Encephalitis – EEE and LAC

Eastern Equine Encephalitis (EEE)

Eastern Equine Encephalitis is a Class B Disease and must be reported to the state within one business day.

Eastern Equine Encephalitis (EEE), an alphavirus, was first recognized in Massachusetts in 1831, when during an outbreak, over 75 horses died. The virus is transmitted by mosquitoes, occurring often in the eastern half of the United States where it causes disease in humans, horses and in some bird species.

The majority of human EEE infections are either asymptomatic or produce nonspecific, flu-like syndromes. Infection is thought to confer life-long immunity against re-infection. Severe disease is occasionally seen in children younger than 15 years of age and is more common in adults older than 50 years of age. The incubation period is typically three to ten days. Treatment is generally supportive. Approximately one-third of those who develop clinical encephalitis from EEE, die from the disease. Among those who recover, half will suffer mild to severe permanent neurologic damage, many requiring permanent institutional care.

In addition to illness in humans, EEE virus can produce severe disease in horses. Since horses are outdoors and attract masses of biting mosquitoes, they are at high risk for contracting EEE when the virus is circulating in the mosquito population. However, there is a vaccine available to protect equines.

The arbovirus surveillance program monitors for cases of EEE in horses. Human cases are usually preceded by those in horses and are exceeded in number by horse cases.

Historically, human EEE cases in Louisiana have been sporadic, with no more than two to three cases every few years (Figures 1, Figure 2 and Table).

Figure 1: Human Eastern Equine Encephalitis Cases - Louisiana, 1960-2012

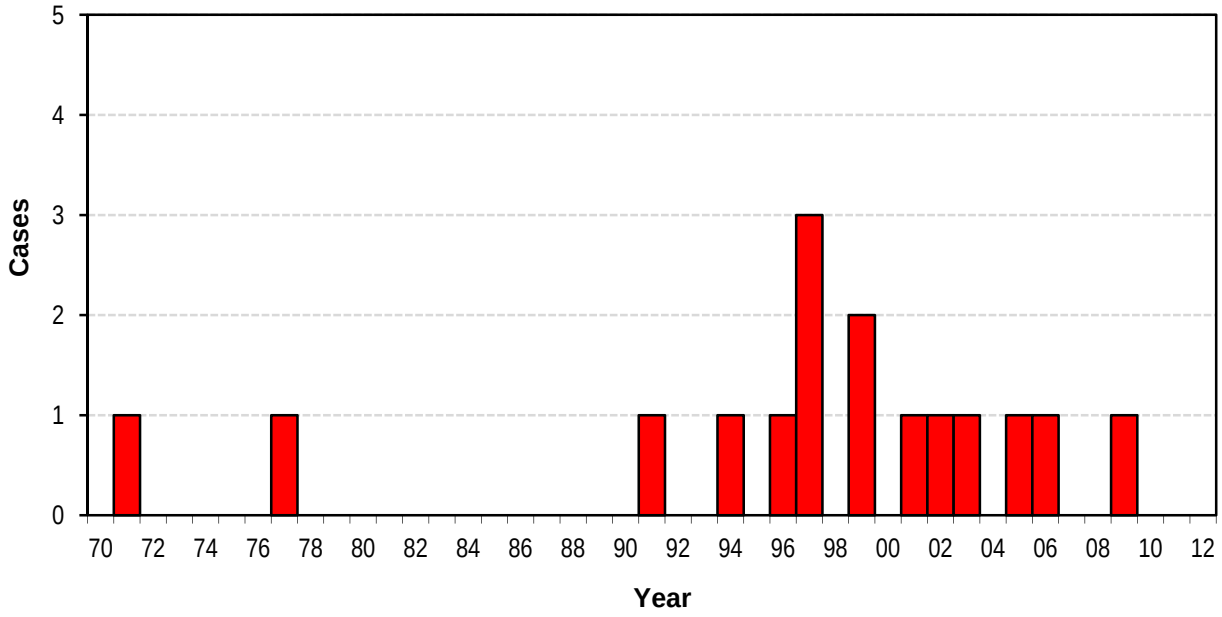
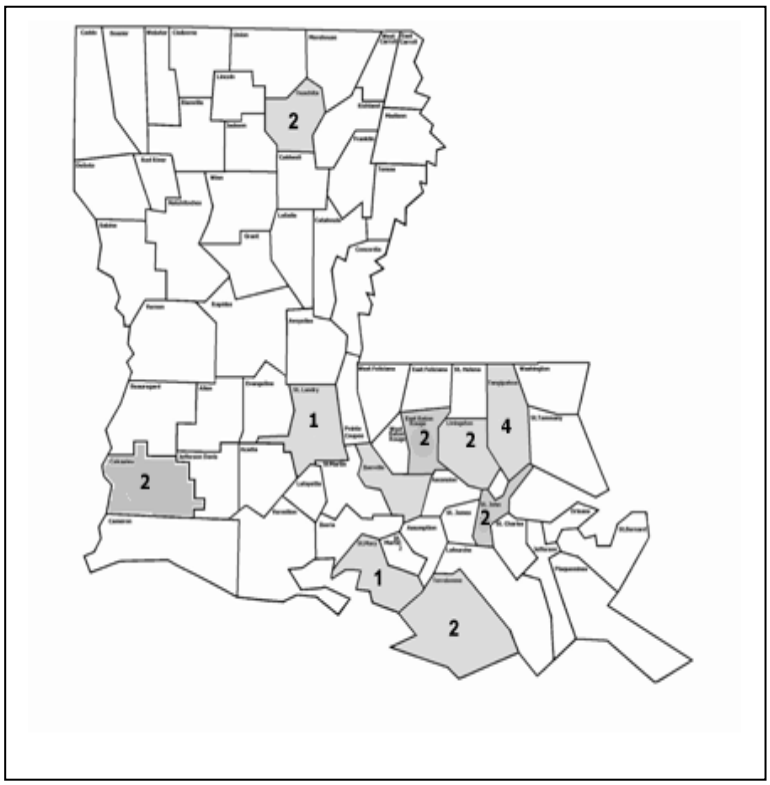


Figure 2: Geographical Distribution - Human Eastern Equine Encephalitis Cases
Louisiana, 1990-2010



EEE virus is sustained in freshwater swamps in a cycle involving birds and *Culiseta melanura* mosquitoes, a species that rarely bites humans or horses. Epidemics in horses and humans occur when other mosquito species such as *Coquillettidia* and *Aedes* become infected and create bridges between infected birds and uninfected mammals.

During late summer and early fall, mosquitoes leave the swamps for drier, forested habitats. As human habitats encroach into such wildlife areas, it is expected that the number of EEE cases will increase.

Table: Summary of Human Eastern Equine Encephalitis Cases - Louisiana, 2000-2012

Year	Number of Cases	Parish	Age	Sex	Deaths	Case Mortality
2000	0					
2001	1	Livingston	68	F		
2002	0					
2003	1	Tangipahoa	44	F		
2004	0					
2005	1	St. John	16	M		
2006	1	East Baton Rouge				
2007/08	0					
2009	1	Calcasieu	13	M		
2010/11/12	0					

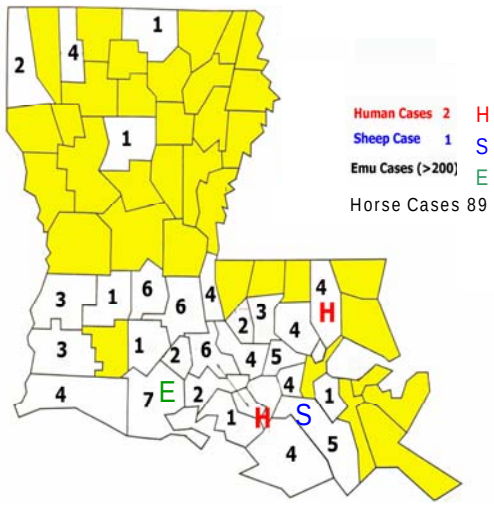
EEE Outbreak of 1999

Two human cases of EEE were reported in Louisiana in 1999. One of the cases was a 47-year old male from the Lafourche/St. Mary border infected in June. The other case was a 44-year old female from Tangipahoa Parish infected in July. Both people survived.

Between May and December of 1999, there were 97 lab-confirmed cases of EEE reported in horses from 32 parishes (Figure 3).

Initial cases were reported from southeast Louisiana (St. Mary, St. James, Assumption, Lafourche, Terrebonne, St. Charles and Ascension parishes). Later cases were reported from Tangipahoa, Livingston, Pointe Coupee, West Baton Rouge, East Baton Rouge, Iberville, St. Landry, Calcasieu, Beauregard, Vermillion, Iberia and St. Martin parishes. Most of the cases occurred in the southern half of the state.

Figure 3: Eastern Equine Encephalitis Cases – Louisiana, May-October, 1999



The majority of affected horses were unvaccinated, which contributed to a high animal mortality rate. In addition to the 97 horses with confirmed infections, numerous other horses reportedly died with encephalitis-like illness that could not be confirmed because blood samples were not submitted.

EEE in Horses from 2000 to 2012 (Figures 4 and 5)

Figure 4: EEE in Horses – Louisiana, 2000-2012

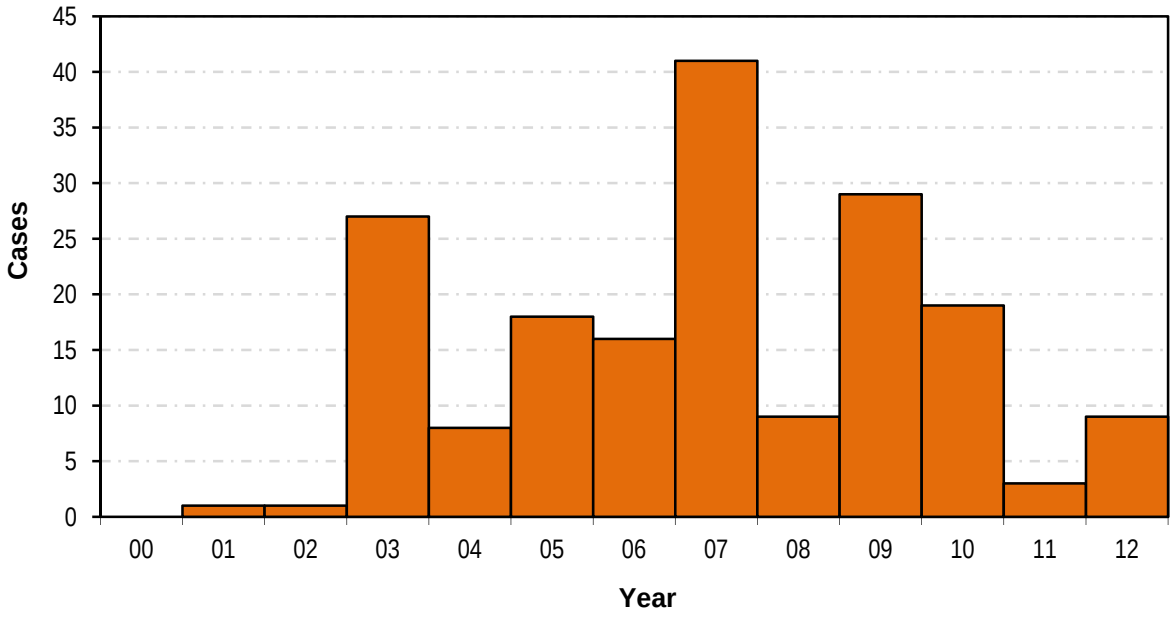
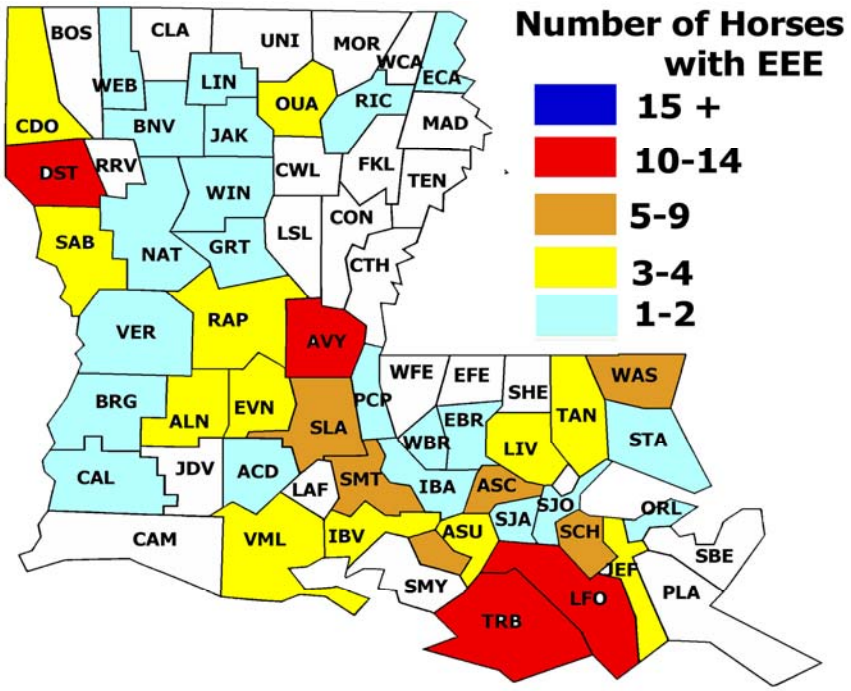


Figure 5: EEE in Horses – Louisiana, 2000-2012



In June 1999, Vermilion parish reported the death of more than 200 emus, ostrich-like birds raised commercially, which are unusually susceptible to EEE.

The Monkey with EEE in Lafayette

In June 2012, a young outdoor-house macaque monkey (*Macaca mul*atta) was found obtunded, non-responsive to noise or tactile stimuli. She later had seizures and was euthanized. A brain biopsy showed multifocal necro-suppurative brain lesions (cerebrum and gray matter). Neurons were the primary targets. She was diagnosed as having EEE neuro-invasive disease.

La Crosse (California Group) Encephalitis (LAC)

La Crosse Encephalitis is a Class B Disease and must be reported to the state within one business day.

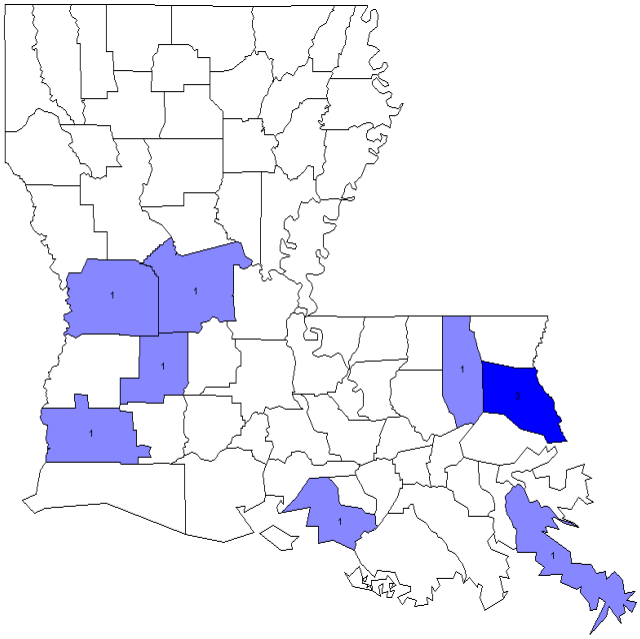
La Crosse Encephalitis (LAC), one of the California serogroup bunyaviruses, is transmitted by mosquitoes to humans in the woodland habitats common to great-Lakes and mid-Atlantic states. The majority of LAC infections are either asymptomatic or mild febrile syndromes. Severe disease characterized from seizures to even coma is usually seen in children younger than 15 years of age. Neurological sequelae typically resolves within several years.

The main vector of LAC is *Aedes triseriatus*, a widely distributed treehole breeder that has adapted to small artificial containers resembling tree holes, such as tires, jars, pots, paint cans and pet dishes. There are concerns that *Aedes albopictus*, the Asian Tiger mosquito, which is common in Louisiana, is also a vector. The discovery of LAC virus in wild populations of *Aedes albopictus*, coupled with the mosquito's expanding distribution in the southeastern United States, suggests that this mosquito may become an important accessory vector, with the potential to increase the number of human cases in endemic foci or expand the range of the disease. Mosquitoes become infected from feeding on viremic small mammals such as chipmunks and tree squirrels.

Sporadic human cases of LAC have occurred in Louisiana in the following parishes (Figure 4):

2001: Allen (1)
2002: Vernon (1)
2003: Tangipahoa (1), Calcasieu(1), St. Mary (1)
2005: St. Tammany (1)
2006: St. Tammany (2), Plaquemines (1)
2008: Rapides (1)

Figure 4: Human LAC cases - Louisiana, 2001-2010



There probably are more cases than those that are sporadically reported, as evidenced by the results of a 2001 OPH seroprevalence study that found the presence of LAC antibodies in 30% of Ouachita residents aged 60 years and over.