

**2011-2014 Habitat Monitoring Systems Report  
Carnegie State Vehicular Recreation Area**



**Carnegie SVRA  
California State Parks  
Off-Highway Motor Vehicle Recreation Division**

**By**

**Tara de Silva  
Environmental Scientist  
Carnegie SVRA**

**Co-author  
Autumn Meisel  
Senior Biologist  
MIG | TRA Environmental Sciences**

**May 2015**

## Table of Contents

Introduction	5
Environmental Setting	5
Vegetation Analysis	8
Avians	8
Aquatic Amphibians and Reptiles	31
Small Mammals (Excluding Bats)	40
Bats	49
Incidental Observations	52
Storm Water Management Plan	56

## Tables

Table 1. 2011 bird survey effort	9
Table 2. 2012 bird survey effort	9
Table 3. 2013 bird survey effort	10
Table 4. 2014 bird survey effort	10
Table 5. Results of bird surveys for the winter/spring of 2011	12
Table 6. Results of bird surveys for the spring of 2012	14
Table 7. Results of bird surveys for the spring of 2013	15
Table 8. Results of bird surveys for the spring of 2014	16
Table 9. Results of bird surveys for the winter/spring of 2011 (0-100 m)	18
Table 10. Results of bird surveys for the spring of 2012 (0-100 m)	19
Table 11. Results of bird surveys for the spring of 2013 (0-100 m)	20
Table 12. Results of bird surveys for the spring of 2014 (0-100 m)	21
Table 13. Bird diversity indices per habitat type by OHV and control	22
Table 14. Average CDFW Special Animal per site by OHV and control (2011)	22
Table 15. Average CDFW Special Animal per site by OHV and control (2012)	22
Table 16. Average CDFW Special Animal per site by OHV and control (2013)	23
Table 17. Average CDFW Special Animal per site by OHV and control (2014)	23
Table 18. Detection frequency per visit for winter/spring 2011	24
Table 19. Detection frequency per visit for spring 2012	26
Table 20. Detection frequency per visit for spring 2013	27
Table 21. Detection frequency per visit for spring 2014	28
Table 22. LLNL Site 300 precipitation data	34
Table 23. Surveyable water bodies for 2011-2014	34
Table 24. Survey effort for 2011-2014	34
Table 25. Summary of species presence and detected breeding	35
Table 26. Aquatic species detection frequencies for 2011-2014	36
Table 27. Aquatic species presence for 2011-2014	36
Table 28. Results of trapping for Site 6	46
Table 29. Results of trapping for Site 10	46
Table 30. Results of trapping for Site 76	47
Table 31. Results of trapping for Site 88	47

Table 32. Small mammal trapping success rate and species presence per site	48
Table 33. Small mammal species presence per riding and non-riding	48
Table 34. Bat monitoring results (2014)	50
Table 35. Incidental species observations for 2011	55
Table 36. Incidental species observations for 2012	56
Table 37. Incidental species observations for 2013	56
Table 38. Incidental species observations for 2014	56

## **Figures**

Figure 1. Study site	7
Figure 2. Map of HMS sites	11
Figure 3. Avian species detected per year by riding and non-riding areas	17
Figure 4. Map of water bodies	33
Figure 5. CRLF in Lime Kiln	38
Figure 6. WSFT metamorph from 2015 surveys	39
Figure 7. Small mammal trapping	40
Figure 8. Small mammal sampling sites	41
Figure 9. Trap locations at HMS site 6	42
Figure 10. Trap locations at HMS site 10	43
Figure 11. Trap locations at HMS site 76	44
Figure 12. Trap locations at HMS site 88	45
Figure 13. Suspected Townsend's big-eared bat	51
Figure 14. Incidental species grid	54

## **INTRODUCTION**

Carnegie State Vehicular Recreational Area (SVRA) is operated by the Off-Highway Motor Vehicular Recreation Division (OHMVRD) of the California Department of Parks and Recreation (CDPR). The SVRA is a unit of the California State Park System that provides off-highway vehicle recreational opportunities to the general public. Within the Carnegie SVRA, approximately 1,575 acres are open to the public for recreational opportunities and approximately 3,440 acres are closed to the public and referred to as the Tesla-Alameda property. The SVRA includes 8 miles of Corral Hollow Creek and is located between the cities of Livermore and Tracy.

The Off-Highway Motor Vehicle Act of 1988 introduced the Wildlife Habitat Protection Plan (WHPP), which was to be created for every SVRA to help maintain and monitor a viable species composition. Habitat Monitoring System (HMS) is an integrated monitoring program that is designed to provide inventories of the plants and animals that occur on SVRAs, as well as ongoing assessments of the impacts of off-highway vehicle use on plant and animal populations and their habitats. If negative impacts are documented, these are to be reduced through appropriate management actions to help to ensure the long-term persistence, or sustainability, of the park's plant and animal species.

In 2010 California State Parks OHV division hired an independent review team from UC Davis to conduct an environmental audit of the existing HMS programs throughout all of the State Vehicular Recreation Areas. UC Davis personnel visited each park and provided an in depth critique of historic and current monitoring efforts to division management as well as recommendations for the future. This environmental audit was the driving factor behind current efforts to restructure the HMS programs division wide.

Natural resource monitoring is conducted annually at the Carnegie SVRA. The following report details natural resource monitoring efforts and findings from 2011 to 2014. This report is organized by taxa, with monitoring efforts reported for birds, aquatic species (primarily amphibians), bats, small mammals (non bat), and incidental observations of diverse taxa.

## **ENVIRONMENTAL SETTING**

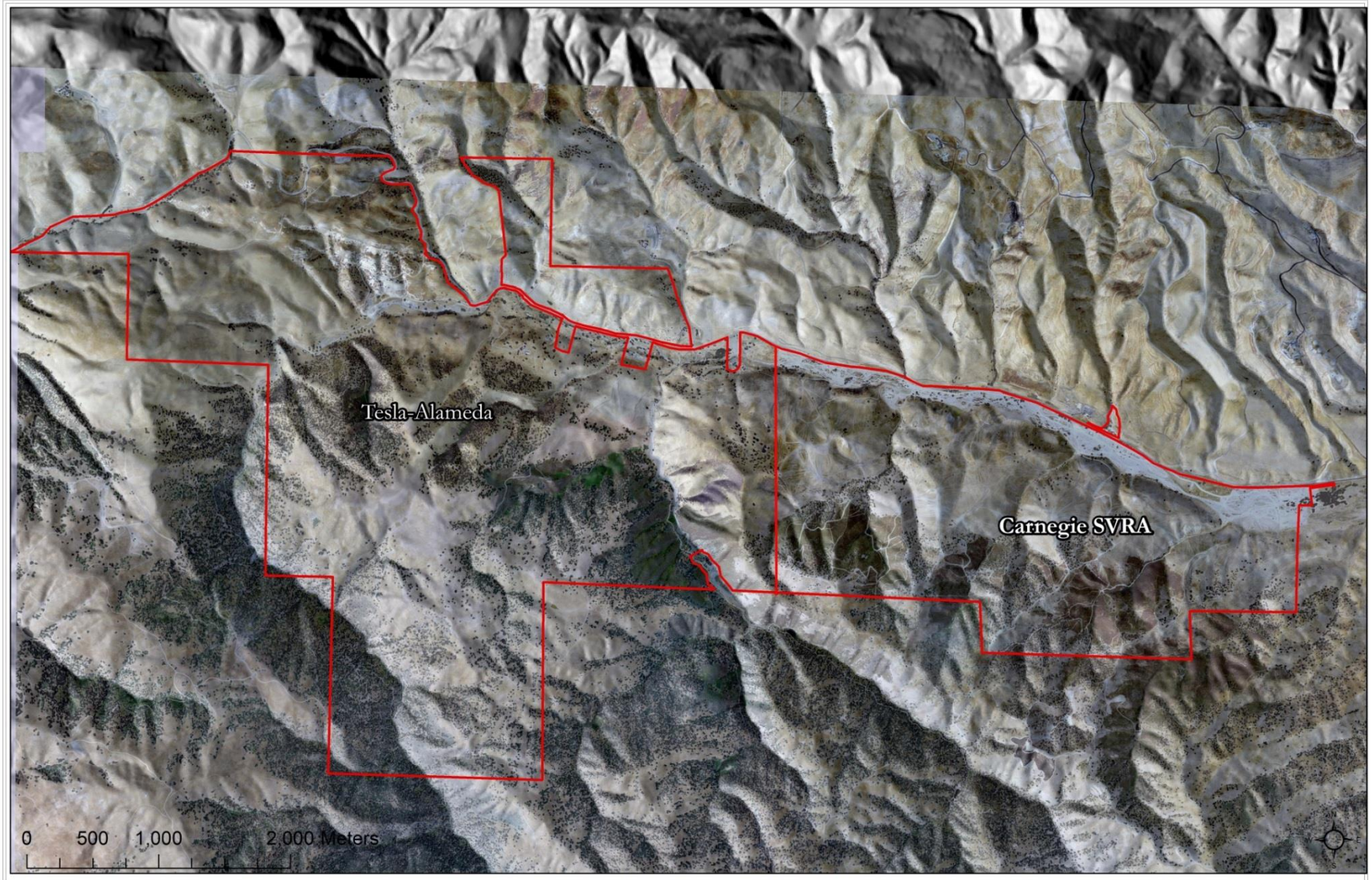
Carnegie State Vehicle Recreation Area encompasses approximately 5,015 acres in the coastal hills of western San Joaquin and eastern Alameda counties. The topography consists of rolling hills with some areas of extremely steep terrain. Several series of habitats exist within Carnegie SVRA including blue oak, California annual grassland, California sagebrush-black sage, mule fat, and Fremont cottonwood. The climate is Mediterranean, with cool, wet winters and hot, dry summers. Of the 5,000 acres, approximately 1,500 are open to off-highway vehicular (OHV) recreation. The park's remaining acreage is primarily used for cattle grazing (Figure 1).

The California annual grassland series covers approximately 50% of the CSVRA and is composed of mainly non-native grasses and forbs. However, native species such as purple needlegrass (*Nassella pulchra*), blue wildrye (*Elymus glaucus* ssp. *glaucus*), and California

fescue (*Festuca californica*) are also present. The blue oak series occupies approximately 35% of the park and consists of blue oaks (*Quercus douglasii*) as the dominant tree found on both the slopes and ravines, with a wide range of canopy cover. The California sagebrush-black sage series covers approximately 11% of the park and includes California sagebrush (*Artemisia californica*), black sage (*Salvia mellifera*), and bush monkeyflower (*Mimulus aurantiacus*). The mule fat and Fremont cottonwood series cover approximately 4% of the park and include Fremont cottonwood (*Populus fremonti*), valley oak, and western sycamore (*Platanus racemosa*) being the dominant tree species with mulefat (*Baccharis salicifolia*) the dominant shrub species. On the higher slopes, conifer species include California juniper (*Juniperus californica*) and foothill pine (*Pinus sabiniana*) and shrub species include holly-leaf redberry (*Rhamnus ilicifolia*), and toyon (*Heteromeles arbutifolia*).

Because of its position in the rain shadow of the Coast Range, CSVRA is unique in that it contains the northernmost range of several arid or desert habitat species, as well as other desert inhabiting species. These include desert olive (*Forestiera pubescens*), desert buckwheat (*Eriogonum fasciculatum* var. *polyfolium*), Mormon tea (*Ephedra californica*), western spadefoot (*Spea hammondi*), glossy snake (*Arizona elegans*), coachwhip (*Masticophis flagellum*), Cassin's kingbird (*Tyrannus vociferans*), greater roadrunner (*Geococcyx californianus*), phainopepla (*Phainopepla nitens*), and Heermann's kangaroo rat (*Dipodomys heermanni*) (unpublished data).

Other wildlife typically seen at the SVRA includes black-tailed deer (*Odocoileus hemionus*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), red-tailed hawk (*Buteo jamaicensis*), and California ground squirrel (*Spermophilus beecheyi*). Several special status or listed animal species are present or have potential to occur on CSVRA, including, but not limited to, foothill yellow-legged frog (*Rana boylei*), California red-legged frog (*Rana aurora draytonii*), western pond turtle (*Clemmys marmorata*), western spadefoot toad (*Spea hammondi*), California tiger salamander (*Ambystoma californiense*), Alameda whipsnake (*Masticophis lateralis euryxanthus*), San Joaquin kit fox (*Vulpes macrotis*), golden eagle (*Aquila chrysaetos*), prairie falcon (*Falco mexicanus*), American badger (*Taxidea taxus*), pallid bat (*Antrozous pallidus*), and Townsend's big-eared bat (*Corynorhinus townsendii*). Occasionally mountain lions (*Puma concolor*) pass through the park. Non-native species such as tree of heaven (*Ailanthus altissima*), blessed milk thistle (*Silybum marianum*), feral pig (*Sus scrofa*) and wild turkey (*Meleagris gallopavo*) are also present.



**Figure 1. Study Site.** Carnegie SVRA: the eastern portion is open to OHV recreation while the Tesla-Alameda acquisition area of the park is currently not open for OHV recreation.

## **VEGETATION ANALYSIS**

In order to modernize vegetation survey techniques and to provide for a more robust and efficient vegetation monitoring program, the monitoring program was revised in 2014 to rely on LiDAR (light detection and ranging) data. LiDAR is a remote sensing technology that measures distance by illuminating a target with a laser and analyzing the reflected light. Vegetation reflection data is collected that can provide information on vegetation type and cover. Airborne LiDAR data allows for a greater area to be surveyed with more accuracy and significantly less staff time compared to on-the-ground vegetation transect monitoring.

On April 19 of 2014, the Carnegie SVRA (both areas of use and non-use) was flown by REY Engineers out of Folsom, CA. This resulted in a very large dataset (65 GB). Due to the lack of an ES for a significant portion of 2014 and the time required for analysis of this first LiDAR dataset, CDPR staff has not completed data analysis at the time of this report. The 2014 vegetation reflection data will be analyzed and reported in the 2015 HMS report. LiDAR will be flown every two years to allow for a comparison of vegetation data.

## **AVIANS**

### **Methodology**

Birds are surveyed using a point count system. The sample points were randomly generated independently from one another using GIS software (ESRI Arc Map 9.3). The distribution was based on a stratified random sample based off of eight levels (Table 1, Figure 1). To provide for statistical independence and since data collection will focus partially on birds, which tend to move around and have large home ranges, the habitat sites were buffered from one another by 200 m. In other words, no site could be within 200 m of another site. To qualify for a specific treatment level, 51 percent of the area surrounding the site needed to consist of the specific treatment level for a 100 m radius. For example, an OHV blue oak site had to be within the riding area and blue oak habitat for at least 51 percent of the surrounding area. An "OHV" site is defined as an area within the SVRA where recreation occurs based on the 1981 General Plan. Some sites have restricted OHV activity but are labeled as OHV sites because they are located within these boundaries. There were 110 point count sites during the 2011, 2012, 2013 and 2014 bird surveys.

Each sample point is surveyed twice each season (winter/spring) for a period of ten minutes each survey. There is a minimum of 10 days between the first survey at any given point and the second survey. The survey time period is from 0700 to 1300 in the winter. The survey time period is 0630-1100 in the spring. Upon arrival at the site, the observer/note taker is quiet for one minute. Birds are identified by sight and sound. Distances from the observer are recorded using a rangefinder, when needed, or the observer's estimate. Direction and habitat type is also recorded. Each survey is conducted with one skilled observer able to identify birds by sight and call, and one note taker or a voice recorder. Typically, two or three teams of observer and note taker are sent out so that all the points can be visited over 3-4 days. Data is recorded in the habitat monitoring database (Microsoft® Access).



**Results**

Table 1-4 show the bird survey effort for 2011-2014. Effort only takes valid samples into consideration; sites must be surveyed twice to be considered samples for this purpose.

Figure 2 shows the distribution of sample sites that were used for bird surveys 2011-2014.

**Table 1. 2011 bird survey effort.**

This winter survey period began on November 30<sup>th</sup>, 2010 and concluded on February 11, 2011. The spring survey period began on April 19, 2011 and concluded on June 29<sup>th</sup>, 2011. During the survey period, 90 bird species were recorded throughout the park, with 84 species observed in the control area and 73 species observed in the riding area (Table 5).

Stratification	Sample Size (n=x)			
	Winter Sample 2 Surveys=Sample	Spring Sample 2 Surveys=Sample	All Samples 4 Surveys=Sample	
OHV	Blue Oak	14	14	14
	CA Annual Grassland	15	15	15
	CA Sagebrush-black sage	15	15	15
	Riparian	9	10	9
	<b>Total</b>	<b>53</b>	<b>54</b>	<b>53</b>
Control	Blue Oak	15	15	15
	CA Annual Grassland	15	15	15
	CA Sagebrush-black sage	15	15	15
	Riparian	10	10	10
	<b>Total</b>	<b>55</b>	<b>55</b>	<b>55</b>

**Table 2. 2012 bird survey effort.**

Winter surveys were not conducted for this year. The spring survey period began on April 25<sup>th</sup>, 2012 and concluded on June 15<sup>th</sup>, 2012. During this survey period, a total of 68 species were detected throughout the park, with 55 species observed in the control area and 52 species observed in the riding areas (Table 6).

Stratification	Spring Sample	
	2 Surveys=Sample	
OHV	Blue Oak	13
	CA Annual Grassland	0
	CA Sagebrush-black sage	0
	Riparian	9
	<b>Total</b>	<b>22</b>
Control	Blue Oak	14
	CA Annual Grassland	0
	CA Sagebrush-black sage	0
	Riparian	9
	<b>Total</b>	<b>23</b>

**Table 3. 2013 bird survey effort.**

Winter surveys were not conducted for this year. The spring survey period began on April 16<sup>th</sup>, 2013 and ended on June 15<sup>th</sup>, 2013. During this survey period, a total of 75 species were detected throughout the park, with 68 species observed in the control area and 56 species observed in the riding areas (Table 7).

Stratification		Spring Sample 2 Surveys=Sample
OHV	Blue Oak	15
	CA Annual Grassland	15
	CA Sagebrush-black sage	0
	Riparian	10
	<b>Total</b>	<b>40</b>
Control	Blue Oak	15
	CA Annual Grassland	15
	CA Sagebrush-black sage	0
	Riparian	10
	<b>Total</b>	<b>40</b>

**Table 4. 2014 bird survey effort.**

Winter surveys were not conducted for this year. The spring survey period began on April 16<sup>th</sup>, 2014 and ended on June 11<sup>th</sup>, 2014. During this survey period, a total of 90 species were detected throughout the park, with 84 species observed in the control areas and 75 species observed in the riding areas (Table 8).

Stratification		Spring Sample 2 Surveys=Sample
OHV	Blue Oak	14
	CA Annual Grassland	15
	CA Sagebrush-black sage	15
	Riparian	10
	<b>Total</b>	<b>54</b>
Control	Blue Oak	14
	CA Annual Grassland	15
	CA Sagebrush-black sage	7
	Riparian	9
	<b>Total</b>	<b>45</b>

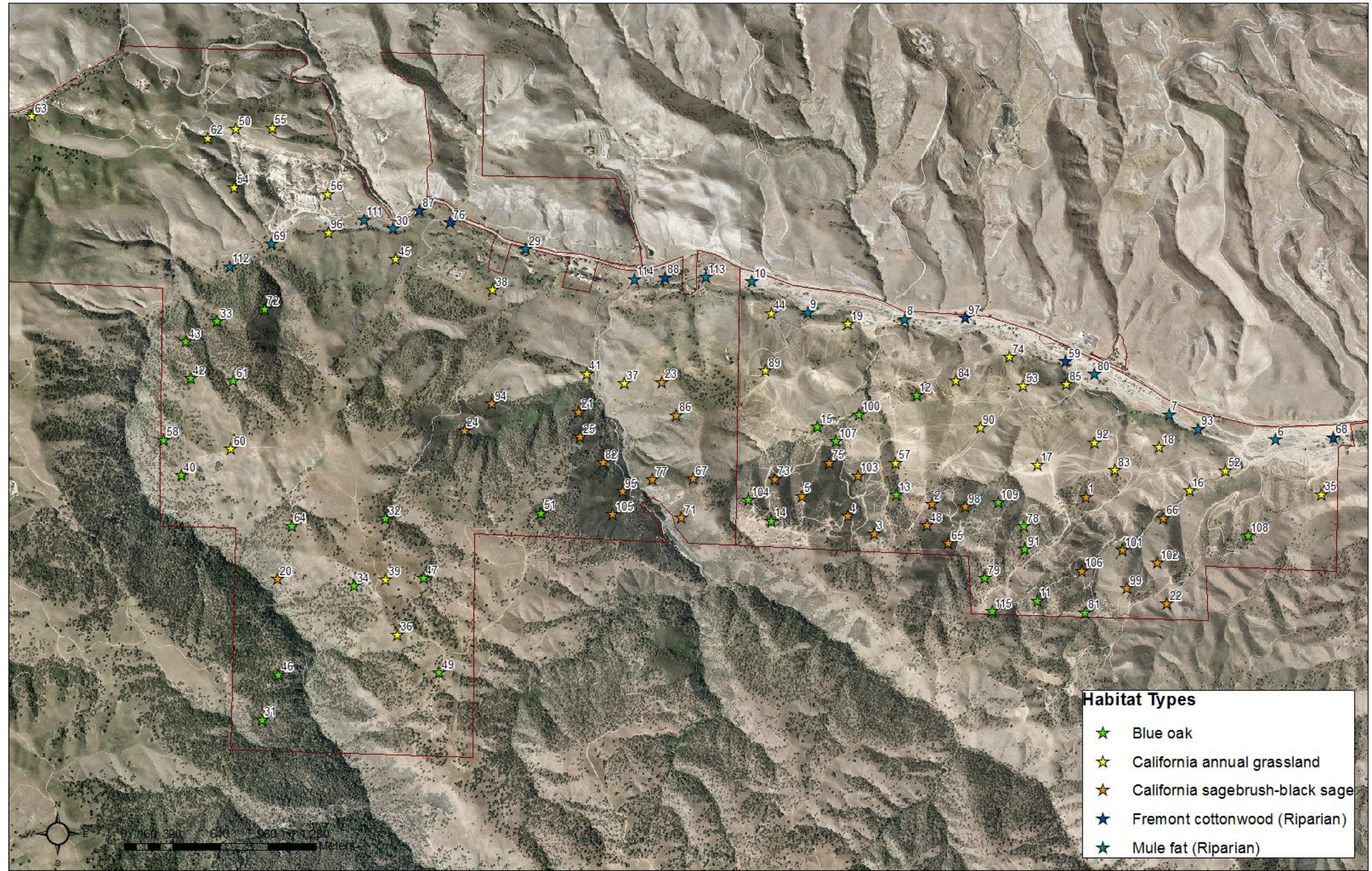


Figure 2. Map of HMS sites.

\*\*Table 5-8: Individual birds by species within the broad parameters of OHV and control sites.  
Species are included in these summary tables regardless of the distance from site.

**Table 5. Results of bird surveys for the winter/spring of 2011 (continued on next page).**

Bird Species	OHV (n=53)	Control (n=55)	Bird Species	OHV (n=53)	Control (n=55)
Acorn Woodpecker	4	31	Northern Flicker	15	64
American Crow	2	0	Northern Harrier	4	5
American Goldfinch	8	21	Northern Mockingbird	24	15
American Kestrel	42	52	Northern Rough-winged Swallow	3	3
American Robin	0	7	Nuttall's Woodpecker	40	47
Anna's Hummingbird	27	21	Oak Titmouse	37	40
Ash-throated Flycatcher	36	18	Olive-sided Flycatcher	2	0
Barn Swallow	1	1	Orange-crowned Warbler	3	2
Belted Kingfisher	0	1	Pacific-slope Flycatcher	2	2
Bewick's Wren	106	92	Phainopepla	23	20
Black Phoebe	8	10	Red-breasted Sapsucker	0	3
Black Throated Gray Warbler	0	1	Red-tailed Hawk	132	71
Black-headed Grosbeak	5	1	Red-winged Blackbird	172	69
Brewer's Blackbird	25	123	Rock Wren	2	6
Brown-headed Cowbird	13	5	Ruby-crowned Kinglet	42	29
Bullock's Oriole	16	14	Rufous Hummingbird	9	7
Bushtit	14	22	Rufous-crowned Sparrow	1	1
California Quail	183	114	Sage Sparrow	3	2
California Thrasher	43	32	Savannah Sparrow	5	7
California Towhee	38	16	Say's Phoebe	16	30
Calliope Hummingbird	1	5	Sharp-shinned Hawk	2	2
Canyon Wren	1	5	Spotted Towhee	59	43
Cassin's Kingbird	3	0	Steller's Jay	0	5
Cliff Swallow	18	7	Townsend's Warbler	2	4
Common Raven	230	180	Turkey Vulture	23	38
Cooper's Hawk	0	1	Violet-green Swallow	0	7
Dark-eyed Junco	45	21	Warbling Vireo	2	0
Eurasian Collared-Dove	0	1	Western Bluebird	85	67
European Starling	29	116	Western Flycatcher	1	0
Fox Sparrow	2	2	Western Kingbird	42	19
Golden Eagle	5	18	Western Meadowlark	166	197
Golden-crowned Sparrow	95	36	Western Scrub-Jay	154	161
Grasshopper Sparrow	0	1	Western Tanager	1	5
Greater Roadrunner	0	2	Western Wood-Pewee	0	2
Hermit Thrush	0	1	White-breasted Nuthatch	6	28
House Finch	118	106	White-crowned Sparrow	206	31
House Sparrow	1	0	White-tailed Kite	1	1
House Wren	0	1	White-throated Swift	3	5
Killdeer	18	15	Wild Turkey	0	4
Lark Sparrow	5	11	Wilson's Warbler	2	7
Lazuli Bunting	1	4	Wrentit	104	96
Lesser Goldfinch	7	6	Yellow Warbler	1	0

Bird Species	OHV (n=53)	Control (n=55)	Bird Species	OHV (n=53)	Control (n=55)
Lewis's Woodpecker	0	1	Yellow-billed Magpie	0	64
Loggerhead Shrike	19	19	Yellow-rumped Warbler	21	52
Mallard	3	2			
Mourning Dove	87	84	Grand Total	2675	2488

**Table 6. Results of bird surveys for the spring of 2012.**

Bird Species	OHV (n=22)	Control (n=23)	Bird Species	OHV (n=22)	Control (n=23)
Acorn Woodpecker	2	32	Lazuli Bunting	1	0
American Goldfinch	1	0	Lesser Goldfinch	3	4
American Kestrel	8	8	Lewis's Woodpecker	2	1
American Robin	0	2	Loggerhead Shrike	4	0
Anna's Hummingbird	2	6	Mourning Dove	41	80
Ash-throated Flycatcher	25	4	Northern Flicker	2	4
Band-tailed Pigeon	2	0	Northern Mockingbird	9	2
Barn Swallow	0	13	Northern Rough-winged Swallow	4	1
Bewick's Wren	19	6	Nuttall's Woodpecker	12	19
Black Phoebe	1	4	Oak Titmouse	13	22
Black-headed Grosbeak	1	1	Orange-crowned Warbler	1	0
Brewer's Blackbird	7	11	Pacific-slope Flycatcher	1	0
Brown-headed Cowbird	8	8	Phainopepla	10	1
Bullock's Oriole	9	14	Prairie Falcon	0	1
Bushtit	1	0	Red-tailed Hawk	19	8
California Quail	18	19	Red-winged Blackbird	4	19
California Thrasher	2	1	Sage Sparrow	0	1
California Towhee	20	7	Say's Phoebe	3	2
Cassin's Kingbird	4	0	Spotted Towhee	9	6
Chipping Sparrow	0	1	Tree Swallow	0	4
Cliff Swallow	18	1	Turkey Vulture	21	9
Common Raven	51	28	Violet-green Swallow	3	0
Cooper's Hawk	0	5	Warbling Vireo	0	2
Dark-eyed Junco	0	5	Western Bluebird	10	18
Eurasian Collared-Dove	0	2	Western Kingbird	19	10
European Starling	8	31	Western Meadowlark	0	13
Golden Eagle	0	5	Western Scrub-Jay	36	38
Grasshopper Sparrow	1	0	Western Tanager	1	2
Greater Roadrunner	0	2	Western Wood-Pewee	0	2
Hermit Thrush	0	1	White-breasted Nuthatch	10	12
House Finch	39	10	Wild Turkey	14	11
House Sparrow	3	0	Wrentit	9	3
Killdeer	3	1	Yellow-billed Magpie	1	15
Lawrence Goldfinch	3	0	Grand Total	518	538

**Table 7. Results of bird surveys for the spring of 2013.**

Bird Species	Riding (n=40)	Control (n= 40)	Bird Species	Riding (n= 40)	Control (n= 40)
Acorn Woodpecker	3	48	Lesser Goldfinch	2	5
Alder Flycatcher	0	1	Loggerhead Shrike	8	9
American Crow	1	1	Mallard	0	2
American Goldfinch	1	0	Mourning Dove	65	80
American Kestrel	10	21	Nashville Warbler	1	0
Anna's Hummingbird	6	6	Northern Flicker	3	5
Ash-throated Flycatcher	33	19	Northern Mockingbird	17	17
Bank Swallow	0	1	Northern Rough-winged Swallow	8	5
Barn Swallow	1	10	Nuttall's Woodpecker	16	21
Belted Kingfisher	0	1	Oak Titmouse	17	32
Bewick's Wren	18	3	Pacific-slope Flycatcher	0	1
Black Phoebe	3	3	Phainopepla	22	1
Black Throated gray warbler	1	0	Red-tailed Hawk	28	30
Black-headed Grosbeak	1	4	Red-winged Blackbird	43	34
Brewer's Blackbird	4	20	Rock Wren	1	1
Brown-headed Cowbird	6	15	Ruby-crowned Kinglet	0	1
Bullock's Oriole	16	21	Rufous-crowned Sparrow	1	0
Bushtit	5	13	Say's Phoebe	0	3
California Quail	12	31	Spotted Towhee	7	4
California Thrasher	5	1	Swainson's Hawk	0	3
California Towhee	9	15	Turkey Vulture	45	57
Cassin's Kingbird	5	4	Violet-green Swallow	1	2
Cliff Swallow	36	23	Warbling Vireo	1	1
Common Raven	147	89	Western Bluebird	21	33
Cooper's Hawk	0	5	Western Kingbird	45	19
Dark-eyed Junco	0	4	Western Meadowlark	1	30
Downy Woodpecker	0	1	Western Scrub-Jay	44	53
Eurasian Collared-Dove	3	13	Western Tanager	1	3
European Starling	2	49	White-breasted Nuthatch	22	5
Golden Eagle	0	14	White-crowned Sparrow	2	5
Golden-crowned Sparrow	0	1	Wild Turkey	9	16
Greater Roadrunner	1	0	Wilson's Warbler	0	3
Horned Lark	0	3	Wren	13	4
House Finch	48	25	Yellow Warbler	1	2
Killdeer	8	6	Yellow-billed Magpie	0	16
Lark Sparrow	3	4	Yellow-rumped Warbler	0	2
Lawrence Goldfinch	2	0			
Lazuli Bunting	0	2	Grand Total	835	982

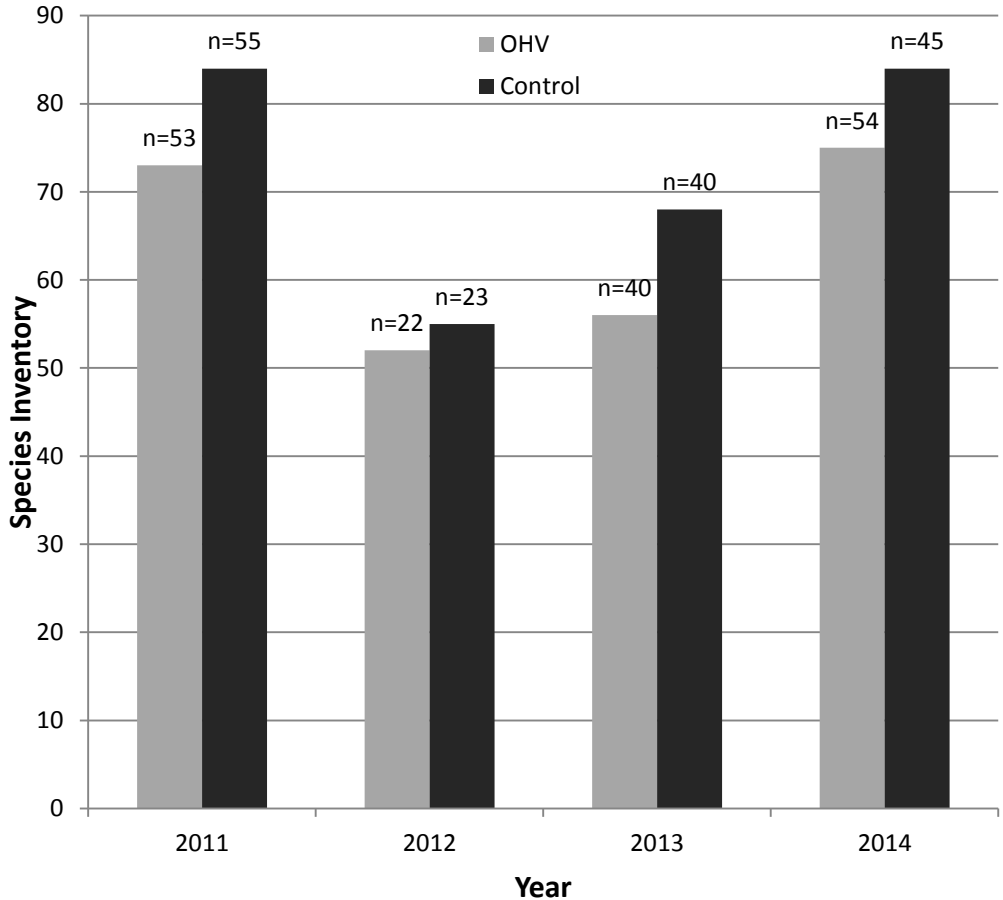
**Table 8. Results of bird surveys for the spring of 2014 (continued on next page).**

Bird Species	OHV n= 56	Control n= 50	Bird Species	OHV n= 56	Control n= 50
Acorn Woodpecker	22	47	Northern Rough-winged Swallow	0	6
American Crow	1	0	Nuttall's Woodpecker	30	36
American Goldfinch	2	1	Oak Titmouse	51	60
American Kestrel	7	20	Olive-sided Flycatcher	0	1
Anna's Hummingbird	10	16	Orange-crowned Warbler	6	2
Ash-throated Flycatcher	65	48	Pacific-slope Flycatcher	15	6
Bank Swallow	4	6	Phainopepla	13	11
Barn Owl	1	0	Prairie Falcon	1	1
Bewick's Wren	67	29	Purple Finch	0	1
Black Phoebe	3	2	Red-breasted Sapsucker	1	3
Black-chinned Hummingbird	1	1	Red-shouldered Hawk	0	1
Black-headed Grosbeak	3	7	Red-tailed Hawk	23	16
Brewer's Blackbird	19	26	Red-winged Blackbird	10	13
Brown-headed Cowbird	9	10	Rock Wren	1	8
Bullock's Oriole	22	26	Ruby-crowned Kinglet	1	3
Burrowing Owl	2	0	Rufous Hummingbird	2	1
Bushtit	33	3	Rufous-crowned Sparrow	2	4
California Quail	23	34	Sage Sparrow	3	4
California Thrasher	8	1	Savannah Sparrow	0	3
California Towhee	48	27	Say's Phoebe	7	3
Cassin's Kingbird	12	3	Spotted Towhee	19	3
Chipping Sparrow	3	7	Steller's Jay	0	9
Cliff Swallow	135	7	Swainson's Hawk	1	3
Common Raven	151	99	Townsend's Warbler	0	1
Cooper's Hawk	1	0	Tree Swallow	0	1
Dark-eyed Junco	0	2	Turkey Vulture	44	26
Eurasian Collared-Dove	5	27	Violet-green Swallow	4	10
European Starling	20	31	Warbling Vireo	1	1
Golden Eagle	7	22	Western Bluebird	27	33
Golden-crowned Sparrow	18	11	Western Kingbird	54	23
Grasshopper Sparrow	0	4	Western Meadowlark	6	61
Horned Lark	0	3	Western Scrub-Jay	63	71
House Finch	151	74	Western Tanager	2	8
House Sparrow	6	0	Western Wood-Pewee	0	4
House Wren	3	6	White-breasted Nuthatch	18	43
Killdeer	1	5	White-crowned Sparrow	20	10
Lark Sparrow	3	13	White-throated Swift	1	1
Lazuli Bunting	1	5	Wild Turkey	6	1



Bird Species	OHV n= 56	Control n= 50	Bird Species	OHV n= 56	Control n= 50
Lesser Goldfinch	19	9	Willow Flycatcher	1	0
Lewis's Woodpecker	1	2	Wilson's Warbler	8	2
Loggerhead Shrike	8	6	Wrentit	52	33
Mallard	1	2	Yellow Warbler	5	17
Mourning Dove	72	59	Yellow-billed Magpie	0	6
Nashville Warbler	0	1	Yellow-rumped Warbler	1	2
Northern Flicker	0	16			
Northern Mockingbird	20	12	Grand Total	1487	1282

Descriptive statistics of the data set are presented in the following tables and figures. The data is presented by a variety of parameters including controlling for distance, diversity indices, California Department of Fish and Wildlife (CDFW) Special Animals species, and detection frequency.



**Figure 3. Avian species detected per year by riding and non-riding areas.** Numbers displayed above bars are the corresponding sample sizes for each stratification.

**Table 9. Results of bird surveys for the winter/spring of 2011 (0-100 m).**

Bird Species	OHV (n=53)	Control (n=55)	Bird Species	OHV (n=53)	Control (n=55)
Acorn Woodpecker	3	20	Northern Mockingbird	16	9
American Goldfinch	8	21	Northern Rough-winged Swallow	0	3
American Kestrel	11	12	Nuttall's Woodpecker	27	26
American Robin	0	4	Oak Titmouse	32	33
Anna's Hummingbird	24	19	Olive-sided Flycatcher	2	0
Ash-throated Flycatcher	23	12	Orange-crowned Warbler	3	2
Barn Swallow	1	1	Pacific-slope Flycatcher	2	2
Bewick's Wren	89	87	Phainopepla	16	8
Black Phoebe	8	9	Red-breasted Sapsucker	0	3
Black Throated Gray Warbler	0	1	Red-tailed Hawk	16	8
Black-headed Grosbeak	5	1	Red-winged Blackbird	32	55
Brewer's Blackbird	11	47	Rock Wren	2	4
Brown-headed Cowbird	12	3	Ruby-crowned Kinglet	35	28
Bullock's Oriole	16	13	Rufous Hummingbird	9	7
Bushtit	14	22	Rufous-crowned Sparrow	1	1
California Quail	68	51	Sage Sparrow	2	2
California Thrasher	21	20	Savannah Sparrow	5	6
California Towhee	32	14	Say's Phoebe	9	23
Calliope Hummingbird	1	5	Sharp-shinned Hawk	2	1
Canyon Wren	1	5	Spotted Towhee	45	41
Cassin's Kingbird	3	0	Townsend's Warbler	2	4
Cliff Swallow	17	6	Turkey Vulture	1	9
Common Raven	49	17	Violet-green Swallow	0	4
Dark-eyed Junco	37	20	Warbling Vireo	2	0
European Starling	17	65	Western Bluebird	62	44
Fox Sparrow	3	2	Western Flycatcher	1	0
Golden Eagle	0	2	Western Kingbird	33	11
Golden-crowned Sparrow	92	35	Western Meadowlark	55	38
Grasshopper Sparrow	0	1	Western Scrub-Jay	85	73
Hermit Thrush	0	1	Western Tanager	1	2
House Finch	111	94	Western Wood-Pewee	0	1
House Sparrow	1	0	White-breasted Nuthatch	6	15
House Wren	0	1	White-crowned Sparrow	181	30
Killdeer	15	9	White-tailed Kite	1	0
Lark Sparrow	4	9	White-throated Swift	0	1
Lazuli Bunting	1	3	Wilson's Warbler	2	4
Lesser Goldfinch	5	2	Wrentit	48	66
Loggerhead Shrike	10	14	Yellow Warbler	1	0
Mallard	1	0	Yellow-billed Magpie	0	8
Mourning Dove	31	24	Yellow-rumped Warbler	22	53
Northern Flicker	6	25			
Northern Harrier	0	1	Grand Total	1510	1323

**Table 10. Results of bird surveys for the spring of 2012 (0-100 m).**

Bird Species	OHV (n=22)	Control (n=23)	Bird Species	OHV (n=22)	Control (n=23)
Acorn Woodpecker	2	23	Lesser Goldfinch	4	4
American Goldfinch	1	0	Lewis's Woodpecker	1	0
American Kestrel	4	2	Loggerhead Shrike	1	1
American Robin	0	1	Mourning Dove	31	13
Anna's Hummingbird	2	5	Northern Flicker	1	2
Ash-throated Flycatcher	23	3	Northern Mockingbird	6	1
Band-tailed Pigeon	2	0	Northern Rough-winged Swallow	2	1
Barn Swallow	0	13	Nuttall's Woodpecker	13	18
Bewick's Wren	21	6	Oak Titmouse	13	23
Black Phoebe	1	4	Pacific-slope Flycatcher	1	0
Black-headed Grosbeak	1	1	Phainopepla	8	1
Brewer's Blackbird	6	7	Prairie Falcon	0	1
Brown-headed Cowbird	7	9	Red-tailed Hawk	0	1
Bullock's Oriole	9	14	Red-winged Blackbird	1	40
Bushtit	1	0	Sage Sparrow	0	1
California Quail	15	22	Say's Phoebe	1	1
California Thrasher	2	1	Spotted Towhee	9	5
California Towhee	21	7	Tree Swallow	0	4
Cassin's Kingbird	4	0	Turkey Vulture	4	1
Chipping Sparrow	0	1	Warbling Vireo	0	2
Cliff Swallow	10	1	Western Bluebird	8	16
Common Raven	12	13	Western Kingbird	17	13
Dark-eyed Junco	0	5	Western Meadowlark	0	8
European Starling	2	28	Western Scrub-Jay	24	34
Grasshopper Sparrow	1	0	Western Tanager	1	2
Hermit Thrush	0	1	Western Wood-Pewee	0	2
House Finch	37	10	White-breasted Nuthatch	10	11
House Sparrow	3	0	Wild Turkey	0	1
Killdeer	4	0	Wrentit	3	2
Lawrence Goldfinch	3	0	Yellow-billed Magpie	0	9
Lazuli Bunting	1	0	Grand Total	354	395

**Table 11. Results of bird surveys for the spring of 2013 (0-100 m).**

Bird Species	OHV (n=40)	Control (n=40)	Bird Species	OHV (n=40)	Control (n=40)
Acorn Woodpecker	2	33	Loggerhead Shrike	3	7
American Crow	0	1	Mourning Dove	40	40
American Goldfinch	1	0	Nashville Warbler	1	0
American Kestrel	3	7	Northern Flicker	3	0
Anna's Hummingbird	6	4	Northern Mockingbird	10	9
Ash-throated Flycatcher	23	15	Northern Rough-winged Swallow	1	4
Barn Swallow	1	9	Nuttall's Woodpecker	15	17
Belted Kingfisher	0	1	Oak Titmouse	16	27
Bewick's Wren	14	2	Pacific-slope Flycatcher	0	1
Black Phoebe	2	3	Phainopepla	12	1
Black Throated gray warbler	1	0	Red-tailed Hawk	2	10
Black-headed Grosbeak	1	3	Red-winged Blackbird	3	27
Brewer's Blackbird	4	13	Rock Wren	1	0
Brown-headed Cowbird	6	11	Ruby-crowned Kinglet	0	1
Bullock's Oriole	13	20	Rufous-crowned Sparrow	1	0
Bushtit	5	13	Say's Phoebe	0	2
California Quail	6	17	Spotted Towhee	6	4
California Thrasher	2	0	Swainson's Hawk	0	1
California Towhee	8	15	Turkey Vulture	3	15
Cassin's Kingbird	3	1	Violet-green Swallow	0	2
Cliff Swallow	24	5	Warbling Vireo	1	0
Common Raven	27	22	Western Bluebird	18	20
Dark-eyed Junco	0	4	Western Kingbird	33	6
Downy Woodpecker	0	1	Western Meadowlark	0	15
Eurasian Collared-Dove	0	10	Western Scrub-Jay	22	29
European Starling	0	36	Western Tanager	1	3
Golden Eagle	0	3	White-breasted Nuthatch	19	4
Golden-crowned Sparrow	0	1	White-crowned Sparrow	2	5
Greater Roadrunner	1	0	Wild Turkey	5	11
Horned Lark	0	3	Wilson's Warbler	0	2
House Finch	41	17	Wrentit	4	1
Killdeer	6	4	Yellow Warbler	1	2
Lark Sparrow	3	2	Yellow-billed Magpie	0	4
Lawrence Goldfinch	2	0	Yellow-rumped Warbler	0	1
Lazuli Bunting	0	2			
Lesser Goldfinch	1	5	Grand Total	429	554

**Table 12. Results of bird surveys for the spring of 2014 (0-100 m).**

Bird Species	OHV (n=54)	Control (n=45)	Bird Species	OHV (n=54)	Control (n=45)
Acorn Woodpecker	13	26	Northern Rough-winged Swallow	0	6
American Goldfinch	1	0	Nuttall's Woodpecker	22	22
American Kestrel	1	7	Oak Titmouse	50	57
Anna's Hummingbird	8	15	Olive-sided Flycatcher	0	1
Ash-throated Flycatcher	49	32	Orange-crowned Warbler	6	1
Bank Swallow	4	6	Pacific-slope Flycatcher	15	6
Barn Owl	1	0	Phainopepla	13	8
Bewick's Wren	48	23	Purple Finch	0	1
Black Phoebe	3	2	Red-breasted Sapsucker	0	3
Black-headed Grosbeak	3	6	Red-tailed Hawk	3	4
Brewer's Blackbird	17	23	Red-winged Blackbird	6	13
Brown-headed Cowbird	7	10	Rock Wren	1	3
Bullock's Oriole	19	24	Ruby-crowned Kinglet	1	3
Burrowing Owl	2	0	Rufous Hummingbird	2	1
Bushtit	33	3	Rufous-crowned Sparrow	2	4
California Quail	10	24	Sage Sparrow	3	4
California Thrasher	7	0	Savannah Sparrow	0	3
California Towhee	34	24	Say's Phoebe	5	2
Cassin's Kingbird	9	3	Spotted Towhee	16	3
Chipping Sparrow	3	6	Steller's Jay	0	6
Cliff Swallow	117	2	Swainson's Hawk	1	3
Common Raven	31	31	Townsend's Warbler	0	1
Dark-eyed Junco	0	2	Turkey Vulture	11	5
Eurasian Collared-Dove	5	25	Violet-green Swallow	4	9
European Starling	14	30	Warbling Vireo	1	1
Golden Eagle	1	1	Western Bluebird	25	29
Golden-crowned Sparrow	17	10	Western Kingbird	35	23
Grasshopper Sparrow	0	4	Western Meadowlark	3	37
Horned Lark	0	3	Western Scrub-Jay	47	48
House Finch	130	72	Western Tanager	2	7
House Sparrow	6	0	Western Wood-Pewee	0	4
House Wren	2	6	White-breasted Nuthatch	11	32
Killdeer	1	4	White-crowned Sparrow	20	10
Lark Sparrow	1	13	White-throated Swift	1	1
Lazuli Bunting	1	4	Wild Turkey	3	1
Lesser Goldfinch	17	7	Willow Flycatcher	1	0
Lewis's Woodpecker	0	2	Wilson's Warbler	8	2
Loggerhead Shrike	6	4	Wrentit	35	13
Mourning Dove	56	44	Yellow Warbler	5	17
Nashville Warbler	0	1	Yellow-billed Magpie	0	1
Northern Flicker	0	7	Yellow-rumped Warbler	1	2
Northern Mockingbird	7	8	Grand Total	1043	911

**Table 13. Bird diversity indices per habitat type by OHV and control.** Diversity indices were calculated based on the combined species counts per habitat for each year’s data (only observations made within 100 m of point were used for this analysis). Diversity indices equals:

$$\sum \rho_i \ln(\rho_i)$$

This translates to the proportion of the number of individuals from one species, divided by the total number of individuals for all species, multiplied by the natural log of this proportion. This is done for all species and then added together. All years reflect spring survey data with the exception of 2011 which incorporates both winter and spring surveys. Data not keyed to species was discarded for the purposes of this analysis (i.e. “hummingbird sp.”).

	2011		2012		2013		2014	
	OHV	Control	OHV	Control	OHV	Control	OHV	Control
Blue Oak	3.2	3.2	3.1	2.9	3.1	3.0	3.3	3.4
CA Annual Grassland	3.0	3.4	-	-	2.7	3.3	2.8	3.4
CA Sagebrush-black sage	3.1	2.9	-	-	-	-	3.2	2.9
Riparian	3.0	3.2	3.1	3.0	3.1	3.3	2.9	3.2

Tables 14-17 show the average or mean observation of a bird from the 2015 CDFW Special Animals list for any given point, stratified by OHV and control sites. The species on the CDFW special animals list are considered to be those of greatest conservation need.

**Table 14. Average CDFW Special Animal per site by OHV and control (2011).**

	All Surveys, All Distances		All Surveys, 0-100 m	
	OHV (n=53)	Control (n=55)	OHV (n=53)	Control (n=55)
Avg	1.49	2.04	1.08	1.20
Median	1	2	1	1
StDev	0.9532	1.2317	0.7560	0.9506
	Spring, All Distances		Spring, 0-100 m	
	OHV (n=54)	Control (n=55)	OHV (n=54)	Control (n=55)
Avg	0.91	1.33	0.66	0.78
Median	1	1	1	1
StDev	0.9370	1.1231	0.7581	0.7121

**Table 15. Average CDFW Special Animal per site by OHV and control (2012).**

	Spring, All Distances		Spring, 0-100 m	
	OHV n= 22	Control n= 23	OHV n= 22	Control n= 23
Avg	1.05	1.83	0.87	1.52
Median	1	2	1	1
StDev	0.90	0.94	0.92	0.95

**Table 16. Average CDFW Special Animal per site by OHV and control (2013).**

	Spring, All Distances		Spring, 0-100 m	
	OHV	Control	OHV	Control
	n= 40	n= 40	n= 40	n= 40
Avg	1.8	3	1.73	2.32
Median	1	3	1	2
StDev	1.04	1.65	1.03	1.47

**Table 17. Average CDFW Special Animal per site by OHV and control (2014).**

	Spring, All Distances		Spring, 0-100 m	
	OHV	Control	OHV	Control
	n= 54	n= 45	n= 54	n= 45
Avg	3.10	4.42	3.33	3.86
Median	2	4	2	3
StDev	3.81	3.19	4.20	2.89

Tables 18-21 display the frequency of individuals detected per visit in control versus riding areas. Observations made further than 100 m from the point were discarded for the purposes of this analysis. Samples are not limited to sites with 2 surveys, as the denominator standardized effort between OHV and control sites. In example: 23 acorn woodpeckers were detected in the control area for spring 2012. 49 control site visits occurred in spring 2012, so there were 49 opportunities to detect acorn woodpeckers (or any other bird species that occurs in the Park) in control areas. Dividing the 23 sightings by 49 (0.47), and repeating this process for all species between stratifications allows for comparisons not skewed by effort, as well as provides an idea of relative species abundance. Many other variables prevent an equal comparison, but effort is not one of them.

**Table 18. Detection frequency per visit for winter and spring 2011 (0-100 m). Continued on next page.**

Bird Species	Winter		Spring		Bird Species	Winter		Spring	
	OHV	Control	OHV	Control		OHV	Control	OHV	Control
Acorn Woodpecker	0.02	0.10	0.01	0.09	Northern Harrier	0	0.01		
American Goldfinch	0	0.22	0.08	0.01	Northern Mockingbird	0.03	0.05	0.13	0.04
American Kestrel	0.07	0.06	0.05	0.06	Northern Rough-winged Swallow			0	0.03
American Robin	0	0.04			Nuttall's Woodpecker	0.13	0.06	0.15	0.18
Anna's Hummingbird	0.07	0.10	0.18	0.10	Oak Titmouse	0.16	0.17	0.15	0.14
Ash-throated Flycatcher			0.23	0.12	Olive-sided Flycatcher			0.02	0
Barn Swallow			0.01	0.01	Orange-crowned Warbler			0.03	0.02
Bewick's Wren	0.32	0.38	0.54	0.42	Pacific-slope Flycatcher			0.02	0.02
Black Phoebe	0.04	0.04	0.04	0.05	Phainopepla	0.01	0.09	0.15	0
Black Throated Gray Warbler			0	0.01	Red-breasted Sapsucker	0	0.03		
Black-headed Grosbeak			0.05	0.01	Red-tailed Hawk	0.08	0.05	0.09	0.03
Brewer's Blackbird	0.05	0	0.06	0.45	Red-winged Blackbird	0.08	0	0.24	0.51
Brown-headed Cowbird			0.12	0.03	Rock Wren	0.02	0.01	0	0.03
Bullock's Oriole			0.16	0.13	Ruby-crowned Kinglet	0.35	0.27	0.02	0.03
Bushtit	0.13	0.16	0.02	0.07	Rufous Hummingbird			0.09	0.07
California Quail	0.13	0.17	0.55	0.33	Rufous-crowned Sparrow	0	0.01	0.01	0
California Thrasher	0.10	0.10	0.13	0.09	Sage Sparrow			0.02	0.02
California Towhee	0.10	0.03	0.23	0.11	Savannah Sparrow	0.05	0.04	0	0.02
Calliope Hummingbird			0.01	0.05	Say's Phoebe	0.09	0.16	0.01	0.08
Canyon Wren	0.01	0.02	0	0.03	Sharp-shinned Hawk	0.01	0.01	0.01	0
Cassin's Kingbird			0.03	0	Spotted Towhee	0.23	0.17	0.24	0.24
Cliff Swallow			0.17	0.06	Townsend's Warbler	0	0.01	0.02	0.03
Common Raven	0.12	0.05	0.37	0.12	Turkey Vulture	0.01	0.03	0	0.06
Dark-eyed Junco	0.39	0.20	0.01	0.01	Violet-green Swallow			0	0.04
European Starling	0	0.23	0.17	0.41	Warbling Vireo			0.02	0
Fox Sparrow	0.02	0.01	0	0.01	Western Bluebird	0.48	0.26	0.16	0.19



Bird Species	Winter		Spring		Bird Species	Winter		Spring	
	OHV	Control	OHV	Control		OHV	Control	OHV	Control
Golden Eagle	0	0.02			Western Flycatcher			0.01	0
Golden-crowned Sparrow	0.97	0.32	0.03	0.05	Western Kingbird			0.33	0.11
Grasshopper Sparrow			0	0.01	Western Meadowlark	0.59	0.12	0.01	0.23
Hermit Thrush	0	0.01			Western Scrub-Jay	0.48	0.38	0.39	0.37
House Finch	0.90	0.88	0.28	0.12	Western Tanager			0.01	0.02
House Sparrow			0.01	0	Western Wood-Pewee			0	0.01
House Wren			0	0.01	White-breasted Nuthatch	0.05	0.09	0.01	0.06
Killdeer			0.15	0.09	White-crowned Sparrow	1.87	0.30	0.08	0.02
Lark Sparrow	0.03	0	0.01	0.09	White-tailed Kite			0.01	0
Lazuli Bunting			0.01	0.03	White-throated Swift			0	0.01
Lesser Goldfinch	0.02	0.02	0.02	0	Wilson's Warbler			0.02	0.04
Loggerhead Shrike	0.07	0.10	0.04	0.05	Wrenit	0.15	0.17	0.32	0.44
Mallard			0.01	0	Yellow Warbler			0.01	0
Mourning Dove	0.01	0.01	0.30	0.20	Yellow-billed Magpie	0	0.08	0	0.01
Northern Flicker	0.04	0.18	0.02	0.09	Yellow-rumped Warbler	0.17	0.41	0.04	0.13

**Table 19. Detection frequency per visit for spring of 2012 (0-100 m).**

Bird Species	OHV	Control	Bird Species	OHV	Control
Acorn Woodpecker	0.04	0.47	Lesser Goldfinch	0.09	0.08
American Goldfinch	0.02	0	Lewis's Woodpecker	0.02	0
American Kestrel	0.09	0.04	Loggerhead Shrike	0.02	0.02
American Robin	0	0.02	Mourning Dove	0.69	0.27
Anna's Hummingbird	0.04	0.10	Northern Flicker	0.02	0.04
Ash-throated Flycatcher	0.51	0.06	Northern Mockingbird	0.13	0.02
Band-tailed Pigeon	0.04	0	Northern Rough-winged Swallow	0.04	0.02
Barn Swallow	0	0.27	Nuttall's Woodpecker	0.29	0.37
Bewick's Wren	0.47	0.12	Oak Titmouse	0.29	0.47
Black Phoebe	0.02	0.08	Pacific-slope Flycatcher	0.02	0
Black-headed Grosbeak	0.02	0.02	Phainopepla	0.18	0.02
Brewer's Blackbird	0.13	0.14	Prairie Falcon	0	0.02
Brown-headed Cowbird	0.16	0.18	Red-tailed Hawk	0	0.02
Bullock's Oriole	0.20	0.29	Red-winged Blackbird	0.02	0.82
Bushtit	0.02	0	Sage Sparrow	0	0.02
California Quail	0.33	0.45	Say's Phoebe	0.02	0.02
California Thrasher	0.04	0.02	Spotted Towhee	0.20	0.10
California Towhee	0.47	0.14	Tree Swallow	0	0.08
Cassin's Kingbird	0.09	0	Turkey Vulture	0.09	0.02
Chipping Sparrow	0	0.02	Warbling Vireo	0	0.04
Cliff Swallow	0.22	0.02	Western Bluebird	0.18	0.33
Common Raven	0.27	0.27	Western Kingbird	0.38	0.27
Dark-eyed Junco	0	0.10	Western Meadowlark	0	0.16
European Starling	0.04	0.57	Western Scrub-Jay	0.53	0.69
Grasshopper Sparrow	0.02	0	Western Tanager	0.02	0.04
Hermit Thrush	0	0.02	Western Wood-Pewee	0	0.04
House Finch	0.82	0.20	White-breasted Nuthatch	0.22	0.22
House Sparrow	0.07	0	Wild Turkey	0	0.02
Killdeer	0.09	0	Wrentit	0.07	0.04
Lawrence Goldfinch	0.07	0	Yellow-billed Magpie	0	0.18
Lazuli Bunting	0.02	0			

**Table 20. Detection frequency per visit for spring of 2013 (0-100 m).**

Bird Species	OHV	Control	Bird Species	OHV	Control
Acorn Woodpecker	0.03	0.43	Lesser Goldfinch	0.01	0.06
American Crow	0	0.01	Loggerhead Shrike	0.04	0.09
American Goldfinch	0.01	0	Mourning Dove	0.54	0.52
American Kestrel	0.04	0.09	Nashville Warbler	0.01	0
Anna's Hummingbird	0.08	0.05	Northern Flicker	0.04	0
Ash-throated Flycatcher	0.31	0.19	Northern Mockingbird	0.14	0.12
Barn Swallow	0.01	0.12	Northern Rough-winged Swallow	0.01	0.05
Belted Kingfisher	0	0.01	Nuttall's Woodpecker	0.20	0.22
Bewick's Wren	0.19	0.03	Oak Titmouse	0.22	0.35
Black Phoebe	0.03	0.04	Pacific-slope Flycatcher	0	0.01
Black Throated gray warbler	0.01	0	Phainopepla	0.16	0.01
Black-headed Grosbeak	0.01	0.04	Red-tailed Hawk	0.03	0.13
Brewer's Blackbird	0.05	0.17	Red-winged Blackbird	0.04	0.35
Brown-headed Cowbird	0.08	0.14	Rock Wren	0.01	0
Bullock's Oriole	0.18	0.26	Ruby-crowned Kinglet	0	0.01
Bushtit	0.07	0.17	Rufous-crowned Sparrow	0.01	0
California Quail	0.08	0.22	Say's Phoebe	0	0.03
California Thrasher	0.03	0	Spotted Towhee	0.08	0.05
California Towhee	0.11	0.19	Swainson's Hawk	0	0.01
Cassin's Kingbird	0.04	0.01	Turkey Vulture	0.04	0.19
Cliff Swallow	0.32	0.06	Violet-green Swallow	0	0.03
Common Raven	0.36	0.29	Warbling Vireo	0.01	0
Dark-eyed Junco	0	0.05	Western Bluebird	0.24	0.26
Downy Woodpecker	0	0.01	Western Kingbird	0.45	0.08
Eurasian Collared-Dove	0	0.13	Western Meadowlark	0	0.19
European Starling	0	0.47	Western Scrub-Jay	0.30	0.38
Golden Eagle	0	0.04	Western Tanager	0.01	0.04
Golden-crowned Sparrow	0	0.01	White-breasted Nuthatch	0.26	0.05
Greater Roadrunner	0.01	0	White-crowned Sparrow	0.03	0.06
Horned Lark	0	0.04	Wild Turkey	0.07	0.14
House Finch	0.55	0.22	Wilson's Warbler	0	0.03
Killdeer	0.08	0.05	Wrentit	0.05	0.01
Lark Sparrow	0.04	0.03	Yellow Warbler	0.01	0.03
Lawrence Goldfinch	0.03	0	Yellow-billed Magpie	0	0.05
Lazuli Bunting	0	0.03	Yellow-rumped Warbler	0	0.01

**Table 21. Detection frequency per visit for spring 2014 (0-100 m).**

Bird Species	OHV	Control	Bird Species	OHV	Control
Acorn Woodpecker	0.12	0.30	Northern Rough-winged Swallow	0	0.07
American Goldfinch	0.01	0	Nuttall's Woodpecker	0.20	0.25
American Kestrel	0.01	0.08	Oak Titmouse	0.46	0.65
Anna's Hummingbird	0.07	0.17	Olive-sided Flycatcher	0	0.01
Ash-throated Flycatcher	0.45	0.36	Orange-crowned Warbler	0.06	0.01
Bank Swallow	0.04	0.07	Pacific-slope Flycatcher	0.14	0.07
Barn Owl	0.01	0	Phainopepla	0.12	0.09
Bewick's Wren	0.44	0.26	Purple Finch	0	0.01
Black Phoebe	0.03	0.02	Red-breasted Sapsucker	0	0.03
Black-headed Grosbeak	0.03	0.07	Red-tailed Hawk	0.03	0.05
Brewer's Blackbird	0.16	0.26	Red-winged Blackbird	0.06	0.15
Brown-headed Cowbird	0.06	0.11	Rock Wren	0.01	0.03
Bullock's Oriole	0.18	0.27	Ruby-crowned Kinglet	0.01	0.03
Burrowing Owl	0.02	0	Rufous Hummingbird	0.02	0.01
Bushtit	0.31	0.03	Rufous-crowned Sparrow	0.02	0.05
California Quail	0.09	0.27	Sage Sparrow	0.03	0.05
California Thrasher	0.06	0	Savannah Sparrow	0	0.03
California Towhee	0.31	0.27	Say's Phoebe	0.05	0.02
Cassin's Kingbird	0.08	0.03	Spotted Towhee	0.15	0.03
Chipping Sparrow	0.03	0.07	Steller's Jay	0	0.07
Cliff Swallow	1.08	0.02	Swainson's Hawk	0.01	0.03
Common Raven	0.29	0.35	Townsend's Warbler	0	0.01
Dark-eyed Junco	0	0.02	Turkey Vulture	0.10	0.06
Eurasian Collared-Dove	0.05	0.28	Violet-green Swallow	0.04	0.10
European Starling	0.13	0.34	Warbling Vireo	0.01	0.01
Golden Eagle	0.01	0.01	Western Bluebird	0.23	0.33
Golden-crowned Sparrow	0.16	0.11	Western Kingbird	0.32	0.26
Grasshopper Sparrow	0	0.05	Western Meadowlark	0.03	0.42
Horned Lark	0	0.03	Western Scrub-Jay	0.44	0.55
House Finch	1.20	0.82	Western Tanager	0.02	0.08
House Sparrow	0.06	0	Western Wood-Pewee	0	0.05
House Wren	0.02	0.07	White-breasted Nuthatch	0.10	0.36
Killdeer	0.01	0.05	White-crowned Sparrow	0.19	0.11
Lark Sparrow	0.01	0.15	White-throated Swift	0.01	0.01
Lazuli Bunting	0.01	0.05	Wild Turkey	0.03	0.01
Lesser Goldfinch	0.16	0.08	Willow Flycatcher	0.01	0
Lewis's Woodpecker	0	0.02	Wilson's Warbler	0.07	0.02
Loggerhead Shrike	0.06	0.05	Wrentit	0.32	0.15
Mourning Dove	0.52	0.50	Yellow Warbler	0.05	0.19
Nashville Warbler	0	0.01	Yellow-billed Magpie	0	0.01
Northern Flicker	0	0.08	Yellow-rumped Warbler	0.01	0.02
Northern Mockingbird	0.06	0.09			

### ***Effort***

At first glance, there seems to be a positive correlation between the numbers of species observed annually, and the annual survey effort (Tables 1-4; Figure 3). In 2010, 63 birds species were seen with a relatively low sample size (n=38), whereas 2011 resulted in 90 species seen (n=109). This positive relation between sampling size and species observation is further supported by the 2012, 2013, and 2014 results of 68, 75, and 90 species, respectively, being observed (n=45, n=80, and n=99 respectively). In addition to the sample size increase, there was also a broadening of the survey period (i.e. 2011: Dec-Feb, April-June; 2010: Feb-June), which may influence the number of individual species recorded annually.

The 2010 effort was the pilot study period to test the protocols, and 2011-2014 aspired to survey all 110 pre-determined sites. As seen in 2012 and 2013, not all sites were sampled. The lower survey effort is especially poignant in the sagebrush-black sage habitats, where no sites were visited in 2012 or 2013; this may be due to a failing in the random sampling design, which does not take site access into account. Many of the sagebrush-black sage points are challenging to get to due to either topography, soil instability, vegetation density, or a combination of these factors. This will be resolved in 2015 by manually adjusting certain points to the closest accessible point (i.e. inaccessible point 20 m down a steep, unstable slope will be moved up 20 m). These changes, while obviously biased in placement, will still adhere to the 200 m point-to-point buffer, as well as the 51% habitat type radius. Overall, although not all sites will be part of a randomized design, this will likely improve avian surveys by ensuring all habitat types are adequately represented in the survey period. A further discussion on this will be provided in the 2015 HMS report.

The least variable data are observations within 100 m of the site, since the sample sites were originally established with 200 m buffer from one another. So if we assume, for the sake of argument, that birds are stationary and do not move then 100 m is the maximum distance that a bird could be observed before we encroach on another sites 100 m observation field. Limiting the observations to 100 m will theoretically reduce the chance of double counting individual birds. It is for this reason that only data collected 100 m or less from a surveyed site was used for the diversity indices, CDFW Special Animals, and detection frequency analyses.

### ***Diversity Indices***

In general, the diversity indices between OHV and control sites are very similar across all four years (Table 13). There does, however, seem to be a consistent difference across 2011, 2013, and 2014 in the grassland habitats between OHV and control areas. This could be due to a number of factors, some of which may include vegetation cover, human presence in an open area, or a combination of the two. Effort was equal for all 3 years of grassland habitat surveys, so this should not have a detectable influence on diversity index. Long-term monitoring will show if this changes over time with the progression of Resource Management Areas (RMA). Although statistical analysis will better define this relationship, the diversity does not appear to be drastically different between the treatment levels (apart from the aforementioned grassland observation), as measured by diversity index. It is important to note that while observation distance was controlled for (0-100 m), effort across habitat types was not taken into account in this analysis, and that while some years it is equal across treatments, it is uneven in others

(Tables 1-4; Figure 3). This summary statistic should continue to be calculated each year to allow for trends to be revealed.

### ***Special Animals***

The Special Animals list is published by the California Department of Fish and Wildlife each year. For this report we used the 2015 version of the special animals as the definitive list of species that have the greatest conservation need regardless of legal status. Tables 14-17 show the average number of species from this list detected during surveys at any given point in riding or non-riding areas, controlled for distance from site (0-100 m). In 2011, twelve species of birds observed during surveys were also on the list for Special Animals. The species that was most widely observed this year was the Nuttall's woodpecker, followed closely by the Oak Titmouse. In 2012, nine species from this list were observed, again, with the Nuttall's woodpecker and oak titmouse vying most abundant each year, as they do in 2013 (eight species detected) and 2014 (seventeen species detected). Standard deviations are around 1 for 2011 and 2012, but vary considerably for 2013 and 2014. Considering the regional threats their populations are experiencing, it will be important to keep track of this group of birds to ensure their persistence and recovery.

### ***Detection frequencies***

This analysis was an attempt at leveling the effort between riding and non-riding areas to allow for a relative abundance comparison. The data (Tables 18-21) revealed that some species were more abundant in OHV areas throughout all four years (Cassin's kingbird), some were more abundant in control areas (yellow-billed magpie), or were around equal and/or varied from year to year (black phoebe). This sort of analysis should be continued if effort remains variable each year, as it is helpful for tracking trends in species incidence and population fluctuations. Currently, there is not enough data to sufficiently support trends within treatment levels.

The 2011 surveys show that not many species were detected in the winter that were not also detected in the spring (four to be exact). This information is useful from a species inventory perspective, however, the winter surveys may also contribute to understanding seasonal abundance influxes of species (dark-eyed junco, ruby-crowned kinglet), and overall population trends over time. Although winter surveys were not conducted in 2012, 2013, and 2014, they will be carried out in future years. This will be facilitated by a reduction in the number of sites, as determined by a power analysis on the existing number of sites and variables. This information will be reported on in the 2015 HMS report.

## AQUATIC AMPHIBIANS AND REPTILES

Aquatic resources on CSVRA include the ephemeral Corral Hollow Creek and its seasonal drainages, as well as other water bodies comprised of stock ponds and sediment retention basins. These water bodies can hold water into the late spring, depending on pond characteristics and seasonal rainfall. A variety of special status amphibian species are known to occur on CSVRA, including special status California red-legged frog (*Rana draytonii*, CRLF), California tiger salamander (*Ambystoma californiense*, CTS), foothill yellow-legged frog (*Rana boylei*, FYLF), and western spadefoot toad (*Spea hammondi*, WSFT). Western pond turtle (*Actinemys marmorata*, WPT), a special status aquatic reptile, also occurs on CSVRA and may be detected during aquatic monitoring. Other species regularly encountered include coast range newt (*Taricha torosa*), western toad (*Anaxyrus boreas*), aquatic garter snake (*Thamnophis atratus*), and Sierran tree frog (*Pseudacris regilla*), also known as Pacific chorus frog.

The purpose of aquatic species monitoring is to determine species presence and species' use of aquatic breeding habitat at the sites surveyed. In addition, monitoring the water bodies allows for an opportunity to assess the aquatic habitat and adjacent uplands and record any changes or threats to these habitats. Work is currently being done to expand the variables measured during surveys to allow for more in-depth population analyses over time.

### Methods

In order to monitor aquatic species, surveys are conducted twice in the spring at known water bodies in the park. This includes twenty-five stock ponds and sediment retention basins, as well as sections of Corral Hollow Creek in both the riding and non-riding areas. Figure 4 displays water body locations. Surveys are typically conducted in April or May and again in May or June. This timing allows for detection of juvenile amphibians with little to no risk of egg mass presence (egg masses could be harmed by dipnetting).

Monitoring is conducted by a qualified biologist in possession of a federal 10(a)1(A) Recovery Permit for CRLF and CTS. The permitted biologist also holds a Memorandum of Understanding (MOU) from the California Department of Fish and Wildlife (CDFW) for handling of listed species as well as a CDFW Scientific Collection Permit. Other biologists may accompany the permitted biologist and assist with the survey.

During surveys, the water body is approached slowly and quietly and scanned with binoculars for any sign of amphibians or reptiles. Following the visual encounter survey, the water body is dipnetted. Sampling consists of carefully dipping the net in the water with a sweeping arc motion, checking the net, and recording any captures by species, including the total number observed and developmental stage. Typically the entire perimeter of the water body is surveyed. A herpetological field guide (Stebbins 1985) and other identification keys or photographs are used to verify species if needed. All amphibians are carefully returned to the water immediately after they are recorded in the net. Turtles are observed by visual encounter only; no trapping of turtles is conducted. The survey methodology described allows for a determination of species presence and breeding.

Other data collected during water body surveys includes the weather at the time of the survey, survey start and stop time, pond capacity, the number of dips made, and number of observers/biologists conducting the survey.

Due to variation in annual rainfall including years with very low levels of rain, in some years water bodies are found to be dry during aquatic species monitoring. Dry water bodies are recorded as such and no further data is collected. It should be noted that three water bodies have successively transformed into mule fat thicket and no longer hold water. One of these is being considered for restoration, and two of these water bodies will be removed from the map (cannot be restored due to the presence of archeological resources). In addition, two ponds have been heavily overgrown with cattails, and will require vegetation removal to allow for the continuance of open water habitat.

Aquatic species monitoring was conducted in 2011, 2012, and 2014. No monitoring was carried out in 2013.



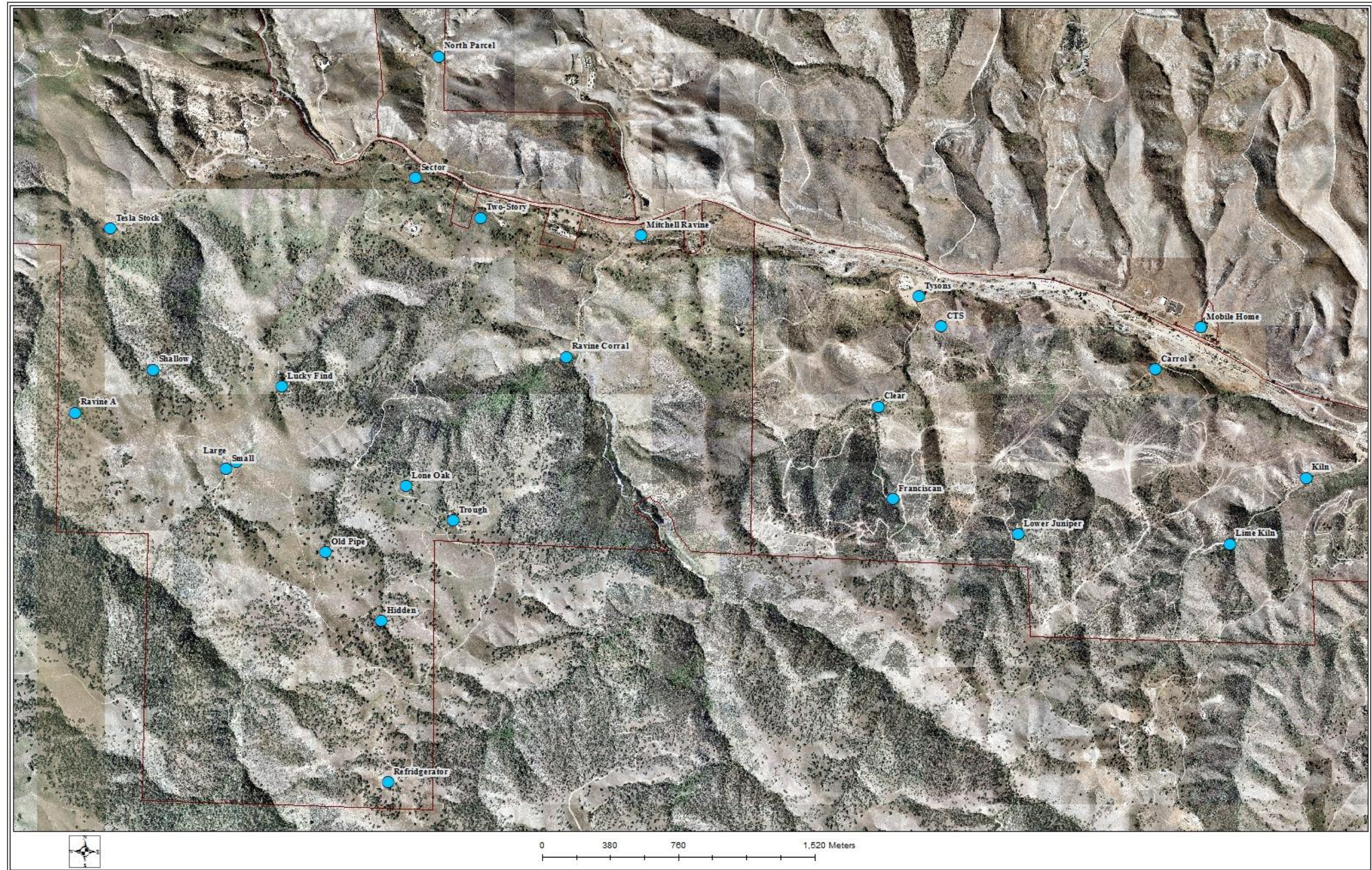


Figure 4. Map of water bodies.

## Results

California has been experiencing several years of drought, and the winters of 2011/2012 and 2013/2014 were very dry. Precipitation data from the Lawrence Livermore National Laboratory (LLNL), Site 300 located on the other side of Corral Hollow Road from CSVRA is provided in Table 22.

**Table 22. LLNL Site 300 precipitation data**

Rainfall Season	Total Precipitation in inches
2010/2011	13.53
2011/2012	7.01
2013/2014	5.36

The 2010/2011 rainfall season had adequate rainfall to support ponding water in most of the water bodies surveyed in the spring of 2011. The 2011/2012 and 2013/2014 rainfall seasons had little precipitation, and many of the water bodies were found to be dry during aquatic species monitoring in the spring of 2012 and 2014. The number of water bodies that held water during the survey period is summarized in Table 23, and survey effort (number of visits) is shown in Table 24. A summary of results from these three years for each of the water bodies included in the monitoring program is presented in Table 25.

**Table 23. Surveyable water bodies for 2011-2014.**

Number of water bodies that were inundated during the survey period for at least one of the two surveys stratified by riding and non-riding areas.

Stratification	Sample size		
	2011	2012	2014
OHV	3	4	5
Control	14	10	10

**Table 24. Survey effort for 2011-2014.**

Total number of surveys that occurred stratified by riding and non-riding. Effort is defined by number of visits and does not take number of dipnet sweeps into account.

Stratification	Survey effort		
	2011	2012	2014
OHV	5	4	8
Control	30	10	17

**Table 25. Summary of species presence and detected breeding.**

Water Body	CRLF			CTS			WSFT			WPT			FYLF			Western Toad			Sierran Tree Frog			Aquatic Garter Snake			Coast Range Newt		
	2011	2012	2014	2011	2012	2014	2011	2012	2014	2011	2012	2014	2011	2012	2014	2011	2012	2014	2011	2012	2014	2011	2012	2014	2011	2012	2014
Hidden Pond		B	B	B												B		B	B	B							
Kiln Pond																B			B								
Large Pond				B														B									
Lime Kiln																											
Lone Oak Pond				B														B	B						B		
Lower Juniper Pond				B																							
Lucky Find Pond																			B								
Mitchell Pond	B	B	B													B	B		B	B							
Mobile Home Pond		B	B																								
Old Pipe Pond				B												B			B		B						
Ravine Corral																B			B								
Refrigerator Pond																B		B	B		B						
Sector Pond				B												B			B	B							
Shallow																			B								
Small Pond	B	B	B	B												B	B	B	B	B	B						B
Tesla Pond				B												B	B		B	B						B	
Trough Pond																B		B	B		B						B
Two Story																			B								
Tyson's																											
CHC- control								B																			
CHC- OHV																B			B								

None (either pond dry or wet but no individuals recorded)
  Recorded
B Breeding detected (eggs or larva)

\*CRLF= California red-legged frog; CTS= California tiger salamander; WSFT= western spadefoot toad; WPT= western pond turtle; FYLF= foothill yellow-legged frog

**Table 26. Aquatic species detection frequencies for 2011-2014.**

Displays the frequency of individuals detected per visit each year in control versus riding areas. For the purposes of this analysis, data from extraneous visits and observations made outside of the monitoring protocol were discarded. Although this method of analysis removes number of visits as a variable for comparing riding and non-riding results, inconsistencies such as the number of water bodies (n), the number of dipnet sweeps, water depth and surface area, and many others remain influences when comparing these numbers.

Aquatic Species	Stratification					
	2011		2012		2014	
	OHV (n= 3)	Control (n= 14)	OHV (n= 4)	Control (n= 10)	OHV (n= 5)	Control (n= 10)
Aquatic Garter Snake	0	0.27	0	0.50	0	0.35
California Newt	0	0.30	0	0.20	0.25	0.35
California Red-legged Frog	0.20	0.30	0.25	0.60	0.38	0.88
California Tiger Salamander	0.20	0.33	0	0	0	0
Pacific Chorus Frog	0	1.03	0.50	0.80	0.13	0.53
Western Pond Turtle	0	0.10	0	0.10	0.13	0
Western Spadefoot Toad	0.40	0	0	0	0	0
Western Toad	0.40	0.57	0	0.30	0	0.41

**Table 27. Aquatic species presence for 2011-2014.**

Displays the percent of surveyable water bodies with aquatic species present, stratified by year and riding versus non-riding areas.

Aquatic species	Stratification					
	2011		2012		2014	
	OHV (n= 3)	Control (n= 14)	OHV (n= 4)	Control (n= 10)	OHV (n= 5)	Control (n= 10)
Aquatic Garter Snake	0%	50%	0%	40%	0%	40%
California Newt	0%	50%	0%	20%	40%	30%
California Red-legged Frog	33%	29%	25%	30%	40%	50%
California Tiger Salamander	33%	50%	0%	0%	0%	0%
Pacific Chorus Frog	0%	100%	25%	30%	20%	50%
Western Pond Turtle	0%	7%	0%	10%	20%	0%
Western Spadefoot Toad	33%	0%	0%	0%	0%	0%
Western Toad	67%	71%	0%	30%	0%	40%

Following is a discussion of findings for each of the four special-status species as well as non-ranked species.

#### California Tiger Salamander; Federal and State Threatened

California tiger salamander was recorded in 2011, but not in the drier years of 2012 or 2014. This is a species that responds to rainfall patterns and may not breed in a drier year when ponds are smaller and dry earlier in the season. CTS spends the majority of its adult life span underground, occurring in ponds only for breeding. If conditions are not suitable for breeding due to a lack of sufficient water, CTS will not breed and thus they will not be recorded at the water bodies. An absence of CTS during monitoring does not signify that the species is absent from the study area, only successful breeding was not detected in the water body that year.

In 2011, larval CTS was recorded in 8 water bodies, including 7 stock ponds on the Tesla-Alameda property and one water basin (Lower Juniper) within the riding area (Table 25). Large Pond had the highest number of CTS recorded, with 34 larvae and one adult netted on May 11. Lower Juniper Pond was surveyed for the first time in 2011 and CTS was observed. At all other ponds where CTS was recorded in 2011, the species had been observed at that pond in the past. CTS was not recorded in any of the water bodies surveyed in the drier years of 2012 and 2014.

#### California Red-legged Frog, Federal Threatened

California red-legged frog is consistently documented at several of the water bodies on the CSVRA. In all three years reviewed in this report, CRLF was recorded at Hidden Pond, Small Pond, Mitchell Ravine Pond, and Lime Kiln. The species was also recorded at Mobile Home Pond in 2012 and 2012, Refrigerator Pond in 2014 and for the first time in Tyson's Basin in 2014.

Hidden Pond provides perhaps some of the best breeding habitat for CRLF on CSVRA due to its size, water holding capacity, and earthen banks. Small Pond and Mitchell Ravine Pond also provide important breeding habitat, but are smaller ponds and may dry out earlier in the year than Hidden Pond. Small pond is located in heavily grazed grassland, and Mitchell Ravine Pond is located adjacent to the Corral Hollow Creek floodplain near Mitchell Ravine Road. Mitchell Ravine Pond supports dense emergent vegetation and may require vegetation management to maintain open water habitat in the future.

Mobile Home Pond is within the CSVRA property boundary, but is located on the north side of Corral Hollow Road. Mobile Home Pond supports a vigorous CRLF population, and many large-sized adults were observed in 2014. The pond supports dense emergent vegetation and is slowly losing open water habitat. Vegetation management at this pond to restore open water habitat for the benefit of CRLF is planned. Nonnative American bullfrog (*Lithobates catesbeianus*) has been recorded at Mobile Home Pond in past years, but has not been recorded since 2006.



**Figure 5. CRLF from Lime Kiln**

Lime Kiln is located within the riding area in a natural cave located off of Kiln Road. Lime Kiln is a water body within a cave. This unique aquatic feature is in near darkness, with no vegetation, a small dirt shore, and rock floor and walls. Breeding has not been recorded in Lime Kiln, but it does provide important refugia for adult CRLF within the riding area. The area surrounding the cave entrance is enclosed in chain link fence, keeping park visitors away from the cave and water body.

One juvenile CRLF was recorded in Tyson's Basin in 2014. Tyson's Basin is located in the riding area near the maintenance yard. Breeding CRLF has never been recorded in this water body and it is hypothesized that this juvenile frog hatched in a nearby CRLF-occupied pond such as Mitchell Ravine or Mobile Home. Juvenile frogs will migrate away from their breeding

pond to escape adult CRLF, which will prey on smaller juvenile frogs.

#### Western Pond Turtle, State Species of Special Concern

Western pond turtle occurs on CSVRA but is rare and not commonly recorded. WPT was observed at Tesla Pond in 2011 and 2012. Tesla Pond was dry in 2014 and no species were recorded there in that year. A single WPT was observed upstream from Tesla Pond in Corral Hollow Creek in 2014 at the same location that a foothill yellow-legged frog was observed (see discussion below). In addition, one turtle was observed at Kiln Basin in 2014. Kiln Basin is located within the riding area adjacent to Kiln Road.

For the time period that this HMS report reviews, WPT is ranked only as a species of special concern. However, on April 9, 2015, a 90-day findings announcement for listing of WPT under the federal Endangered Species Act was published. The one year review for listing will begin in July, 2015.

#### Foothill Yellow-legged Frog, State Species of Special Concern

Foothill yellow-legged frog is the most rare special-status species on CSVRA. A single adult FYLF was observed in Corral Hollow Creek on the Tesla-Alameda property in 2014. This was the first record of this species on the SVRA since 2000, when a single FYLF was observed, also in the Tesla-Alameda portion of Corral Hollow Creek.

Foothill yellow-legged frog is a stream-breeding species that inhabits streams year-round. Thus its preferred habitat is largely overlooked in the current aquatic species monitoring program which focuses on ponds. A monitoring program could be established that focuses on this species and includes all of the Tesla-Alameda stretch of the creek during the spring. The descending limb of the spring hydrograph is the most favorable time to survey Corral Hollow Creek for FYLF as the creek can be dry in the summer and fall.

### Western Spadefoot Toad, State Species of Special Concern

Western spadefoot is unique from the other amphibians as the species' preferred breeding habitat is not ponds or running streams, but instead temporary rain pools that form during the rainy season. WSFT was recorded in 2011 at two locations in Corral Hollow Creek, both outside of the riding area on the Tesla-Alameda property.

A limitation with the monitoring program described above is that breeding habitat for western spadefoot toad is not well surveyed for. Spadefoot toads may breed in rain pools that form within the Corral Hollow Creek floodplain or pooling areas within the creek where water slows. Similar to CTS, spadefoot toad breeds in response to adequate rainfall and the development of suitable pools that will support the species through larval metamorphosis. Carnegie staff is developing a monitoring program specific to western spadefoot for Corral Hollow Creek and floodplain rain pools. Development of this program began in the fall of 2013, however no monitoring was conducted in 2014 due to the drought and the lack of rain pools.



**Figure 6. WSFT metamorph from 2015 surveys**

Surveys for WSFT have begun this year (2015). Surveys for adult WSFT were conducted five nights, two of which were during a warm storm event that occurred February 6-8. It was raining on the night of February 6, and 69 adult WSFT were counted within various pools within Corral Hollow Creek and floodplain in the riding area. Several pairs in amplexus were observed. Data on this species, including larval surveys, will continue to be collected in the

winter and spring of 2015 and will be reported on in the 2015 HMS report.

### Non-ranked Species

In addition to the special-status species listed above, four species that have no special status or ranking are regularly recorded at the water bodies. These include western toad, Sierran tree frog, aquatic garter snake, and California newt. All four of these species were recorded at various water bodies in 2011, 2012, and 2014. In the dry years of 2012 and 2014 some of the water bodies where these species had been recorded in the past did not pond water. Ponds that were still supporting some or all of these species even in the driest year of 2014 include Hidden, Refrigerator, Small, Old Pipe, and Trough ponds. These ponds are important aquatic habitat as they still function to support these breeding amphibians even in a drought year when other water bodies lack suitable water. Resource management at CSVRA should include regular analysis of water quality, pond structure/stability, emergent vegetation cover, and adjacent upland habitat quality so that these ponds, as well as any that support special-status species, are maintained.

## **SMALL MAMMALS (EXCLUDING BATS)**

Between the years of 2011 and 2014, small mammal trapping was conducted only in 2011. The reason trapping was not conducted in other years was due to the significant level of effort required, and limited resources being allocated to other priority projects. Additionally, no special status small mammal species are known to occur on CSVRA.

### **Methodology**

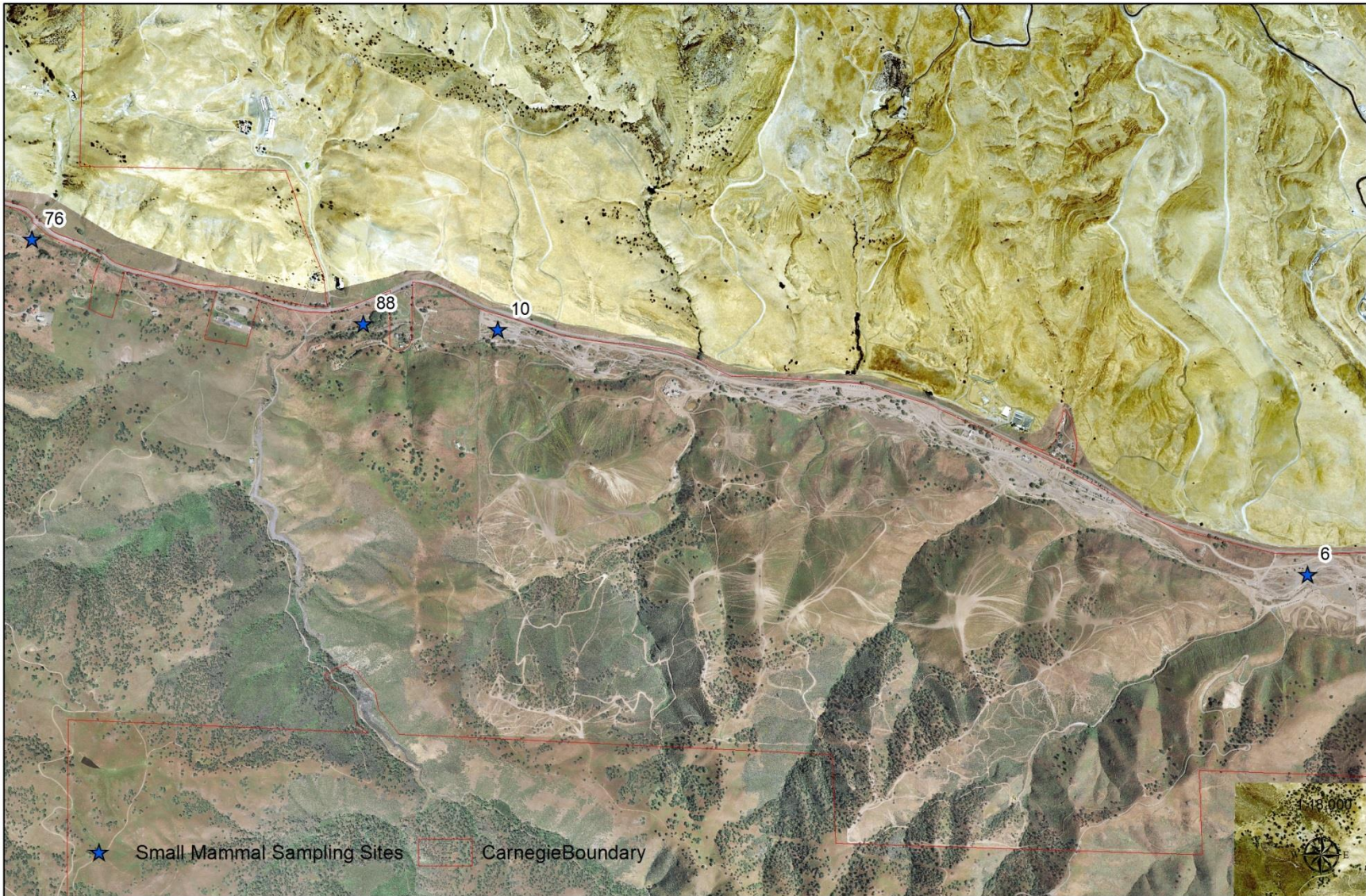
Small mammal trapping occurred at four sites in the fall of 2011. Two sites are located in the riding area and two sites are located in the non-riding area. One of the riding area sites (HMS Site 6) is behind the creek riparian setback that was erected in 2009. All of the sites are within the riparian habitat and are also sampled for bird species in the spring. Therefore, the site location was originally generated randomly using ArcMap 9 (ESRI). However, the locations of the twenty traps within each of the four sites were subjectively selected based on runways and vegetation structure.

Twenty Sherman live traps (Model XLK) are set for three nights at each site. The twenty traps were not placed beyond 36 meters of the site marker. This constraint was based on the protocol used to measure trail density which allows for the possibility of vegetation features within 36 m to be sampled. The traps are baited with a mixture of oats, apples, and molasses and are checked twice, once in the morning and once in the evening. The traps also had poly-fill placed inside to help keep the animals warm. Animals are identified, sexed, weighed, and released in close proximity to the trap. Sampling effort was equal across treatments.



**Figure 7. Small mammal trapping.**





**Figure 8. Small mammal sampling sites.** The four sites were located in the riparian habitat. Site 76 and 88 were outside the riding area while 6 and 10 were in the riding area.



**Figure 9. Trap Locations at HMS Site 6 (within riding area).**



**Figure 10. Trap Locations at HMS Site 10 (within riding area).**



**Figure 11. Trap Locations at HMS Site 76 (outside riding area).**



**Figure 12. Trap Locations at HMS Site 88 (outside riding area).**

## Results

At all sites, more mammals were captured in traps set in the morning than in the evening. Evening traps caught zero to one individual, whereas daytime traps caught approximately 5 to 15 individuals. A similar diversity of species was recorded at the sites, with a total of four species seen, all of which are native and common. At site 6 in the riding area, western harvest mouse (*Reithrodontomys megalotis*), deer mouse (*Peromyscus maniculatus*), and Heermann's kangaroo rat (*Dipodomys heermanni*) were captured. At site 10, also in the riding area, these three species as well as California pocket mouse (*Chaetodipus californicus*) were recorded. Species captured at Site 76, outside of the riding area, include western harvest mouse, deer mouse, and California pocket mouse. All four species were captured at site 88, outside of the riding area.

**Table 28. Results of trapping for Site 6.**

Date	Start time	Species	Count	Recapture
11/1/2011	PM	<i>No species trapped</i>	-	-
11/2/2011	AM	Deer mouse	3	-
		Heermann's kangaroo rat	5	-
		Western harvest mouse	2	-
	PM	<i>No species trapped</i>	-	-
11/3/2011	AM	Deer mouse	3	-
		Heermann's kangaroo rat	7	-
		Western harvest mouse	1	-
	PM	Heermann's kangaroo rat	1	-
11/4/2011	AM	Deer mouse	2	2
		Heermann's kangaroo rat	9	2

**Table 29. Results of trapping for Site 10 (continued on next page).**

Date	Start time	Species	Count	Recapture
10/18/2011	PM	<i>No species trapped</i>	-	-
10/19/2011	AM	California pocket mouse	2	-
		Deer mouse	3	-
		Heermann's kangaroo rat	2	-
		Western harvest mouse	4	-
	PM	<i>No species trapped</i>	-	-
10/20/2011	AM	California pocket mouse	1	-
		Deer mouse	5	-
		Heermann's kangaroo rat	2	-
		Western harvest mouse	4	-
	PM	<i>No species trapped</i>	-	-
10/21/2011	AM	California pocket mouse	2	2
		California vole	1	-

Date	Start time	Species	Count	Recapture
10/21/2011	AM	Deer mouse	4	1
		Heermann's kangaroo rat	2	-
		Western harvest mouse	3	-

**Table 30. Results of trapping for Site 76.**

Date	Start time	Species	Count	Recapture
10/18/2011	PM	<i>No species trapped</i>	-	-
10/19/2011	AM	Deer mouse	3	-
		Western harvest mouse	1	-
	PM	<i>No species trapped</i>	-	-
10/20/2011	AM	California pocket mouse	4	-
		Deer mouse	2	-
	PM	California pocket mouse	1	-
10/21/2011	AM	California pocket mouse	4	1
		Deer mouse	3	-

**Table 31. Results of trapping for Site 88.**

Date	Start time	Species	Count	Recapture
11/1/2011	PM	Western harvest mouse	1	-
11/2/2011	AM	California pocket mouse	2	-
		Deer mouse	8	-
		Heermann's kangaroo rat	1	-
		Western harvest mouse	2	-
	PM	Deer mouse	1	-
		Western harvest mouse	1	-
11/3/2011	AM	California pocket mouse	2	-
		Deer mouse	11	2
		Heermann's kangaroo rat	2	-
	PM	California pocket mouse	1	-
11/4/2011	AM	Deer mouse	13	4

**Table 32. Small mammal trapping success rate and species presence per site.**

Site	Trapping success	Species	Site presence
HMS 6	28%	Heermann's kangaroo rat	18%
		Deer mouse	7%
		Western harvest mouse	3%
HMS 10	30%	California pocket mouse	5%
		Heermann's kangaroo rat	5%
		California vole	1%
		Deer mouse	10%
		Western harvest mouse	9%
HMS 76	15%	California pocket mouse	8%
		Deer mouse	7%
		Western harvest mouse	1%
HMS 88	38%	California pocket mouse	4%
		Heermann's kangaroo rat	3%
		Deer mouse	28%
		Western harvest mouse	3%

**Table 33. Small mammal species presence per riding and non-riding.**

Species	OHV 29%	Control 26%
California pocket mouse	3%	6%
Heermann's kangaroo rat	12%	1%
California vole	0%	0%
Deer mouse	8%	17%
Western harvest mouse	6%	2%



## **BATS**

### **Methodology**

In 2014 a monitoring program for bats was initiated, and bat surveys were conducted in July and August, 2014. Surveys were conducted by bat biologist Jeff Alvarez of the environmental consulting firm The Wildlife Project.

Due to the variety of habitat types, the expansive study site, and the potential for numerous species' microhabitat requirements that could be investigated, visual encounter surveys and passive acoustic surveys were conducted at a few, selected locations in both the SVRA riding area and the Tesla-Alameda property. Site visits were conducted on July 17, 24, 31, and August 11, 2014. Visual encounter surveys were conducted by examining the external features of and entering the cavities of mines, large rock cracks (i.e., small caves), and natural caves. Evidence of guano, food debris piles, urine stains, roosting bats, carcasses of dead bats, and any detectable audio signatures were noted during each visit. Passive acoustic surveys began July 24 and ended August 11, 2014. These surveys were conducted for one or two week periods at Hidden Pond, Mitchell Ravine Pond, and Tyson's Basin, one cattle trough ("Tara's Trough") located at a Park residence, Lime Kiln cave, and one large mine adit (Tesla Mine).

Passive acoustic devices consisted of the Wildlife Acoustics SM2 Bat meter. Units were placed adjacent to the site of focus with a cabled microphone mounted on a PVC pole and placed within the stock pond targeted for data collection. Alternatively, units were placed within the opening of caves/mines such that the microphone head was mounted from the roof of the structure. Units were set to collect data beginning at one hour before sunset for 5 hours, and then for 30 minutes each hour until one hour after sunrise. Data were analyzed using Kaleidoscope 2.0.7 software (Wildlife Acoustics). Acoustic signatures that were not identifiable, were ambiguous, or which overlapped significantly with another species were discarded.

### **Results**

A total of 6 bat species were detected during the surveys, including two state Species of Special Concern. In addition, CSVRA Environmental Scientist Tara de Silva entered the Tesla Mine during the week of September 14, 2014 and noted at least three bats flying within the adit. The bats were photographed and are presumed with a great deal of certainty to be Townsend's big-eared bats, a candidate species for state threatened listing (photo identification made by Jeff Alvarez). This species has been added to Table 34.

**Table 34. Bat monitoring results (2014).**

Site name	Site information	Type of site	Bat Species detected	Common names of bats (status)
Hidden Pond	Freshwater stock pond (drying—approx. 6 inches deep); isolated from other inundated water bodies in an oak woodland/oak savannah; surrounding roost potential: tree cavities, tree bark crevices, rock outcrop crevices, tree canopy; open pathway for drinking and foraging; grazed by cattle; predators limited; obstructions limited	drinking, foraging	<i>Myotis yumanensis</i> <i>Parastrellus hesperus</i>	Yuma myotis (CSC) canyon bat
Mitchell Ravine Pond	Freshwater stock pond (drying—approx. 12 inches deep); isolated from other inundated water bodies and adjacent to seasonally dry riparian zone (Corral Hollow Creek); surrounding roost potential: tree cavities, tree bark crevices, rock outcrop crevices, tree canopy; pathway for drinking and foraging limited by cattail; no grazing; predators limited; obstructions = emergent vegetation	drinking, foraging	<i>Myotis yumanensis</i> <i>Myotis thysanoides</i>	Yuma myotis (CSC) fringed myotis
Tyson's Basin	Freshwater detention basin (drying—approx. 6 inches deep); isolated from other inundated water bodies and adjacent to seasonally dry riparian zone (Corral Hollow Creek); surrounding roost potential: tree cavities, tree bark crevices, rock outcrop crevices, tree canopy; pathway for drinking obscured by floating emergent vegetation, and foraging area open; no grazing; predators limited; obstructions = none	drinking, foraging	<i>Antrozous pallidus</i> <i>Myotis yumanensis</i> <i>Myotis thysanoides</i> <i>Myotis californicus</i> <i>Myotis evotis</i> <i>Parastrellus hesperus</i>	pallid bat (CSC) Yuma myotis (CSC) fringed myotis California myotis long-eared myotis canyon bat
Lime Kiln Cave	Freshwater spring exposed to the surface within cave system (extremely unique); isolated from other inundated water bodies; immediately adjacent to a dry riparian corridor; surrounding roost potential: cave, rock crevices, tree canopy, tree bark crevices; pathway for drinking and foraging clear within cave system, but entry obscured by Fremont cottonwood; no grazing; predators include California red-legged frog, snakes, ring-tail (if present); obstructions at cave entrance	drinking, foraging, day roosting, night roosting	<i>Antrozous pallidus</i> <i>Myotis yumanensis</i> <i>Myotis evotis</i> <i>Parastrellus hesperus</i>	pallid bat (CSC) Yuma myotis (CSC) long-eared myotis canyon bat
Tara's trough	Freshwater trough 8 feet in diameter; isolated from other inundated water bodies within an oak savannah; within 75 feet of an occupied residence; no exit ramp currently in place; surrounding roost potential: residential dwellings, tree cavities, tree canopy, tree bark crevices; pathway for drinking clear on three sides, no grazing; predators limited	drinking, foraging	<i>Myotis yumanensis</i>	Yuma myotis (CSC)
Tesla Mine	Abandoned mine with bat gate; rare roosting habitat in the region; set within arid brushland hillside surrounded by grassland and sparse tree cover; nearest drinking site is Hidden Pond (on site) or off site pools or troughs; surrounding roost potential: mine adit, mine shaft, rock crevices, tree crevices, tree canopy, tree cavity, additional mine shafts (sub-optimal); no grazing; predators include snakes and ringtail (if present)	drinking, foraging, day roosting, night roosting	<i>Parastrellus hesperus</i> <i>Corynorhinus townsendii</i>	canyon bat Townsend's big-eared bat (CESA candidate)



**Figure 13. Suspected Townsend's big-eared bat (*Corynorhinus townsendii*)**

The timing of the survey effort (i.e., July/August), the very dry conditions of the site in the drought year, and other factors may have contributed greatly to the results that were collected. Some bat species use sites seasonally, yet that site may provide very critical short-term roosting habitat for migratory movements. Other bats may remain in the same general region for the majority of the year, making only short movements or short duration bouts of torpor.

All bats generally leave a roosting site and head immediately to water bodies to drink. As water bodies dry and secondary drinking areas lie further from roosting sites, habitat suitability may decrease, particularly in dry years. Therefore the timing of bat surveys should be based on site conditions rather than the calendar year. In 2014 the site was quite dry with only 16% of available stock ponds holding any amount of water. Our strategy was to collect acoustic data at sites that continued to support drinking sites. During years where water is more abundant and widely distributed the species detected may be very different.

The variety of bats species utilizing drinking sites, mines, and caves at Carnegie SVRA is indicative of the variety and diversity of habitat types available at the park. The species ranged from cave and crevice roosting bats to tree roosting species. The majority of the species detected were found at drinking sites. Among those sites, Tyson's Basin was found to have the greatest diversity in species, with Lime Kiln Cave having a similar species composition (Table 34). The majority of the drinking sites included the detection of multiple bat species. Only Tara's Trough had a single bat species detected.

The following bat monitoring program will be instituted on an annual or biannual basis, depending on available CSVRA resources:

1. Conduct acoustic and visual encounter surveys at Tesla Mine. Ideally, visual encounter surveys will be conducted in winter (December/January; visual encounter surveys will be focused on hibernating bats) and late spring (June; acoustic surveys).
2. Conduct annual acoustic surveys at Tyson's Basin, Mitchell Ravine and Hidden Pond during a period between June 1 and August 1. Additional ponds (e.g., Small Pond) can and will be added if time, budget, and hydroperiod allows. The onset of acoustic sampling will be initiated after Corral Hollow Creek is dry and at least 50% of the existing stock ponds and water detention basins are dry. This will focus bat drinking-sites to those that appear to maintain water for the latest date. If the structure or condition of Tyson's Basin, Mitchell Ravine, and Hidden Pond changes over time, a surrogate pond will be selected.
3. Conduct a single visual encounter survey of buildings and structures within CSVRA between May 1 and August 1. This survey will identify guano piles, urine stains, dead bats, live bats, and other evidence of bat use.

## **INCIDENTAL OBSERVATIONS**

Incidental observations are observations of species made outside of the monitoring program described above. While this data is not analytical, it does provide a record of presence for those species listed. This list, however, should not be used as proof that a species is absent from the park. The list is highly subjective as it relies on observations from staff and visitors with their own interests and limitations. The grid that has been established (Figure 10) is intended to allow a coarse and quick data collection method. Not all observations have been linked to a grid location.

Incidental species observations from 2011 to 2014 are presented in Tables 35-38. If an HMS site is identified, this means the observation was closest to that site but not necessarily at that location. The previous Carnegie SVRA Environmental Scientist (ES) transferred to another department in March, 2014 and the subsequent ES began in mid-July, 2014. The lack of an ES for some of 2014, as well as training time for the current ES, resulted in few incidental observations being collected and reported in 2014.



Figure 14. Incidental species grid.

**Table 35. Incidental species observations for 2011.**

There were 59 species recorded via incidental observations this year.

Species	Count	Species	Count
Acorn Woodpecker	1	Northern Flicker	1
American Kestrel	3	Northern Harrier	4
American Pipit	1	Northern Mockingbird	1
Ash-throated Flycatcher	1	Nuttall's Woodpecker	2
Belted Kingfisher	1	Oak Titmouse	2
Bewick's Wren	1	Olive-sided Flycatcher	2
Black Phoebe	2	Prairie Falcon	2
Black-headed Grosbeak	2	Red Fox	1
Black-tailed Deer	2	Red-breasted Sapsucker	2
Bobcat	5	Red-tailed Hawk	1
Bullock's Oriole	1	Red-winged Blackbird	1
California Thrasher	1	Ring-necked Duck	2
Cassin's Vireo	1	Rock Wren	2
Coyote	13	Ruby-crowned Kinglet	1
Dark-eyed Junco	3	Rufous-crowned Sparrow	2
European Starling	2	Say's Phoebe	1
Ferral Pig	9	Spotted Towhee	1
Golden Eagle	2	Tree Swallow	6
Grasshopper Sparrow	1	Tule Elk	1
Gray Fox	7	Turkey Vulture	2
Great Horned Owl	1	Warbling Vireo	2
Greater Roadrunner	2	Western Bluebird	4
House Finch	4	Western Meadowlark	1
Jack Rabbit	1	Western Scrub-Jay	2
Killdeer	3	White-breasted Nuthatch	1
Lesser Goldfinch	3	White-crowned Sparrow	2
Lewis's Woodpecker	1	White-tailed Kite	7
Loggerhead Shrike	2	Wild Turkey	3
Mountain Lion	1	Wilson's Warbler	1
Northern Alligator Lizard	3		

**Table 36. Incidental species observations for 2012.** There were 35 species recorded via incidental observations this year.

Species	Count	Species	Count
Blue Grosbeak	1	Great Horned Owl	1
Bobcat	5	Greater Roadrunner	1
Bufflehead	1	Horned Lark	1
Burrowing Owl	1	Lewis's Woodpecker	2
California Thrasher	1	Mallard	1
California Kingsnake	3	Northern Alligator Lizard	1
California Newt	1	Northern Flicker	1
California Red-legged Frog	1	Northern Rough Wing Swallow	1
California Tiger Salamander	1	Phainopepla	3
Canyon Wren	1	Red-tailed hawk	1
Cedar Waxwing	1	San Joaquin Coachwhip	1
Cooper's Hawk	2	Skunk	1
Coyote	4	Tule Elk	2
Dark Eyed Junco	1	Western Pond Turtle	1
Eurasian Collared-Dove	1	White-tailed Kite	1
Ferral Pig	1	White-throated swift	1
Golden Eagle	4	Wrentit	1
Gopher Snake	1		

**Table 37. Incidental species observations for 2013.** There were 19 species recorded via incidental observations this year.

Species	Count	Species	Count
Bobcat	2	Horned Lark	2
Burrowing Owl	1	Hutton's Viero	1
California thrasher	1	Mountain Lion	2
Canyon Wren	1	Orange Sulfur	1
Cassin's Kingbird	1	Rayless Ragwort	1
Coast Horned Lizard	2	Red legged frog	1
Coyote	1	Red-breasted Sapsucker	1
Gopher Snake	3	Song Sparrow	1
Grasshopper Sparrow	2	Tule Elk	1
Gray Fox	1		

**Table 38. Incidental species observations for 2014.** There were 3 species recorded via incidental observations this year.

Species	Count	Species	Count
Bobcat	1	White-tailed Kite	1
Golden Eagle	1		



## **STORM WATER MANAGEMENT PLAN**

Carnegie SVRA operates under the 2008 Soil Conservation Standard and Guidelines, as follows:

Off-highway vehicle (OHV) recreation facilities shall be managed for sustainable long-term prescribed use without generating soil loss that exceeds restorability, and without causing erosion or sedimentation which significantly affects resource values beyond the facilities. Management of OHV facilities shall occur in accordance with Public Resources Code, Sections 5090.2, 5090.35, and 5090.53.

The last CSVRA HMS report prepared in 2010 included a section for soils and trail monitoring, photo point program, restoration and rehabilitation projects, and storm water monitoring. These efforts are implemented under the 2008 Soil Conservation Standard and Guidelines and CSVRA's Storm Water Management Plan (SWMP) and are reported in annual SWMP reports. Included in these reports is annual monitoring of erosion control Best Management Practices (BMPs) such as rolling dips, RMA fences, and check dams. Restoration projects implemented to reduce sedimentation and water quality impacts are reviewed. Photo point images are taken annually and photos relevant to soil and trail management are reviewed in the SWMP. Water quality testing is conducted throughout the year with results included in the SWMP report. The SWMP reports for the rain seasons of 2010/2011 to 2013/2014 are available through the CDPR OHMVRD and are not discussed further in this HMS report.