WEST NILE VIRUS SUMMARY REPORT 2014 SEASON
UTAH DEPARTMENT OF HEALTH

Report Purpose

The purpose of this document is to provide Utah West Nile virus (WNV) partners a concise summary of this season's major results. Information displayed in this report has been compiled by the Utah Department of Health (UDOH), but reflects information obtained from concerted joint efforts. All activities related to WNV during the 2014 season involved major contributions from many different agencies. These include as follows: blood banks of Utah, local health departments (LHDs), Utah Department of Agriculture and Food (UDAF), Utah Division of Wildlife Resources (UDWR), Utah Mosquito Abatement Association (UMAA), the Utah Public Health Laboratory (UPHL), and the Utah Veterinary Diagnostic Laboratory (UVDL). In addition to the direct contribution of surveillance data, these agencies were also involved in systematic planning and preparation for the 2014 season. The intent of this report is to document the results of the efforts put forth by these entities during the 2014 WNV season.

Note: *The purpose of this report is to describe general trends that occurred during the 2014 season. Specific surveillance counts may be subject to change as data continues to be reconciled for the season.*

Introduction to WNV

During the summer of 2014, WNV reemerged in Utah. This was the twelfth year WNV activity was detected in Utah. WNV is a disease transmitted by mosquitoes. Birds are the natural hosts of the disease with humans and horses serving as accidental hosts. The majority of people infected with WNV never develop symptoms. A small percentage of infected individuals will display West Nile fever symptoms (i.e. fever, headache, and body aches). A more serious form of the disease, West Nile neuroinvasive illness, may also occur when the virus infects the central nervous system. People with this form of the disease will have high fevers, severe headaches, neck stiffness, and mental confusion. Hospitalization is often required and death is possible.

Introduction to WNV Surveillance in Utah

Surveillance for WNV activity involves several different components. Since the disease is zoonotic in nature, both human and animal surveillance occurs. In past years, WNV surveillance in Utah involved human, mosquito, wild bird, horse, and sentinel chicken populations. Due to the involvement of these different populations, surveillance efforts this season enlisted the expertise and abilities of many different agencies. Budget constraints again limited surveillance for the 2014 season, and in order to keep more critical surveillance running, wild bird testing, sentinel chicken testing and official coordinated equine testing efforts at UDAF were again eliminated from routine surveillance. Local mosquito abatement districts (MADs), in conjunction with the UMAA, performed necessary trapping and identification for mosquito surveillance. Confirmation of these mosquitoes occurred at the UPHL. Major health care providers submitted human samples across the state with testing occurring at both the UPHL and private laboratories such as ARUP (Associated Regional and University Pathologists). The three major blood banks servicing Utah (American Red Cross, ARUP, and Mountain Star) coordinated screening of donated blood for identification of

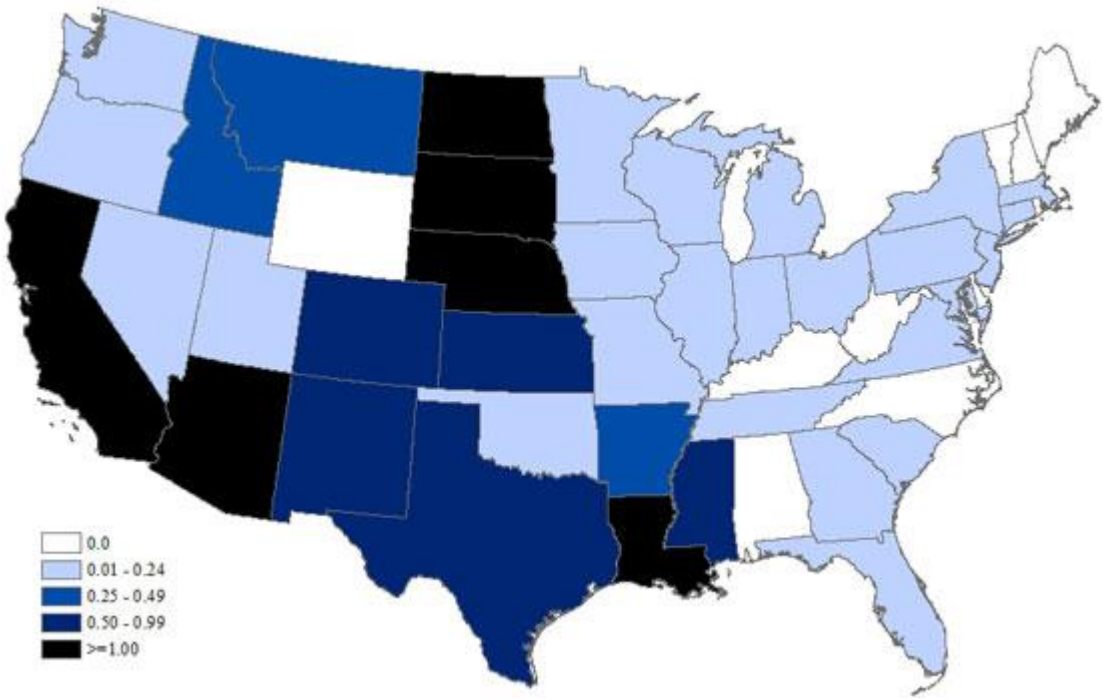
viremic donors. All LHDs in Utah were involved with disseminating, investigating, and responding to surveillance data indicative of local WNV activity.

2014 Season National Highlights

West Nile virus neuroinvasive disease incidence maps present data reported by state and local health departments to CDC's ArboNET surveillance system. Figure 1 shows the incidence of human neuroinvasive disease (e.g., meningitis, encephalitis, or acute flaccid paralysis) by state for 2014 ranging from 0.01-0.24, 0.25-0.49, 0.50-0.99, and greater than, or equal to, 1.00 case per 100,000 population.

Figure 1

West Nile Virus Neuroinvasive Disease Incidence by State – United States, 2014 (as of December 16, 2014)



This map shows the incidence of human West Nile virus neuroinvasive disease (e.g., meningitis, encephalitis, or acute flaccid paralysis) by state for 2014 with shading ranging from 0.01-0.24, 0.25-0.49, 0.50-0.99, and greater than, or equal to, 1.00 case per 100,000 population.

Neuroinvasive disease cases have been reported to ArboNET from the following states for 2014: Arizona, Arkansas, California, Colorado, Connecticut, District of Columbia, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Jersey, New Mexico, New York, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, Washington, and Wisconsin.

Nationally, 2014 had less human activity reported than in previous seasons. For 2014, of the 2,085 human cases reported to CDC, 1,262 (61%) were reported as West Nile meningitis or encephalitis (neuroinvasive disease) and 823 (36%) were reported as West Nile fever (milder disease); as opposed to 2,374 total human cases reported to CDC in 2013, with 1,205 (51%) reported as West Nile meningitis or encephalitis (neuroinvasive disease), and 1,169 (49%) reported as West Nile fever (milder disease). There were a total of 84 fatalities in 2014, compared to 114 fatalities in 2013.

2013 Season Utah Highlights

Activity during the 2014 WNV season in Utah was lower in human cases and equine cases than the 2013 season. However, mosquito activity was much higher, with 167 pools testing positive in 2014, compared to 69 in 2013. The vast majority of activity occurred along the Wasatch Front, with sporadic positive reports in other areas of the state. A total of nine counties had activity detected during the 2014 season. For 2014, all positive RAMP tests for mosquitoes were confirmed by PCR at UPHL.

Table 1: WNV activity, Utah 2014 (positive counts only)

Total West Nile Virus Positive Samples: Utah 2014					
County of Residence	**Human**	**Chicken***	**Horse**	**Mosquito**	**Total**
Beaver	0	0	0	0	0
Box Elder	0	0	1	10	11
Cache	0	0	0	0	0
Carbon	0	0	0	0	0
Daggett	0	0	0	0	0
Davis	0	0	0	27	27
Duchesne	0	0	0	0	0
Emery	0	0	0	0	0
Garfield	0	0	0	0	0
Grand	0	0	0	0	0
Iron	0	0	1	0	1
Juab	0	0	0	0	0
Kane	0	0	0	0	0
Millard	0	0	0	0	0
Morgan	0	0	0	0	0
Piute	0	0	0	0	0
Rich	0	0	0	0	0
Salt Lake	2	0	1	98	101
San Juan	0	0	0	0	0
Sanpete	0	0	0	0	0
Sevier	0	0	0	0	0
Summit	0	0	0	0	0
Tooele	0	1	0	2	3
Uintah	0	0	1	5	6
Utah	0	0	0	5	5

Wasatch	0	0	0	0	0
Washington	0	0	0	11	11
Wayne	0	0	0	0	0
Weber	0	0	0	9	9
State Total	**2**	**1**	**4**	**167**	**174**

Human Cases of WNV: Utah 2014					
Age Group	**Total**	**% Total**	**Fever**	**Death**	**Neuroinvasive**
< 18					
18-39					
40-64	1	50%			1
≥ 65	1	50%	1		
State Total	**2**	**100%**	**1**		**1**

*The state did not conduct sentinel chicken surveillance in 2014. However, some counties still maintained sentinel chicken flocks.

Past Season Comparison

2003 was the first year WNV activity was established in Utah. Similar to many initial seasons in other states, activity was muted. One human case was reported for the 2003 season in Utah, in addition to one viremic donor who did not develop symptoms. Horse activity was the main indication of WNV presence in 2003. 2004 was the first year WNV activity was established in northern Utah along the Wasatch Front. The majority of activity for 2004 occurred in extreme southern and eastern areas of Utah, such as Washington and Grand counties. During 2005, activity expanded into more northern regions of the state and Utah and Uintah counties served as focal points for detected activity. The 2006 season was the most active season. Activity was focused along the Wasatch Front in the more populated areas, Salt Lake County and Utah County. With an increase in activity, there was also an increase in fatalities, with Utah experiencing five. 2007 started the decline in the number of cases, as well as a decrease in the number of fatalities. 2007 also showed that the virus was moving into the more northern parts of the state, with the bulk of cases being in Cache and Box Elder counties. Activity during the 2008 WNV season decreased compared to activity detected during the 2007 season. The 2009 - 2011 seasons saw an even more dramatic decrease in the level of activity. Due to inconsistencies with RAMP testing, it was decided that mosquito pools would only be counted if they were confirmed by PCR. This led to a decrease in the number of positive mosquito pools detected throughout the state. The southwestern portion of Utah saw the most animal (mosquito) activity for the 2010 - 2012 seasons. For the 2013 season, Washington County, in the southwest portion of the state, saw the majority of activity, both human and animal. For 2014, activity was centered mostly along the Wasatch Front.

Table 2: WNV season comparison, Utah 2003-2014

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Human	1	11	52	158	70	27	2	2	3	5	7	2
Horse	35	5	68	59	18	8	6	3	1	3	7	4
Bird*	2	8	22	76	19	3	0	0	0	0	40	2
Chicken*	9	32	79	107	74	16	1	1	0	1	2	1
Mosquito Pools	3	181	80	466	225	140	284	31	23	21	69	167
Counties with Detection	9	11	17	19	19	14	12	5	6	8	9	9

*Wild bird and sentinel chickens were not part of Utah's active surveillance in 2011-2013. However, the large increase in bird activity was due to an eared grebe and bald eagle die-off in October 2013 – January 2014.

2014 Utah Activity Timeline

The majority of surveillance measures began in June 2014. West Nile virus activity was detected in a crow the week of June 7, 2014. Additional activity was then detected in the week of July 13, 2014, in mosquito pools confirmed by PCR from Box Elder, Uintah and Washington Counties. Activity was detected throughout the summer and into October, with WNV activity being in all formal surveillance measures (horse, human, and mosquito) by August. Utah's first human case was reported the week of August 17, 2014. Human, mosquito and equine cases continued to be reported into October. All active surveillance for the 2014 season had ceased by the end of October. However, testing of suspect human and horse cases continues year-round.

Human Surveillance

Human surveillance occurs primarily through reporting of results indicative of acute infection from major laboratories. LHDs were immediately notified in these instances for the initiation of case investigations. Due to issues with testing kits from a major reference laboratory from the 2008 season, it was again determined that all human samples would be confirmed at UPHL. Additionally, major blood banks servicing Utah screened donations for the presence of WNV.

The total Utah human case count for the 2014 season currently stands at two identified cases.

There were no individuals identified as being infected with WNV through blood donation screening.

Table 3: WNV clinical comparison of human cases, United States vs. Utah, 2014

	Utah	United States
Case Number	2	2,122
Fatalities	0	85
Percent Fatalities	0%	4%
Percent Neuroinvasive Disease	50%	60%

Table 4: WNV, clinical and demographic comparison of human cases, Utah 2003-2014

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Case Number	1	11	52	158	70	28	2	2	3	5	7	2
Fatalities	0	0	1	5	2	0	0	0	0	1	0	0
Percent Male	100%	45%	54%	51%	51%	79%	50%	100%	66%	60%	57%	100%
Median Age (years)	NA*	53	43	47	50	41	NA*	NA*	NA*	70	61	NA*
Age Range (years)	NA*	5-80	6-86	1-88	3-89	4-79	NA*	NA*	NA*	22-87	20-85	NA*

*Not available: data suppressed due to small number of reported cases in this year

Figure 2 represents human and mosquito pool positivity over time. The first activity for 2014 was detected in a crow the week of June 7. Additional activity was then detected in mosquitoes during the week of July 13, 2014. This graph represents the activity in Utah from June – September 2014.

Figure 2

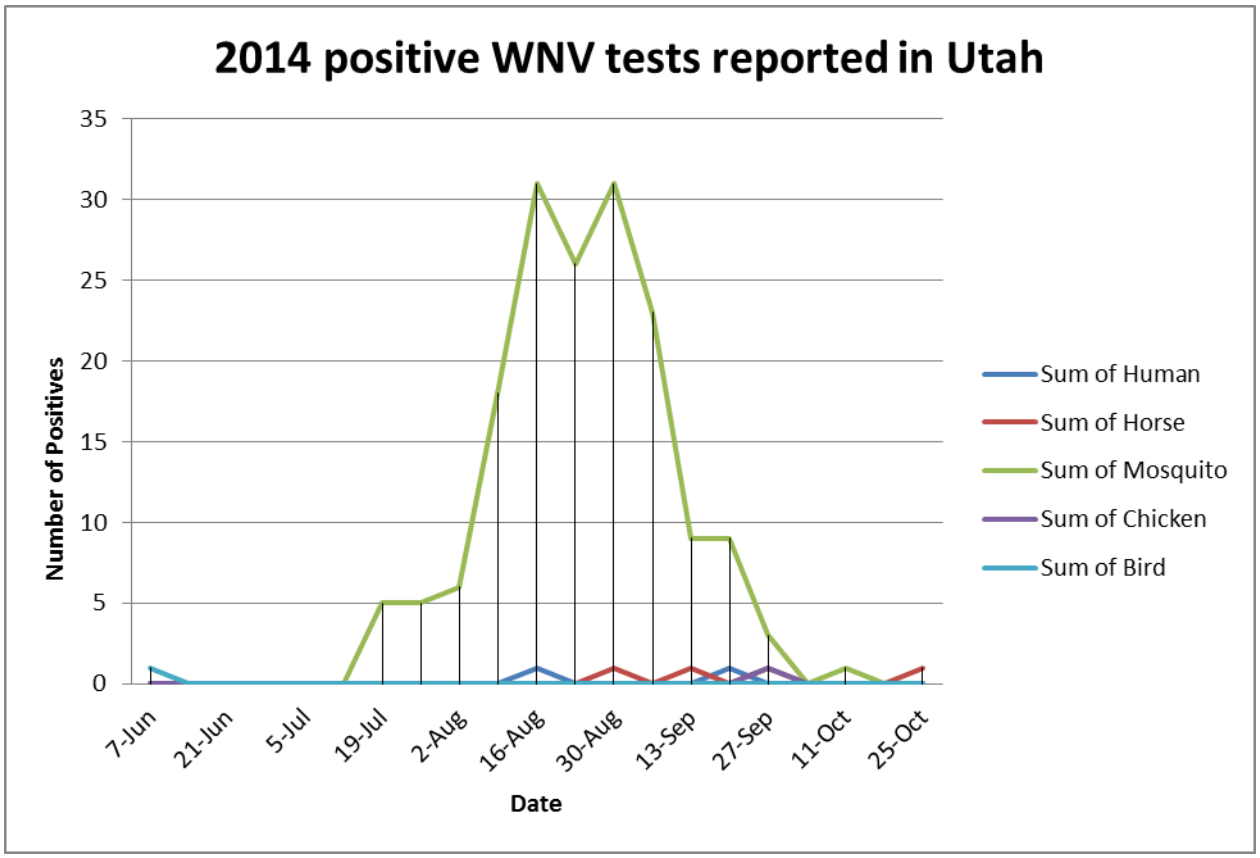


Table 5 compares Utah to surrounding states. Although many states were seeing increased activity, Utah experienced only two human cases with no fatalities.

Table 5

Utah in comparison to surrounding states, as reported to CDC ArboNet, 2014								
	Neuroinvasive disease cases		Non-neuroinvasive disease cases		Total cases		Deaths	
State	Case Count	Rate per 100,000 person years	Case Count	Rate per 100,000 person years	Case Count	Rate per 100,000 person years	Case Count	Rate per 100,000 person years
Arizona	80	1.21	24	0.36	104	1.57	12	0.18
Colorado	45	0.85	69	1.31	114	2.16	5	0.09
Idaho	5	0.31	13	0.81	18	1.12	0	0.00
Montana	3	0.30	2	0.20	5	0.49	0	0.00
New Mexico	19	0.91	5	0.24	24	1.15	1	0.05
Utah	1	0.03	1	0.03	2	0.07	0	0.00
Wyoming	0	0.00	5	0.86	5	0.86	0	0.00

Mosquito Surveillance
Personnel from mosquito abatement districts across the state performed the primary functions of trapping mosquitoes at various locations in their district. Trapped mosquitoes were identified and sorted into "pools" based on species. Each mosquito pool contained 50-100 individual mosquitoes. These pools were shipped to the UPHL for testing by PCR.

Horse surveillance
Surveillance of equine disease related to WNV infection was again coordinated by the UDAF. Veterinarians across the state were encouraged to submit samples from suspect equine cases to the UVDL-Logan for testing. Results of these serum tests were reported by the UDAF to the UDOH with appropriate notification occurring for positive cases. The majority of samples submitted for testing were from domestic, privately owned horses with symptoms indicative of infection and no history of vaccination. Disease awareness among veterinarians and horse owners was accomplished through distribution of pamphlets and periodic updates using the Utah Veterinary Alert Listserver.

Wild bird surveillance
Due to budget constraints, routine wild bird surveillance was discontinued for the 2014 season.

Sentinel chicken surveillance
Due to budget constraints, routine sentinel chicken surveillance was discontinued for the 2014 season.

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