

Annual Report

West Nile Virus Surveillance and Mosquito Control

2006



**Environmental Health Division
Special Programs Section**

2006 West Nile Virus Surveillance and Mosquito Control: Executive Summary

In 2004, the Southern Nevada Health District (SNHD) implemented a West Nile virus (WNV) surveillance and public health education program, and subsequently found the virus in Clark County. Since its implementation, the WNV surveillance program has grown to include mosquito trapping and health education in Lincoln, Nye, and White Pine Counties.

The primary WNV surveillance tool used by SNHD in 2006 was mosquito trapping and testing. In 2006, SNHD set 871 Encephalitis Vector Surveillance (EVS) mosquito traps in Clark, Lincoln, Nye, and White Pine counties, submitting 25,793 mosquitoes to the Nevada State Department of Agriculture's Animal Disease Laboratory, Reno (ADL) for WNV analysis. In addition to WNV, mosquitoes were tested for St. Louis Encephalitis (SLE) and Western Equine Encephalitis (WEE).

Mosquitoes positive or suspect for WNV were collected from Clark and Nye counties and represented six different species: *Culex tarsalis*, *Culex quinquefasciatus*, *Anopheles franciscanus*, *Anopheles freeborni*, *Psorophora columbiae*, *Culiseta inornata* and *Culiseta incidens*. Additionally, WEE positive *Culiseta inornata* were collected in White Pine County. Although SNHD set 310 more EVS traps in 2006 than in 2005, the total number of WNV positive or suspect mosquitoes in 2006 was 275, a significant reduction from the 1,826 collected in 2005. In spite of the decrease in positive mosquitoes, WNV maintains a low level presence in the mosquito populations of Southern Nevada.

A second component of the WNV surveillance program was migratory bird sampling. Of the 159 bird samples submitted to the ADL in 2006, zero tested positive for WNV. One American Coot (*Fulica americana*) collected in Clark County tested positive for SLE. For comparison, in 2005, 179 birds were sampled with 6 testing positive and one suspect for WNV.

In 2006, the sentinel chicken flock surveillance component, used throughout 2004 and 2005, was dropped in favor of expanding the mosquito surveillance component.

Mosquito control, a critical function of WNV, SLE and WEE prevention, occurred in Clark County concurrent with mosquito surveillance activities. SNHD continued using the Mosquito Control Hotline (759-1220) and on-line complaint form to address citizen complaints regarding dead birds, areas of standing water, and other mosquito related concerns. In 2006, SNHD staff responded to 1049 hotline complaints requiring field response, including breeding source abatement and/or mosquito trapping and testing. Of these complaints, 885 responses were made to stagnant swimming pools on private residences. Additionally, known mosquito breeding sources were surveyed and chemically treated on a routine basis, and mosquito fish were trapped and placed in areas for mosquito control.

Health education and community outreach was ongoing throughout the year, with SNHD staff providing WNV prevention and mosquito control information at health fairs, schools, seminars, media interviews, and through routine field activities.

In 2006, three West Nile cases were reported as being from Clark County, although none were locally acquired.

West Nile Virus Surveillance and Mosquito Control: Overview

In 2004, the Southern Nevada Health District (SNHD) Environmental Health Division (EHD) developed and implemented a comprehensive mosquito borne disease (arbovirus) surveillance program. This program, developed in response to West Nile virus' introduction and spread across the United States, included testing of mosquitoes, sentinel chickens and migratory birds, as well as provided arbovirus prevention strategies to Southern Nevadans.

Samples were submitted to the Nevada Department of Agriculture, Animal Disease Laboratory, Reno (ADL), for West Nile virus (WNV), St. Louis Encephalitis (SLE), and Western Equine Encephalitis (WEE) analysis. In 2004, surveillance activities were focused in Clark County, with limited mosquito trapping in neighboring Nye County. Shortly after implementing the arbovirus surveillance program, SNHD identified WNV in mosquitoes in both Clark and Nye counties, as well as eight (8) WNV positive birds in Clark County.

Funding for arbovirus surveillance in 2004 was provided by a Center for Disease Control and Prevention (CDC) grant of \$35,350, administered through the Nevada State Health Division. This grant funding was divided between SNHD and Clark County Vector Control (CCVC), with SNHD responsible for WNV surveillance and CCVC responsible for mosquito control.

In 2005, CDC funding increased to \$45,902 and surveillance expanded to encompass Clark, Nye, Lincoln and White Pine counties. Due to the public health impact of WNV, CCVC's mosquito control responsibilities were transferred to SNHD along with funding specifically for mosquito breeding abatement activities. WNV positive mosquitoes were found in all four counties, along with six (6) WNV positive birds from Clark County.

In 2006, funding from the CDC for WNV surveillance increased to \$97,147. The added funding greatly strengthened the effectiveness, efficiency, and geographical reach of the WNV surveillance program. SNHD conducted routine mosquito surveillance in Clark, Nye, Lincoln and White Pine counties, finding WNV in Clark and Nye counties, and WEE in White Pine County.

Geographical Information System (GIS)

In 2006, SNHD fully implemented desktop GIS into tracking locations of mosquito traps, bird samples, and mosquito breeding abatement activities. Field staff, equipped with Global Positioning Systems (GPS), coordinated with the desktop GIS to develop an extensive WNV surveillance geodatabase, plan and record field activities, and provide aerial photographs of field environments.

Data recorded in the desktop GIS have been plotted onto maps and supplement the numeric tables throughout this report.

Mosquito Surveillance:

Mosquito trapping and testing remains the cornerstone of SNHD's arbovirus surveillance program. In comparison to migratory bird or sentinel chicken flock sampling, mosquito surveillance provides an up-to-date indicator of WNV vectors in an area. Mosquito sampling also provides information on the type of mosquitoes present, their estimated infection rate, and can be used as a trigger for control measures. In Clark County, the major mosquito breeding months are generally April through October, with the breeding season shorter in the higher elevations of Nye, Lincoln and White Pine counties. This breeding season is weather dependent and will vary slightly from year to year.

SNHD uses two primary traps for collecting mosquitoes; the Encephalitis Vector Surveillance (EVS) trap and the New Jersey light trap.

The New Jersey Light Trap is a stationary trap set year round at the same field location. A 25-watt bulb is used for attracting mosquitoes and the traps are checked weekly. The insects are collected and examined to determine general population characteristics; however, mosquitoes collected in these traps are not submitted to the ADL for disease analysis. SNHD set four New Jersey Light Traps in different locations around Clark County in 2006.

The portable EVS trap, designed to collect host seeking female mosquitoes using carbon dioxide as the primary attractant, was used extensively throughout Southern Nevada. The traps are set overnight in potential mosquito breeding areas such as washes, drainage ditches, rivers and pools of standing water, as well as in human and equine population centers. From the collection site, live mosquitoes are frozen on dry ice and transported to SNHD where they are sorted by species, gender, and pooled for submission (one pool consists of no more than 50 adult females of a single species from the same trap). Once identified, sorted and pooled the mosquitoes are placed into vials, packed in ice and shipped overnight to the ADL for analysis.

In 2006 the SNHD set 871 EVS traps in Clark, Nye, Lincoln, and White Pine counties, submitting 25,793 mosquitoes to the ADL for WNv, SLE, and WEE analysis. As shown in Figure 1, although SNHD set 310 more EVS traps in 2006 than in 2005, the total number of WNv positive or suspect mosquitoes in 2006 was 275 (.01%), a significant reduction from the 1,826 (.06%) collected in 2005. In spite of the decrease in positive mosquitoes, WNv maintains a low level presence in the mosquito populations of Southern Nevada. Map 1 shows the distribution of EVS traps set by SNHD in Clark, Nye, White Pine, and Lincoln Counties.

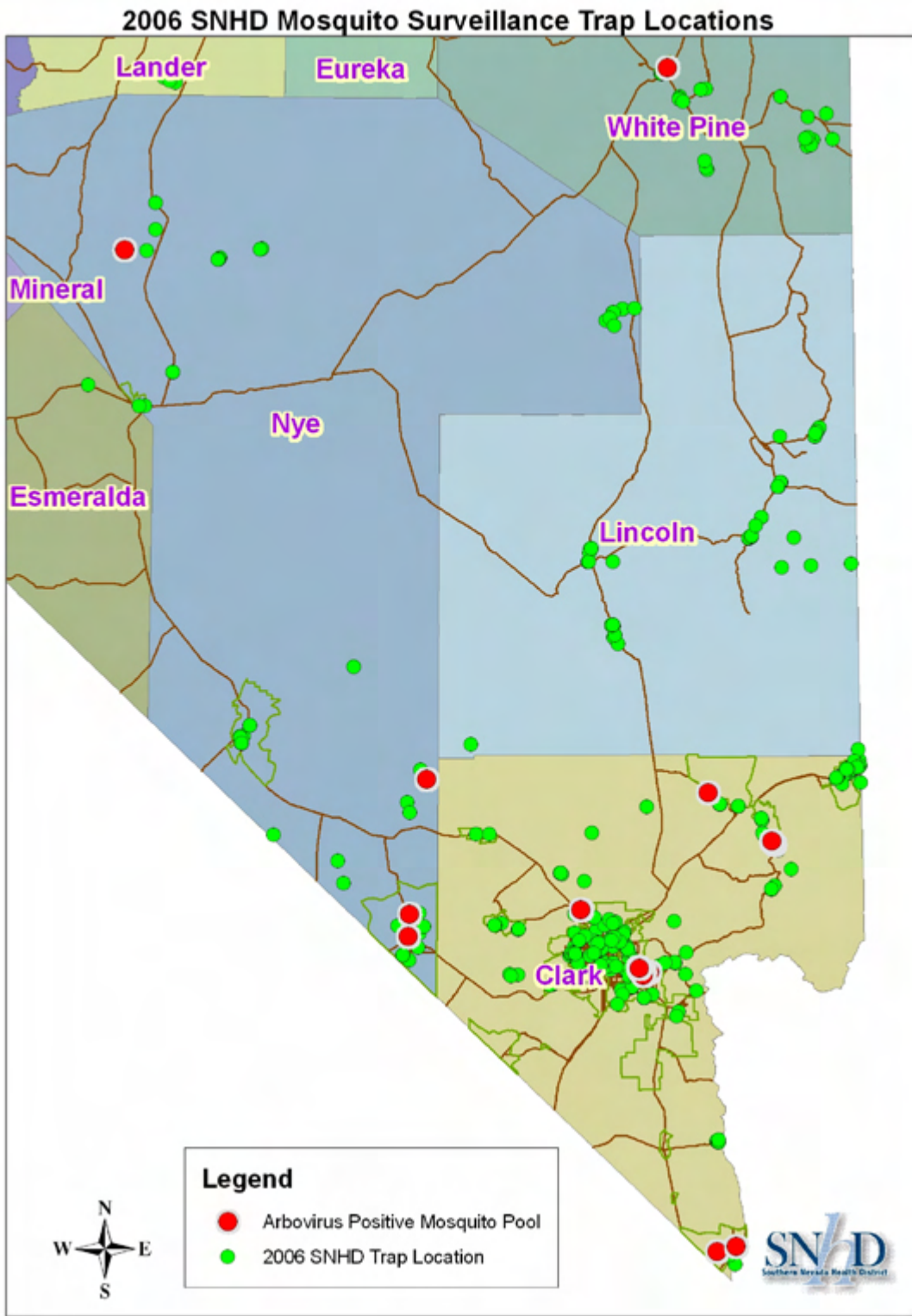
Figure 2 shows a comparison of mosquito submissions from Clark, Lincoln, Nye, and White Pine counties.

Figure 1: 2004 – 2006 EVS Sample Submission Comparison

	2004	2005	2006
EVS Traps Set	NA	561	871
Pools Submitted	154	1,256	1,162
Mosquitoes Tested	4,900	31,059	25,793
Arbovirus Positive Pools	25	59	23
Arbovirus Positive Mosquitoes	154	1,826	275

Figure 2: Mosquito Submissions by County

County	# EVS Traps	# Pools	# Mosquitoes	# Pos or Suspect Pools	# Pos or Suspect Mosquitoes
Clark	704	750	17,477	17	265 – WNv
Nye	49	105	1,511	5	5 – WNv
White Pine	49	105	1,925	1	5 – WEE
Lincoln	69	202	4,880	0	0
Total	871	1,162	25,793	23	275



Map 1: Southern Nevada Health District EVS Trapping Locations

The following sections describe trap locations, mosquito submission numbers, and results by county.

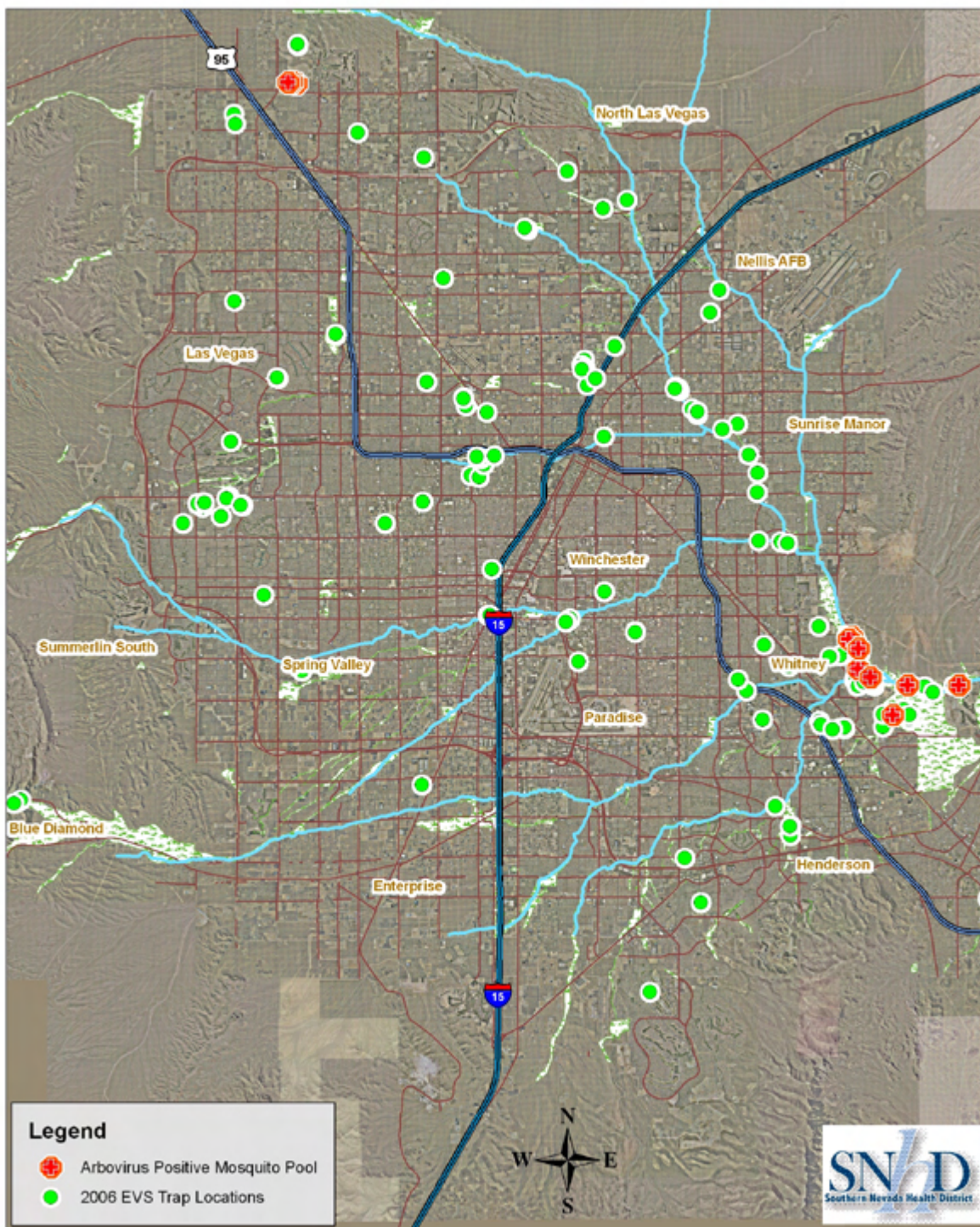
Clark County (Population 1,800,000):

In 2006, SNHD set 704 EVS traps in rural and urban Clark County. From the 704 EVS traps, 750 pools were submitted, totaling 17,477 mosquitoes. Of the 750 pools submitted, 17 were WNV positive, totaling 265 mosquitoes. Figure 3 details the type and number of mosquitoes tested from Clark County, including the WNV positive samples. Map 2 shows the spatial distribution of the Clark County EVS trap locations.

Figure 3: Clark County Mosquito Submissions

Mosquito Species	# of Mosquitoes	# of Pools	# Pos or Suspect Mosquitoes	# Pos or Suspect Pools
<i>Culex tarsalis</i>	9562	325	233	7
<i>Culex quinquefasciatus</i>	2632	121	8	4
<i>Culex erythrothorax</i>	2279	88	0	0
<i>Aedes vexans</i>	875	50	1	1
<i>Psorophora columbiae</i>	798	21	4	2
<i>Anopheles freeborni</i>	568	39	1	1
<i>Culiseta inornata</i>	455	46	0	0
<i>Anopheles franciscanus</i>	219	46	18	2
<i>Culex stigmatosoma</i>	46	8	0	0
<i>Psorophora signipennis</i>	37	3	0	0
<i>Culiseta incidens</i>	3	1	0	0
<i>Ochlerotatus dorsalis</i>	3	2	0	0
<i>Ochlerotatus flavescens</i>	0	0	0	0
<i>Ochlerotatus nigromaculis</i>	0	0	0	0
<i>Ochlerotatus spencerii idahoensis</i>	0	0	0	0
TOTAL	17,477	750	265	17

2006 SNHD West Nile Virus Surveillance Clark County



Map 2: Clark County EVS Trap Distribution

Nye County (Population 40,777):

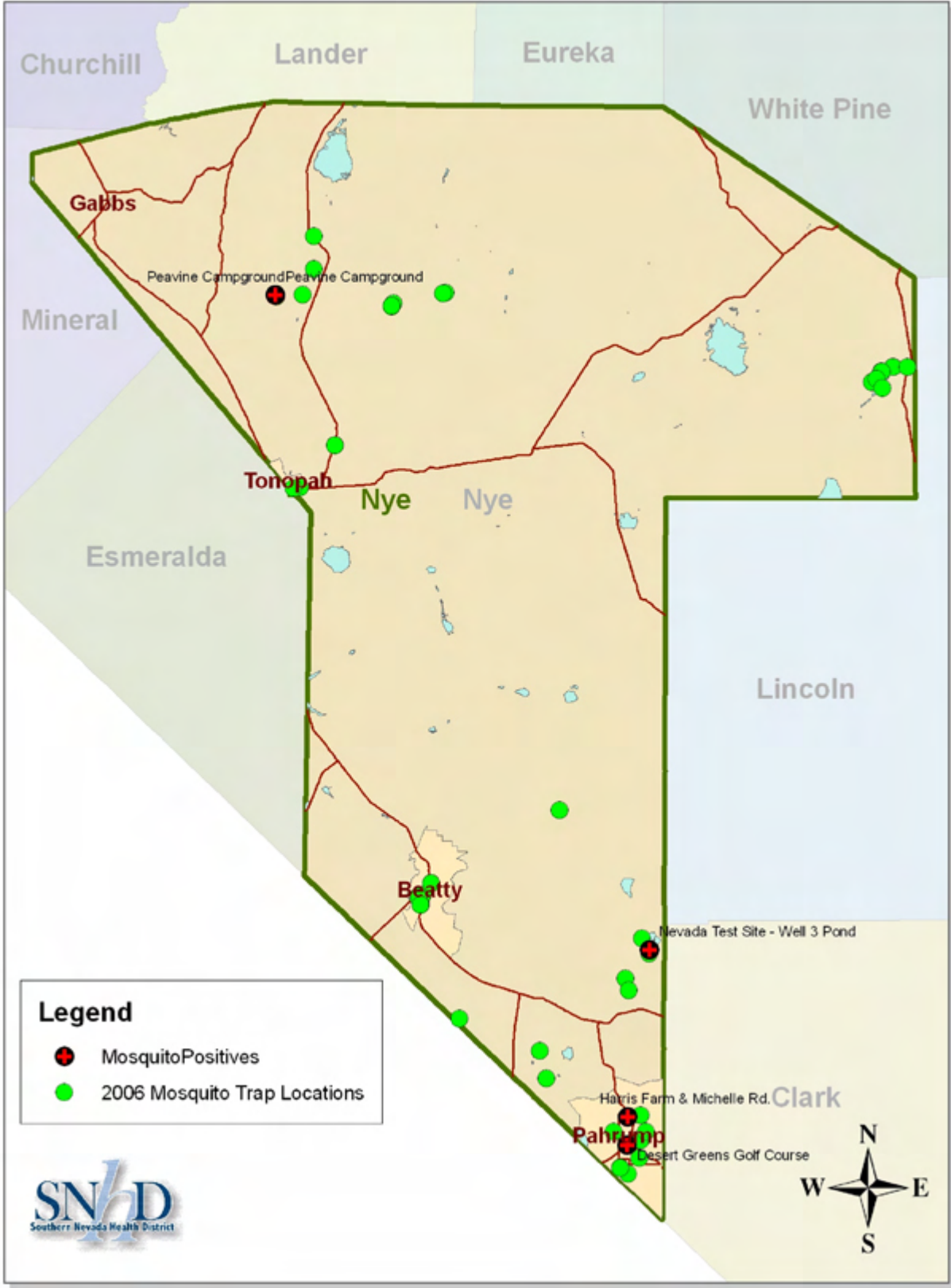
In response to the Pahrump WNV horse outbreak of 2005, Nye County Emergency Management developed and implemented a mosquito surveillance and control program. In 2006 SNHD provided Nye County with technical information on using EVS traps and guidance on applying mosquito control larvicides and adulticides. SNHD continued trapping mosquitoes in remote areas of Nye County including Beatty and Tonopah, while Pahrump was surveyed by Nye County staff. The mosquitoes collected by Nye County Emergency Management were submitted to SNHD for identification, pooling and shipment to the ADL.

In 2006, 49 EVS traps were set in Nye County, totaling 1,511 tested mosquitoes from 105 pools. Of the 105 pools submitted to the ADL, five were positive for WNV, totaling five mosquitoes. Figure 4 details the type and number of mosquitoes tested from Nye County, including the WNV positive samples. Map 3 shows the spatial distribution of the Nye County EVS trap locations.

Figure 4: Nye County Mosquito Submissions

Mosquito Species	# of Mosquitoes	# of Pools	# Pos or Suspect Mosquitoes	# Pos or Suspect Pools
<i>Culex erythrothorax</i>	975	31	0	0
<i>Culex tarsalis</i>	403	40	2	2
<i>Anopheles freeborni</i>	56	11	0	0
<i>Anopheles franciscanus</i>	45	8	0	0
<i>Culiseta inornata</i>	26	10	2	2
<i>Culiseta incidens</i>	5	4	1	1
<i>Ochlerotatus dorsalis</i>	1	1	0	0
<i>Aedes vexans</i>	0	0	0	0
<i>Culex quinquefasciatus</i>	0	0	0	0
<i>Culex stigmatosoma</i>	0	0	0	0
<i>Ochlerotatus flavescens</i>	0	0	0	0
<i>Ochlerotatus nigromaculis</i>	0	0	0	0
<i>Ochlerotatus spencerii idahoensis</i>	0	0	0	0
<i>Psorophora columbiae</i>	0	0	0	0
<i>Psorophora signipennis</i>	0	0	0	0
TOTAL	1,511	105	5	5

2006 SNHD Mosquito Surveillance Trap Locations Nye County



Map 3: Nye County EVS Trap Distribution

White Pine County (Population 9,100):

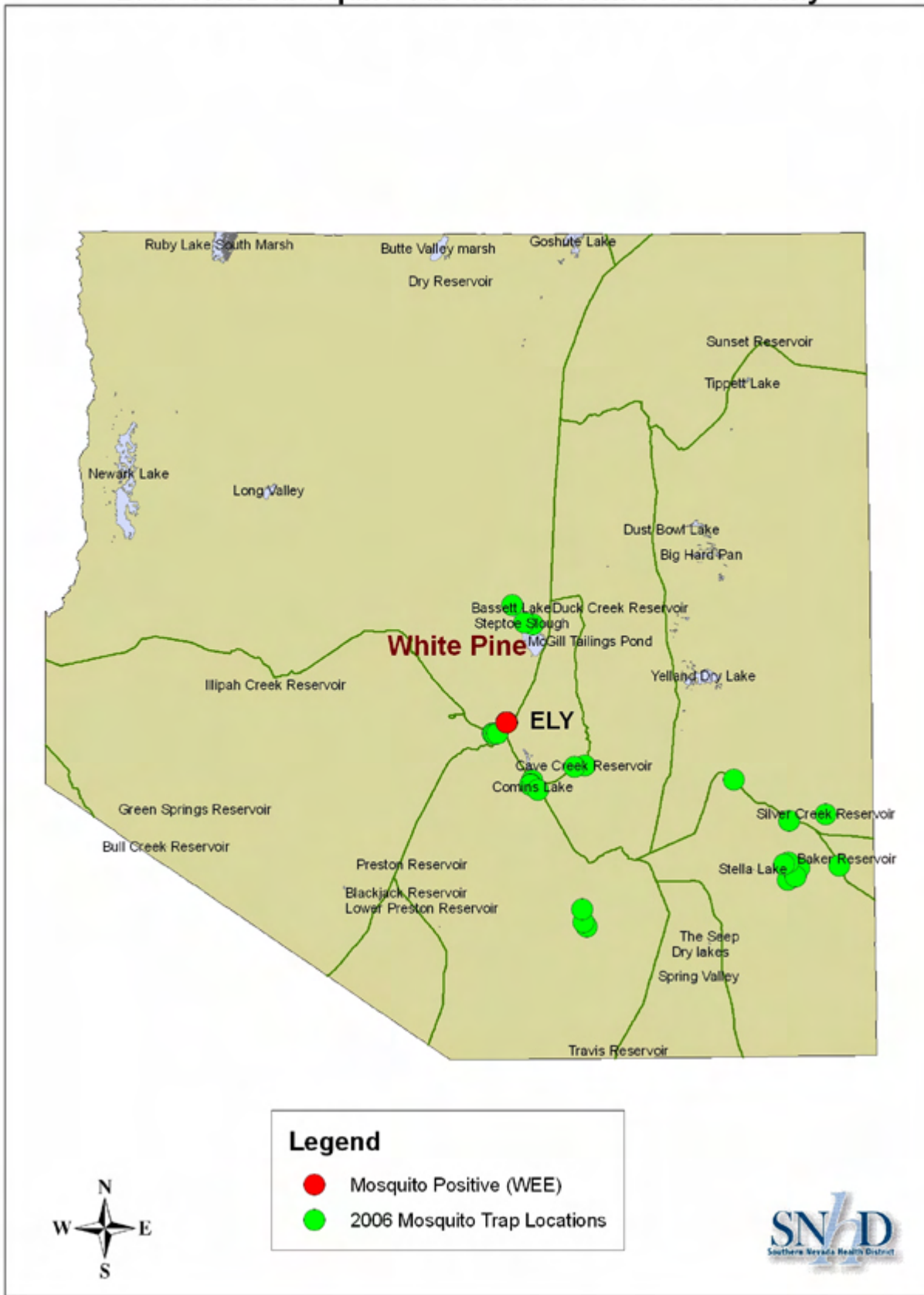
In 2006, SNHD set 49 EVS traps in White Pine County, totaling 1,925 tested mosquitoes from 105 pools. Of the 105 pools submitted to the ADL, one was positive for WEE, totaling five mosquitoes. None of the mosquitoes tested from White Pine County were positive for WNV. EVS traps were set in and immediately around Ely, with the remainder of the county being surveyed by the Nevada Department of Agriculture

Figure 5 details the type and number of mosquitoes tested from White Pine County, including the WEE positive samples. Map 4 shows the geographical distribution of the White Pine County EVS trap locations.

Figure 5: White Pine County Mosquito Submissions

Mosquito Species	# Mosquitoes	# of Pools	# Pos or Suspect Mosquitoes	# Pos or Suspect Pools
<i>Culex erythrothorax</i>	889	23	0	0
<i>Culex tarsalis</i>	659	31	0	0
<i>Culiseta inornata</i>	168	27	5	1
<i>Ochlerotatus flavescens</i>	96	4	0	0
<i>Ochlerotatus spencerii idahoensis</i>	56	6	0	0
<i>Anopheles freeborni</i>	35	9	0	0
<i>Ochlerotatus dorsalis</i>	10	3	0	0
<i>Ochlerotatus nigromaculis</i>	2	2	0	0
<i>Aedes vexans</i>	0	0	0	0
<i>Anopheles franciscanus</i>	0	0	0	0
<i>Culiseta incidens</i>	0	0	0	0
<i>Culex quinquefasciatus</i>	0	0	0	0
<i>Culex stigmatosoma</i>	0	0	0	0
<i>Psorophora columbiae</i>	0	0	0	0
<i>Psorophora signipennis</i>	0	0	0	0
TOTAL	1,915	105	5	1

2006 SNHD Mosquito Surveillance White Pine County



Map 4: White Pine County EVS Trap Distribution

Lincoln County (Population 4,200):

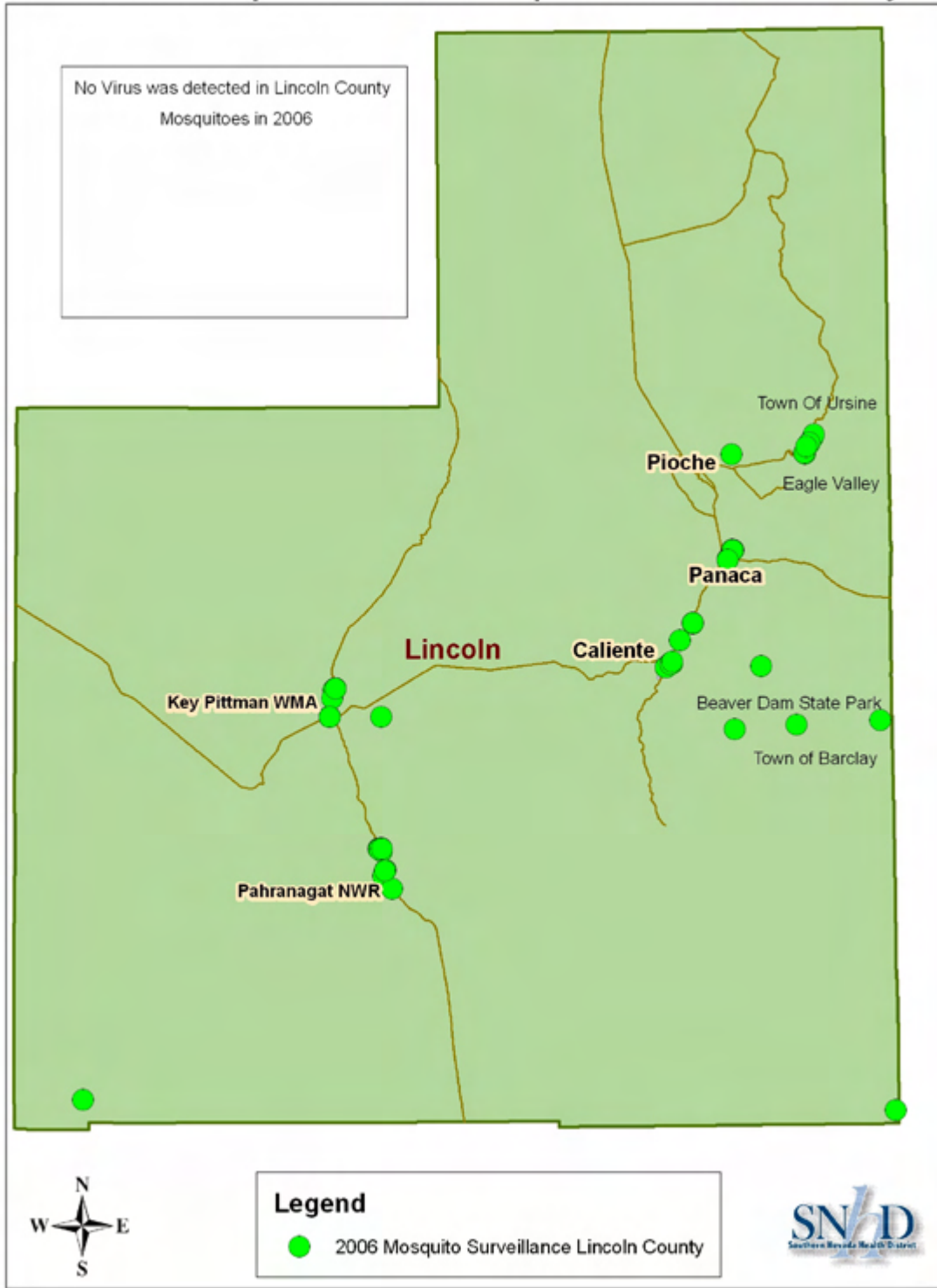
In 2006, SNHD set 69 EVS traps, collecting 4,880 mosquitoes from 202 pools. None of the mosquitoes tested from Lincoln County were positive for WNV, WEE or SLE.

Figure 6 details the type and number of mosquitoes tested from Lincoln County and Map 5 shows the spatial distribution of the EVS trap locations.

Figure 6: Lincoln County Mosquito Submissions

Mosquito Species	# Mosquitoes	# of Pools	# Pos or Suspect Mosquitoes	# Pos or Suspect Pools
<i>Culex erythrothorax</i>	2711	77	0	0
<i>Culex tarsalis</i>	1684	57	0	0
<i>Culiseta inornata</i>	149	22	0	0
<i>Anopheles freeborni</i>	113	17	0	0
<i>Ochlerotatus dorsalis</i>	104	10	0	0
<i>Anopheles franciscanus</i>	49	8	0	0
<i>Culiseta incidens</i>	1	1	0	0
<i>Aedes vexans</i>	69	10	0	0
<i>Culex quinquefasciatus</i>	0	0	0	0
<i>Culex stigmatosoma</i>	0	0	0	0
<i>Ochlerotatus flavescens</i>	0	0	0	0
<i>Ochlerotatus nigromaculis</i>	0	0	0	0
<i>Ochlerotatus spencerii idahoensis</i>	0	0	0	0
<i>Psorophora columbiae</i>	0	0	0	0
<i>Psorophora signipennis</i>	0	0	0	0
TOTAL	4,880	202	0	0

2006 SNHD Mosquito Surveillance Trap Locations Lincoln County



Map 5: Lincoln County EVS Trap Distribution

Bird Surveillance

In 2006, SNHD continued sampling and testing birds for WNv. Oral swab specimens were collected from birds by the USDA Wildlife Services, animal hospitals, bird rehabilitation centers and SNHD staff. In total, 159 birds were submitted to the ADL, with one (1) American Coot (*Fulica americana*) positive for SLE. All of the bird samples were from Clark County. Figure 7 details the type and number of birds tested for WNv, SLE and WEE and Figure 8 is a comparison of bird submissions from 2004 through 2006. Map 6 shows the spatial distribution of the sampled birds in Clark County.

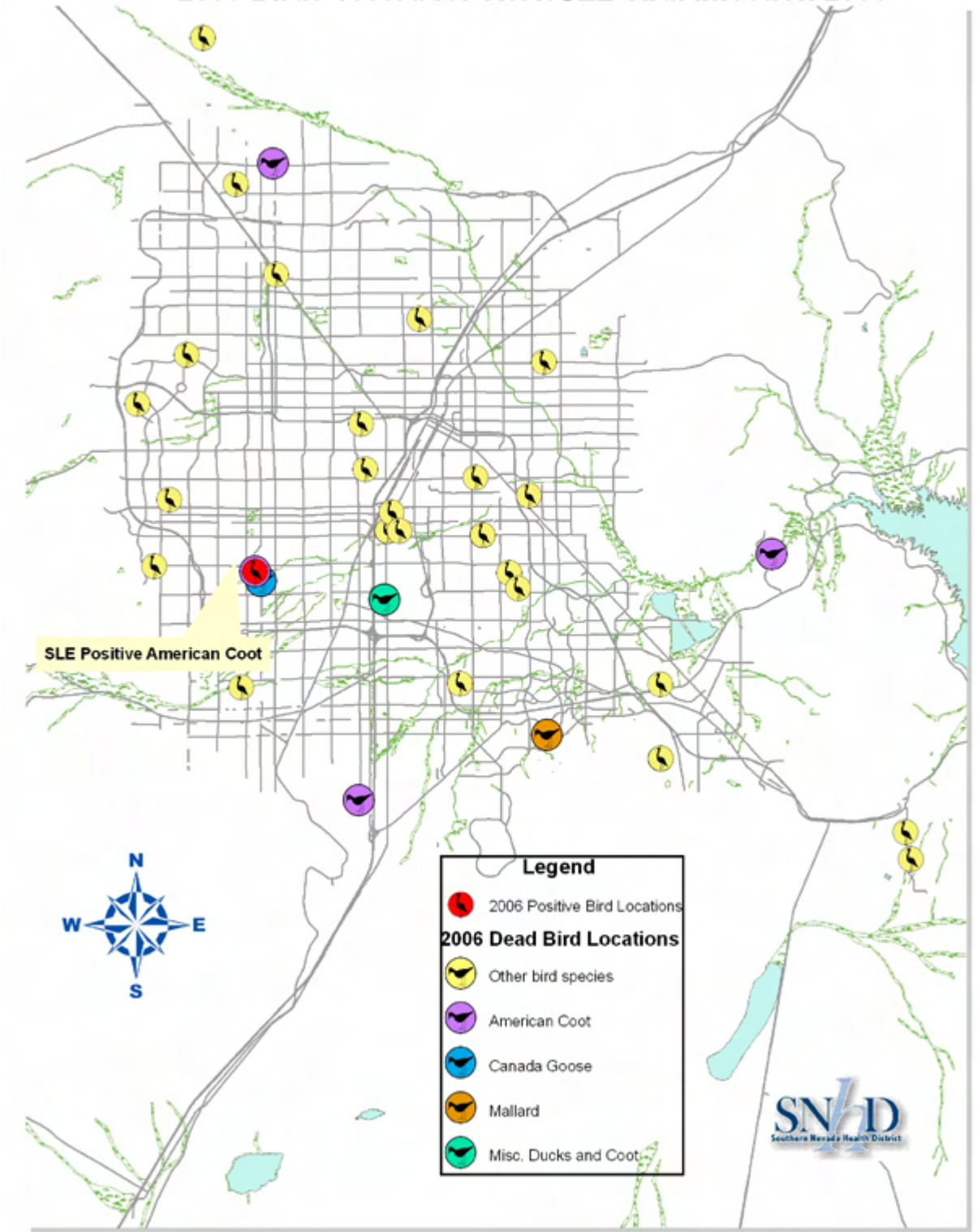
Figure 7: Bird Sample Species Distribution

Common Name	Scientific Name	# of Samples	# Arbovirus Positive
American Coot	<i>Fulica americana</i>	93	1 - SLE
Mallard	<i>Anas platyrhynchos</i>	22	0
Canada Goose	<i>Branta canadensis</i>	8	0
American Kestrel	<i>Falco sparverius</i>	3	0
Raven	<i>Corvus corax</i>	3	0
Ring-Necked Duck	<i>Aythya collaris</i>	3	0
Cowbird	<i>Molothrus ater</i>	2	0
Finch	<i>Carpodacus mexicanus</i>	2	0
Redhead Duck	<i>Aythya americana</i>	2	0
Red-Tailed Hawk	<i>Buteo jamaicensis</i>	2	0
American Avocet	<i>Recurvirostra americana</i>	2	0
American Crow	<i>Corvus brachyrhynchos</i>	1	0
B. Wing Hawk	NA	1	0
Cinnamon Teal	<i>Anas cyanoptera</i>	1	0
Duck	NA	1	0
Gambel's Quail	<i>Callipepla gambelii</i>	1	0
Great Blue Heron	<i>Ardea herodias</i>	1	0
Great-Tailed Grackle	<i>Quiscalus mexicanus</i>	1	0
Merlin	<i>Falco columbarius</i>	1	0
Mocking Bird	NA	1	0
Peregrine Falcon	<i>Falco peregrinus</i>	1	0
Pied-billed grebe	<i>Podilymbus podiceps</i>	1	0
Poorwill	<i>Phalaenoptilus nuttallii</i>	1	0
Red Naped Sapsucker	<i>Sphyrapicus nuchalis</i>	1	0
Rhode Island Red Chicken	<i>Gallus domesticus</i>	1	0
Ruddy Duck	<i>Oxyura jamaicensis</i>	1	0
Sharp Shinned Hawk	<i>Accipiter striatus</i>	1	0
Western Grebe	<i>Aechmophorus occidentalis</i>	1	0
TOTAL		159	1

Figure 8: 2004 – 2006 Bird Sample Submission Comparison

	2004	2005	2006
Birds Tested	155	179	159
Arbovirus Positive Birds	8	6	1

2006 Birds Tested for WNV/SLE Viral Infection 2006



Map 6: Bird Sample Distribution in Clark County

Sentinel Chicken Flocks

The sentinel chicken flock surveillance component, used throughout 2004 and 2005, was discontinued in 2006 in favor of expanding the mosquito surveillance component.

Mosquito Control

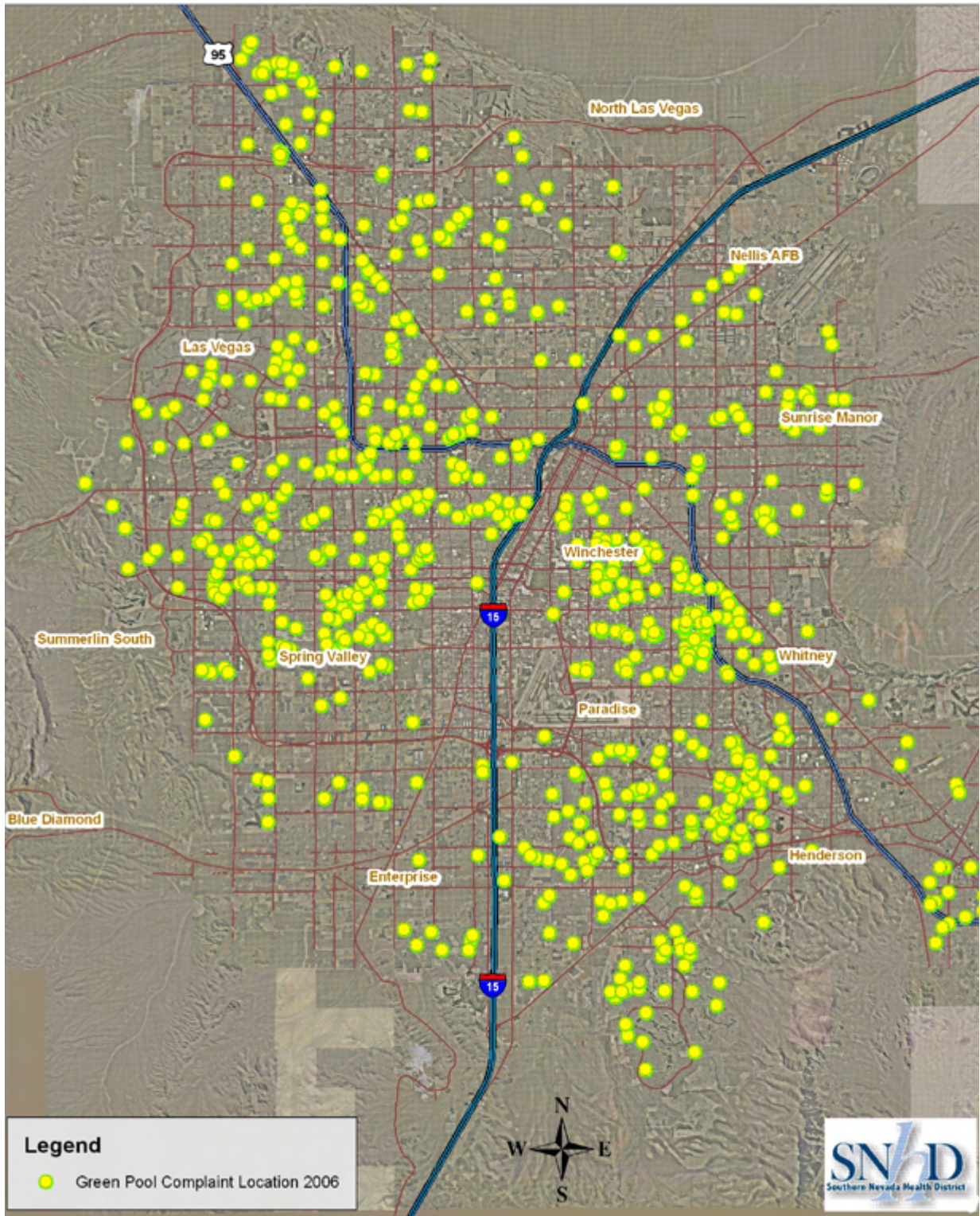
The principal goal of SNHD's mosquito control program is to eliminate or reduce mosquito breeding sources. Integrated pest management principles are used to abate mosquito breeding sources, with environmental engineering to eliminate the source being the first course of action, followed by placing mosquito fish in the breeding habitat. If neither of these options are feasible or effective, SNHD will treat the mosquito breeding areas with insecticides. The insecticides SNHD uses to control mosquitoes are registered by the EPA and are carefully chosen for larviciding and adulticiding applications. Mosquito adulticiding is not a routine activity and is conducted to control biting mosquitoes in areas where larviciding is impractical to control the population.

Seventeen species of mosquitoes live in Clark County, of which ten are known to be arbovirus vectors. In Clark County the peak mosquito breeding season is March through October, but with moderate winter temperatures, several of these mosquito species can breed year round.

In 2005, a mosquito control hotline (759-1220) and on-line complaint form were established by SNHD to address citizen complaints regarding mosquito breeding and WNV concerns. In 2006, SNHD responded to 1,049 citizen complaints requiring field response, including breeding source abatement and/or mosquito trapping and testing. Of the 1,049 complaints, 885 responses were to stagnant swimming pools, with the remaining responses to vacant lots, storm drains, washes and other areas of standing water. Many of these responses required multiple site visits to verify the mosquito breeding source had been eliminated. Map 7 shows the spatial distribution of the field responses.

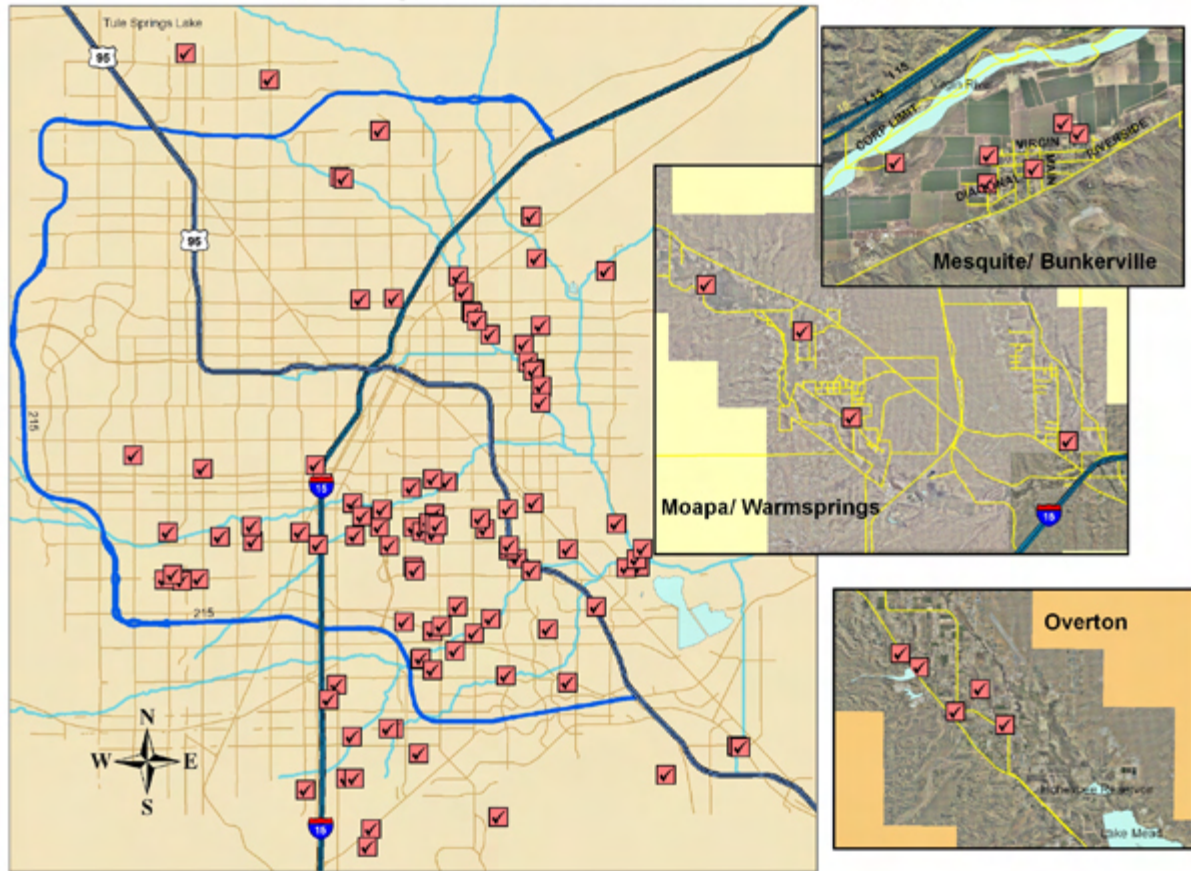
In addition to responding to hotline complaints, SNHD routinely inspected and treated 111 known mosquito breeding sources between March and October. These areas include flood channels, roadside ditches, catch basins, pastures, irrigated fields, wastewater treatment ponds, and wetland ponds. Local public agencies and private property owners were contacted to maintain drainage in channels and ditches, remove or thin vegetation in wetland and wastewater ponds, remove debris from street gutters and drains, as well as improve field irrigation methods for agriculture use. Map 8 shows the spatial distribution of the mosquito breeding sources routinely checked and treated throughout 2006.

2006 SNHD Green Pool Complaint Locations



Map 7: Mosquito Control Hotline Generated Field Responses

Routine Mosquito Control Treatment Areas 2006



Map 8: Routine Mosquito Control Treatment Areas in Clark County

Educational Outreach:

An integral component of the arbovirus surveillance and control program is SNHD's involvement with public health education outreach. Outreach was accomplished throughout the year, using formal and informal methods including media interviews, community group presentations, health fair booths, school presentations and citizen contact through field activities. A timeline of WNV surveillance and mosquito control educational outreach is listed in Appendix A.

Epidemiology Surveillance Methodology

West Nile encephalitis is a reportable condition per Nevada Administrative Code (NAC) Chapter 441A.520. West Nile fever was made temporarily reportable by a technical bulletin issued by the Nevada State Health Division on September 23, 2003. The temporary West Nile requirement expired on September 23, 2006, and was not renewed by the State Health Officer.

Although the reporting requirement lapsed, it was not thought to change the reporting procedures of local laboratories for several reasons. First, laboratories do not have information about the symptoms of patient, and would not be able to distinguish encephalitis cases from fever cases; therefore, all positive West Nile results are reported to the health authority. Second, it is thought that laboratories were unaware that the reporting requirement had lapsed. Finally, the majority of West Nile cases reported in Southern Nevada in previous seasons have been reported in the month of August; the reporting requirement was still in effect in August of 2006.

In order to ensure the prompt and complete reporting of West Nile cases in the future, West Nile infection was made reportable in Clark County on January 4, 2007 by order of the Chief Health Officer.

Cases

In 2006, three West Nile cases were reported as being from Clark County, although none were locally acquired. In the United States, a case is reported by the person's home jurisdiction, despite being acquired or diagnosed elsewhere. Two of the cases were acquired in and diagnosed out of state; one case was acquired and diagnosed in Utah, and the second case was acquired and diagnosed in Illinois. Both cases had spent a significant amount of time out of state prior to the onset of their illness, and had spent no time in Nevada during their incubation period. The third case was acquired and diagnosed in Northern Nevada, and had not been in Clark County in the ten days prior to the onset of illness. The case also reported being bitten by mosquitoes after arrival in Northern Nevada, approximately a week before the onset of symptoms.

Public Information Activities

The Southern Nevada Health District implemented a variety of risk communication and informational strategies in order to educate the public about illnesses related to West Nile virus and prevention measures. These strategies were implemented using a multi-media approach consisting of print and broadcast news stories, paid advertisements, brochures, a special section of the health district website and a feature on HD-tv, the health district sponsored television show. A timeline of WNV surveillance and mosquito control media releases is listed in Appendix B.

HD-tv

The third episode of Health District Television (HD-tv) aired for six weeks beginning in July 2006. The theme of the episode was summer safety and featured a West Nile Virus story detailing the health district's surveillance activities and offering prevention information for the public. Clips of the episode are currently available on the health district website.

Collateral Materials

The health district developed a "Fight the Bite" logo with art developed by a commercial graphic artist. The logo is used on all West Nile virus collateral including its website.

A West Nile virus brochure for the general public entitled, "What You Need to Know about West Nile Virus/Lo Que Usted Necesita Saber Sobre el Virus del Nilo," was developed and copies are available in English and Spanish. Additionally, a brochure with general information on mosquito control was developed in conjunction with vector control staff.

Website

A West Nile virus section of the health district website was expanded to include the following topic areas: overview information; prevention; insect repellent; symptoms and treatment; FAQs; resources; and mosquito control. The section also includes access to a mosquito complaint form and lists the West Nile virus hotline.

Paid Advertisements

The health district ran print advertisements at the beginning of the 2006 West Nile virus season. The ads were placed in the *Las Vegas Review-Journal* and the *Las Vegas Sun* on April 23, April 26, April 30, and May 23. An additional ad was placed in a special "Backyard Living" section of the *Las Vegas Review-Journal* on April 1, 2006.

Conclusion:

The 2006 WNV surveillance and mosquito control season was very productive for SNHD. Mosquito surveillance in Clark, Lincoln, Nye, and White Pine counties extended in geographical range as well as number of EVS traps set, with over 25,000 mosquitoes tested for WNV, SLE and WEE. Although the number of arbovirus positive mosquitoes was low at .01%, WNV does maintain a background level in mosquito species of southern Nevada.

Mosquito breeding source abatement involved responding to over 1,000 citizen generated complaints regarding backyard breeding sources, such as abandoned swimming pools, and other sources of standing water. Additionally, known mosquito breeding sources around Clark County were treated to minimize mosquito growth. Environmental engineering and mosquito control treatments of these breeding areas were critical in reducing the number of potential WNV vectors, greatly impacting the health of residents and visitors of Clark County.

In 2007, SNHD will continue to abate mosquito breeding sites and set EVS traps in Clark County, as well as continue to develop desktop GIS applications for these activities. The extent to which mosquito surveillance is conducted in Nye, Lincoln, and White Pine counties is dependent upon funding by the CDC. Regardless of funding, however, SNHD will continue to provide mosquito control technical expertise and arbovirus prevention education as needed to the communities of Southern Nevada.

Appendix A

A timeline of WNV surveillance and mosquito control educational outreach and staff training:

January

- University of Nevada Pesticide Applicator Certification School, Las Vegas
- West Nile Virus Working Group, Reno
- Kiwanis Club, Mosquito Control Presentation, Las Vegas.

April:

- WNV article for Southern Nevada Water Authority, Las Vegas Wash Coordination Committee newsletter.
- Career Day Mosquito Control Presentations, various elementary schools, Las Vegas.

May

- North Las Vegas Rotary Club, Las Vegas
- Nevada Cancer Institute Health Fair, Tonopah
- Nye County Emergency Management, Pahrump

June

- KVBC News 3 interview, Las Vegas

July

- Las Vegas Review Journal interview, Las Vegas
- Desert Valley Times interview, Mesquite
- Health District TV (HDTV) interview, Las Vegas

August

- Las Vegas Review Journal interview, Las Vegas

September

- KVBC News 3 interview, Las Vegas
- Henderson Home News interview, Henderson
- Elementary School presentation on Mosquito Control, Las Vegas.
- Multi Agency Task Team (MATT), Mosquito Control presentation, Las Vegas.

November

- Moapa Indian Health Fair, Moapa Valley
- Pesticide Applicator's Field Day, Las Vegas

In addition to providing WNV education to the community, SNHD staff attended educational seminars, including:

February

- Centers for Disease Control, 2006 West Nile Virus Conference, San Francisco, CA.
- 'Mosquitoes of Southern Nevada' identification training, Las Vegas.

March

- Mosquito larvicide and adulticide update seminar with Wellmark, Las Vegas.
- Mosquito control training with Washoe County Vector Control , Reno, NV.

April

- Nevada GIS Conference, Las Vegas.
- GIS training with Washoe County, Reno, NV.

June

- ESRI Arc GIS I and II training seminar, Henderson.

August

- International and Southwest Conference on Disease in Nature Communicable to Man, San Antonio, TX.

October

- 59th Annual Utah Mosquito Abatement Association Conference, St. George, UT.
- National ESRI Health Users GIS Conference, Denver, CO.

December

- Southern Nevada GIS Users Group workshop, Las Vegas.

Appendix B

A timeline of WNV surveillance and mosquito control media releases:

New Releases

- “Safety tips for healthy and happy holiday weekend,” June 30, 2006
- “SNHD reports Clark County’s first human West Nile Virus case for 2006,” August 18, 2006
- “SNHD surveillance detects West Nile Virus in mosquitoes in Clark County,” August 29, 2006
- “SNHD surveillance detects West Nile Virus in 12 mosquitoes in Clark County, September 7, 2006
- “SNHD surveillance detects West Nile Virus in 3 mosquitoes in Clark County,” September 8, 2006
- “SNHD reports Clark County’s third human West Nile Virus case for 2006,” September 14, 2006

Print Media Coverage

Monday, May 8, 2006:

“Pools Harboring West Nile Risk,” *Las Vegas Review-Journal*

Tuesday, August 1, 2006:

“West Nile Virus claims senator,” *Las Vegas Review-Journal*

Saturday, August 19, 2006:

“Virus makes mark in county,” *Las Vegas Review-Journal*

Thursday, August 31, 2006:

“Positive tests spur West Nile caution,” *Las Vegas Review-Journal*

Saturday, September 2, 2006:

“Don’t fear West Nile,” *Las Vegas Review-Journal*

Tuesday, September 5, 2006:

“West Nile virus cases soar to 84,” *Elko Daily Free Press*

Friday, September 8, 2006:

“West Nile virus strikes second Southern Nevadan,” *Las Vegas Review-Journal*

Friday, September 15, 2006:

“County last in urban areas for toddler vaccinations,” *Las Vegas Sun*

“Third person this year gets West Nile Virus,” *Las Vegas Review-Journal*

Channel 5 KVVU Saturday, September 16, 2006:

3rd human case of West Nile Virus confirmed in CC, 10pm v/o.

Thursday, September 21, 2006:

“Mosquitoes test positive for West Nile,” *Las Vegas Review-Journal*

Saturday, September 23, 2006:

“West Nile takes life in Nevada,” *Las Vegas Review-Journal*

Sunday, September 24, 2006:

“West Nile virus claims life in state,” The Week in Review, *Las Vegas Review-Journal*

Broadcast Media Coverage

LV1 Friday, March 24:

The Southern Nevada Health District plans vigilant response to West Nile Virus, 9 pm report.

Channel 3 KVBC Monday, May 8, 2006:

Health District cautioning that West Nile Virus season is upon us, 4 pm report.

Channel 8 KLAS Tuesday, May 23, 2006:

As West Nile Season begins, the Southern Nevada Health District is cracking down on unmaintained swimming pools where mosquitoes can breed – 4:30pm live report with Phil Bondurant & Glenn Savage comment; 6pm live report.

Channel 3 KVBC Friday, July 21, 2006:

2 people under the age of 50 have confirmed cases of West Nile Virus in Humboldt County, 5pm v/o.

Channel 8 KLAS Friday, July 21, 2006:

2 cases of human West Nile Virus have been confirmed in Humboldt County, 5pm v/o; 6pm v/o – warning against permitting areas of standing water on your property.

Channel 5 KVVU Friday, July 21, 2006:

2 confirmed human cases of West Nile Virus reported in Humboldt County, 10pm v/o.

Channel 8 KLAS Wednesday, July 26, 2006:

Third human case of West Nile Virus in Nevada has been reported in Carson City, 6pm v/o.

Channel 3 KVBC Friday, July 28, 2006:

The bugs are out in force this summer in the valley, 4pm report – tagged with precautions for West Nile Virus prevention; 6pm report on preventing West Nile.

Channel 3 KVBC Thursday, June 29, 2006:

4pm feature report on West Nile Virus prevention by the Southern Nevada Health District; 6pm report.

Channel 3 KVBC Saturday, July 29, 2006:

Mosquito in Clark County has tested positive for West Nile Virus, v/o.

Channel 3 KVBC Tuesday, August 1, 2006:

State Sen. Mark Amodei has contracted West Nile Virus, probably while attending a meeting in South Carolina, v/o.

Channel 8 KLAS Tuesday, August 1, 2006:

CDC experiment concludes the likelihood of the H5N1 Virus mutating to become a lethal pandemic is less than originally feared, report.

Channel 13 KTNV Tuesday, August 1, 2006:

Nevada senator Mark Amodei is back at work after being treated for the West Nile Virus he may have caught in South Carolina v/o's.

Channel 3 KVBC Thursday, August 3, 2006:

Update on the West Nile Season by state – NV reporting 3 human cases so far, v/o.

3 on WB Saturday, August 5, 2006:

18 cases of West Nile Virus in humans reported in NV this year, v/o.

Channel 5 KVVU Sunday, August 6, 2006:

18 human cases of West Nile Virus have been reported in NV, v/o.

Channel 8 KLAS Sunday, August 6, 2006:

18 reported human cases of West Nile Virus in Nevada, v/o's.

Channel 3 KVBC Friday, August 18, 2006:

Southern Nevada Health District is reporting its first human case of West Nile Virus – disease was contracted, however, during a visit to northern NV, 6pm v/o.

Channel 13 KTNV Friday, August 18, 2006:

Southern Nevada Health District is reporting its first human case of West Nile Virus – disease was contracted, however, during a visit to northern NV, 4:30pm v/o.

Channel 5 KVVU Friday, August 18, 2006:

Southern Nevada Health District is reporting its first human case of West Nile Virus – disease was contracted, however, during a visit to northern NV, 10pm v/o.

Channel 3 KTNV Wednesday, August 30, 2006:

Mosquitoes testing positive for West Nile Virus have been found in Laughlin and Overton, 6:30pm v/o.

Channel 15 Wednesday, August 30, 2006:

Mosquitoes testing positive for West Nile Virus found in Clark County, 6pm v/o.

Channel 3 KVBC Friday, September 8, 2006:

Another human case of West Nile Virus has been confirmed in Southern NV – victim did not contract the disease here, however, 4pm v/o.

Channel 3 KVBC Thursday, September 14, 2006:

3rd human case of West Nile Virus in Clark County reported by the Southern Nevada Health District – patient believed to have contracted the illness in Illinois, 6pm v/o.

Channel 8 KLAS Friday, September 15, 2006:

3rd human case of West Nile Virus confirmed in Clark County – although the victim may have contracted the disease in Illinois, 4pm v/o.

Channel 3 KVBC Friday, September 22, 2006:

NV is reporting its first human death from West Nile Virus this year, 4pm v/o; 6pm v/o – death occurred in Elko.

Channel 5 KVVU Friday, September 22, 2006:

NV has its first fatal human West Nile Virus case in Elko County, 10pm v/o;

Appendix C

2006 West Nile Virus Surveillance Collaborators:

Southern Nevada Health District

Environmental Health Division

Glenn D. Savage, REHS, Environmental Health Director
Steve Goode, REHS, Environmental Health Manager
Daniel Maxson, REHS, Environmental Health Supervisor (retired)
Mark Bergtholdt, MPH, REHS, Environmental Health Supervisor
Richard Hicks, BCE, REHS, Environmental Health Consultant
Vivek Raman, REHS, Senior Environmental Health Specialist
Brad Gore, REHS, Environmental Health Specialist II
Alexis Barajas, REHS, Environmental Health Specialist II
Patricia Hayde, REHS, Environmental Health Specialist II
Phil Bondurant, Environmental Health Specialist I
Jonathan Gore, Environmental Health Specialist I
Ignacio Leycegui, Environmental Health Specialist I
Timothy Ripp, Environmental Health Specialist I
Kathy Apalategui, Senior Administrative Assistant
Roberta Young, Administrative Assistant II

Epidemiology Division

Patricia Rowley, Epidemiology Manager
Brian Labus, MPH, Senior Epidemiologist

Public Information Office

Jennifer Sizemore, Public Information Manager
Stephanie Bethel, Public Information Officer
Julie Hurd, Publication Specialist

Nevada Department of Agriculture

Animal Disease and Food Safety Laboratory, Reno

David Thain, DVM, State Veterinarian (retired)
Annette Rink, PhD, Laboratory Supervisor
Marcus Smith, Senior Microbiologist
Kimberly Priest, Microbiologist III
Yvonne Kirsten, Administrative Assistant

Washoe County

District Health Department – Vector-Borne Diseases Program

Scott Mosen, REHS, Program Manager
Mike Murray, REHS
Judith Saum, REHS
Jim Shaffer, REHS

Clark County

United States Department of Agriculture

Darren Williams, Supervisory Wildlife Biologist (retired)
Heather Clove, Wildlife Specialist
Shaun Trudell, Wildlife Specialist

Las Vegas Valley Water District

Raymond Saumure, PhD, Springs Preserve Research Biologist

Mesquite Animal Control

Joe Macias, Animal Control Officer

Nye County

State of Nevada Bureau of Community Health

Maureen Budahl, Community Nurse

Nye County Emergency Management

Brent Jones, Emergency Management Director

Matt McCarty, Mosquito Control and Surveillance Personnel

Nevada Test Site

Derek Hall, Biologist

Lincoln County

State of Nevada Bureau of Community Health

Jean Lucht, Public Health Nurse II

Sheila Davis, Public Health Administrative Assistant

US Fish and Wildlife Service

Mary Maxwell, Pahrangat National Wildlife Refuge Manager

State of Nevada Department of Wildlife

Bart Tanner, Key Pittman Wildlife Management Area

Dana Johnson, Kirch Wildlife Refuge Area Manager

White Pine County

Nevada State Bureau of Health Protection Services

Chuck Stahl, REHS, Environmental Health Specialist III