Annual Report

Zoonotic Infectious Disease Surveillance

2006

Environmental Health Division
Special Programs Section

Introduction:

The Southern Nevada Health District (SNHD), Environmental Health Division, conducts routine surveillance of local wild animals for diseases communicable to humans. These diseases include rabies, plague, hantavirus, *Bartonella*, and raccoon roundworm. This report details the type of animals and insects tested, and the results from the surveillance activities conducted in 2006.

In 2006, SNHD implemented a Geographical Information System (GIS) into tracking locations of zoonotic disease surveillance activities. Field staff, equipped with Global Positioning Systems (GPS), entered field data into a desktop GIS system. This data has been plotted onto maps and supplements the numeric tables throughout this report.

Mosquito-borne viruses are addressed in a separate report entitled "West Nile Virus Surveillance and Mosquito Control" and are not reviewed in this report.

Rabies Surveillance:

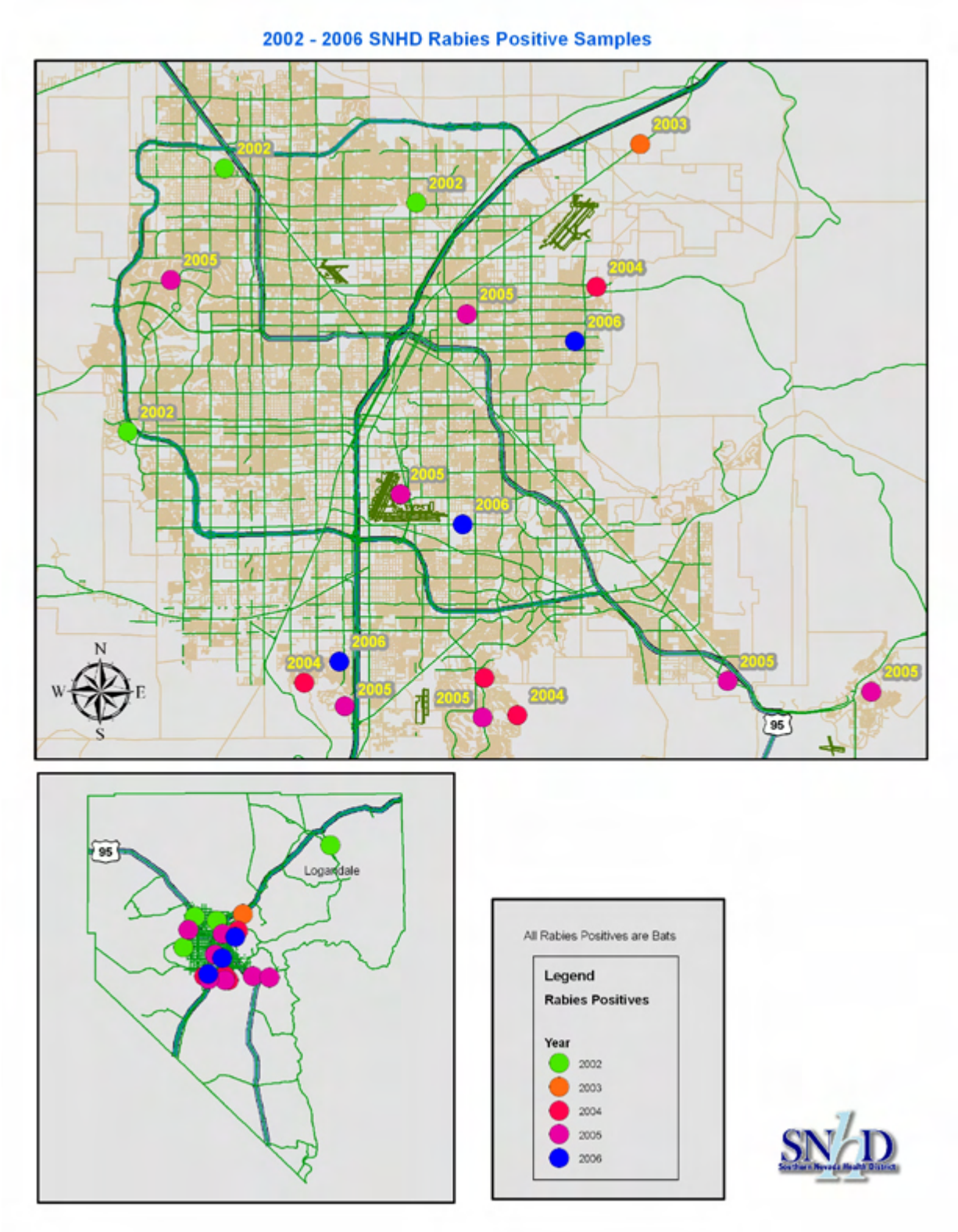
Rabies is a disease of the nervous system caused by a virus. It usually results from an exposure to an animal with rabies and is fatal almost 100% of the time to humans. In 2006, SNHD submitted 93 specimens from seven (7) animal species to the Nevada State Department of Agriculture, Animal Disease Lab (ADL) for rabies surveillance, with four (4) bats testing positive. Animal samples were collected by Animal Control agencies in Clark County and submitted to SNHD for recording and shipment to the ADL. Figure 1 details the type of specimens submitted for rabies testing in 2006. Figure 2 is a year-by-year comparison of rabies test submissions since 2001. Map 1 shows the geographical distribution of the positive rabies samples since 2002. No human cases of rabies infection have been reported to SNHD.

Figure 1: 2006 Rabies Surveillance Submissions

Animal	# Sampled	# Positive
Bat	24	4
Cat	33	0
Dog	32	0
Gopher	1	0
Fox	1	0
Mouse	1	0
Rat	1	0
TOTAL	**93**	**4**

Figure 2: 2001 – 2006 Rabies Test Submission Comparison

Year	Total Sampled	# of Bats	# Positive Bats
2001	156	17	4 bats
2002	138	22	4 bats
2003	128	13	1 bat
2004	155	20	4 bats
2005	140	19	7 bats
2006	93	24	4 bats
TOTAL	**810**	**115**	**24 (21%)**



Map 1: Positive Rabies Samples 2002 - 2006

Hantavirus Surveillance:

Hantavirus pulmonary syndrome (HPS) is a serious respiratory disease transmitted by infected rodents through urine, droppings, or saliva. Humans can contract the disease when they breathe in aerosolized fecal matter or urine containing the virus. In 2006, SNHD submitted 386 blood samples to the University of New Mexico for hantavirus analysis. Samples were collected by SNHD. Of 386 animal samples, 11 Deer mice (*Peromyscus maniculatus*), three (3) Cactus mice (*Peromyscus eremicus*), and two (2) Piñon mouse (*Peromyscus truei*) were positive for hantavirus. The hantavirus positive animals were collected in the Spring Mountain Range, Mt. Charleston and in the Desert National Wildlife Refuge. Figure 3 details the type and numbers of animals tested for hantavirus. Figure 4 is a year-by-year comparison of hantavirus test submissions since 2001. Map 2 shows the spatial distribution of hantavirus sample collections in Clark County. In 2006 there was one (1) human case of hantavirus in Nevada, however no human cases of hantavirus infection have been reported in Clark County.

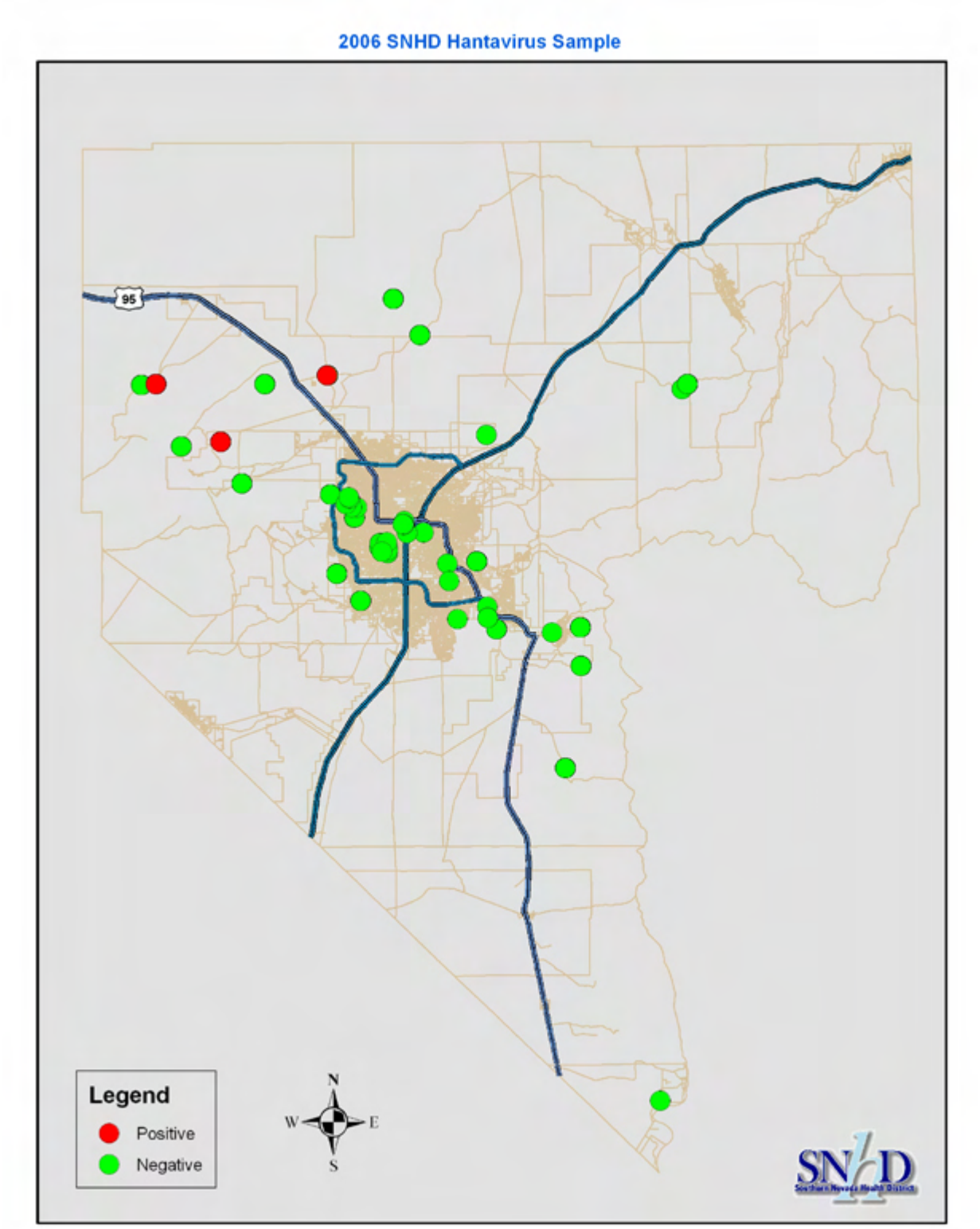
Figure 3: Hantavirus Specimen Distribution

Species	Name	# Sampled for Hantavirus	# Hantavirus Positive
Peromyscus maniculatus	Deer Mouse	74	11
Peromyscus eremicus	Cactus Mouse	50	3
Peromyscus boyli	Brush Mouse	46	0
Neotoma albigula	White-throated Wood Rat	38	0
Peromyscus truei	Piñon Mouse	40	2
Rattus rattus	Roof rat	37	0
Dipodomys merriami	Merriam's Kangaroo Rat	30	0
Perognathus formosus	Long Tail Pocket Mouse	30	0
Reithrodontomys megalotis	Western Harvest Mouse	13	0
Neotoma lepida	Desert Wood Rat	11	0
Ammospermophilus leucurus	White-tailed Antelope Squirrel	6	0
Peromyscus crinitis	Canyon Mouse	6	0
Prognathus penicillatus	Desert Pocket Mouse	2	0
Mus musculus	House Mouse	1	0
Dipodomys deserti	Desert Kangaroo Rat	1	0
Microdipodops pallidus	Pale Kangaroo Mouse	1	0
TOTAL		**386**	**16 (4%)**

Figure 4: 2001 – 2006 Hantavirus Test Submission Comparison

Year	Samples Tested	Total
2001	0	0
2002	0	0
2003	50	4
2004	0	0
2005	128	0
2006	386	12
Total	**564**	**16**

Deer Mouse	Cactus Mouse	Western Harvest Mouse	Pinon Mouse
0	0	0	0
0	0	0	0
0	0	4	0
0	1	0	0
0	0	0	0
8	2	0	1
8	**3**	**4**	**1**



Map 2: Hantavirus Sample Distribution

Plague Surveillance:

Plague is caused by a bacterium, *Yersinia pestis*, which is carried by fleas that feed on infected animals. In 2006, SNHD submitted 459 animal blood samples to the Centers for Disease Control and Prevention (CDC) for plague analysis. Samples were collected by USDA Wildlife Services personnel or SNHD. Out of the 459 animals sampled, three (3) Gray Foxes (*Urocyon cinereoargenteus*) were positive for plague. The plague positive fox samples were collected on Mt. Charleston. Figure 5 details the type and numbers of animals tested for plague. Additionally, 329 fleas were combed from rodents, with one (1) *Malaraeus sinomus* testing positive for plague. Figure 6 details the type and numbers of fleas submitted for plague analysis. Figure 7 is a year-by-year comparison of plague test submissions since 2001. Map 1 shows the spatial distribution of plague sample collections in Clark County. No human cases of plague infection have been reported to SNHD.

Figure 5: Plague Specimen Distribution

Species	Name	# Sampled for Plague	Plague Results Received	Plague Positive Results	# Animals With Fleas	Fleas Positive Results
Peromyscus maniculatus	Deer Mouse	74	49	0	7	0
Peromyscus eremicus	Cactus Mouse	42	15	0	19	1
Peromyscus boylii	Brush Mouse	43	52	0	13	0
Neotoma albigula	White-throated Wood Rat	37	13	0	22	0
Peromyscus truei	Piñon Mouse	40	9	0	0	0
Sylvilagus auduboni	Desert Cottontail Rabbit	39	39	0	0	0
Rattus rattus	Roof Rat	38	25	0	1	0
Dipodomys merriami	Merriam's Kangaroo Rat	34	8	0	6	0
Perognathus formosus	Long Tail Pocket Mouse	26	0	0	0	0
Procyon lotor	Raccoon	22	22	0	0	0
Reithrodontomys megalotis	Western Harvest Mouse	11	0	0	1	0
Canis latrans	Coyote	12	12	0	0	0
Neotoma lepida	Desert Wood Rat	8	6	0	0	0
Ammospermophilus leucurus	White-tailed Antelope Squirrel	6	3	0	6	0
Peromyscus crinitus	Canyon Mouse	5	0	0	0	0
Felis felis	Domestic Cat	5	5	0	0	0
Lepus californicus	Jack Rabbit	4	0	0	0	0
Perognathus penicillatus	Desert Pocket Mouse	1	0	0	0	0
Urocyon cinereoargenteus	Gray Fox	3	3	3	0	0
Castor canadensis	Beaver	2	2	0	0	0
Mus musculus	House Mouse	2	0	0	1	0
Dipodomys microps bonnevillei	Chisel Tooth Kangaroo Rat	1	0	0	0	0
Spilogale gracilis	Civit Cat (skunk)	1	0	0	0	0
Dipodomys deserti	Desert Kangaroo Rat	1	0	0	0	0
Microdipodops pallidus	Pale Kangaroo Mouse	1	0	0	0	0
Spermophilus variegatus	Rock Squirrel	1	1	0	0	0
TOTAL		**459**	**264***	**3**	**76**	**1**

***Additional sample results are pending from the CDC Plague Laboratory**

Figure 6: Flea Specimen Distribution

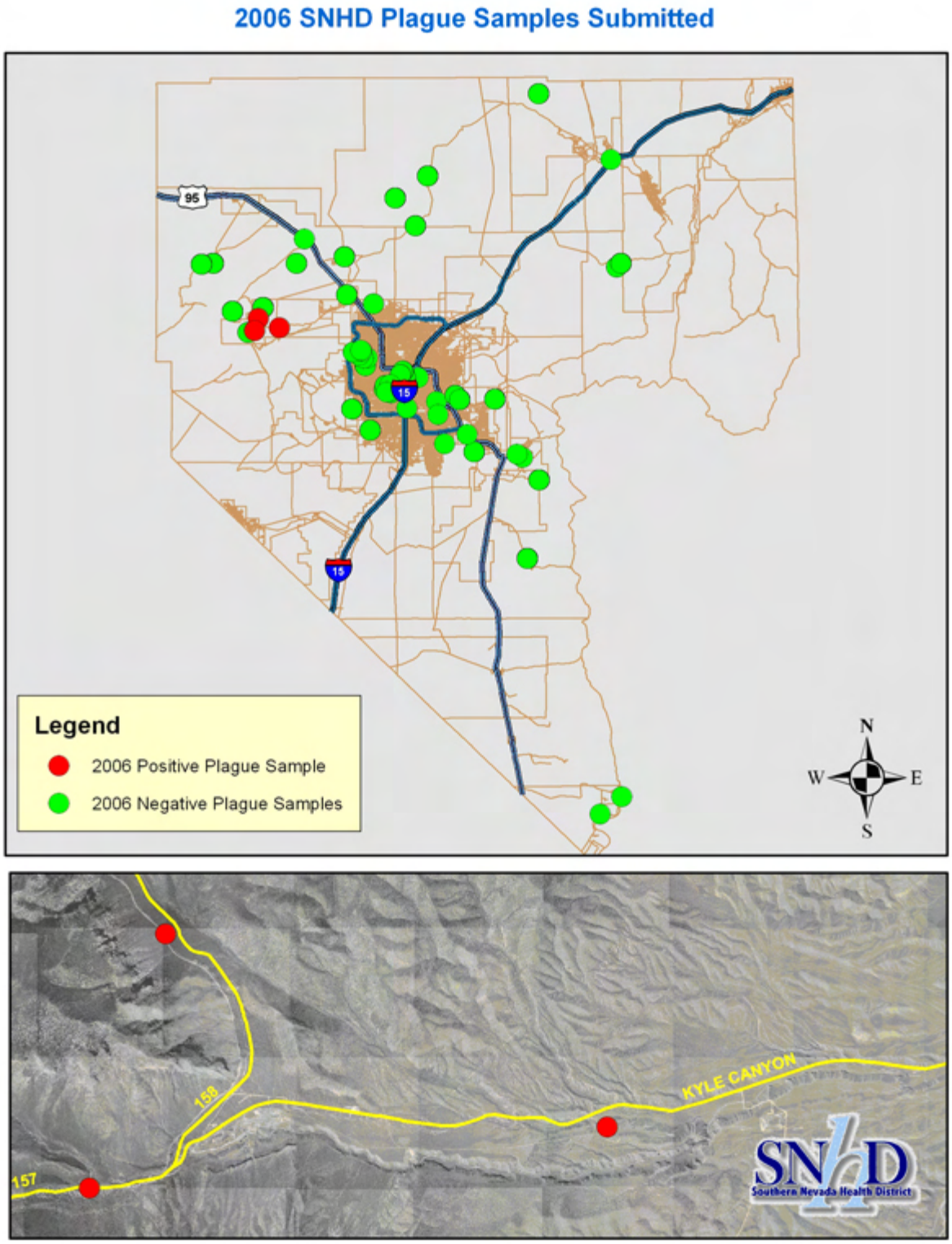
Flea Species	# Sampled	# Positive
Orchopeas sexdentatus	146	0
Thrassis bacchi	60	0
Malaraeus sinomus	26	1
Thrassis arizonensis	17	0
Orchopeas leucopus	20	0
Meringis dipodomys	15	0
Peromyscopsylla hesperomys	13	0
Aetheca wagneri	19	0
Malaraeus telchinus	6	0
Hystrichopsylla dippei	2	0
Eumolpianus eumolpi	2	0
Catallagia decipiens	1	0
Epitidea wemmani	1	0
Hoplopsyllus anomalus	1	0
TOTAL	**329**	**1**

Figure 7: 2001 – 2006 Plague Sample Distribution

Year	Samples	# Positive
2001	116	12
2002	25	0
2003	84	7
2004	84	3
2005	128	0
2006	459	3*
Total	**896**	**25(2.8%)**

Gray Fox	Raccoon	Feral Cat	Palmers Chipmunk
5	4	2	1
0	0	0	0
7	0	0	0
2	1	0	0
0	0	0	0
3	0	0	0
17	**5**	**2**	**1**

***Additional sample results are pending from the CDC Plague Laboratory**



Map 3: Plague Sample Distribution

***Bartonella* Surveillance:**

Bartonella henselae is a bacterium that causes cat scratch fever, an animal disease communicable to man. In 2006, the Centers for Disease Control (CDC) tested 105 Clark County rodent blood samples for *Bartonella*, identifying the bacteria in 28 of the samples (27%). Figure 8 details the type and numbers of rodents tested by the CDC for *Bartonella*. Figure 9 is a year-by-year comparison of *Bartonella sp.* test submissions since 2001. In 2001 there was one (1) human case of *Bartonella* in Nevada, however, no human cases of *Bartonella* infection have been reported in Clark County.

Figure 8: *Bartonella* Specimen Distribution

Species	Name	# Sampled for *Bartonella*	# Positive for *Bartonella*
Peromyscus maniculatus	Deer Mouse	32	8
Peromyscus truei	Pinon Mouse	24	9
Perognathus formosus	Long Tail Pocket Mouse	14	6
Reithrodontomys megalotis	Western Harvest Mouse	11	2
Neotoma albigula	White-throated Wood Rat	9	0
Peromyscus eremicus	Cactus Mouse	8	2
Neotoma lepida	Desert Wood Rat	4	0
Ammospermophilus leucurus	White-tailed Antelope Squirrel	1	0
Dipodomys merriami	Merriams's Kangaroo Rat	1	0
Perognathus penicillatus	Desert Pocket Mouse	1	1
TOTAL		**105**	**28 (27%)**

Figure 9: 2000 – 2006 *Bartonella* Sample Distribution

Year	# Sampled for *Bartonella*	# Positive for *Bartonella*
2000	26	7
2001	0	0
2002	0	0
2003	50	0
2004	0	0
2005	0	0
2006	105	28
Total	**181**	**35 (19%)**

Raccoon Roundworm Surveillance:

Baylisascaris procyonis is a roundworm that lives in the intestines of raccoons. The worm does not harm the raccoon, but can cause serious illness in humans. The adult worms shed millions of microscopic eggs that are passed in the raccoon's feces. These eggs are resistant to most environmental conditions, and with adequate water, can survive from months to years. People become infected with *Baylisascaris* when they ingest eggs which are in soil, water, or on objects that have been contaminated with raccoon feces. When humans ingest these eggs, they hatch into larvae in the person's intestine and migrate throughout the body, affecting the organs and muscles.

In 2004, SNHD and USDA Wildlife Services collaborated to collect and submit raccoon fecal samples to the ADL for *Baylicascaris* analysis. Since 2004, the ADL has identified *Baylisascaris* as well as other roundworm species including *Capillaria* sp., *Trichursis* sp., and *Toxocara* sp. from raccoon fecal matter in Clark County. In response to identifying roundworm in raccoon fecal samples, SNHD developed a health fact sheet available on www.southernnevadahealthdistrict.org and provides information on *Baylisascaris* at the annual University of Nevada Pesticide Applicator Certification training and other Zoonotic Disease seminars.

In 2006, SNHD submitted 23 raccoon fecal samples to the ADL for *Baylisascaris* testing, of which two (2) samples were positive for *Baylisascaris* and two (2) samples were positive for *Capillaria*. Figure 10 is a year-by-year comparison of raccoon roundworm submissions since 2004. No human cases of *Baylisascaris* infection have been reported to SNHD.

Figure 10: 2004 – 2006 Raccoon Parasite Distribution

Year	# Raccoon Fecals Sampled	# Roundworm Present	# *Baylisiscaris* Present	# *Capillaria* Present	# *Trichursis* Present	# *Toxocara canis* Present
2004	16	3	2	1	0	0
2005	17	5	2	0	2	1
2006	23	4	2	2	0	0
Total	**56**	**11 (20%)**	**6**	**3**	**2**	**1**

Conclusion:

Zoonotic diseases such as rabies, plague, hantavirus, *Bartonella*, and raccoon roundworm are present in wild animal populations in Southern Nevada. An integral component of the zoonotic disease surveillance 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, and citizen contact through field activities

The Environmental Health Division continues to develop and expand its Zoonotic Infectious Disease Surveillance program, identifying areas of endemic disease and looking for emerging pathogens.

2006 Zoonotic Disease 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
Phil Bondurant, Environmental Health Specialist I
Jonathan Gore, Environmental Health Specialist I
Ignacio Leycegui, Environmental Health Specialist I
Timothy Ripp, Environmental Health Specialist I

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

United States Department of Agriculture – Wildlife Services

Las Vegas Valley Water District

Desert National Wildlife Refuge

Nevada Department of Agriculture Animal Disease and Food Safety Laboratory, Reno

Washoe County District Health Department – Vector-Borne Diseases Program

Centers for Disease Control, Fort Collins, Colorado

University of New Mexico, Albuquerque, New Mexico