



# Fulton County and Clarke: A Twelve Year Partnership in Mosquito Control

## Program Overview

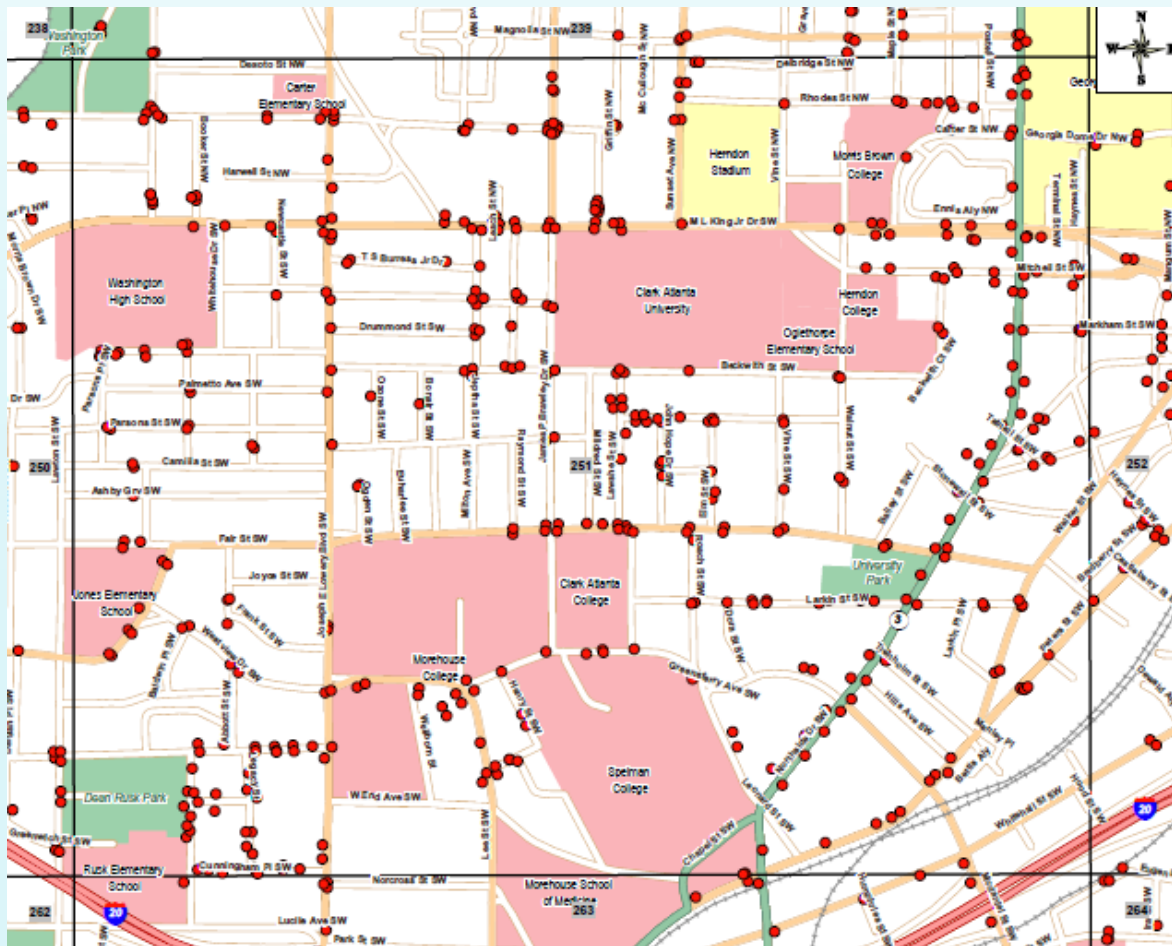
- Clarke Environmental Mosquito Management, Inc. has been Fulton County's mosquito control contractor since 2001, the year WNV was introduced in the area.
- During this time, Clarke and Fulton County have developed a comprehensive mosquito control program that protects the public health of over 900,000 residents
- Clarke has obtained historical data and operational maps for Fulton County that include Surveillance maps for ABC and gravid trap locations, 12,000 catch basins, larval sites and backpack barrier application

# Program Overview

- Key program objectives:
  - Control the key vector and nuisance mosquito species in man-made container habitats, such as street catch basins and tire piles
    - Main species of interest: *Culex quinquefasciatus* (WNV), *Aedes albopictus* (nuisance)
  - Utilize environmentally sensitive larval control products:
    - Natular (OMRI certified, EPA reduced-risk larvicide)
    - Vectolex CG
  - Inspect and larvicide historical mosquito larval habitats in residential areas
  - Adult mosquito surveillance in historical “hot spot” areas
  - Provide emergency response in the event of an outbreak of mosquito-borne disease

## Catch Basin Overview

- In 2011, Clarke began using Natular XRT larvacide tablets to treat 12,000 open street catch basins
  - Active ingredient in Natular is spinosad, the product of a naturally occurring soil bacterium
  
- Previously designated "Hot Spots" are treated first.
  - Historical WNV-positive mosquitoes
  - High-risk populations
  - Public lands such as parks, schools, recreational areas



ACCOUNT NAME:  
**FULTON CO.**

ACCOUNT NUMBER:  
**003397**

**CB SECTION 251**





**CB = 424**

DATE TREATED: \_\_\_\_\_

CB TREATED: \_\_\_\_\_

TECH: \_\_\_\_\_ / SUPERVISOR \_\_\_\_\_

IMPORTANT! CB TREATED = PRODUCT USED

-  TREATED
-  DELETE
-  NOT TREATED, DO NOT DELETE
-  NEW

REVISION DATE: April 22, 2008

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**CLARKE**  
Mosquito Control

## Bicycle Program

- In 2011, Clarke introduced Bicycles to treat catch basins to promote environmentally sustainable practices in Fulton County
- In the past two years, over 3,000 catch basins were treated by bikes
- This program, along with handheld smart phones to capture data, was implemented to support minimizing carbon footprint



# Inspection and Larval Treatment

- When the program started in 2001, a helicopter survey was performed to map potential mosquito larvae development sites in Fulton County.
- Over the past 10 years, maps of ravines, wetlands, tire shops, tire piles, etc. have been continuously updated and refined to pinpoint key tire locations and key larval development sites
- These sites are primarily treated with backpack application of Vectox CG and tire piles are retreated every 30 days unless otherwise specified by the county
- Tire piles/illegal tire dumping is a major problem in the county

# Tire Piles of Fulton County...



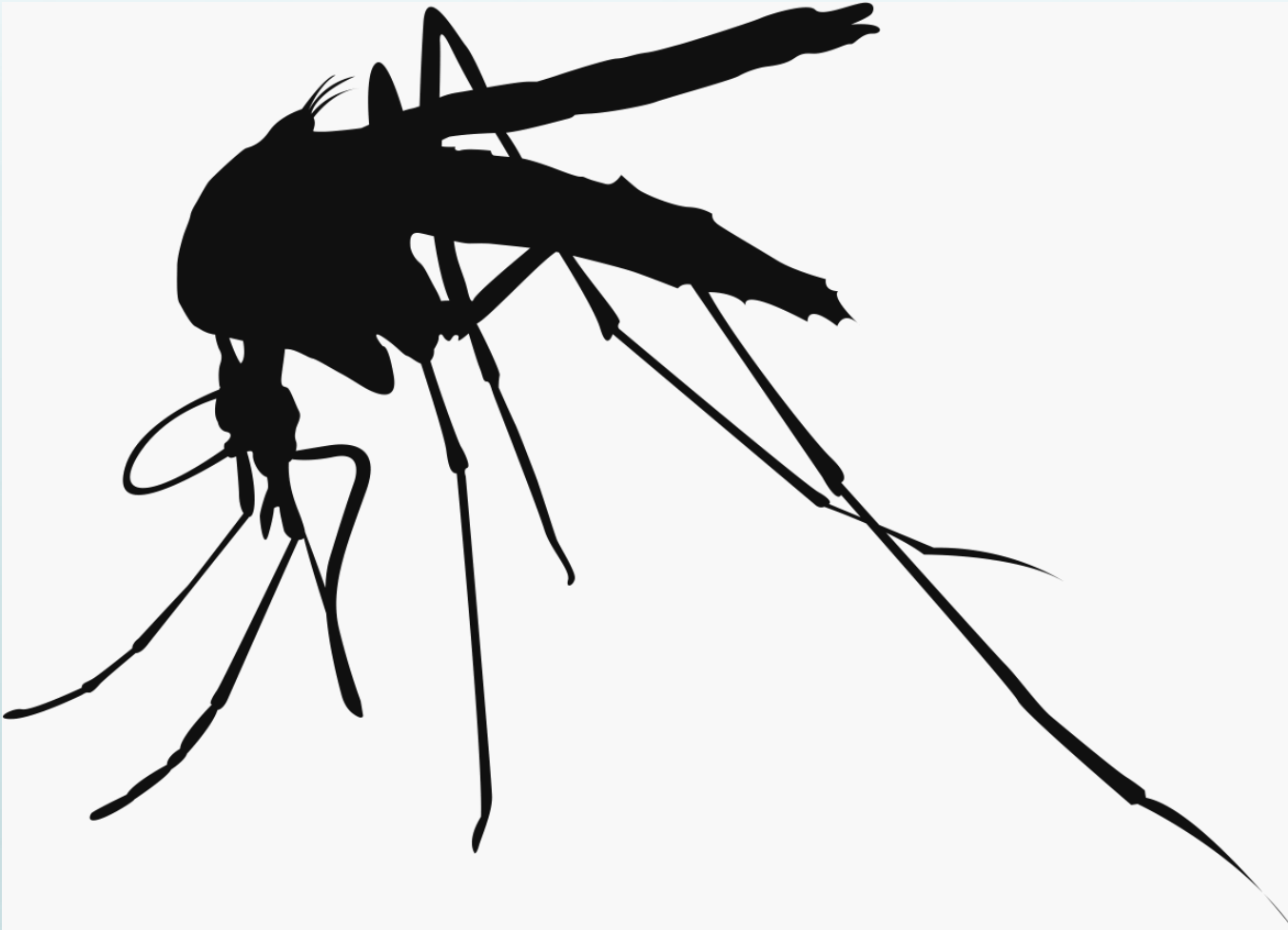
## Barrier Treatment

- In 2012, increased WNV activity nationwide prompted Fulton County to take a proactive approach to adulticiding around WNV-positive mosquitoes and humans.
  - Backpack barrier treatments performed with Flit 10EC (5% permethrin) on vegetation and mosquito resting habitat
- Barrier spraying focused primarily around positive mosquito pool trap sites, and any citizen complaints that were referred to Clarke from Fulton County

## Surveillance

- There are a total of 30 trap sites that are spread throughout the county.
- A total of 280 gravid traps and 50 ABC traps were set totaling 330 trap nights
- Pooling/testing of adult mosquitoes is completed in the Regional laboratory in Manassas, VA
  - PCR confirmation performed by UGA on all WNV-positive pools

# Adult Mosquito Surveillance in Fulton County, GA from 2001 to 2012



**Andy Lima – Clarke – GMCA, October 17<sup>th</sup> – 19<sup>th</sup>, 2012**

# National and Local Weather Trends

- Mid-July, 55% of U.S. in moderate to extreme drought (most since 1956)
  - Mostly central US, but western and central GA also very dry
    - Moderate to exceptional drought for all of 2012 in Fulton County.
    - Exceptional heat in late June/early July in Atlanta
    - The mean temperature for June-August (74.41 °F) was the 3<sup>rd</sup> warmest summer on record.
      - [http://droughtmonitor.unl.edu/12\\_week.gif](http://droughtmonitor.unl.edu/12_week.gif)

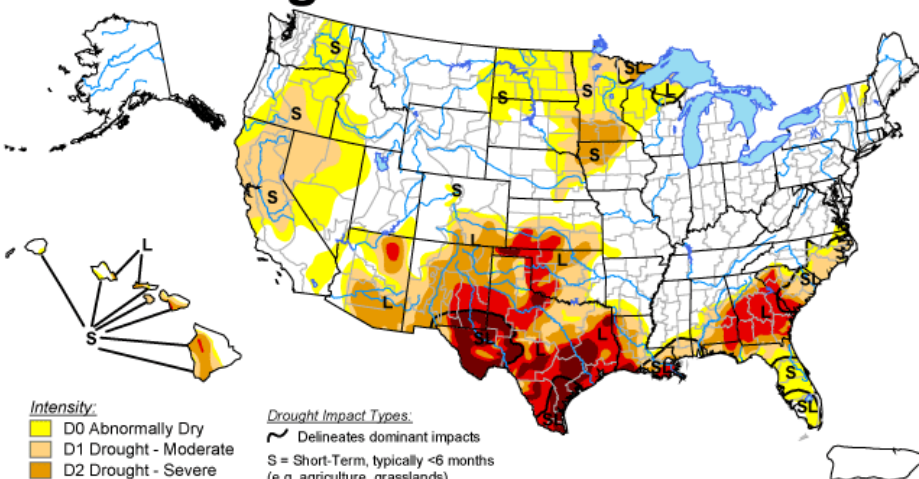
# Nationwide Drought

## January 2012

## October 2012

### U.S. Drought Monitor

January 3, 2012  
Valid 7 a.m. EST



#### Intensity:

- Yellow: D0 Abnormally Dry
- Orange: D1 Drought - Moderate
- Red: D2 Drought - Severe
- Dark Red: D3 Drought - Extreme
- Black: D4 Drought - Exceptional

#### Drought Impact Types:

- ~ Delineates dominant impacts
- S = Short-Term, typically <6 months (e.g. agriculture, grasslands)
- L = Long-Term, typically >6 months (e.g. hydrology, ecology)

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

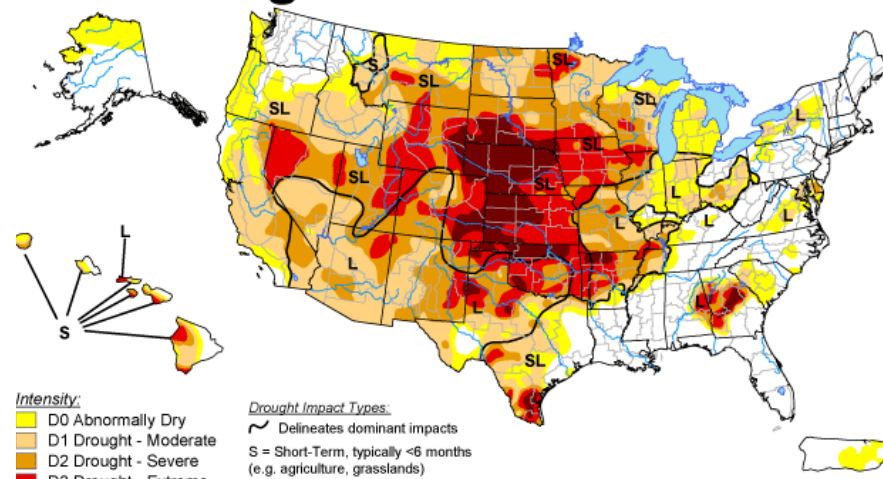
<http://droughtmonitor.unl.edu/>



Released Thursday, January 5, 2012  
Author: Brad Rippey, U.S. Department of Agriculture

### U.S. Drought Monitor

October 9, 2012  
Valid 7 a.m. EDT



#### Intensity:

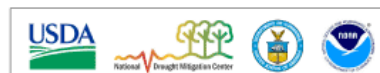
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<http://droughtmonitor.unl.edu/>



Released Thursday, October 11, 2012  
Author: Matthew Rosencrans, NOAA/NWS/NCEP/CPC

# Georgia Drought

## January 2012

## October 2012

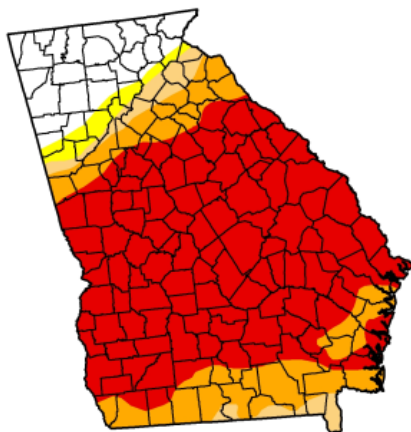
### U.S. Drought Monitor

Georgia

January 3, 2012

Valid 7 a.m. EST

	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	12.07	87.93	85.36	81.00	63.92	0.00
Last Week (12/27/2011 map)	12.07	87.93	85.36	81.00	63.92	0.00
3 Months Ago (10/04/2011 map)	5.59	94.41	90.93	87.59	77.63	0.00
Start of Calendar Year (12/27/2011 map)	12.07	87.93	85.36	81.00	63.92	0.00
Start of Water Year (09/27/2011 map)	5.62	94.38	90.72	85.56	78.76	0.00
One Year Ago (12/28/2010 map)	2.42	97.58	85.37	40.34	6.49	0.00



#### Intensity:

■ D0 Abnormally Dry  
■ D1 Drought - Moderate  
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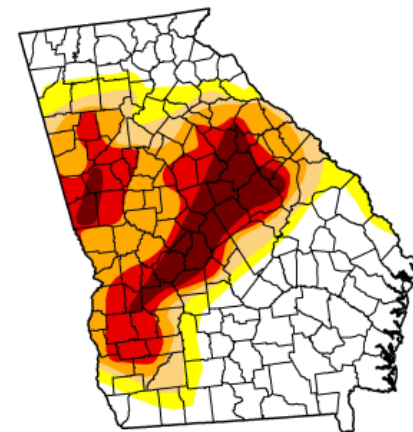
### U.S. Drought Monitor

Georgia

October 9, 2012

Valid 7 a.m. EST

	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	44.69	55.31	45.58	37.07	21.78	9.03
Last Week (10/02/2012 map)	42.42	57.58	47.77	38.67	21.78	9.03
3 Months Ago (07/10/2012 map)	12.29	87.71	75.71	59.14	38.44	21.73
Start of Calendar Year (12/27/2011 map)	12.07	87.93	85.36	81.00	63.92	0.00
Start of Water Year (09/25/2012 map)	37.30	62.70	52.44	42.66	34.04	17.18
One Year Ago (10/04/2011 map)	5.59	94.41	90.93	87.59	77.63	0.00



#### Intensity:

■ D0 Abnormally Dry  
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Released Thursday, October 11, 2012  
Matthew Rosencrans, NOAA/NWS/NCEP/CPC

# Combined Sewer Systems (CSS) and Combined Sewer Overflows (CSO)

- **Separated Sewer System** – A two-pipe sewer system in which one pipe collects sewage and sends it to a wastewater treatment plant and the other pipe collects stormwater, which is typically discharged to a stream.
- **Combined Sewer System** – A one-pipe sewer system in which a single pipe collects both sewage and stormwater.
- **CSO (Combined Sewer Overflow)** – Designed discharge from a combined sewer system into a stream. Usually occurs during heavy rainfall.

# Atlanta has a Combined Sewer System.

- Combined sewer systems are remnants of the country's early infrastructure and so are typically found in older communities.
- Combined sewer systems serve roughly 772 communities containing about 40 million people.
- Most communities with combined sewer systems (and therefore with CSOs) are located in the Northeast and Great Lakes regions, and the Pacific Northwest (see map on following slide).

# CSS locations in the United States

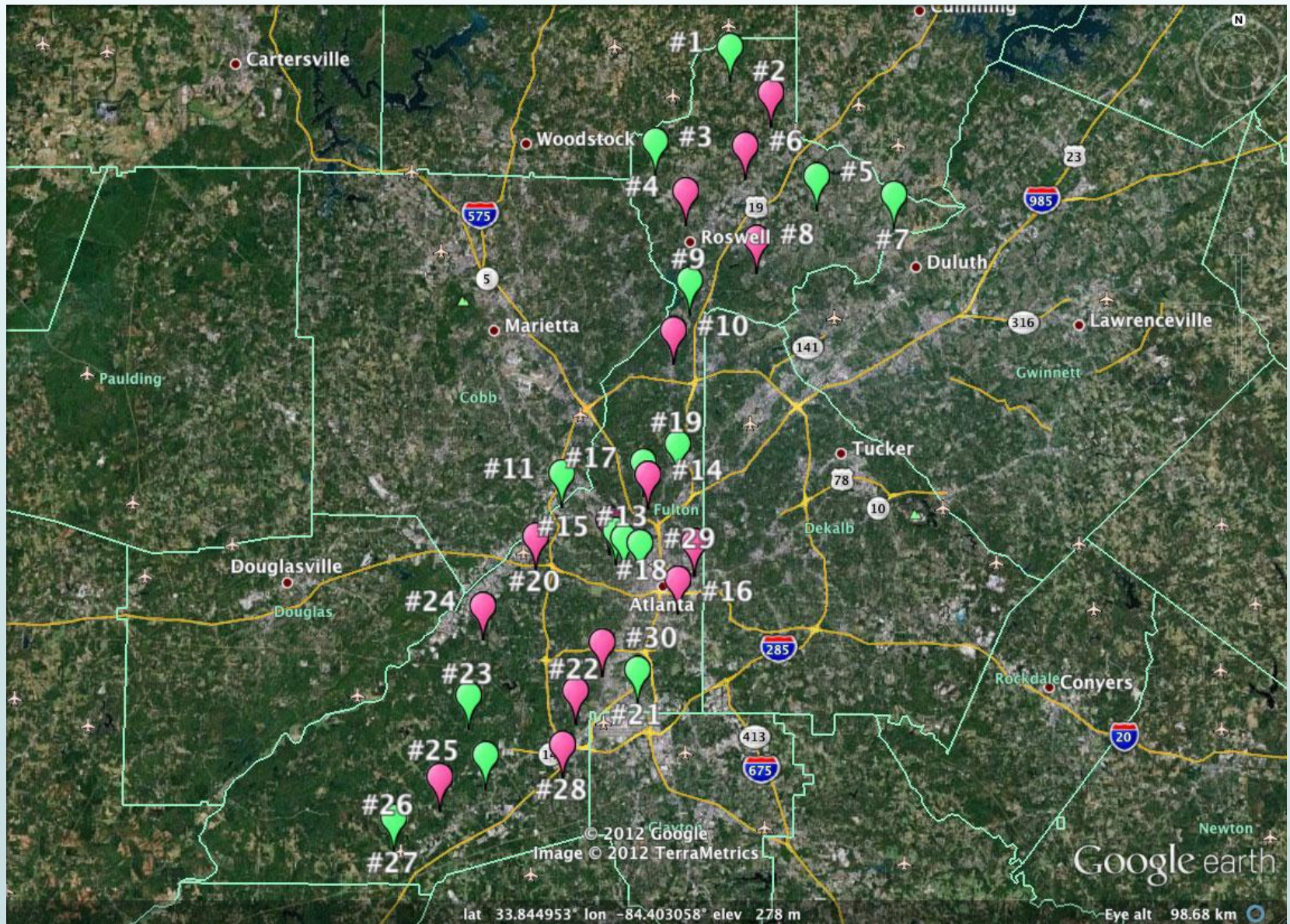


<http://cfpub.epa.gov/npdes/cso/demo.cfm>

# Mosquito Surveillance Schedule

- 30 trap sites, 10 in each region of Fulton Co. (north, central, south)
- 15 trap sites active each epiweek (27—42)
  - Alternate between odds and evens each week
- Traps set/picked up Monday thru Wednesday
  - Shipped overnight for screening at regional lab (Manassas, VA)
  - Positives shipped overnight to UGA for PCR confirmation
    - Official positive data usually received about 7 to 10 days after trap set

# FULTON COUNTY TRAP LOCATIONS



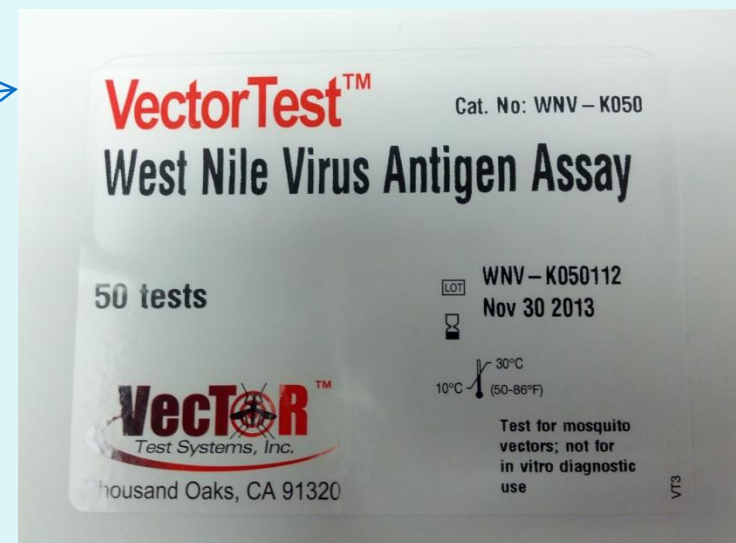
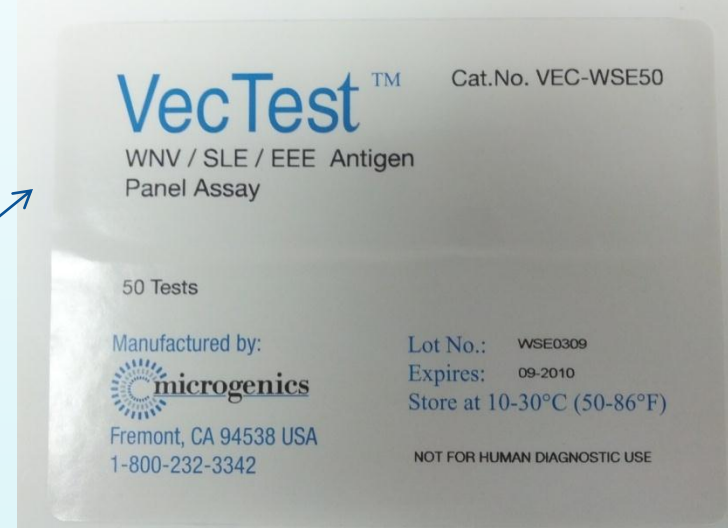
# Adult Mosquito Collections

- 280 Gravid Trap Nights
- 50 ABC Trap Nights
- **330 total Trap Nights**
  - 6/10/2012 (epiweek 24) thru 10/20/2012 (epiweek 42)
    - **VectorTest mosquitoes from July 1<sup>st</sup> (epiweek 27) to October 20<sup>th</sup>, 2012 (epiweek 42)**
    - **PCR confirmation of all WNV + pools by UGA**



# Testing Mosquitoes for WNV

- First season using VectorTest to screen mosquito pools for WNV.
- Thermo-Fisher discontinued VecTest production (August)
  - standard field wick assay since 2001
- Kirti Dave created similar wick assay called VectorTest which is readily available and will be the new standard. (kirtidave@aol.com)



# VectorTest Protocol

- Mosquitoes ID'd to species at each of (30) trap sites
  - 10 to 50 per pool
  - *Cx. quinquefasciatus*
- Pools testing WNV+ submitted to UGA for PCR confirmation
- Cold chain maintained through collection, shipment, and confirmation

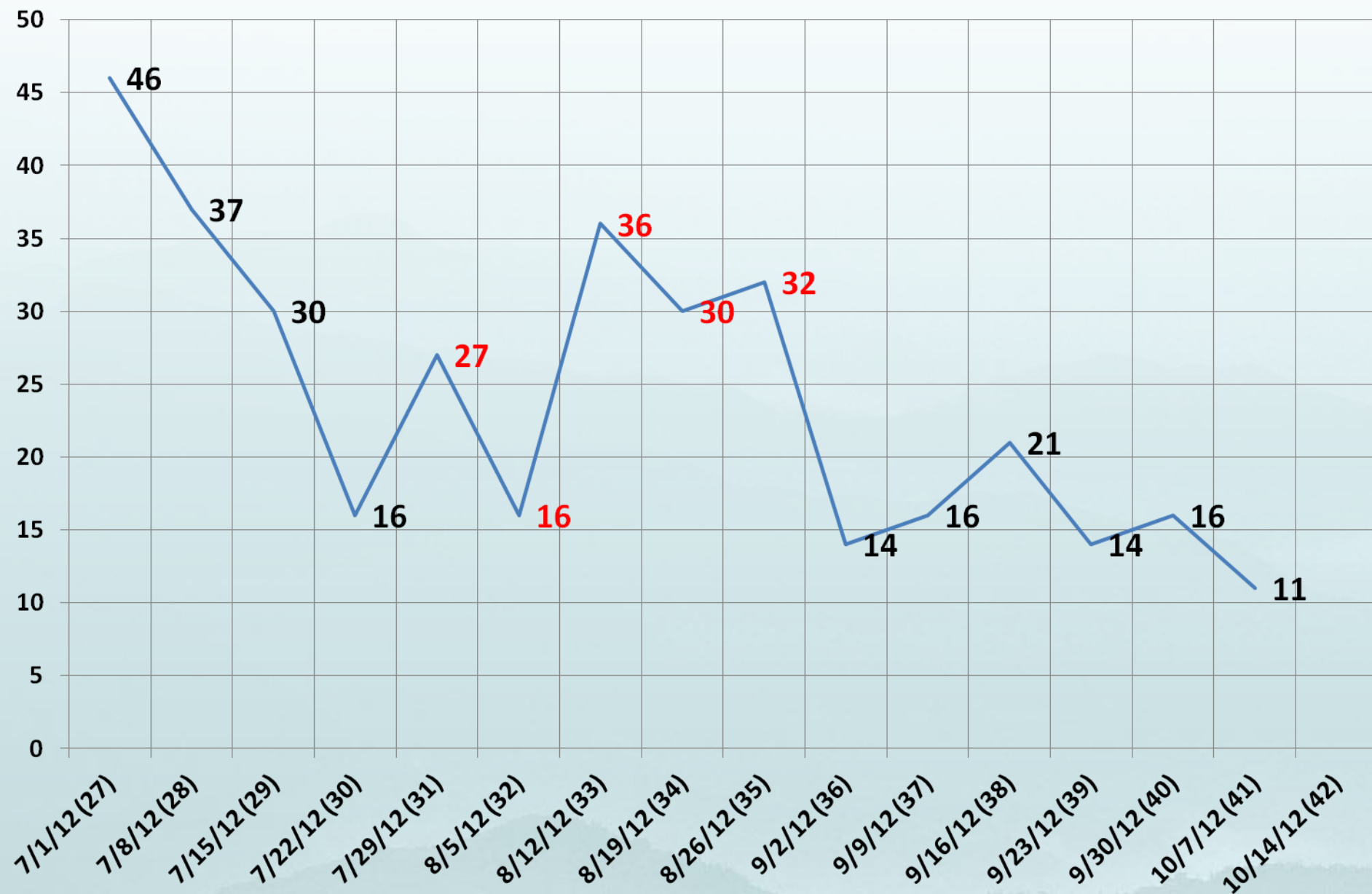


# 2012 Testing Results

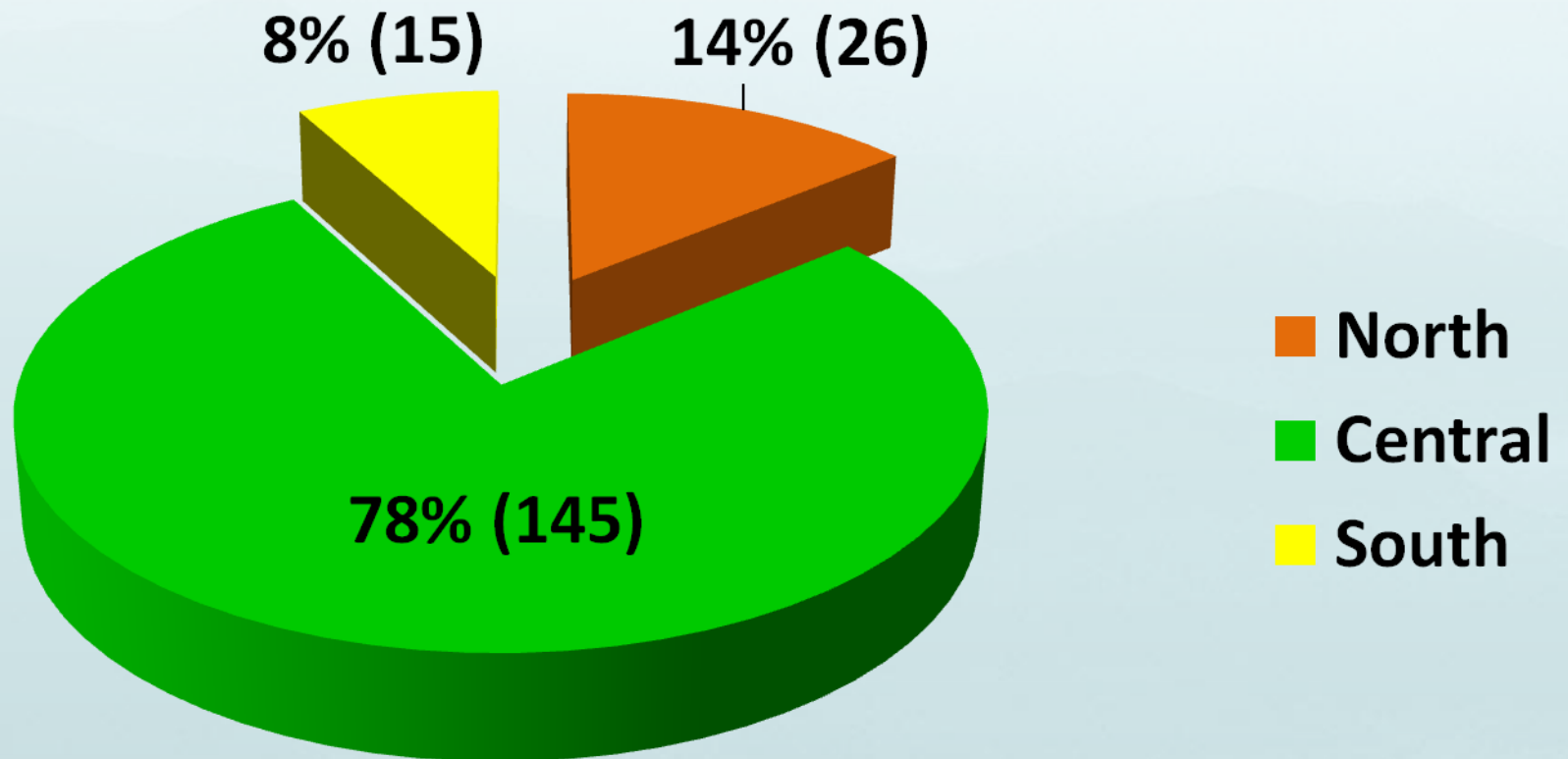
- 28 pools out of 126 WNV + by VectorTest (22%)
- PCR confirmations
  - UGA, lab of Dr. Daniel Mead
    - Nested RT-PCR using mosquito homogenate from VectorTest
    - 100% confirmation of VectorTest positives by PCR



AVG # mosquitoes pooled per test by epiweek in Fulton County, GA – 2012



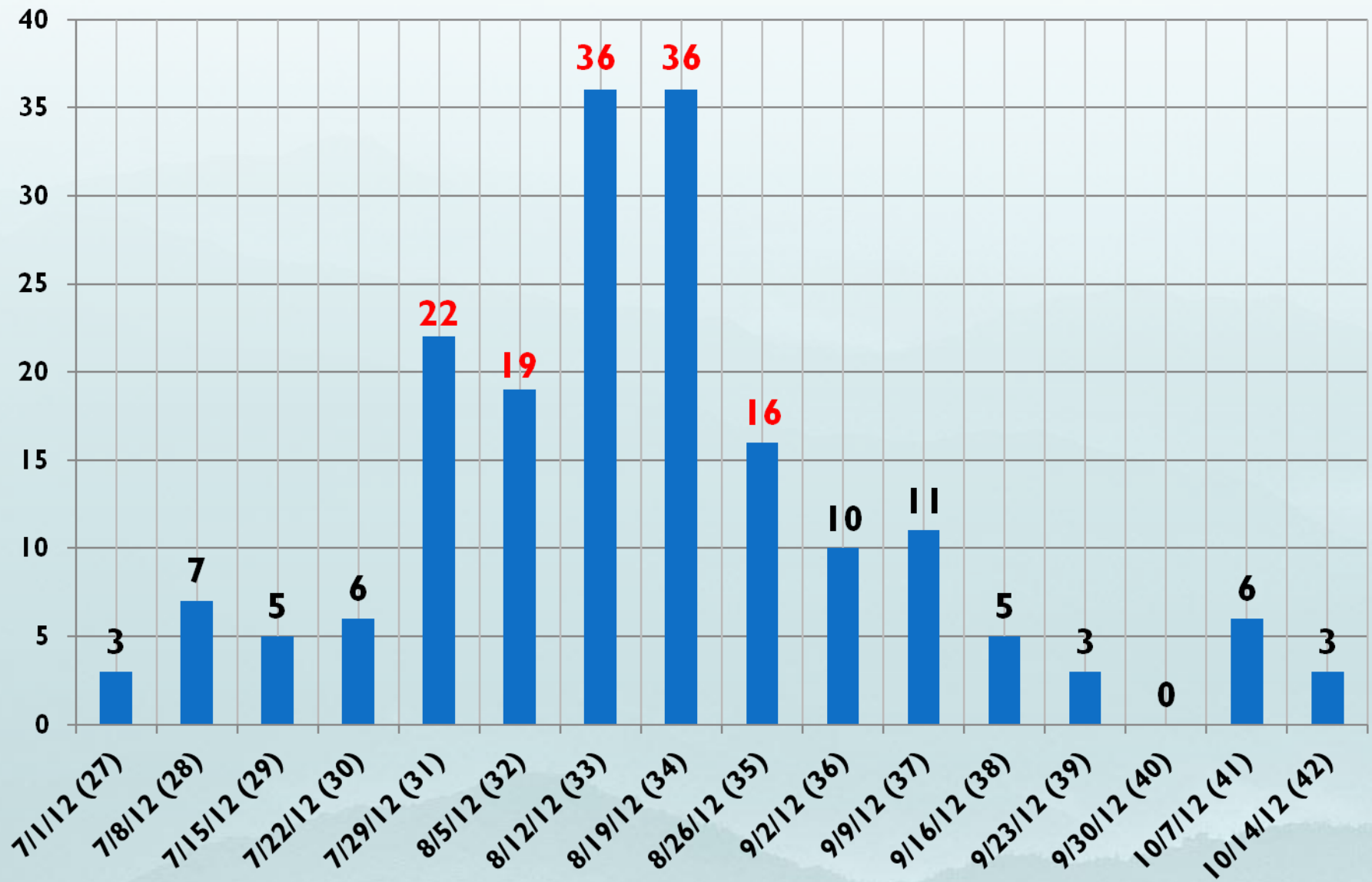
## Proportion of WNV+ Pools from each region of Fulton County, GA



# WNV+ mosquito pools in Fulton County by trap location, 2006 – 2012

Site name	2006	2007	2008	2009	2010	2011	2012	7-year total	HIST # positives	% POS from region
White Column Golf Course								0	26	14%
Alpharetta Park								0		
Brookfield West C.C								0		
Roswell Area Park	1		1		3	1	5	11		
Ocee Park								0		
Wills Park					5		1	6		
Abbotts Bridge Rd. and Bales	1							1		
East Roswell Park					1	2		3		
North Annex								0		
Sandy Springs Health Center	1				2	1	1	5		
Whittier Mills Park	2		4	1		1	1	9	145	78%
North CSO (now Grove Park)		2	4	3	8		3	20		
Greens Ferry CSO	1				7	8		16		
Tanyard Creek CSO	2				1	4	2	9		
1388 West Ave.		1	3		3	7	2	16		
Mounted Police	1	2		2	14	1		20		
Bobby Jones Golf Course	3	1			2	4	2	12		
Springvale Park	1	1	1	1	6		4	14		
Frankie Allen Park	3	1	4		6	3	3	20		
Adamsville Health Center			1		8			9		
Hapeville Police Dept.	2			1				3	15	8%
Truitt 4-H Center			5			1	1	7		
4480 Stonewall Tell Rd.								0		
Sandtown Park					1			1		
Ronald Bridges Park							1	1		
Duncan Memorial Park								0		
Wilkerson Mill Farris Park								0		
Burdett Park							1	1		
Rico Rd. (now 186 Sunset Ave.)								0		
HJC Bowden Senior Center						1	1	2		
	18	8	23	8	67	34	28		186	

## Total #WNV positives by epiweek in Fulton County, GA (2006 -- 2012)

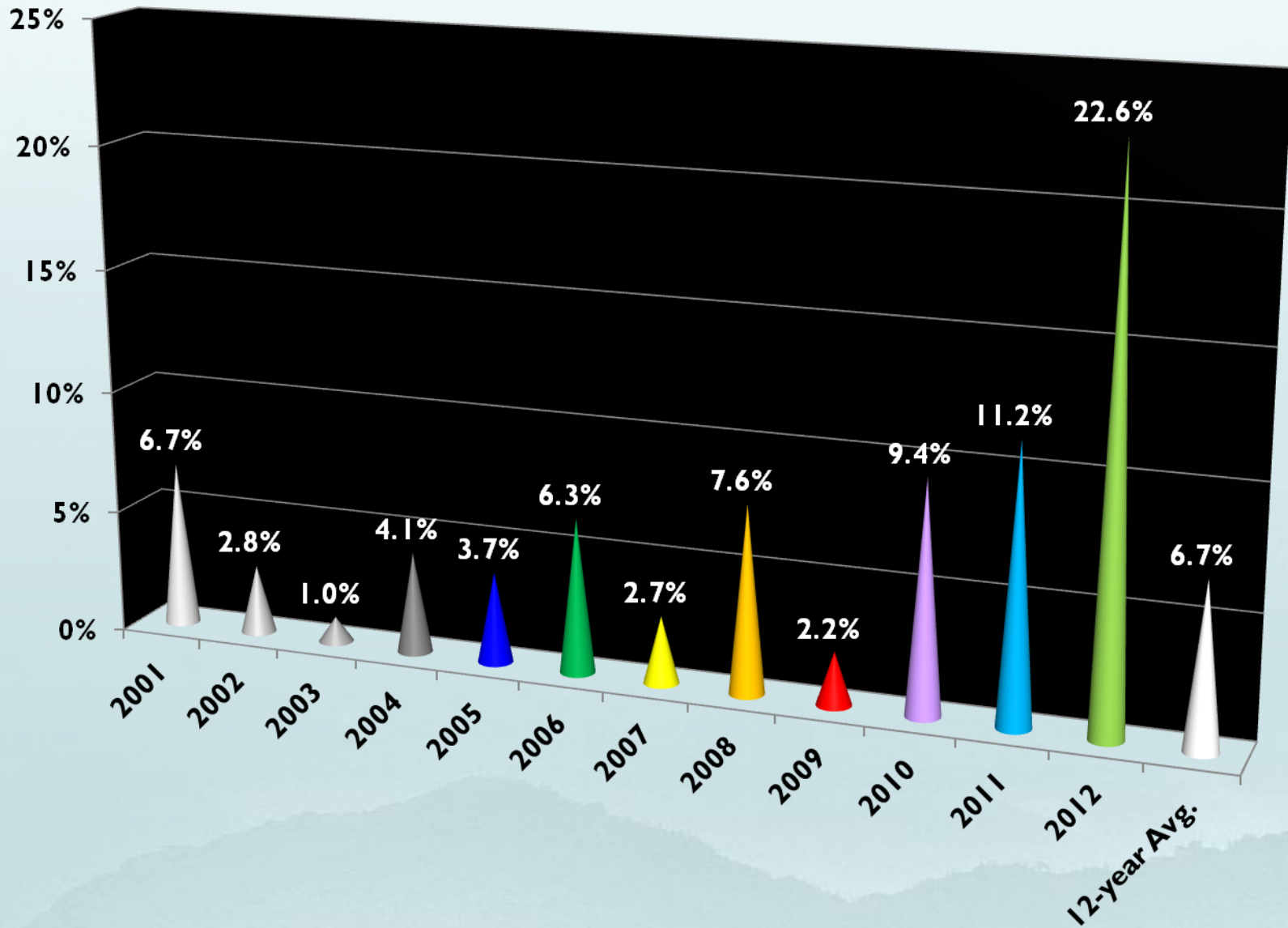


# Proportion of Fulton County mosquito pools WNV positive, 2001 – 2012

Fulton County	# Pools Tested	# Pools Positive	% Pools Positive
2001	460	31	6.7%
2002	2012	56	2.8%
2003	1472	15	1.0%
2004	1530	63	4.1%
2005	969	36	3.7%
2006	301	19	6.3%
2007	293	8	2.7%
2008	301	23	7.6%
2009	371	8	2.2%
2010	713	67	9.4%
2011	276	31	11.2%
2012	124	28	22.6%
12-year Avg.	735	32	6.7%

- High % in 2012 likely due to:
  - Larger # mosquitoes per WNV test (up to 50 instead of up to 25 with direct PCR)
  - More targeted testing (*Cx. quinquefasciatus* only)
  - WNV epidemic in 2012

# Percentage of Fulton County mosquito pools positive for WNV, 2001 -- 2012



## Number of WNV-positive humans in the United States, 2001 – 2012

	# Human WNV cases	# Deaths	% Mortality
<b>12-year AVG.</b>	<b>2965</b>	<b>119</b>	<b>5.3%</b>
<b>*2012*</b>	<b>4249</b>	<b>168</b>	<b>4.0%</b>
<b>*2011*</b>	<b>712</b>	<b>43</b>	<b>6.0%</b>
<b>*2010*</b>	<b>1021</b>	<b>57</b>	<b>5.6%</b>
<b>*2009*</b>	<b>720</b>	<b>32</b>	<b>4.4%</b>
<b>*2008*</b>	<b>1356</b>	<b>44</b>	<b>3.2%</b>
<b>*2007*</b>	<b>3630</b>	<b>124</b>	<b>3.4%</b>
<b>*2006*</b>	<b>4269</b>	<b>177</b>	<b>4.1%</b>
<b>*2005*</b>	<b>3000</b>	<b>119</b>	<b>4.0%</b>
<b>*2004*</b>	<b>2539</b>	<b>100</b>	<b>3.9%</b>
<b>*2003*</b>	<b>9862</b>	<b>264</b>	<b>2.7%</b>
<b>*2002*</b>	<b>4156</b>	<b>284</b>	<b>6.8%</b>
<b>*2001*</b>	<b>66</b>	<b>10</b>	<b>15.2%</b>
<b>Totals</b>	<b>35580</b>	<b>1422</b>	

Source: CDC/USGS. Does not include viremic blood donors. % mortality computed by me.

# According to the CDC (and Ros)...

- As of October 9<sup>th</sup>, 2012:
  - A total of 4,249 cases of West Nile virus disease in people, including 168 deaths, have been reported to CDC. Of these, 2,123 (50%) were classified as neuroinvasive disease (such as meningitis or encephalitis) and 2,126 (50%) were classified as non-neuroinvasive disease.
  - The 4,249 cases reported thus far in 2012 is the highest number of West Nile virus disease cases reported to CDC through the second week in October since 2003. Almost 70 percent of the cases have been reported from eight states (Texas, California, Louisiana, Mississippi, South Dakota, Michigan, Oklahoma, and Illinois) and over a third of all cases (1520) and deaths (154) have been reported from Texas

## WNV positive humans in GA, 2001 –2012

Human Positives (YEAR)	Georgia	Fulton County	% Positives from Fulton County	Human Deaths (Georgia)
<b>12-year AVG.</b>	<b>24</b>	<b>4</b>	<b>19%</b>	<b>2</b>
<b>*2012*</b>	<b>58</b>	<b>6</b>	<b>10%</b>	<b>4</b>
<b>*2011*</b>	<b>22</b>	<b>1</b>	<b>5%</b>	<b>3</b>
<b>*2010*</b>	<b>13</b>	<b>1</b>	<b>8%</b>	<b>0</b>
<b>*2009*</b>	<b>4</b>	<b>0</b>	<b>0%</b>	<b>2</b>
<b>*2008*</b>	<b>7</b>	<b>1</b>	<b>14%</b>	<b>0</b>
<b>*2007*</b>	<b>47</b>	<b>9</b>	<b>19%</b>	<b>1</b>
<b>*2006*</b>	<b>7</b>	<b>2</b>	<b>29%</b>	<b>1</b>
<b>*2005*</b>	<b>16</b>	<b>8</b>	<b>50%</b>	<b>2</b>
<b>*2004*</b>	<b>21</b>	<b>8</b>	<b>38%</b>	<b>1</b>
<b>*2003*</b>	<b>48</b>	<b>8</b>	<b>17%</b>	<b>4</b>
<b>*2002*</b>	<b>43</b>	<b>8</b>	<b>19%</b>	<b>7</b>
<b>*2001*</b>	<b>6</b>	<b>1</b>	<b>17%</b>	<b>1</b>

## WNV positive mosquitoes in GA, 2001 – 2012

Mosquito Positives (YEAR)	Georgia	Fulton County	% Positives from Fulton County
<b>12-year AVG.</b>	<b>104</b>	<b>31</b>	<b>33%</b>
<b>*2012*</b>	<b>114</b>	<b>28</b>	<b>25%</b>
<b>*2011*</b>	<b>396</b>	<b>34</b>	<b>9%</b>
<b>*2010*</b>	<b>99</b>	<b>67</b>	<b>68%</b>
<b>*2009*</b>	<b>24</b>	<b>8</b>	<b>33%</b>
<b>*2008*</b>	<b>51</b>	<b>22</b>	<b>43%</b>
<b>*2007*</b>	<b>75</b>	<b>8</b>	<b>11%</b>
<b>*2006*</b>	<b>81</b>	<b>18</b>	<b>22%</b>
<b>*2005*</b>	<b>67</b>	<b>37</b>	<b>55%</b>
<b>*2004*</b>	<b>126</b>	<b>63</b>	<b>50%</b>
<b>*2003*</b>	<b>113</b>	<b>19</b>	<b>17%</b>
<b>*2002*</b>	<b>107</b>	<b>70</b>	<b>65%</b>
<b>*2001*</b>	<b>36</b>	<b>32</b>	<b>89%</b>

*Neuroinvasive and non-neuroinvasive cases only. Viremic blood donors **not** included.*

Source: CDC / Ros Kelly / personal records

# Acknowledgments

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- Fulton County Department of Health and Wellness
- Ros Kelly, Public Health Entomologist—GDPH
- Dr. Daniel Mead, Southeastern Cooperative Wildlife Disease Study—UGA

We at Clarke thank you wholeheartedly for your years of hard work with WNV in Georgia!

# Questions ???

