

Maricopa County Environmental Services Department Vector Control Division

Best Management Practices for Mosquito Management

John Townsend

Maricopa County Environmental Services
Vector Control Division Manager



MARICOPA COUNTY ENVIRONMENTAL HEALTH CODE

CHAPTER III

RODENTS, INSECTS AND VERMIN

REGULATION 1. **Infestation - Harborage**

The infestation by or harborage of rodents, lice, bedbugs, roaches, flies or **other arthropods of public health significance**, in or about any premises is hereby declared to be dangerous to public health. Any condition or place that constitutes a feral colony of honeybees that is not currently maintained by a beekeeper and that poses a health or safety hazard to the public is hereby declared to be a public nuisance dangerous to the public health. No person shall cause, maintain, or within his control, permit such infestation or harborage. The owner, occupant, or person in control of any place or premises shall take all reasonable measures to prevent such infestation or harborage and, upon notification from the Department to do so, shall take all necessary and proper steps to eliminate the infestation or harborage and to prevent its recurrence.

MARICOPA COUNTY ENVIRONMENTAL HEALTH CODE
CHAPTER III
RODENTS, INSECTS AND VERMIN

REGULATION 2. Mosquitoes

No person shall cause, maintain or, within his control, permit any accumulation of water in which mosquitoes breed or are likely to breed. The owner, occupant, or person in control of any place where mosquitoes are breeding, or which constitutes a breeding place for mosquitoes shall take all necessary and proper steps to eliminate the mosquito breeding and to prevent its recurrence through the elimination of or the institution of necessary control measures at mosquito breeding sites.

Best Management Practices for Mosquito Management

Best Management Practices (BMP) should form the fundamental approach to mosquito management for all mosquito control programs. Agencies should strive to adhere to these BMPs to the maximum extent practicable, given resource availability.

Programs are encouraged to maintain documentation as to how they intend to employ the components listed below in a Pesticide Discharge Management Plan as part of their operative AZPDES permit.

Best Management Practices for Mosquito Management

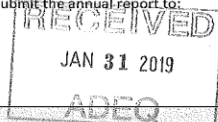


ANNUAL REPORT FORM for the AZPDES Pesticide General Permit

Arizona Pollutant Discharge Elimination System (AZPDES) Annual Report Cover.

This form is for any Operator that is a Decision-maker required to prepare an annual report (see Pesticide General Permit AZG2011-001, Section 8.5). The annual report must be completed and included with the Pesticide Discharge Management Plan no later than February 14 for all covered pesticide discharge activities occurring during the previous calendar year. For discharges to an impaired water or outstanding Arizona water, or authorization under a specific approval, the annual report must be SUBMITTED to ADEQ and received by the department no later than February 21 for the previous calendar year. If required, submit the annual report to:

Arizona Department of Environmental Quality
Stormwater and General Permits Unit
1110 West Washington Street, 5415A-1
Phoenix, Arizona 85007



A. GENERAL INFORMATION			
Operator Name: Darcy Kober - Maricopa County Environmental Services Department Director			
Project Name: MCESD-Vector Control		Authorization Number: AZPEST- 300008	
Address: 3800 N. Central	City: Phoenix	State: AZ	Zip Code: 85012
Phone Number(s): (602) 372-5599	Fax: (602) 506-0725	E-mail: DarcyKober@mail.maricopa.gov	
Contact Name and Title (if different than Operator): John Townsend - Vector Control Division Manager			
Address: 3220 W. Gibson Lane	City: Phoenix	State: AZ	Zip Code: 85009
Phone Number(s): (602) 506-0703	Fax: (602) 506-0725	E-mail: jtownsen@mail.maricopa.gov	
B. DISCHARGE INFORMATION			
If you maintained permit coverage but did not apply pesticides (and had no adverse incidents or corrective actions) in the previous year, check "No Discharge," skip to Section E., and sign the Certification. Otherwise, please complete the remaining sections of the form.			
<input type="checkbox"/> No Discharge			
C. ADVERSE INCIDENTS AND CORRECTIVE ACTION			
1. Was an adverse incident observed and/or corrective actions taken for any Pest Treatment Area for which you have coverage under the permit?			
<input checked="" type="checkbox"/> No adverse incidents were observed and no corrective action was taken.			
<input type="checkbox"/> Yes, an adverse incident was observed and/or correct action was taken. Complete questions 2 – 5 for each Pest Treatment Area in which adverse incidents were observed or corrective actions were taken. Copy this section for additional submissions.			
2. Pest Treatment Area:			

Best Management Practices for Mosquito Management

Surveillance

Is the backbone of all Integrated Mosquito Management programs. Identifies problem species and population trends in order to direct and evaluate control methods.

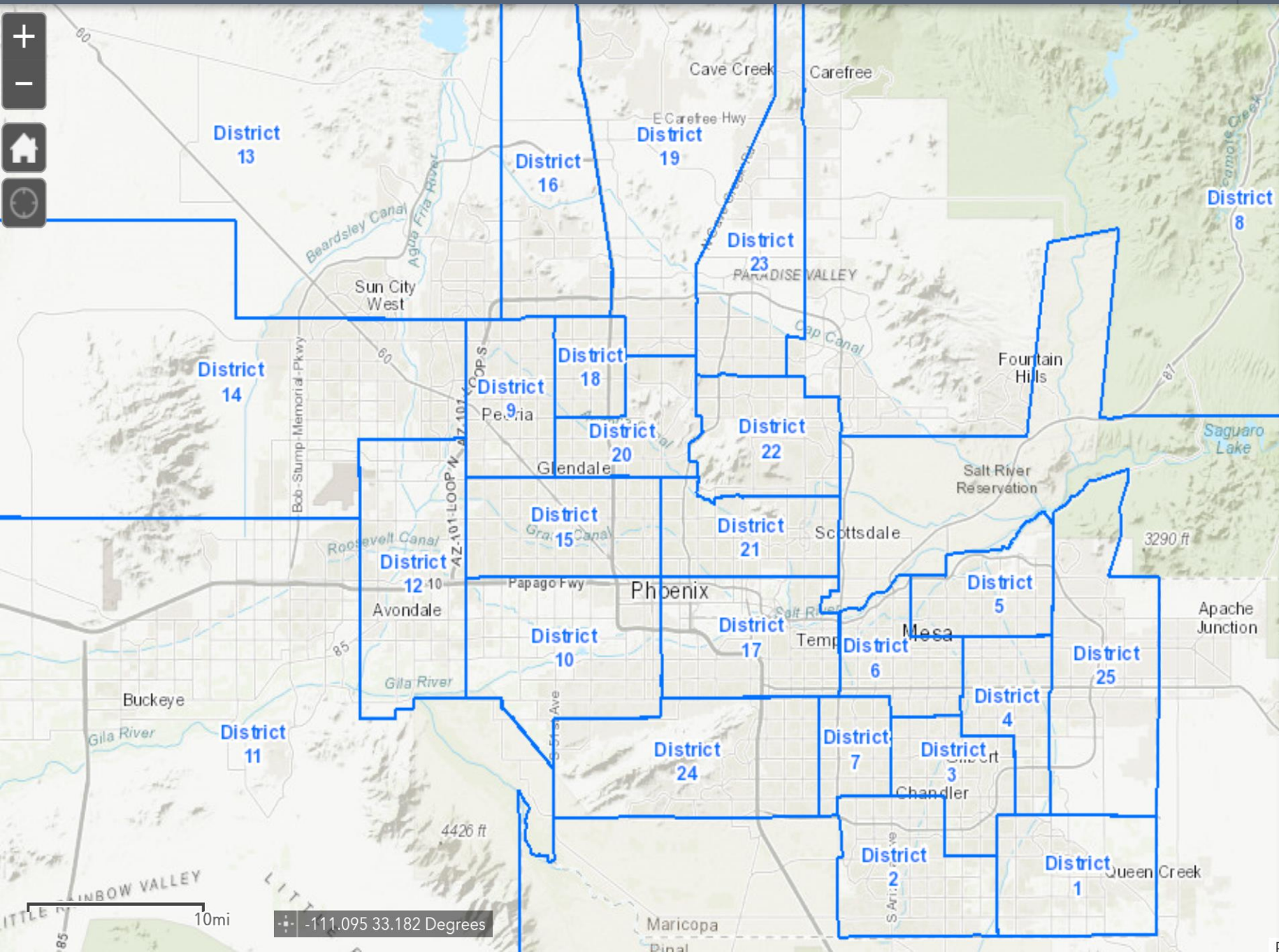
Determines species to ensure that the most appropriate control methods are chosen.

Determine population levels of adult mosquitoes using professionally acceptable techniques, including service requests, trap or collection data, to establish needs for action.

Best Management Practices for Mosquito Management

Mapping of the Surveillance Data

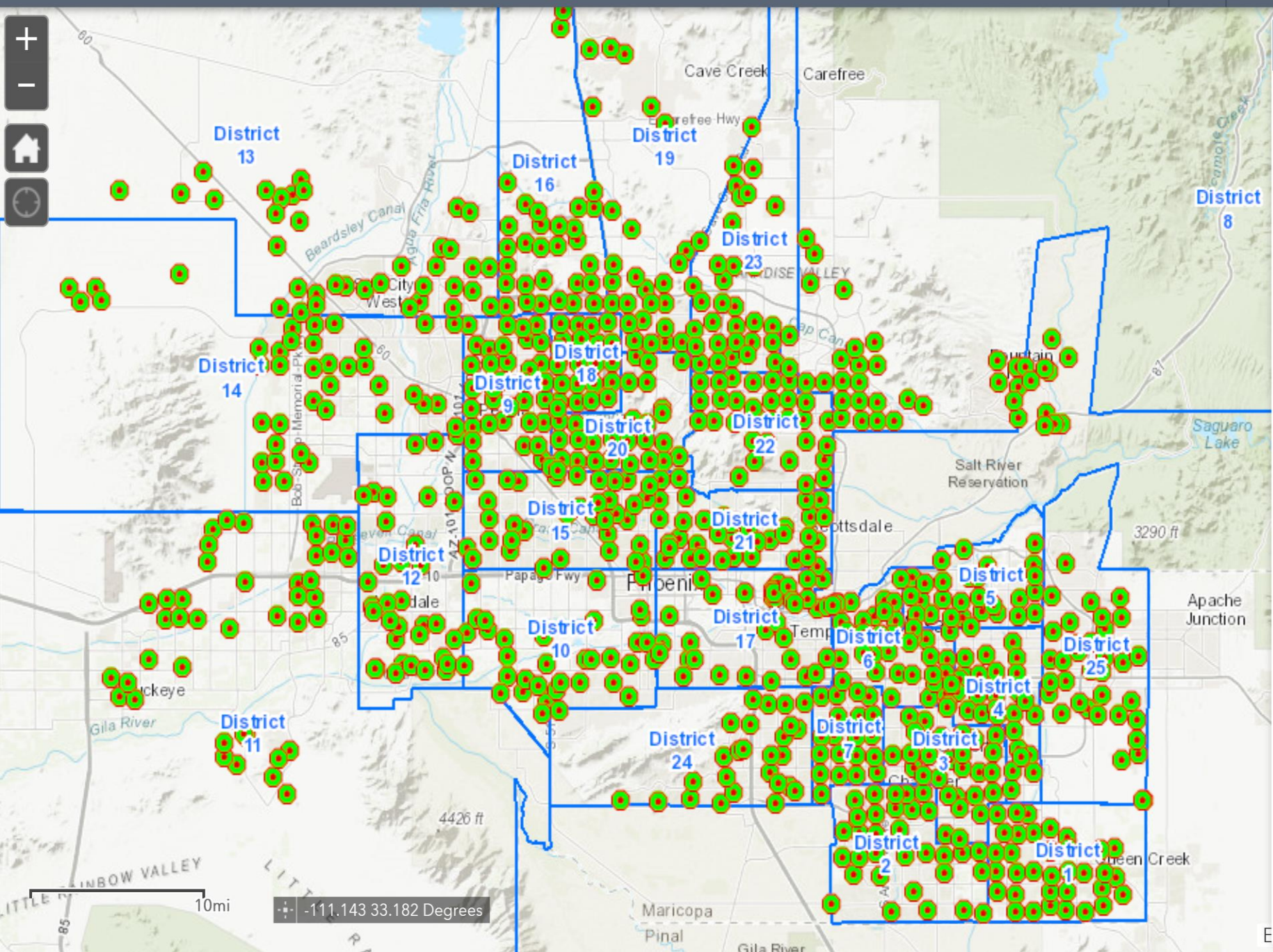
Utilize maps to continually monitor major sources of larval/adult mosquitoes in addition to documenting areas where control measures have been instituted. These maps should also define your treatment areas.



Layer List

Layers

- Mosquito Data ...
- Traps ...
- Vector Control Districts ...
- Fogging (Current Year) ...
- Fogging (Last Year) ...



Layer List

Layers

Mosquito Data

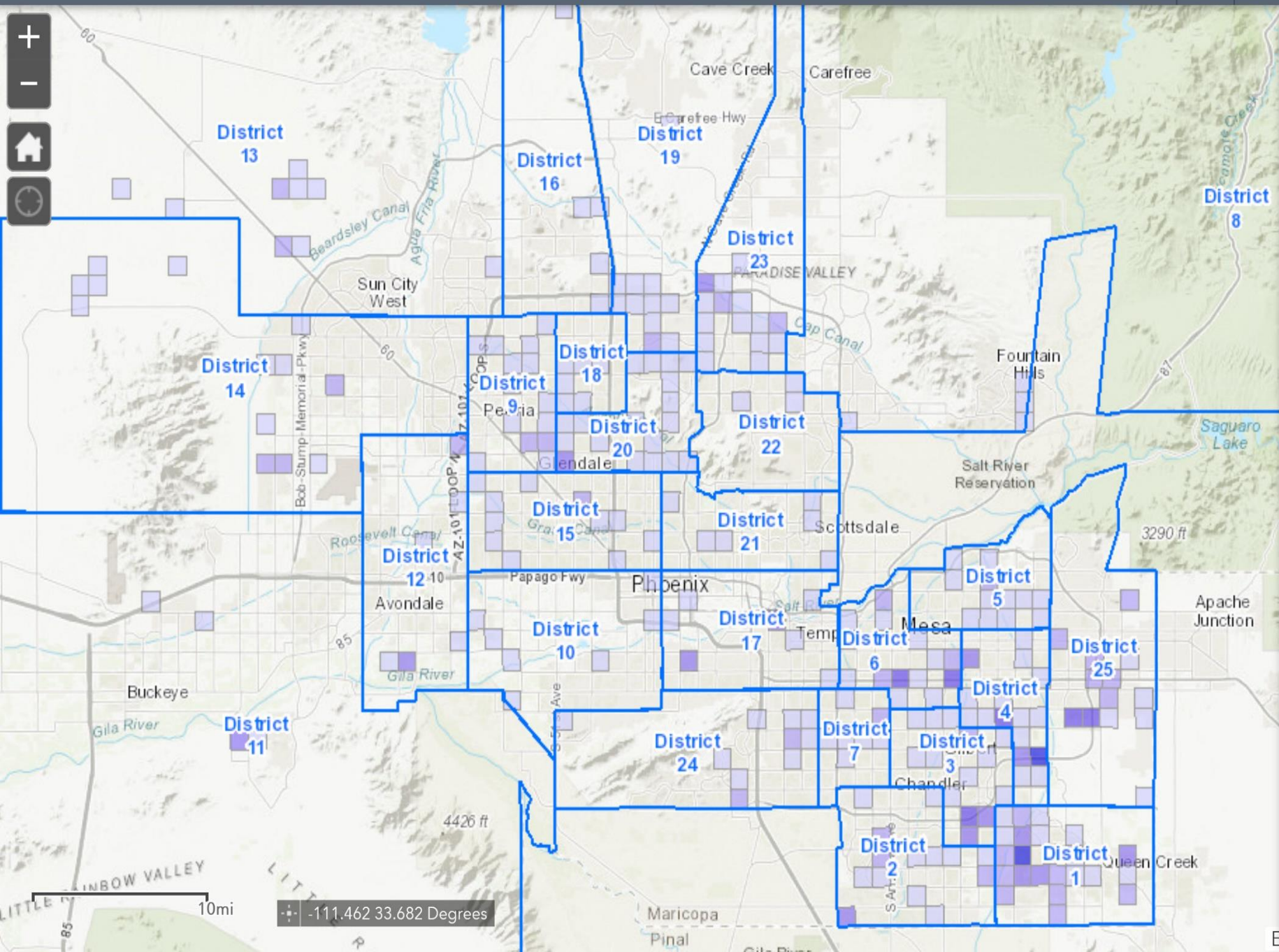
Traps

Vector Control Districts

Fogging (Current Year)

Fogging (Last Year)

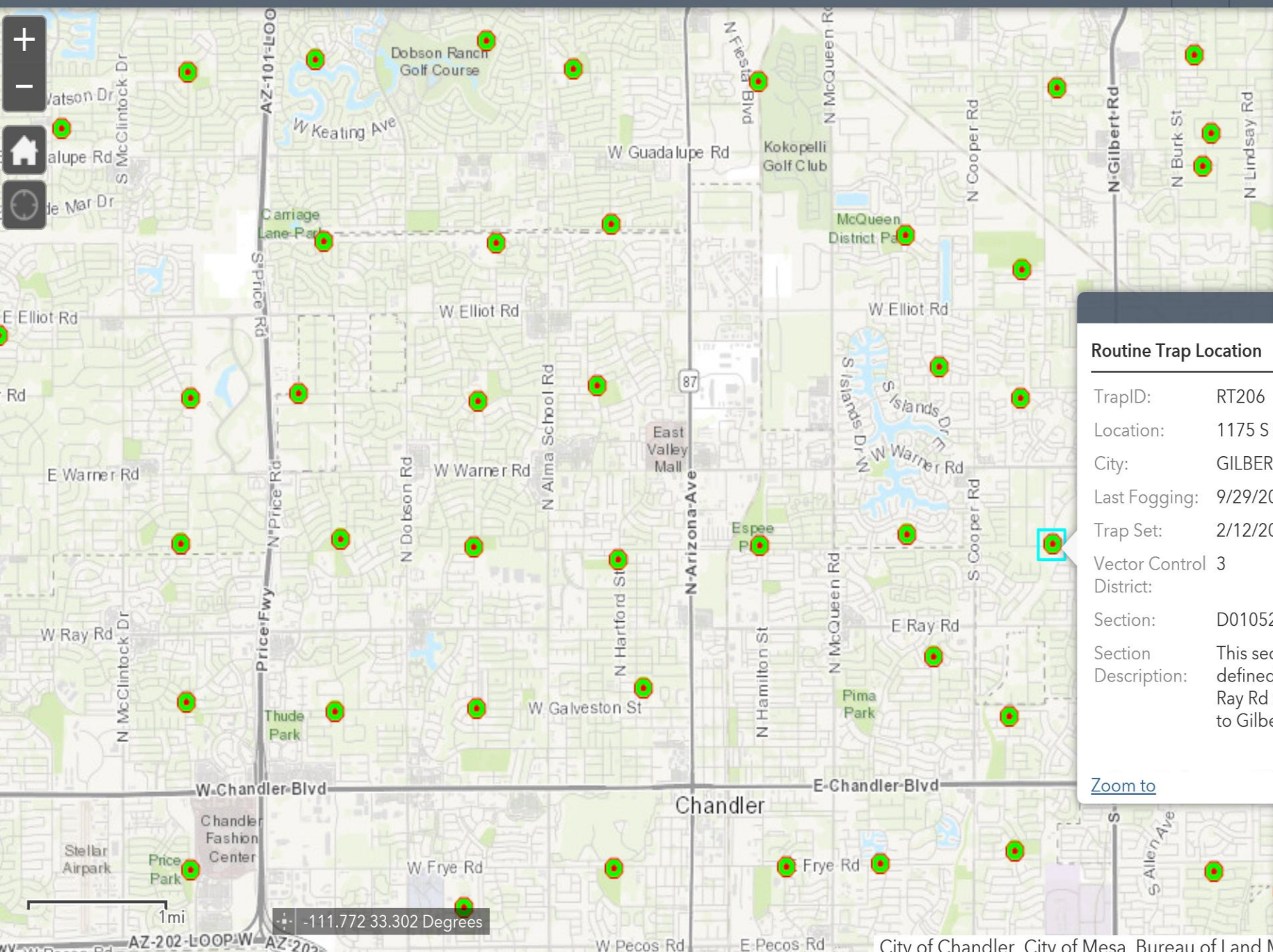
-111.143 33.182 Degrees



Layer List

Layers

- Mosquito Data
- Traps
- Vector Control Districts
- Fogging (Current Year)
- Fogging (Last Year)



Layer List

Layers

- Mosquito Data
- Traps
- Vector Control Districts

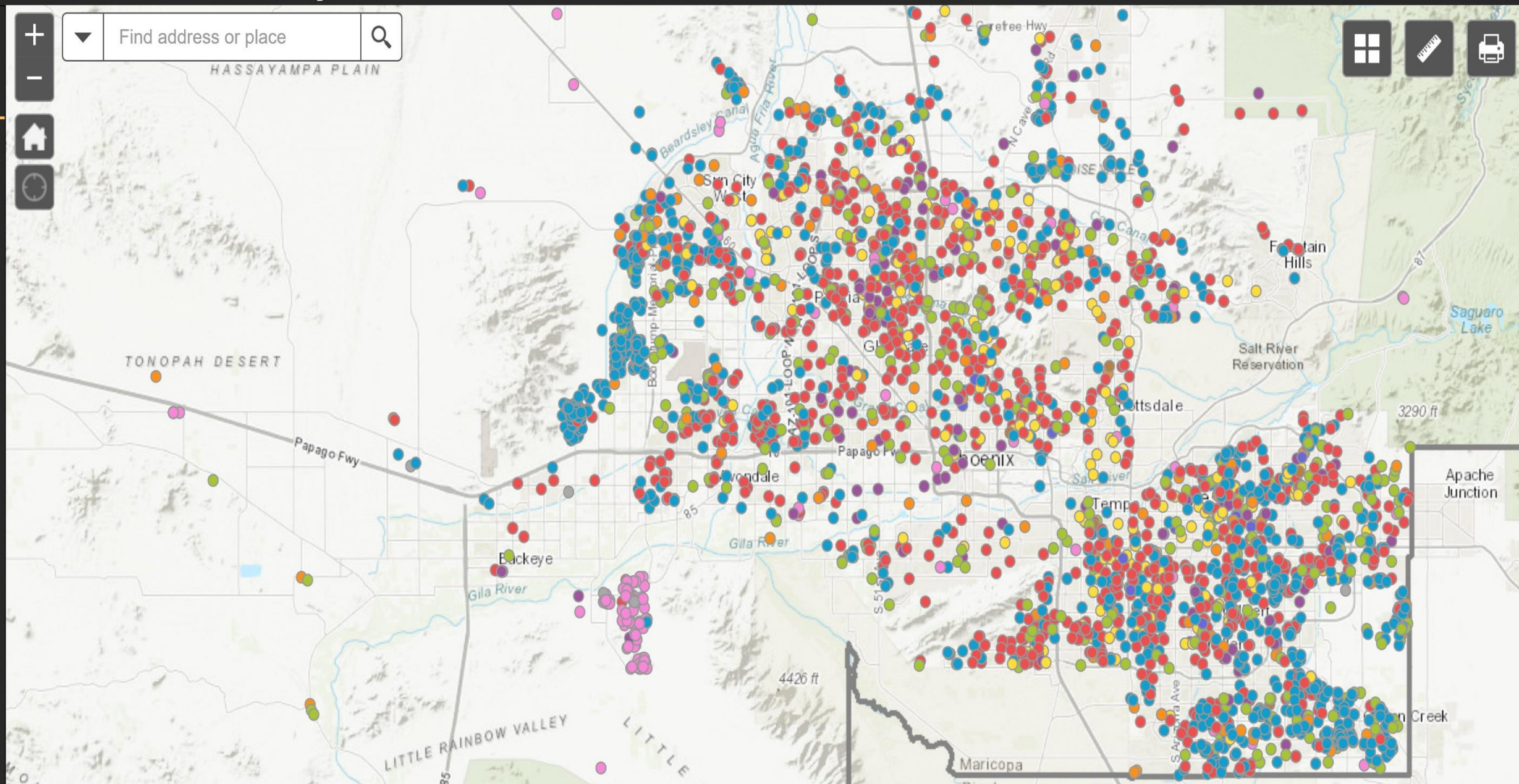
Routine Trap Location

TrapID: RT206
 Location: 1175 S OAK CT
 City: GILBERT
 Last Fogging: 9/29/2018, 1:48 AM
 Trap Set: 2/12/2019, 12:15 PM
 Vector Control 3
 District:
 Section: D010524
 Section Description: This section is roughly defined from Warner Rd to Ray Rd and from Cooper Rd to Gilbert Rd.

[Zoom to](#)



Arbovirus Activity Maricopa County Environmental Services-Vector Control



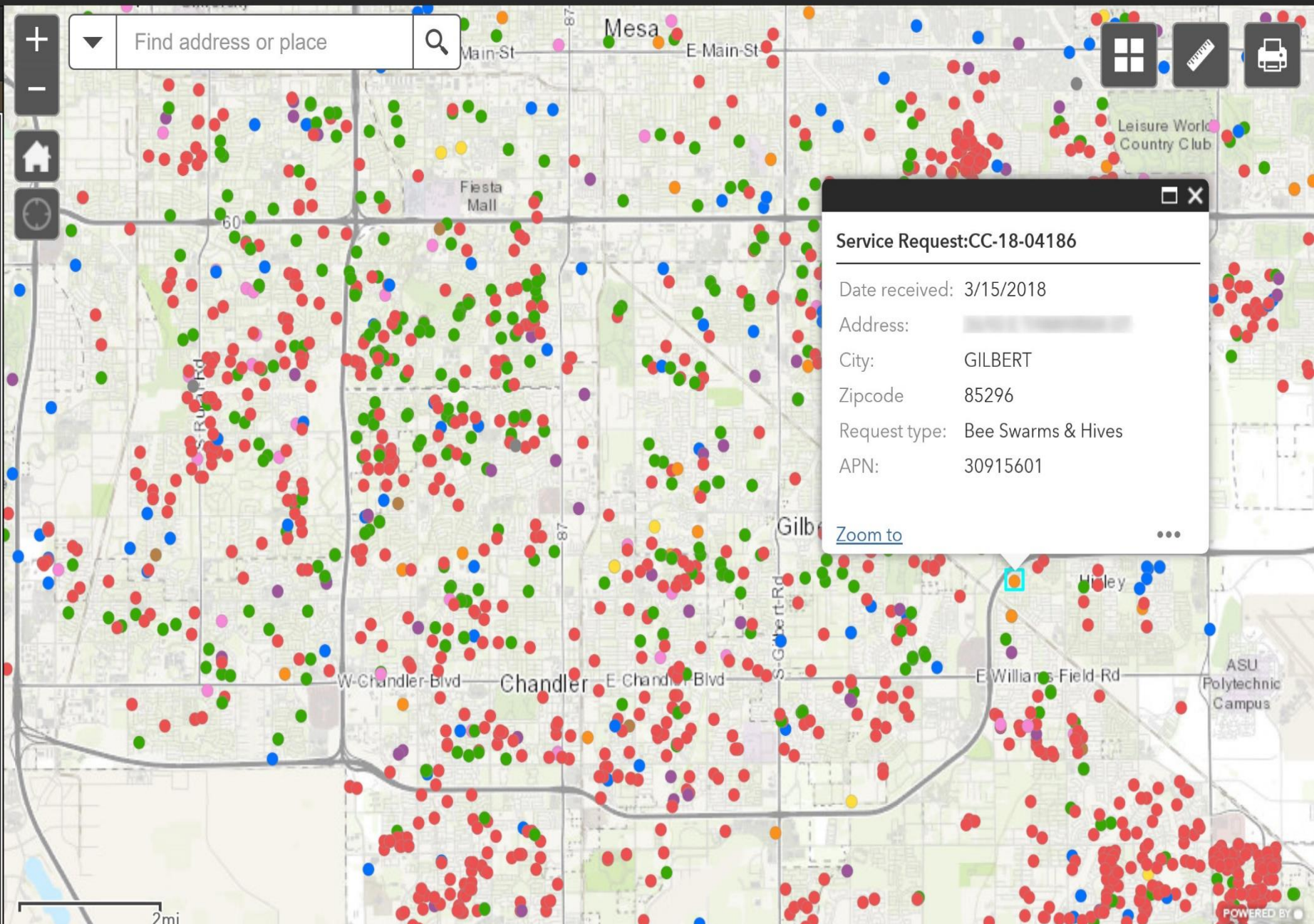
10mi 3157 ft

-111.552 33.148 Degrees

Layer List

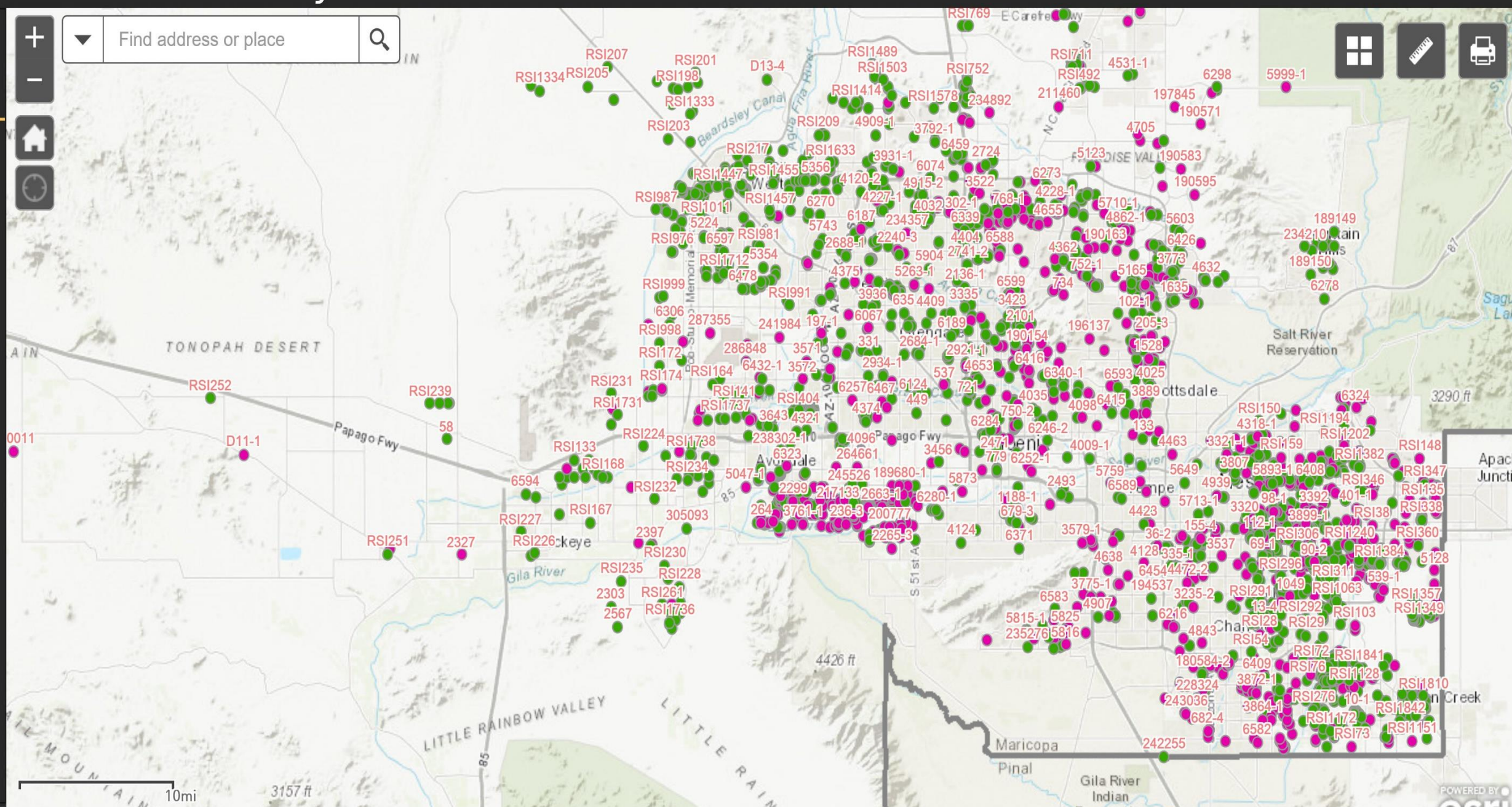
Layers

- Service Request
- Mosquitos - Outside, Source Unknown
- Mosquitos - Green Pool
- Mosquitos - Stagnant / Standing Water (Breeding Ground)
- Mosquitos - Outside, Source Is Known
- Bee Swarms & Hives
- Flies - Outside
- Rats - In Any Non-Permitted Structure
- Rats - General Info On Roof Rats
- Mosquitos - Ground Fogging Notification List
- Flies - Dairy
- Surveillance Location
- MC Section

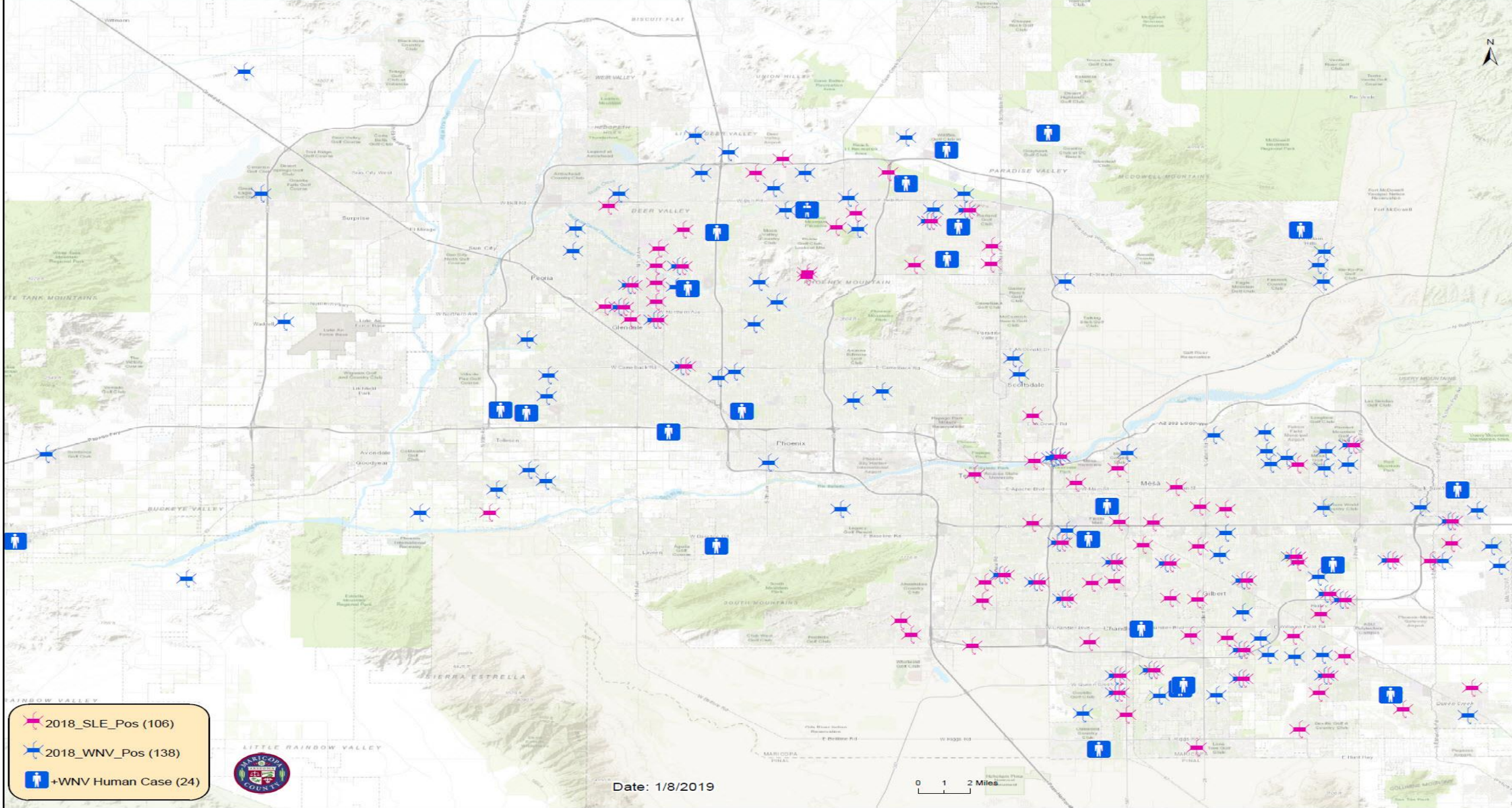




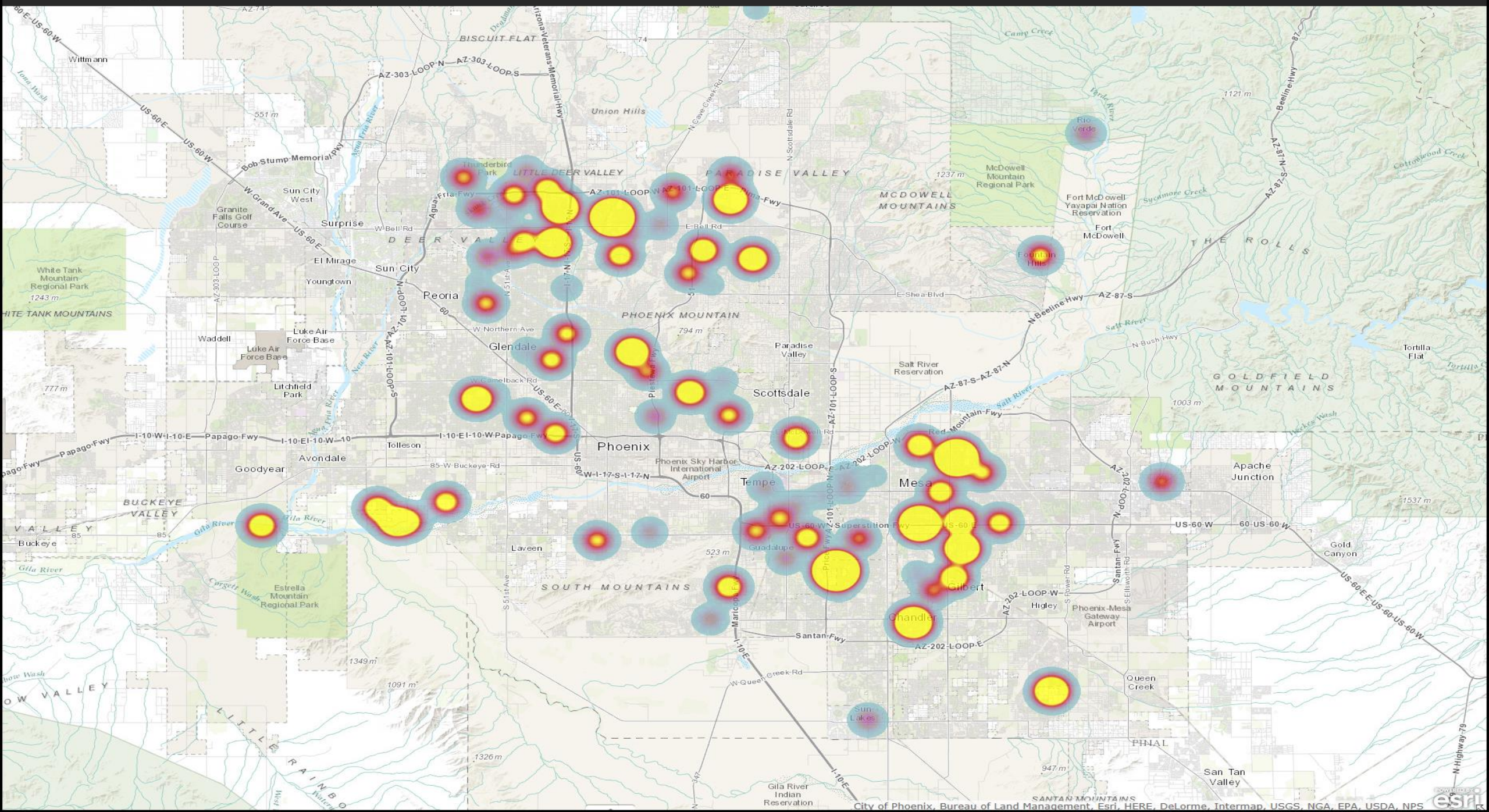
Arbovirus Activity Maricopa County Environmental Services-Vector Control



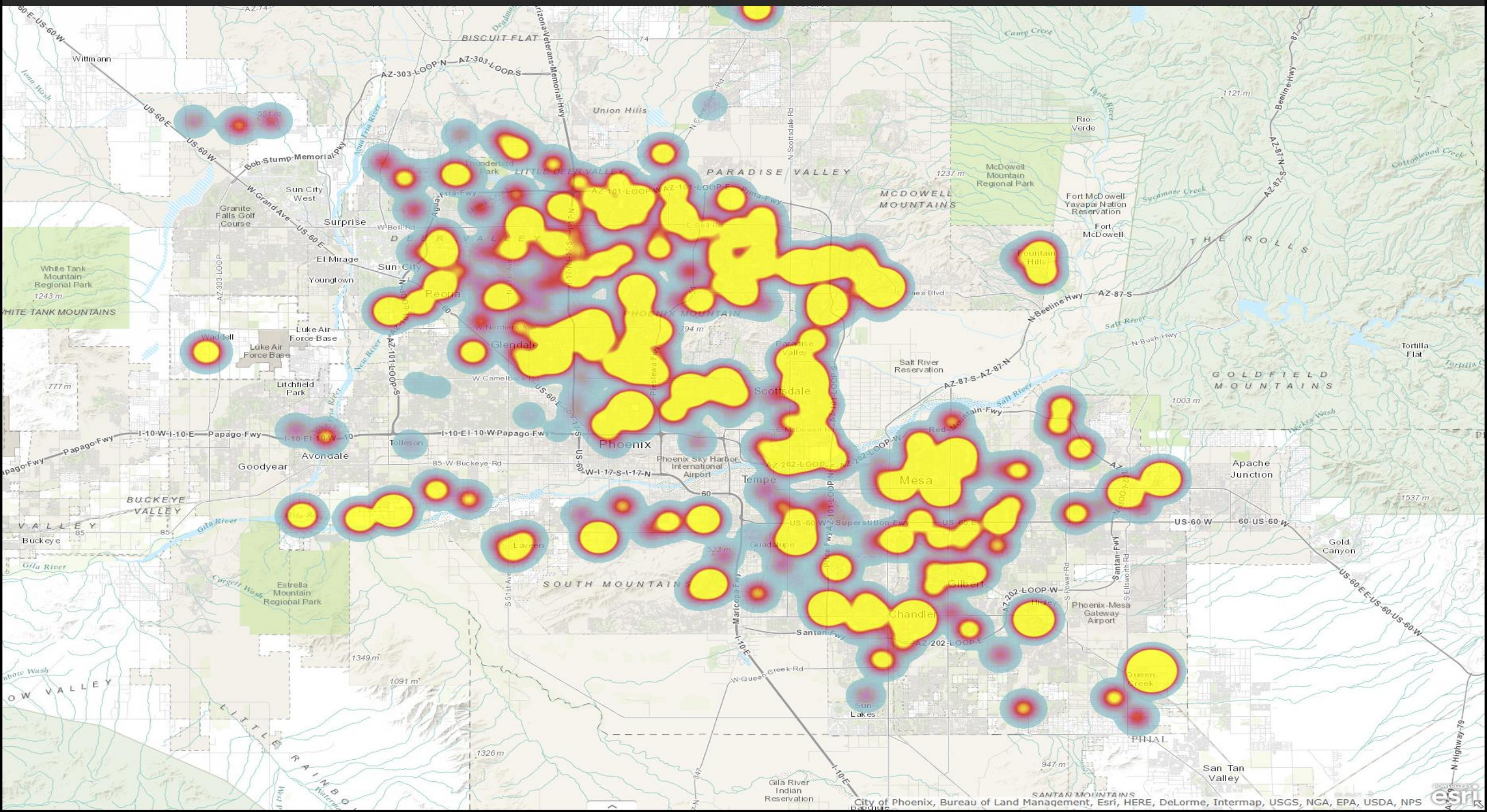
2018 ARBOVIRUS ACTIVITY MAP



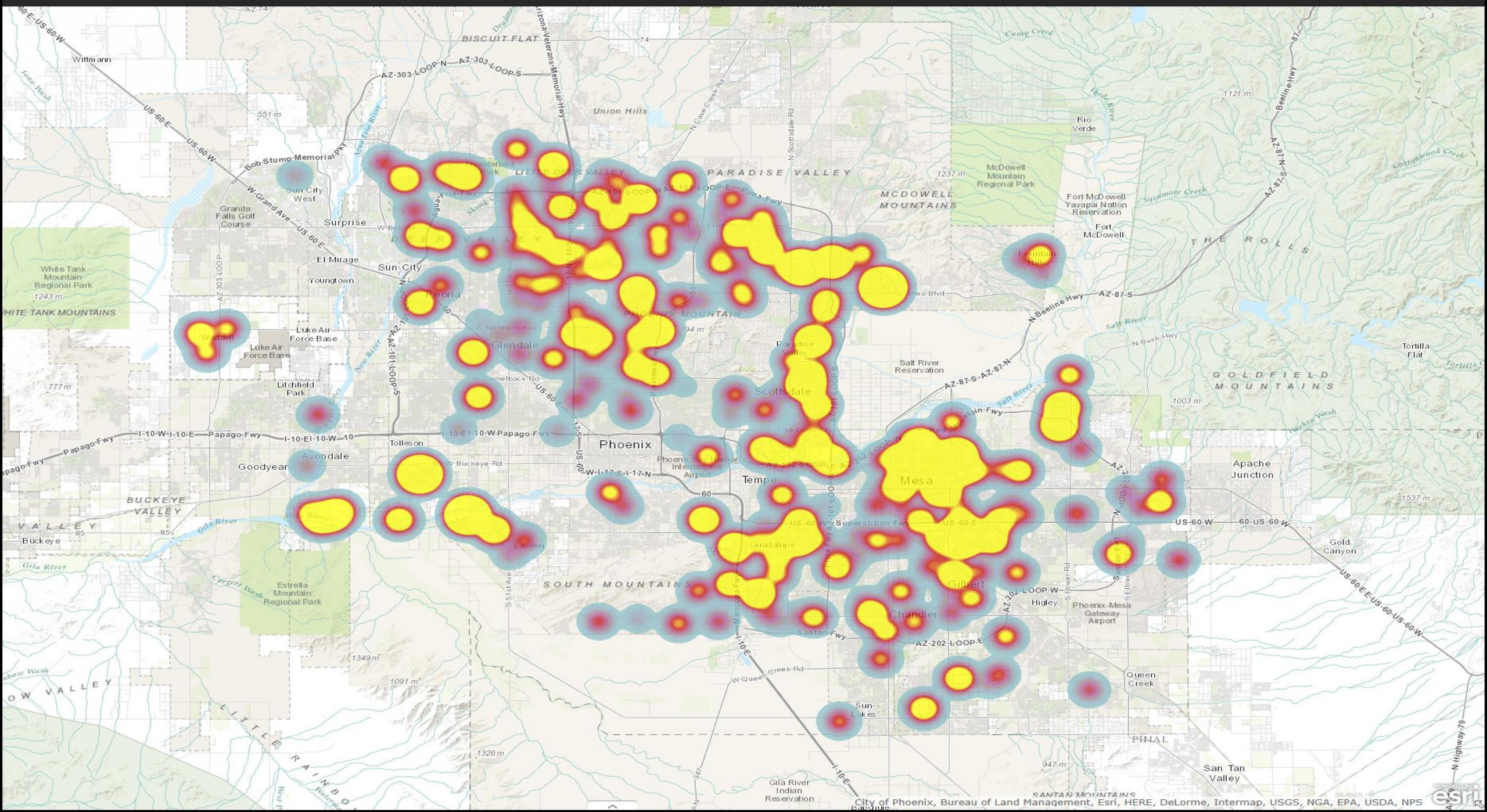
2006 Aedes aegypti activity-Maricopa County Vector Control



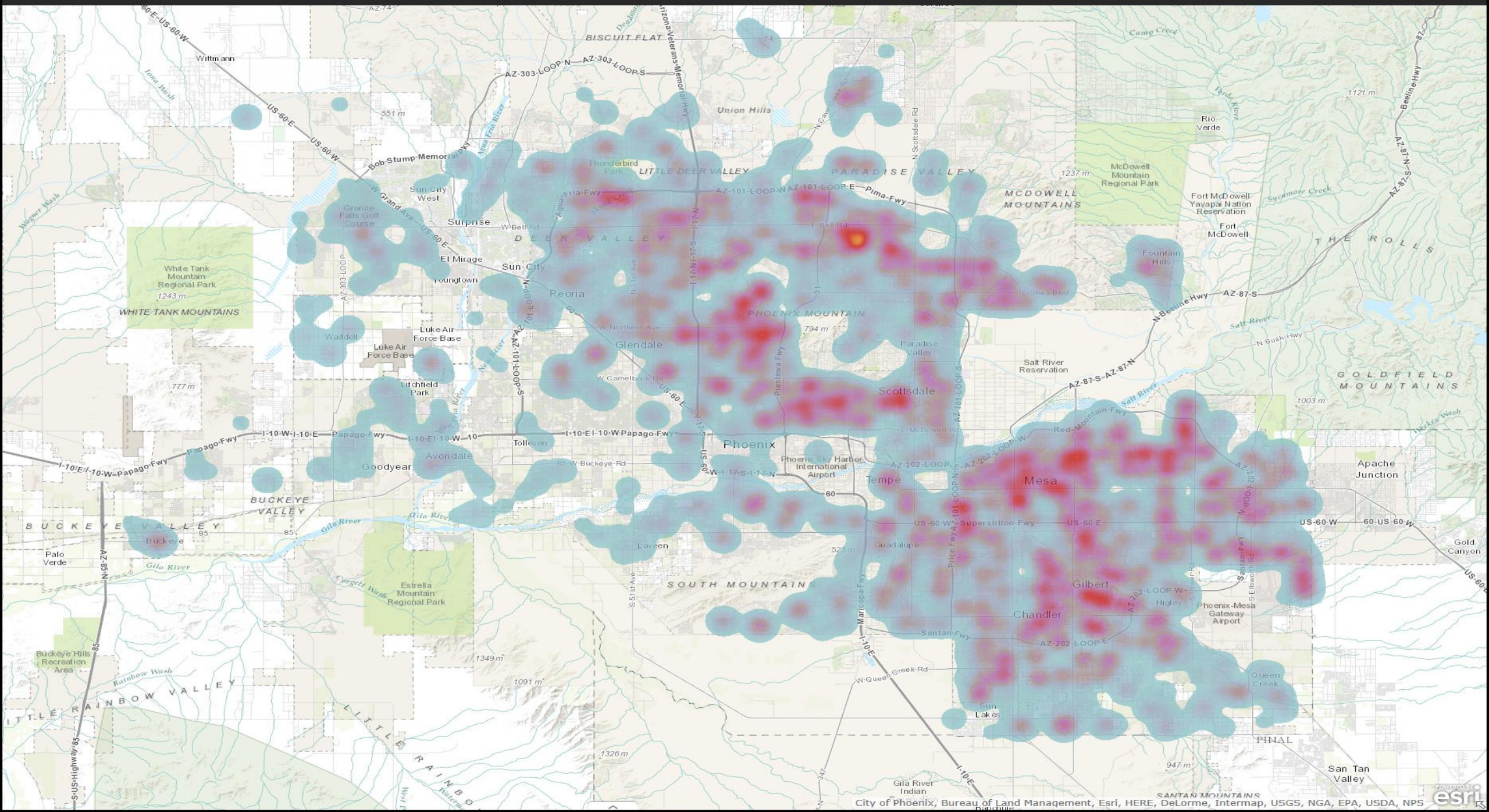
2008 Aedes aegypti activity-Maricopa County Vector Control



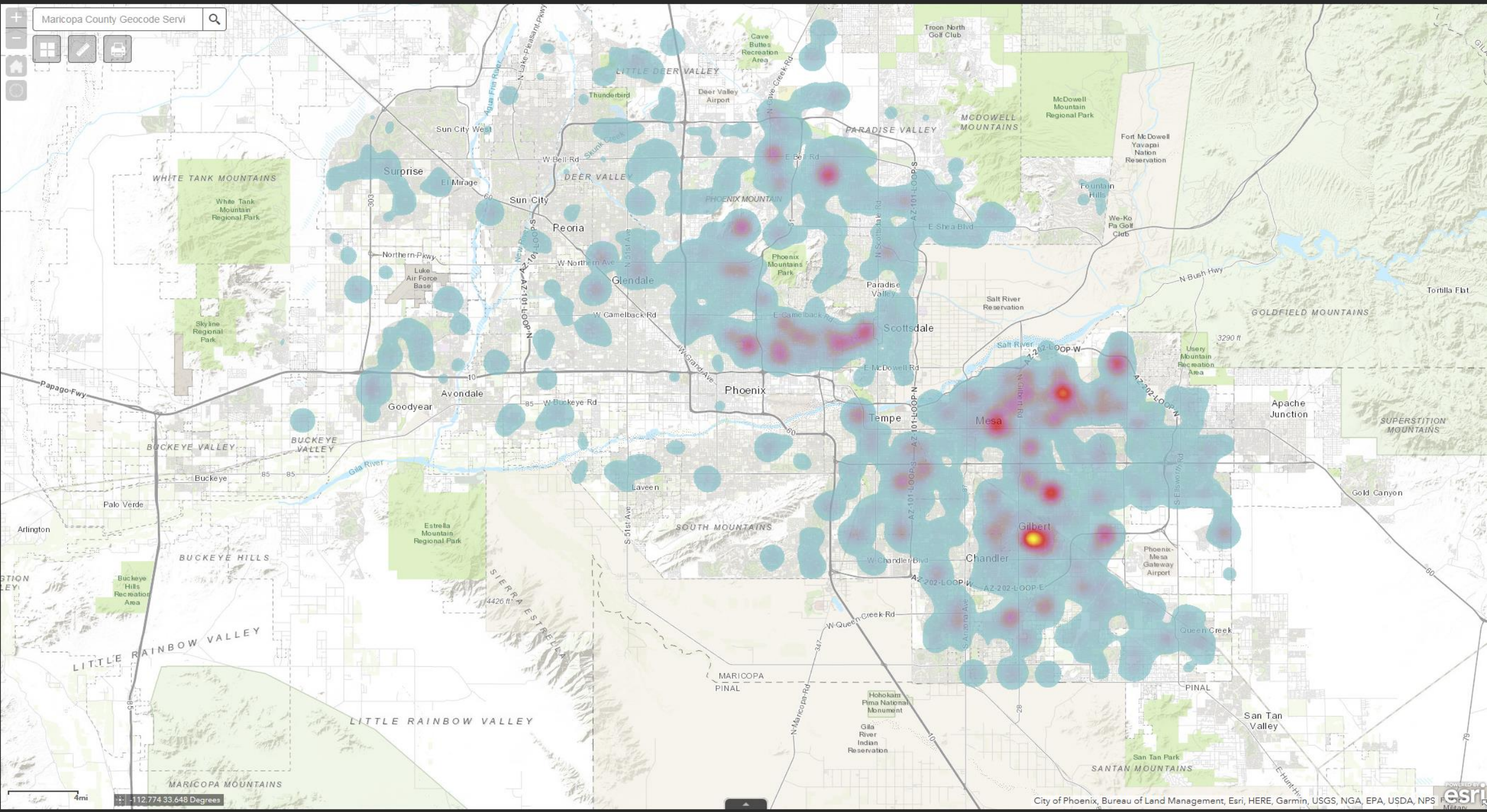
2011 Aedes aegypti activity-Maricopa County Vector Control



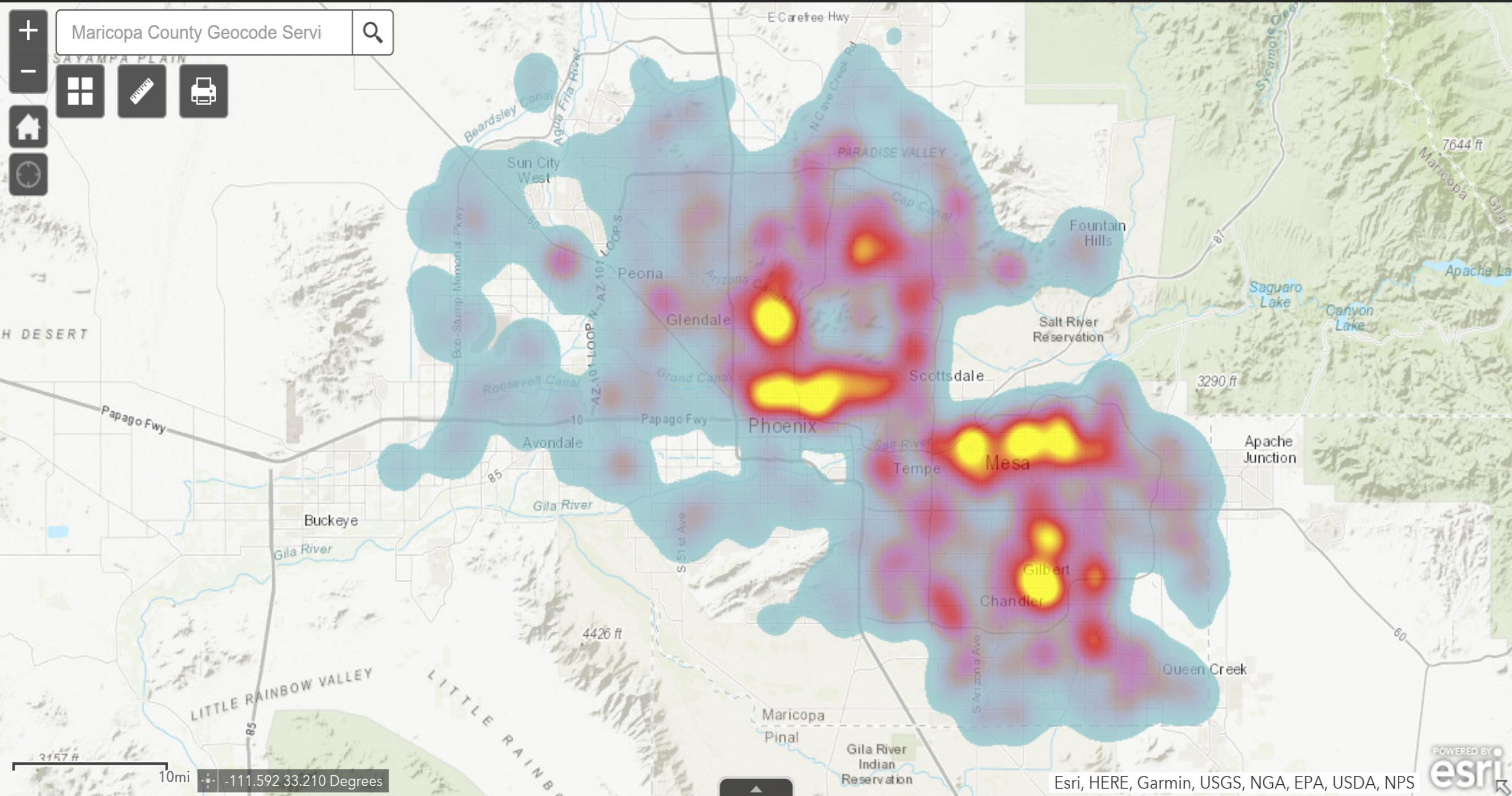
2015 Aedes aegypti activity-Maricopa County Vector Control



2017 Aedes aegypti activity-Maricopa County Vector Control



Aedes aegypti activity-Maricopa County Vector Control



Best Management Practices for Mosquito Management

Set Action Thresholds

Decisions to initiate control measures need to be based on the analysis of either larval or adult mosquito surveillance or other available field data. Programs must establish a mechanism on which decisions to institute control measures are based

Determine threshold values that trigger **routine control measures**. These values are used for guidance but can be influenced by other factors when control operations are instituted – particularly in disease outbreak scenarios or mosquito-borne disease prevention

Maricopa County Treatment Criteria

	Response	Follow Up	Surveillance (Routine Inspection Sites)	CO2 Trap Follow Up to Determine Efficacy of Treatment	Surveillance (Routine Inspection Sites)	CDC Risk Level
+ WNv M+ SLE M	Fog 1 square mile *	Set CO2 traps/survey for breeding site	Larvicide	Yes	Yes	3,4,5
+ WNv H, +SLE H	Set CO2 Traps/survey for breeding site	positive mosquitoes fog 1 square mile	Larvicide	Yes	Yes	3,4,5
+ WNv A, +SLE A	Set CO2 Traps/survey for breeding site	positive mosquitoes fog 1 square mile	Larvicide	Yes	Yes	3,4,5
Flood Water > 300 OR Culex spp > 30*	Fog 1 square mile *	Set CO2 traps	Larvicide	Yes	Yes	2
Aedes aegypti >50	Handheld fogging of the surrounding drains	Set CO2 traps	Larvicide	Yes	Yes	1,2

Best Management Practices for Mosquito Management

Physical Control or Source Reduction

Source reduction (the elimination, removal or modification of larval mosquito habitats) typically is the most effective and economical long-term method of mosquito control, but this may not be practicable for many larval habitats.

Source reduction can be as simple as overturning a discarded bucket, disposing of old tires or turning a wheel barrow upside-down so it won't collect rainwater.

These efforts often minimize and/or eliminate the need for mosquito larviciding in the affected habitat in addition to greatly reducing the need for adulticiding in nearby areas.



Best Management Practices for Mosquito Management

Biological Control

These control methods are often resource-intensive and may not be advisable or practicable for many programs. Nonetheless, their feasibility should be explored.

Stocking of certain species of native, non-invasive fish known to be predators of mosquito larvae, may provide significant reductions in larval mosquito populations and act as a long term treatment option.

Utilization of bats, birds, dragonflies and other predators of mosquitoes can be problematic and ineffective as a primary control strategy and is not recommended as a major component of any control strategy.



Best Management Practices for Mosquito Management

Public Health Mosquitocides

Handling, disposal, personal protective measures and applications must be made in full accordance with products label.

Larvicides Often the primary control method in natural or man-made wetlands, riverine bottomlands, woodland pools, freshwater marshes, roadside ditches, stormwater management ponds, etc. These can also be a primary control method in locations where mosquito populations are determined to be in concentrated sources in urban areas or in close proximity to houses. Larvicides can be labor intensive and expensive to apply to large breeding areas.

Biological larvicides

- a. Microbial larvicides – Bti, Bs, Spinosad
- b. Growth regulators and chitin synthesis inhibitors - methoprene

Chemical larvicides

- a. Organophosphates - Temephos
- b. Oils – petroleum and mineral-based

Best Management Practices for Mosquito Management

Adulticides

Adulticides are applied so as to impinge upon the mosquito target in flight or at rest on vegetation. Adulticiding based on surveillance data is an extremely important part of any integrated mosquito management program and may form the primary treatment method for many programs where comprehensive larviciding is not practical.

Adulticides utilized in basic programs are typically applied as an Ultra-Low-Volume (ULV) spray where small amounts of insecticide are dispersed by aircraft or truck-mounted equipment.



In some jurisdictions, adulticides may also be applied via “thermal fogs”, utilizing heat to atomize droplets. Adult mosquitoes may also be targeted by “barrier treatments”, which involve application of a residual insecticide to vegetation where mosquitoes are known to rest.



Best Management Practices for Mosquito Management

Adulticides Adulticides should only be applied when established spray thresholds have been exceeded.

Non-residual adulticides applied to the air column in order to impinge upon mosquitoes in flight should only be applied when the target species is active.

Adulticides should be applied strictly according to label specifications. This will produce minimal effects on non-target organisms and promote efficacy.

Adulticides should only be applied by personnel trained or certified in their usage and handling.

Adulticides labeled for mosquito control may include:

Organophosphates –Malathion, Naled

Natural pyrethrins -Derived from Chrysanthemum plants

Pyrethroids -Permethrin, Resmethrin, Sumithrin

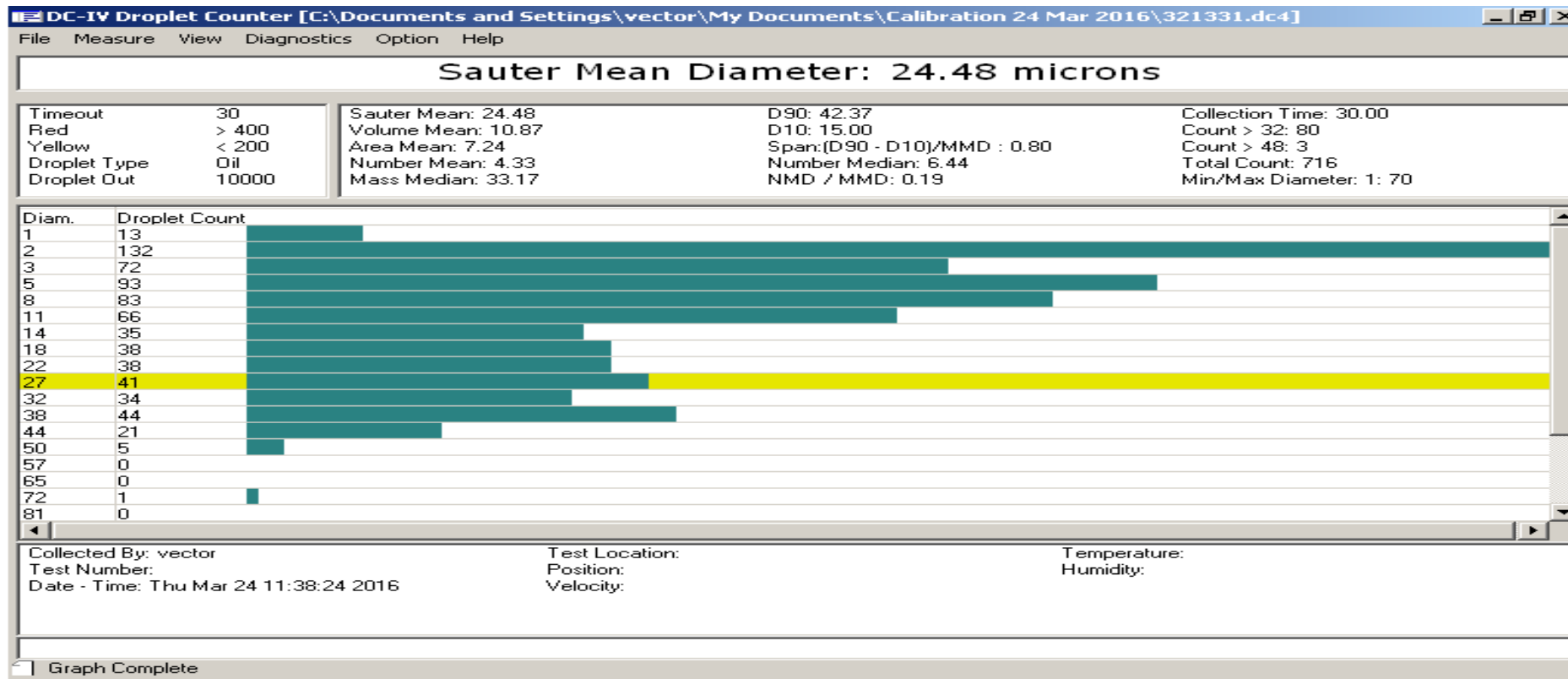
Pyrethroid derivatives –Etofenprox, Deltamethrin

Best Management Practices for Mosquito Management

Adulticides continued

Adulticides should be applied at label rates that are effective as determined by monitoring. Applying doses lower than those that provide adequate control can in fact result in the need for additional adulticide treatments and might encourage development of insecticide resistance.

Adulticide application equipment should be calibrated and maintained per equipment manufacturer's specifications. Droplet size calibration should be performed at the beginning of the fogging season.



Best Management Practices for Mosquito Management

Monitoring for Efficacy/Resistance

Resistance management techniques attempt to minimize the risk of mosquitoes becoming resistant to the existing chemicals and should be practiced in even basic programs

Utilizing physical control/source reduction and biological control methodologies to the maximum extent practicable.

Avoiding the use of the same class of chemical against both immature and adult mosquitoes.

Applying pesticide at the rate recommended on the label. Do not underdose.

Utilizing a different chemical class at the beginning and end of treatment season.

Assessing susceptibility at the beginning and sometime during the mosquito season

Best Management Practices for Mosquito Management

Education & Community Outreach

Education of the general public should be encouraged to enlist resident's support in eliminating mosquito habitat, proper screening methods and proper application of personal protective measures such as repellents to minimize human/mosquito contact



**FIGHT
THE BITE!**

West Nile Virus Hotline
602.506.0700
fogging notification 🟢 green pools
dead birds 🟡 mosquitos



Watch the Video

Video is offered in
Windows Media format

- High Speed
- Dial Up

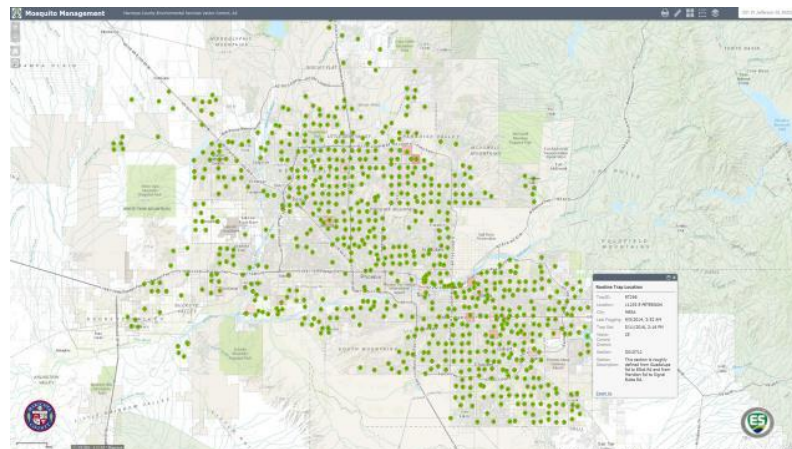
**Need to Schedule
a Presentation for
Your Group?**
~ click here ~

**Reduce your risk
of West Nile Virus**

1. Avoid Mosquito Bites
2. Mosquito-Proof Your Home
3. Help Your Community

CDC

Mosquito control programs should keep their constituents informed of surveillance and control activities to the maximum extent practicable.



- Today's Fogging Schedule
- Upcoming Fogging Schedule

**Mosquito Activity
in your neighborhood**

**SUBSCRIBE TO
WEST NILE VIRUS
INFORMATION UPDATES**

Best Management Practices for Mosquito Management

Record-keeping

Operators/applicators should record the following for each application and maintain the records for the time specified by the **Arizona Department of Agriculture, Pest Management Division**, which is three years

Applicator's name, address and pesticide applicator certification number

Application date and time of day or night

Product name and EPA registration number

General location of application and approximate size of area treated

Amount of material applied

Rate of application

Best Management Practices for Mosquito Management

Record-keeping

Materials Applied

Materials	Amount	Area Treated	Application Rate	Number of Applications	Total Treatment Cost	Cost per Area Treated
5% Skeeter Abate	918 dry oz	229,500 sq.ft.	0.4 dry oz/100 sq.ft	1651 Times	\$831.94	\$0.36
Agnique MMF G Dry	82 dry oz	10,300 sq.ft.	0.8 dry oz/100 sq.ft	42 Times	\$13.27	\$0.13
Altosid XR Briquettes	6,302 ea.	630,200 sq.ft.	1 ea./100 sq.ft	4673 Times	\$20,355.46	\$3.23
Altosid XR-G	3,127 dry oz	446,750 sq.ft.	0.7 dry oz/100 sq.ft	3493 Times	\$1,651.45	\$0.37
Duet	68 gal.	6,804 acres	0.01 gal./acre	27 Times	\$9,146.00	\$1.34
Fish	360 ea.	7,200 sq.ft.	5 ea./100 sq.ft	21 Times	\$54.00	\$0.75
FourStar Briquettes 45	432 lb.	43,200 sq.ft.	1 lb./sq.ft.	298 Times		
FourStar WSP	1,962 lb.	196,150 sq.ft.	1 lb./sq.ft.	2098 Times		
Larvicide Oil	918 fl.oz	61,200 sq.ft.	1.5 fl.oz/100 sq.ft.	360 Times	\$93.23	\$0.15
Natular XRT	369 ea.	36,900 sq.ft.	1 ea./100 sq.ft	168 Times	\$1,424.34	\$3.86
Permanone 30-30	71 gal.	10,121 acres	0.007 gal./acre	39 Times	\$7,789.41	\$0.77
VectoMax WSP	1,330 pouches	66,500 sq.ft.	1 pouch/50 sq.ft	747 Times	\$2,433.90	\$3.26

Best Management Practices for Mosquito Management

Materials Applied by Field Technician

Record-keeping

AcunaR

Altosid XR Briquettes

Amount	ID Number	Area Treated	Application Rate	Treatment Date	Treatment (Area) Notes
16.0 ea.	CC-19-02806	1,600.0 sq.ft.	1 ea./100 sq.ft.	02/14/19	

Altosid XR-G

Amount	ID Number	Area Treated	Application Rate	Treatment Date	Treatment (Area) Notes
0.7 dry oz	267254	100.0 sq.ft.	0.7 dry oz/100 sq.ft.	02/14/19	

FourStar WSP

Amount	ID Number	Area Treated	Application Rate	Treatment Date	Treatment (Area) Notes
2.0 lb.	4360-1	100.0 sq.ft.	1 lb./sq.ft.	02/05/19	
2.0 lb.	4360-10	100.0 sq.ft.	1 lb./sq.ft.	02/05/19	
2.0 lb.	4360-2	100.0 sq.ft.	1 lb./sq.ft.	02/05/19	
2.0 lb.	4360-3	100.0 sq.ft.	1 lb./sq.ft.	02/05/19	
2.0 lb.	4360-4	100.0 sq.ft.	1 lb./sq.ft.	02/05/19	
1.0 lb.	4360-5	50.0 sq.ft.	1 lb./sq.ft.	02/05/19	
1.0 lb.	4360-6	50.0 sq.ft.	1 lb./sq.ft.	02/05/19	
1.0 lb.	4360-7	50.0 sq.ft.	1 lb./sq.ft.	02/05/19	
1.0 lb.	4360-8	50.0 sq.ft.	1 lb./sq.ft.	02/05/19	
1.0 lb.	4360-9	50.0 sq.ft.	1 lb./sq.ft.	02/05/19	

Larvicide Oil

Amount	ID Number	Area Treated	Application Rate	Treatment Date	Treatment (Area) Notes
6.0 fl.oz	CC-19-02806	400.0 sq.ft.	1.5 fl.oz/100 sq.ft.	02/14/19	

VectoMax WSP

Amount	ID Number	Area Treated	Application Rate	Treatment Date	Treatment (Area) Notes
2.0 lb.	2645-1	100.0 sq.ft.	1 lb./sq.ft.	02/08/19	
2.0 lb.	2645-2	100.0 sq.ft.	1 lb./sq.ft.	02/08/19	
2.0 lb.	4500-1	100.0 sq.ft.	1 lb./sq.ft.	02/08/19	
1.0 lb.	6097	50.0 sq.ft.	1 lb./sq.ft.	02/11/19	
2.0 lb.	RSI1265	100.0 sq.ft.	1 lb./sq.ft.	02/11/19	
2.0 lb.	RSI1268	100.0 sq.ft.	1 lb./sq.ft.	02/11/19	
2.0 lb.	SC003	100.0 sq.ft.	1 lb./sq.ft.	02/11/19	
2.0 lb.	SC006	100.0 sq.ft.	1 lb./sq.ft.	02/11/19	
1.0 lb.	SC038	50.0 sq.ft.	1 lb./sq.ft.	02/11/19	
2.0 lb.	3036-1	100.0 sq.ft.	1 lb./sq.ft.	02/12/19	
2.0 lb.	3036-2	100.0 sq.ft.	1 lb./sq.ft.	02/12/19	
2.0 lb.	5264	100.0 sq.ft.	1 lb./sq.ft.	02/14/19	
2.0 lb.	RSI1488	100.0 sq.ft.	1 lb./sq.ft.	02/14/19	

Best Management Practices for Mosquito Management

Thank You



John Townsend
Maricopa County Environmental Services
Vector Control Division Manager
(602) 506-0703