

## Saint Louis Encephalitis (SLE)

*Saint Louis Encephalitis is a Class B Disease and must be reported to the state within one business day.*

St. Louis Encephalitis (SLE), a flavivirus, was first recognized in 1933 in St. Louis, Missouri during an outbreak of over 1,000 cases. Since 1964, an average of 128 cases has been reported annually across the United States. SLE cases occur in unpredictable, intermittent outbreaks or sporadic cases during the late summer and fall. The illness is usually benign, consisting of fever and headache; most ill persons recover completely. Severe disease is occasionally seen in young children but is more common in adults older than 40 years of age. The incubation period for SLE is five to 15 days. Ten percent to 25% of adults die from complications of this disease; the risk of fatality increases with age in older adults

Arboviral encephalitis can be prevented by taking personal protection measures such as:

- Applying mosquito repellent to exposed skin
- Wearing protective clothing such as light colored, loose fitting, long sleeved shirts and pants
- Eliminating mosquito breeding sites near residences by emptying containers which hold stagnant water
- Using fine mesh screens on doors and windows.

In the 1960s, there were 27 sporadic cases; in the 1970s, there were 20. In 1980, there was an outbreak of 12 cases in New Orleans. In the 1990s, there were seven sporadic cases and two outbreaks; one outbreak in 1994 in New Orleans (16 cases), and the other in 1998 in Jefferson Parish (14 cases). Of interest, five of the seven sporadic cases in the 1990s occurred in 1998, the same year as the Jefferson outbreak. The largest outbreak of SLE occurred in Monroe and West Monroe in 2001. No cases had been reported from Monroe between 1976 and 2001.

In 2003, between the end of July and mid-November, ten cases of SLE were reported from three neighboring parishes in Louisiana: Baton Rouge, Iberville and Livingston. In 2005, two cases of SLE were reported; in 2006 two sporadic cases of SLE were reported; in 2007 three SLE cases were reported; in 2008 one SLE case was reported. No cases of SLE have been reported since 2008 to the present (Figure 1, Table).

Figure 1: Saint Louis Encephalitis Cases - Louisiana, 1960-2016

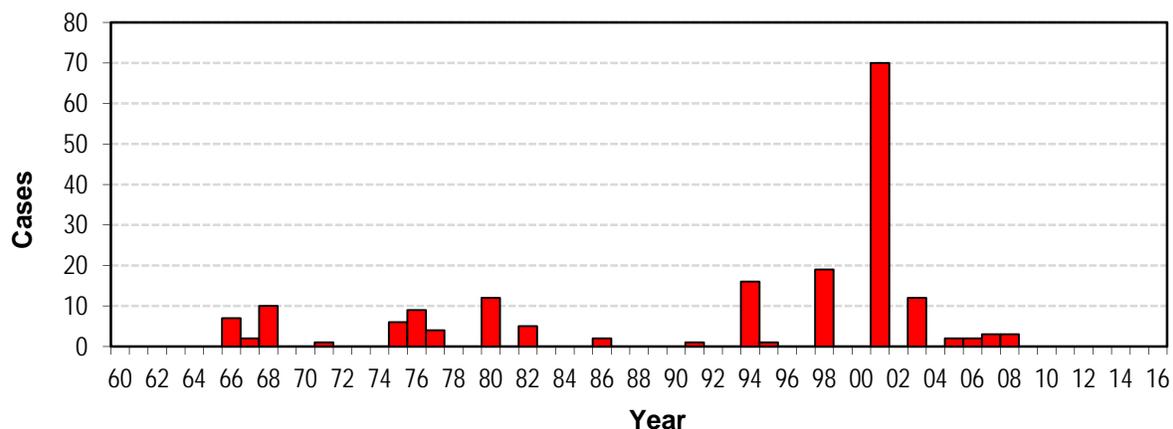


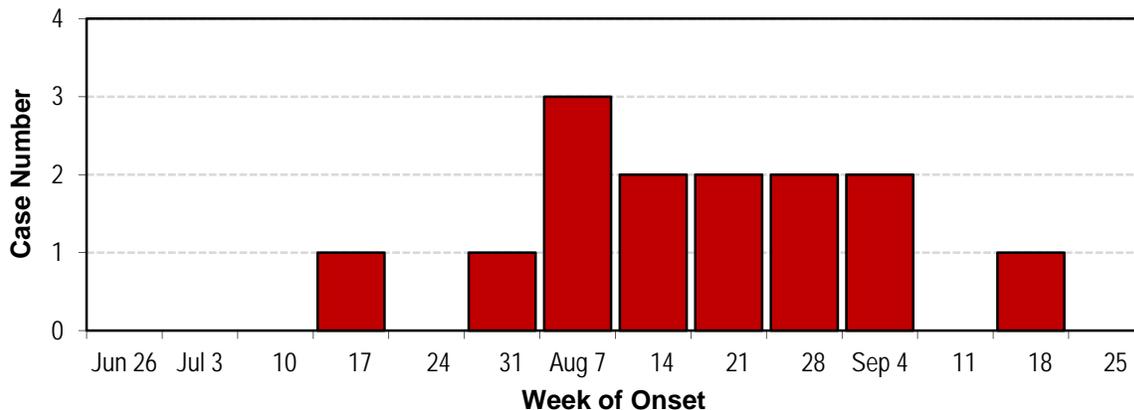
Table: Summary of Saint Louis Encephalitis Cases - Louisiana, 1994-2016

Year	Nbr. of Cases	Parish(es)	Age Range (Years)	Gender	Race	Deaths	Case Mortality
1994	14	Orleans (homeless) Washington	12-81	60% M	60% Afr-Am	3	20%
1998	13	Jefferson Lafayette St. Tammany	6-72	53% F	79% W	1	5%
2001	63	Ouachita Morehouse Richland Franklin	4-81	54% F	54% W	4	6%
2003	6	Livingston East Baton Rouge Iberville Caddo Calcasieu	33-73	58% M	75% W	1	8%
2005	2	Orleans (homeless)	35-60	50%	Unknown	0	0%
2006	2	Orleans	18-55	50%	Unknown	0	0%
2007	2	Tangipahoa Jefferson	>65	66% M	66% W	0	0%
2008	2	Caddo Richland	<30	100% F	Unknown	0	0%

**The SLE Outbreak of 1994**

From July to October 1994, 15 cases of SLE were reported in Louisiana. The last SLE outbreak previously occurred in 1980 and since then, very few sporadic cases had been reported. Of the 15 SLE cases, 14 occurred in residents of the metropolitan New Orleans area and one case occurred in a Washington Parish resident. Onset of illness ranged from July 22<sup>nd</sup> to October 8<sup>th</sup> with ages ranging from 12 to 81 years. Nine (60%) of the cases were males, and nine (60%) were African-Americans. Three of the cases died (case mortality 20%), (Figure 2).

Figure 2: SLE Outbreak - New Orleans - Louisiana, 1994



In order to specify the vector involved in this outbreak, the trapping and testing of mosquitoes for SLE virus was done by the Centers for Disease Control and Prevention (CDC) in collaboration with New Orleans Mosquito Control. None of the mosquitoes tested were positive for the SLE virus.

Although *Culex quinquefasciatus* has been assumed to be the vector for SLE in this outbreak (and indeed large populations of *C. quinquefasciatus* mosquitoes were found near some of the initial cases), the finding of a higher than expected abundance of *Culex nigripalpus*, the primary SLE virus vector in Florida, raises the possibility of transmission by *C. nigripalpus* mosquitoes in this outbreak.

Because 33% of the cases reported for July and August occurred in homeless persons who spent a great deal of their time outdoors, there was concern that this group might be particularly at high risk for SLE. In order to compare the rate of SLE exposure in the homeless population and in the general population, serosurveys were conducted in October of persons attending the city's Health Care for the Homeless Clinic and persons attending the city's sexually transmitted diseases (STD) clinic. None of the samples from 128 homeless people were positive for SLE antibodies, and only one of the samples from 505 persons at the STD clinic were positive for SLE antibodies. Based on these data, the prevalence of SLE infection in the general population and the homeless population was likely to be in the same range 0.5% to 0.9%.

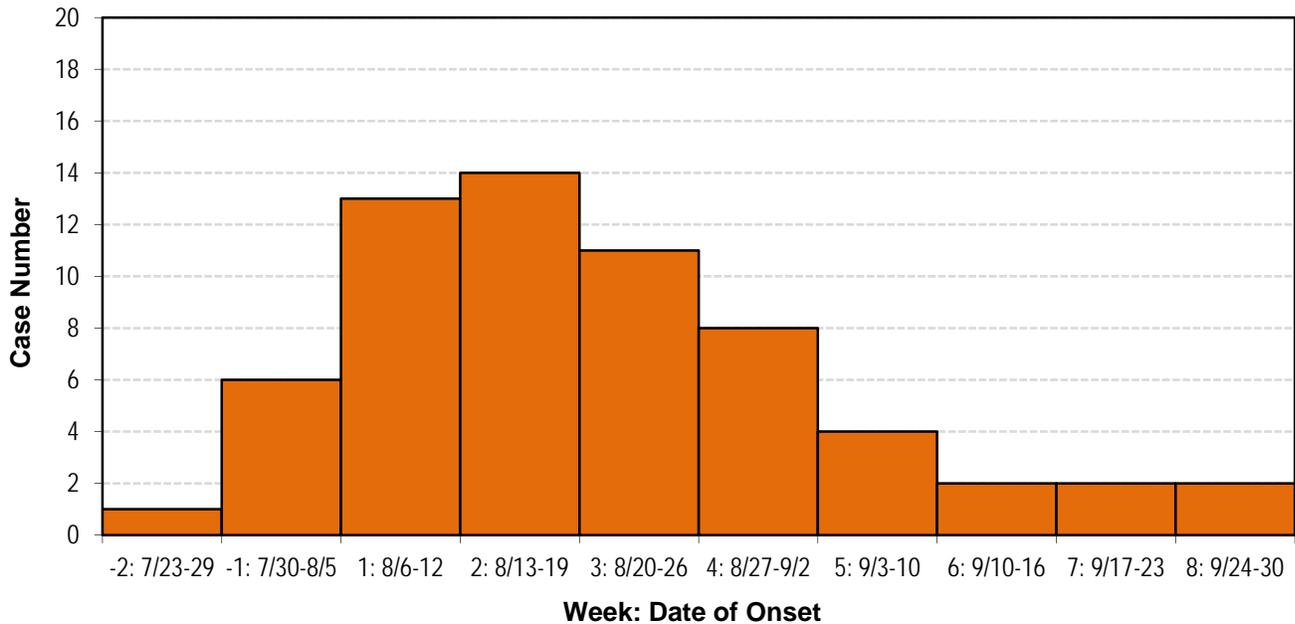
### **The SLE Outbreak of 1998**

Between July and October of 1998, 19 cases of SLE were reported from three parishes in southern Louisiana. Of the SLE cases reported, five were reported from Lafayette Parish, one from St. Tammany Parish and the remaining 13 cases were reported from Jefferson Parish. Onset of illness ranged from July 5th to September 27th. Ages ranged from six to 72 years. Ten of the cases (53%) were females and 15 (79%) of the cases were White. Only one death was reported (case mortality: 5%).

### **The SLE Outbreak in Monroe of 2001**

In 2001, 63 cases of SLE were reported in Monroe and West Monroe with seven additional cases reported in the neighboring parishes of Richland, Morehouse and Franklin. The epidemic curve based on blood collection date (date disease was suspected) showed an explosive outbreak reaching a peak by the second week and progressively slowing down. The SLE epidemic curve by week of onset shows that by the time the first case was diagnosed (Week 1: 8/6/2001 to 8/13/2001), 60% or more of the cases were already infected (Figure 3).

Figure 3: SLE Epidemic Curve by Week of Onset - Louisiana, 2001



Most of the cases lived in low socio-economic areas. Houses were often run down, many with screens in disrepair. Backyards were usually large, with heavy brush and many trees.

There was an abundance of sources of mosquito larvae, particularly for *Culex quinquefasciatus*, which is the main vector. Infection rates in mosquitoes were still high at four to five per 1,000 mosquitoes after five weeks into the outbreak. Small containers or areas filled with heavily polluted water, where this species of mosquitoes prefer to breed, were commonplace. Houses were built on short posts with leaking plumbing or air conditioning units, creating puddles under the houses. There were many drainage ditches clogged with vegetation and garbage.

Clinically, most cases presented with fever and meningitis syndrome with altered mental status. Tremors were common (56% of cases). There were three deaths. Age group distribution showed predominance among those aged 45 years and older. Cases are presumptively diagnosed on the basis of a positive IgM for Flavivirus. The first cases were further tested by the CDC in Fort Collins, CO. by neutralization. Acute and convalescent serums were collected and forwarded to the CDC lab for confirmation. Mosquito pools (*Culex quinquefasciatus*) confirmed the presence of SLE virus.

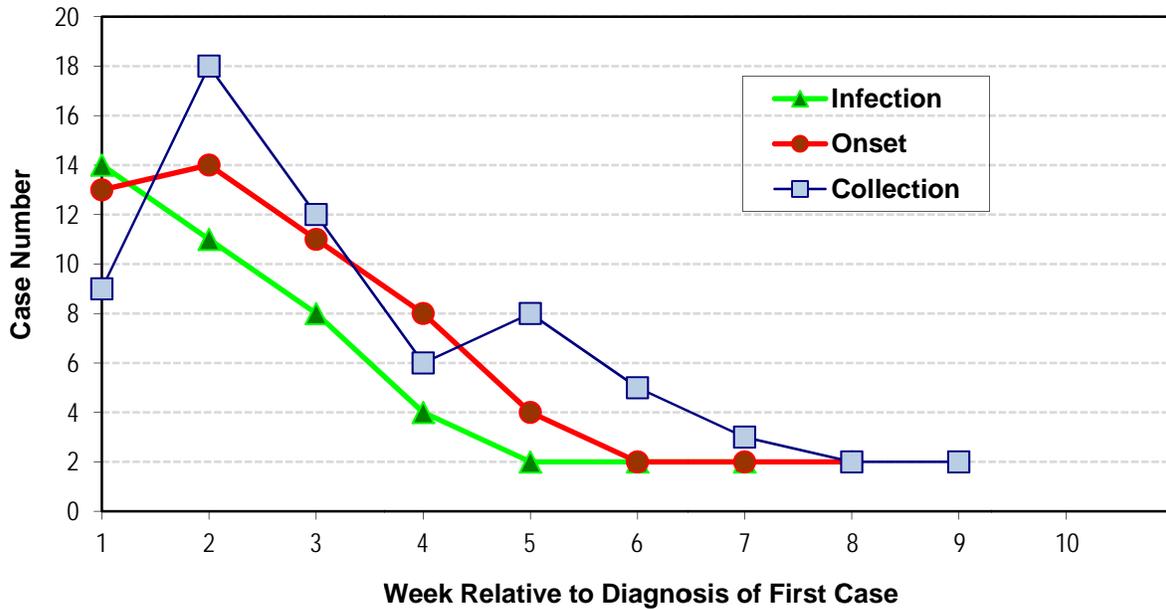
As soon as the first case was reported, campaigns for health education and increased mosquito adulticiding were implemented. Within three weeks, more than 95% of the population interviewed was aware of the problem and of precautionary measures. However, driving through the affected areas in the evening, one could see people sitting on their front porches socializing, children playing in the streets and house screens still in disrepair.

Adulticiding with pyrethroid applications by trucks was targeted against pest mosquitoes and was on-going before the outbreak. After the first cases were reported to mosquito control, aerial

and truck applications increased, and house-to-house applications were initiated.

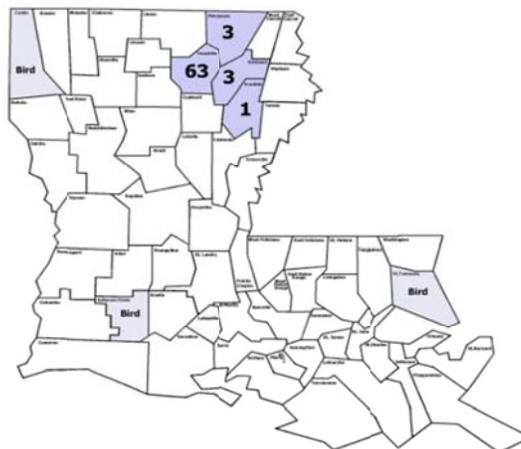
The outbreak lasted until the first week in October. By week one (when the first cases were reported), it appeared that more than 60% of cases were already in their incubation period (Figure 4).

Figure 4: SLE Epidemic Curves- Monroe Outbreak: Weeks of Infection, Onset and Collection of Blood or CSF - Louisiana, 2001



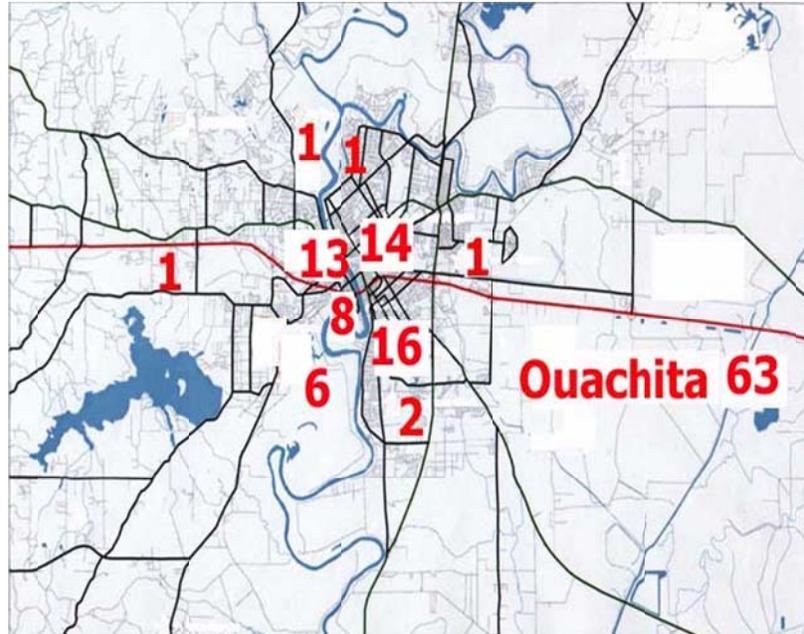
All cases were in Monroe (Ouachita Parish) and surrounding parishes (Morehouse, Richland and Franklin), (Figure 5).

Figure 5: SLE Cases - Louisiana, 2001



The highest number of cases concentrated around the intersection of the Ouachita River and Interstate 20, overlapping the towns of Monroe and West Monroe (Figure 6).

Figure 6: SLE Cases - Ouachita Parish - Louisiana, 2001



### The SLE Outbreak of 2003

In 2003, between the end of July and mid-November, ten cases of SLE were reported from three neighboring parishes in Louisiana. Of the SLE cases reported, three were reported from East Baton Rouge Parish, one from Iberville Parish, and six from Livingston Parish. Onset of illness ranged from July 23<sup>rd</sup> to November 12<sup>th</sup>.

It should be noted that two sporadic cases were also reported in mid-April (one in the northwest corner of the state in Caddo Parish and one in the southwest corner in Calcasieu Parish).

Seven out of the 12 cases were men (58%). The age range of cases was from 33 to 73 years of age (50% of cases were older than 45 years). Nine of the 12 cases were White (75%). There was one death reported.

### SLE Cases of 2005

In 2005, two cases of SLE were reported among Louisiana residents who evacuated from Hurricane Katrina to neighboring states.

For both cases, the onset of illness was the second week of September. One case was reported from Texas and one case was reported from Mississippi. One case was a homeless resident of Louisiana.

**SLE Cases of 2006, 2007 and 2008**

There were two sporadic cases of SLE reported in 2006. One case was younger than 20 years of age and one case was older than 45 years. Both cases were residents of Orleans Parish. The onset of illness ranged from the end of August to early October.

In 2007, there were three SLE cases reported. Two of the cases were male older than 65 years of age. Two of the cases were from Tangipahoa Parish and the third was from Jefferson Parish.

In 2008, there was one SLE case and two SLE-fever cases. All three infections were in females younger than 30 years of age. Two of the cases were in Caddo Parish; the third was in Richland Parish.

Based on over 40 years of surveillance in Louisiana, it is expected that sporadic cases with intermittent outbreaks will be reported every few years as SLE; the mosquito vectors that carry the disease are endemic across the state.