

WEST NILE VIRUS SUMMARY REPORT 2017 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 2017 season involved major contributions from many different agencies, including: 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 2017 season. The intent of this report is to document the results of the efforts put forth by these entities during the 2017 WNV season.

Note: *This report describes general trends that occurred during the 2017 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 2017, WNV reemerged in Utah with elevated levels when compared to the last ten years. This was the fifteenth 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

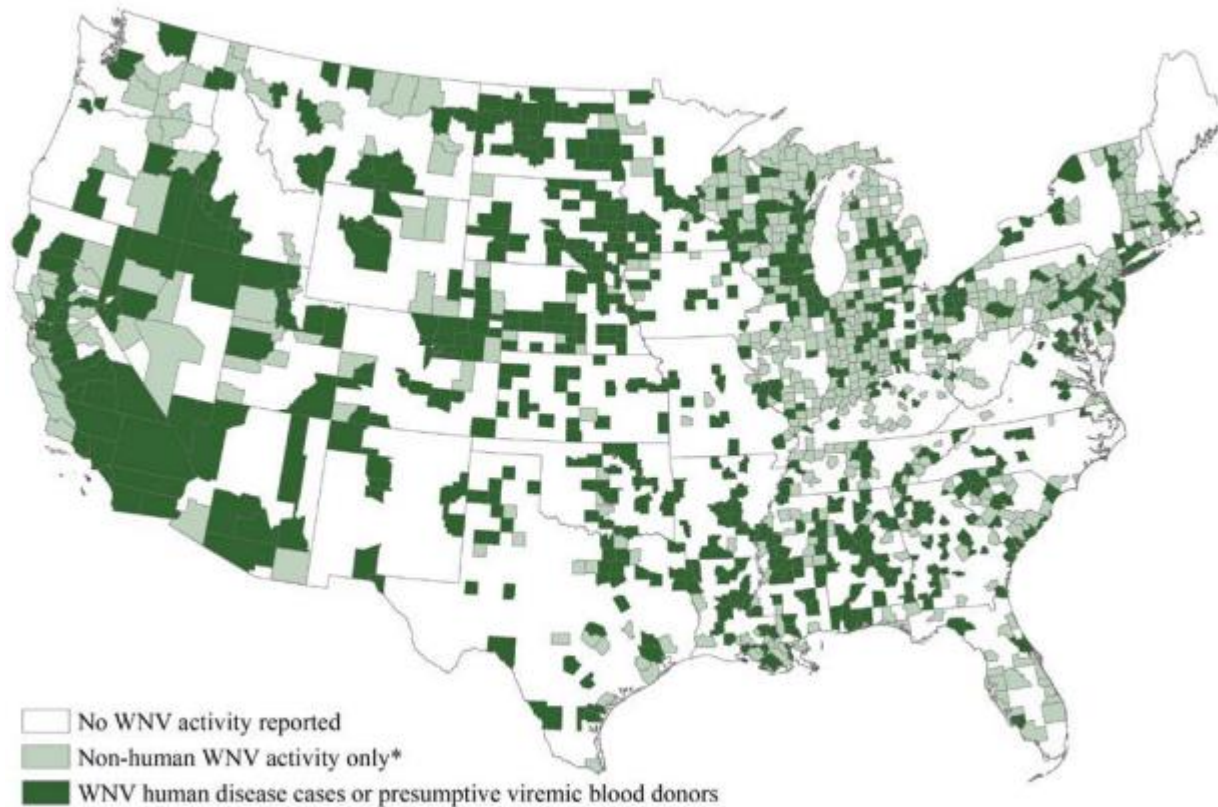
Surveillance for WNV activity involves several different components. Since the disease is zoonotic in nature, both human and animal surveillance occurs. In past years, WNV surveillance in Utah involved human, mosquito, wild bird, horse, and sentinel chicken populations. Due to the involvement of these different populations, surveillance efforts this season enlisted the expertise and abilities of many different agencies. Budget constraints again limited surveillance for the 2017 season. To maintain more critical surveillance, 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 healthcare 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.



2017 Season National Highlights

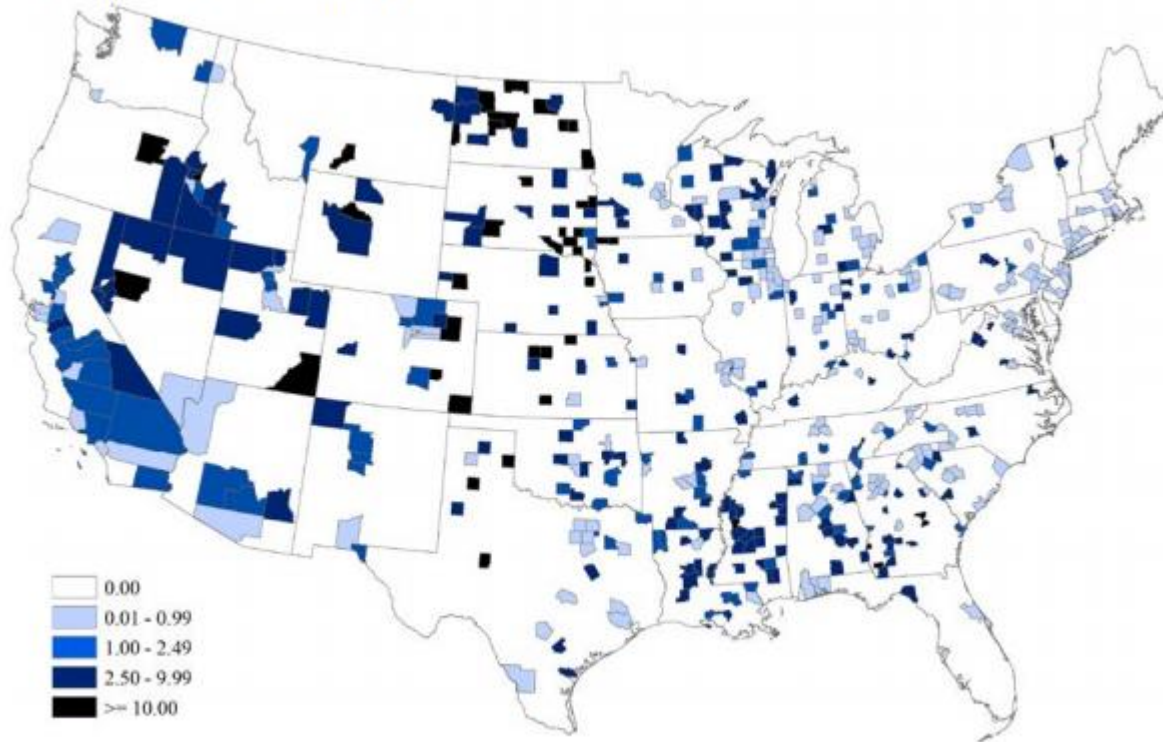
West Nile virus neuroinvasive disease incidence maps present data reported by state and local health departments to CDC's ArboNET surveillance system. Figure 1 shows the incidence of human West Nile virus cases per 100,000 population from light to dark, darker representing higher incidence. Figure 2 shows human neuroinvasive disease (i.e., meningitis, encephalitis, or acute flaccid paralysis) by state for 2017 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 (WNV) activity reported to ArboNET, by county — United States, 2017



*WNV human disease cases or presumptive viremic blood donors. Presumptive viremic blood donors have a positive screening test which has not necessarily been confirmed.

Figure 2. West Nile virus (WNV) neuroinvasive disease incidence* reported to ArboNET, by county — United States, 2017



*Incidence per 100,000 population

Neuroinvasive disease cases were reported to ArboNET from the following states for 2017: Alabama, Arizona, Arkansas, California, Colorado, Connecticut, District of Columbia, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

For 2017, of the 1,921 human cases reported to CDC, 1,279 (67%) were reported as West Nile meningitis or encephalitis (neuroinvasive disease) and 642 (34%) were reported as West Nile fever (milder disease), as opposed to 1,662 total human cases reported to CDC in 2016, with 877 (53%) reported as West Nile meningitis or encephalitis (neuroinvasive disease), and 785 (47%) reported as West Nile fever (milder disease). There were a total of 115 fatalities reported in 2017, compared with 84 fatalities reported in 2016.

2017 Season Utah Highlights

Activity during the 2017 WNV season in Utah was substantially higher in humans and horses than the previous nine seasons, as shown in Figure 3. During the 2017 WNV season, 62 infected persons were reported; approaching numbers reported during the 2007 WNV season with 70 infected persons reported. The vast majority of activity occurred along the Wasatch Front, with sporadic positive reports in other areas of the state. A total of 16 counties had activity detected during the 2017 season. During 2017, most positive RAMP tests for mosquitoes were confirmed by PCR at UPHL. Utah County Mosquito Abatement and Southwest Mosquito Abatement conducted independent RAMP and PCR testing.

Table 1. WNV activity, Utah 2017 (positive counts only)

Total West Nile Virus Positive Samples					
County of Residence	Human	Horse	Mosquito		Total
Beaver	-	1	-		1
Box Elder	4	4	19		27
Cache	4	3	7		14
Carbon	-	2	-		2
Daggett	-	-	-		-
Davis	8	1	111		120
Duchesne	4	5	5		14
Emery	-	-	-		-
Garfield	-	-	-		-
Grand	-	-	-		-
Iron	-	-	-		-
Juab	-	1	-		1
Kane	-	-	-		-
Millard	1	-	8		9
Morgan	-	1	-		1
Piute	-	-	-		-
Rich	-	-	-		-
Salt Lake	30	2	226		258
San Juan	1	-	-		1
Sanpete	-	-	-		-
Sevier	-	1	-		1
Summit	-	-	-		-
Tooele	-	3	-		3
Uintah	1	2	25		28
Utah	7	7	11		25
Wasatch	-	-	-		-
Washington	-	-	10		10
Wayne	-	-	-		-
Weber	2	2	21		25
Hill Air Force Base	-	-	-		-
State Total	62	35	443		540
Human Cases of WNV					
Age Group	Total	% Total	Fever	Death	Neuroinvasive
<18	3	5%	2	-	1
18-39	7	11%	5	-	2
40-64	28	45%	11	3	17
≥65	24	39%	6	3	18
State Total	62	100%	24	6	36

*UDOH did not conduct sentinel chicken surveillance in 2017. However, some counties still maintained sentinel chicken flocks.

Past Season Comparison

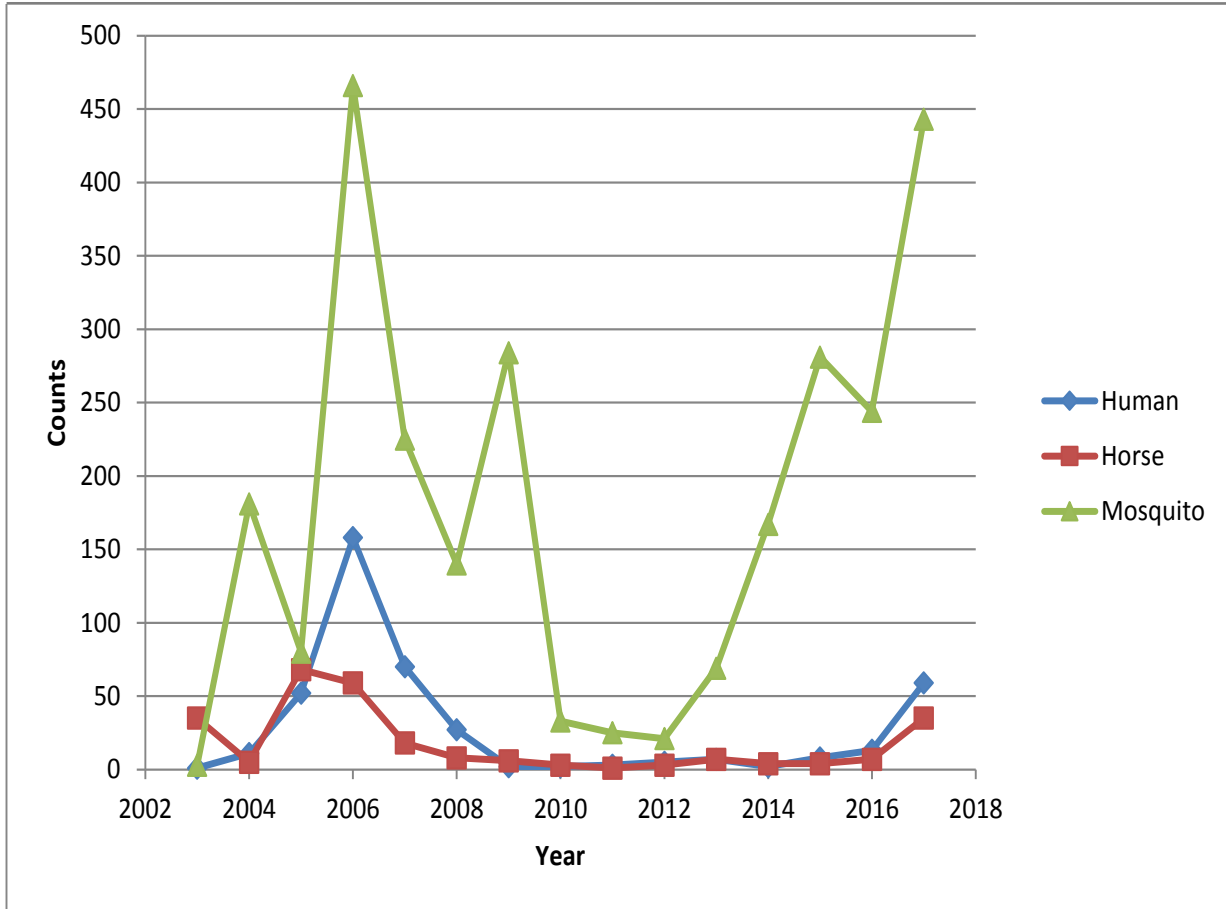
WNV activity was first established in Utah in 2003. Similar to many initial seasons in other states, activity was muted. One human case was reported for the 2003 season in Utah, in addition to one viremic donor who did not develop symptoms. Horse activity was the main indication of WNV presence in 2003. 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 of Salt Lake County and Utah County. With an increase in activity, there was also an increase in fatalities, with Utah experiencing five. The number of cases began to decline in 2007, as well as the number of fatalities. During that same year, the virus was moving into the more northern parts of the state, with the bulk of cases occurring in Cache and Box Elder counties. Activity during the 2008 WNV season decreased compared with 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, mosquito pools were counted only if 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. During the 2013 season, Washington County, in the southwest portion of the state, saw the majority of activity, both human and animal. During 2014, activity was centered mostly along the Wasatch Front. In 2015 and 2016, mosquito activity occurred mostly along the Wasatch Front, but there was some activity in Box Elder, Grand, and Weber Counties.

Table 2. WNV season comparison, Utah 2007-2017

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Human	70	27	2	2	3	5	7	2	8	13	62
Horse	18	8	6	3	1	3	7	4	4	7	35
Bird*	19	3	0	0	0	0	40	2	-	-	3
Chicken*	74	16	1	1	0	1	2	1	4	-	-
Mosquito Pools	225	140	284	31	23	21	69	167	281	244	443
Counties with Detection	19	14	12	5	6	8	9	9	8	8	17

*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.

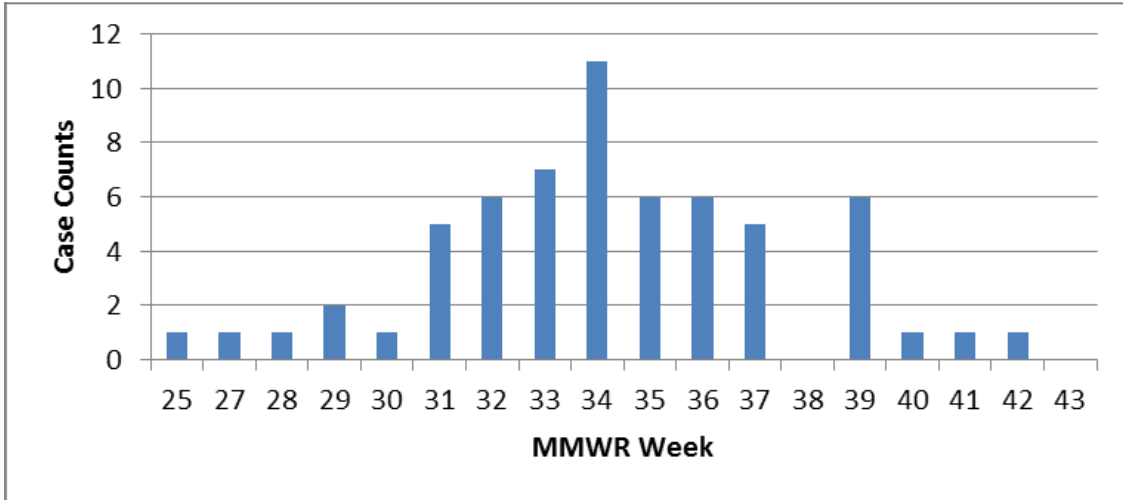
Figure 3. WNV positive cases, Utah, 2003-2017



2017 Utah Activity Timeline

The majority of surveillance measures began at the end of June in 2017. Mosquito activity was detected during the week of June 25, 2017, in mosquito pools confirmed by PCR from Uintah and Salt Lake 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 MMWR week 25 on June 28, 2017, as shown in Figure 4. All active surveillance for the 2017 season had ceased by the end of October. However, testing of suspect human and horse cases continues year-round.

Figure 4. WNV reported human cases by MMWR Week, Utah, 2017



Human Surveillance

Human surveillance relies primarily on reporting results indicative of acute infection from major laboratories. LHDs were immediately notified in these instances for the initiation of case investigations. Specimens were sent to CDC for confirmation on the first human cases of persons who died possibly due to WNV, and abnormal test results. This will be the method used to confirm human cases for future seasons as well. Major blood banks continued servicing Utah screened donations for the presence of WNV.

There were 14 individuals identified as infected with WNV through blood donation screening, eight of whom were ruled out given an absence of symptoms. The remaining six persons identified through blood donation screening exhibited symptoms consistent with WNV infection.

Table 3. WNV clinical comparison of human cases, United States vs. Utah, 2017

	Utah	United States
Case Number	62	1,832
Fatalities	5	111
Percent Fatalities	8.1%	6.06%
Percent Neuroinvasive Disease	61%	66%

Table 4. WNV clinical and demographic comparison of human cases, Utah 2007-2017

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Case Number	70	28	2	2	3	5	7	2	8	13	62
Fatalities	2	0	0	0	0	1	0	0	0	1	6
Percent Male	51%	79%	50%	100%	66%	60%	57%	100%	75%	54%	70%
Median Age (years)	50	41	NA*	NA*	NA*	70	61	NA*	55	60	61
Age Range (years)	3-89	4-79	NA*	NA*	NA*	22-87	20-85	NA*	18-90	18-90	14-86

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

Table 5. WNV human case clinical and demographic characteristics, compared to surrounding states, Utah, 2017

Utah in comparison to surrounding states, as reported to CDC ArboNet, 2017							
	Neuroinvasive disease cases		Non-neuroinvasive disease cases		Total cases	Deaths	
State	Case Count	Percent (%)	Case Count	Percent (%)	Case Count	Case Count	Percent (%)
Arizona	86	0.82	18	0.17	104	8	0.07
Colorado	28	0.42	38	0.57	66	4	0.06
Idaho	14	0.61	9	0.39	23	0	0
Montana	3	0.27	8	0.72	11	0	0
New Mexico	21	0.7	9	0.3	30	1	0.03
Utah	38	0.62	23	0.37	61	6	0.09
Wyoming	4	0.57	3	0.43	7	0	0

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 Listserv. UDAF also updated an interactive map showing positive equine cases across the states.

<https://www.arcgis.com/home/webmap/viewer.html?webmap=05d1052335224f0da04ba5d7d2738666&extent=-119.4205,35.2414,-102.0951,42.8078>

Wild Bird Surveillance

Due to budget constraints, routine wild bird surveillance was discontinued for the 2017 season. However, reports of a golden eagle from Kane County, and a pigeon and peafowl from Salt Lake County, were received.

Sentinel Chicken Surveillance

Due to budget constraints, routine sentinel chicken surveillance was discontinued for the 2017 season.

For questions on this report, please contact Dallin Peterson at 801-538-6191 or email:ddpeterson@utah.gov.