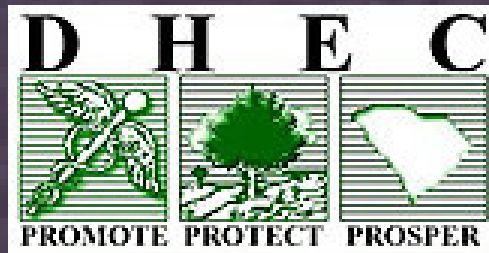


South Carolina State Report



Sue C. Ferguson, REHS/RS
SC Department of Health & Environmental Control
Bureau of Environmental Health

SPHVCC - San Francisco, CA - February 22, 2006

2004 & 2005 Weather

- No Major Hurricanes
- Minor brushes with Tropical Storms
- Mosquito Populations relatively light

Rabies Statistics

2004

181 Cases in Animals

2 Dogs

3 Cats

0 Other Domestic

32 Skunks

21 Foxes

11 Bats

111 Raccoons

0 Rodents

1 Other Wild (Bobcat)

2005

220 Cases in Animals

7 Dogs

8 Cats

0 Other Domestic

21 Skunks

31 Foxes

21 Bats

129 Raccoons

0 Rodents

3 Other Wild (Bobcats)

Tickborne Disease

2004 Human Cases

- Lyme Disease – 16
- RMSF – 68
- Ehrlichiosis - 10

2005 Human Cases

- Lyme Disease – 18
- RMSF – 64
- Ehrlichiosis - 9

Mosquito-borne Disease (Imported Cases)

2004

Malaria – 10

Dengue – 1

2005

Malaria – 11

Dengue – 1

Update on West Nile Virus & Other Mosquito-Borne Diseases in South Carolina

Chris Evans, PhD

South Carolina Department of Health & Environmental Control
Bureau of Laboratories
Columbia, SC





National Data

UNITED STATES

Scale of Miles
0 50 100 200 300 400

Canals

B 117 C 112 D 107 E 102 F 97 G 92 H 87 J 82 K 77 I

60
1
45
2
30
15
0
15
30
45
60

1
2
3
4
5
6

West Nile Virus National Human Case Counts

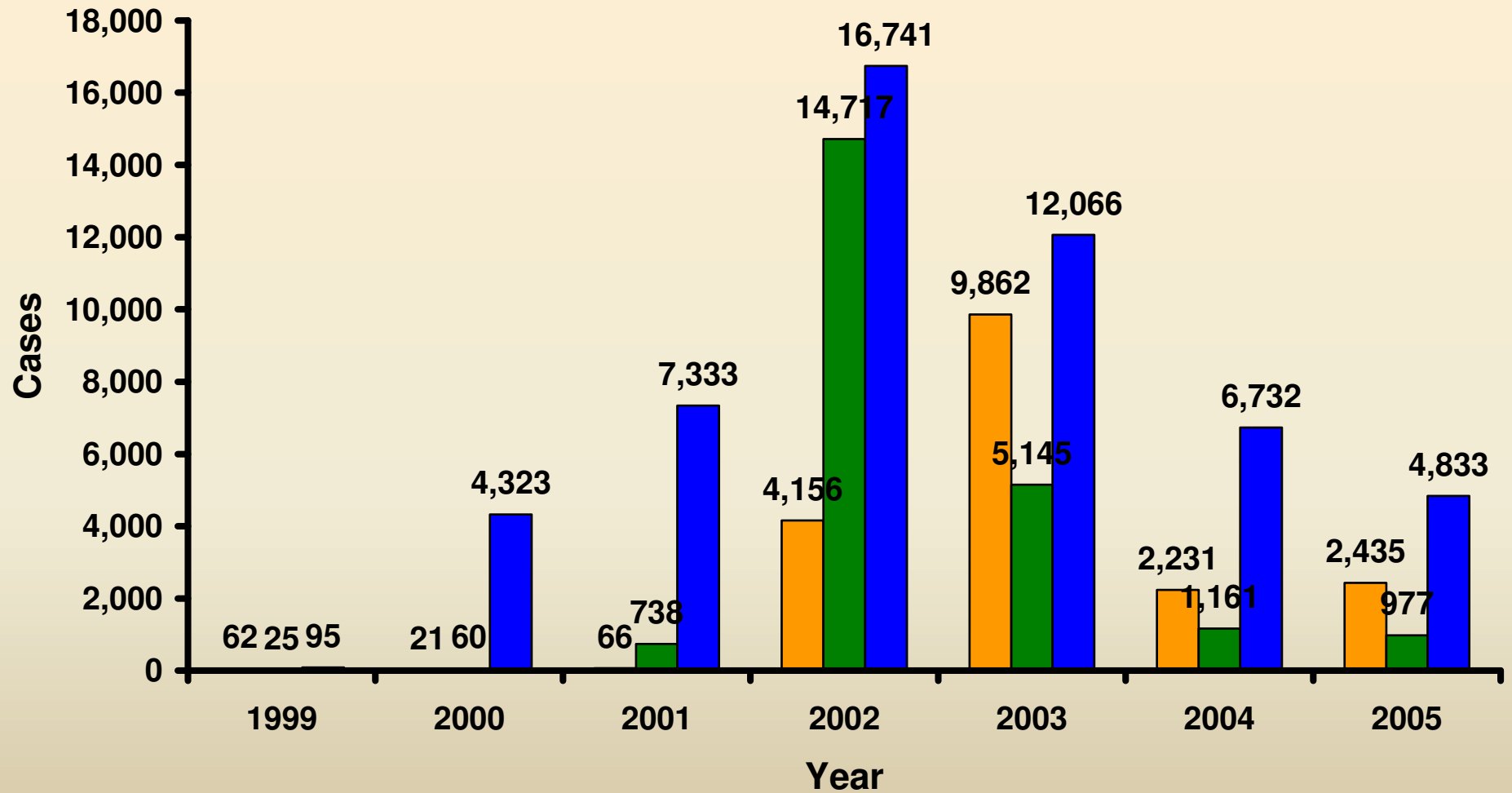
- 1999 – 2005
 - 3.78% mortality rate

	Human Cases	Deaths
1999	62	7
2000	21	2
2001	66	9
2002	4,156	284
2003	9,862	264
2004	2,231	73
2005*	2,435	73
TOTAL	18,833	712

*976 neuroinvasive; 1,289 WNV fever; 170 other clinical/unspecified

WNV National Case Counts

(Rev. 25 October, 2005)





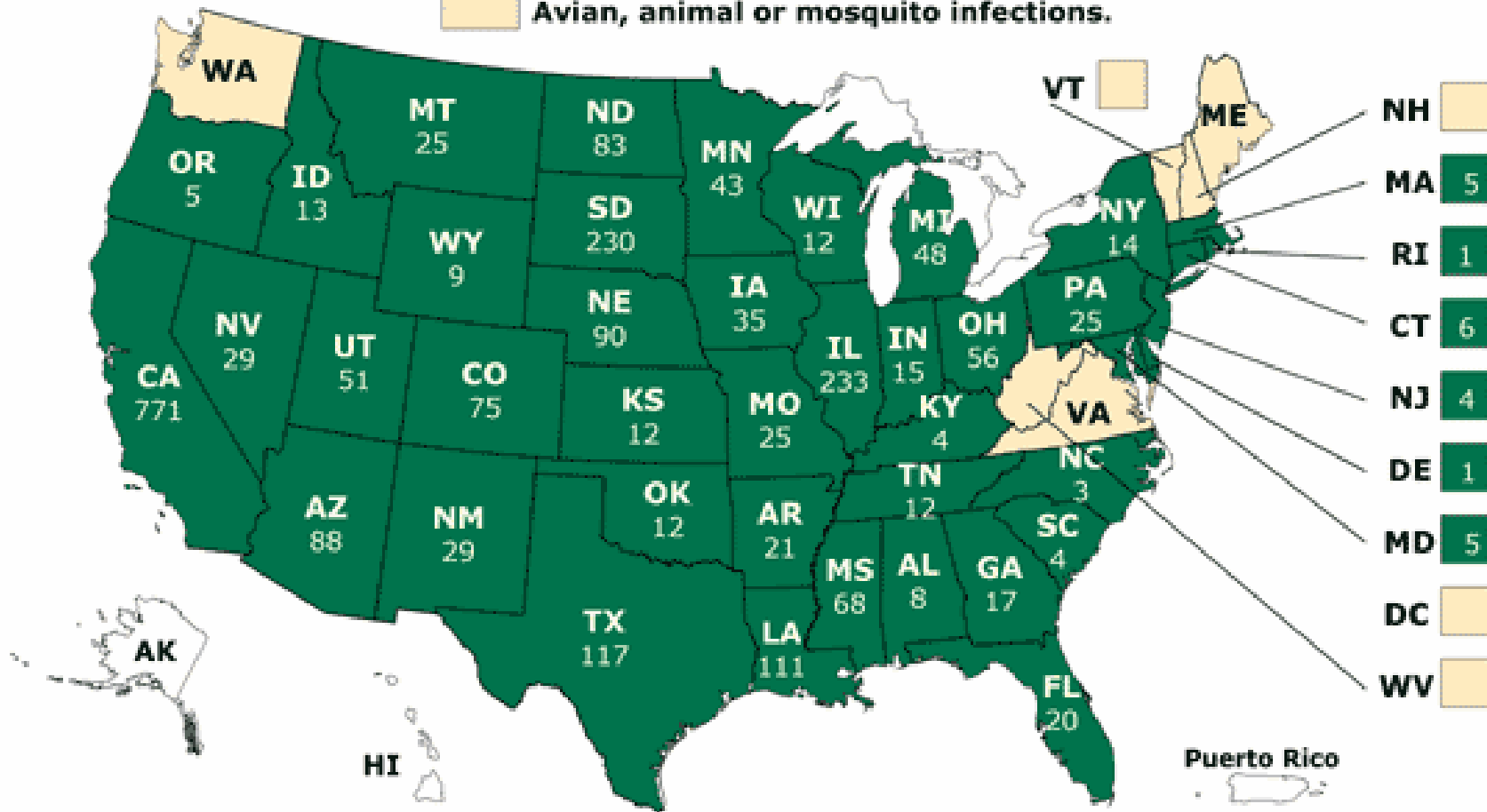
■ Humans (18,833) ■ Equines (22,823) ■ Birds (52,123)

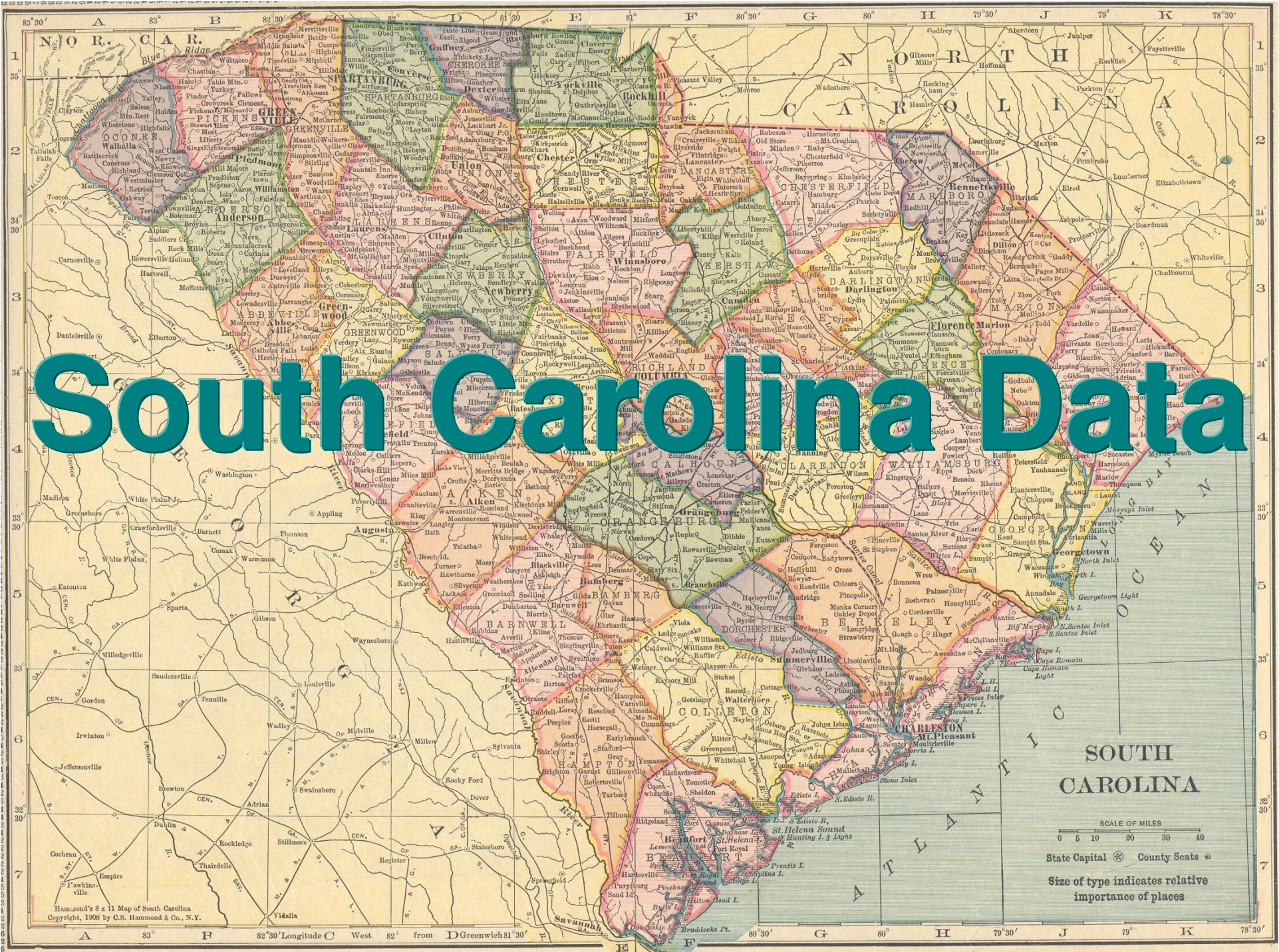
2005 WNV Human Cases

(Rev. October 25, 2005)



 Indicates human disease case(s).
 Avian, animal or mosquito infections.





South Carolina Data

SOUTH CAROLINA

SCALE OF MILES
0 5 10 20 30 40

State Capital ⊗ County Seats ⊙

Size of type indicates relative importance of places

Hammond's 8 x 11 Map of South Carolina
Copyright, 1908 by C.S. Hammond & Co., N.Y.

Longitude West from Greenwich 81° 30'



2005 – Numbers Tested

71,929

2,605 pools
33 counties

148

761 birds tested
in 2003; 131
tested in 2004

86

(DHEC &
Clemson
University)

156



Mosquitoes



Birds

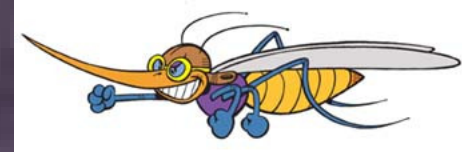


Horses /
Mammals



Humans

Mosquito Collections



CDC Light Traps



Gravid Traps

Mosquito Surveillance Involved 25 Organizations



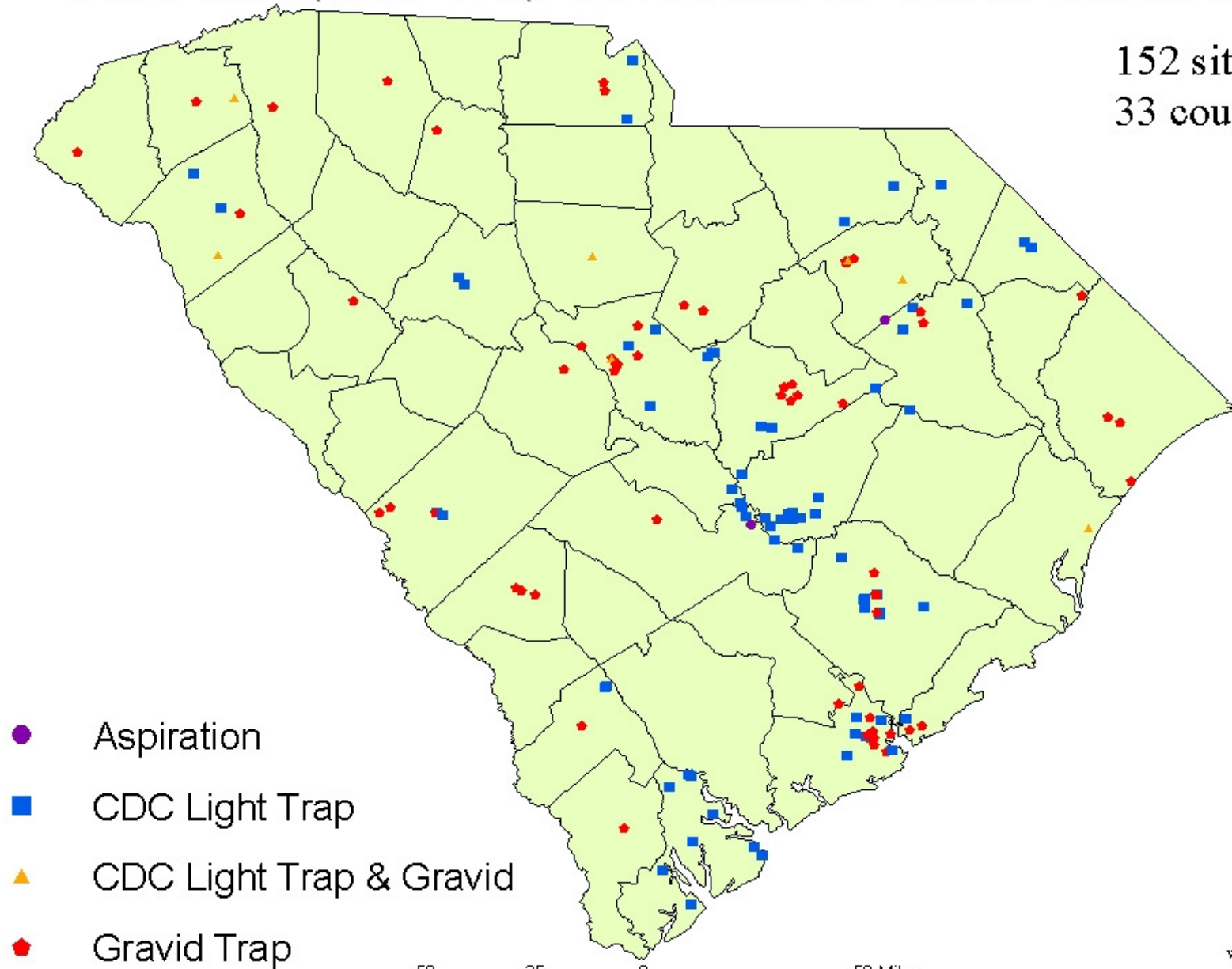
- **Health Departments** ⁽¹⁷⁾
 - Aiken, Anderson, Barnwell (via Allendale), Charleston, Florence, Greenville, Greenwood (via Laurens), Hampton, Horry, Kershaw, Lexington (via Orangeburg), Marion, Oconee, Orangeburg, Richland, Spartanburg, Sumter, and York
- **Mosquito Control** ⁽⁸⁾
 - **County** ⁽⁴⁾
 - Beaufort, Charleston, Georgetown, Richland
 - **City** ⁽³⁾
 - Hartsville (Darlington Co.), Ridgeland (Jasper Co.), Pickens (Pickens Co.)
 - **Lake Impoundment** ⁽¹⁾
 - Santee Cooper Vector Management
 - Berkeley, Calhoun, Clarendon, and Orangeburg

Vector Specialists

- Loss of Vector Control Skills due to Retirements
- May 2003
- 15 Sanitarians from Local Health Departments
- Funds from CDC BT/PHEP & WNV/ELC Grants
- Curriculum & Training Experiences
- WNV Trapping & Surveillance

2005 Mosquito Trap Locations in South Carolina

152 sites
33 counties



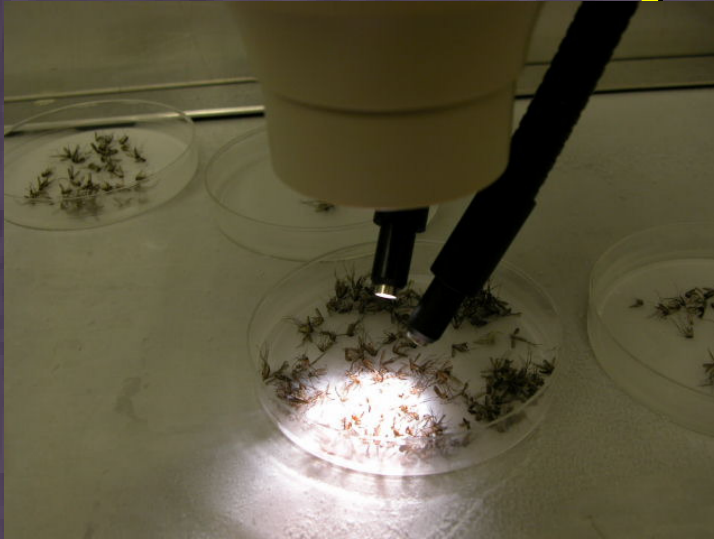
50 25 0 50 Miles

Rev. 31 Oct 2005

Mosquito Trap Nights



Mosquito Testing



Species Identified, Sorted and Pooled



Mosquitoes Macerated with Mixer Mill



Virus Cultures

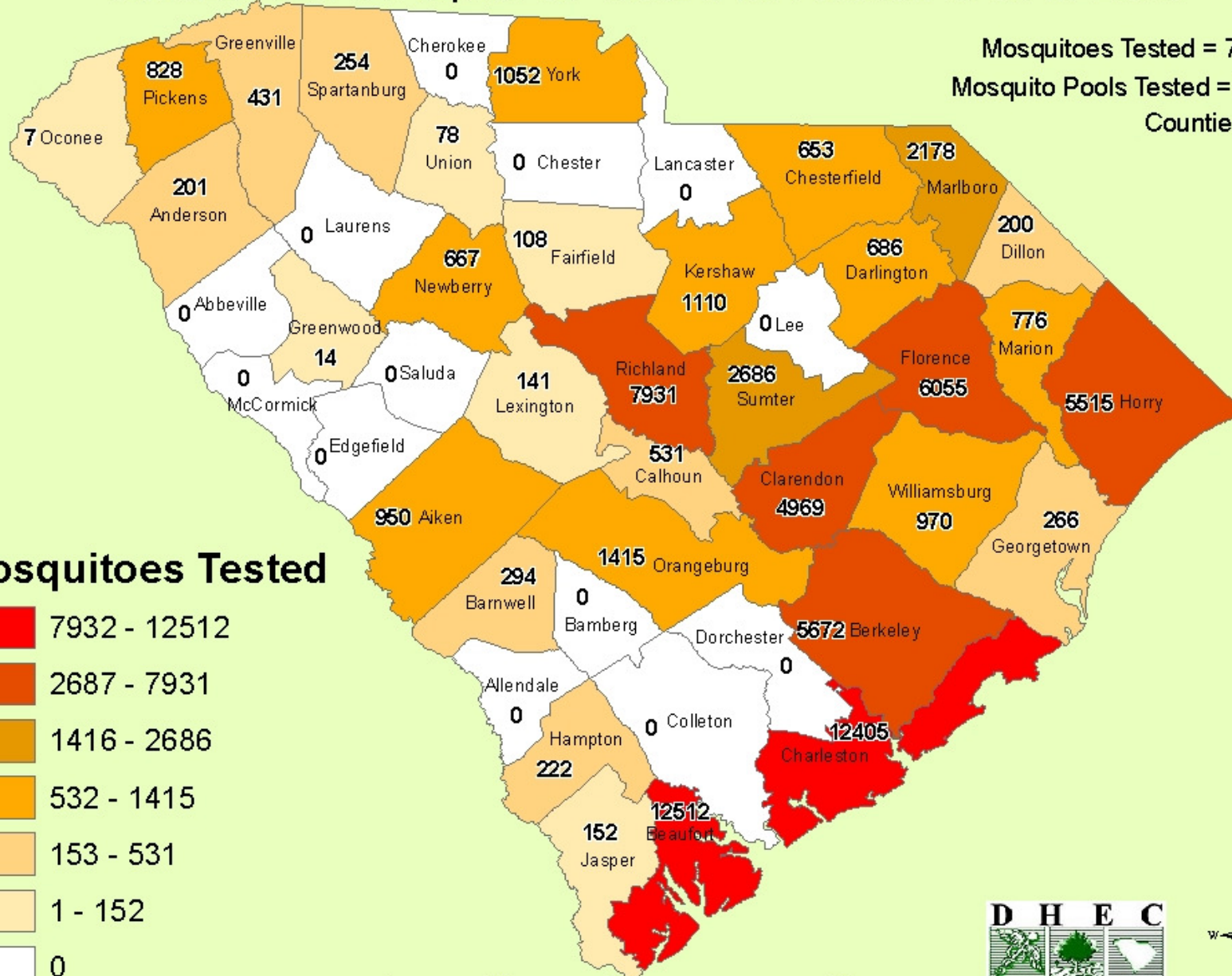


Molecular Testing for RNA Virus Detection

Numbers of Mosquitoes Tested for Arboviruses in 2005

Mosquitoes Tested = 71,929
 Mosquito Pools Tested = 2,605
 Counties = 33

Mosquitoes Tested



Rev. 31 Oct 2005

Mosquitoes Tested for Arboviruses

SPECIES	Frequency	Percent
<i>Cx. quinquefasciatus</i>	14,796	20.60%
<i>Ae. vexans</i>	9,472	13.20%
<i>An. crucians</i> complex	6,042	8.40%
<i>Oc. taeniorhynchus</i>	4,687	6.50%
<i>Oc. infirmatus</i>	4,390	6.10%
<i>Oc. atlanticus/tormentor</i>	3,743	5.20%
<i>Cq. perturbans</i>	3,641	5.10%
<i>Ps. ferox</i>	3,569	5.00%
<i>Cx. restuans</i>	3,513	4.90%
<i>Cx. erraticus</i>	3,228	4.50%
<i>Ae. albopictus</i>	2,848	4.00%
<i>Cx. salinarius</i>	2,241	3.10%
<i>Oc. canadensis</i>	1,782	2.50%
<i>Ps. columbiae</i>	1,539	2.10%
<i>An. quadrimaculatus s.l.</i>	1,044	1.50%
<i>Ur. sapphirina</i>	969	1.30%

Mosquitoes Tested for Arboviruses,

continued

SPECIES	Frequency	Percent
<i>Cx. nigripalpus</i>	953	1.30%
<i>Cx. quinquefasciatus/restuans</i>	904	1.30%
<i>Oc. sticticus</i>	635	0.90%
<i>Cs. melanura</i>	440	0.60%
<i>Oc. species</i>	368	0.50%
<i>Oc. triseriatus</i>	346	0.50%
<i>Ps. howardii</i>	216	0.30%
<i>Cx. species</i>	140	0.20%
<i>Ps. ciliata</i>	133	0.20%
<i>An. punctipennis</i>	105	0.10%
<i>Oc. sollicitans</i>	73	0.10%
<i>Cx. territans</i>	60	0.10%
<i>Or. signifera</i>	31	0.00%
<i>Oc. fulvus pallens</i>	16	0.00%
<i>Oc. japonicus</i>	5	0.00%

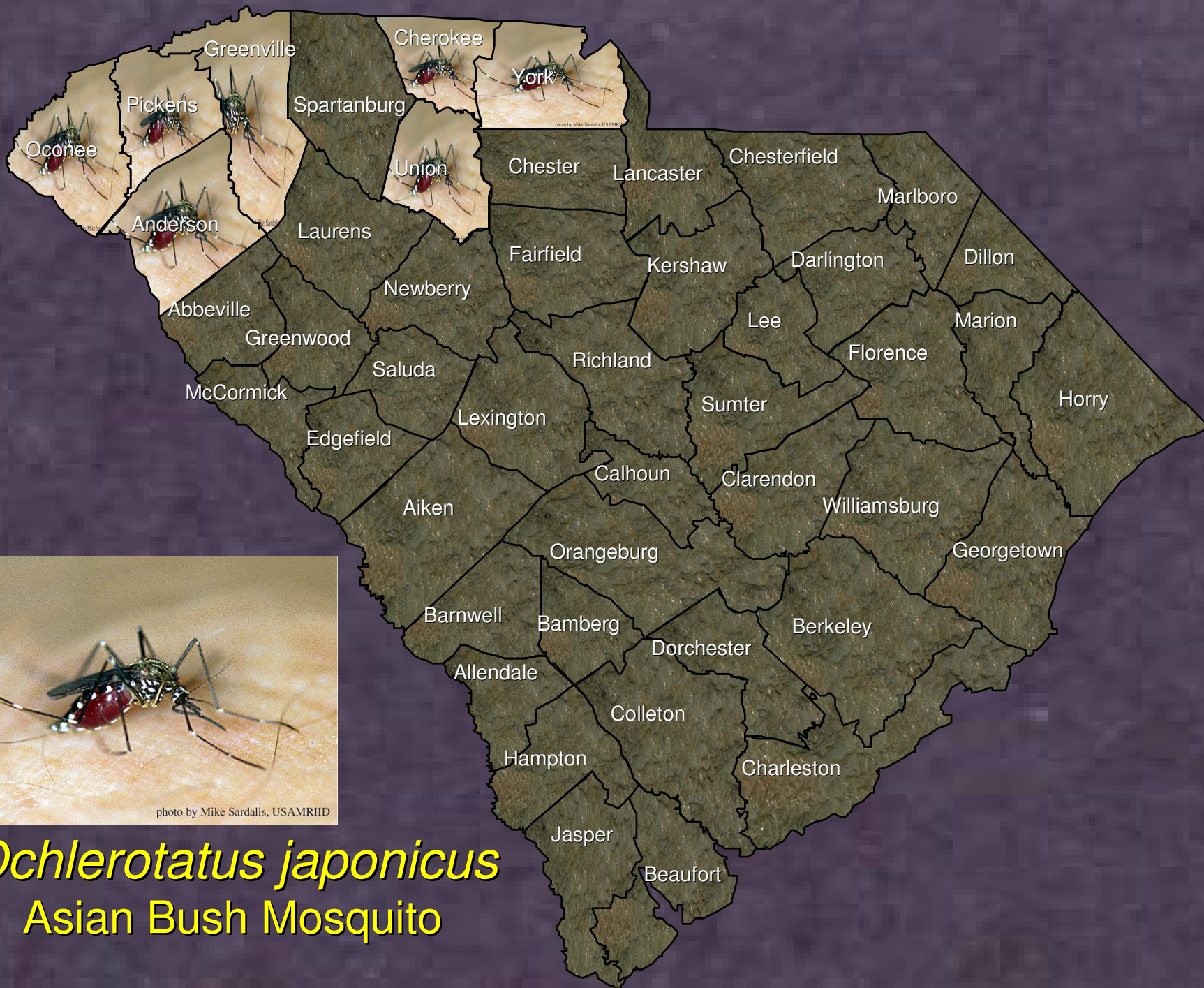


photo by Mike Sardalis, USAMRIID

Ochlerotatus japonicus
Asian Bush Mosquito

Bird Species to Submit to SCDHEC

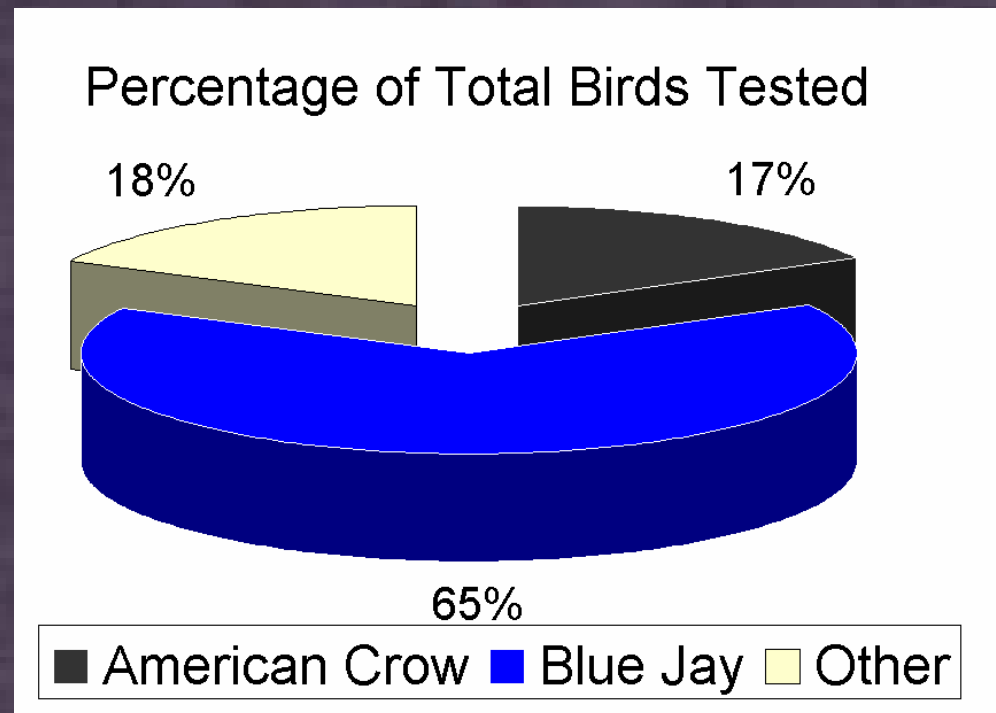
- **Dead “crows”**
 - American crows, Fish crows,
Common ravens
- **Dead blue jays**
- **Others:**
 - Birds submitted by veterinarians
 - Exceptions made when more than
one species was seen and was
not part of a mass die-off



**Testing:
April 15 to November 30**

WNV-Positive Birds

- American crow
 - 6 positive / 25 tested (24.0%)
- Blue jay
 - 33 positive / 97 tested (34.0%)
- Other
 - 0 positive / 26 tested (0.00%)



Bird Testing



Oral and/or Cloacal Swab

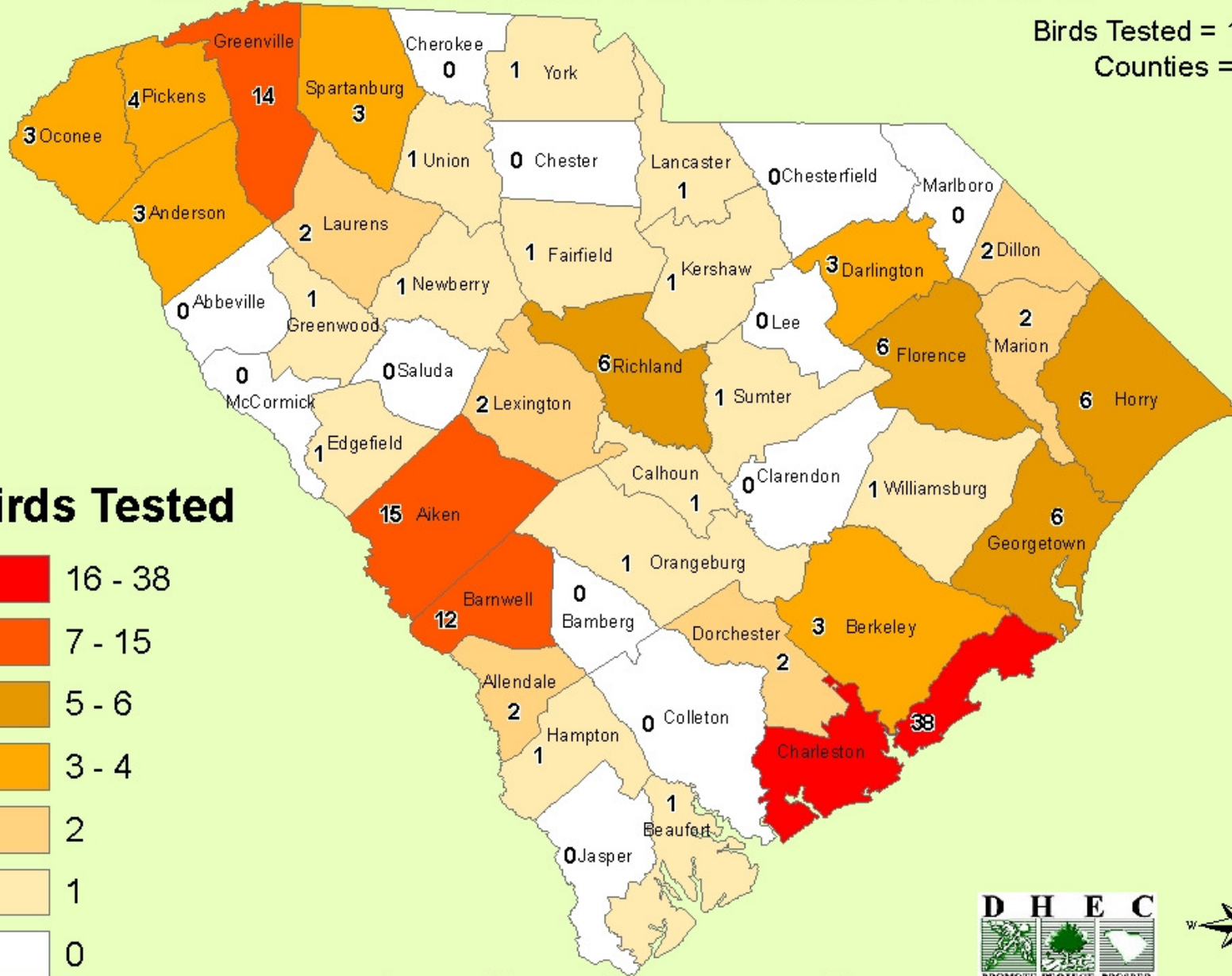


Brain Sample

Numbers of Birds Tested for Arboviruses in 2005

Birds Tested = 148
Counties = 34

Birds Tested



Rev. 31 Oct 2005

Human Testing

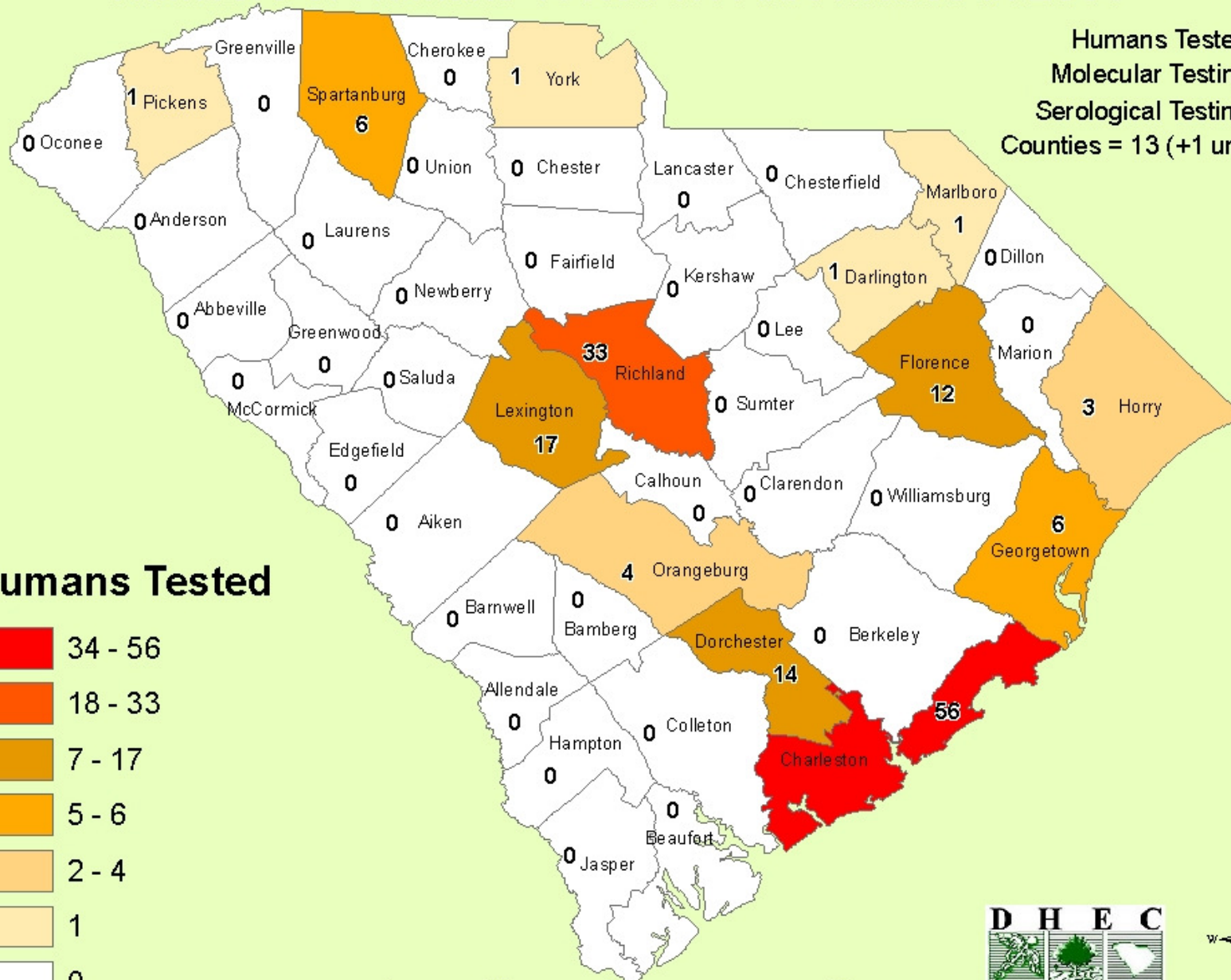
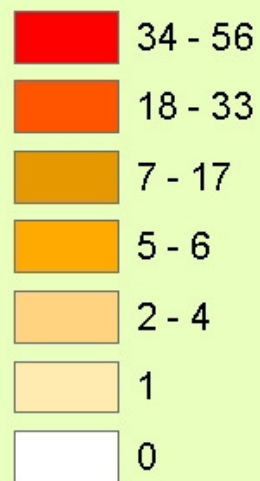
Does beer attract mosquitoes?



Numbers of Humans Tested for Arboviruses in 2005

Humans Tested = 156
 Molecular Testing = 118
 Serological Testing = 129
 Counties = 13 (+1 unknown)

Humans Tested



Rev. 28 Oct 2005

West Nile Virus (WNV)



WNV Positive Cases by Species

<u>Type</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>TOTAL</u>
Humans	1	6	2	5	14
Birds	52	282	21	39	394
Equines	25	54	5	1	85
Mosquito Pools	3	3	1	36	43
Alpacas	0	1	0	0	1
Deer	0	0	1	0	1
TOTAL:	81	346	30	81	538

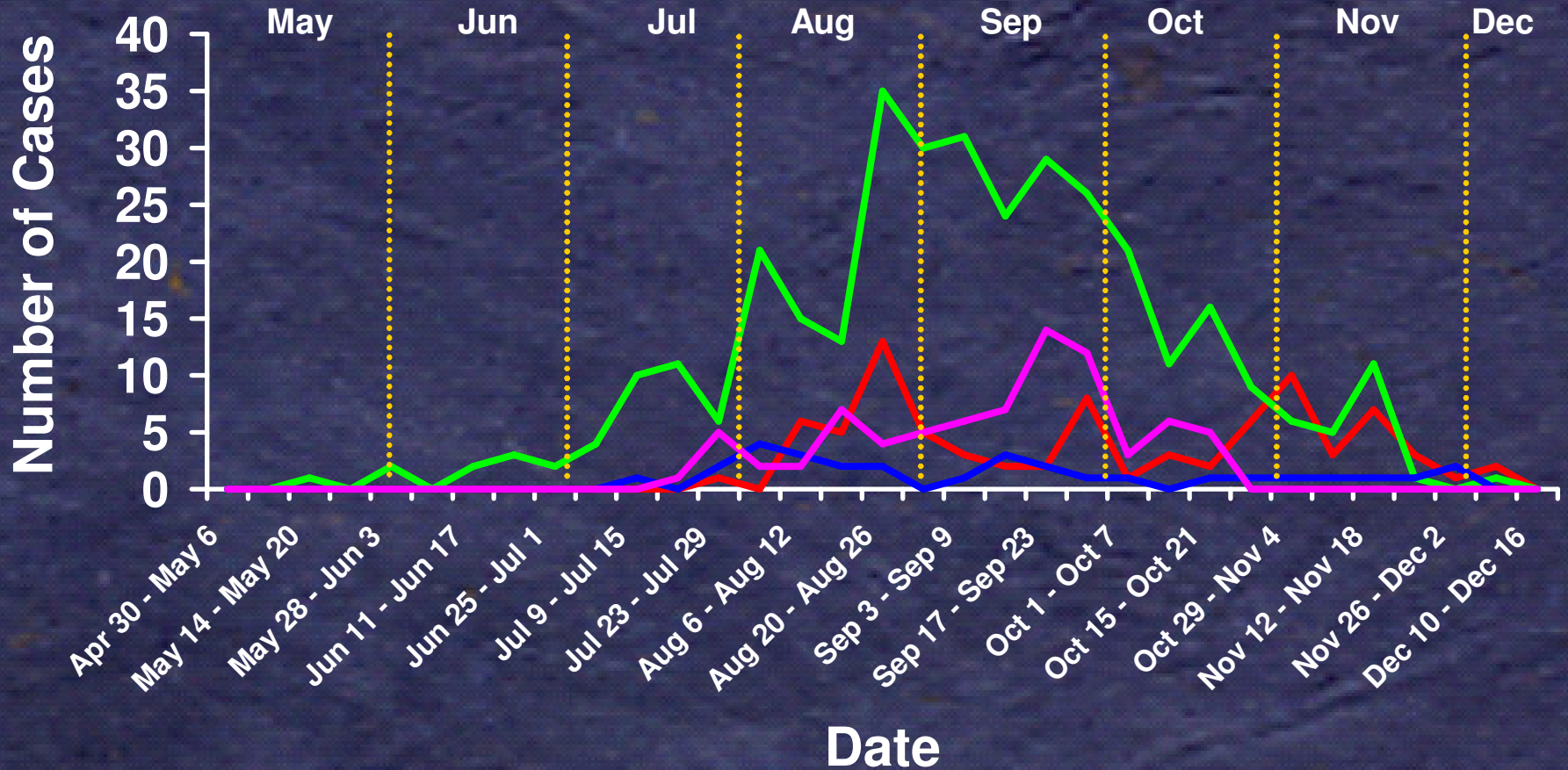
Richard Explaining the Survey





South Carolina WNV-Positive Cases by Date

(Birds, Horses, Humans, Mosquitoes)



— 2002 Cases — 2003 Cases — 2004 Cases — 2005 Cases

Number of WNV Cases in South Carolina, 2005

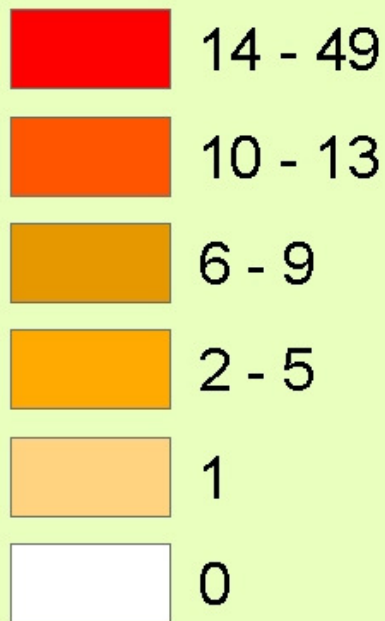
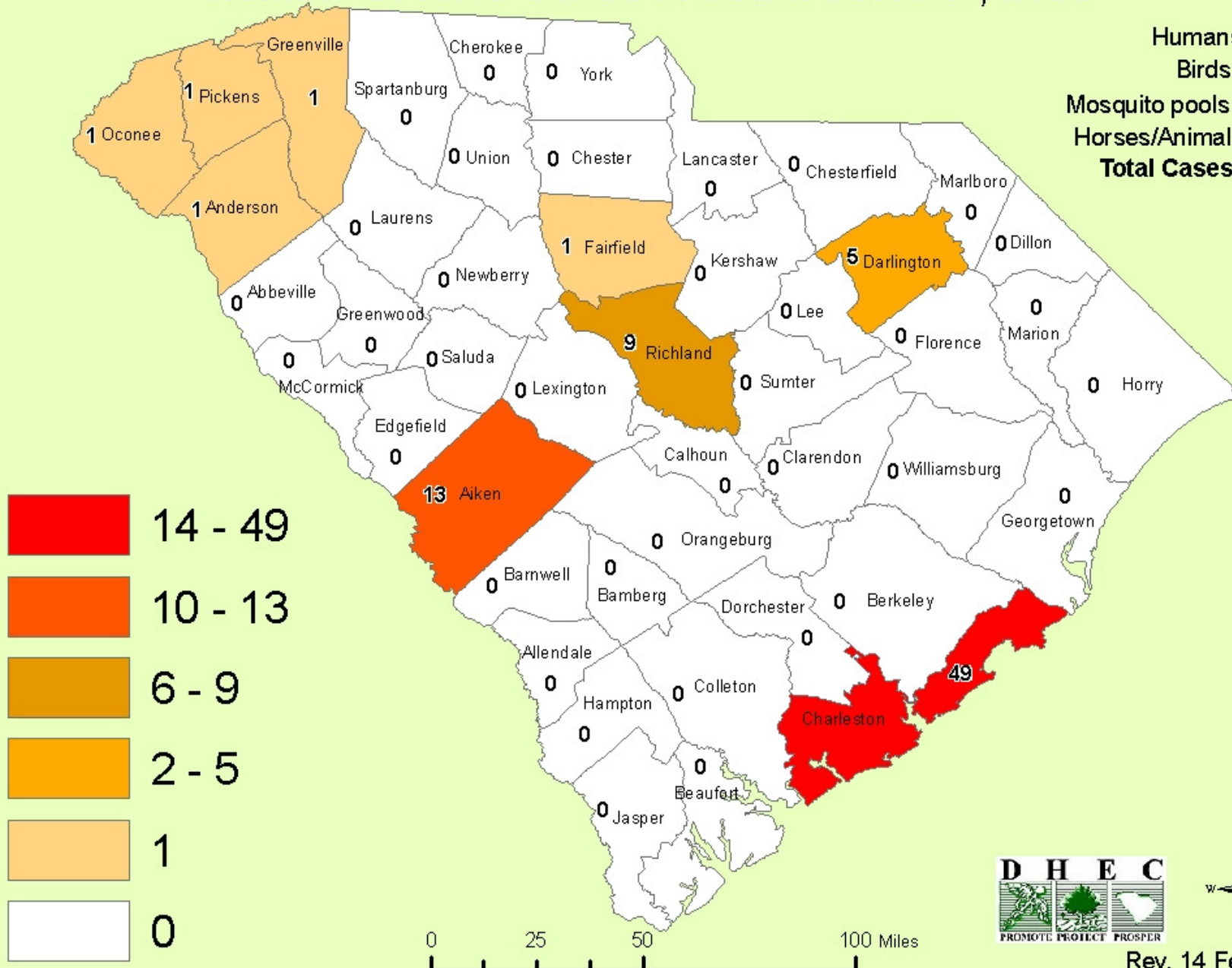
Humans = 5

Birds = 39

Mosquito pools = 36

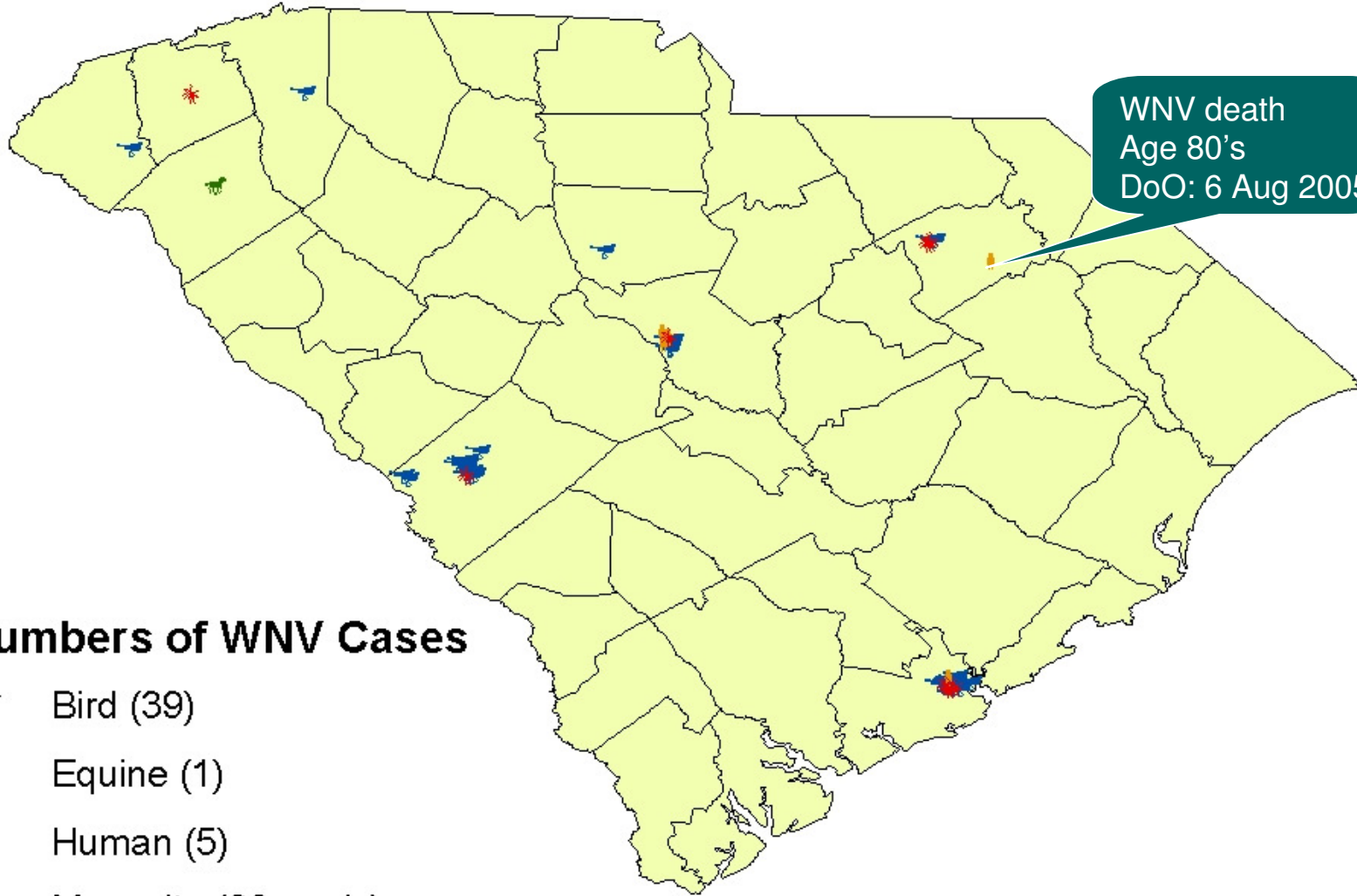
Horses/Animals = 0

Total Cases = 80



Rev. 14 Feb 2006

2005 WNV-positive Cases in South Carolina



Numbers of WNV Cases

-  Bird (39)
-  Equine (1)
-  Human (5)
-  Mosquito (36 pools)

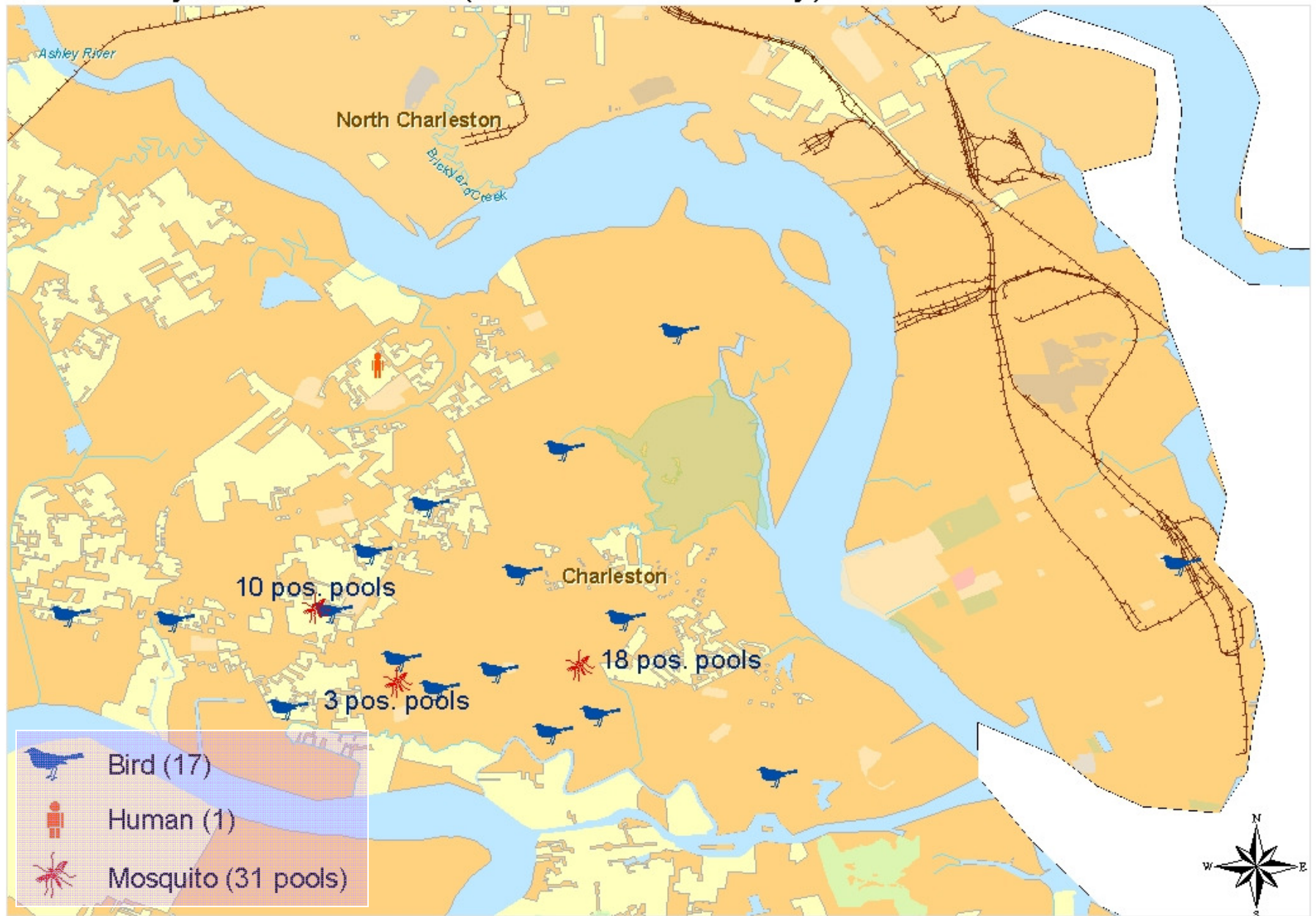
SC DHEC
Bureau of Laboratories
Chris Evans, PhD, and Julie Mobley, MPH

50 0 50 Miles



Rev. 23 Jan 2006

2005 City of Charleston (Charleston County) West Nile Virus Positives

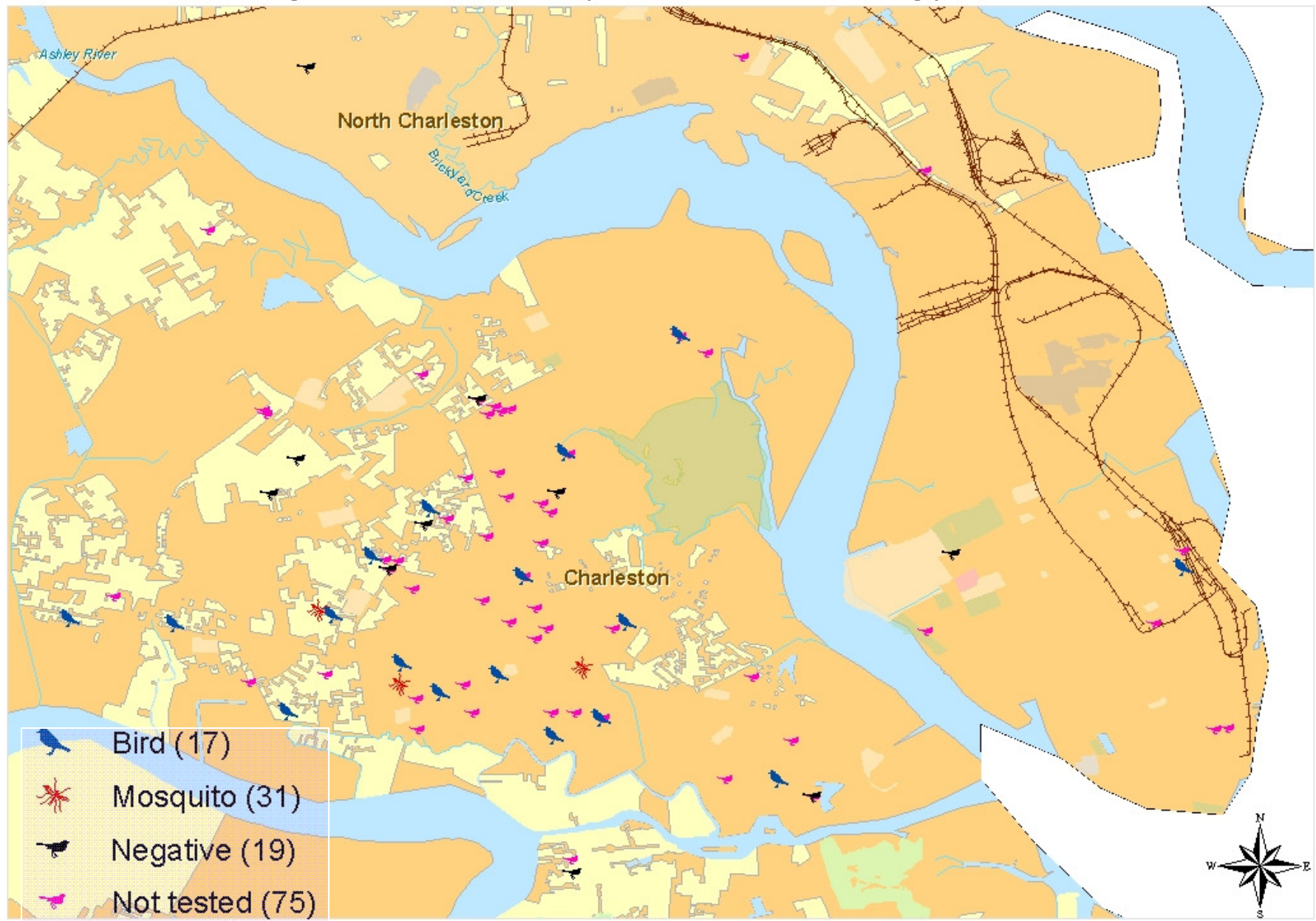


Prepared by: SCDHEC, Bureau of Labs, Chris Evans, PhD

1 0.8 0.6 0.4 0.2 0 1 Miles

Rev. 12 Feb 2006

City of Charleston (Charleston County) Birds

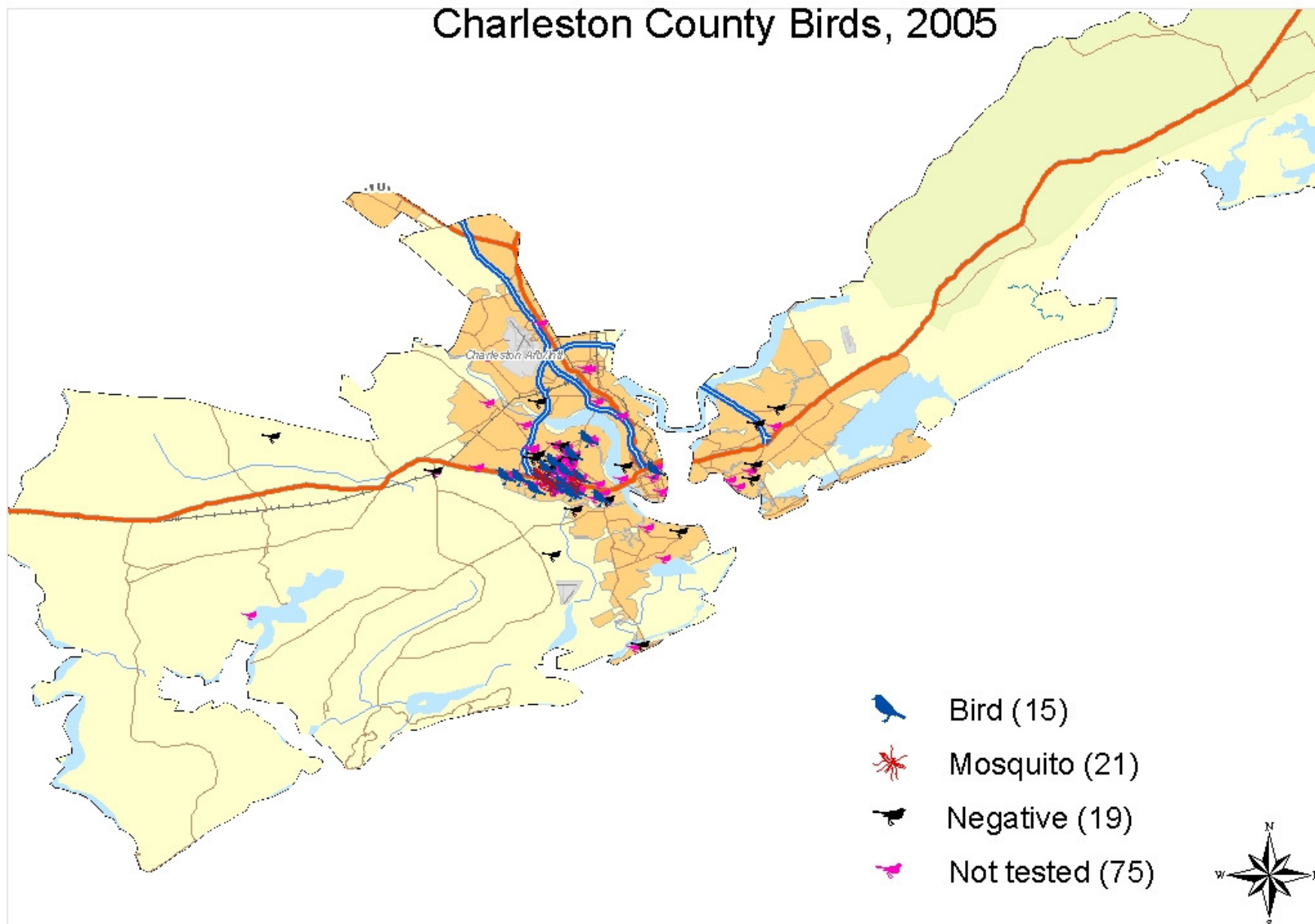


Prepared by: SCDHEC, Bureau of Labs, Chris Evans, PhD

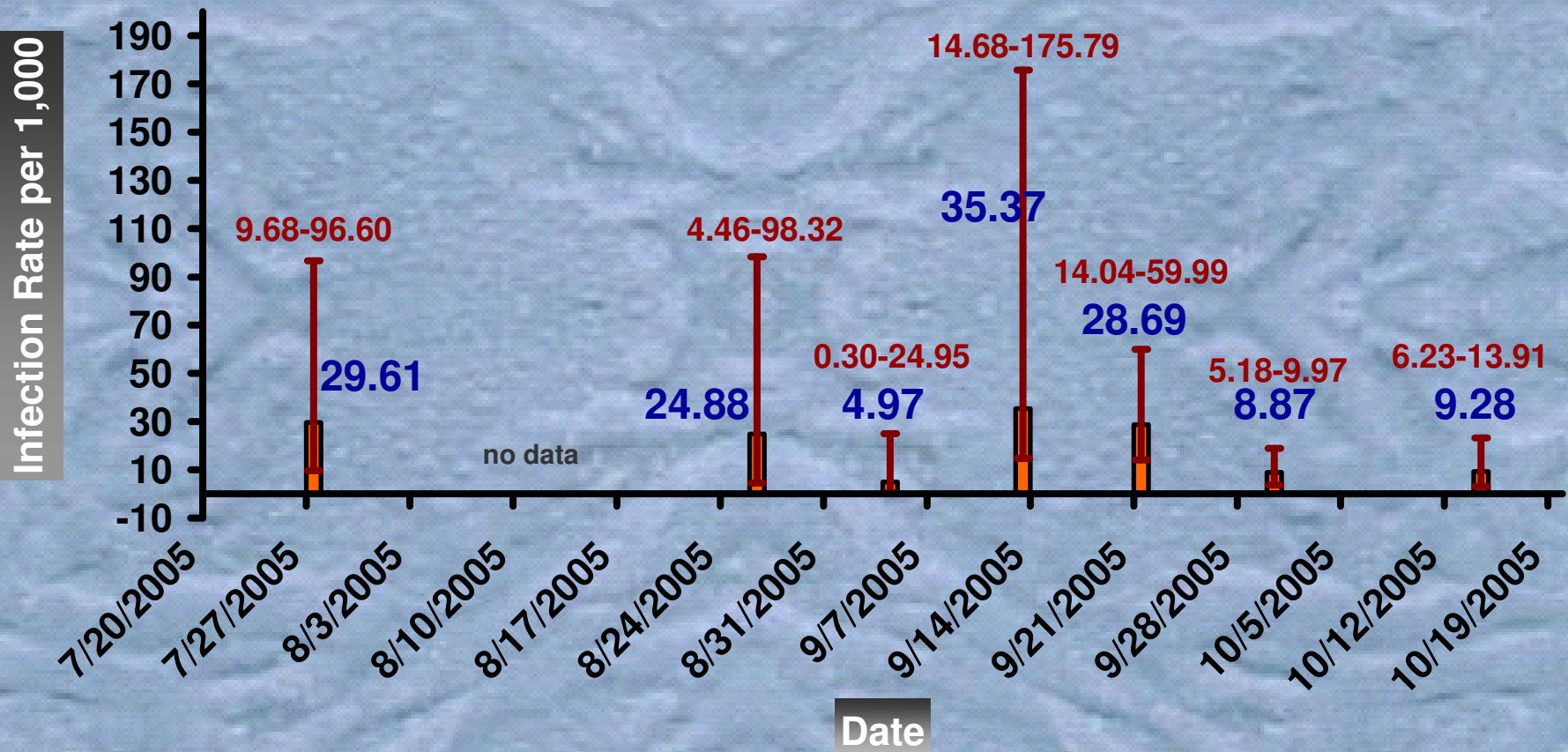
1 0.8 0.6 0.4 0.2 0 1 Miles

Rev. 31 Oct 2005

Charleston County Birds, 2005



Charleston County (West Ashley) Mosquito Infection Rate (*Culex quinquefasciatus*)



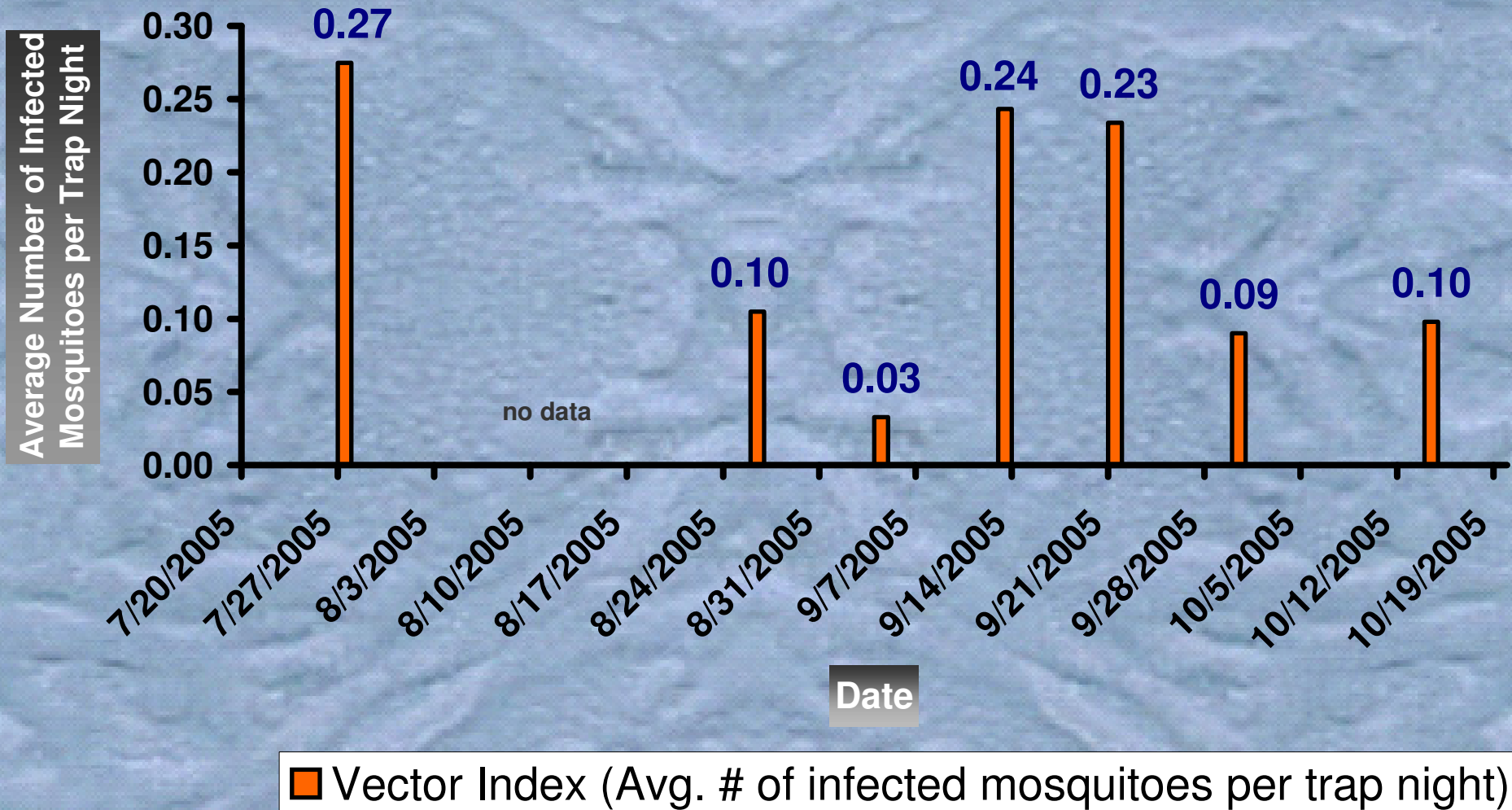
Y error bars = 95% confidence interval

■ Infection Rate per 1,000

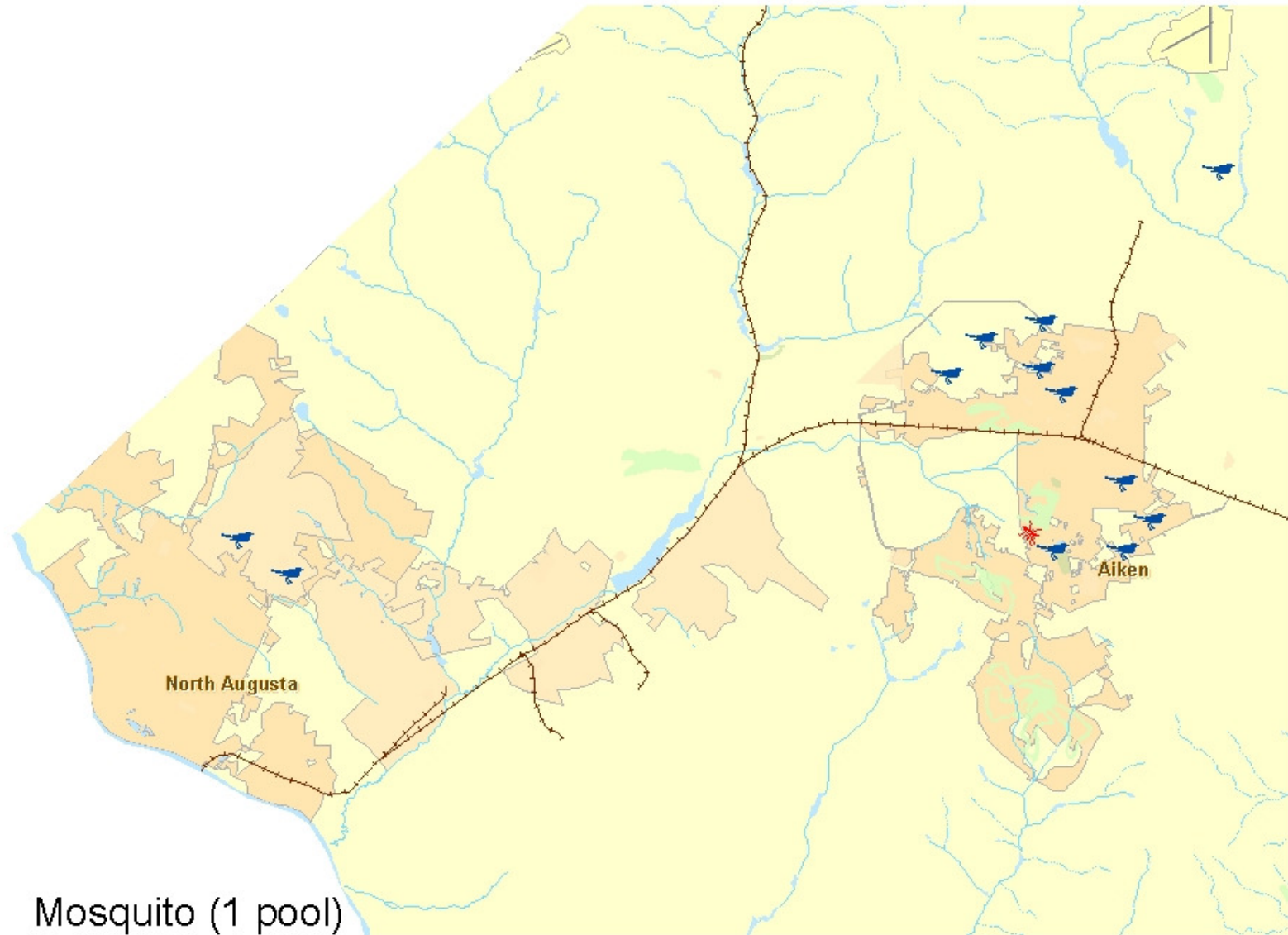
Charleston County (West Ashley) Vector Index

for *Culex quinquefasciatus*

(infection rate per 1,000 X number of mosquitoes per trap night)



Cities of Aiken and Belvedere (Aiken County) West Nile Virus Positive Cases



Mosquito (1 pool)



Bird (12)

5 3.75 2.5 1.25 0

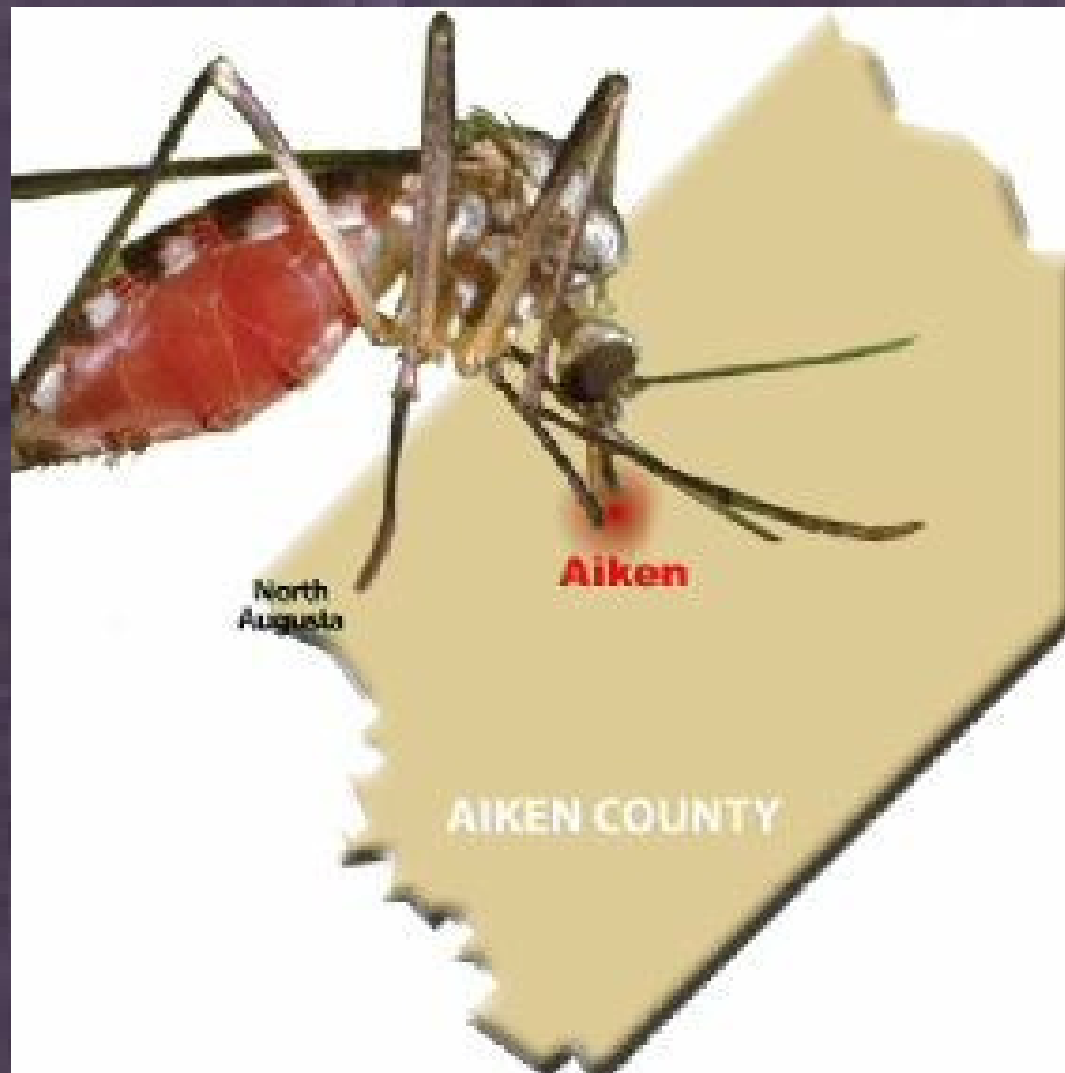
5 Miles

Rev. 31 Oct 2005

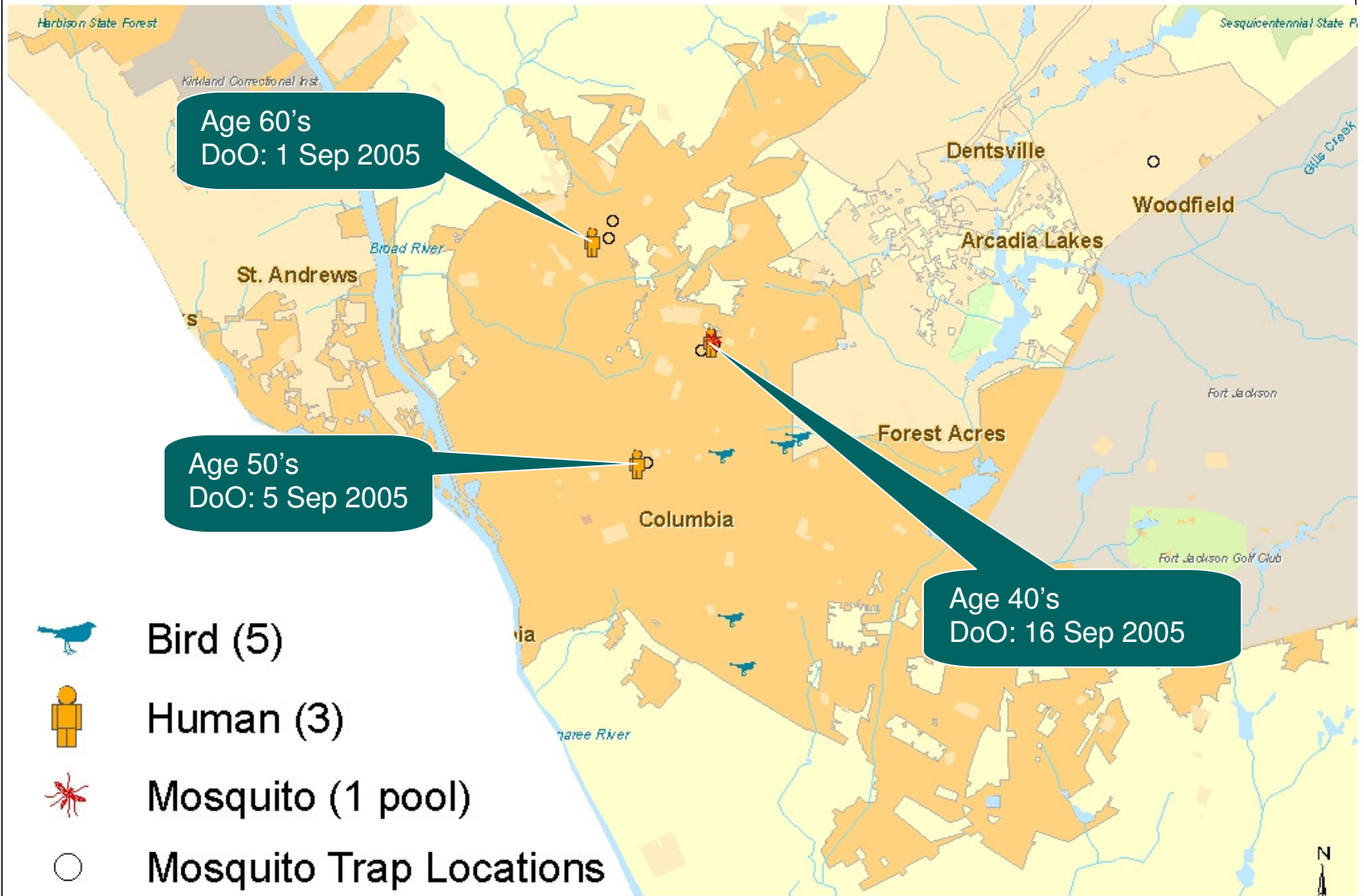


Aiken Standard

Your Local Source Since 1867







City of Columbia (Richland County), West Nile Virus Positives



Age 60's
DoO: 1 Sep 2005

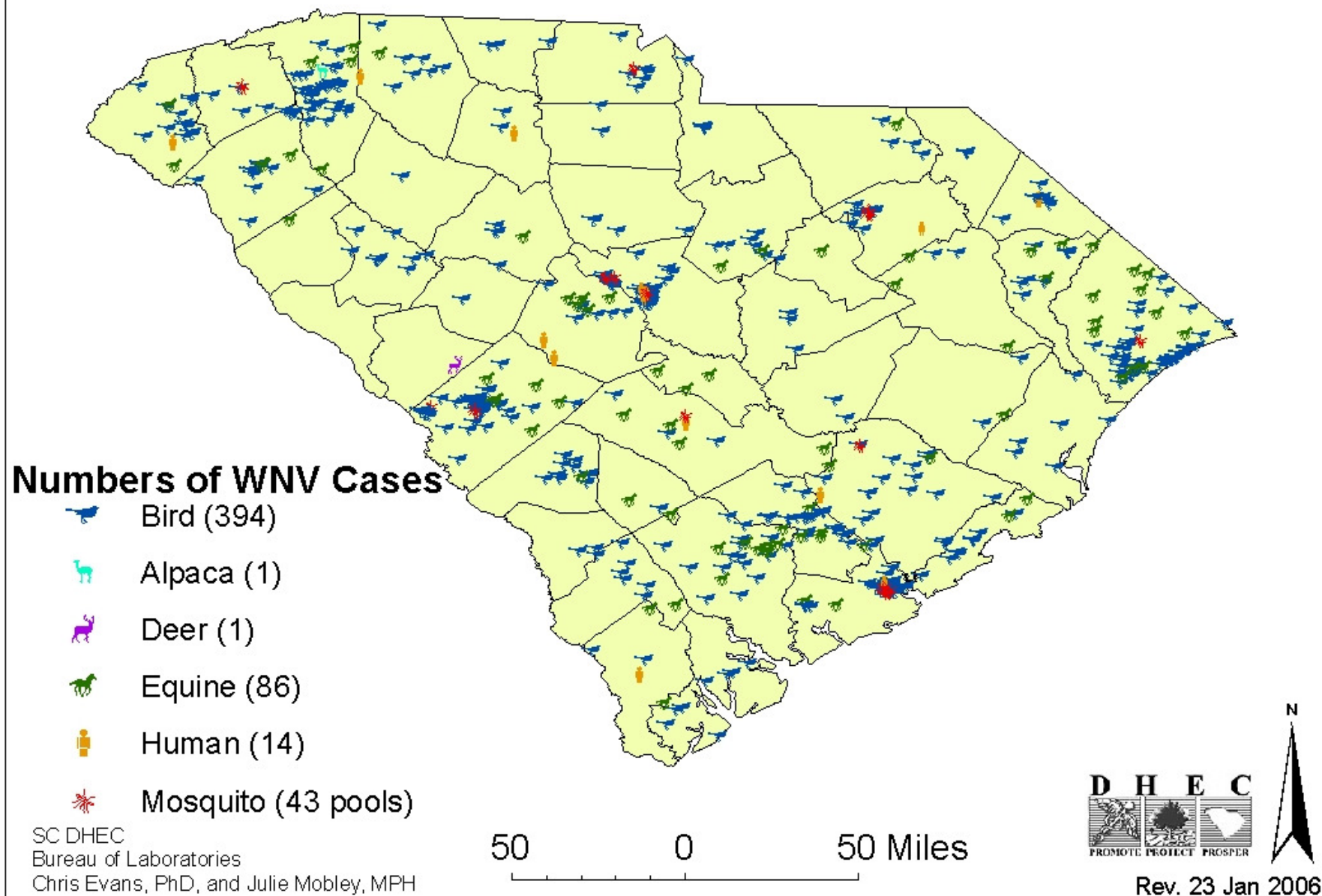
Age 50's
DoO: 5 Sep 2005

Age 40's
DoO: 16 Sep 2005

-  Bird (5)
-  Human (3)
-  Mosquito (1 pool)
-  Mosquito Trap Locations

5 3.75 2.5 1.25 0 5 Miles

2002-2005 WNV-positive Cases in South Carolina



Changes in Attitudes - WNV

- “Old News”
- Low Response re: Bird Submissions
- Lack of Media Attention

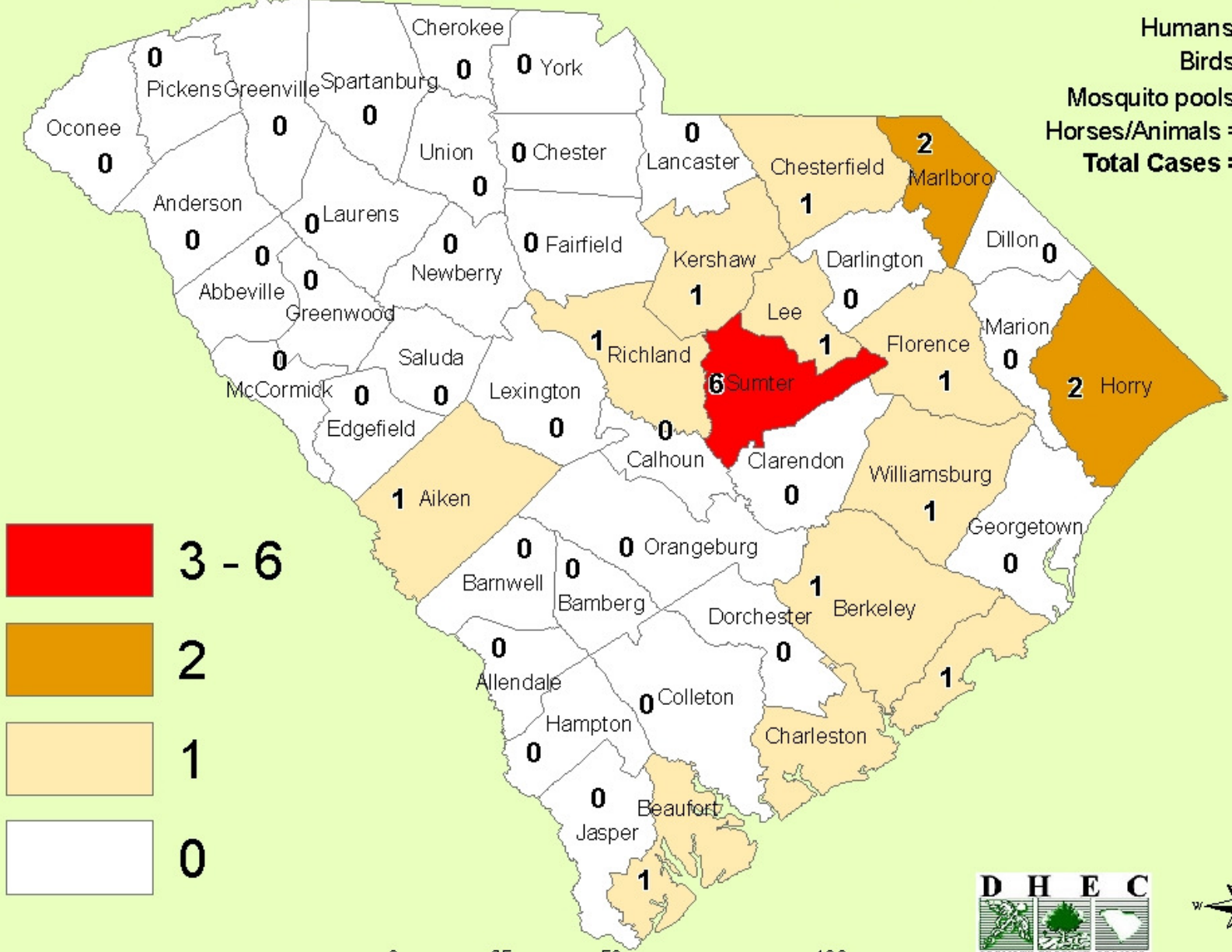
Eastern Equine Encephalitis Virus (EEE)



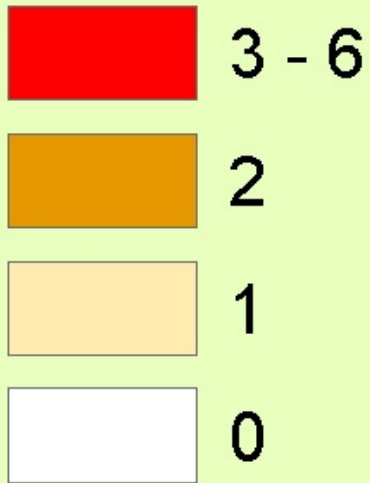
EEE Positive Cases by Species

<u>Type</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>TOTAL</u>
Humans	2	1	1	4
Birds	11	1	1	13
Equines	152	5	16	173
Mosquito Pools	27	2	2	31
Dogs	1	0	0	1
Goats	1	0	0	1
TOTAL:	194	9	20	223

Number of EEE Cases in South Carolina, 2005



Humans = 1
 Birds = 1
 Mosquito pools = 2
 Horses/Animals = 16
Total Cases = 20



Rev. 31 Oct 2005

2005 EEE Cases in South Carolina as of October 31, 2005

n = 20 cases

Age 80's
DoO: 4 Oct 2005

Culex erraticus
Culiseta melanura

93% mortality rate

-  Bird (1)
-  Equine (16)
-  Humans (1)
-  Mosquito (2 pools)

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Chris Evans, PhD, and Julie Mobley, MPH

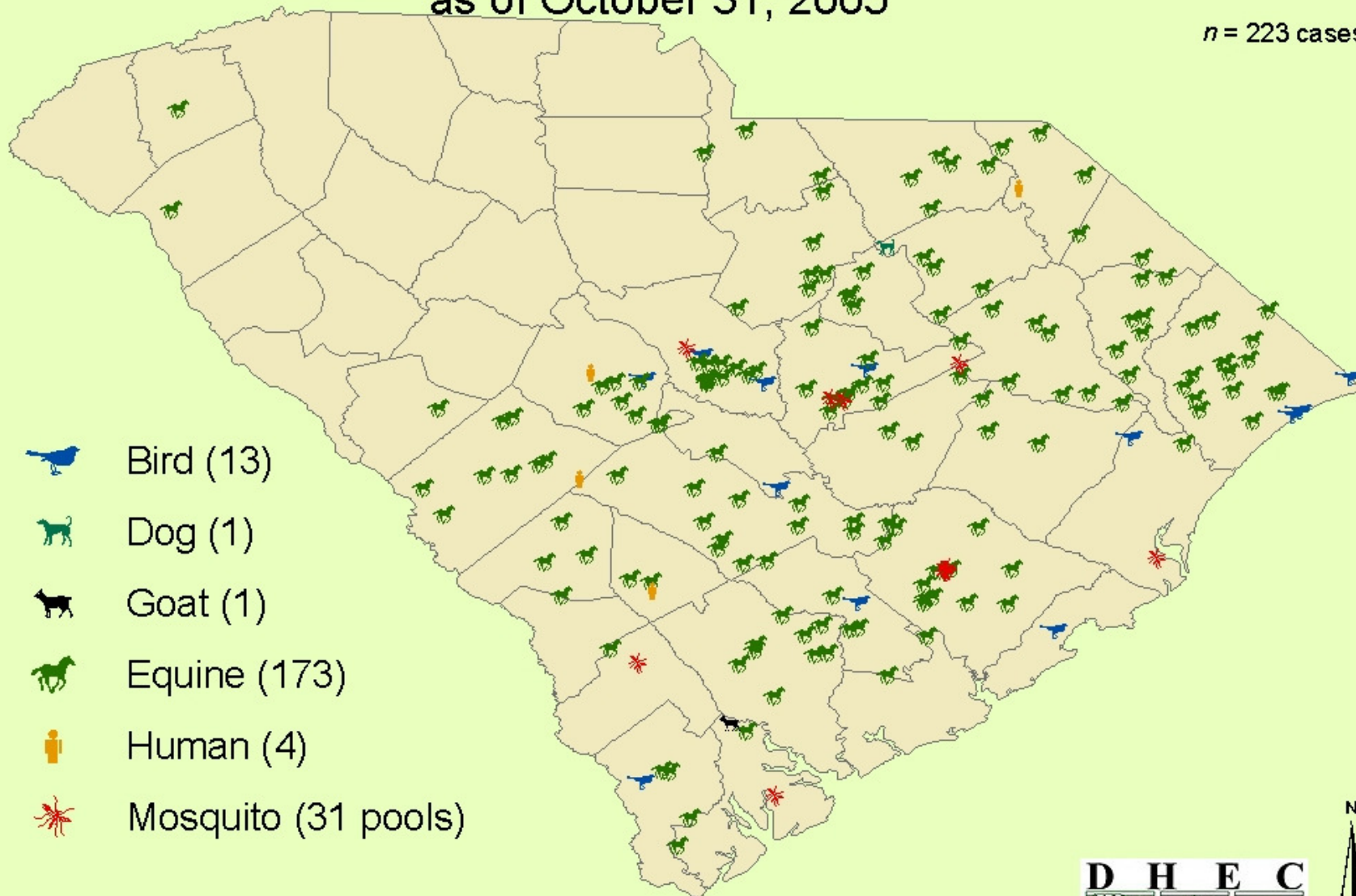
50 0 50 Miles



Rev. 31 Oct 2005

2003- 2005 EEE Cases in South Carolina as of October 31, 2005

n = 223 cases



-  Bird (13)
-  Dog (1)
-  Goat (1)
-  Equine (173)
-  Human (4)
-  Mosquito (31 pools)

SC DHEC
Bureau of Laboratories
Chris Evans, PhD, and Julie Mobley, MPH

50 0 50 Miles

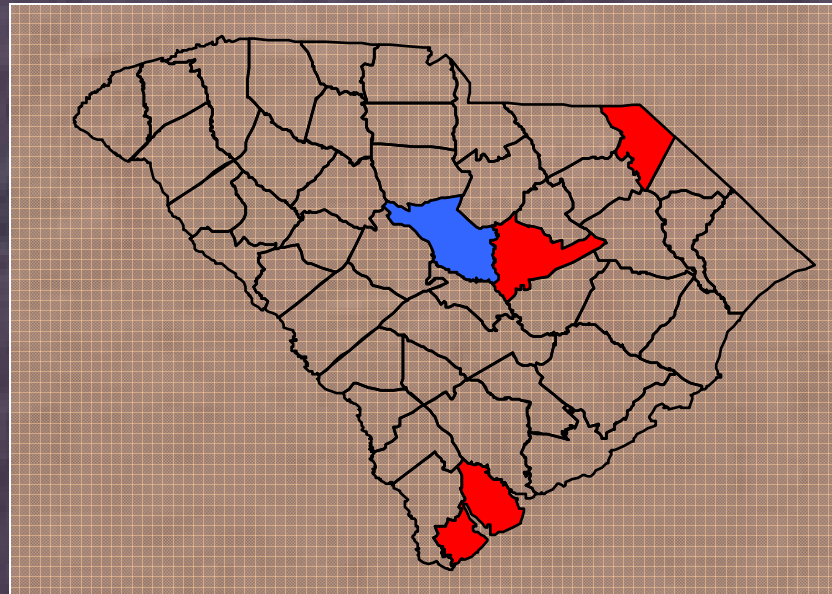


Rev. 31 Oct 2005

Other Arboviruses 2005

Bunyamwera Arboviruses

Cache Valley Virus
 Keystone Virus



Arbovirus	County	Species	Date (2005)
Cache Valley	Marlboro	<i>Anopheles crucians</i> complex (2)	14 Jul
	Sumter	<i>Anopheles crucians</i> complex (1)	19 Jul
	Beaufort	<i>Ochlerotatus taeniorhynchus</i> (1)	03 Aug
	Beaufort	<i>Anopheles crucians</i> complex (1)	11 Aug
Keystone	Richland	<i>Ochlerotatus atlanticus/tormentor</i> (1)	10 Aug

Patrick Brown Scott Phillips Liz Hager
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Chris Klein Art Wozniak
Jim Wilkins Arthur Hamilton Sue Ferguson Tammy Brewer
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