

Vector-Borne Diseases

2014 Final Report



Iowa Department of Public Health
Center for Acute Disease Epidemiology
Division of ADPER and Environmental Health

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INTRODUCTION

The Center for Acute Disease Epidemiology (CADE) uses the most recent Council of State and Territorial Epidemiologists (CSTE)/Centers for Disease Control and Prevention (CDC) case definitions found at <http://wwwn.cdc.gov/nndss/script/casedefDefault.aspx>. These definitions are used to classify the case as confirmed, probable, suspect, not a case, or awaiting more information. **Only confirmed and probable cases meeting the CSTE/CDC case definitions are included in this report.**

Disease case counts were compiled from the Iowa Disease Surveillance System (IDSS). Disease case counts and Iowa-specific case demographics were retrieved from IDSS, which is maintained within CADE. In addition, the data file was generated using MMWR (Morbidity Mortality Weekly Report) year 2014. Therefore, case counts in this report may vary slightly from counts generated using the calendar year of 2014.

MOSQUITO-BORNE DISEASES

WEST NILE VIRUS

West Nile virus (WNV) is a mosquito-borne virus that has been documented in Europe, the Middle East, Africa, India, parts of Asia, Australia, and the Americas. The virus was first identified in the West Nile district of Uganda in 1937. It was first reported in the United States in 1999, when 62 cases and seven deaths from West Nile virus infection were reported in the New York City area. Since 1999, West Nile virus has spread across the continental United States. The virus was identified in a dead crow in the eastern part of Iowa in September 2001. Human cases in Iowa have been reported every year since 2002.

WNV is endemic in Iowa and activity usually peaks in late summer and early fall. Iowa law requires WNV diseases to be reported to the Iowa Department of Public Health (IDPH). IDPH then works in collaboration with Local Public Health (LPH) and other appropriate partners to investigate all reported cases.

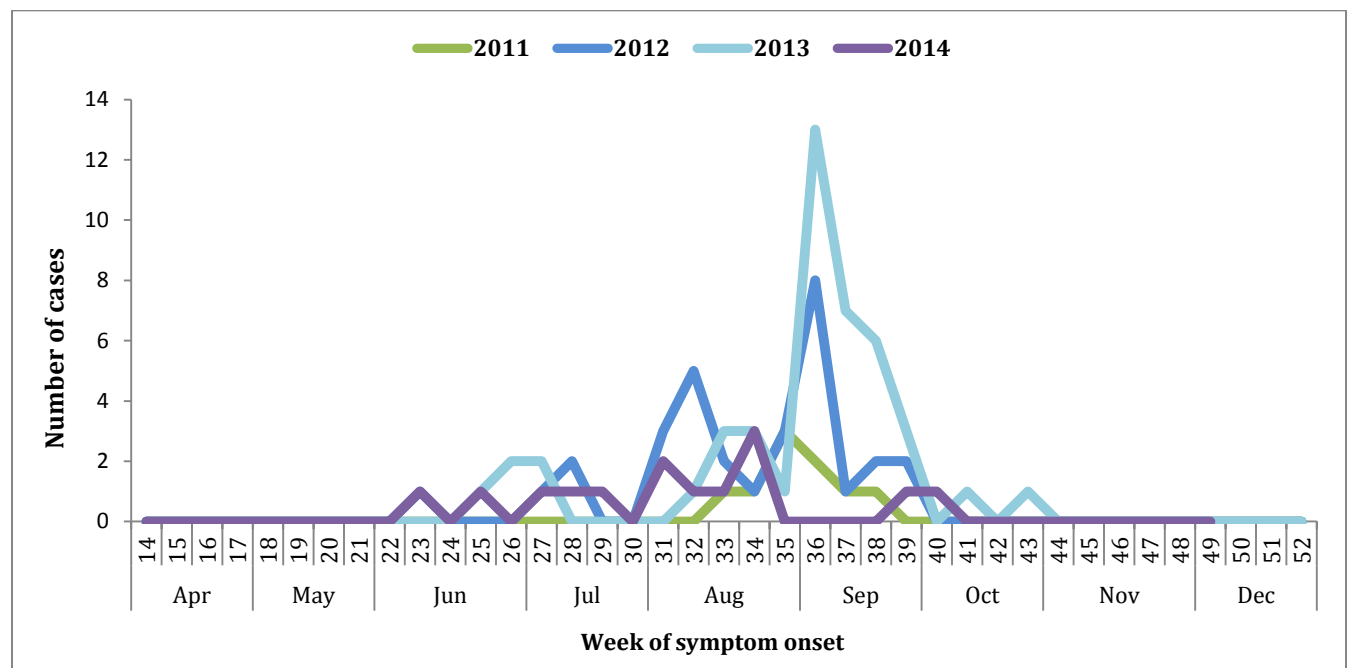
During the 2014 surveillance season, 15 cases of WNV infection were reported to IDPH. The 15 reported cases represent a 66percent decrease from the 44 WNV cases reported in 2013 (Table 1, Figure 1).

Table 1. Reported West Nile virus disease cases and presumptive viremic blood donors, Iowa, 2008 – 2014

Year	Neuroinvasive cases	Non-neuroinvasive cases	Total # cases	Reported Deaths	Presumptive viremic blood donors†
2008	3	3	6	1	2
2009	0	5	5	0	1
2010	5	4	9	2	1
2011	5	4	9	0	0
2012	11	20	31	0	6
2013	24	20	44	0	12
2014	5	10	15	0	3

†Presumptive viremic blood donors (PVDs) are people who had no symptoms at the time of donating blood through a blood collection agency, but whose blood tested positive when screened for the presence of West Nile virus.

Figure 1. Number of reported West Nile virus (WNV) cases- Iowa, 2011-2014



Human Surveillance Data

In 2014, a total of 15 human cases of WNV in 11 Iowa counties were reported (Table 2, Figure 2). Of the 15 cases, five (33percent) had neuroinvasive illness and 10 (67percent) had non-neuroinvasive illness. Of the 15 total cases, 53percent were hospitalized (Table 3).

Blood donors are routinely screened for WNV infection by blood centers. Three WNV Presumptive Viremic Blood Donors (PVDs) were reported in Iowa in 2013. PVDs are people who had no symptoms at the time of donating blood, but whose blood tested positive when screened for the presence of WNV.

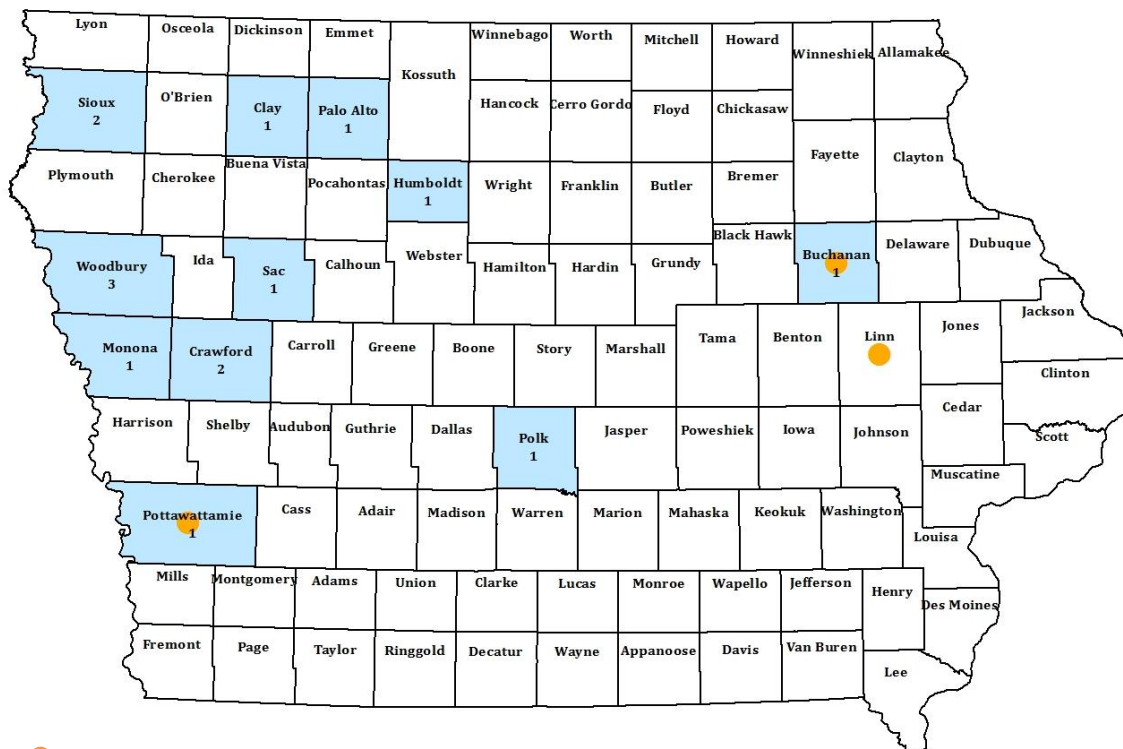
Table 2. Reported Human West Nile virus cases by local jurisdiction, Iowa, 2014

County	Neuroinvasive Cases*	Non-neuroinvasive Cases	Total # of cases	Presumptive viremic blood donors†
Buchanan	0	1	1	1
Clay	0	1	1	0
Crawford	1	1	2	0
Humboldt	1	0	1	0
Linn	0	0	0	1
Monona	0	1	1	0
Plymouth	0	1	1	0
Polk	0	1	1	0
Pottawattamie	0	1	1	0
Poweshiek	0	0	0	1
Sac	1	0	1	0
Sioux	1	1	2	0
Woodbury	1	2	3	0
Total	5	10	15	3

*Includes cases reported as meningitis, encephalitis, or acute flaccid paralysis

†Presumptive viremic blood donors (PVDs) are people who had no symptoms at the time of donating blood through a blood collection agency, but whose blood tested positive when screened for the presence of West Nile virus.

Figure 2: Human WNV disease cases reported, by county - Iowa, 2014



● Counties with a case of asymptomatic blood donor

Table 3. Characteristics of reported WNV disease cases, Iowa, 2014

	Neuroinvasive (N = 5) No. (%)	Non-neuroinvasive (N = 10) No. (%)
Gender		
Male	3 (40)	6 (60)
Female	2 (60)	4 (40)
Age		
0-17	0 (0)	2 (20)
18-40	0 (0)	3 (30)
41-60	3 (60)	4 (40)
61-80	2 (40)	1 (10)
81+	0 (0)	
Symptoms		
Altered sensorium	2 (40)	1 (10)
Anorexia	2 (40)	6 (60)
Coma	0 (0)	0 (0)
Confusion /Memory loss	4 (80)	3 (30)
Cranial nerve palsy	1 (20)	0 (0)
Fatigue	4 (80)	8 (80)
Fever	5 (100)	6 (60)
Flaccid Paralysis	1 (20)	1 (10)
Headache	3 (60)	9 (90)
Joint pain	2 (40)	4 (40)
Muscle pain	3 (60)	7 (70)
Nausea	1 (20)	7 (70)
Photophobia	1 (20)	2 (20)
Rash	1 (20)	3 (30)
Seizures	0 (0)	0 (0)
Swollen lymph nodes	0 (0)	2 (20)
Vision loss	1 (20)	1 (10)
Vomiting	1 (20)	5 (50)
Outcome		
Hospitalized	5 (100)	3 (30)
Death	0 (0)	0 (0)

Ecological Surveillance

In 2014, the Iowa Department of Public Health in collaboration with the State Hygienic Laboratory (SHL), Iowa State University (ISU), and local public environmental health partners conducted ecological surveillance in four counties by monitoring mosquitoes and testing for infected populations. In 2014, 15 mosquito pools and five horses tested positive for WNV (Table 4).

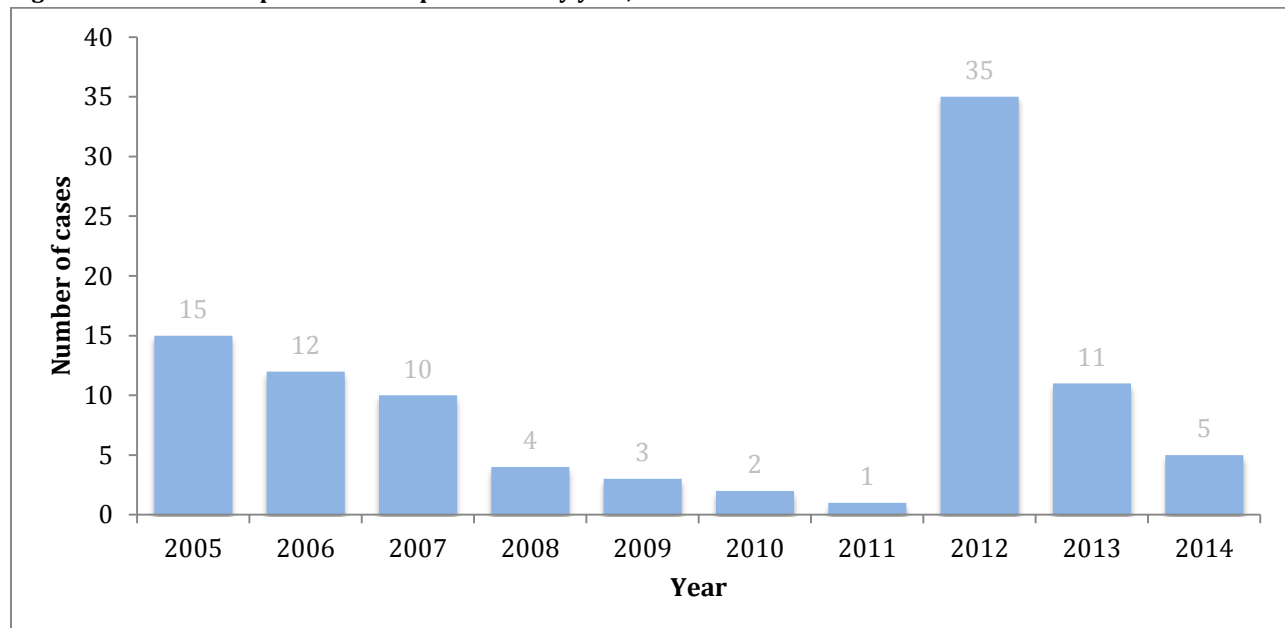
Table 4. Equine and Mosquito Surveillance, 2014 Positives

County	Horses	<i>Culex pipiens</i> Complex
Black Hawk	1	N/A
Davis	1	N/A
Johnson	1	N/A
Louisa	1	N/A
Lucas	1	N/A
Polk	0	4
Story	0	8
Woodbury	0	3
State Total	5	15

Equine/Veterinary Surveillance

Veterinary cases of WNV, EEE, and WEE are legally required to be reported to the State Veterinarian. Five WNV positive horses were reported to the Iowa Department of Agriculture and Land Stewardship in 2014 (Figure 3).

Figure 3: Number of reported WNV equine cases by year, Iowa 2003-2014



Mosquito Surveillance

Mosquitoes were collected using CDC CO2 traps and New Jersey gravid traps in four (Black Hawk, Pottawatomie, Scott, Woodbury) counties in Iowa. These mosquitoes were speciated at ISU and sent to SHL for viral testing. In 2014, SHL tested 378 pools of mosquitos speciated at ISU. In total, 15 mosquito pools tested positive for WNV. The overall positivity rate for WNV testing in 2014 was 4percent (15/378).

Table 5. Detailed mosquito pools results

Species	# of Pools	WNV	WNV
		Negative	Positive
Cx. pipiens	262	247	15
Cx. tarsalis	2	2	0
Cx. territans	11	11	0
Ae. japonicus	103	103	0
Total	378	363	15

National WNV Activity (2014)

In 2014, 932 counties in 48 states and the District of Columbia reported WNV activity to ArboNET; 566 counties in 44 states and the District of Columbia reported WNV human disease cases or viremic blood donors (Figure 5).

In 2014, a total of 2,205 human cases of WNV disease were reported from 503 counties in 42 states and the District of Columbia (Figure 6). Of all WNV disease cases reported, 1,347 (61percent) were classified as neuroinvasive disease (e.g., meningitis, encephalitis, acute flaccid paralysis) and 858 (39percent) were classified as non-neuroinvasive. Of the reported cases, 90percent had onset of illness in July-September (Figure 4).

In addition, 344 WNV presumptive viremic blood donors were reported from 31 states. Of these, 28 (8percent) developed clinical illness and are also included as disease cases.

Figure 4. WNV disease cases reported to ArboNET, by week of onset – United States, 2014

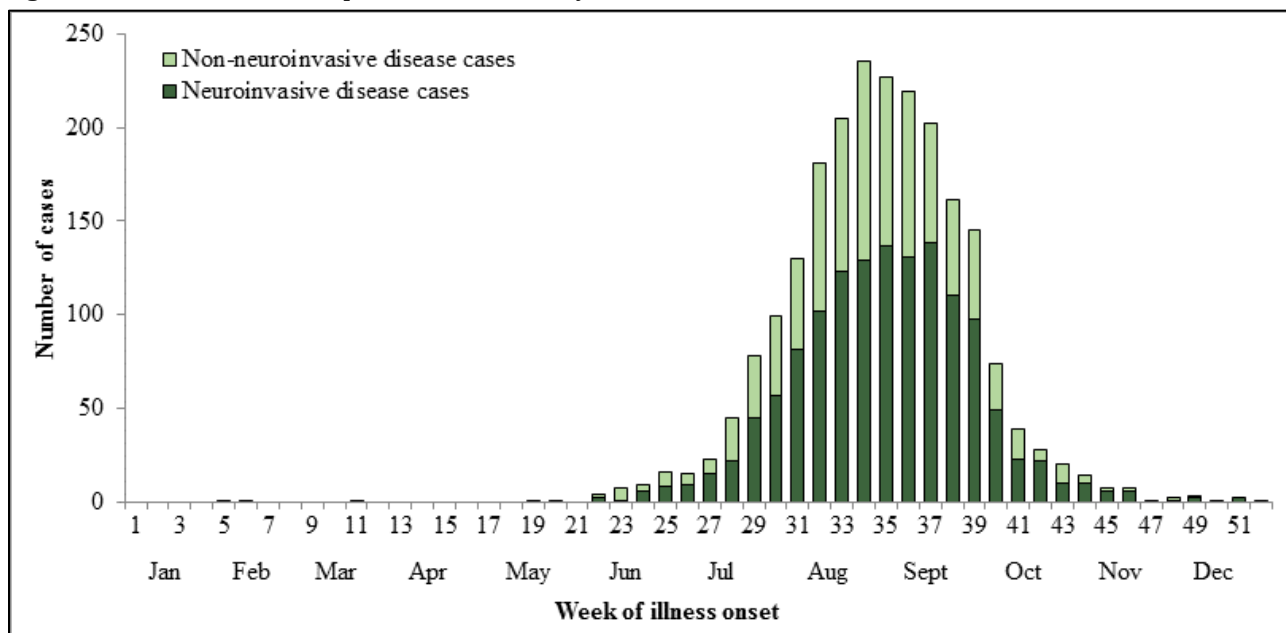


Figure 5. WNV activity reported to ArboNET, by county - United States, 2014

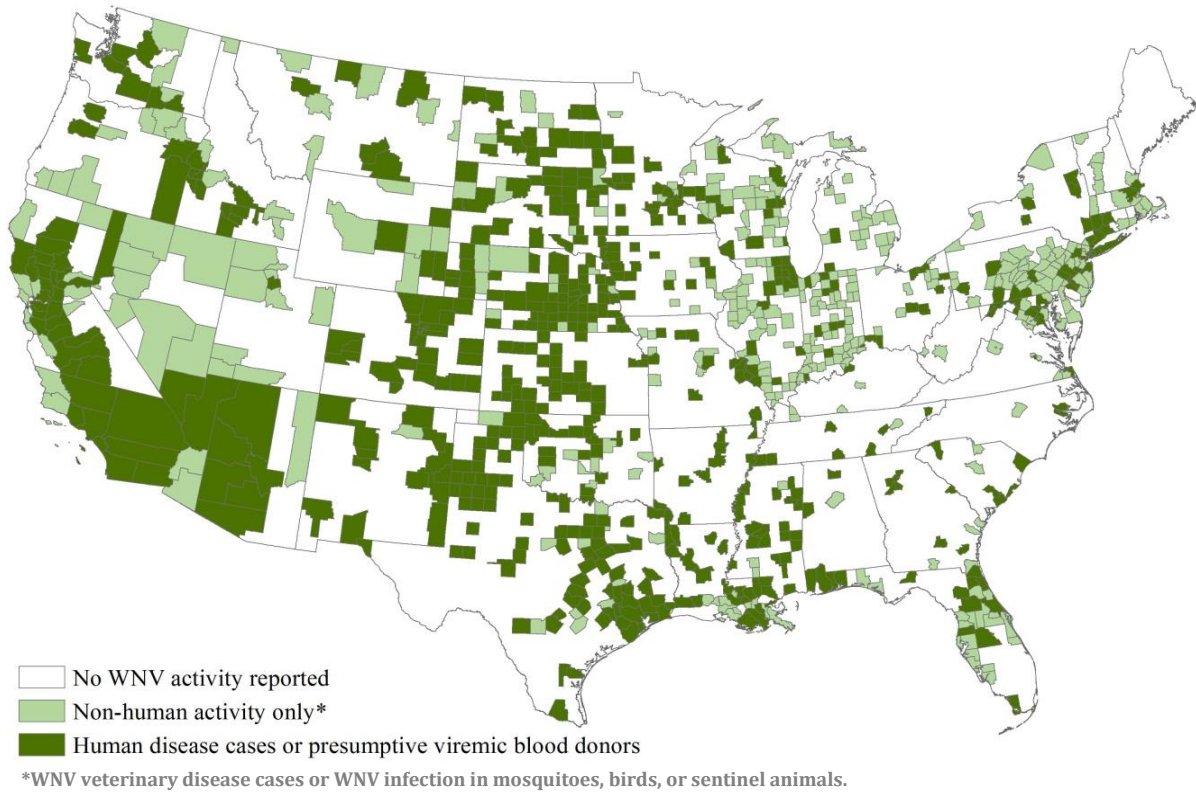
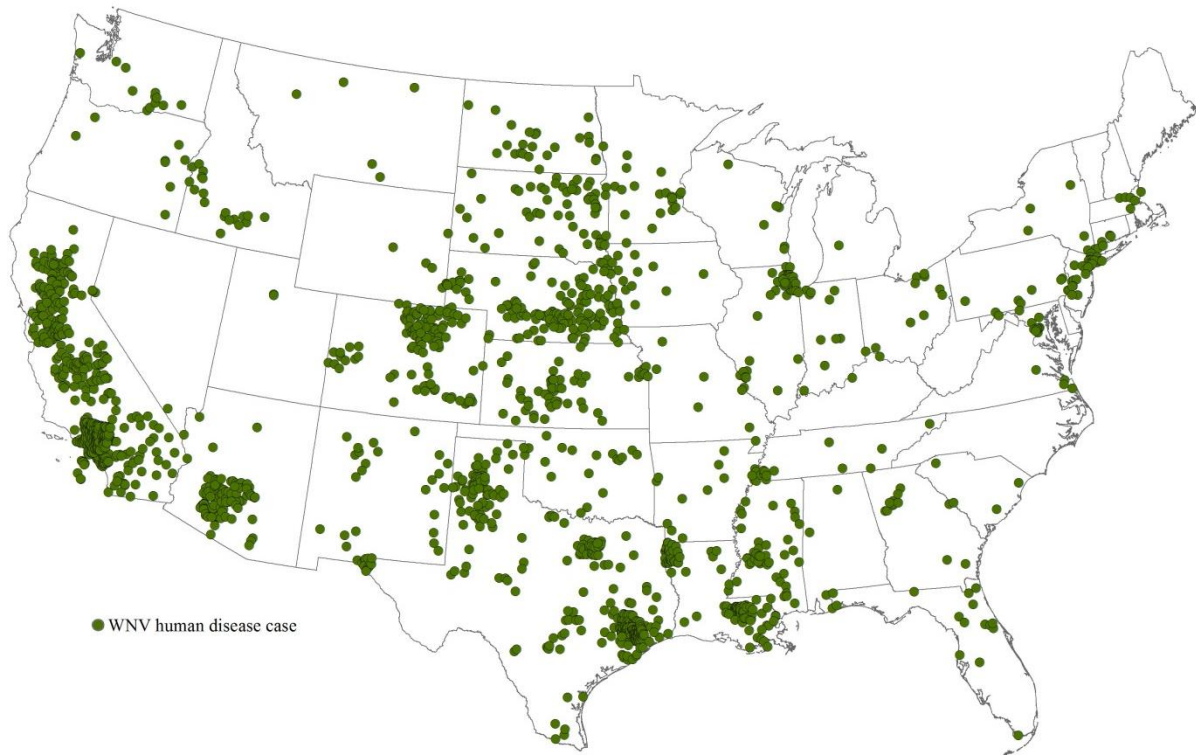


Figure 6. WNV disease cases reported to ArboNET, by county - United States, 2014



CHIKUNGUNYA

Chikungunya is a viral disease that is spread to people by the bite of an infected *Aedes aegypti* and *Aedes albopictus* mosquito. Mosquitoes become infected when they feed on a person already infected with this virus.

Prior to 2013, chikungunya outbreaks had been identified in countries in Africa, Asia, Europe, and islands in the Indian and Pacific Oceans. In late 2013, the first local transmission of chikungunya virus in the Americas was first identified in Caribbean countries and territories.

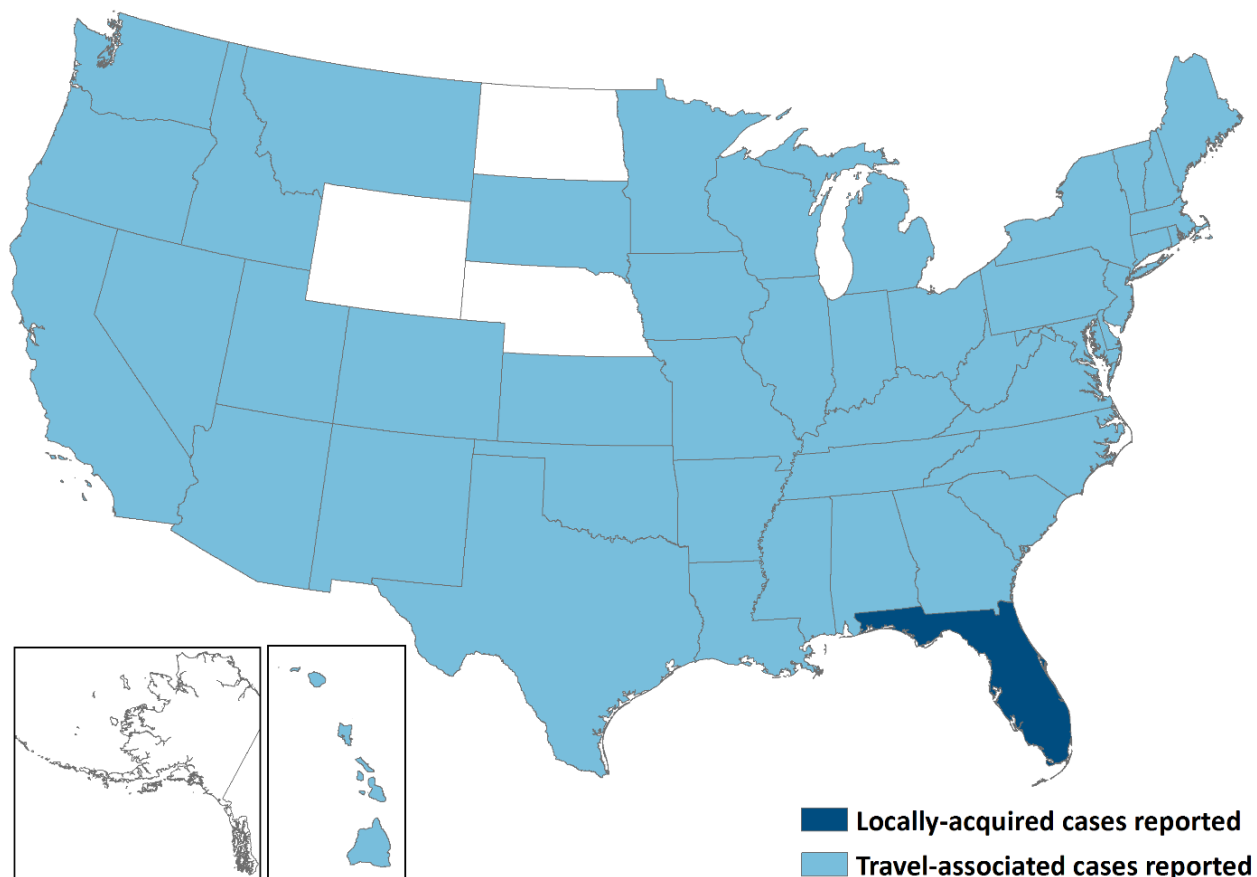
Chikungunya is not found in Iowa. Cases occurring in Iowa are in travelers returning from parts of the world where chikungunya transmission occurs. In 2014, four imported cases of chikungunya virus disease were reported in Iowa.

National Chikungunya Activity (2014)

In 2014, a total of 2,799 chikungunya virus disease cases were reported to CDC from U.S. states. Eleven locally-transmitted cases have been reported in Florida. All other cases occurred in travelers returning from affected areas.

A total of 4,702 chikungunya virus disease cases have been reported to CDC from U.S. territories for 2014. Of these, 4,651 were locally-transmitted cases reported from Puerto Rico and the U.S Virgin Islands and American Samoa. The remaining 51 cases occurred in travelers returning from other affected areas.

Figure 7. States reporting chikungunya virus disease cases – United States, 2014



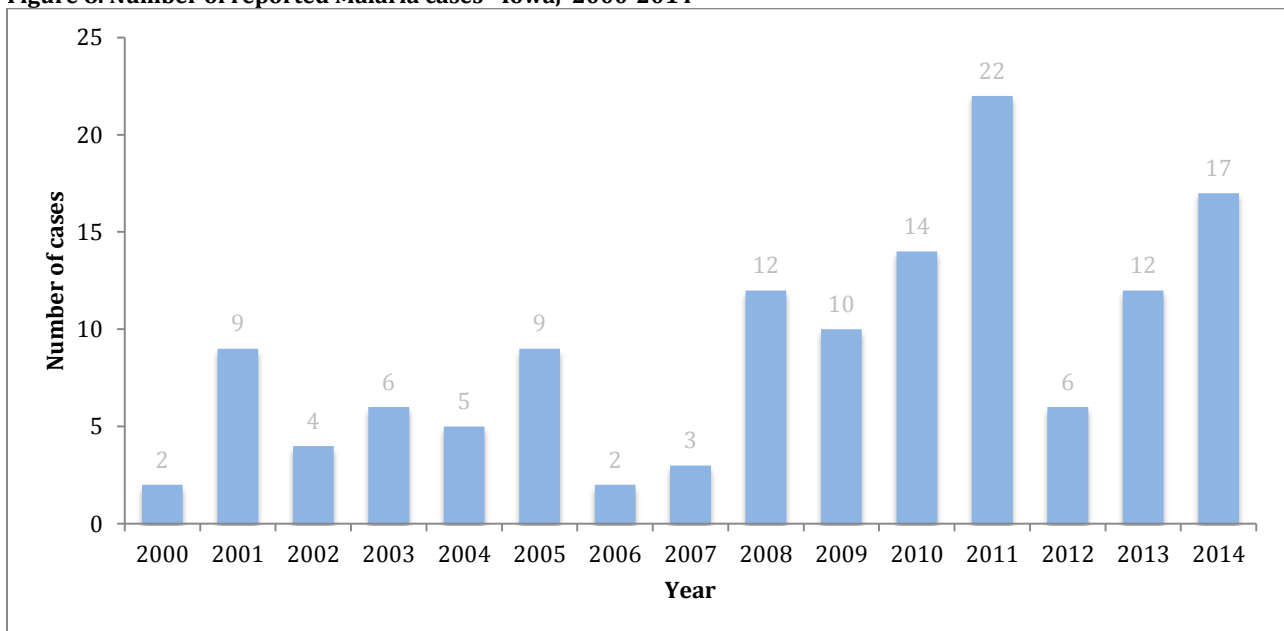
MALARIA

Malaria is a serious and sometimes fatal disease caused by a parasite that commonly infects *Anopheles* mosquitoes. Malaria is spread to humans by the bite of the infected female mosquito. Only *Anopheles* mosquitoes can transmit malaria and they must have been infected through a previous blood meal taken from an infected person.

Malaria was eliminated from the U.S. in the early 1950s. Cases occurring in the U.S. and Iowa are in travelers and immigrants returning from parts of the world where malaria transmission occurs.

In 2014, 17 imported cases of malaria were identified in Iowa, an increase of five cases from the 12 cases reported in 2013. Cases ranged from ages 2 to 56 with a median age of 26 years. All infections were acquired outside of the United States.

Figure 8. Number of reported Malaria cases- Iowa, 2000-2014



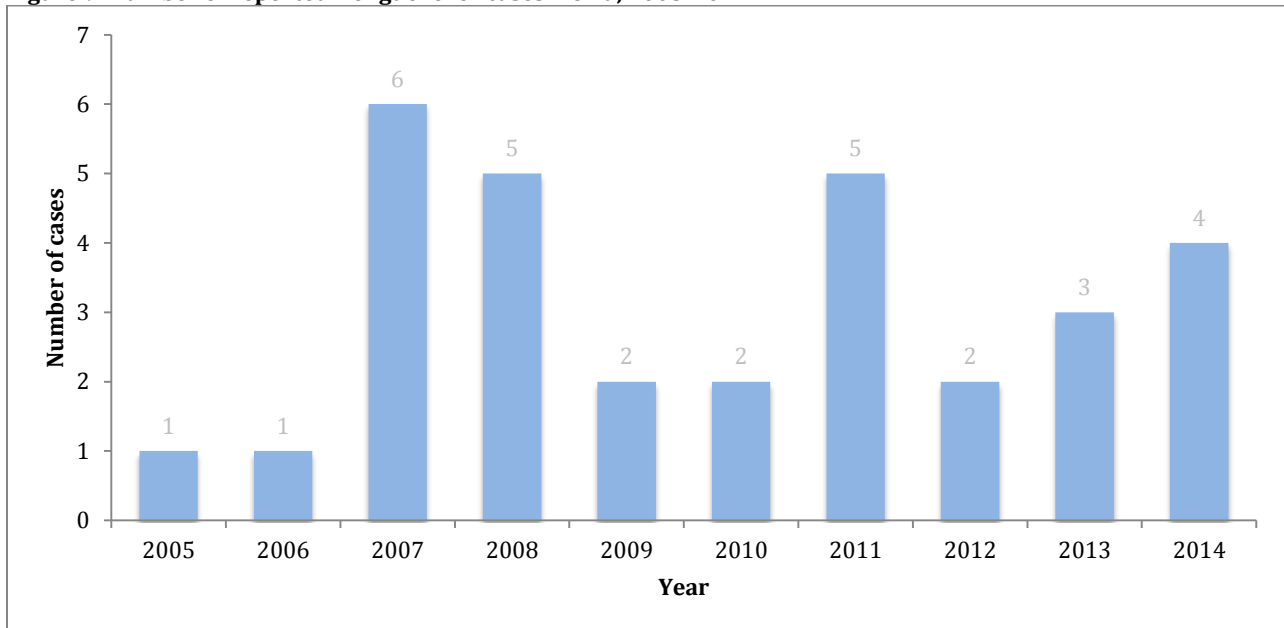
DENGUE FEVER

Dengue is a disease caused by any one of four related viruses, which are passed by the bite of an infected *Aedes aegypti* or *Aedes albopictus* mosquito. Infection with one of the four viruses does not protect against the others and consecutive infections put people at greater risk of developing dengue hemorrhagic fever (DHF).

Dengue is not found in Iowa. Nearly all dengue cases reported in the United States were acquired elsewhere by travelers or immigrants.

In 2014, four imported cases of Dengue fever were reported to IDPH. Cases ranged from age 19 to 52 with a median age of 23 years.

Figure 9. Number of reported Dengue fever cases– Iowa, 2005-2014



TICK-BORNE DISEASES

LYME

Lyme disease is caused by *Borrelia burgdorferi*, and, is transmitted to humans by the bite of an infected tick, primarily *Ixodes scapularis* (also known as the black legged or deer tick)..

Ticks are most likely to spread the Lyme disease bacterium during their pre-adult stage (nymph). Ticks are most active between May and July, and are commonly found in tall grasses and brush of wooded areas in Iowa.

In 2014, 193 cases of Lyme disease were reported to IDPH, a 10 percent increase over the previous three-year average (Figure 11). The 2014 Iowa case rate for Lyme disease was 6.2 cases per 100,000 persons.

Figure 10: Confirmed and probable cases of Lyme disease, Iowa, 2014

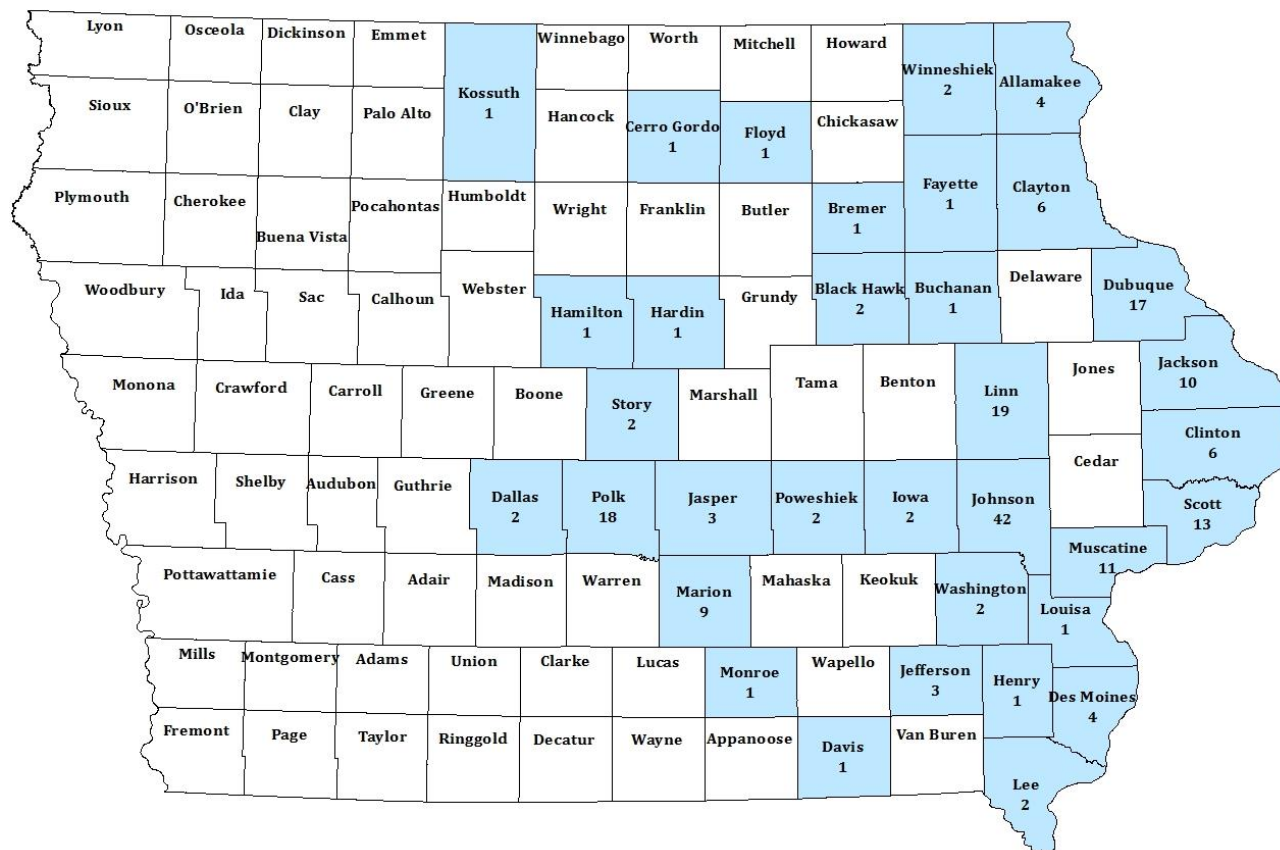
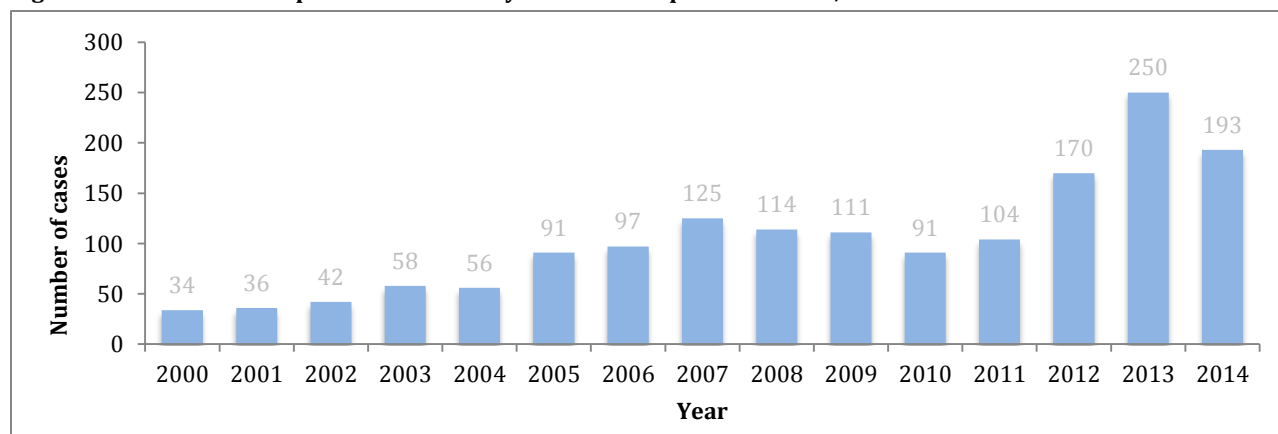


Figure 11. Confirmed and probable cases of Lyme disease reported to IDPH, 2002-2014



ROCKY MOUNTAIN SPOTTED FEVER (RMSF)

In 2014, 10 cases of Rocky Mountain spotted fever (RMSF) were reported in Iowa. American dog ticks are carriers of *Rickettsia rickettsii*, the bacteria that causes RMSF. The American dog tick is the most common species of tick in Iowa and can be found in every county in the state. The tick is most active late March through August.

Iowa RMSF cases in 2014 had symptom onset dates from May to October. Cases ranged from ages 26 to 60, with a median age of 46. Nine out of the 10 cases were male.

Figure 12: Confirmed and probable cases of Rocky Mountain spotted fever disease, Iowa, 2014

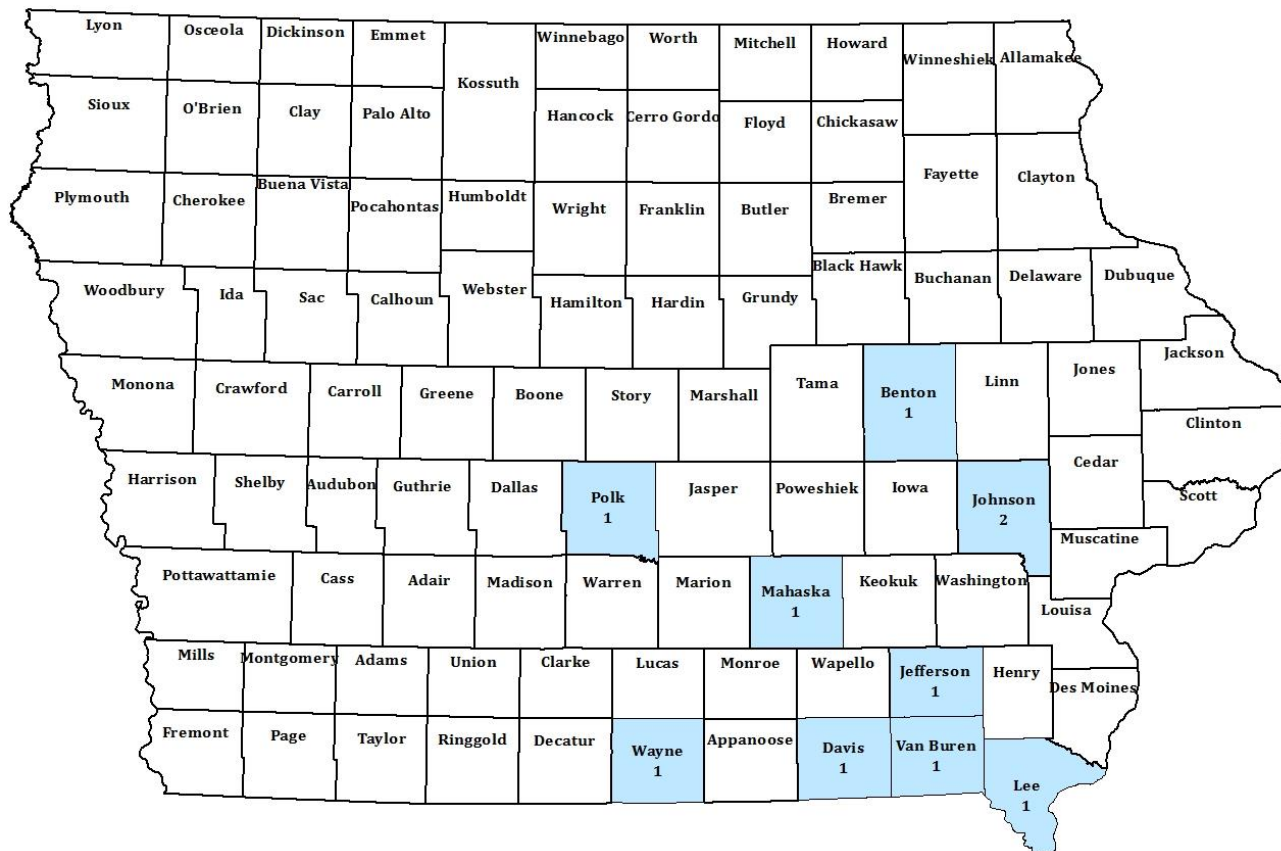
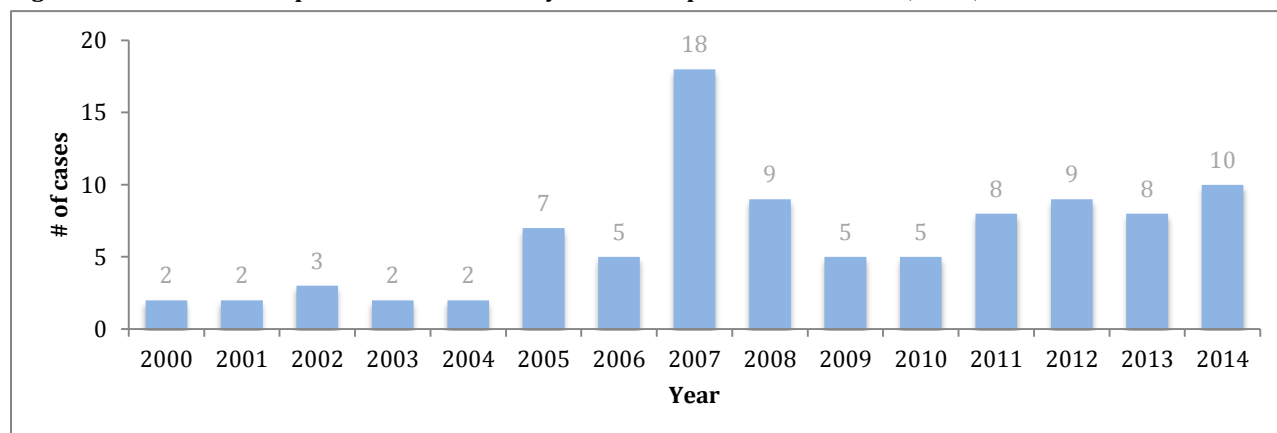


Figure 13: confirmed and probable cases of Rocky Mountain spotted fever disease, Iowa, 2000-2014



EHRlichiosis/ANAPLASMOSIS

There are at least three species of bacteria responsible for ehrlichiosis/anaplasmosis in the United States: *Ehrlichia chaffeensis*, *Anaplasma phagocytophilum*, and *Ehrlichia ewingii*. They are transmitted by the bite of an infected lone star tick (*Amblyomma americanum*), which is found in Iowa. The clinical signs and symptoms of these infections are similar.

In 2014, there were 17 cases of ehrlichiosis/anaplasmosis reported to IDPH. This represents a 113 percent increase from the eight cases reported in 2013.

Table 6: Reported Ehrlichiosis/Anaplasmosis disease cases, Iowa, 2008 - 2014

Species	2008	2009	2010	2011	2012	2013	2014
<i>Anaplasma phagocytophilum</i>	0	4	2	2	3	4	8
<i>Ehrlichia chaffeensis</i> ,	5	2	0	2	2	3	8
<i>Ehrlichia ewingii</i>	1	0	0	0	0	0	0
Ehrlichiosis/Anaplasmosis undetermined	1	2	0	4	2	1	1
Total	7	8	2	8	7	8	17

RESOURCES

For additional arboviral disease information and data, please visit the following websites:

Iowa Department of Public Health:

[http://www.idph.state.ia.us/Cade/DiseaseIndex.aspx?disease=West Nile Virus](http://www.idph.state.ia.us/Cade/DiseaseIndex.aspx?disease=West+Nile+Virus)

CDC's Division of Vector-Borne Diseases:

<http://www.cdc.gov/ncezid/dvbd/>

National Notifiable Diseases Surveillance System:

<http://wwwn.cdc.gov/NNDSS/script/casedef.aspx?CondYrID=616&DatePub=1/1/2011%2012:00:00%20AM>

U.S. Geological Survey (USGS):

<http://diseasemaps.usgs.gov/>

AABB (American Association of Blood Banks):

www.aabb.org/programs/biovigilance/Pages/wnv.aspx

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