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**Arbovirus Surveillance:  
Annual Summary Report  
2004**

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## Annual Arbovirus Surveillance Summary Report: 2004

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This past arbovirus season demonstrated the effectiveness of our surveillance program. Because of the emergence of West Nile virus (WNV), an arbovirus new to the Americas, in the northeast in 1999 and its rapid migration, surveillance efforts had been intensified. Funding was through a supplemental ELC grant from the CDC. Our longstanding laboratory experience with arboviruses and multi-agency collaborative surveillance program placed Florida in a better position to face the onslaught of West Nile Virus than were many states. Surveillance described below includes assay of dead bird and mammal tissue (virus detection and isolation) and sentinel chicken and wild bird serology assays performed at the Florida Department of Health, Bureau of Laboratories, Tampa Virology Laboratory. Results of clinical (human diagnostic) testing are not included in this report.

West Nile virus (WN) is a flavivirus, closely related to SLE but, unlike SLE, birds infected with WNV often die. Virus may be detected in the tissues of those birds. The first infected bird in Florida was detected on July 3, 2001, in a crow submitted from Jefferson County. At this time the virus is present throughout Florida, although activity in some parts of the state is higher than in others.

Effective arbovirus surveillance entails a concerted, coordinated effort over an extended time period. Sampling must be routinely and regularly performed in order for baseline activity to be recognized. Thus, increases above the historical levels of activity indicate increased risk of spread to the human population, risk that may be reduced by appropriate interventions. This past season started early in West Central Florida, with WN seroconversions in sentinels beginning in April in Hillsborough County and increasing through June. This county has a long-standing sentinel program with extensive historical data. On June 30, the county was notified that activity was considered significant, and the County Mosquito Control Department immediately revised and increased its spray strategy. There were only three human WN infections confirmed in Hillsborough County during 2004. During 2004, 27 dead birds were submitted for WN testing from Hillsborough County; two were positive, both prior to increased mosquito control activities. Surveillance data for 2003 and 2004 for Hillsborough County is illustrated in Figure 1a.

Counties that have only recently begun arbovirus surveillance are at a disadvantage. They lack the comparative historical database and they are just beginning to develop and set into place sampling strategies and methods. Dade County began a comprehensive surveillance program in 2003. However, in 2004, they experienced a late start-up and repeated delays in weekly specimen submissions. Most of the 21 human cases occurred prior to the start of 2004 surveillance testing (Figure 1b).

Figure 1a. Arbovirus surveillance activities, Hillsborough County, 2003-2004

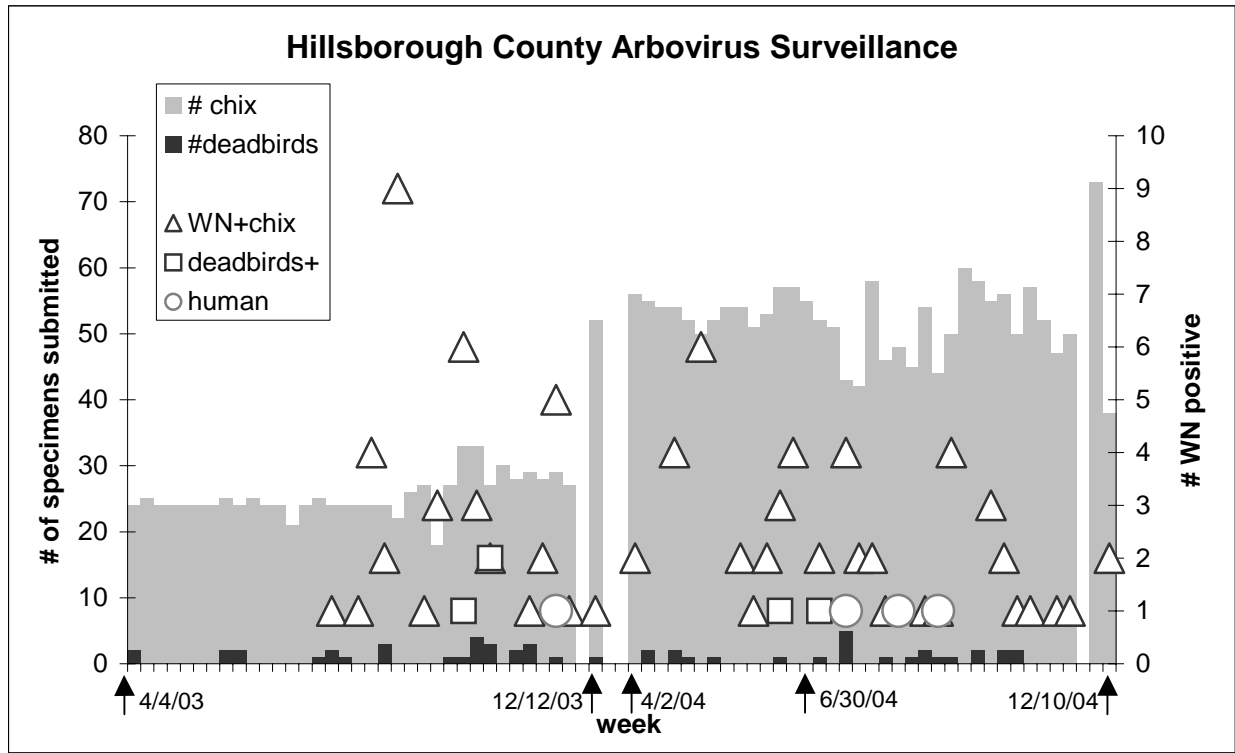
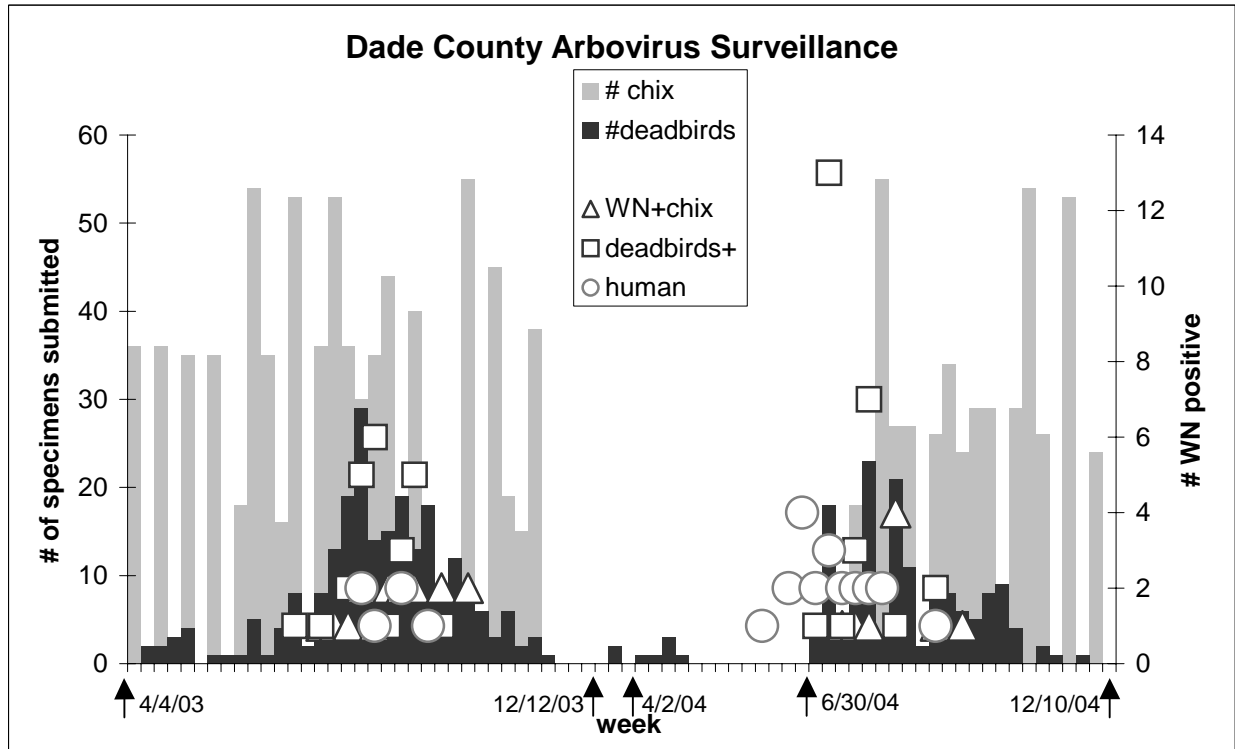


Figure 1b. Arbovirus surveillance activities, Dade County, 2003-2004



Numbers of dead bird submissions have fallen dramatically since 2001 (Table 1). All of the submitted animals were screened for WNV by molecular assays (TaqMan RT-PCR), within 1 week of receipt. Samples negative by screening were inoculated onto VERO cell culture for detection of other arboviruses and to increase detection sensitivity for WNV. Molecular methods are highly sensitive, but only assay a very small amount of sample; cell culture is also a very sensitive technique and allows for the testing of a much larger sample volume.

A total of 614 specimens: 571 birds, 40 mammals, 3 reptiles) were received for virological assay during 2004. This is a decrease of 74% in dead animal submissions from 2003. Submissions were made from most counties (51) in Florida. Mammals included: 28 horses, 6 primates, 2 squirrels, and 1 each domestic dog, goat, llama and wolf. WNV has been detected in 32 birds and 1 mammal (wolf); EEE in 1 bird and 5 mammals (horses). A picorna-like virus was isolated from 2 baboons. Data on submissions and WN test results for 2004-2001 by county is presented in Table 2.

The highest number of West Nile positive birds, 28, was from Dade County, which submitted the most specimens, 169 birds. Although 27 species of birds were submitted, 79% of the positives were corvids (19 bluejays, 3 mockingbirds). Additional WN positive species from Dade County included canaries (2), cuckoo (1) and doves (3 out of 76 submissions for a positive rate of 4%). In Hillsborough County a bluejay and a crow and in Orange County a bluejay, were also West Nile Virus positive.

During 2004, 1940 traditional pools of mosquitoes were submitted from 12 counties across the state. Molecular (TaqMan) assays for WNV were performed on all submitted pools. It is important to determine whether the virus detected in a mosquito is viable (i.e., multiplies in cell culture) as part of ascertaining vector potential of the various species. Additionally, extracts of some mosquitoes seem to contain inhibitors of RT-PCR, resulting in false negative molecular assays. Thus VERO cell cultures were also inoculated with homogenized pools.

Commercial assays for WNV antigen in mosquito pools (VecTest, RAMP) were used by some mosquito control agencies. They sent residual samples from 232 RAMP and 37 VecTest one step kits to TBL for confirmation. Because these samples are inactivated, they can be tested only by RT-PCR; cell culture is not possible. A two-step VecTest is available which allows for both cell culture and RT-PCR confirmation; 48 specimens from two-step kits were submitted. None of these samples was confirmed positive.

WNV was detected in three traditional pools of *Culex nigrapalpus* from Duval (2) and Palm Beach (1) counties. These positive pools were collected on September 14 and 15 in Duval and on August 18 in Palm Beach. One pool of *Oc. atlanticus* from Sarasota collected August 13 yielded California virus group viruses. California group viruses were also found in three pools from St. Johns county: *Oc. atlanticus* collected July 1 and August 2 and *Ps. columbiae* collected on August 16.

Table 1. Number of arbovirus assays performed 2000-2004

Assay	2004	2003	2002	2001	2000
<b>Serology</b>					
HAI	104,350	99,939	74,075	65,458	41,698
IgM Elisa	1,813	2,423	1,376	633	440
SN	3,060	3,692	2,343	924	839
<b>Virology</b>					
Animal tissue	614	2,320	4,009	7,773	19
Mosquito pools	2,257	6,292	4,130	1,378	160

Table 2. Dead bird/mammal submissions for detection of WNV, by county by year. Counties with sentinel chicken programs are indicated in **bold**.

county	2004			2003			2002			2001		
	total #	WN+	% +	total #	WN+	% +	total #	WN+	% +	total #	WN+	% +
<b>Alachua</b>	12	0	0	85	13	15.3	190	21	11.0	294	64	21.8
Baker	0	0	0	2	0	0	0	0	.	5	2	40.0
<b>Bay</b>	9	0	0	149	108	72.5	230	7	3.0	446	86	19.3
Bradford	3	0	0	14	5	35.7	14	1	7.1	63	19	30.2
<b>Brevard</b>	1	0	0	1	0	0	93	3	3.2	307	3	1.0
Broward	6	0	0	34	9	26.5	137	1	0.7	185	14	7.6
Calhoun	0	0	0	14	8	57.1	8	2	25.0	16	8	50.0
<b>Charlotte</b>	1	0	0	2	0	0	23	1	4.3	69	8	11.6
<b>Citrus</b>	5	0	0	32	2	6.3	72	5	6.9	97	15	15.5
Clay	4	0	0	45	4	8.9	73	3	4.1	243	51	21.0
<b>Collier</b>	3	0	0	7	3	42.9	150	12	8.0	128	7	5.5
Columbia	1	0	0	14	6	42.9	37	2	5.4	51	29	56.9
<b>Dade</b>	170	28	16.5	269	25	9.3	203	2	1.0	397	21	5.3
Desoto	6	0	0	3	0	0	15	1	6.7	7	0	0
Dixie	5	0	0	14	0	0	18	1	5.6	35	9	25.7
<b>Duval</b>	6	0	0	21	2	9.5	42	0	0	537	101	18.8
Escambia	18	0	0	234	74	31.6	304	123	40.5	216	9	4.2
<b>Flagler</b>	0	0	0	1	0	0	20	6	30.0	74	2	2.7
Franklin	0	0	0	6	2	33.3	4	0	0	22	4	18.2
Gadsen	0	0	0	0	0	0	2	0	0	53	27	50.1
Gilchrist	12	0	0	7	3	42.9	22	5	22.7	38	11	28.9
<b>Glades</b>	1	0	0	1	1	100	7	0	0	19	1	5.3
Gulf	1	0	0	0	0	0	3	0	0	41	15	36.6
Hamilton	0	0	0	11	1	9.1	15	0	0	31	14	45.2
Hardee	0	0	0	0	0	0	3	2	66.7	2	1	50
<b>Hendry</b>	3	0	0	0	0	0	20	1	5.0	13	2	15.4
Hernando	19	1	5.2	68	1	1.5	102	7	6.9	129	8	6.2

county	2004			2003			2002			2001		
	total #	WN+	% +	total #	WN+	% +	total #	WN+	% +	total #	WN+	% +
Highlands	0	0	0	1	0	0	22	4	18.2	49	2	4.1
<b>Hillsborough</b>	38	2	5.2	51	3	5.9	92	8	8.7	157	2	1.3
Holmes	2	0	0	13	5	38.5	11	3	27.3	36	12	33.3
<b>Indian River</b>	79	0	0	5	0	0	5	1	20.0	12	0	0
<b>Jackson</b>	16	0	0	123	37	30.1	142	34	23.9	98	12	12.2
<b>Jefferson</b>	9	0	0	18	3	16.7	8	0	0	27	16	59.3
Lafayette	0	0	0	1	0	0	0	0	0	15	8	53.3
Lake	3	0	0	3	0	0	67	35	52.2	146	14	9.6
<b>Lee</b>	4	0	0	0	0	0	14	2	14.3	18	2	11.1
<b>Leon</b>	10	0	0	98	11	11.2	111	3	2.7	318	110	34.6
Levy	4	0	0	28	11	39.3	44	8	18.2	94	23	24.5
Liberty	0	0	0	8	2	25.0	0	0	0	17	9	52.9
<b>Madison</b>	11	0	0	29	4	13.7	24	0	0	35	10	28.6
<b>Manatee</b>	0	0	0	0	0	0	5	0	0	88	4	4.5
<b>Marion</b>	22	1	0	52	3	5.8	122	41	33.6	188	41	21.8
<b>Martin</b>	5	0	0	9	1	11.1	27	0	0	37	3	8.1
Monroe	7	0	0	52	2	3.8	59	0	0	165	18	10.9
<b>Nassau</b>	0	0	0	17	1	5.9	27	0	0	98	23	23.5
Okaloosa	0	0	0	193	58	30.1	144	5	3.5	410	25	6.1
Okeechobee	1	0	0	17	3	17.6	34	2	5.9	19	1	5.2
<b>Orange</b>	10	1	10.0	56	0	0	124	9	7.3	262	3	1.1
<b>Osceola</b>	6	0	0	18	1	5.5	25	0	0	46	2	4.3
<b>Palm Beach</b>	37	0	0	169	10	5.9	285	7	2.5	189	7	3.7
<b>Pasco</b>	8	0	0	22	1	4.5	86	12	14.0	249	21	8.4
<b>Pinellas</b>	8	0	0	47	1	2.1	45	6	13.3	207	1	0.5
Polk	3	0	0	11	0	0	26	0	0	61	5	8.2
<b>Putnam</b>	2	0	0	2	0	0	59	7	11.9	92	12	13.0
Santa Rosa	12	0	0	112	37	33.0	100	11	11.0	162	16	9.9
<b>Sarasota</b>	0	0	0	41	1	2.4	280	19	6.8	166	4	2.4
<b>Seminole</b>	7	0	0	39	0	0	88	5	5.7	203	4	2.0
<b>St. Johns</b>	2	0	0	0	0	0	1	0	0	33	0	0
<b>St. Lucie</b>	3	0	0	13	1	7.7	41	1	2.4	37	2	5.4
Sumter	0	0	0	3	0	0	33	6	18.2	35	1	2.9
Suwanee	2	0	0	4	1	25.0	7	0	0	102	48	47.1
Taylor	2	0	0	13	8	61.5	15	0	0	29	13	44.8
Union	0	0	0	12	2	16.7	10	1	10.0	32	8	25.0
<b>Volusia</b>	2	0	0	6	0	0	58	6	10.3	84	3	3.6
Wakulla	1	0	0	11	3	27.2	3	0	0	108	64	54.9
<b>Walton</b>	5	0	0	43	5	11.6	44	3	6.8	84	8	9.5
Washington	7	0	0	24	8	33.3	33	3	9.1	41	16	39.0
Unknown	0	0	0	0	0	0	2	0	0	6	2	33.3
total	614	32	5.2	2398	489	20.4	4130	448	10.8	7773	1106	14.2

The “Sentinel Chicken” surveillance program has long been a mainstay of arbovirus surveillance in Florida. Mosquito control agencies or County Health Departments within participating counties maintained small flocks of chickens at various sites in their area. The birds were bled at specified intervals, and the samples sent to our laboratory. All specimens received in the lab by 12 noon on Wednesday were processed and assayed in that week's test. The hemagglutination inhibition test (HAI) was used to ascertain the presence of antibody to Flavivirus (SLE/WNV) and to Alphavirus (EEE/HJ) viruses. Reports were expeditiously faxed to the submitters each Friday afternoon. Summary reports were also compiled and e-mailed to County Health Department Directors for all participating counties. The Department of Health used this data in its determination of whether to issue/call off Medical Alerts.

The HAI test used in this laboratory is a broadly reactive screening test, and detects total antibodies developed to WN, SLE, EEE and HJ viruses. An additional advantage of the HAI assay, is that serum from any vertebrate species can be analyzed by this method. Thus, our surveillance program is capable of detecting the presence of all these arboviruses in sentinel chickens, wild birds, mammals and reptiles. Nevertheless, to ascertain which virus is present requires additional testing.

The IgM Elisa assay provides a means to distinguish between antibody to SLE or to WN with sera from humans or chickens, but not other animals; some cross-reactions may occur in this assay. Sentinel sera which reacted with SLE antigen in the HAI test were deemed “flavivirus positive” and if sufficient residual serum was available, were assayed by the Chicken IgM Elisa for antibody to SLE and to WN antigens, the week following the HAI test, with results reported on Tuesday. Additionally, sera that were reactive with EEE antigen were deemed “alphavirus positive” and were tested for antibody to EEE by the IgM Elisa. Since IgM in chickens appears to be of short duration (few weeks), ELISA negative or equivocal sera were then re-tested using a serum neutralization assay to confirm the presence of specific antibody.

The most specific test to distinguish between antibodies developed to these viruses is the serum neutralization assay. This quantitative assay uses infectious virus of each type to challenge the test serum. Cell cultures are then inoculated with the serum-virus mixture and the protective effect of the serum, that is, its ability to neutralize the lethality of the virus, is calculated. The serum neutralization assay is complex, hazardous and requires a significant amount of technologist time. Sera from animals other than chickens, e.g., from wild birds or mammals, are confirmed by the SN assay. Flavivirus positive sera are assayed against both WN and SLE viruses; alphavirus positive sera are assayed against both EEE and HJ viruses.

During 2004, Highlands J (HJ) virus was added to the SN protocol based on the MSPH thesis work of staff member Christy Ottendorfer. HJ virus cross-reacts to a limited extent with EEE in the HAI assay, however, it is not known to be a human pathogen. Thus, a positive test for HJ does not indicate the same risk of disease as does a positive EEE result and control measures would not be as critical. Nevertheless, both viruses frequently co-circulated. (Table 3)

Table 3. Sentinel Chicken seroconversions to EEE and HJ viruses during 2004.

month	#						
	susceptibles	# EEE+	# HJ+	Total#+	%EEE+	%HJ+	%+
Jan	848	4	0	4	0.5	0.0	0.5
Feb	802	8	1	9	1.0	0.1	1.1
Mar	969	7	10	17	0.7	1.0	1.8
Apr	1211	2	1	3	0.2	0.1	0.2
May	1456	6	0	6	0.4	0.0	0.4
Jun	1551	12	10	22	0.8	0.6	1.4
Jul	1602	23	3	26	1.4	0.2	1.6
Aug	1558	22	6	28	1.4	0.4	1.8
Sep	1508	5	3	8	0.3	0.2	0.5
Oct	1668	8	5	13	0.5	0.3	0.8
Nov	1309	26	13	39	2.0	1.0	3.0
Dec	772	10	9	19	1.3	1.2	2.5

Of the 3,258 individual sentinel birds assayed this year (52,123 serum samples), 352 (10.8%) developed antibody to WN virus, 12 to SLE virus (0.4%), 134 (4.1%) to EEE virus and 61 (1.9%) to HJ virus. Sera from 189 mammals were submitted for arbovirus antibody determination (HAI, SNPR assays); 17 were confirmed to have antibody to WN virus. Sera from 6 reptiles were assayed for antibody to arboviruses; all were negative.

Sera from 1032 non-sentinel avians were also assayed in (HAI, SN) assays for the detection of antibody to WNV. Data are presented in table 4. Not all of the HAI positive sera from wild birds are confirmable. In many cases the birds are too small to collect an adequate volume of serum for a second assay. The blood may be diluted in the field, resulting to a starting dilution that is too dilute for antibody detection. It must also be noted that this is prevalence data and not a generally an indicator of incident (recent) infection. Of these birds, 3.4% had alphavirus antibody detected in the HAI test to and 3.6% had flaviviruses antibody; one had antibody to both WN and EEE.

Table 4. Non-sentinel avian serum assayed during 2004.

County	# submitted	# alphavirus		# flavivirus	
		HAI +	# confirmed EEE/HJ	HAI +	# confirmed WN/SLE
Brevard	1	0	0	1	1/0
Gilchrist	1	0	0	0	0
Hillsborough	11	0	0	2	1/1
Indian River	83	0	0	1	1/0
Okaloosa	237	18	7/0	15	3/0
Orange	80	0	0	1	1/0
Palm Beach	5	0	0	0	0
Santa Rosa	120	6	4/1	6	0
Sarasota	1	0	0	0	0
Walton	253	6	1/1	8	4/0
Washington	240	5	3/1 (*+5)	3	3/0 (*+2)
Total	1032	35		37	

\* +5: 5 additional birds confirmed as alphavirus group antibody positive; \*+2: 2 additional birds confirmed as flavivirus group antibody positive.

Figures 2a and 3a depict numbers of monthly positive sentinel seroconversions since 1988, for Alphavirus (EEE/HJ) and Flavivirus (SLE/WNV) respectively. Figures 2b and 3b depict rates of seroconversion. As the numbers of sentinels has changed significantly over the years, for a meaningful interpretation of the data, it is essential that rates of seroconversion rather than just numbers of positive birds be compared.

Of the 67 counties in Florida, 33 submitted sera for arbovirus surveillance last season. This is an increase from 27 counties participating in 2001. Degree of participation varied amongst the regions. Figure 4a depicts the # of sentinels exposed in each region of the state by month, 4b the number of sentinel sera submitted. Table 5 compares annual seroconversions by region with the regional historical means. Due to small numbers of historical data points, the North and Panhandle regions have been combined and the MASR computed for the combined regions. The MASR was significantly greater than historical levels for flavivirus (SLE/WN combined) for the central region. The elevated level of alphavirus in the south is due to the inclusion of HJ virus.

Table 5. Mean annual seroconversions rates (MASR) by region, 2004.

	South	Central	<i>North</i>	<i>Panhandle</i>	North & Panhandle
EEE: 2004	0.25	1.02	<i>4.9</i>	<i>14.0</i>	7.8
HJ: 2004	0.50	0.57	<i>2.1</i>	<i>5.9</i>	3.3
Alphavirus: 2004	0.75	1.59	<i>7.06</i>	<i>19.84</i>	11.08
Alphavirus: MASR	0.2	2.0			10.0
Alphavirus:MASR 95% CI	0.03-0.43	0.46-3.48			7.92-12.16
SLE: 2004	0.62	0.68	<i>0.1</i>	<i>0.0</i>	0.1
WN: 2004	6.34	19.39	<i>6.7</i>	<i>11.7</i>	8.3
Flavivirus: 2004	6.96	20.07	<i>6.78</i>	<i>11.74</i>	8.34
Flavivirus: MASR	19.0	11.8			3.0
Flavivirus: MASR 95% CI	11.11- 26.97	5.59- 17.99			0.8-5.24

Figures 5, 6, 7, 8, 9 and 10 show, respectively, for each county: the numbers of surveillance sites maintained, the total number of susceptible chickens exposed during 2004, the number of serum samples which were submitted from exposed birds, the number of sentinel birds which seroconverted to EEE, the number of birds which seroconverted to SLE and the number of birds which seroconverted to WNV during 2004.

There are still substantial areas of the state that are not monitored. Sampling is clustered, primarily in the “traditional SLE belt” across the central and northern regions of the state and hence, the distribution of virus activity appears clustered both in space and time. Counties initiate and terminate annual surveillance activity at various times during the year and thus there is a risk of missing detection of critical early season viral amplification. The panhandle and southern regions had the lowest level of sentinel participation in 2004. The highest numbers of human cases of WN occurred in the south-eastern counties of Dade and Broward. Broward county does not have a sentinel program and Dade county’s program was late starting this year. It would be of value for our understanding and future control of arbovirus outbreaks, if these currently underrepresented areas of the state could be encouraged to participate in surveillance activities.

Table 6a provides a listing of the counties which participated during 2004, the numbers of sites and birds they maintained, the number of sera they submitted, the numbers of sentinels which seroconverted to EEE, HJ, SLE and WN viruses and the percent of exposed birds which seroconverted. Seroconversion dates are given in table 6b; confirmed seroconversions are indicated by "\*"; presumptives are listed when a confirmation was not possible for that bird.

Figures 11, 12 and 13 depict the rate of seroconversions to EEE, SLE and WNV, respectively, by month, for the four state regions. Seroconversions to alphavirus (EEE and HJ) occurred during most months of year, and peaked in November, which was the only month significantly elevated above historical values. Activity was highest in the panhandle, as is traditional. The annual regional seroconversion rates for SLE were well below each regional historical mean. This is the fourth year WNV has been detected in Florida, thus historical comparisons are not as useful as for agents with a long history in the state. Antibody response to WNV, peaked in August, a month earlier than for the historical data. Sentinel chicken seroconversion rates to WNV increased earlier in the year and decreased sooner in the south than in the panhandle. Nevertheless, there were elevated levels of seroconversions to WN early in the year (January through February) in the panhandle, indicating virus transmission during the north Florida winter. Specific antibody to SLE was detected at a very low level. Historically, SLE has shown multiyear quiescent periods between widespread outbreaks.

In 2001, WN activity was low in the south and central regions and elevated in the north and panhandle regions of the state; 2002 saw low activity in the panhandle and increased activity in central and southern regions. In 2003, the seroconversion rates to WN were highest in the south and again in the panhandle regions. In 2004, seroconversions to WNV in sentinel chickens primarily occurred in the "traditional SLE-belt", across the state.

There were fewer WN positive sentinels than last year, as was also the case with other surveillance systems (dead birds, mosquitoes) and with human cases. This phenomenon was seen nationwide during 2004. Nevertheless, early in the season (July), the data suggested that west-central Florida was going to be the epicenter for a significant outbreak of WNV. A series of events prevented that occurrence. First, mosquito control acted appropriately on surveillance data, the Department of Health released appropriate prevention messages in a timely manner and the press, primarily in areas with surveillance activities, disseminated them. The impact of four major hurricanes and a tropical storm moving through the areas which had been experiencing virus activity was also highly significant in changing the course of this arbovirus season.

A total of 104,350 HAI, 1,813 ELISA and 3,060 SN tests were performed for arbovirus studies. This includes both the sentinel flock incidence studies, and wild bird sera submitted for prevalence studies. An average of 1000 sera were assayed each week.

It must be noted that this very effective Arbovirus Sentinel Surveillance program is a success because of the efforts of its two full time technical staff, Maribel Casteneda and Rita Judge. They directed and trained OPS staff working on Arbovirus grants and student volunteers in the HAI protocol, while maintaining test quality control. Eddie Tensley, is responsible for the production of goose erythrocytes used each week as the indicator red blood cell in the HAI assay by both the Tampa and Jacksonville laboratories, and assists in specimen preparation. Ann Mitulinsky, Christy Ottendorfer, Ana Quevedo and Logan Wolpin (OPS, ELC grant) performed HAI, Elisa, SN, dead bird and mosquito assays. The Arbovirus Surveillance Team by working

together in such a productive manner has enhanced our ability to provide useful data in a timely manner to a variety of concerned agencies.

Figure 2a. Numbers of sentinel chicken seroconversions to Alphavirus (EEE/HJ) by month: 1988 to 2004

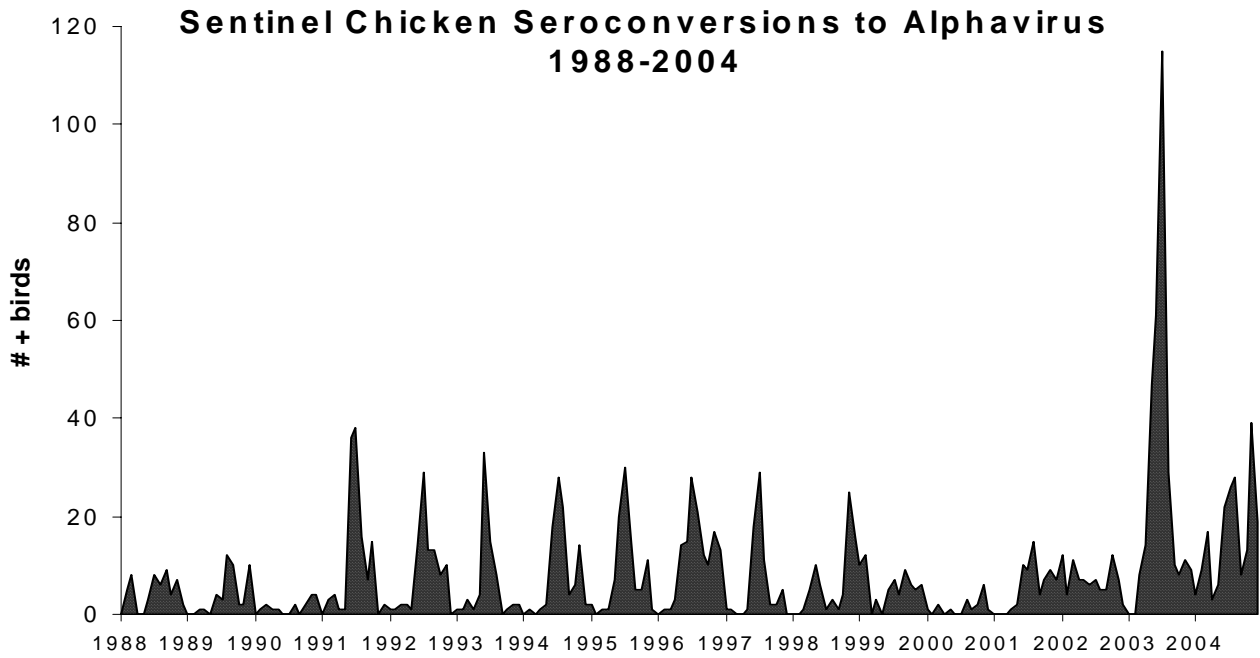


Figure 2b. Rate of sentinel Chicken seroconversion to Alphavirus (EEE/HJ) by month: 1988 to 2004

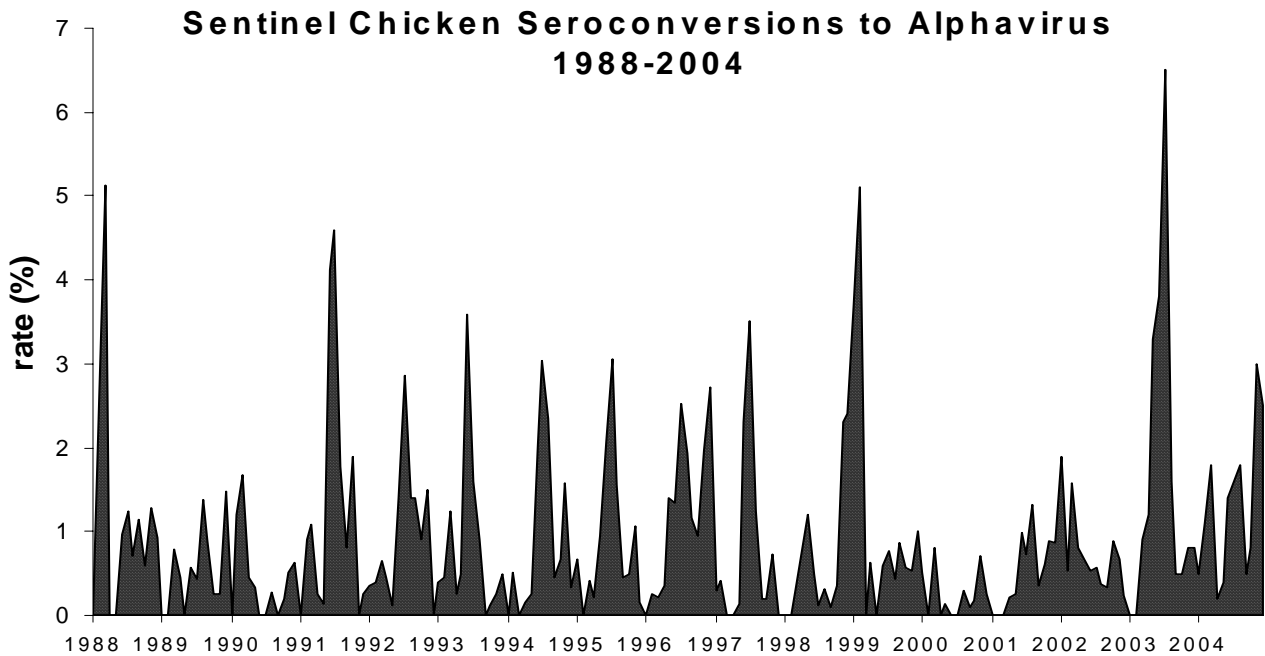


Figure 3a. Numbers of sentinel chicken seroconversions to Flavivirus (SLE/WN) by month: 1988 to 2004

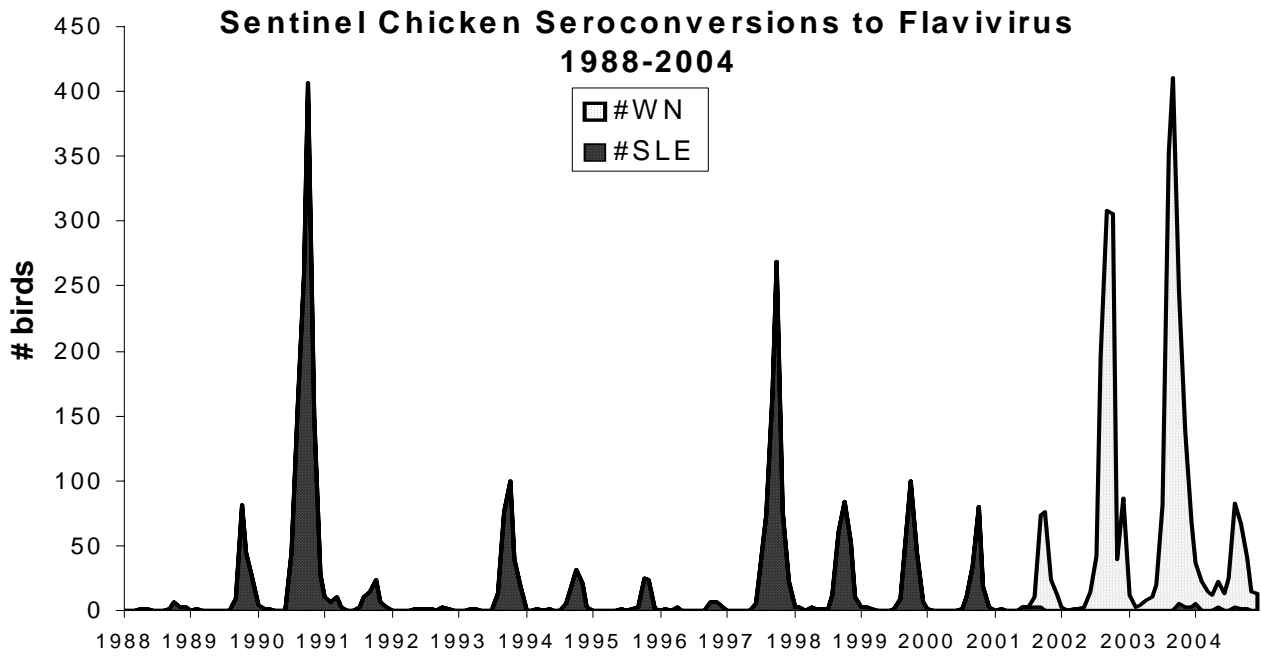


Figure 3b. Rate of sentinel Chicken seroconversion to Flavivirus (SLE/WN) by month: 1988 to 2004

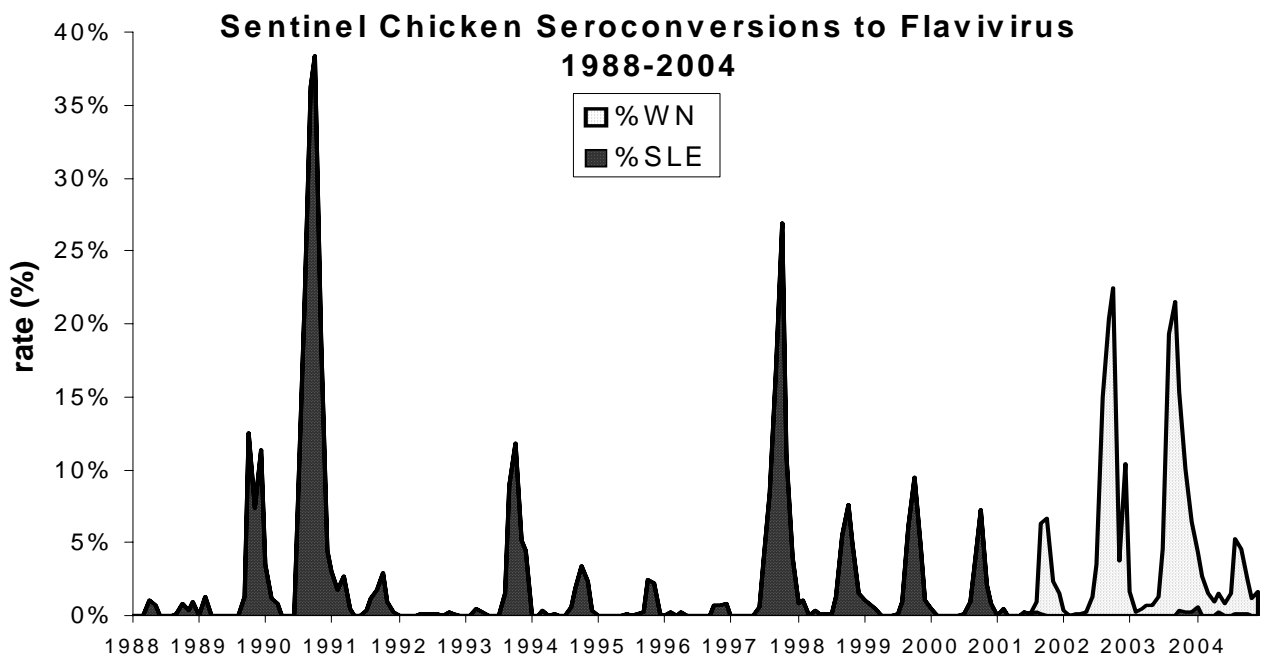


Figure 4a. Number of sentinels by region by month, 2004

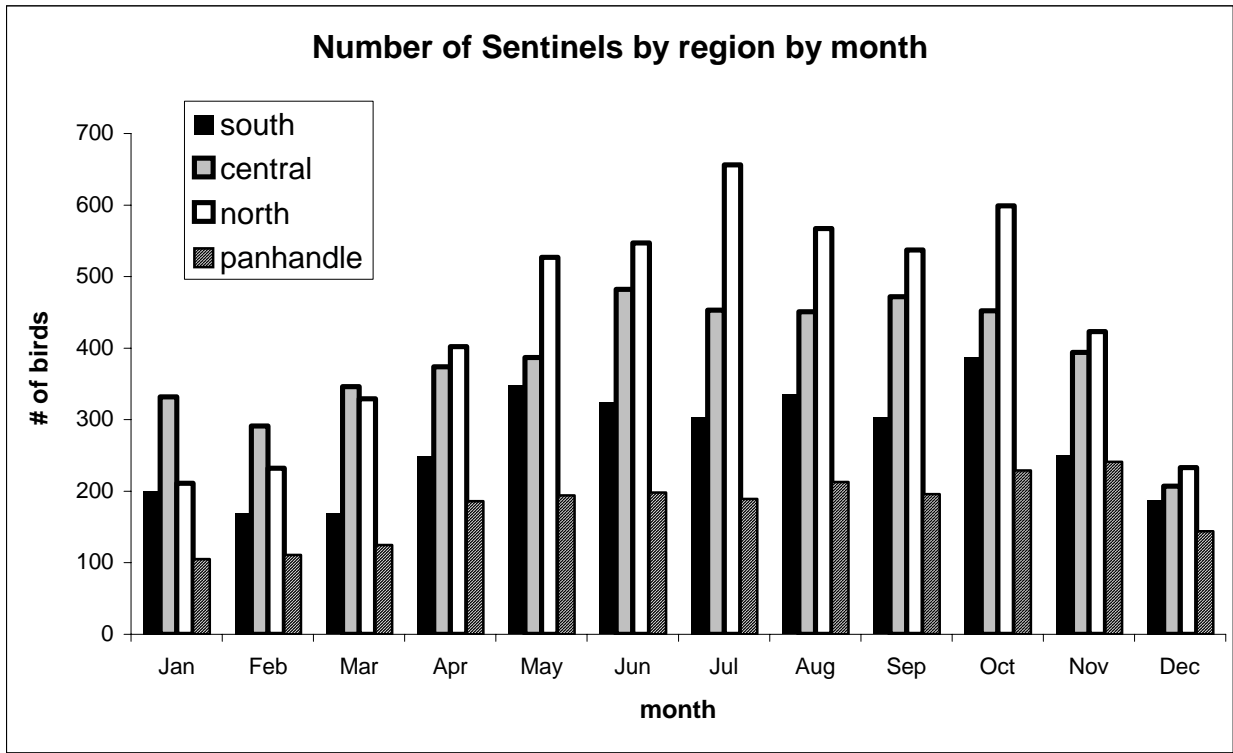


Figure 4b. Numbers of sentinel sera submitted by region by month, 2004

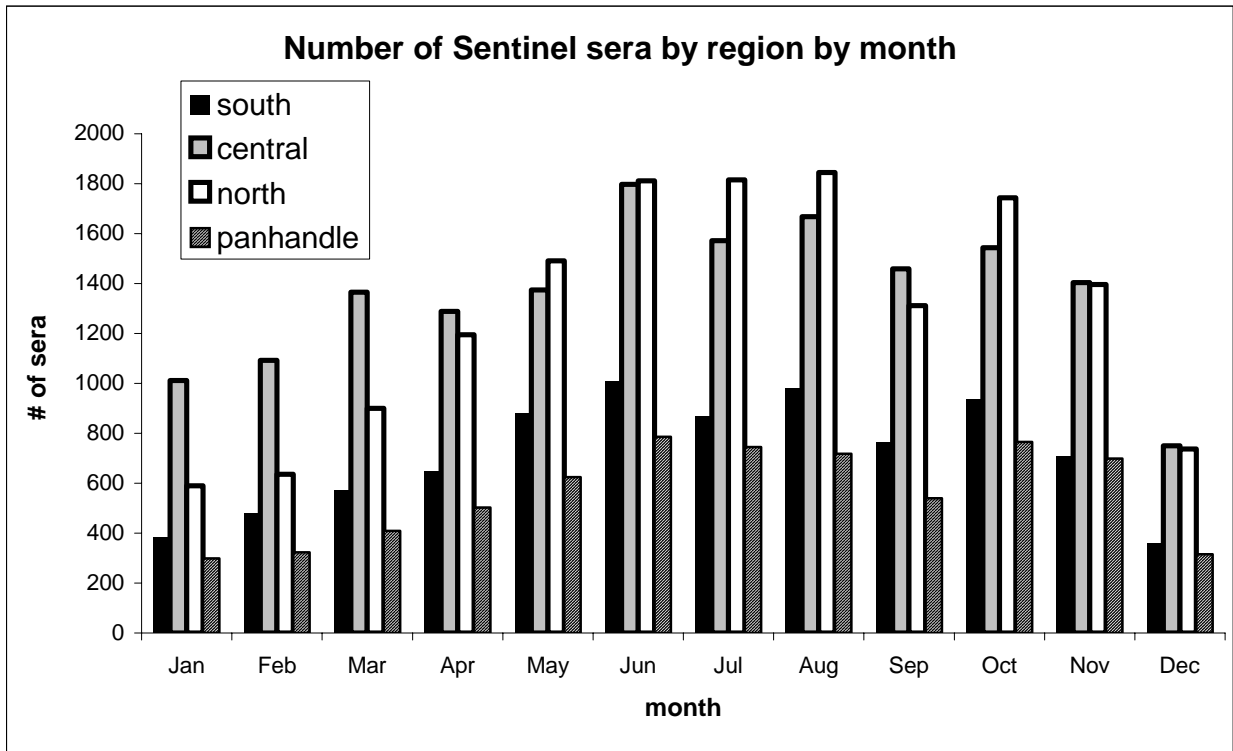


Figure 5. Number of sentinel sites by county, 2004.

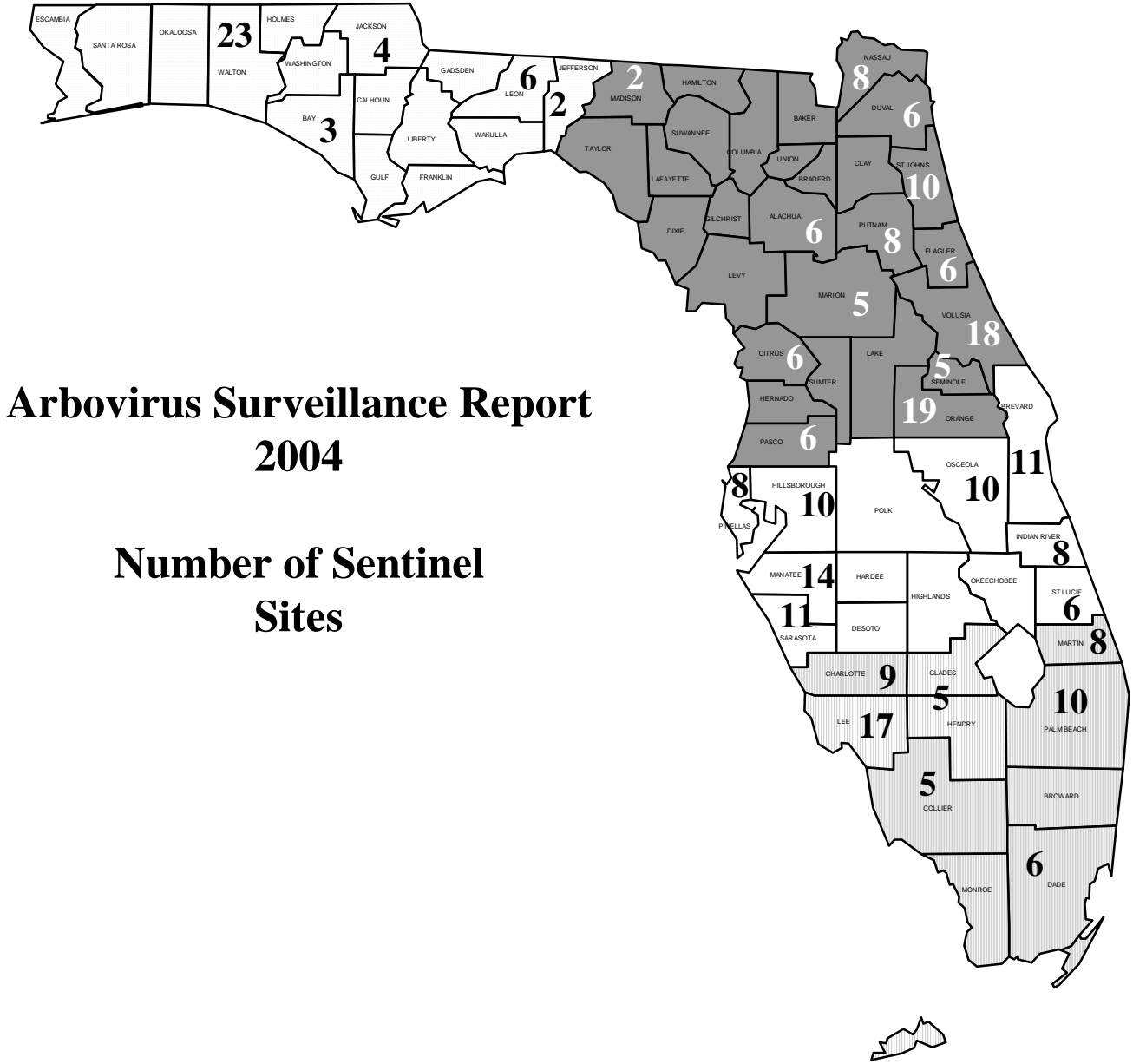
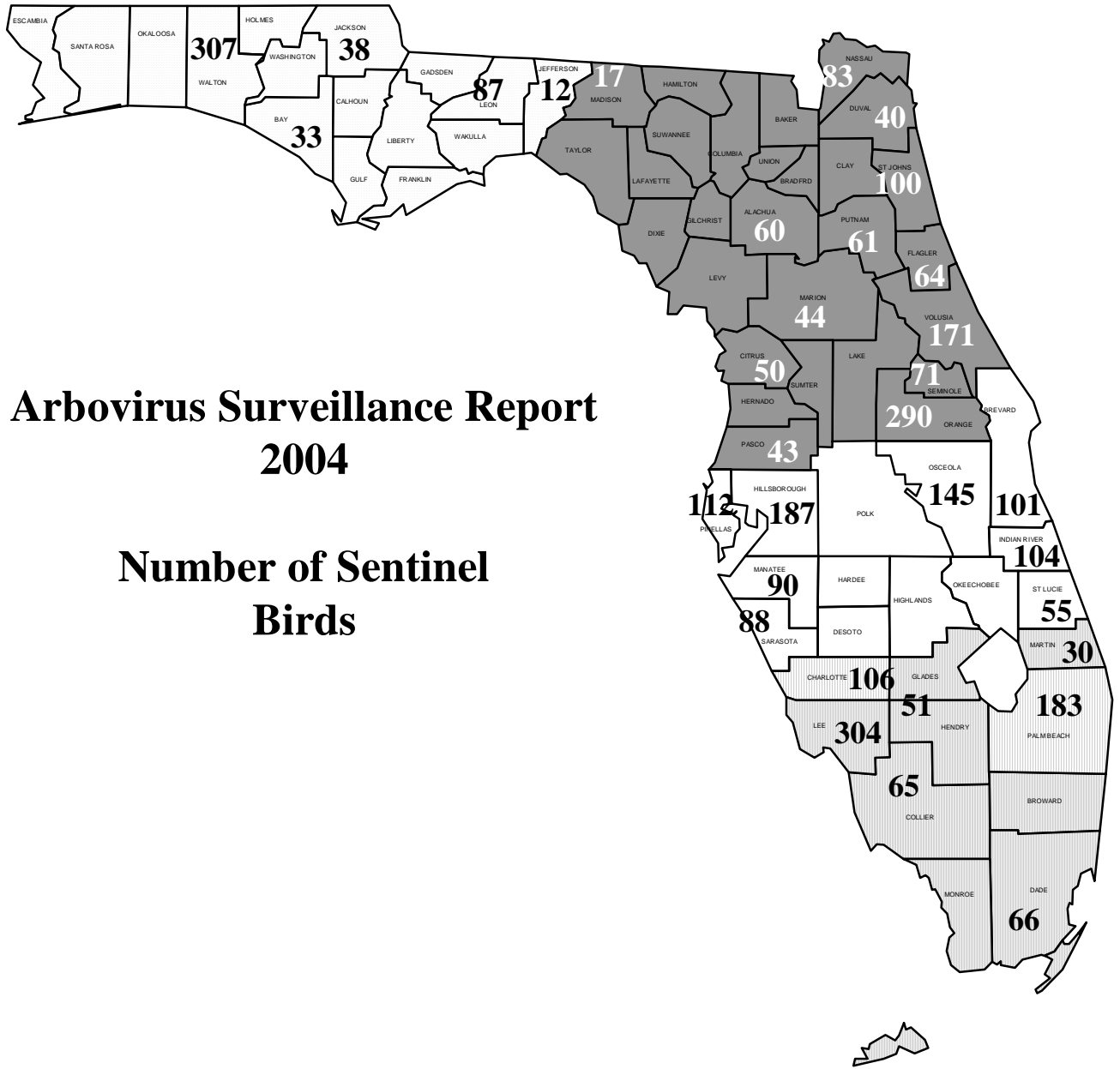


Figure 6. Number of sentinel birds by county, 2004.



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Birds**

Figure 7. Number of sentinel sera by county, 2004.

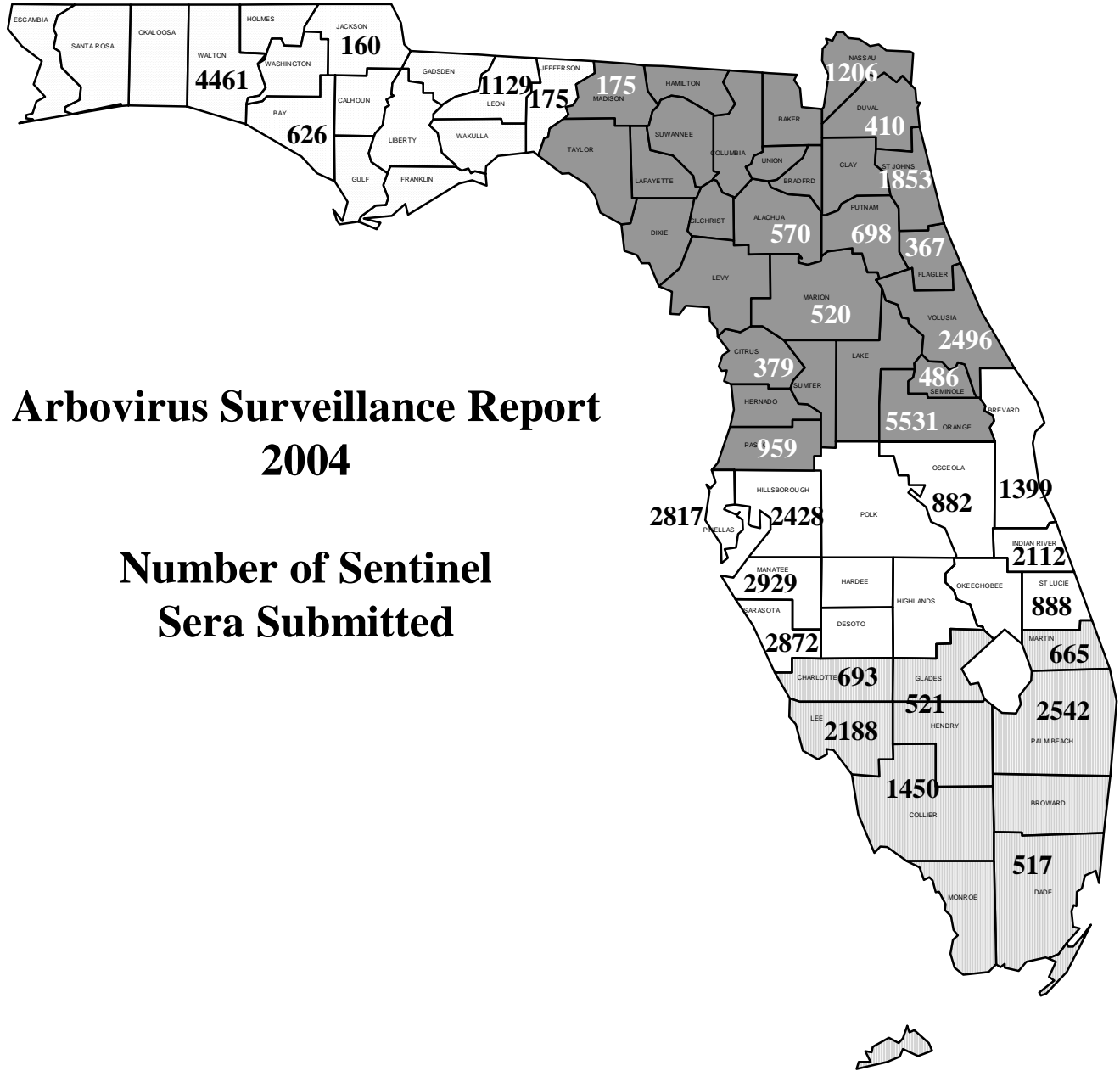
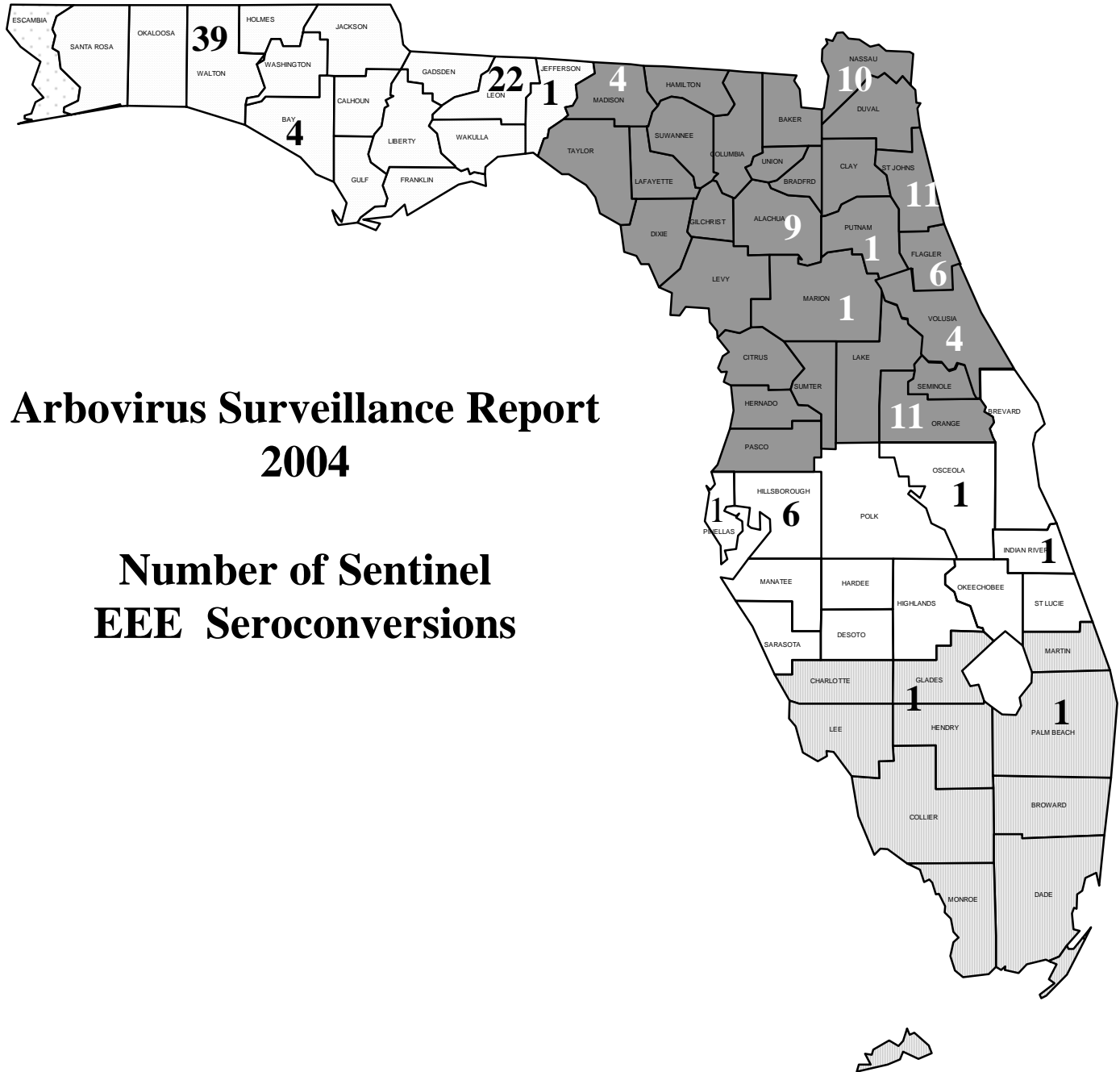


Figure 8. Number of sentinel seroconversions to EEE virus by county, 2004



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**Number of Sentinel  
EEE Seroconversions**

Figure 9. Number of sentinel seroconversions to SLE virus by county, 2004

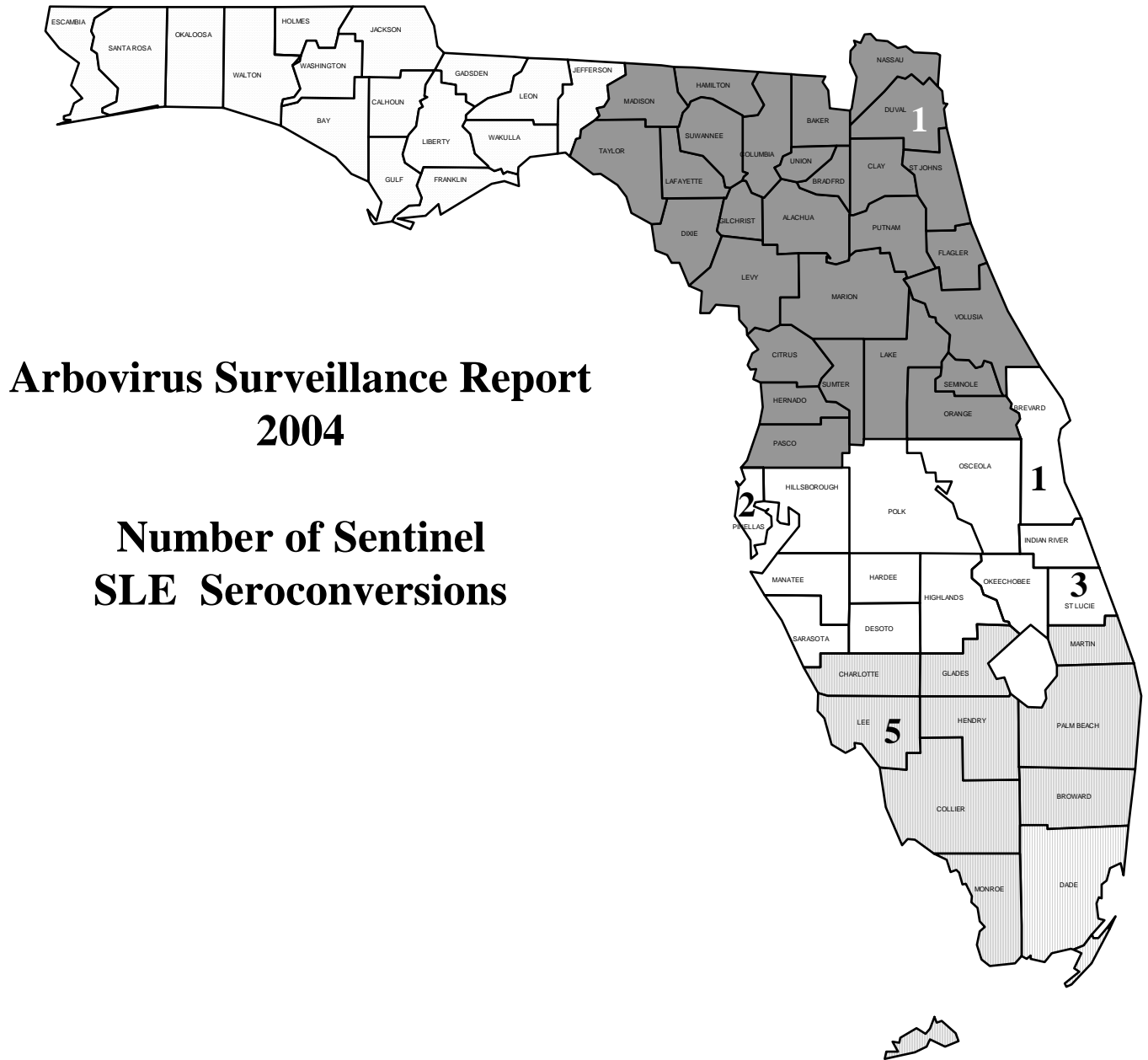


Figure 10. Number of sentinel seroconversions to WN virus by county, 2004

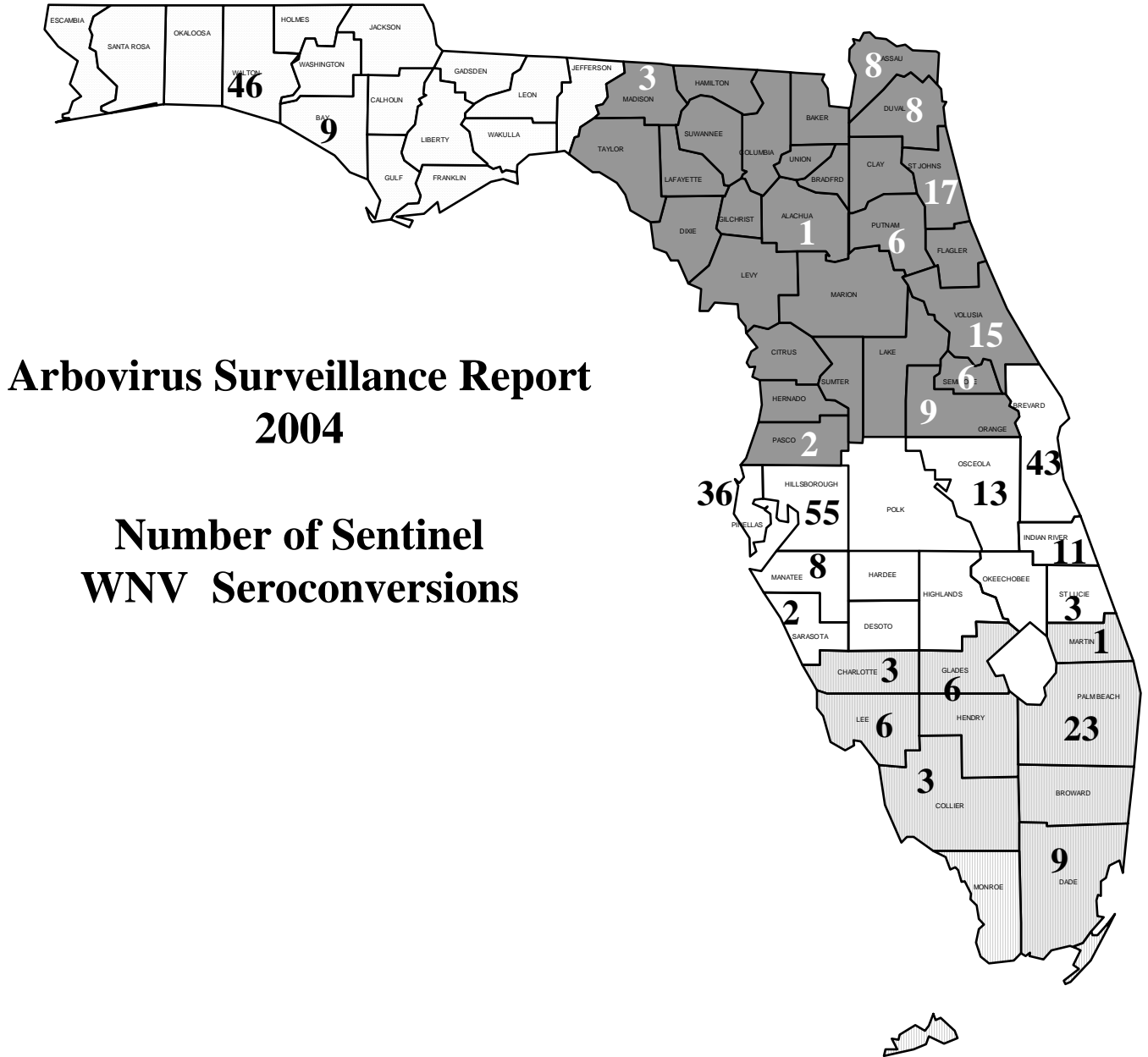


Table 6a. ARBOVIRUS SURVEILLANCE REPORT: Sentinel flock activity by county-

County	# of Sites Monitored	# of Susceptibles Examined	# of Sera from Susceptibles Examined	# of Sentinels Seroconverting				(% ) Percent of Sentinels Seroconverting			
				EEE	HJ	SLE	WN	EEE	HJ	SLE	WN
Alachua	6	60	570	9	1	0	1	15.0	1.7	0.0	1.7
Bay	3	33	626	4	3	0	9	12.1	9.1	0.0	27.3
Brevard	11	101	1399	0	0	1	43	0.0	0.0	1.0	41.6
Charlotte	9	106	693	0	1	0	3	0.0	0.9	0.0	2.8
Citrus	6	50	379	0	0	0	0	0.0	0.0	0.0	0.0
Collier	5	65	1450	0	0	0	3	0.0	0.0	0.0	4.6
Dade	6	66	517	0	0	0	9	0.0	0.0	0.0	13.6
Duval	6	40	410	0	0	1	8	0.0	0.0	2.5	20.0
Flagler	6	64	367	6	2	0	0	9.4	3.1	0.0	0.0
Hendry/Glades	5	51	521	1	0	0	6	2.0	0.0	0.0	11.8
Hillsborough	10	187	2428	6	5	0	55	3.2	2.7	0.0	27.8
Indian River	8	104	2112	1	0	0	11	1.0	0.0	0.0	10.6
Jackson	4	38	160	1	0	0	0	1.0	0.0	0.0	10.6
Jefferson	2	12	175	0	1	0	0	8.3	0.0	0.0	0.0
Lee	17	304	2188	0	0	5	6	0.0	0.0	1.6	2.0
Leon	6	87	1129	22	19	0	0	25.3	21.8	0.0	0.0
Madison	2	17	175	4	0	0	3	23.5	0.0	0.0	17.6
Manatee	14	90	2929	0	0	0	8	0.0	0.0	0.0	8.9
Marion	5	44	520	1	2	0	0	2.3	4.5	0.0	0.0
Martin	8	30	665	0	0	0	1	0.0	0.0	0.0	3.3
Nassau	8	83	1206	10	5	0	8	3.8	2.1	0.0	3.1
Orange	19	290	5531	11	6	0	9	3.8	2.1	0.0	3.1
Osceola	10	145	882	1	0	0	13	0.7	0.0	0.0	9.0
Palm Beach	10	183	2542	1	3	0	23	0.5	1.6	0.0	12.6
Pasco	6	43	959	0	0	0	2	0.0	0.0	0.0	4.7
Pinellas	8	112	2817	1	0	2	36	0.9	0.0	1.8	32.1
Putnam	8	61	698	1	3	0	6	1.6	4.9	0.0	9.8
Sarasota	11	88	2872	0	0	0	2	0.0	0.0	0.0	2.3
Seminole	5	71	486	0	0	0	6	0.0	0.0	0.0	8.5
St. Johns	10	100	1853	11	0	0	17	11.0	0.0	0.0	17.0
St. Lucie	6	55	888	0	0	3	3	0.0	0.0	5.5	5.5
Volusia	18	171	2496	4	4	0	15	2.3	2.3	0.0	8.8
Walton	23	307	4461	39	6	0	46	12.4	2.0	0.0	14.7
Totals	281	3258	47104	134	61	12	352				

Table 6b. ARBOVIRUS SURVEILLANCE REPORT: Sentinel flock activity by county

County	Week of Sero Conversion (* Indicates Confirmed)
Alachua	<b>EEE</b> 5/10(3*), 6/8(1*), 6/14(1*), 7/26(3*), 8/30(1*); <b>HJ</b> : 8/30(1*) <b>WN</b> : : 8/30(1*)
Bay	<b>EEE</b> : 11/30(2*), 12/14(2*); <b>HJ</b> : 8/17(1*), 11/30(1*), 12/7(1*); <b>WN</b> : : 8/3(1*), 8/17(2*), 8/24(4*), 9/7(1*), 9/28(1*)
Brevard	<b>SLE</b> 8/24(1*); <b>WN</b> : 7/1(1*), 7/8(1*), 7/9(3*), 7/16(3*), 7/19(1*), 7/22(1*), 7/30(2*), 8/4(1*), 8/5(1*n), 8/16(5*), 8/17(1*), 8/18(2*), 8/20(1*), 8/25(2*), 8/26(6*), 8/27(1*), 8/30(1*), 9/10(1*), 9/13(2*), 9/14(2*), 9/15(1*), 9/17(1*), 9/22(1*), 10/14(1*) 10/21(1*)
Charlotte	<b>HJ</b> : 12/3(1*); <b>WN</b> : 10/15(1* <sup>n</sup> ), 12/3(2*)
Citrus	
Collier	<b>WN</b> : 2/9(1*), 5/25(1*), 12/13(1*)
Dade	<b>WN</b> : 7/26(1*), 8/2(1*), 8/9(1*), 8/23(2*), 8/24(2*), 9/13(1*), 9/28(1*)
Duval	<b>SLE</b> : 5/4(1*); <b>WN</b> : 9/16(1*), 9/20(3*), 9/28(1*), 10/5(1*), 10/18(1*), 10/25(1*)
Flagler	<b>EEE</b> : 4/5(1*), 4/26(1*), 5/10(1*), 5/17(1*), 6/28(2*); <b>HJ</b> : 6/21(1*), 10/4(1*)
Hendry/Glades	<b>EEE</b> : 7/6(1*); <b>WN</b> : 3/12(1*), 9/8(1*), 9/20(1*), 9/24(1*), 10/8(1*), 10/15(1*); <b>FLAVI</b> : 6/2(1*)
Hillsborough	<b>EEE</b> : 7/6(1*), 7/13(1*), 7/27(3*), 12/20(1*); <b>HJ</b> : 3/16(1*), 6/8(1*), 6/15(1*), 6/22(1*), 6/29(1*); <b>WN</b> : 4/6(2*), 4/27(2*), 5/11(6*), 6/2(2*), 6/8(1*), 6/15(3*), 6/22(3*), 6/29(4*), 7/6(1*), 7/13(2*), 7/27(4*), 8/10(2*), 8/17(1*), 9/8(1*), 9/13(1*), 9/21(4*), 10/12(2*, 1*n), 10/19(2*), 10/26(2*), 11/2(2*), 11/16(1*), 11/23(1*), 12/14(2*), 12/20(1*), 12/27(2*)
Indian River	<b>EEE</b> : 5/20(1*); <b>WN</b> : 1/8(2*), 3/17(1*), 3/25(1*), 4/22(1*), 5/20(2*), 5/27(2*), 8/12(1*), 8/27(1*)
Jackson	<b>HJ</b> : 11/??(1*)
Jefferson	<b>EEE</b> : 6/20(1*)
Lee	<b>SLE</b> : 1/5(2*), 1/19(2*), 1/20(1*); <b>WN</b> : 1/5(1*), 1/6(2*), 1/19(1*), 4/20(1*), 8/9(1*)
Leon	<b>EEE</b> : 7/30(1*), 8/6(2*), 9/17(1*), 10/8(1*), 10/25(3*), 10/29(3*), 11/8(3*), 11/15(1* <sup>n</sup> ), 11/19(3*), 11/29(1*), 12/6(1* <sup>n</sup> ), 12/10(1*), 12/13(1* <sup>n</sup> ); <b>HJ</b> : 8/13(2*), 9/7(1*), 9/24(1*), 10/8(1*), 10/15(1*), 11/8(7*), 11/12(1*), 11/19(2*), 12/3(3*);
Madison	<b>EEE</b> : 7/11(1*), 8/1(1*), 8/7(1*), 8/14(1*); <b>WN</b> : 9/11(2*), 9/26(1*)
Manatee	<b>WN</b> : 1/12(2*), 3/29(1*), 3/30(2*), 4/12(1*), 8/30(1*), 9/20(1*)
Marion	<b>EEE</b> : 7/17(1*); <b>HJ</b> : 6/10(1*), 7/9(1*)
Martin	<b>WN</b> : 5/28(1*)
Nassau	<b>EEE</b> : 7/5(1*), 7/11(1*), 8/1(1*), 8/2(2*), 8/8(1*), 8/15(1*), 8/16(1*), 8/30(1*), 9/17(1*); <b>HJ</b> : 6/7(1*), 7/18(1*), 8/16(1*), 9/10(1*), 10/3(1*); <b>WN</b> : 4/19(1*), 8/23(2*), 8/30(1*), 9/10(2*), 10/3(1*), 10/10(1*)
Orange	<b>EEE</b> : 2/9(1*), 2/23(1*), 6/14(1*), 6/28(2*), 7/1(1*), 7/6(2*), 7/9(1*), 7/19(1*), 7/26(1*); <b>HJ</b> : 3/12(1*), 3/15(2*), 4/5(1*), 6/7(2*); <b>WN</b> : 1/12(1*), 1/20(1*), 5/10(1*), 8/19(1*), 9/20(1*), 9/24(1*), 10/1(1*), 10/25(1*), 12/10(1*)

County	Week of Sero Conversion (* Indicates Confirmed)
Osceola	<b>EEE:</b> 6/2(1*); <b>WN:</b> 8/24(4*), 9/7(3*), 9/14(1*), 9/21(2*), 9/28(1*), 10/12(2*)
Palm Beach	<b>EEE:</b> 11/29(1*); <b>HJ:</b> 12/6(3*); <b>WN:</b> 2/16(1*), 7/12(2*), 7/19(2*), 7/26(1*), 8/2(2*), 8/9(4*), 8/16(2*), 8/30(4*), 9/13(2*), 9/20(1*), 9/21(2*n)
Pasco	<b>WN:</b> 8/9(1*), 10/26(1*)
Pinellas	<b>EEE:</b> 1/26(1*); <b>SLE:</b> 5/17(2*); <b>WN:</b> 1/20(1*), 1/26(1*), 2/16(2*), 2/23(2*), 3/15(1*), 8/16(2*), 8/23(1*), 8/30(2*), 9/7(3*), 9/13(1*), 9/20(2*), 10/4(4*), 10/11(2*), 10/18(1*), 10/25(2*), 11/8(1*), 11/15(3*), 11/22(2*), 11/29(1*), 12/20(2*)
Putnam	<b>EEE:</b> 8/6(1*); <b>HJ:</b> 6/25(1*), 8/20(1*), 10/29(1n*); <b>WN:</b> 5/20(1*), 5/21(1*), 8/5(1*), 9/10(1*), 9/23(1*), 10/8(1*)
Sarasota	<b>WN:</b> 1/12(1*), 2/2(1*)
Seminole	<b>WN:</b> 8/26(2*), 8/27(1*), 9/16(1*), 9/30(1*), 12/9(1*)
St. Johns	<b>EEE:</b> 6/1(2*), 6/14(1*), 7/5(2*), 7/19(1*), 8/2(1*), 8/9(1*), 8/16(1*), 8/23(1*), 9/13(1*); <b>WN:</b> 3/30(1*), 8/23(2*), 8/30(1*), 9/20(2*), 9/27(1*), 9/28(3*), 10/4(1*), 10/11(2*), 10/18(1*), 11/8(1*), 11/15(1*), 11/29(1*)
St. Lucie	<b>SLE:</b> 8/26(1*), 9/30(1*), 10/1(1*); <b>WN:</b> 8/12(1*), 8/26(2*)
Volusia	<b>EEE:</b> 3/22(1*), 8/9(2*), 12/13(1*); <b>HJ:</b> 2/23(1*), 3/15(2*), 3/22(1*); <b>WN:</b> 1/5(6*), 1/12(2*), 8/30(1*), 9/13(3*), 10/4(1*), 10/11(1*), 10/18(1*)
Walton	<b>EEE:</b> 1/21(3*), 2/12(1*), 2/25(5*), 3/15(2*), 3/16(1*), 3/18(1*), 3/19(1*), 3/29(1*), 8/11(1*), 8/23(1*), 9/2(1*), 10/18(2*n), 11/1(1*), 11/2(2*), 11/5(1*), 11/10(2*), 11/15(1*), 11/16(3*,1*n), 11/22(2*), 11/29(2*), 12/1(2*), 12/13(1*), 1/3(1*); <b>HJ:</b> 3/15(2*), 3/29(1*), 7/15(1*), 11/15(1*), 12/6(1*); <b>WN:</b> 1/10(2*), 1/13(2*), 1/15(2*), 1/20(1*), 1/22(3*), 1/26(1*), 2/2(2*), 2/9(2*), 2/12(3*), 2/18(1*), 2/19(3*), 2/24(3*), 2/25(1*), 3/1(1*), 3/4(2*), 3/5(1*), 3/22(1*), 3/25(1*), 3/29(1*), 4/2(1*), 4/5(1*), 4/6(1*), 4/12(1*), 5/10(1*), 5/12(1*), 5/13(1*), 5/17(1*), 8/30(1*), 9/13(1*), 10/21(1*), 11/8(1*), 12/1(1*); <b>ALPHA:</b> 7/16(2*), 11/10(1*), 11/15(1*), 11/16(1*); <b>FLAVI:</b> 11/8(1*), 12/1(2*)

Figure 11. Rate of sentinel seroconversions to EEE virus by region by month, 2004. "State" is the statewide rate for that month for 2004; "Avg. historical" is the average statewide rate from 1990 through 2004. Rate = number of seroconversions to EEE in a region divided by the number of susceptible birds exposed during the month in the region, expressed as %.

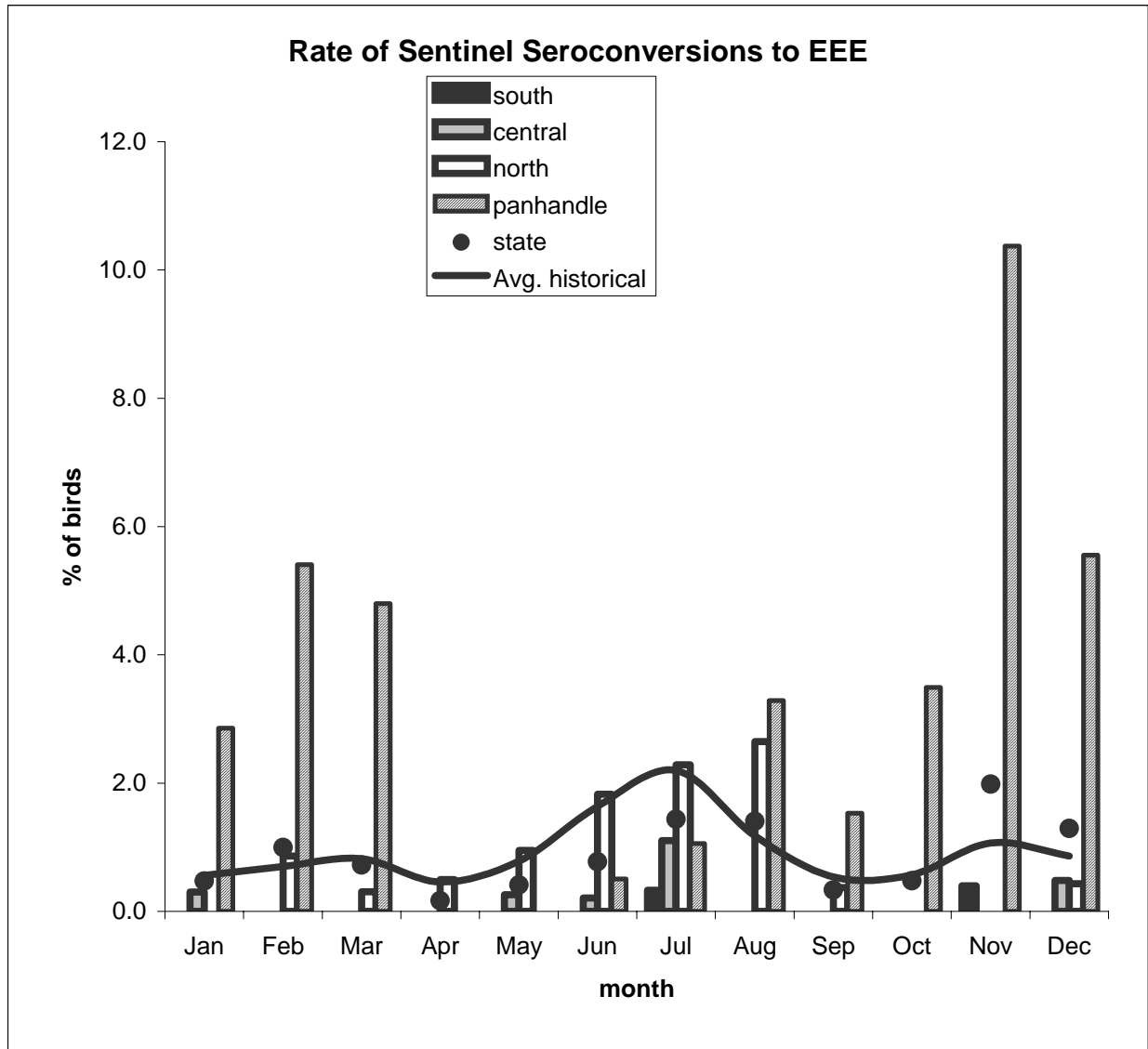


Figure 12. Rate of sentinel seroconversions to SLE virus by region by month, 2004. "State" is the statewide rate for that month for 2004; "Avg. historical" is the average statewide rate from 1990 through 2004. Rate = number of seroconversions to SLEE in a region divided by the number of susceptible birds exposed during the month in the region, expressed as %.

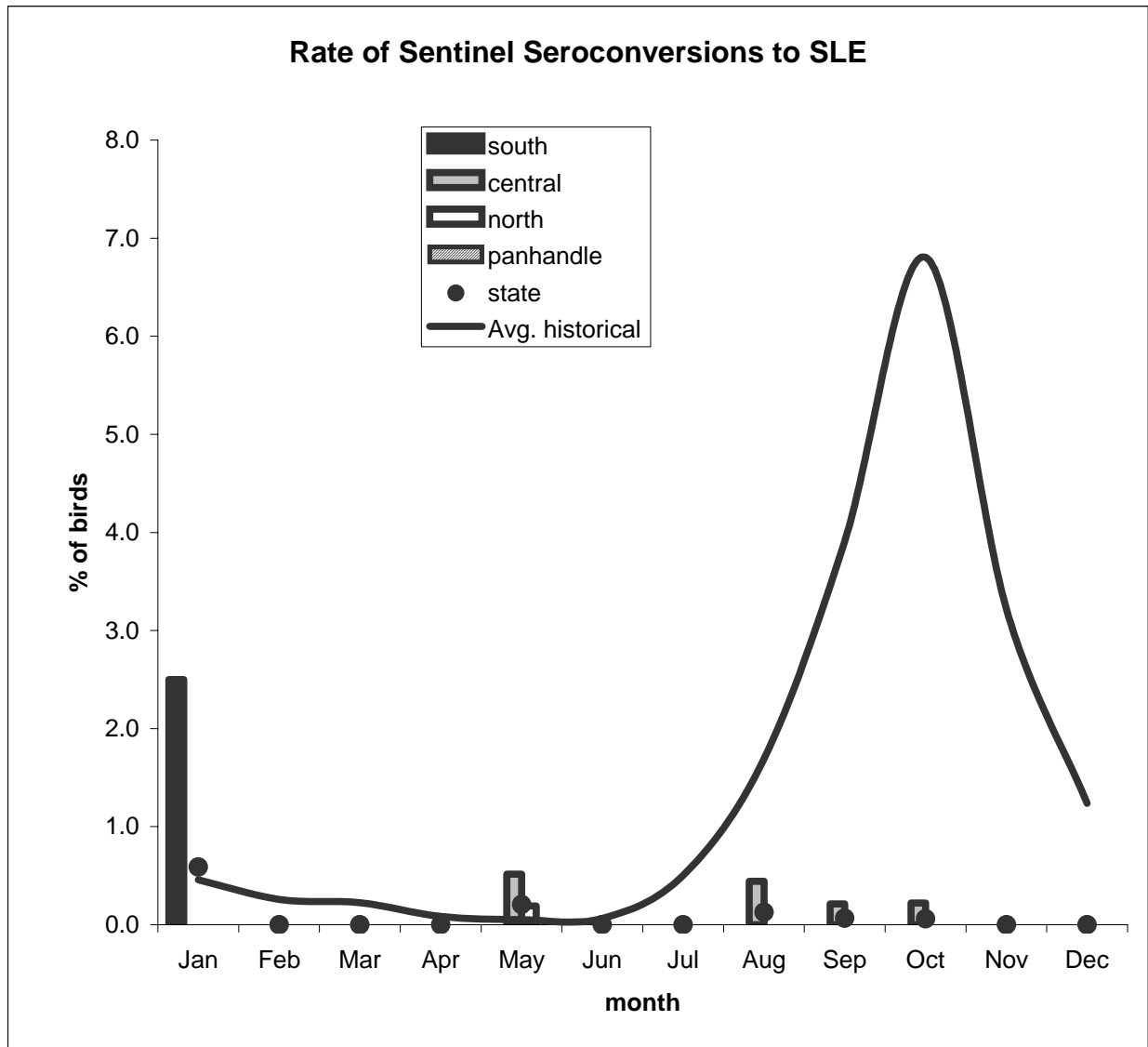


Figure 13. Rate of sentinel seroconversions to WN virus by region by month, 2004. "State" is the statewide rate for that month for 2004; "Avg. historical" is the average statewide rate from 1990 through 2004. Rate = number of seroconversions to WN in a region divided by the number of susceptible birds exposed during the month in the region, expressed as %.

