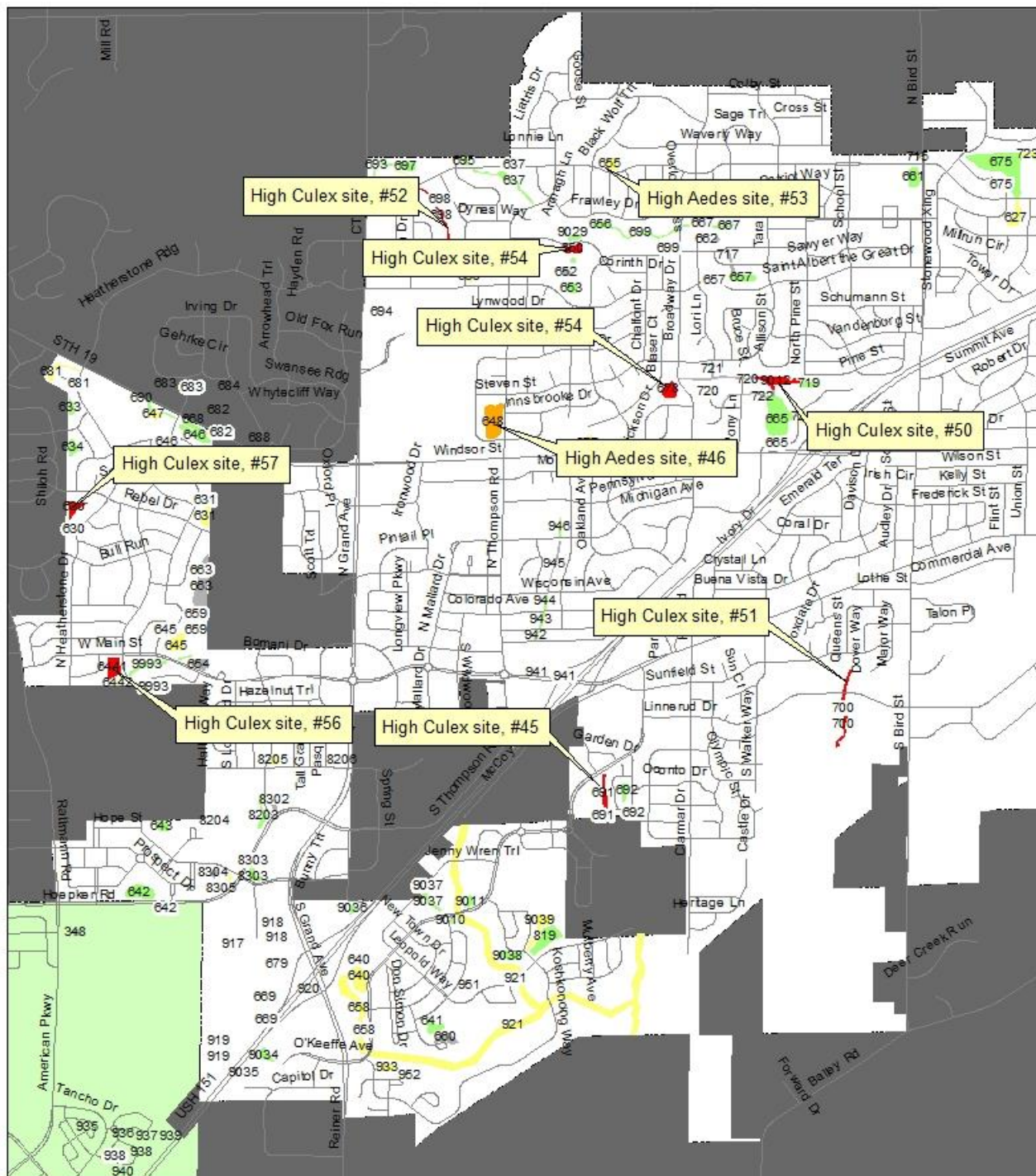




Figure 11. 2021 Mosquito larvae monitoring results –Sun Prairie (East), WI.

