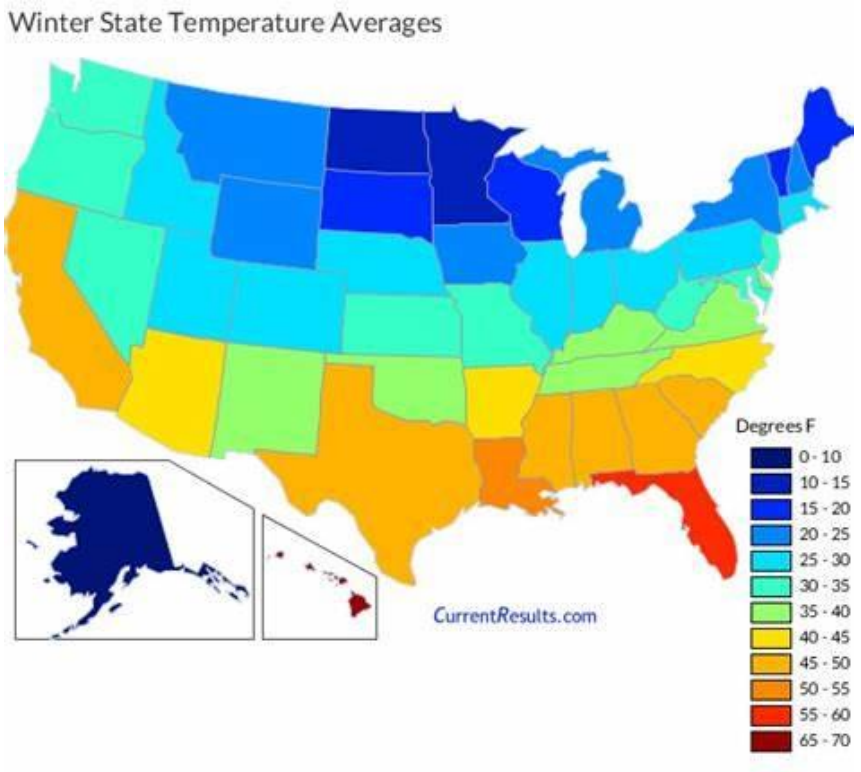
Historic Distribution of *Aedes aegypti* in Georgia

GMCA / Rosmarie Kelly / Oct 16-18, 2019

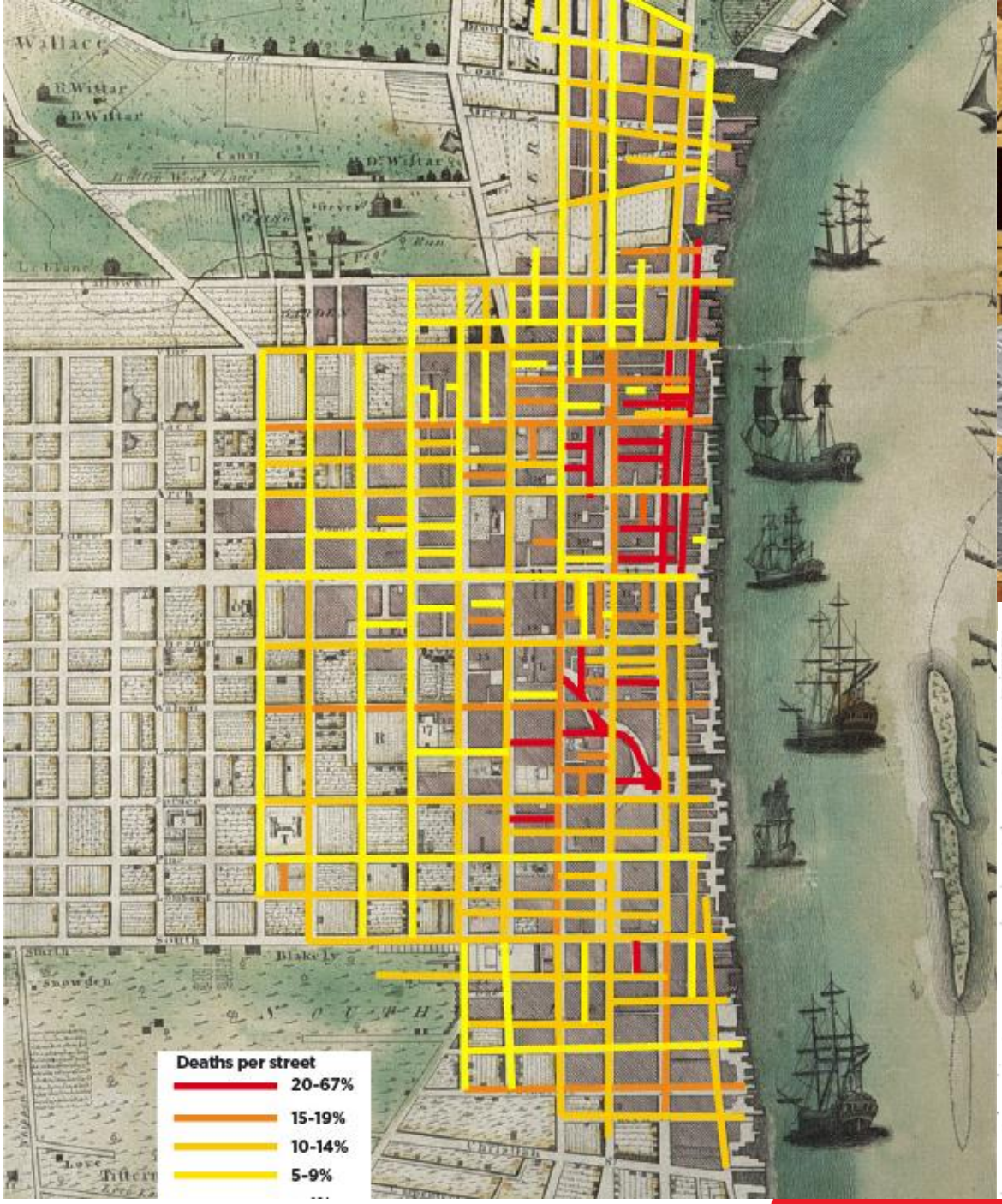
However, an overwintering population of *Aedes aegypti* has been documented in the Capitol Hill neighborhood of Washington, DC, since 2011.

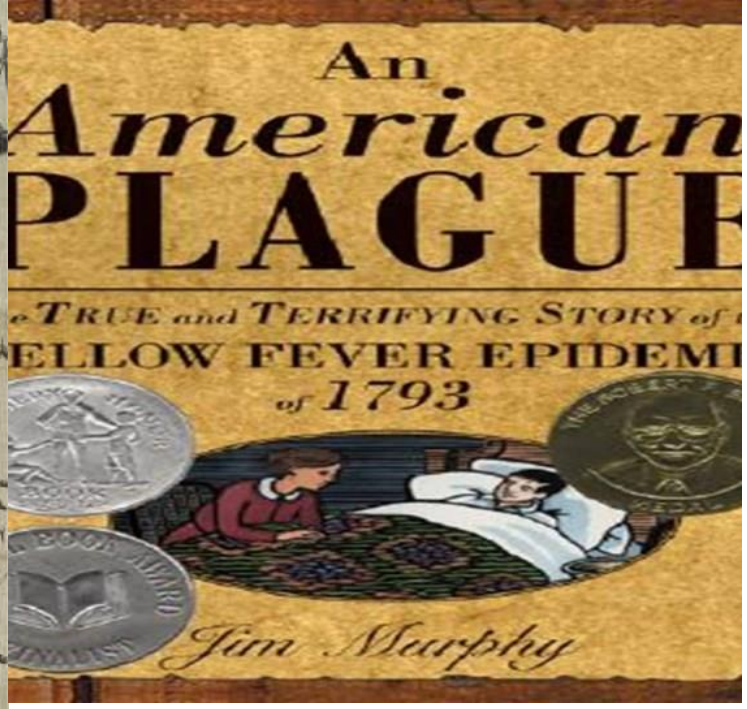
- *Aedes aegypti* is an invasive, highly anthropophilic mosquito and a major vector for yellow fever, dengue, Zika, and chikungunya.
- Population persistence in the continental United States is reportedly limited to southward of the average 50°F winter isotherm, which in the east, bisects Alabama, Mississippi, Georgia, and South Carolina.



- The first yellow fever outbreaks in the United States occurred in late 1690s.
- Nearly 100 years later, in the late summer of 1793, refugees from a yellow fever epidemic in the Caribbean fled to Philadelphia.
  - Within weeks, people throughout the city were experiencing symptoms.
  - By the middle of October, 100 people were dying from the virus every day.
  - Caring for the victims so strained public services that the local city government collapsed.
  - Philadelphia was also the seat of the United States government at the time, but federal authorities simply evacuated the city in face of the raging epidemic.

Dead House on the Schuylkill during the yellow fever in Philadelphia in 1793, David Johnson Kennedy, Watercolor, Historical Society of Pennsylvania.





MALIGNANT FEVER,

LATELY PREVALENT IN

PHILADELPHIA:

WITH A STATEMENT OF THE

PROCEEDINGS

THAT TOOK PLACE ON THE SUBJECT IN DIFFERENT PARTS OF THE

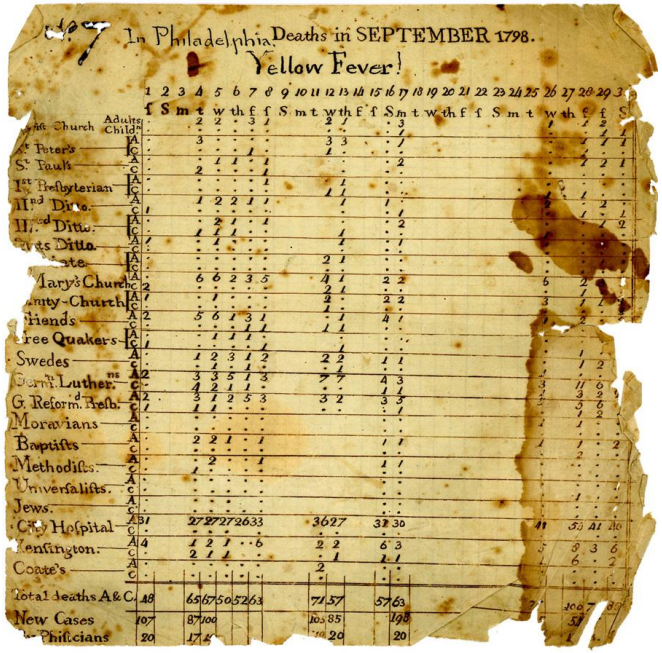
UNITED STATES.

BY MATHEW CAREY.

PHILADELPHIA:

PRINTED BY THE AUTHOR.

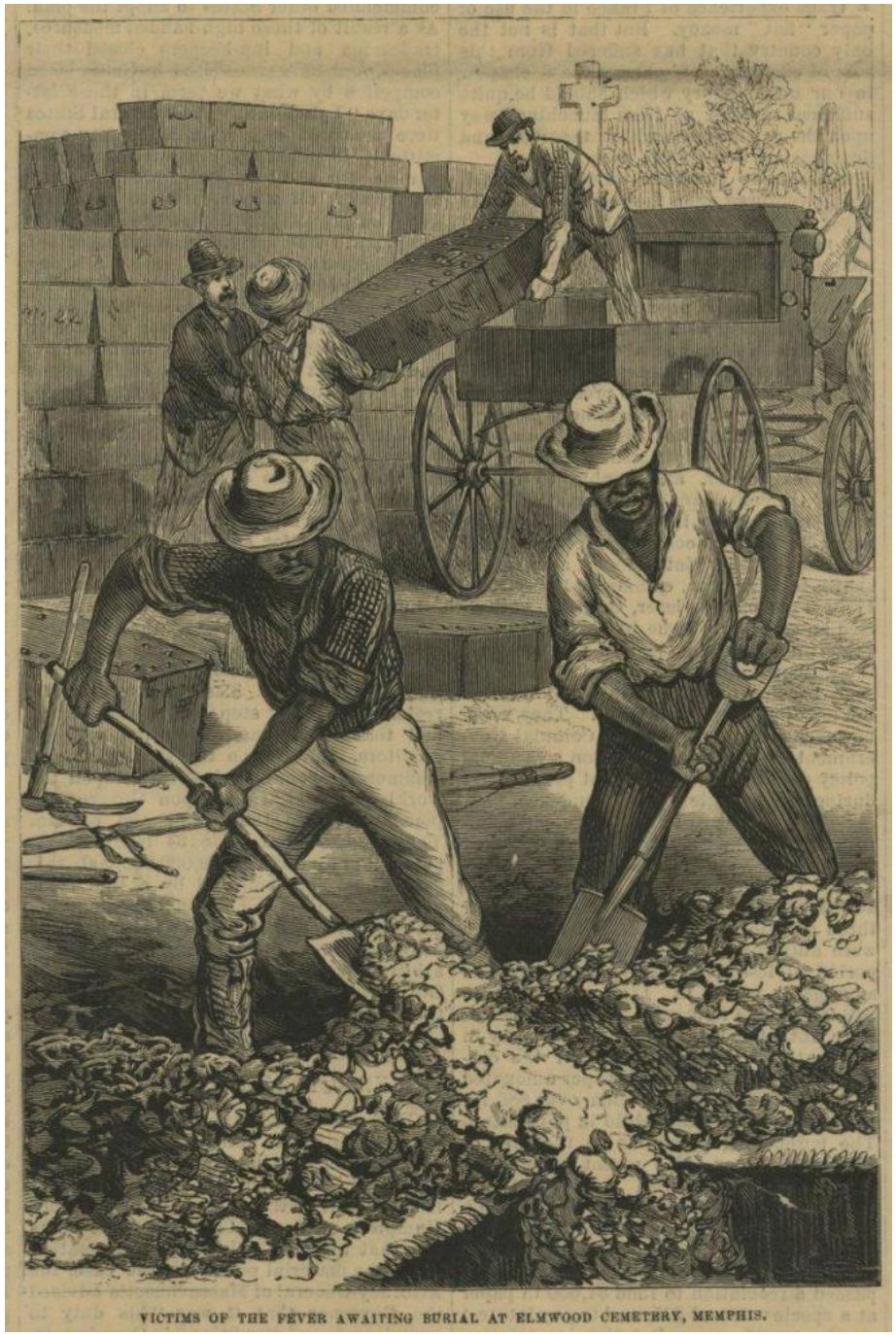
- A yellow fever epidemic in Philadelphia in 1793 was one of the main reasons why the newly created United States of America consolidated their plans to place the capitol in Washington D.C., while the business community of the U.S. moved to New York.
- Prior to the epidemic, the government, as well as the big-business community, was located in Philadelphia, and it was thought that Philadelphia would become the capitol of U.S.
- However, the yellow fever epidemic literally changed U.S. history, which is why the White House is in Washington, but Wall Street is located in New York.



http://chrc-phila.org/tag/1798-yellow-fever-epidemic/

Nearly 700 people in Savannah, Georgia died from yellow fever in 1820, including two local physicians who lost their lives caring for the stricken. Several other epidemics followed, including 1854 and 1876.

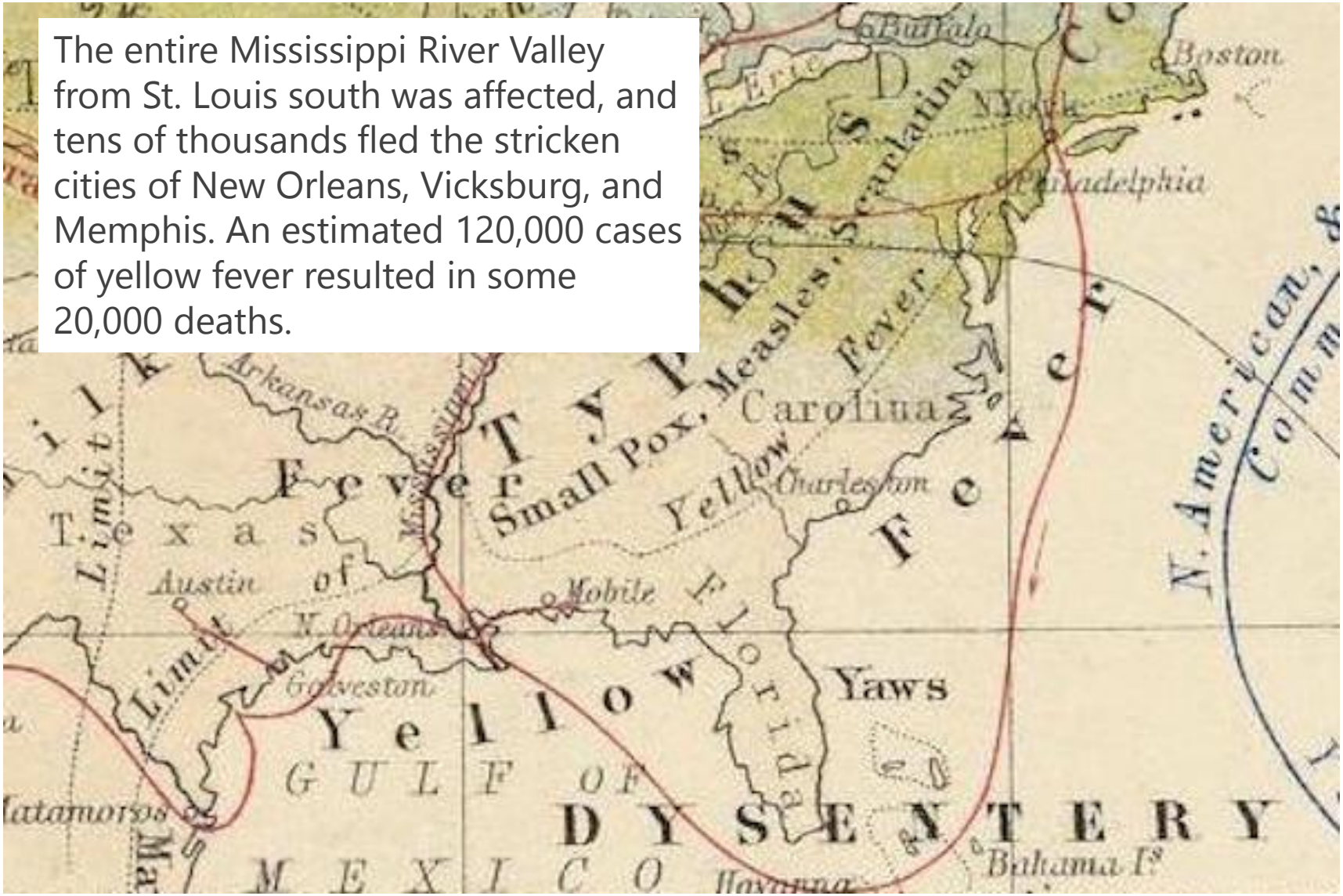
http://www.keytosavannah.com/blog/graves-of-yellow-fever-victims



Memphis suffered several epidemics during the 1870s, culminating in the 1878 epidemic (called the Saffron Scourge of 1878), with more than 5,000 fatalities in the city.

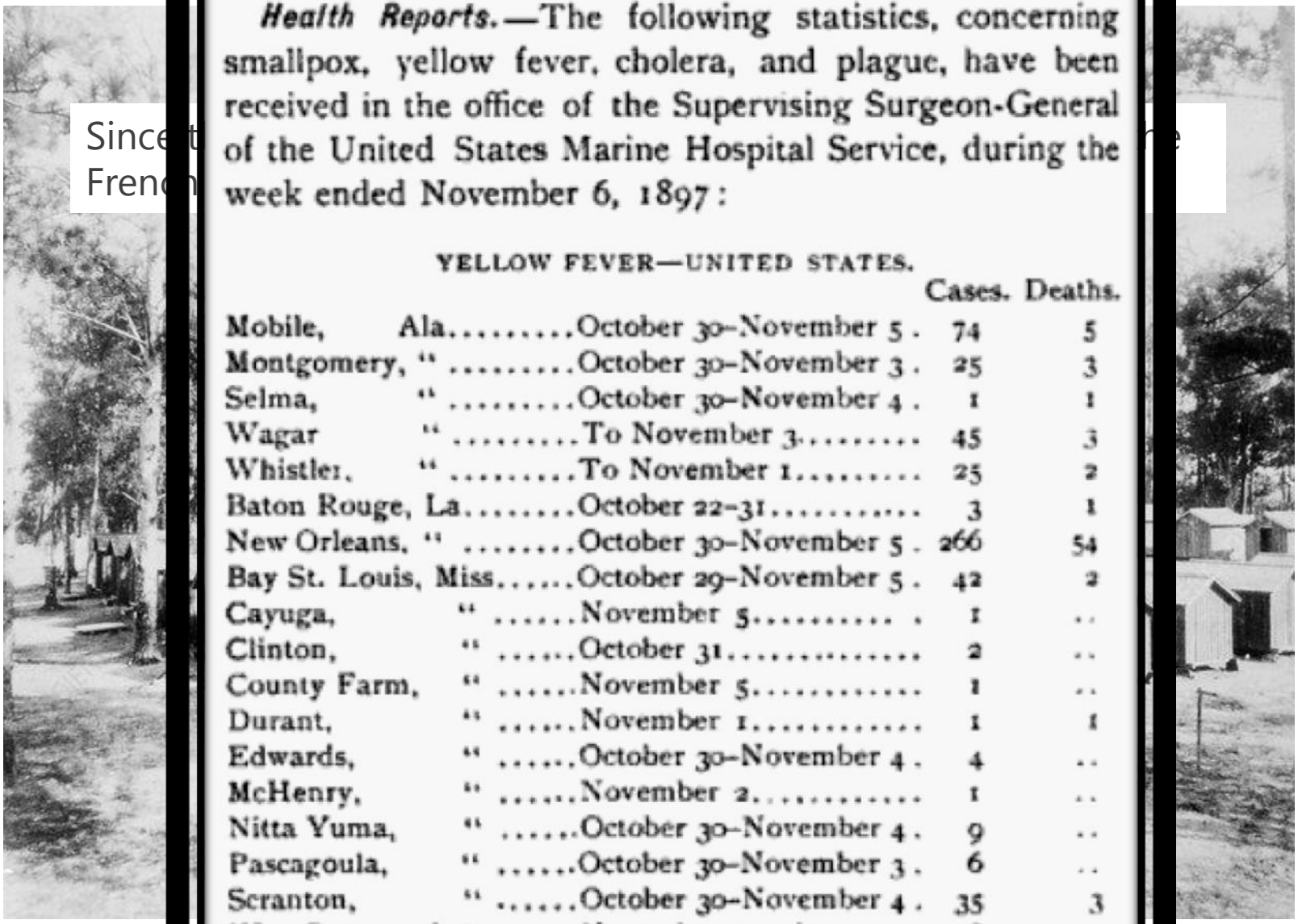
Yellow fever burial, Memphis, Tennessee, September 21, 1878. Illustration by unknown creator, published by Frank Leslie's Illustrated Newspaper.

The entire Mississippi River Valley from St. Louis south was affected, and tens of thousands fled the stricken cities of New Orleans, Vicksburg, and Memphis. An estimated 120,000 cases of yellow fever resulted in some 20,000 deaths.



The Yellow Fever Epidemic of 1878

https://archive.org/details/b21354017/



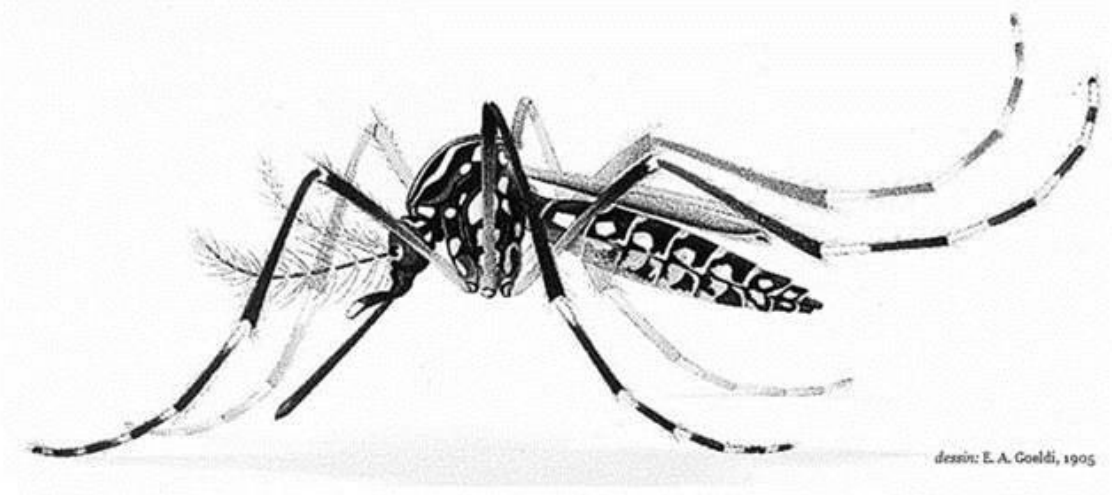
Health Reports.—The following statistics, concerning smallpox, yellow fever, cholera, and plague, have been received in the office of the Supervising Surgeon-General of the United States Marine Hospital Service, during the week ended November 6, 1897:

YELLOW FEVER—UNITED STATES.

			Cases.	Deaths.
Mobile,	Ala.	October 30–November 5	74	5
Montgomery,	"	October 30–November 3	25	3
Selma,	"	October 30–November 4	1	1
Wagar	"	To November 3	45	3
Whistler,	"	To November 1	25	2
Baton Rouge,	La.	October 22–31	3	1
New Orleans,	"	October 30–November 5	266	54
Bay St. Louis,	Miss.	October 29–November 5	42	2
Cayuga,	"	November 5	1	..
Clinton,	"	October 31	2	..
County Farm,	"	November 5	1	..
Durant,	"	November 1	1	1
Edwards,	"	October 30–November 4	4	..
McHenry,	"	November 2	1	..
Nitta Yuma,	"	October 30–November 4	9	..
Pascagoula,	"	October 30–November 3	6	..
Scranton,	"	October 30–November 4	35	3
West Pascagoula	"	November 2 and 3	8	..
Memphis,	Tenn.	October 30–November 5	19	10

Yellow Fever Camps, 1898

The TOWN MOSQUITO – Le MOUSTIQUE de la VILLE



AEDES AEGYPTI

The VIRUS CARRIER – Le PORTEUR de VIRUS

Yellow fever/la fièvre jaune – dengue – zika - chikungunya

Deny this ONE mosquito species the water pockets it needs to hatch its larvae near people and quickly solve <u>four</u> public health problems in <u>one</u> targeted effort.

MosquitoPundit blog

Surveys for *Aedes aegypti* were of two types prior to 1958:

- The first involved only the recording of premises found breeding the mosquito during control procedures.
  - The sample size was usually large because all premises were inspected as part of the control program.
- The second type of survey had no connection with control work.
  - Instead, premises on which *Ae. aegypti* breeding was considered possible were inspected in surveys lasting one week or less in a community.
  - The sample size was relatively small, and the ability of the surveyor to select likely premises was important in determining results.

THE 1958 *AEDES AEGYPTI* DISTRIBUTION IN THE UNITED STATES

Milton E Tinker and George R Hayes, Jr
CDC Public Health Service, Atlanta, GA
Mosquito News, June 1959

In 1958, three types of surveys were used to develop three sets of facts:

1. quantitative urban surveys of 19 cities in which blocks inspected were selected by random sampling techniques to obtain a statistically valid determination of the magnitude of the species population:
2. qualitative urban surveys of 65 cities where the presence of the species was determined in as short a time as possible;
3. and exploratory rural surveys of 9 counties in which likely premises were inspected to discover breeding of the species in such areas.

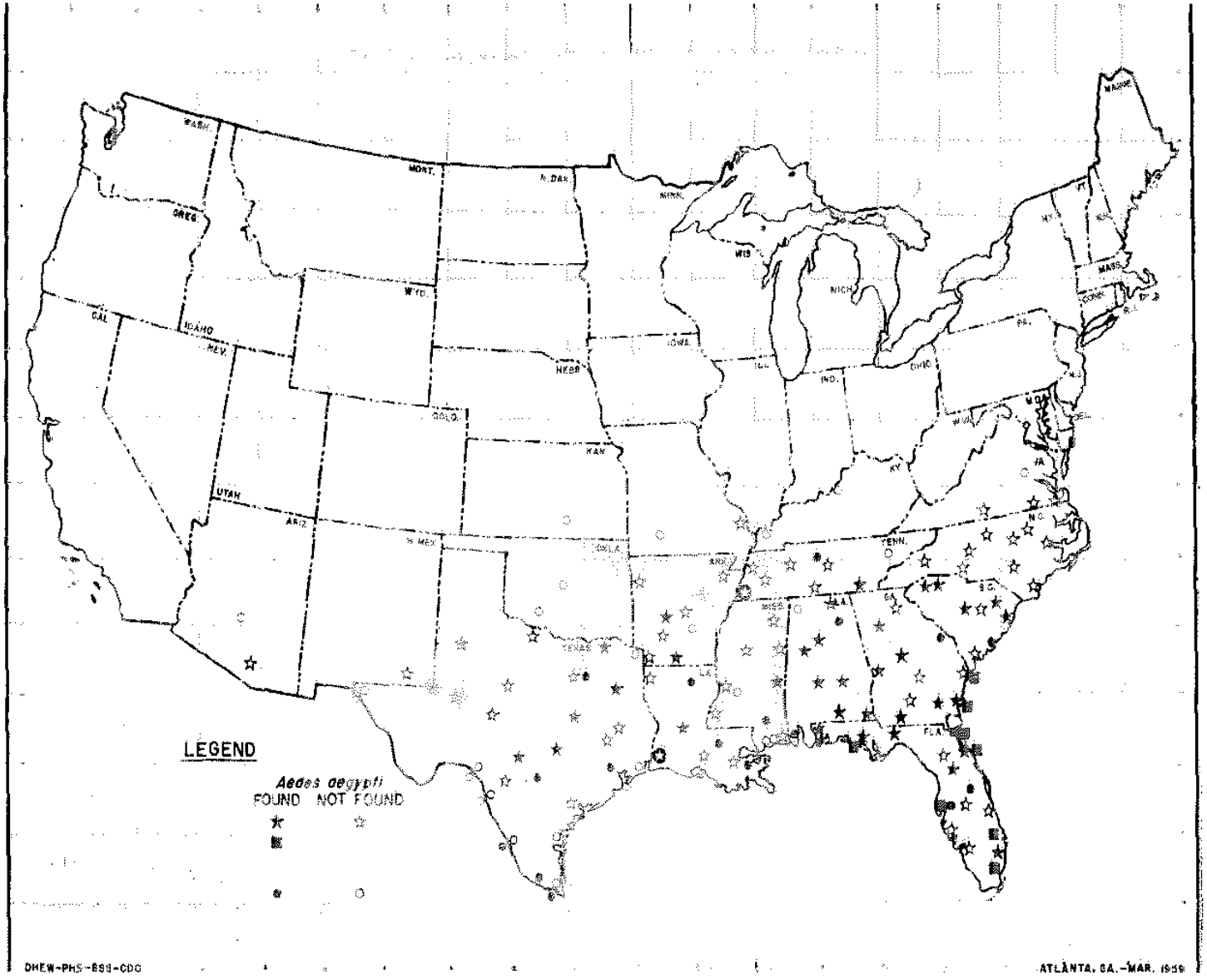
Qualitative Urban	Quantitative Urban	Exploratory Rural	Number of Premises Surveyed	Results
Brunswick			21	+
Columbus			38	+
Macon			38	+
Savannah			56	-
Thomasville			11	+
Tifton			112	-
Waycross			15	+
	Atlanta		518	11.6%
	Gainesville		225	0.0%
		Thomas County	53	-
		Dodge County	155	-

Of the 42 cities where seaport and airport facilities were inspected by the Division of Foreign Quarantine, *Ae. aegypti* was found in only one, Savannah, Georgia, where they were not found during CDC surveys.

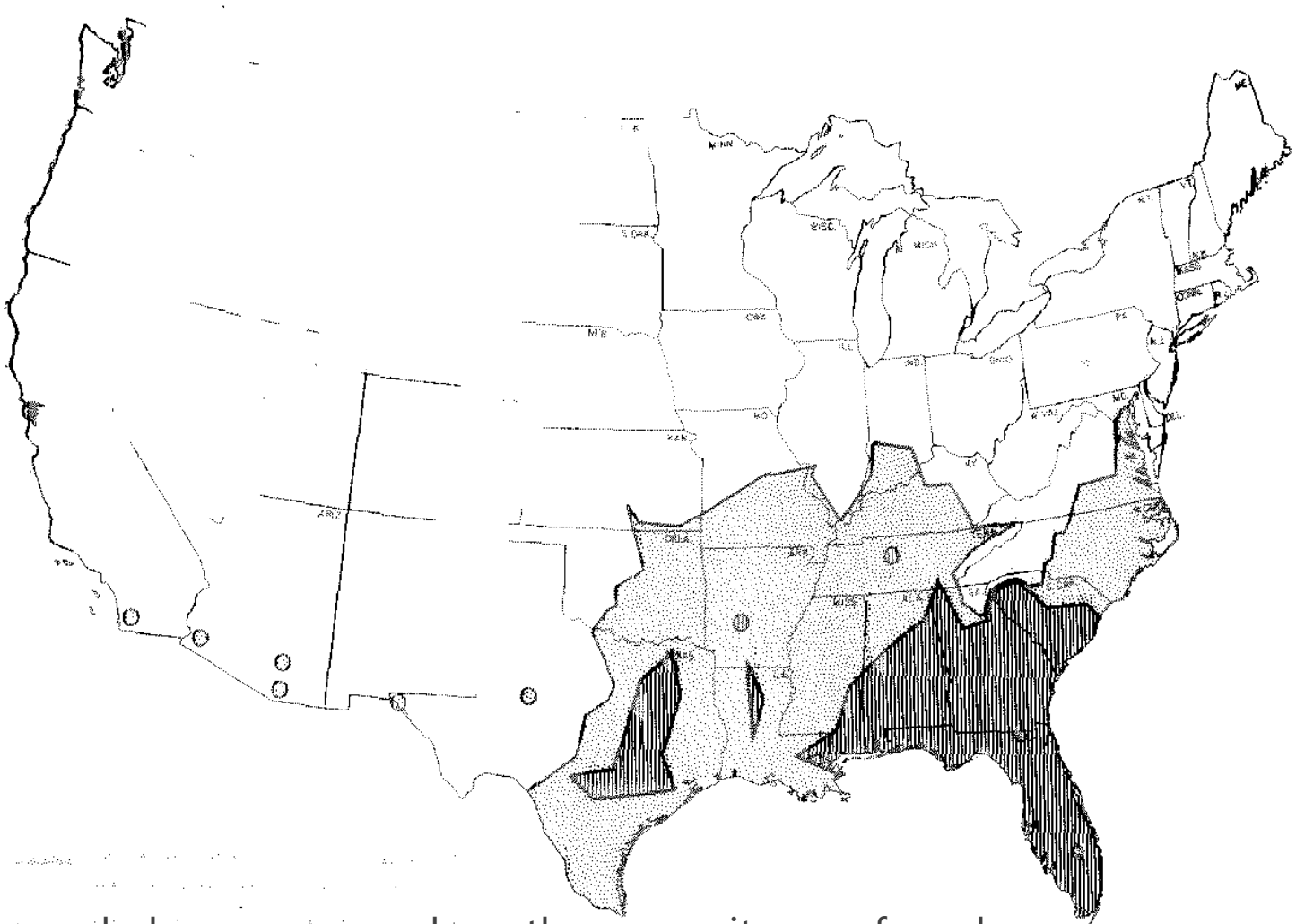
Since 3 subsequent surveys of the Savannah port facilities by the Division of Foreign Quarantine and a survey of the whole city by CDC have failed to disclose further infestations, this positive finding was probably a temporary import.

NOTE: *Aedes aegypti* has continued to be found occasionally and in small numbers in Savannah

1956-1958 Surveys



Distribution of *Aedes aegypti* in the US, 1959



DISTRIBUTION OF *AEDES AEGYPTI* INFESTATIONS IN THE UNITED STATES

HARVEY B. MORLAN AND MILTON E. TINKER
American Journal of Tropical Medicine & Hygiene, 1965

A Public Health Service program to eradicate *Aedes aegypti* from the United States was initiated by the Communicable Disease Center (CDC) with funds appropriated by Congress in October 1963. From 1956 through 1962, CDC surveys conducted in cooperation with state and local departments of health in 440 communities of 262 countries had shown *Ae. aegypti* in 101 counties of nine southeastern states.

TABLE 1

Summary of Aedes aegypti *survey, 1964*

State	Counties		Communities		Premises	
	Surveyed	Infested	Surveyed	Infested	Surveyed	Infested
Ala.	64	46	693	228	6,597	462
Ark.	23	2	252	2	4,385	3
Fla.	58	29	538	68	5,812	169
Ga.	143	72	844	159	22,253	396
La.	48	1	435	2	13,927	13
Miss.	72	14	493	31	6,601	53
N. C.	17	1	158	1	2,473	1
Okla.	15	0	183	0	3,980	0
S. C.	39	15	413	44	4,582	87
Tenn.	26	2	217	3	3,924	5
Texas	134	21	1,031	28	15,974	42
Total	639	203	5,257	566	90,508	1,231

The 1964 survey consisted of inspection of premises most likely to be infested in each community in the county. The size of the survey in a county differed, based on human population, urban nature, and number of communities. The general requirement was to survey one percent of the premises in the county.

The following table shows the county inspected with # premises inspected/# of premises with *Ae. aegypti*.

https://archive.org/details/b21354017/

SCENE IN MEMPHIS—A HOWARD PHYSICIAN ON HIS ROUNDS.

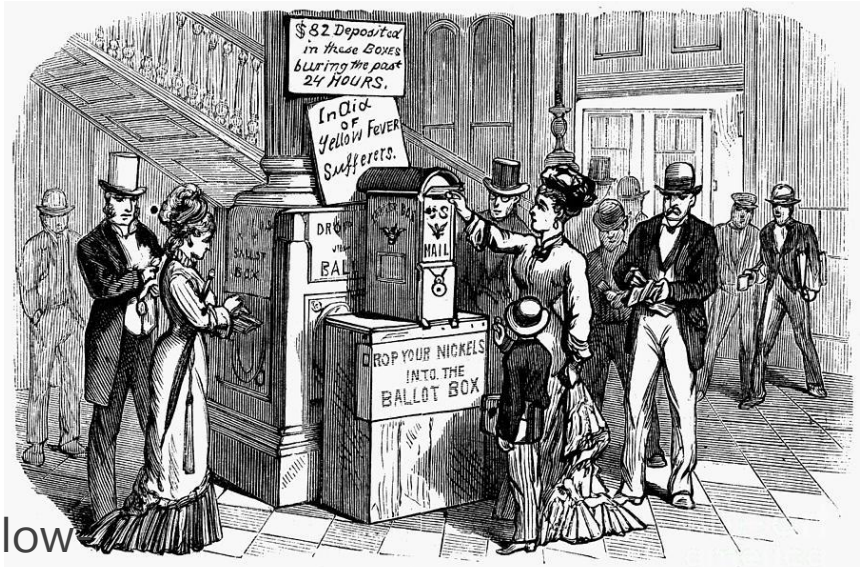
County inspected with # premises inspected/# of premises with *Ae. aegypti*

GEORGIA	
Atkinson	80/2
Baker	76/13
Baldwin	40/9
Banks	62/0
Barrow	80/0
Bartow	95/0
Ben Hill	26/5
Berrien	55/0
Bibb	77/8
Bleckley	53/0
Brantley	83/0
Brooks	66/2
Burke	90/0
Butts	65/0
Calhoun	60/2
Camden	75/1
Candler	38/2
Carroll	108/0
Catoosa	59/0
Charlton	45/4
Chatham	226/0
Chattahoochee	34/2
Chatooga	71/0
Cherokee	55/0
Clarke	72/5
Clay	40/5
Clayton	131/0
Clinch	80/0
Cobb	484/0
Coffee	75/4
Colquitt	101/7
Columbia	69/2
Cook	50/0
Coweta	87/2
Crawford	27/1
Crisp	52/5
Dade	45/0

Dawson	28/0
Decatur	70/4
DeKalb	1,342/0
Dodge	75/0
Dooly	47/0
Dougherty	164/18
Douglas	57/0
Early	54/5
Echols	49/0
Effingham	75/1
Elbert	85/0
Emanuel	67/4
Fayette	51/1
Forsyth	55/0
Franklin	66/0
Fulton	10,722/8
Gilmer	50/0
Glascock	35/0
Glynn	42/6
Gordon	75/0
Grady	82/11
Greene	85/0
Gwinnett	191/0
Hall	160/0
Hancock	68/0
Haralson	90/1
Harris	59/5
Hart	66/0
Heard	45/0
Henry	104/0
Houston	179/3
Irwin	84/2
Jackson	90/0
Jasper	47/0
Jeff. Davis	45/2
Jefferson	80/0
Jenkins	60/0
Johnson	40/2

Jones	74/0
Lamar	83/4
Lanier	36/0
Lee	30/3
Lincoln	43/0
Long	10/3
Lowndes	89/11
McDuffie	69/0
McIntosh	61/0
Macon	75/0
Madison	63/0
Marion	57/3
Meriwether	99/0
Miller	44/5
Mitchell	112/9
Monroe	62/4
Montgomery	62/5
Morgan	81/0
Murray	59/0
Muscogee	59/10
Newton	42/0
Oconee	73/0
Oglethorpe	73/0
Paulding	36/0
Peach	63/0
Pickens	46/0
Pierce	71/8
Pike	57/0
Polk	124/0
Pulaski	65/0
Putnam	56/0
Quitman	23/4
Randolph	28/14
Richmond	44/5
Rockdale	60/0
Schley	30/3
Screven	75/0
Seminole	48/11
Spalding	109/6
Stephens	70/0
Stewart	24/5
Sumter	82/5

Talbot	50/2
Taliaferro	52/1
Tattnall	66/9
Taylor	55/1
Telfair	41/10
Terrell	42/4
Thomas	126/26
Tift	65/9
Toombs	82/16
Troup	128/13
Truetlen	40/2
Turner	35/1
Twiggs	67/0
Upson	83/5
Walker	121/0
Walton	97/0
Ware	69/5
Washington	96/0
Wayne	75/13
Webster	30/6
Wheeler	31/5
Whitfield	129/0
Wilcox	23/0
Wilkes	80/0
Wilkenson	93/2
Worth	103/1

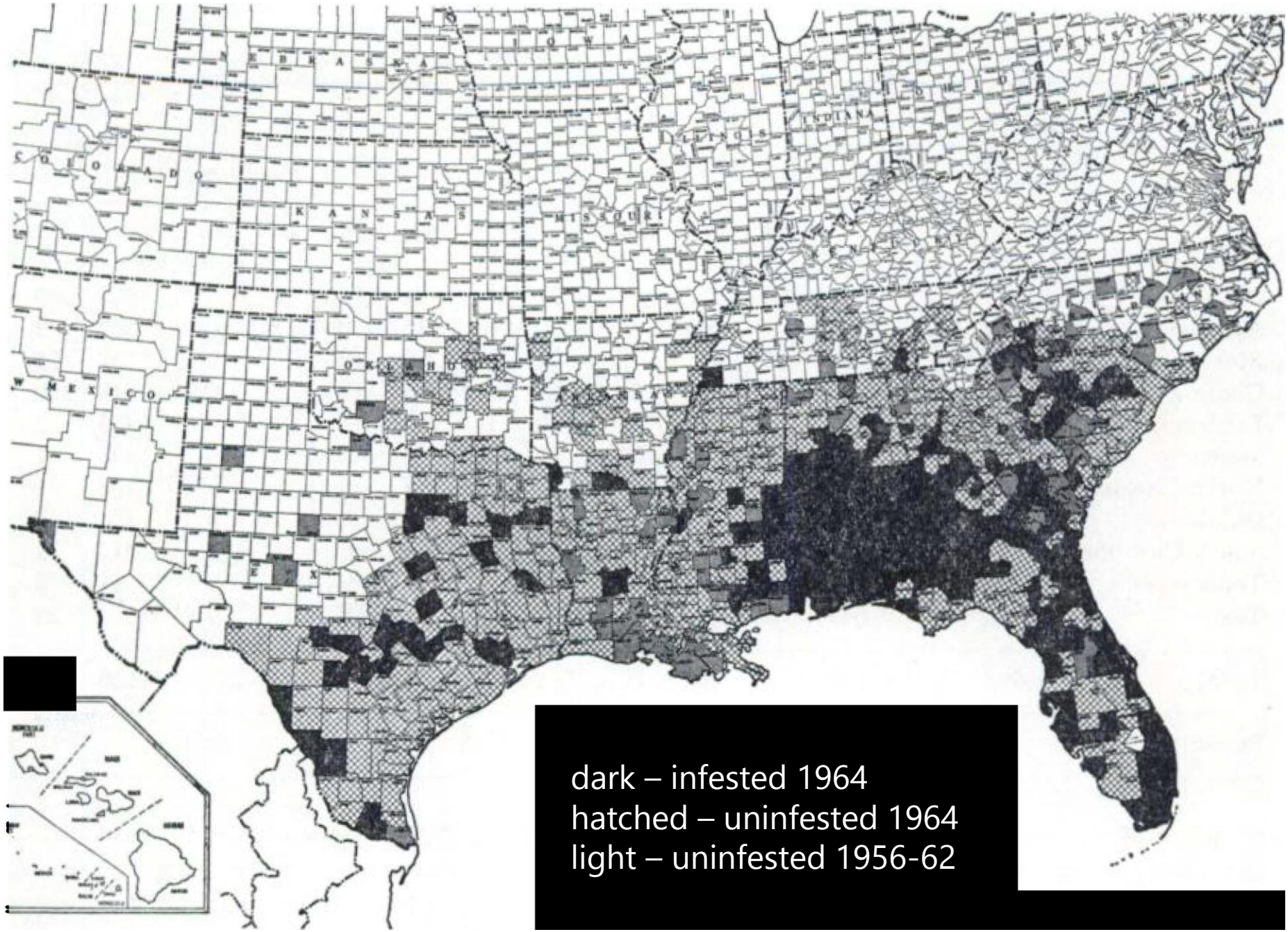


CITIZENS LEAVING THEIR CONTRIBUTIONS IN THE POST-OFFICE YELLOW-FEVER BOX.

https://www.alabamapioneers.com/yellow-fever-epidemics-and-free-land/

Infestations of *Ae. aegypti* were found in 566 communities in 203 counties or parishes.

- The states of Alabama, Florida, and Georgia had the largest number of infestations, with 147 of the 203 infested counties, or 72%.
- Of the 203 counties infested:
  - 78 had been found infested previously,
  - 12 had been negative on previous inspection, and
  - 113 had not been surveyed.
- Of the 436 negative counties:
  - 52 had been negative on previous inspection,
  - 14 previously infested, and
  - 370 had not been surveyed.
- Of the counties surveyed, 32% were infested.
- The program to eradicate *Ae. aegypti* from the continental United States, which began in 1964, never reached its ultimate goal and was terminated in 1969 because of lack of funds.

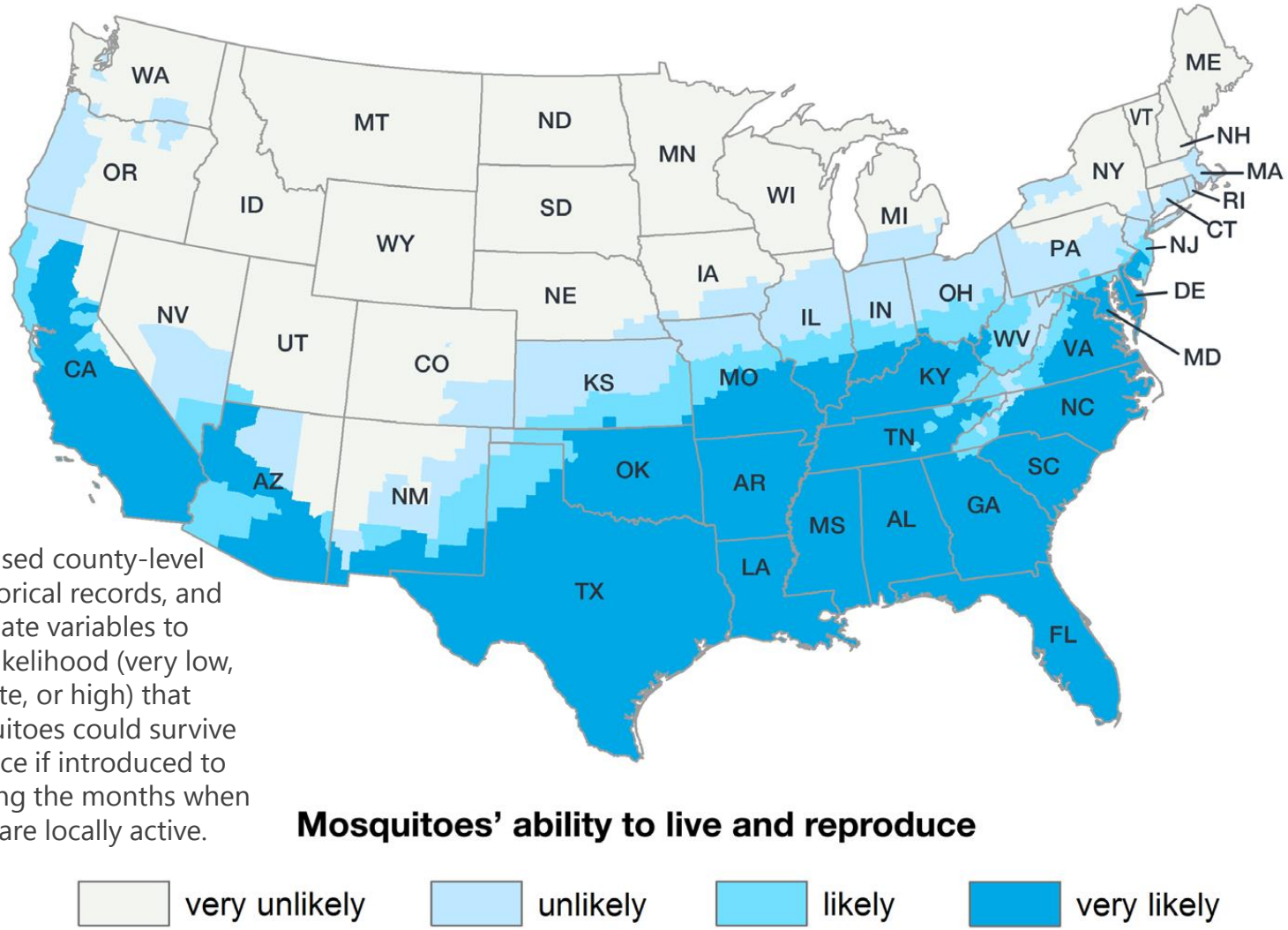

dark – infested 1964
hatched – uninfested 1964
light – uninfested 1956-62

The 1964 survey provided definite information on infested communities, but negative findings did not provide conclusive evidence of the absence of *Ae. aegypti*. The survey extended over a large geographic area, but inspection was limited to about one percent of the total number of premises.

Size of communities infested by Aedes aegypti, *1964*

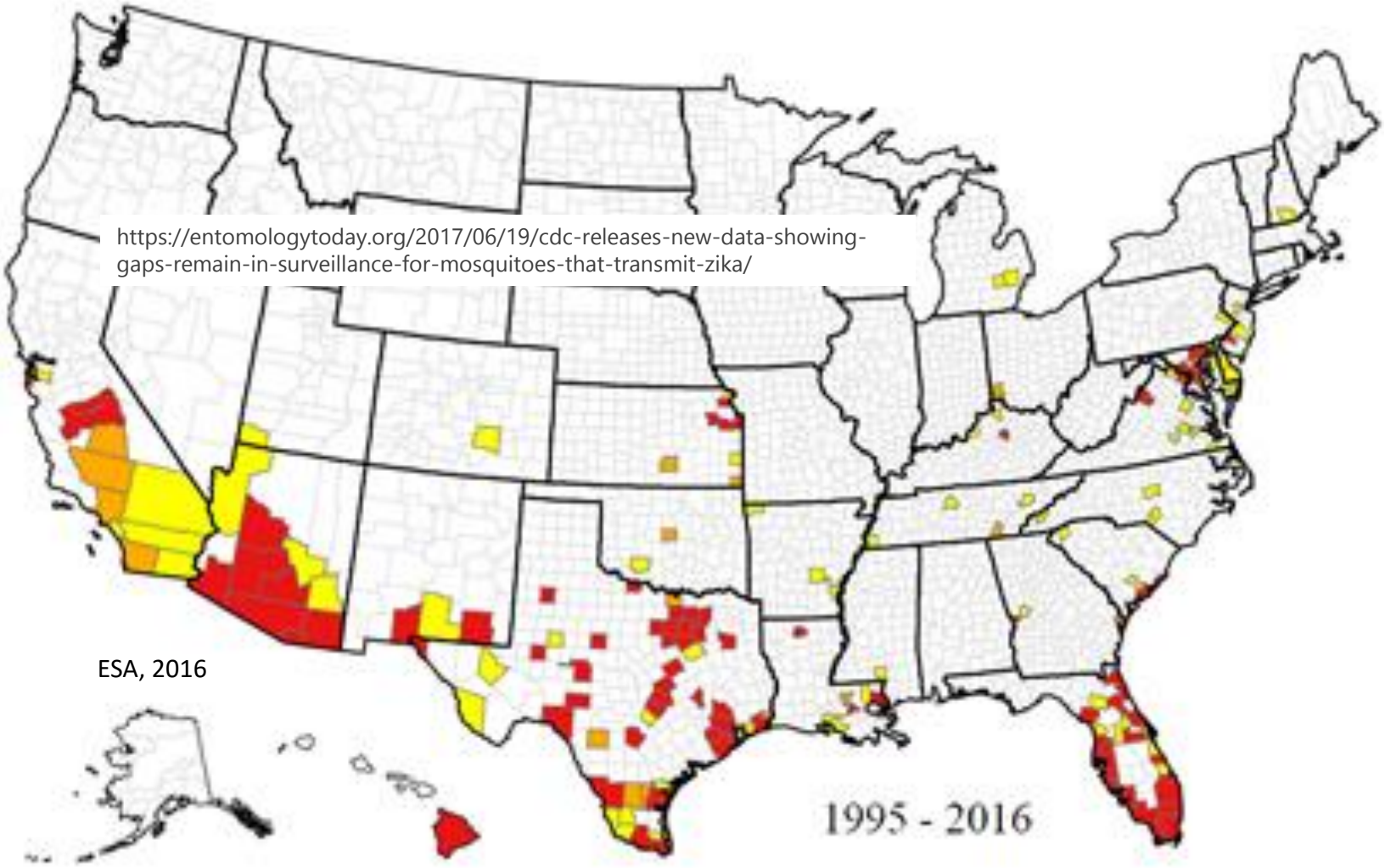
State	Size of community (no. population)												Total	
	Rural		−1000		1000–2500		2,500–10,000		10,000–50,000		+50,000			
	Surv.	Inf.	Surv.	Inf.	Surv.	Inf.	Surv.	Inf.	Surv.	Inf.	Surv.	Inf.	Surv.	Inf.
Alabama	57	21	479	120	60	23	71	45	21	16	5	5	693	230
Arkansas	23	0	181	0	21	0	9	0	15	2	3	0	252	2
Florida	48	8	332	23	63	7	71	18	20	12	3	3	537	71
Georgia	131	28	499	55	105	29	81	29	26	14	6	5	848	160
Louisiana	44	0	267	0	57	0	50	1	13	1	4	0	435	2
Mississippi	67	6	320	14	55	7	41	2	9	2	1	0	493	31
North Carolina	16	0	83	0	26	0	25	1	8	0	0	—	158	1
Oklahoma	15	0	124	0	17	0	14	0	12	0	1	0	183	0
South Carolina	39	4	244	14	66	9	52	9	9	6	3	2	413	44
Tennessee	26	0	114	1	28	0	25	0	20	0	4	2	217	3
Texas	124	1	549	6	166	1	132	6	48	8	11	6	1,030	28
Total	590	68	3,192	233	664	76	571	111	201	61	41	23	5,259	572
Percent		11.5		7.3		11.4		16.5		30.3		56.1		10.9

CDC's best estimate of the potential range of *Ae. aegypti* in the US

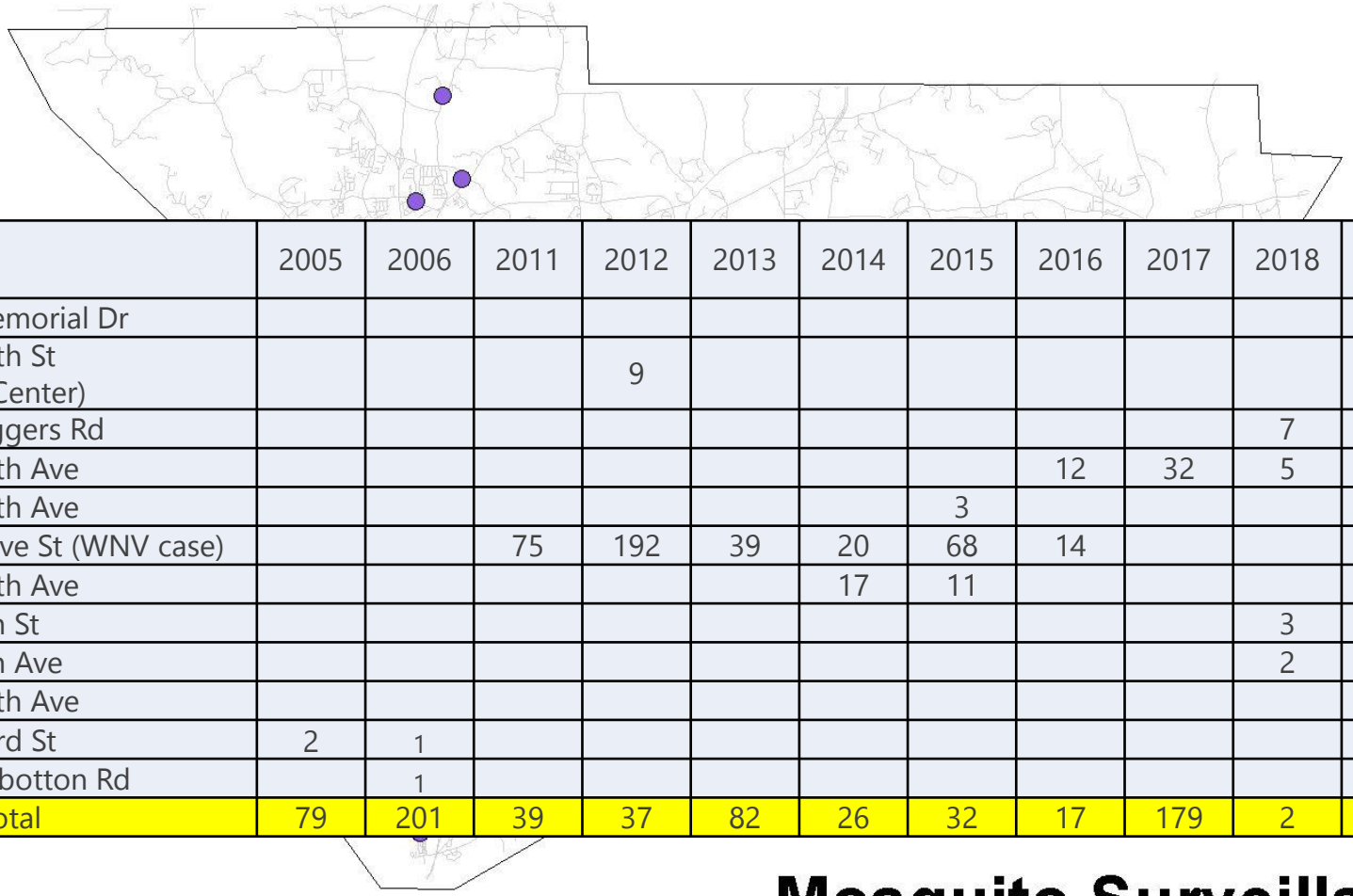


The model used county-level records, historical records, and suitable climate variables to predict the likelihood (very low, low, moderate, or high) that these mosquitoes could survive and reproduce if introduced to an area during the months when mosquitoes are locally active.

https://www.cdc.gov/zika/vector/range.html, 2018



This map shows counties where *Aedes aegypti* was reported between January 1, 1995 and March 2016. Counties shown in yellow had records for one year within that time period; those shown in orange had two years of presence records, and those shown in red had three or more years of presence records.



location	2005	2006	2011	2012	2013	2014	2015	2016	2017	2018	2019*	Grand Total
1006 Memorial Dr											2	2
1212 15th St (Senior Center)				9								9
1314 Biggers Rd										7		7
1518 10th Ave								12	32	5		49
2314 19th Ave							3					3
2321 Olive St (WNV case)			75	192	39	20	68	14				412
3613 14th Ave						17	11					28
908 26th St										3	52	55
602 26th Ave										2		2
2601 10th Ave											125	125
1056 43rd St	2	1										3
1336 Talbotton Rd		1										1
Grand Total	79	201	39	37	82	26	32	17	179	2	2	696

Mosquito Surveillance Muscogee County

4 0 4 8 Miles

Any Questions?