Lassen Transect Resurvey
2006 Annual Report

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A. Introduction and Project Goals

John Perrine

The "Lassen Transect" is a 3,000 square mile swath of northern California running from the Sacramento River to the Nevada border (Figure A1). Within the transect are a wide variety of habitats, including the grassy plains of the Central Valley, the foothill oak woodlandss, dense conifer forest, subalpine peaks and meadows, glacial lakes, sagebrush flats and high desert. The transect includes all of Lassen Volcanic National Park and Eagle Lake, large sections of the Lassen National Forest and the Tehama Wildlife Area, and portions of the Great Basin ecological region.

The Lassen Transect was originally surveyed from 1924 through 1929 by Joseph Grinnell, the founding Director of the MVZ, and his colleagues Joseph Dixon and Jean Linsdale. They visited more than 50 sites throughout the region, documenting the distributions of more than 350 species of birds, mammals, reptiles and amphibians, and collecting approximately 4,500 specimens. They summarized their results in the 1930 monograph "Vertebrate Natural History of a Section of Northern California through the Lassen Peak Region" (University of California Press). For many areas in the transect, their survey remains the most comprehensive vertebrate inventory yet conducted. Their specimens housed at the MVZ are still being used for wide variety of scientific research projects.

The resurvey of the Lassen Transect began in the summer of 2006 and is expected to take two to three years to complete. Resurvey efforts include inventorying the local bird, mammal, reptile and amphibian species as close as possible to the historic sites; collecting a few representative samples of each species as voucher specimens; taking extensive notes on the local habitats; and re-photographing specific sites that were photographed 85 years ago by Joseph Grinnell and his colleagues. The surveys in the Lassen Transect will be important for determining whether the species' range shifts recently documented in the Yosemite Transect are occurring throughout the state. This project will also build upon local species inventory and monitoring efforts by the National Park Service, US Forest Service, California Department of Fish and Game and the Bureau of Land Management, providing important information to assist with the management and conservation of California's rich wildlife heritage.

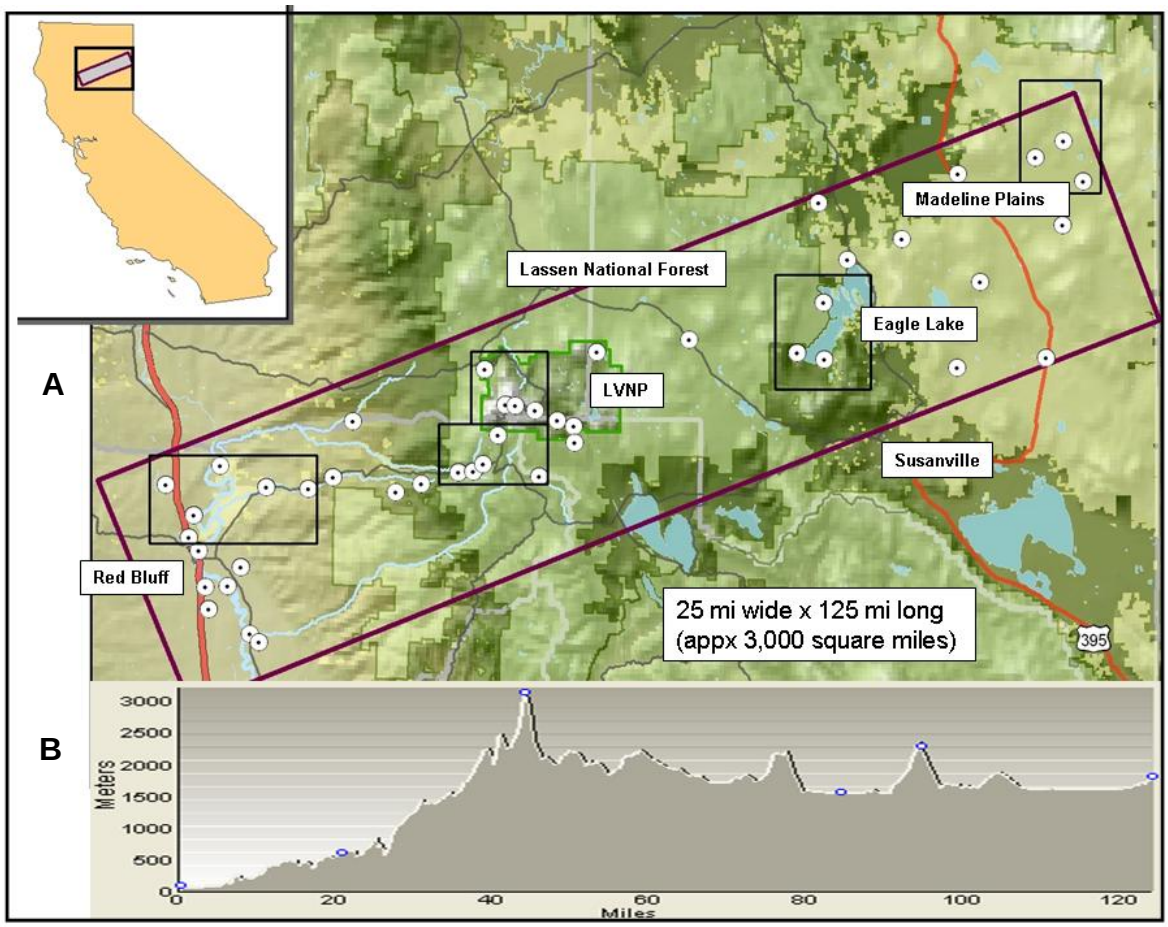

Figure A1: A) The Lassen Transect, bounded by the purple rectangle, runs from the Central Valley to the Nevada border. White circles denote historic sampling locations (n=45) described in Grinnell et al. 1930. Black rectangles within the transect indicate where mammal, bird or herpetile inventory efforts were concentrated in 2006. See Figure C1 for a map of bird point count survey lines. "LVNP" = Lassen Volcanic National Park. B) Elevations range from <200 m near the Sacramento River to >3200 m at Lassen Peak to 1800 m at Eagle Lake and the Madeline Plains. Blue open circles on the elevation profile indicate waypoints used to generate the profile and do not represent survey sites.

Summary of 2006 Field Efforts

Fieldwork was conducted from May through September. The area north of Red Bluff (see Figure A1) was surveyed via bird point counts and herp area searches; mammal trap lines and bird collection surveys are planned for 2007. The Mineral area was surveyed by mammal trap lines, bird point counts, bird collection surveys, and herp area searches. Sites in the western portion of Lassen Volcanic National Park were surveyed by mammal trap lines only, plus a few opportunistic herp observations; bird point count and mistnet surveys are planned for 2007. The southern and western shores of Eagle Lake were surveyed by mammal trap lines, bird point counts, bird collection surveys, and herp area searches. Sites in the Madeline Plains area in the northeastern corner of the transect were surveyed by mammal trap lines only, plus a few opportunistic herp encounters; bird point counts and collection surveys are planned for 2007. Additional bird point counts were conducted at sites in the southeastern corner of the transect.

B. Mammal Surveys

John Perrine and Christopher Conroy

Methodology and Extent

In general, each mammal site was surveyed over a five day period. On the first day, traps were established to sample all the major habitat types in the immediate area. Traps were then checked daily for four subsequent days. On the final morning we retrieved the traps and moved them to the next sampling location. Sites in close proximity were often sampled concurrently.

Given the differences in major habitats across the transect, the diversity of habitats at each site, and the range in food habits of our focal taxa, we did not use a standardized trapping design (such as a fixed grid or parallel lines of traps set at uniform distance intervals utilizing a common bait). Such a rigid spatial design usually fails to adequately sample all the habitat types at a site, and is a poor replication of the Grinnell-era effort. Instead, we established our traplines to explicitly sample each habitat type at a site.

A standard trapline consisted of 40 Sherman live traps and 10 Tomahawk live traps, making a total trap effort of 200 trapnights (50 traps x 4 nights). To maximize the probability of detection for small mammals, we placed individual traps in "likely" spots within each habitat (e.g., along *Microtus* runways or downed logs). Individual traps along the line might be moved among different microsites during the sampling period, depending upon the trap success rate, to maximize the opportunity to document the total mammalian diversity at the site. This flexible and adaptive approach is consistent with the methodology used by Grinnell et al., whereas a more rigid sampling frame would not be.

Traps were baited with a mixture of whole oats, birdseed mixture and peanut butter. The bait in a trap was replenished when it became low, such as after a successful capture. If trap success in any particular habitat was low, or if particular species proved difficult to sample via the Sherman and Tomahawk live traps, we conducted supplemental trapping using Victor rat traps and Museum Special mouse traps. Macabee gopher traps were used if there was fresh gopher sign in the area. Roadkills, sightings of other species (such as tree squirrels) or their calls or sign (e.g, tracks, dens, burrows, etc.) were also noted as indicators of their presence in the area.

In meadow areas we also employed pitfall traps to capture small mammals such as shrews, as well as non-aquatic amphibians and reptiles. The pitfall traps were arranged in a meandering line, usually consisting of 20-25 plastic cups (32 oz., 7” tall by 4” wide), buried to the rim in the ground at approximately 10 m intervals using a 4” soil auger. The pitfall trap lines were run concurrent with the other traps at the site. Pitfall traps were not baited. At the end of the sampling period, we removed the cups and refilled the holes. This approach had no significant impact upon the local habitat. The trap lines, gopher traps and pitfall cups were discretely marked with surveyor flagging during the sample period, all of which was removed when the sampling at that site was completed.

To determine the presence of pika (*Ochotona princeps*), we utilized an area search method developed by Erik Beever of the National Park Service. This protocol relies largely on the detection of diagnostic sign such as haypiles, droppings, alarm calls, etc. Pika surveys were conducted only in sites where pika historically occurred and/or were likely to currently be present.

All traps and pitfalls were checked in early morning and late afternoon. Some captured animals were retained as vouchers (see below), and others were released. Animals to be released were sexed and weighed and their reproductive condition was noted (testis condition for males; vaginal, pelvic, and nipple condition for females). A small ear clip was collected from a few individuals (usually from *Peromyscus*

and *Tamias*) prior to release. Animals to be vouchered were euthanized quickly and humanely and then prepared as museum specimens according to established MVZ protocols. We attempted to take no more than 10 individuals per species per site, but we occasionally exceeded the number due to trap mortalities and cryptic species identification (e.g., *Sorex* and *Tamias*). In some areas, we closed the traps during daytime hours to minimize trap mortality.

Preliminary Results

The following results and data summaries reflect the current status of our data (as of mid-December 2006). Note that when this report was being prepared, some specimens (e.g., the *Sorex* specimens) had not yet been fully prepared and identified. Therefore, the results presented here are subject to revision. Also note that the following tables indicate the number of animals captured and collected; in some circumstances, a single collected animal might become more than one specimen in the MVZ collection (e.g., if it contained embryos that were removed and cataloged separately).

During our 2006 field season, we established 32 traplines, producing 1,352 capture events. In 727 cases (53.8% of captures), the captured animal was retained as a voucher specimen . An additional 21 specimens were obtained by salvage (primarily roadkills), as follows: 9 at Eagle Lake, 7 at Mineral, 4 at Madeline Plains and 1 in Lassen Park.

1. Eagle Lake (Lassen County)

Our team worked the western and southern edges of Eagle Lake from 12-23 June. Specimens collected from this trip were cataloged under Accession 14177. We operated out of the US Forest Service's Eagle Campground on the southern shore. *Spermophilus lateralis* and *Tamias* sp. were abundant in the campground, usually becoming active just before dawn. A Tomahawk trap under one of our trucks caught a *S. lateralis* in minutes. Gopher sign, including winter cores and fresh mounds, was found closer to the lake shore but no traps were set for them. Our team sampled eight sites in this area (see below table). Much of the surrounding Lassen National Forest is actively grazed, so cattle sign was evident at many sites, even though the animals may not have been moved to these sites yet this year. *Odocoileus hemionus* were seen sporadically. The *Sylvilagus* observed at several sites was likely *S. nuttallii* but no specimens were obtained.

Trapline	Elev (ft)	Latitude	Longitude	Extent (m)	Label
1 mi S, 1 mi E Christie Campground	5125	40.55524	-120.82179	500	A
Brockman Flat	5269	40.59898	-120.84955	300	B
Brockman Lava Beds	5192	40.58688	-120.83904	200	C
Downtown Spalding	5146	40.66141	-120.77508	50	D
Merrill Creek	5090	40.54937	-120.80754	300	E
Mouth of Pine Creek	5109	40.67886	-120.79060	300	F
Papoose Meadow, "Cabin/Meadow" Line	5335	40.52491	-120.76608	200	G
Papoose Meadow, "Yellow Pine" Line	5384	40.52672	-120.76846	200	H
Pine Creek	5150	40.66361	-120.79268	500	I

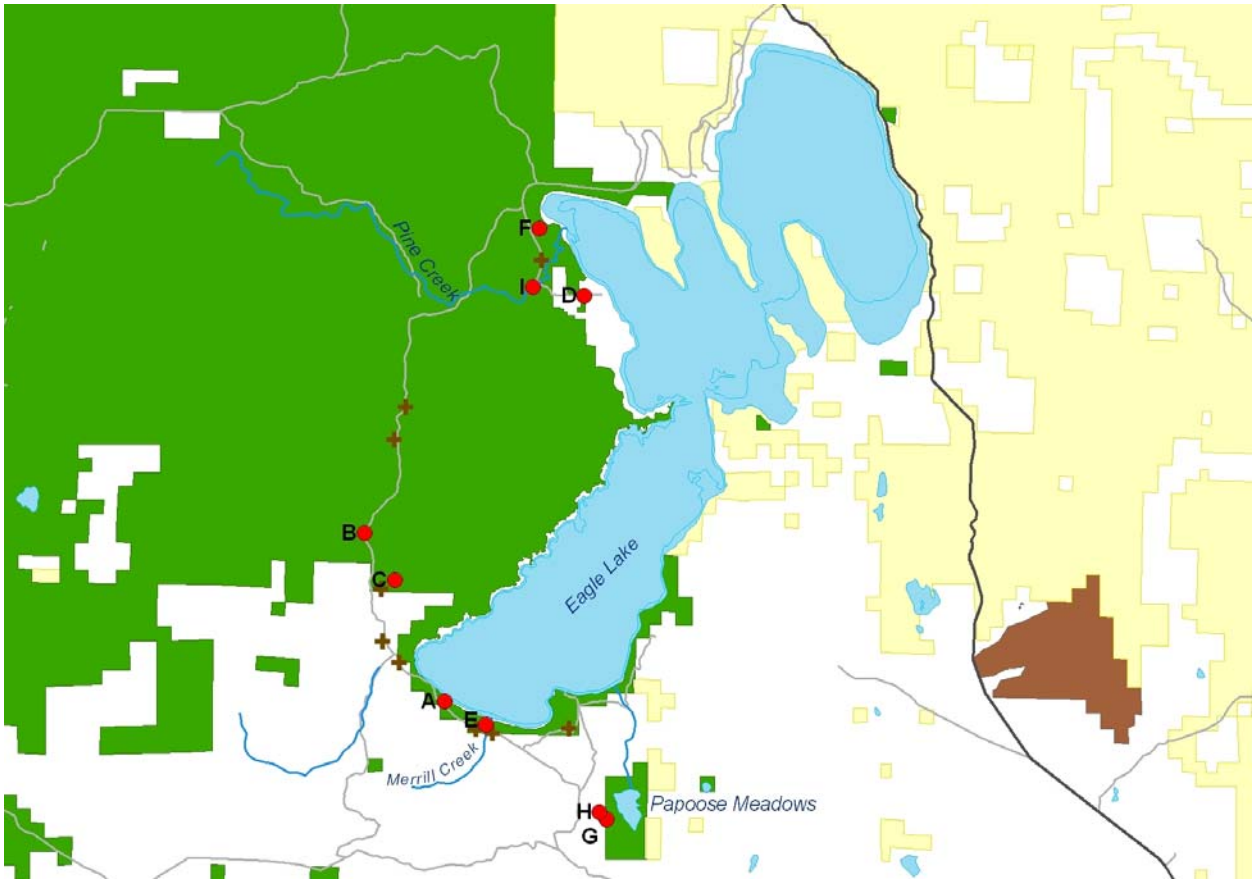

Figure B1: Mammal specimen localities at Eagle Lake (Lassen County). Red dots denote traplines. Crosses denote localities where specimens (primarily roadkills) were salvaged. Lassen National Forest lands shown in green, BLM lands in tan, and CDFG lands in brown.

1 mi S, 1 mi E Christie Campground (A on Figure B1)
Sampling dates: 19-23 June.
Sampling effort: 40 Shermans, 10 Tomahawks, 12 Macabees.
Land ownership: Lassen National Forest

At this site, the habitat transitioned from yellow pine forest with little understory to a fringe of young pines and grass, then a short meadow before the lake's edge. The trapline meandered among the young and mature pines, and where the forest was sparse, the traps were set under sagebrush. Gopher traps were set opportunistically at fresh diggings.

Order	Family	Species	Total Captures	Specimens Kept
Insectivora	Soricidae	*Sorex* sp.	7	7
Rodentia	Sciuridae	*Spermophilus beldingi*	15	6
"	"	*Tamias* sp.	1	0
"	Geomyidae	*Thomomys monticola*	5	6
"	Muridae	*Microtus montanus*	3	3
"	"	*Peromyscus maniculatus*	6	4

An ear clip was collected from one *P. maniculatus* that was then released. *Tamiasciurus douglasii* was seen and heard here on several occasions but was not captured.

Brockman Flat (B on Figure B1)
Sampling dates: 15-19 June.
Sampling effort: 40 Shermans, 25 pitfalls (no Tomahawks).
Land ownership: Lassen National Forest

This trapline meandered in and around a wet meadow on the E side of Eagle Lake Road (Highway A-1), approximately 10 mi from the Eagle Campground. The forest was a mixed conifer assemblage dominated by yellow pine, with occasional downed logs at the meadow's edge.

Order	Family	Species	Total Captures	Specimens Kept
Rodentia	Sciuridae	*Tamias amoenus*	3	3
"	Muridae	*Microtus longicaudus*	1	1
"	"	*Microtus montanus*	14	11
"	"	*Peromyscus maniculatus*	22	10

Ear clips were collected from three of the *P. maniculatus* that were released. *Spermophilus lateralis* were seen here on several days, close to the highway, but none was never captured.

Brockman Lava Beds (C on Figure B1)
Sampling dates: 15-19 June.
Sampling effort: 40 Shermans, 10 Tomahawks.
Land ownership: Lassen National Forest

This trapline was approximately 1 mi E of Highway A-1, down a dirt access road. The habitat was sagebrush, ceanothus and manzanita scrub, interspersed with rocky lava outcrops, and with occasional yellow pine and juniper trees. The soil was red and powdery.

Order	Family	Species	Total Captures	Specimens Kept
Rodentia	Sciuridae	*Spermophilus beecheyi*	10	2
"	"	*Tamias amoenus*	18	6
"	Heteromyidae	*Dipodomys californicus*	2	2
"	"	*Perognathus parvus*	1	1
"	Muridae	*Peromyscus maniculatus*	33	11
"	"	*Peromyscus truei*	3	3

Ear clips were kept from two of the *P. maniculatus* that were released. We observed an adult *Canis latrans* from the dirt access road on the mornings of 18 and 19 June; a pup was also seen on 19 June. On some days many of our traps were tripped and disturbed, likely by *S. beecheyi* or possibly coyotes. *Dipodomys* tracks were abundant in soft dirt of a side road near our trapline; we set an additional 5 Tomahawks there the final night but got no captures.

Downtown Spalding (D on Figure B1)
Sampling dates: 14-16 June
Sampling effort: 10 Shermans, 10 Tomahawks.
Land ownership: private

The Spalding Tract is a fairly small development of vacation homes, trailers and RVs, with a few stores, a marina and a landing strip. Our trapsite was an undeveloped lot next door to (E of) the Eagle Lake Restaurant, Bar and General Store, located at the corner of Lakeview and Mahogany Streets in Spalding. We had observed several *S. beldingi* in the lot and we received permission from the landowner to catch some. The property owners said the ground squirrels seemed more abundant this year than usual, and had become especially numerous in the past few weeks. There was extensive ground squirrel sign on the lot, such as active burrows with fans of dirt, along with two decomposing *S. beldingi* in the grass. We set traps around the yard, along the fence, under piles of wood and debris, and beneath several old trailers and vehicles.

Order	Family	Species	Total Captures	Specimens Kept
Rodentia	Sciuridae	*Spermophilus beldingi*	12	12
"	Muridae	*Peromyscus maniculatus*	1	1

The *P. maniculatus* was an adult female with four embryos. The property owner was disappointed that we did not capture the entire colony of *S. beldingi*. We observed several other mammal species nearby in town. *Marmota flaviventris* was seen running across the road and standing in people's front yards, especially those yards framed by large rocks. We also saw *Lepus californicus* and *Sylvilagus* sp. (probably *nuttallii*) near other houses in town, along with a few *Odocoileus hemionus*. We received reports of *Spermophilus beecheyi* at other lots in town but we did not see any. Jessica Blois observed a *Sciurus griseus* in an empty lot at the western edge of town near the town directory, and we collected a roadkill here the following day.

Merrill Creek (E of Figure B1)
Sampling dates: 19-23 June.
Sampling effort: 40 Shermans, 10 Tomahawks, 8 Macabees.
Land ownership: Lassen National Forest

This trapline ran along Merrill Creek perpendicular to Eagle Lake Road (Highway A-1) north and down the creek to Eagle Lake. At the point where we lost cover, we extended the traps to the east, through the grassy edge of the forest. The creek was dry in spots, and metal barriers had formed pools in some places. Most of the site was shaded by yellow pines, cottonwoods and tall willows, interspersed with the occasional cedar, white fir and the odd Sequoia. The creek banks flattened near its mouth, forming small wet meadows only a few meters across.

Order	Family	Species	Total Captures	Specimens Kept
Insectivora	Soricidae	*Sorex* sp.	4	4
Rodentia	Sciuridae	*Spermophilus beldingi*	14	4
"	"	*Spermophilus beecheyi*	1	0
"	"	*Tamias amoenus*	12	8
"	"	*Tamias minimus*	1	1

"	Geomyidae	*Thomomys monticola*	2	2
"	Muridae	*Microtus longicaudus*	5	5
"	"	*Microtus montanus*	4	4
"	"	*Peromyscus maniculatus*	38	9

Ear clips were collected from seven of the *P. maniculatus* that were released. *Microtus montanus* was collected from the open, sunny grassy area, not from the dark and muddy sections. *Tamiasciurus douglasii* were heard in the trees on 21 June but no specimens were collected. One *Spermophilus beecheyi*

The first trapline began inside, beneath and around the abandoned cabin (which had much rodent sign and swallow nests), then ran along the fencelines of the adjacent corral and into the meadow, paralleling the yellow pines at the edge, running between piles of woody debris. The 10 Tomahawks were set out on the afternoon of 18 June but the rest of line was added the next morning, so there were a total of 50 Tomahawk trapnights on this line.

Order	Family	Species	Total Captures	Specimens Kept
Insectivora	Soricidae	*Sorex* sp.	4	3
Rodentia	Sciuridae	*Spermophilus beldingi*	4	2
"	"	*Spermophilus lateralis*	4	3
"	"	*Tamias amoenus*	2	1
"	Muridae	*Microtus montanus*	1	1
"	"	*Peromyscus maniculatus*	40	6
"	"	*Peromyscus truei*	1	1

Ear clips were collected from five of the *P. maniculatus* that were released. One of the *P. maniculatus* specimens was an adult female with four embryos. *S. beldingi* alarm calls were heard from the meadow edge near cabin on 20 June, and one was seen running along edge of corral, by the ruins of an old shed, on 22 June.

b) The "yellow pine" trapline (H on Figure B1)
Sampling dates: 19-23 June.
Sampling effort: 40 Shermans, 10 Tomahawks, 12 Macabees.
Land ownership: Lassen National Forest.

The second trapline ran approximately NW from the old cabin, slightly uphill, into a thinned and managed yellow pine forest with manzanita shrubs and occasional rocky hillocks, then turned and ran parallel to the meadow edge where the understory changed to sage and lupine. The latter half of this line had smaller unthinned trees including white fir and juniper. The Macabee gopher traps were set among fresh sign in a small side meadow 50-200 m NW of the cabin.

Order	Family	Species	Total Captures	Specimens Kept
Rodentia	Sciuridae	*Spermophilus lateralis*	15	2
"	"	*Tamias amoenus*	9	6
"	Geomyidae	*Thomomys monticola*	3	3
"	Muridae	*Peromyscus maniculatus*	20	0

Ear clips were taken from six of the *P. maniculatus* that were released.

John Perrine, Zach Hanna and Jessica Blois conducted a pika survey on 21 June (1800-1845 h) on the talus slopes along the eastern edge of the meadow. They found and collected fresh scat but observed no pika or haypiles and heard no alarm call. Due to time constraints, only the southern third of the ridge was surveyed.

Pine Creek (I on Figure B1)
Sampling dates: 12-16 June
Sampling effort: 40 Shermans, 10 Tomahawks
Land ownership: Lassen National Forest

This trapline followed a shallow, braided and marshy stretch of Pine Creek as it ran through lava outcrops and a mixed assemblage of yellow pine, aspen, juniper and sagebrush. The second half of the trapline was in a flatter, drier area dominated by yellow pine and sagebrush with occasional mountain mahogany. Fresh vole sign was seen in wetter areas. By the end of the sampling at this site, portions of the creek had started to dry up.

Order	Family	Species	Total Captures	Specimens Kept
Rodentia	Sciuridae	*Spermophilus beecheyi*	8	6
"	"	*Tamias amoenus*	8	8
"	Muridae	*Microtus longicaudus*	1	1
"	"	*Neotoma fuscipes*	2	2
"	"	*Peromyscus maniculatus*	27	12
"	"	*Peromyscus truei*	3	3

Ear clips were taken from nine of the *P. maniculatus* that were released. Tracks that may have been *Dipodomys* (hind feet paired, no front tracks, and a prominent tail drag) were seen in the soft dirt of the access road, but none were captured here.

Salvage/Other

One *Scapanaus latimanus* roadkill was collected from Hwy A1. *Sciurus griseus* were seen crossing Hwy A1 on multiple occasions, and three roadkills were collected: one from 4 blocks W of the general store in Spalding, one from Lakeview Drive / Spalding Road 1 mi S of intersection with Hwy A1, and one from Hwy A1 0.5 mi S of the Christie Day Use Area. One *Spermophilus beecheyi* roadkill was collected from Hwy A1, 3 mi W of turnoff to Gallatin Marina. We observed *S. beldingi* in the lakeside meadow at Gallatin Marina on 18 June, but the human activity there made trapping impractical. We also observed one *S. beldingi* crossing the road at the Christie Day Use Area on 19 June. Many *S. lateralis* were present near the camp store at the Gallatin marina; they had clearly become acclimated to humans. One was trapped at the Eagle Campground (as mentioned above) and two roadkills were collected from Hwy A1: one 3 mi S of Pine Creek, and one at Merrill Campground. One *Tamias amoenus* roadkill was salvaged from Hwy A1. One *Lepus californicus* roadkill was collected from Hwy A1 at entrance to Christie Day Use area. A *Sylvilagus* (probably *nuttallii*) was observed crossing A1 on 14 June. One *Taxidea taxis* was seen walking on the shoulder of Hwy A1 on 15 June.

Perrine spent 10-12 June at the CSU Chico field station on the eastern shore of Eagle Lake teaching a course on the use of automatic cameras for wildlife inventory. This area was a cattle ranch in the 1920s prior to becoming a field station. The local vegetation transitions from yellow pine to the juniper and sagebrush of the Great Basin, with abundant mountain mahogany. Perrine observed *Lepus californicus* and *Sciurus griseus* there, along with many *Tamias* sp. (probably *T. minimus*) and abundant sign of *Neotoma fuscipes*. Camera stations baited with a pair of chicken drumsticks detected *Mephitis mephitis*, *Lynx rufus*, and *Urocyon cinereoargenteus* (called "silver fox" by the locals). Station caretaker John Crowe reported that he often saw and heard *Ochotona princeps* in the jumbled lava flows just E of the station. The outbuildings had numerous bats; the exterior walls were peppered with bat droppings. Pronghorn (*Antilocapra americana*) were observed from the access road just outside the station.

2. Mineral vicinity (Tehama and Plumas Counties)

Our team worked the vicinity of Mineral from 12-21 July, operating out of the Lassen National Forest's Battle Creek Campground (see below for details). Specimens collected on this trip were cataloged under Accession 14183. The winter of 2005-2006 was particularly heavy and this likely contributed to the low productivity of many of our traplines.

Trapline	Elev (ft)	Latitude	Longitude	Extent (m)	Label
Battle Creek Campground	4850	40.34688	-121.62932	200	A
Battle Creek, 0.5 mi. W jxn with Hwy 36	4775	40.35202	-121.63409	200	B
Bluff Falls (lower line)	6503	40.41278	-121.53160	300	C
Bluff Falls (upper line)	6630	40.41121	-121.53290	200	D
Childs Meadow Resort	4923	40.36132	-121.49360	50	E
Summit Creek, north of Hwy 36	5738	40.36890	-121.53831	250	F
Summit Creek, south of Hwy 36	5275	40.35804	-121.55757	250	G
Wilson Lake	5290	40.34453	-121.43214	250	H
1/3 mi W of Wilson Lake (by road)	5402	40.34370	-121.44671	250	I

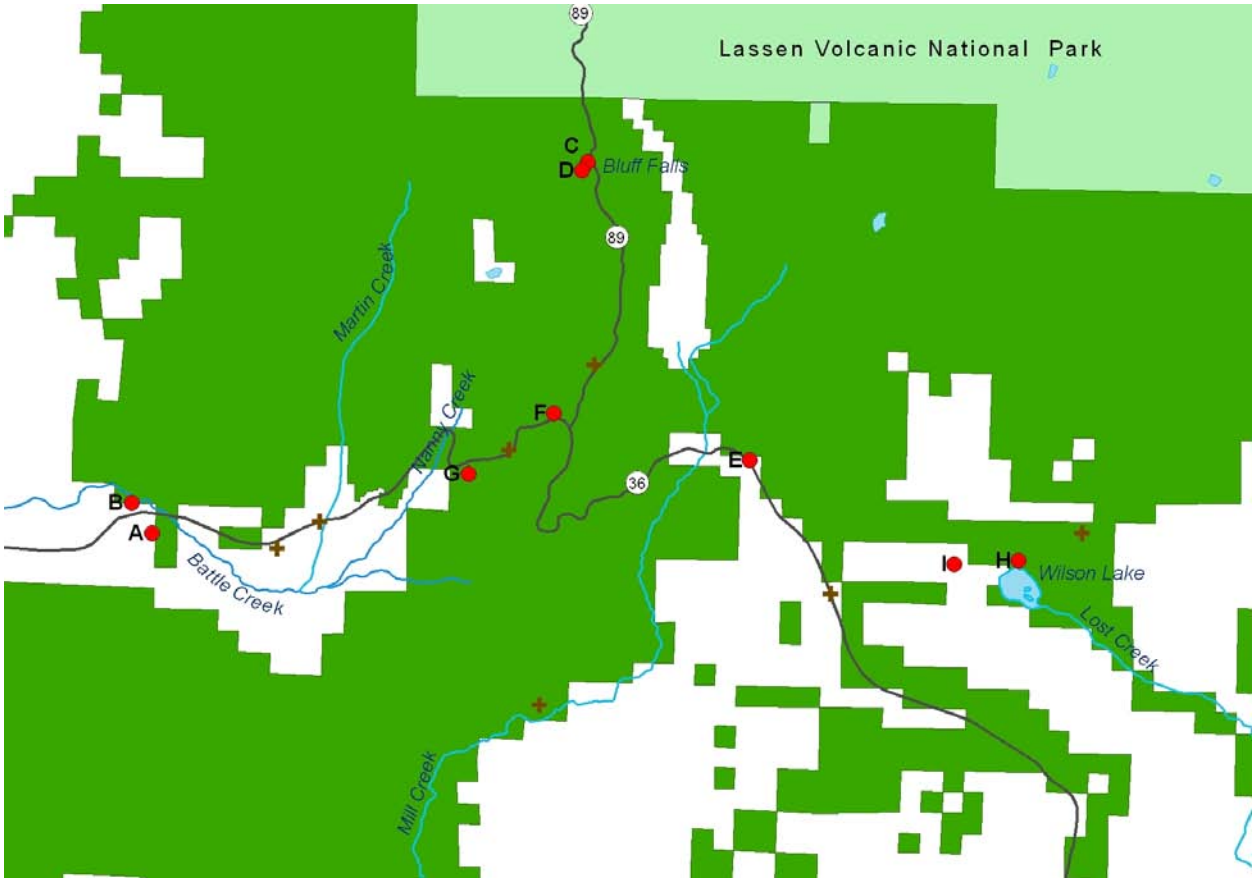

Figure B2: Mammal specimen localities around Mineral (Tehama and Plumas Counties). Red dots denote traplines. Crosses denote localities where specimens (primarily roadkills) were salvaged. Lassen National Forest lands shown in green and LVNP lands in light green.

Battle Creek Campground (A on Figure B2)
Sampling dates: 15-20 July
Sampling effort: 40 Shermans, 10 Tomahawks, four Macabees
Land ownership: Lassen National Forest

The Battle Creek Campground is located S of Hwy 36 approximately 1 mi W of Mineral, on the western edge of Battle Creek Meadows. Vegetation in the campground is primarily mixed conifer (white fir, incense cedar and sugar pine) with understory shrubs of manzanita, bitter cherry, currant, gooseberry and ceanothus. We camped at the S end of the campground, and our trapline extended S away from our campsite, up a slope and then winding back down. Traps were set below trees and shrubs and along downed logs. Along the trapline were occasional boulders and rocky structures with cracks large enough for small mammals to use as cover. Note that 15 Shermans were set on 15 July, with the remainder of the traps added the following day.

Order	Family	Species	Total Captures	Specimens Kept
Insectivora	Soricidae	*Sorex* sp.	5	5
Rodentia	Sciuridae	*Glaucomys sabrinus*	1	1
"	"	*Spermophilus lateralis*	26	6 *
"	"	*Tamias senex*	50	20
"	Muridae	*Clethrionomys californicus*	2	2

* 2 additional *S. lateralis* specimens were caught opportunistically in and around our tents.

Ear clips were collected from 10 of the *T. senex* that were released. The *Clethrionomys californicus* was caught near a rocky outcrop on the ridge over camp, along the edge of the conifer forest and the hilltop clearcut, in a very dry area. A second specimen was caught in the same trap the following day. This trap was in the bouldery forest edge which was interspersed with *Ribes* and mountain whitethorn.

According to the campground hosts, *Sciurus griseus, Spermophilus lateralis, Tamiasciurus douglasii* and *Tamias* sp. were common around the immediate area. *S. lateralis* was indeed abundant around the campground, even entering our tents on occasion. *T. douglasii* were seen occasionally but were not captured. A few very fresh gopher mounds were seen near the campground host's site; we set several Macabees but got no captures. The soil was hard and the tunnels were fairly deep. Allison Shultz observed *Sciurus griseus* near Battle Creek Bridge near the bird team's mist net station on 16 July. She also reported a *Spermophilus beldingi* atop a rockpile near the bridge over Battle Creek along the access road to "Church Camp" at W edge of Battle Creek Meadow, but was not sure of the species identification; no other *S. beldingi* were observed during the trip. Allison Shultz and Morgan Tingley observed a pair of *Glaucomys sabrinus* fighting or having a territorial dispute in the trees near their campsite in the Battle Creek Campground early in the evening of 7 June. Perrine and Cicero observed a family group (1 adult and 3-4 juveniles) of *Procyon lotor* roadside at Hwy 36 at the campground entrance on 19 July at 2300 h.

Perrine and Castillo searched for *Ochotona princeps* in the boulder slope immediately W of the campground entrance, running along the S side of Hwy 36, on 20 July from 1915-2045 h. They found no *Ochotona princeps* sign, but did find abundant sign of *Neotoma cinerea* (whitewash urine streaks and fresh scat) on the N-facing slope.

Battle Creek, 0.5 mi W of junction with Hwy 36 (B on Figure B2)
Sampling dates: 17-21 July.
Sampling effort: 40 Shermans, 10 Tomahawks, 2 Macabees.
Land ownership: Lassen National Forest

This trapline was located N of Hwy 36, just W of the Battle Creek Bridge, in the riparian area adjacent to Battle Creek with abundant willows, bunch grasses and flowering shrubs. The first half of the trapline was set near the creek, in open mixed conifer forest and in the more lushly vegetated areas alongside the creek. The second half of the trapline, set the following day, meandered through the shrubby oaks along the edge of the mixed conifer forest, some 50 ft above the creek.

Order	Family	Species	Total Captures	Specimens Kept
Rodentia	Sciuridae	*Tamias senex*	3	3
"	Muridae	*Peromyscus truei*	2	2

Peromyscus truei was caught among the shrubby oaks on a dry hillside, near some rock structure they might use as cover. Conroy observed fresh vole sign near the end of the trap loop and relocated some Sherman traps to this spot but got no captures. A *Sciurus griseus* was observed crossing the highway near Battle Creek Bridge. A single fresh gopher mound was seen by the creek near the traplines traps, in a little island of boulders with sand and vegetation in between. Two Macabees were set in the mound but were backfilled and did not catch the gopher.

Bluff Falls (C, D on Figure B2)
Land ownership: Lassen National Forest

Bluff Falls is located on the W side of Hwy 36 approximately 1 mi S of the boundary to Lassen Volcanic National Park. The water course was densely vegetated with alders and willows, with rocky slopes on either side, within a matrix of mixed conifer forest. The first trapline of 40 Shermans and 10 Tomahawks was set here on 12 July and operated through 16 July. Initially, the trapline began near where the falls cascade over the rock face and fall into the boulders, with the traps set as close to the moving water as possible. This area was dense with alder and willow, along with equisetum, corn lily, ferns and other herbaceous plants. On the afternoon of 13 July, after no captures had been acquired, the second half of the trapline was moved to the E side of Hwy 89 where the habitat was flatter and more grassy. Traps were set in grass along the creek and at the edges of alders. Based on historic photos and descriptions, this is likely the meadow where the Grinnellian team (Borell and Hunt) camped when surveying this area in 1924, but the meadow has since become overgrown with alders.

A second line of 40 Shermans and 10 Tomahawks was set just S of Bluff Falls on 13 July due to the low capture success of the initial line. This second line was in a mixture of manzanita, shrubby oak and firs at the forest edge. The trapline operated from 13-17 July. All captures here were near the end of the line near the sparse forest edge, despite the abundance of berries on the manzanita bushes.

Order	Family	Species	Total Captures	Specimens Kept
Rodentia	Sciuridae	*Tamias senex*	5	5
"	Dipodidae	*Zapus princeps*	6	6
"	Muridae	*Microtus longicaudus*	1	1
"	"	*Peromyscus maniculatus*	6	6

All the *Peromyscus maniculatus* captured here were juveniles and may have merely been dispersing through the area.

Perrine and Castillo surveyed the rocky slopes on the N and S sides of Bluff Falls for *Ochotona princeps* on 21 July 0930-1100 h. They saw no pika or haypiles and heard no alarm calls, but found whitewash and dry feces on both slopes. The sign on the S slope was in the loose rock at the base of the cliff, while on N slope the sign was in the boulders near the top of the slope. *Neotoma cinerea* whitewash and feces were not common here except among the large piled boulders near the base of the N side of the Falls.

Childs Meadow Resort (E on Figure B2)
Sampling dates: 18-21 July.
Sampling effort: 9-11 Macabees per night.
Land ownership: Private.

This line consisted solely of gopher traps set in the fresh diggings in the grassy hillside in front of the guest cabins. A total of 6 *Thomomys monticola* were captured and kept as specimens. The property owner said that *S. lateralis* were common in the area, and that *Marmota flaviventris* occurred in the cattle pasture across the road (although she may have been referring to *S. beecheyi*). No specimens or definitive observations of any of these species were obtained while checking the gopher traps. We did observe several *Odocoileus hemionus* near where Hwy 36 crosses Mill Creek, approximately 0.5 mi W of Childs Meadow Resort.

Summit Creek (F, G on Figure B2)
Land ownership: Lassen National Forest

Two traplines were operated near the junction of Summit Creek and Hwy 36, to replicate the historic "Summit Creek" locality.

a) Summit Creek, S of Hwy 36 (G on Figure B2)
Sampling dates: 12-16 July.
Sampling effort: 40 Shermans, 10 Tomahawks
Land ownership: Lassen National Forest

This trapline ran along the S side of Summit Creek, just E of where Lassen National Forest road 29N60 crosses the creek. The trapline began along edge of creek, in alders and cobbles, but the creekside quickly became impassible due to the dense alders and the steepness of the banks. The trapline therefore turned uphill, into the mixed conifer forest (white fir, incense cedar, and sugar pine), until it reached an old road (likely LNF 29N60F) with 1-2 m tall regenerating firs and many manzanita and ceananothus shrubs. The line then circled back down to a ferny creekside flat just a few meters W of where it began.

Order	Family	Species	Total Captures	Specimens Kept
Insectivora	Soricidae	*Sorex* sp.	3	3
Rodentia	Sciuridae	*Spermophilus lateralis*	5	5
"	"	*Tamias senex*	5	5
"	"	*Tamiasciurus douglasii*	1	1
"	Dipodidae	*Zapus princeps*	3	2

"	Muridae	*Clethrionomys californicus*	5	5
"	"	*Microtus longicaudus*	3	3
"	"	*Peromyscus maniculatus*	4	4

We observed virtually no squirrels, chipmunks, deer or other mammals while working this line.

b) Summit Creek, N of Hwy 36 (F on Figure B2)
Sampling dates: 13-17 July.
Sampling effort: 40 Shermans, 10 Tomahawks, 5 Macabees.
Land ownership: Lassen National Forest

Due to the low amount of riparian vegetation at the "Summit Creek, S of Hwy 36" site, we established a second trapline along Summit Creek immediately N of Hwy 36. This area was considerably flatter, with many small riparian meadows fringing the creek, and more open alder stands. The trapline started within 15 m of Hwy 36, then extended N along the W edge of the creek. Traps were concentrated in the creekside riparian vegetation (all within 15 m of the water's edge), such as the small riparian meadows, stands of alder, and the cobblestone creek banks.

Order	Family	Species	Total Captures	Specimens Kept
Insectivora	Soricidae	*Sorex* sp.	1	1
Rodentia	Sciuridae	*Tamias senex*	4	4
"	Geomyidae	*Thomomys monticola*	1	1
"	Muridae	*Clethrionomys californicus*	*	3
"	"	*Microtus longicaudus*	*	5
"	"	*Microtus montanus*	1	1
"	"	*Peromyscus maniculatus*	7	7

* n=10 total captures between these 2 taxa.

One of the *M. longicaudus* specimens collected was a female with four embryos. We observed *Tamiasciurus douglasii* at the start of line near the culvert flowing under Hwy 36, but no individuals were captured. On 15 July we also observed a medium-sized *Ursus americanus* in the mixed conifer forest approximately 75 m from creek; it was tearing into large downed logs, presumably for termites and beetle larvae.

Wilson Lake (H, I on Figure B2)
Wilson Lake was the easternmost site sampled in the Mineral area.

a) N shore of Wilson Lake (H on Figure B2)
Sampling dates: 16-20 July 2006.
Sampling effort: 40 Shermans, 10 Tomahawks, 7 Macabees
Land ownership: Lassen National Forest

This trapline began near the parking pullout at the NW side of Wilson Lake, and then ran along the forest edge where shrubs and conifers extended into the lakeside meadow. There was significant standing water in the lakeside meadow itself, making trapping there impractical. The trapline ran parallel to the lakeshore, in the fringing pines, into the drier conifer forest on the NE side of the lake, then following an old dirt road heading back toward Wilson Lake Road, and then looped back into the lakeside meadow just E of the road. The meadow was too damp for pitfalls to be set, and the wetness seemed to increase rather

than decrease during the sampling period, presumably due to snowmelt at higher elevations. Interestingly, many of the pines along the wet fringing meadow were dead, and most had multiple softball-sized galls on branches. The gopher traps were set at fresh sign near the end of the trapline (S of Wilson Lake Road) and in drier upland open pine forest on other side of the road.

Order	Family	Species	Total Captures	Specimens Kept
Insectivora	Soricidae	*Sorex* sp.	1	1
Rodentia	Sciuridae	*Spermophilus beecheyi*	1	1
"	"	*Tamias amoenus*	2	2
"	"	*Tamias senex*	13	11
"	Geomyidae	*Thomomys monticola*	3	3
"	Muridae	*Peromyscus maniculatus*	1	1

Ear clips were collected from three *T. senex*, one of which was subsequently recaptured and died in the trap, thereby becoming a whole-animal specimen as well. The smaller *T. amoenus* were captured beneath the shrubs near the wet meadow, whereas the larger *T. senex* were collected in drier upslope conifer forest. A *Sylvilagus* (probably *S. nuttallii*) was seen in the brush near the start of trapline on 17 July. Voles of indeterminate species were seen near the gopher traps at end of line by Jessie Castillo and near the parking pullout by Chris Clark, but none were captured in our traps. One *Spermophilus beecheyi* and one *Tamiasciurus douglasii* were collected near the camping area on the western side of the lake. Jeff Wilcox saw *Puma concolor* tracks in some muddy tire ruts through the wet meadow on S end of Wilson Lake on 20 July.

b) 1/3 mi W of Wilson Lake (I on Figure B2)
Sampling dates: 18-21 July
Sampling effort: 40 Shermans, 10 Tomahawks
Land ownership: Lassen National Forest

This second trapline was established to sample habitat types not represented at the first trapline, such drier meadow and shrubs, and to attempt to acquire specimens of *Spermophilus beecheyi* which had been observed running across the road here. The trapline ran parallel to the Wilson Lake Road, in a shrubby area approximately 10 m N of the road. This site appeared to be a revegetating dirt road or skidder trail and had numerous ceanothus, gooseberry and manzanita shrubs but no pines.

Order	Family	Species	Total Captures	Specimens Kept
Insectivora	Soricidae	*Sorex* sp.	1	1
Rodentia	Sciuridae	*Spermophilus beecheyi*	1	1
"	"	*Tamias senex*	21	14
"	Muridae	*Peromyscus maniculatus*	3	3

Ear clips were collected from the seven *T. senex* that were released. We observed a *Lepus californicus* running through the brush on 19 July, and we roused a spotted *Odocoileus hemionus* fawn from under a ceanothus bush on 20 July. On several occasions we observed *Spermophilus lateralis* and *S. beecheyi* alongside the road between Wilson Lake and Hwy 36.

Salvages/Other

Al Blomquist invited us to trap gophers in the flowerbeds at his house in Mineral; six Macabees set for several nights there yielded only 1 *Scapanus latimanus* at the edge of his lawn and the adjacent meadow. We observed *Tamiasciurus douglasii* crossing the highway between Mineral and Wilson Lake on several occasions road, and we collected a roadkill from USFS road 29N17, 0.5 mi from the north shore of Wilson Lake. Similarly, we observed *Sciurus griseus* crossing Hwy 36 0.25 mi E of Mineral Post Office on 19 July, and collected a roadkill from Hwy 172, 1 mi W of Mill Creek Resort, the following day. *Spermophilus beecheyi* were seen crossing road near Mineral's water treatment plant, ½ mi E of Battle Creek Campground, and crossing Hwy 172 1.2 mi from Hwy 36 in Mineral, and a roadkill was collected on E side of Mineral just a few hundred yards E of the post office. One *Spermophilus lateralis* roadkill was collected from Hwy 89, 0.75 mi N of jxn with Hwy 36. Cicero and Wilcox observed *Marmota flaviventris* from Hwy 36 a few hundred yards E of the Mineral Post Office, near the eastern edge of Battle Creek Meadows. Two roadkilled *Lepus americanus* were collected from Hwy 36: one 1.8 mi E of Childs Meadow Resort, and one from 0.9 mi W of the junction with Hwy 89; the latter was a female with four large embryos. A *Lepus californicus* roadkill was collected from Hwy 36, 10 mi E from E end of Paynes Creek. *Odocoileus hemionus* tracks were ubiquitous but the animals were rarely seen. On occasion we observed does with spotted fawns.

3. Madeline Plains (Lassen County)

Our team surveyed the Madeline Plains area of Lassen County from 16-25 August, operating out of the BLM campground at Dodge Reservoir. Specimens collected on this trip were cataloged under Accession 14190. The area around the reservoir seems heavily grazed, and there is no riparian vegetation at the edge of the lake and no tules in the shallows. The water had an oily sheen and the air was thick with smell of cattle dung. The Madeline Plains is an extensive sagebrush flat with junipers occurring on the hillsides. Most of the area is open cattle range with some irrigated alfalfa in the flats. The high trap success we had in this area was a stark contrast to the relatively low trap success in Mineral and Lassen Volcanic National Park. The combination of irrigation and livestock grazing likely have major effects on the soil and vegetation characteristics of the local area. According to the locals, the extent of irrigated alfalfa will likely increase throughout the area in the coming years.

The white and orange markings of *Neotoma* were prominent on rocky outcrops and cliffs surrounding the plains. Mike Thompson, owner of the Three Dot Ranch at Roberts Reservoir, reported that they did not have the ground squirrel that sits on fenceposts (i.e., *Spermophilus beecheyi*) but they did have one that looks and acts like a prairie dog (*S. beldingi* or *S. townsendi*). Jake Young, manager of the Dodge Ranch, the largest operation in the Plains, said much the same thing, and added that the squirrels had spotted pelts, had a high-pitched alarm call ("*pee pee pee pee pee*") and were common near woodpiles. In the spring these squirrels are so common that the locals have a shooting contest, but by the time we visited the squirrels were entirely underground and we were unable to obtain a specimen or a sighting. Neither rancher mentioned *S. lateralis*, which we captured at several sites; they may have thought these animals were large chipmunks. Both Thompson and Young said *Taxidea taxis* was common and was generally disliked because its holes posed a risk to horses. *Canis latrans*, *Lepus californicus* and *Sylvilagus nuttallii* were extremely common throughout the sagebrush flats and were sighted crossing the road virtually every day. In some areas it was difficult to drive at any speed after dusk due to all the leporids crossing the road.

Trapline	Elev (ft)	Latitude	Longitude	Extent (m)	Label
5 mi N Observation Peak	5325	40.84532	-120.17653	200	A
7 mi N Observation Peak	5347	40.86155	-120.15990	200	B
9.5 mi N Observation Peak	5354	40.89191	-120.16599	200	C
Coyote Flat	5322	40.88974	-120.26846	250	D
Dodge Ranch Headquarters	5345	40.88837	-120.18111	200	E
Dodge Reservoir Campground	5837	40.97216	-120.13266	200	F
Dodge Reservoir Outflow	5672	40.96636	-120.13745	100	G
Horne Ranch	5384	40.82822	-120.13889	500	H
Tuledad Road, 3.7 mi N (by road) intersection with Stage Road	5613	40.92563	-120.13857	100	I

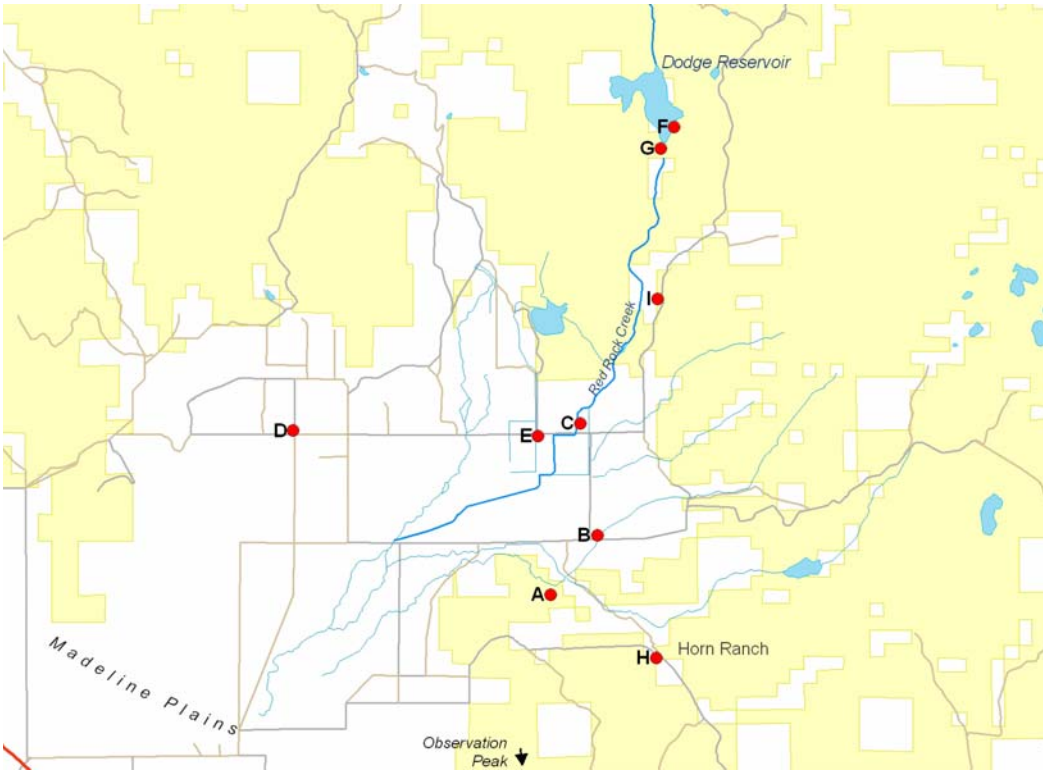

Figure B3: Mammal specimen localities around the Madeline Plains (Lassen County). Red dots denote traplines. BLM lands shown in tan.

5 mi N of Observation Peak (A on Figure B3)
Sampling date: 21-25 August.
Sampling effort: 40 Shermans, 10 Tomahawks
Land ownership: Private (Dodge Ranch).

This trapline was set in an isolated area of sand dunes capped with sagebrush and interspersed with occasional patches of wiry grass. Animal tracks were abundant in the soft sand, from jackrabbits to beetles. This site is likely the best direct comparison to the historic "Box Springs" sampling site (composed of the "7 mi N of Observation Peak" and "6 mi N of Observation Peak" traplines) due to the

soft sand dunes interspersed with sagebrush. We set our traps beneath the sage to minimize trap mortality of day-caught animals.

Order	Family	Species	Total Captures	Specimens Kept
Rodentia	Sciuridae	*Tamias amoenus*	*	1
"	"	*Tamias minimus*	*	9
"	Heteromyidae	*Dipodomys ordii*	14	14
"	"	*Microdipodops megacephalus*	6	6
"	Muridae	*Onychomys leucogaster*	2	2
"	"	*Peromyscus maniculatus*	46	13
"	"	*Peromyscus truei*	1	1

* n=39 total *Tamias* captures.

Note that virtually all captures were in the sandy dune areas; the grassy patches gave only occasional *P. maniculatus*.

7 mi N of Observation Peak (B on Figure B3)
Sampling dates: 17-21 August.
Sampling effort: 40 Shermans, 10 Tomahawks
Land ownership: Private (Dodge Ranch)

This trapline was located on the N side of Marr Road (CR 526), 0.25 mi E of the intersection with Stage Road (CR 504). We selected this site to replicate the historic sites 7 and 6 mi N of Observation Peak, but the area now seems structurally different. The historic sites may have been slightly to the S, or the local habitat has changed since the 1920s. The area is a rabbitbrush and sagebrush flat with occasional small patches of grass; the soil was firm but not caked or cracked (see below), but there was no loose sand or dunes at this site. An irrigation standpipe marked the S end of the trapline, but the irrigation regime here is unclear. The rabbitbrush was in full flower during our visit; the vegetation here seemed more dense and lush than at the Coyote Flat site (see below), and large anthills were uncommon. Old vole clippings were present in several of the small patches of tall grass. On 20 August we began closing the Shermans during the day to minimize trap mortality of *Tamias*.

Order	Family	Species	Total Captures	Specimens Kept
Rodentia	Sciuridae	*Tamias minimus*	39	15
"	Heteromyidae	*Perognathus parvus*	2	2
"	Muridae	*Peromyscus maniculatus*	8	6
"	"	*Reithrodontomys megalotis*	3	3

An ear clip was taken from one of the *T. minimus* that was released. We observed several *Lepus californicus* among the brush, and their droppings were ubiquitous. We also saw *Sylvilagus* sp. running across Tuledad road nearby. Conroy found vole clippings and scat in stands of tall grass, but none were captured here. The lack of *Dipodomys* captures here was surprising, as they were abundant at Coyote Flat (*D. californicus*), 5 mi N of Observation Peak (*D. ordii*) and other sites in the region. It is unclear why *Dipodomys* would be absent from this site, but irrigation patterns and other land use factors may play a role.

9.5 mi N of Observation Peak (C on Figure B3)
Sampling dates: 17-21 August.
Sampling effort: 40 Shermans
Land ownership: Private (Dodge Ranch).

This relatively short trapline followed a small (1 m wide) irrigation canal paralleling a dirt access road on the edge of a field. Traps were placed in the tall, dense grass and forbs along the E bank of the canal.

Order	Family	Species	Total Captures	Specimens Kept
Rodentia	Heteromyidae	*Perognathus parvus*	5	5
"	Muridae	*Onychomys leucogaster*	1	1
"	"	*Peromyscus maniculatus*	45	10
"	"	*Reithrodontomys megalotis*	8	7

Ear clips were collected from five of the *P. maniculatus* that were released. Clippings and runways believed to be of *Microtus* were observed here, but no individuals were captured. We roused a *Canis latrans* from the tall grass on the W side of the canal on 18 August. We observed tracks of *Taxidea taxis* and *Procyon lotor* in the dirt of the access road adjacent to the canal.

Coyote Flat (D on Figure B3)
Sampling dates: 17-21 August.
Sampling effort: 40 Shermans, 10 Tomahawks, 5 Macabees.
Land ownership: Private (Dodge Ranch)

This area, analogous to the historic "Red Rock Post Office" sampling site, was a nondescript section of flat, open cattle range. The vegetation was sagebrush scrub with occasional open patches of firmly caked and often cracked hardpan soil. Large anthills were common and we often had to move our traps to prevent the ants from taking all our oat bait and from attacking captured animals. Our trapline was 1 mi W of the intersection of Tuledad (CR 506) and Mail Route (CR 502) roads. The trapline formed a rough square or loop which was bisected N/S by a dirt road flanked by old telegraph poles. The habitat here was fairly homogeneous, but the E side of dirt road seemed drier, less densely vegetated, with more standing dead sage. One wonders about the irrigation scheme used here and what effect it has on the biological community. Macabee traps were set at fresh gopher sign in and adjacent to the dirt road and were operated for two nights. On August 19 we began closing the Shermans during the day to reduce *Tamias* captures and associated trap mortality; traps were re-opened in the evening to capture nocturnal animals.

Order	Family	Species	Total Captures	Specimens Kept
Rodentia	Sciuridae	*Tamias minimus*	45	14
"	Geomyidae	*Thomomys talpoides*	1	1
"	Heteromyidae	*Dipodomys californicus*	15	12
"	"	*Perognathus parvus*	7	7
"	Muridae	*Lemmiscus curtatus*	3	3
"	"	*Peromyscus maniculatus*	62	19

Ear clips were collected from five *T. minimus*, one of which subsequently died upon recapture and became a whole-animal specimen. Similarly, ear clips were collected from five *P. maniculatus* that were released, three of which subsequently died upon recapture and became whole-animal specimens.

Dodge Ranch Headquarters (E on Figure B3)
Sampling dates: 22-25 August
Sampling effort: 29 Tomahawks
Land ownership: Private (Dodge Ranch)

These traps were set primarily to capture any ground squirrels that might still be active aboveground. Traps were placed in batches around old tractors and farm equipment, where there were numerous, large burrow entrances in the soil. They were also placed along the dirt berm adjacent to a small irrigation canal and along the fence edge adjacent to Tuledad road beside alfalfa fields.

Order	Family	Species	Total Captures	Specimens Kept
Rodentia	Heteromyidae	*Dipodomys californicus*	1	1
"	Muridae	*Neotoma cinerea*	1	1

Dodge Reservoir Campground (F on Figure B3)
Sampling dates: 16-20 August.
Sampling effort: 40 Shermans, 10 Tomahawks
Land ownership: Bureau of Land Management

This trapline started at the base of the ridge immediately S of the Dodge Reservoir Campground, then followed the ridge line before winding back down to the N toward the campground and reservoir. The vegetation was sagebrush with scattered large junipers, and traps were set under the sagebrush or at the base of the junipers. The rocky outcroppings near the top of the ridge had extensive orange and white sign of *Neotoma,* but no traps were placed that high up.

Order	Family	Species	Total Captures	Specimens Kept
Rodentia	Sciuridae	*Tamias amoenus*	*	5
"	"	*Tamias minimus*	*	1
"	Heteromyidae	*Dipodomys californicus*	5	5
"	"	*Perognathus parvus*	4	4
"	Muridae	*Neotoma fuscipes*	1	1
"	"	*Peromyscus maniculatus*	31	11
"	"	*Peromyscus truei*	1	1
Lagomorpha	Leporidae	*Sylvilagus nuttallii*	1	1

* n=8 total *Tamias* captures.

Ear clips were collected from 10 of the *P. maniculatus* that were released. One of the *P. maniculatus* specimens was a female with two large embryos that were retained in formalin. *Tamias minimus* were common around camp, climbing in the junipers and darting around rocks in camp. Likewise, we often observed *Dipodomys californicus* at camp in evenings, investigating our cook table and the bait canisters.

We set a couple of Macabees at fresh gopher diggings around campground but caught no specimens. Bats were abundant around the junipers and lake edge in the evenings but the species was unclear. From camp we heard *Canis latrans* howls on several nights. Conroy found fresh vole clippings in the meadow associated with a small spring just off the dirt road between the campground and the dam, but no traps were placed there to determine the species.

Dodge Reservoir Outflow (G on Figure B3)
Sampling dates: 17-21 August.
Sampling effort: 40 Shermans, 10 Tomahawks
Land ownership: Bureau of Land Management

Dodge Reservoir is manmade, with an earthen dam and outflow pipe at its S end. At the base of the dam was a small pool flanked by thick grass, rose bushes and a few other shrubs, and we found fresh vole clippings in the grass here. Our trapline ran alongside Red Rock Creek as it flowed out of the reservoir. Local habitats were the narrow riparian meadow, fringed with rocky outcroppings, and interspersed with occasional juniper and shrubs. The creekside meadow became just few meters wide in some places, and the rocky slopes had extensive *Neotoma* sign. In theses spots the trapline extended into the loose rocks slopes to target *Neotoma* and other rodents that might not be in the grass. The area was grazed by cattle (encountered on several sampling days) and feral horses (as evidenced by fresh droppings). *Tamias* were observed almost daily near the rocks.

Order	Family	Species	Total Captures	Specimens Kept
Rodentia	Muridae	*Microtus longicaudus*	2	2
"	"	*Microtus montanus*	1	1
"	"	*Neotoma cinerea*	1	1
"	"	*Neotoma fuscipes*	6	6
"	"	*Peromyscus maniculatus*	27	8
"	"	*Peromyscus truei*	10	8
"	"	*Reithrodontomys megalotis*	7	7

Ear clips were collected from 15 of the *P. maniculatus* that were released.

Horne Ranch (H on Figure B3)
Sampling dates: 21-25 August.
Sampling effort: 40 Shermans, 10 Tomahawks, 6 Macabees.
Land ownership: Private (Dodge Ranch).

This trapline focused on the riparian, dry meadow and rocky outcrops just N of where CR 503 intersects with Painter's Creek, approximately 0.5 mi from the buildings of the old Horne Ranch. The first half of the trapline ran through the tall, dense grass at the edge of the creekside willows, following the creek toward a pond, but then made a right-angle turn across the meadow (interspersed with sage and rabbitbrush) to a small rocky ridge. The line turned again to follow the ridge back to the S, ending just across the meadow from the starting point.

The Macabee traps were set at fresh diggings in the riparian vegetation. One set upslope in the drier area caught a *Dipodomys californicus*. The *Tamias minimus* and *Spermophilus lateralis* were associated with the rocky outcrop; the latter was caught in a Tomahawk trap among the rocks and had extensive

subcutaneous fat. Another *S. lateralis* was observed along the road 1 mi W of the trapline. The old ranch buildings were full of rodent scat, probably *Neotoma* or *S. lateralis*, but we placed no traps there. Both *Lepus californicus* and *Sylvilagus nuttalli* were common around the old buildings.

Order	Family	Species	Total Captures	Specimens Kept
Rodentia	Sciuridae	*Spermophilus lateralis*	1	1
"	"	*Tamias minimus*	1	1
"	Geomyidae	*Thomomys talpoides*	1	1
"	Heteromyidae	*Dipodomys californicus*	4	4
"	"	*Perognathus parvus*	3	3
"	Muridae	*Neotoma fuscipes*	1	1
"	"	*Peromyscus maniculatus*	54	13
"	"	*Peromyscus truei*	3	3
"	"	*Reithrodontomys megalotis*	3	3
Lagomorpha	Leporidae	*Lepus californicus*	1	1
"	"	*Sylvilagus nuttallii*	1	1

Tuledad Road, 3.7 mi N of intersection with Stage Road (I on Figure B3)
Sampling dates: 22-25 August
Sampling effort: 1 Tomahawk and 10 Victor snaps.
Land ownership: Private (Dodge Ranch)

This small trapline was set to target *Spermophilus lateralis* which was observed crossing the road here, approximately 0.25 mi S of the entrance to the old Evans Ranch (now part of Dodge Ranch). The area was a gently sloping hillside with many exposed rocks, thin dry grass and interspersed junipers. We observed a *S. lateralis* near the Victor traps on 24 August but none were captured.

Order	Family	Species	Total Captures	Specimens Kept
Rodentia	Muridae	*Neotoma lepida*	1	1
"	"	*Peromyscus maniculatus*	4	4
"	"	*Peromyscus truei*	3	3
	Heteromyidae	*Perognathus parvus*	2	2

Salvage / Other

Tamias minimus were commonly seen darting across the roads and climbing junipers and fenceposts throughout the area. We observed an *Ondatra zibethicus* swimming among the tules at Roberts Reservoir on 16 August. The ranch hands at Dodge Ranch provided 3 *Lepus californicus* specimens, and we salvaged another roadkill from the Dodge Reservoir access road. We detected no *Brachylagus*, which has become quite rare since Grinnell's days. We observed a *Canis latrans* crossing Stage Road at 1300h on 17 August. Pronghorn (*Antilocapra americana*) were seen on the Plains and the low foothills on a daily basis, in groups up to 90 individuals. Feral horses were seen in smaller groups (5-10 individuals) and their scat was prominent on the dirt roads; according to local ranchers, the BLM had just removed 800 head from the nearby hills. Cattle and their sign were ubiquitous at all sites throughout the area.

4. Lassen Park West (Shasta County)

Lassen Volcanic National Park lies at the heart of the Lassen Transect and contains the highest elevations in the area. As mentioned under the Mineral section, the winter of 2005-2006 was particularly heavy in the region. The park road did not open to the public until mid-July, and even in September patches of snow, some as large as a football field, remained at the higher elevations. The heavy winter was likely the principal factor behind the low trap success at our higher-elevation lines in the park. Our team sampled areas in the western half of the park from 5-14 September, operating out of the Crags Campground. Specimens collected on this trip were cataloged under Accession 14202. *Spermophilus lateralis* were common around camp and we frequently saw *Tamiasciurus douglasii* and heard them felling cones.

Trapline	Elev (ft)	Latitude	Longitude	Extent (m)	Label
Lake Helen	8205	40.47066	-121.51040	250	A
Emerald Lake	8083	40.46886	-121.51794	250	B
King's Creek Falls	6912	40.45971	-121.44478	300	C
Upper King's Creek Meadow	7465	40.46521	-121.47640	150	D
W end Manzanita Lake	5846	40.53759	-121.57018	200	E

Figure B4: Mammal specimen localities in the western portion of Lassen Volcanic National Park (Shasta County). Red dots denote traplines. LVNP lands shown in light green and Lassen National Forest lands in dark green.

Lake Helen (A on Figure B4)
Sampling dates: 5-9 September.
Sampling effort: 40 Shermans, 10 Tomahawks

This trapline ran down a steep slope along the N side of Lake Helen, amongst stands of hemlock with patches of *Arctostaphalos nevadensis*. The trapline intercepted the lakeshore 100 m E of a small drainage into the lake, then ran along the lakeshore amongst the rocks and lupine. The line continued W, running back uphill for 100 m into some large boulders. Note that the first trap night (Sept 5) consisted of only Sherman traps; the Tomahawks were added the next day. There was no real riparian vegetation at Lake Helen, as the hemlock and lupine continued right to the water's edge. Most of the lupine was not yet in flower, except on most exposed sunny patches, and virtually none had produced seed pods. Likewise, the manzanita was not yet fruiting. Along the rocky slope and in the sandy volcanic soil by the lake were many small holes, presumably rodent burrows, but the paucity of captures suggests that most were unoccupied this year.

Order	Family	Species	Total Captures	Specimens Kept
Insectivora	Soricidae	*Sorex* sp.	1	1
Rodentia	Sciuridae	*Spermophilus lateralis*	6	4

Most of the *Spermophilus lateralis* captured on the rocky slopes were juveniles whom had been out of the den for only a few weeks. Several of the females captured here were still lactating, and with snowfall expected in November it is unclear whether these animals will have enough time to lay on sufficient fat to survive the upcoming winter. Gopher and mole diggings were found near the E end of the trapline, near the road pullout overlooking Lake Helen.

Emerald Lake (B on Figure B4)
Sampling dates: 6-10 September
Sampling effort: 40 Shermans, 10 Tomahawks

Due to the low trap success at Lake Helen and the lack of riparian vegetation there, we established a second trap line at nearby Emerald Lake. This trapline began at the muddy banks of the W shore of Emerald Lake, then ran along the W and N shores, along the base of a talus slope, up the E side of the slope, then cut E into saddle between Emerald Lake and Lake Helen. The lakeside vegetation was predominantly mountain heather, and after the talus slope the vegetation was open hemlock woodland interspersed with rocky stubble. Blue lupine was common in the open areas, and much of it was flowering.

Order	Family	Species	Total Captures	Specimens Kept
Rodentia	Sciuridae	*Spermophilus lateralis*	12	4
"	"	*Tamias amoenus*	1	1
"	"	*Tamias speciosus*	4	4
"	Muridae	*Peromyscus maniculatus*	4	4

We found an *Ochotona princeps* floating dead in Emerald Lake on 7 September. The specimen was surprisingly fresh and in good condition, with only some minor abrasions on the inside of its forelimbs. Pika scat was also found at several spots in the talus slope, but no pika or haypiles were observed and no

alarm calls were heard. In the talus slope we also found fresh sign of *Marmota flaviventris*, and a pair of them were seen scampering among the roadside rocks at the hairpin turn just past Emerald Lake. No definitive sign of *Neotoma* was seen in the talus. There were fresh mole diggings on the S shore of the lake, and there was much old gopher sign at the far end of the trapline in the saddle between Emerald Lake and Lake Helen. *Spermophilus lateralis* and *Tamias* were common near the edge of the lake, especially near the talus slope. Deer tracks were abundant, and on September 6 we observed 3 bucks here, 2 of which were out of velvet and 1 was still in velvet. It is interesting how much more productive the Emerald Lake trapline was, compared to Lake Helen, presumably due to the lower elevation.

Kings Creek Falls (C on Figure B4)
Sampling dates: 6-10 September.
Sampling effort: 40 Shermans, 10 Tomahawks, 25 pitfalls, 3 Macabees

This area corresponds to the historic "Warner Creek, 6600 ft" sampling locality, which the field notes indicates was just above Kings Creek Falls. Our trapline sampled several different habitat types along the N side of the creek. The 40 Shermans were set in the narrow meadow habitat, among the grass, lupine (gone to seed) and corn lily, and also beside downed logs and beneath willows and shrubs (e.g. *Ribes*). The 10 Tomahawks were set in a mixed conifer assemblage (hemlock, red fir, lodgepole pine) slightly upslope from the creek. The Macabees were set at fresh diggings alongside the creek, one of which immediately caught a *T. monticola*. The Macabees were then moved to additional diggings in a small wet meadow approximately 50 m from the creek, where the horse trail joins the main hiking trail. The 25 pitfall cups were placed around the perimeter of this little meadow, which was on a slight slope.

Order	Family	Species	Total Captures	Specimens Kept
Insectivora	Soricidae	*Sorex* sp.	5	5
Rodentia	Sciuridae	*Tamias senex*	1	1
"	Dipodidae	*Zapus princeps*	10	10
"	Geomyidae	*Thomomys monticola*	3	3
"	Muridae	*Microtus longicaudus*	10	9
"	"	*Peromyscus maniculatus*	4	4
Carnivora	Mustelidae	*Mustela erminea*	1	1

One *M. longicaudus* specimen was a female with eight nearly full-term embryos that were retained in formalin.

Upper Kings Creek Meadow (D on Figure B4)
Sampling dates: 6-10 September
Sampling effort: 40 Shermans, 10 Tomahawks, 25 pitfalls.

This site corresponds to the historic "Warner Creek, 8000 ft" sampling locality, which the field notes and photographs clearly indicate was Upper Kings Creek Meadows. Due to the abundance of tourists in the main meadow, we located our traps in the NW portion of the meadow, in the western hairpin turn along the S slope of Reading Peak, approximately 500 m (by road) N of the turnout to the Kings Creek Picnic Area. Our trapline followed the east branch of the creek, which was densely vegetated with many wildflowers, forbs and low shrubs, and then it cut westward across the grassy meadow almost to the creek's west branch, and then it looped back N to end in a hemlock grove near the starting point. The pitfall cups were all along the eastern for, <10 m from the creek. There was much fresh *Aplodontia rufa*

sign (burrows and fresh cuttings) along the eastern fork of creek in a stand of corn lily; we placed several Tomahawks in the burrow entrances specifically to target them, resulting in 1 capture.

Order	Family	Species	Total Captures	Specimens Kept
Insectivora	Soricidae	*Sorex* sp.	9	9
Rodentia	Aplodontidae	*Aplodontia rufa*	1	1
"	Dipodidae	*Zapus princeps*	9	7
"	Geomyidae	*Thomomys monticola*	1	1
"	Muridae	*Microtus longicaudus*	2	2
"	"	*Peromyscus maniculatus*	4	4

West end of Manzanita Lake (E on Figure B4)
Sampling dates: 10-14 September.
Sampling effort: 40 Shermans, 10 Tomahawks.

The major habitat types in the immediate vicinity of the W end of Manzanita Lake Major habitat types were lakeside riparian meadow and yellow pine forest. Our trapline here began at a small creek outflow on W shore of the lake's N lobe. There was very little riparian vegetation along the creek due to its steep banks, so the traps here were among rocks and beneath small firs. The line followed along the edge of Manzanita Lake, with the traps place in alder and dense sedges. The line continued N into the drier conifer forest, then arced around the Park's entrance station, crossing Hwy 89 and the associated "Summertown" service road. The line capped a small ridge NE of entrance station; charred logs indicate this area burned several years ago. Traps were placed under shrubs and along downed logs. The line ended in the dense sedge stand at the intersection of the service road and Hwy 89, just 100 m from the entrance station. Unlike the traplines at higher elevation, this one was very productive, presumably due to the reduced impact of last winter's heavy snowfall.

Order	Family	Species	Total Captures	Specimens Kept

C. Bird Point Counts

Morgan Tingley

Introduction

Joseph Grinnell, as part of his daily life and his collecting trips, conducted a large number of bird surveys, which are documented in the 13,000 pages of field notes written over the course of his life. The Museum of Vertebrate Zoology is interested in exploring how bird communities have changed between Grinnell's time and the present, by conducting bird surveys in the regions where Grinnell and colleagues spent the most time working and documenting birds. This work began in 2003, with a systematic census of the birds of Yosemite National Park and surrounding areas which lasted for two years. In 2006 the Museum began resurveying bird observations recorded by Grinnell and his colleagues in the Lassen Transect.

It was a major challenge to design a survey that would be comparable to the original observations and also serve as a baseline for future studies. The historic surveys were essentially timed counts of birds recorded along whatever route Grinnell and his colleagues happened to take within the area they were working. In their most detailed records, which they called "paper censuses," they recorded the numbers of individuals of species per half hour, their starting and ending times, and their route. This gave a record of birds per unit time along a specific route. Since Grinnell's day, a tremendous amount of research has been focused on bird surveys. Not surprisingly, new methodologies are now preferred to provide better estimates of desired properties (e.g., species richness, abundance, trends, and detectability). Consequently, as was done in the Yosemite resurvey, we carried out a series of variable distance point counts along several transects that overlapped as nearly as possible the routes that Grinnell and his colleagues had likely taken.

Methods

From May through July 2006, we surveyed birds at 13 Grinnellian sites throughout the Lassen transect (Figure C1). Resurvey sites were selected based on multiple criteria. First, sites needed to be locatable with high confidence from the field notes. Second, sites needed to have been surveyed for breeding birds (generally between May and July). Third, sites with multiple historic surveys were given priority. Fourth, sites were picked to represent the range of the habitats and elevations found within the Lassen transect. Some sites that did not perfectly meet the preceding criteria were surveyed to create consistency with the bird and mammal collecting localities.

The 13 sites surveyed in 2006 represent slightly less than half the locations selected for bird resurveys in the Lassen Transect. The remaining sites will be resurveyed in 2007. For example, none of the historic sites in Lassen National Park were resurveyed in 2006, due to the heavy snow cover that remained in many high-elevation areas well into the resurvey period.

At the 13 sites we established a total of 126 points along trails representative of the survey routes used by Grinnell and his colleagues. Most transects contained 10 points, although the exact number varied depending on the availability of habitat and accessible land. Within a transect, points were at least 200 m apart. Because the terrain was often variable and transects could not be laid out linearly, distances between points were usually much greater than 200 m to guarantee independence. See Figure C2 for an example 10-point transect in the vicinity of Mineral, in Tehama Co.

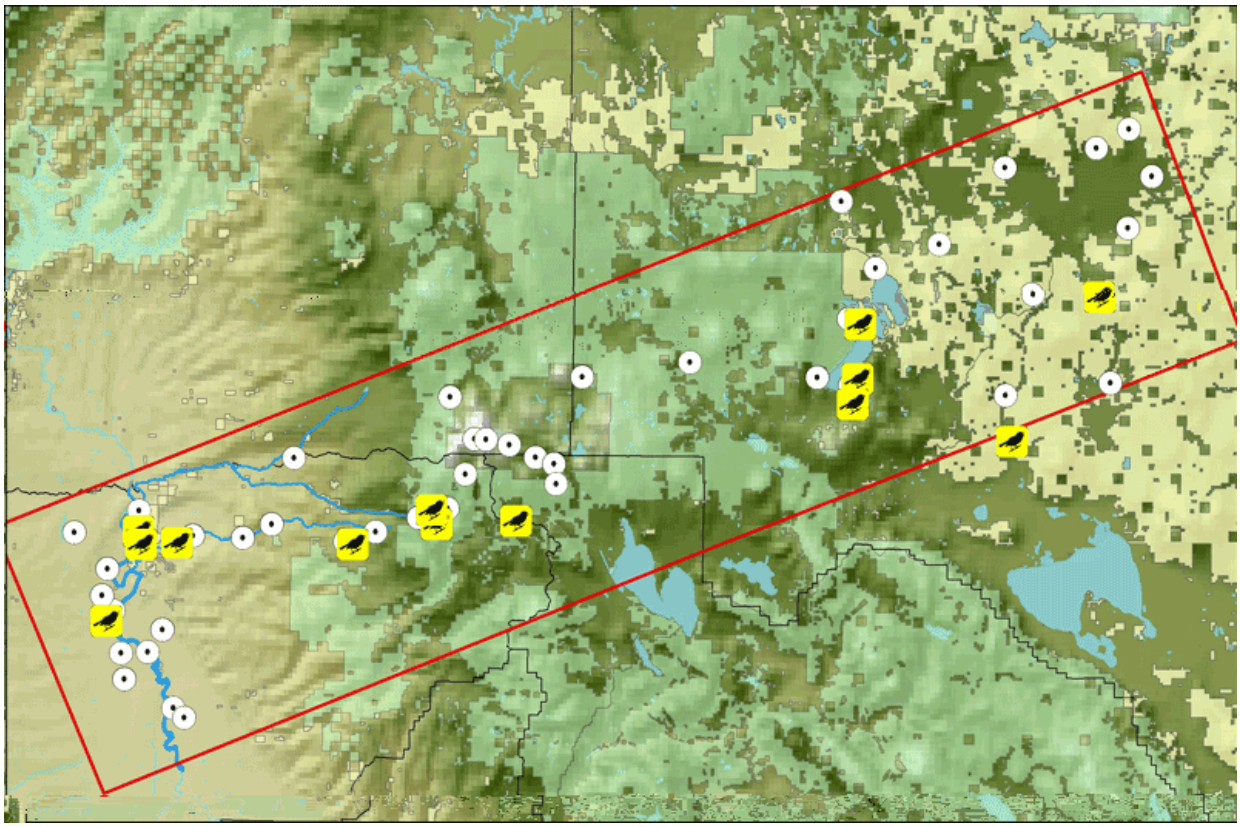

Figure C1: Bird point count locations (bird symbols) in the Lassen Transect, summer 2006.

According to established point count methodology, each point is the center of an imaginary circle with an infinite radius. During a survey, the observer arrives at the point (as identified with GPS and landmarks), waits for 60 seconds as a rest period, then begins a 7-minute point count where every bird seen or heard is recorded. For each individual bird, the following data are collected: species, number in group (if a flock), sex, age, how identified (singing, calling, visual), whether it was flying over (i.e., not "in" the point), any observed breeding behavior, and the distance from the observer to the bird. Distance measurements are estimates, but the relative distance is checked at each point using a laser range finder, and observers are trained in distance-estimation techniques prior to conducting the surveys. At the start of each survey, we record the temperature (°C), wind speed (using the Beaufort 12-point scale), and sky condition (using a similar 6-point scale).

Results

In 2006, we conducted 27 surveys at the 13 sites for a total of 262 point counts. We surveyed seven sites three times during the season, and the remaining six sites only once. Two observers conducted all surveys throughout the season. Over all 27 surveys, we recorded a total of 3,526 bird observations, representing 142 species. A brief summary of all transect surveys is given in Table C1. A full list of all species seen is presented in Table 2. The total number of individuals (of all species) seen during a transect survey varied widely (from 31 to 212), with the number of individuals seen being significantly correlated with dominant habitat type (One-way ANOVA: $F_{4,22} = 22.6$, $P < 0.0001$). The most individuals were seen in the lowland riparian areas of the Sacramento River Valley, while the least individuals were seen in the sagebrush-juniper habitats of the Great Basin. Per point, the highest average number of individuals seen was 17 birds per point at two sites along the Sacramento River (RB01, RB02), and the lowest was 6 birds per point at two surveys in Pete's Valley in the Great Basin.

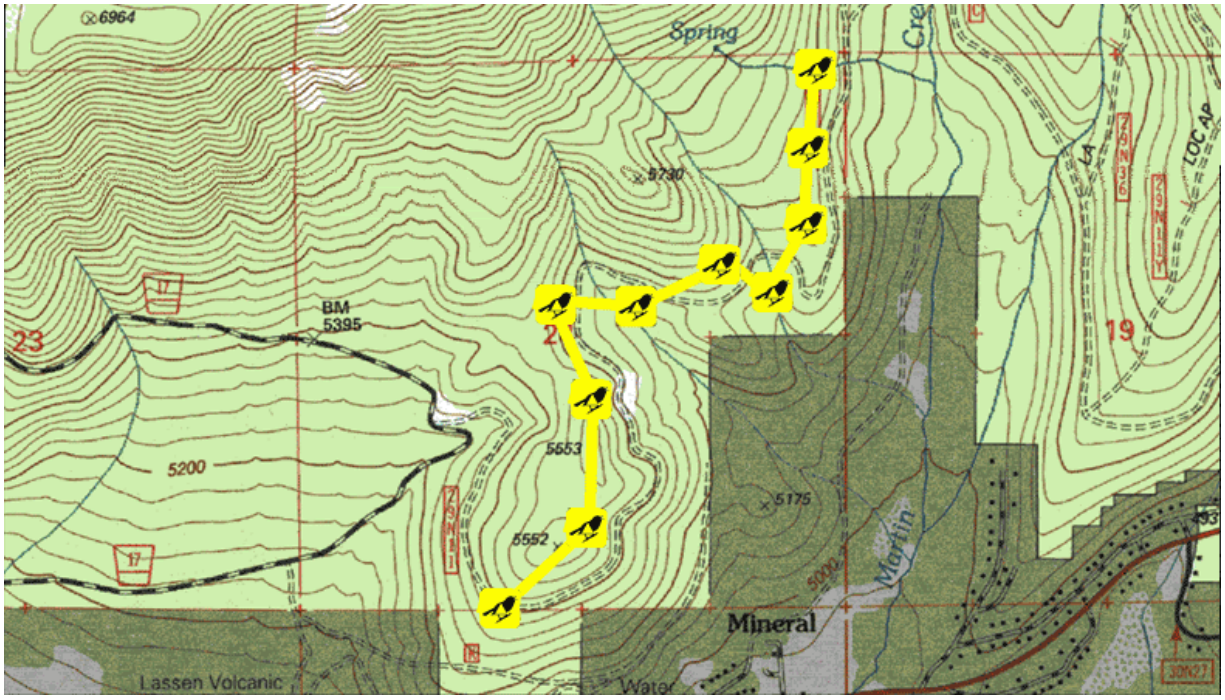

Figure C2: A sample bird point count route near Mineral (Tehama County). Bird symbols denote individual survey points (n=10) along the route.

Differences in species richness followed similar patterns: lowland riparian areas held the most species and sagebrush-juniper communities held the fewest species. The greatest number of species detected during a survey was 49 species, during the first survey along the transect RB01 near the city of Red Bluff. The fewest species detected during a survey was 10 species during two surveys at Pete's Valley outside of the city of Susanville.

Sites were also compared using species diversity indices (Simpson's Inverse and Shannon-Weaver indices) which incorporate the relative abundance of each species. Both indices were closely correlated with species richness observed for each survey, indicating that most communities surveyed had high species evenness and were not greatly skewed toward a few super-abundant species. The highest Simpson's diversity (22.5) was observed at Eagle Lake (EL02), even though fewer species (34) were observed there than at several other surveys, including the RB03 survey (which had a richness of 49 but a Simpson's of 20.5). Consequently, taking abundance into account is important when comparing the diversity of different localities in the Lassen transect.

Of the 142 species seen at the 13 sites, most were seen at more than one site (Table C2), yet 40 species were uniquely detected at only one site. We expect this number to decrease in the future as we more than double the number of sites surveyed around the Lassen area. However, the species that were only detected at one site demonstrate some of the inherent weaknesses in generalized bird point counts. For example, point counts are best for passerines, and many non-passerines that are neither abundant nor easily detectable (especially through lack of vocalizations) are easily missed. Certain groups of birds, in particular nocturnal species (owls, nightjars), are usually entirely missed by point counts.

Table C2 also provides the number of sites each species was seen (for the 13 sites of interest here) by Grinnell and colleagues during the historical bird surveys. This allows preliminary comparisons of historical data to present data for the 13 sites surveyed in the Lassen transect. As this comparison demonstrates, 25 species were seen in the present surveys which were not seen in the historical surveys at those same sites. This is in comparison to 35 species (not listed) that were found in the historical surveys but have yet to be found in the present surveys. Some of the species new to the modern surveys have shown drastic expansions or colonizations in the past century, such as Brown-headed Cowbirds, European Starlings, and Wild Turkeys. Others can possibly be associated with increased human presence in the landscape: Northern Mockingbird, Ring-billed Gull, and Barn Swallow. However easy it may be to create a story behind each species on the list, the only way to separate real trends from artifacts of methodology is through continued surveys and increased spatial coverage.

Table C1. Surveys conducted in 2006 in the Lassen transect with both site-specific characteristics and survey-specific bird diversity results.

Transect	County	Elevation (m)	Survey Dates	Number of individuals	Individuals per point	Number of Species	Inverse Simpson's	Shannon-Weaver	Dominant Habitat
RB03	Tehama	84	5/26/2006	212	16	49	20.2	3.41	Lowland riparian
-	-	-	6/5/2006	205	16	40	18.9	3.25	-
-	-	-	7/5/2006	198	15	34	18.8	3.19	-
RB02	Tehama	100	5/25/2006	171	17	30	15.0	2.97	Lowland riparian
RB01	Tehama	109	5/24/2006	173	17	31	14.4	2.96	Lowland riparian
DA01	Tehama	180	6/6/2006	148	15	32	16.5	3.07	Oak woodland
-	-	-	6/7/2006	128	13	35	18.3	3.18	-
-	-	-	7/4/2006	118	12	25	14.2	2.89	-
LY01	Tehama	1109	6/8/2006	109	11	25	15.5	2.92	Transition conifer
BC01	Tehama	1491	7/6/2006	159	16	28	15.7	2.97	Transition conifer
-	-	-	7/8/2006	136	14	25	10.3	2.77	-
-	-	-	7/9/2006	164	16	29	8.9	2.75	-
MI01	Tehama	1621	6/9/2006	100	10	23	14.0	2.84	Transition conifer
-	-	-	6/10/2006	95	10	25	14.0	2.88	-
-	-	-	7/3/2006	101	10	24	14.8	2.90	-
WL01	Plumas	1643	7/7/2006	102	10	22	12.0	2.73	Transition conifer
-	-	-	7/8/2006	107	11	19	10.2	2.57	-
-	-	-	7/9/2006	103	10	27	13.3	2.89	-
EL01	Shasta	1569	6/14/2006	116	12	30	14.6	3.01	Yellow Pine-mixed conifer
EL02	Shasta	1658	6/15/2006	107	11	34	22.5	3.31	Yellow Pine-mixed conifer
PM01	Shasta	1622	6/23/2006	70	7	19	7.5	2.42	Yellow Pine-mixed conifer
PV01	Shasta	1338	6/16/2006	31	6	11	7.9	2.23	Sagebrush-Juniper
-	-	-	6/18/2006	35	7	10	7.5	2.15	-
-	-	-	6/21/2006	28	6	10	5.9	1.99	-
RA01	Shasta	1629	6/17/2006	75	8	20	13.1	2.75	Sagebrush-Juniper
-	-	-	6/19/2006	79	8	24	13.1	2.84	-
-	-	-	6/22/2006	87	9	24	13.0	2.85	-

Table C2. List of species seen during re-survey of 13 sites in the Lassen Transect. For each species, the number of modern sites where the species was found is given along with a paired comparison of how many of the same sites the species was detected at in the historical surveys.

Common Name	No. of sites (modern)	No. of sites (historical)	*Common Name*	No. of sites (modern)	No. of sites (historical)
Wild Turkey	2	0	Great Egret	1	0
Mountain Quail	4	2	Green Heron	1	1
California Quail	7	4	American White Pelican	1	2
Canada Goose	4	2	Turkey Vulture	7	6
Mallard	5	1	Olive-Sided Flycatcher	5	5
Cinnamon Teal	1	0	Western Wood-Pewee	12	8
Common Merganser	4	2	Willow Flycatcher	2	2
Lewis's Woodpecker	1	2	Hammond's Flycatcher	4	3
Acorn Woodpecker	4	3	Gray Flycatcher	3	0
Red-Breasted Sapsucker	3	3	Dusky Flycatcher	7	3
Williamson's Sapsucker	2	1	Black Phoebe	3	0
Nuttall's Woodpecker	2	3	Ash-Throated Flycatcher	5	5
Downy Woodpecker	2	1	Western Kingbird	5	5
Hairy Woodpecker	7	4	Brown Creeper	5	5
White-Headed Woodpecker	4	4	Cassin's Vireo	4	6
Northern Flicker	9	3	Warbling Vireo	4	8
Pileated Woodpecker	4	2	Steller's Jay	7	4
Belted Kingfisher	4	1	Western Scrub-Jay	5	5
Black-Chinned Hummingbird	1	1	Gray Jay	1	0

(Table C2, continued).

Common Name	No. of sites (modern)	No. of sites (historical)	*Common Name*	No. of sites (modern)	No. of sites (historical)
Oak Titmouse	3	3	Lark Sparrow	4	4
Juniper Titmouse	2	1	Black-throated Sparrow	1	1
Bushtit	5	3	Rufous-Crowned Sparrow	1	0
Tree Swallow	6	3	Green-Tailed Towhee	3	3
Violet-Green Swallow	5	0	Spotted Towhee	8	2
No. Rough-Winged Swallow	3	1	California Towhee	3	3
Barn Swallow	1	0	Orange-Crowned Warbler	2	0
Cliff Swallow	4	3	Nashville Warbler	3	4
Golden-Crowned Kinglet	3	1	Yellow Warbler	6	8
Horned Lark	1	2	Yellow-Rumped Warbler	7	6
Pine Siskin	1	3	Black-Throated Gray Warbler	1	3
American Goldfinch	3	3	Hermit Warbler	2	3
Lesser Goldfinch	8	6	Macgillivray's Warbler	3	3
Lawrence's Goldfinch	2	0	Common Yellowthroat	2	3
Purple Finch	2	3	Wilson's Warbler	5	4
Cassin's Finch	3	5	Yellow-Breasted Chat	1	4
House Finch	7	4	Western Tanager	9	7
Red Crossbill	1	1	Black-Headed Grosbeak	8	6
Evening Grosbeak	3	3	Blue Grosbeak	2	1
Fox Sparrow	4	3	Lazuli Bunting	6	3
Song Sparrow	3	7	Bullock's Oriole	6	4
Lincoln's Sparrow	1	3	Yellow-Headed Blackbird	1	2
Dark-Eyed Junco	6	5	Red-Winged Blackbird	6	5
Savannah Sparrow	3	2	Western Meadowlark	8	8
Chipping Sparrow	7	7	Brewer's Blackbird	8	7
Brewer's Sparrow	1	2	Brown-Headed Cowbird	10	0

D. Bird Collections

Carla Cicero

Methodology and Extent

Birds were collected at two Grinnellian survey areas during the summer of 2006: Eagle Lake and Mineral. These areas correspond to two of the four mammal trap areas during 2006, and sites within these areas were chosen to explicitly sample different habitat types and to overlap with the mammal collecting sites, where possible.

Birds were collected using one of three methods: mistnet, shotgun, and salvage (i.e., found dead). In general, mistnet surveys were the most systematic of the three methods (see below). Collecting by shotgun was supplemental to mistnet captures and was conducted mostly in areas not monitored by nets, although there was some overlap in location. The number of days spent collecting by shotgun at each major area varied depending on other activities. Salvaged birds were collected opportunistically. There were no concerted efforts to sample at night, and thus nocturnal bird species (e.g., owls) are not well-represented.

Mistnets were run for four consecutive days at each site, and four sites were monitored in different habitats at each of two general locations (Eagle Lake, Mineral) for a total of 8 days of netting. Thus, two net runs were monitored simultaneously, each of which consisted of 9-10 nets that were setup in pairs with a central shared pole. Two additional days were taken to setup and take down nets. Nets were open for variable periods of time depending on location, ease of access, bird activity/captures, and weather. Nets usually were opened early in the morning, and were monitored regularly until closing. Nets were closed during the heat of the day to minimize mortality. Captured birds either were retained as vouchers or released.

We attempted to take no more than 10 individuals per species per major area or ecological zone (i.e., Eagle Lake, Mineral). However, we occasionally exceeded that number due to salvaged birds found after the limit was reached.

Bird observations also were recorded at each site, although not in a standardized method. Those are not summarized below because a separate team will report on standardized bird censuses. However, opportunistic bird observation data are available in individual field journals that will be archived in the Museum of Vertebrate Zoology.

Results

The following data summarize the results of our collecting efforts for 2006. The majority of bird specimens were prepared as standard study skins with frozen tissues. A few specimens (those in poorer condition) were prepared as skeletons, Additional parts (e.g., stomach contents, parasites) were saved from some birds.

1. Eagle Lake (Lassen County)

Our team worked the northern, western, and southern edges of Eagle Lake from 12-23 June 2006, operating from the US Forest Service's Eagle Campground on the southern shore. Specimens collected on this trip were cataloged under Accession 14177. Brown-headed Cowbirds (*Molothrus ater*), not recorded here historically, were abundant in the campground and a "camp net" quickly yielded 10 individuals as well as occasional other birds. We sampled four sites in this area with mistnets and eight locations by

shotgun; salvaged birds were collected incidentally at an additional eight locations, including three mammal traps. The table below shows all localities where bird specimens were collected.

Specific Locality	Latitude	Longitude	Method	Label
0.5 mi N of North Eagle Lake Campground, 5300 ft	40.74064	-120.72343	shotgun	A
Eagle Campground at Eagle Lake, 5100 ft	40.54848	-120.78190	mistnet	B
Eagle Lake Road (Road A1), 5100 ft, 0.5 mi W Christie Campground	40.57595	-120.84406	salvage	C
Hwy 139, 4.2 mi S of intersection with Termo-Grasshopper Rd	40.85152	-120.75772	salvage	D
Hwy. 395, 0.5 mi N Honey Lake Rest Area	40.15397	-120.28814	salvage	E
Junction of Eagle Lake Rd. and Stones Rd., 5200 ft	40.70471	-120.73905	salvage	F
Merrill Creek at Eagle Lake, 5100 ft	40.54937	-120.80754	salvage	G
Mouth of Pine Creek, 5100 ft, Eagle Lake	40.67886	-120.79060	shotgun, salvage	H
Papoose Meadow, 5300 ft	40.52520	-120.76691	shotgun	I
Pine Creek (tomahawk trap #131), 5150 ft, Eagle Lake	40.66361	-120.79268	salvage	J
Pine Creek, 5200 ft, 1 mi N and 1 mi W Spalding Tract	40.66335	-120.79460	mistnet, shotgun	K
Pine Creek, 5300 ft, 1 mi N and 1.5 mi W Spalding Tract	40.66362	-120.81404	shotgun	L
Pine Creek, 5400 ft, 1 mi N and 3 mi W Spalding Tract	40.66610	-120.83662	shotgun	M
Pine Creek, 5500 ft., 1.5 mi N and 3.5 mi W Spalding Tract	40.67847	-120.85126	shotgun	N
USFS Rd. 31N02, 5600 ft, 1 mi N and 1 mi E Gallatin Marina, Eagle Lake	40.56552	-120.75696	mistnet	O
USFS Rd. 32N79, 5300 ft., 1 mi N Christie Campground at Eagle Lake	40.58367	-120.84426	mistnet	P
W Shore Eagle Lake at Halfmoon Beach, 5100 ft	40.68532	-120.79166	shotgun	Q
W Side Papoose Meadow (near cabin), 1635 m	40.52500	-120.76671	salvage	R

Latitude and longitude for net sites represent the centroid of the net locations.

Mistnet Survey Sites:

Eagle Campground at Eagle Lake, 5100 ft (B on Figure D1)
Sampling dates: 13-22 June 2006
Sampling effort: 9 nets monitored from 13-17 June (4 pairs, 1 single net); a 10th net was set up in the campground and monitored from 15-22 June.
Land ownership: Lassen National Forest

Habitat: Open yellow pine in a meadow with scattered sagebrush; second growth yellow pine with an understory of young trees (part of a 1984 burn that was replanted in 1985); open yellow pine in the campground.

Order	Family	Species	Total Captures	Specimens Kept
Piciformes	Picidae	*Picoides albolarvatus*	2	2
Passeriformes	Certhiidae	*Certhia americana*	1	1
"	Corvidae	*Cyanocitta stelleri*	1	1
"	Emberizidae	*Junco oreganus*	1	1
"	Fringillidae	*Carpodacus cassinii*	1	1
"	"	*Coccothraustes vespertinus*	2	2
"	Icteridae	*Euphagus cyanocephalus*	1	1
"	"	*Molothrus ater*	9	9
"	Paridae	*Poecile gambeli*	7	7
"	Parulidae	*Dendroica coronata*	2	2
"	Sittidae	*Sitta carolinensis*	3	3

"	"	*Sitta pygmaea*	4	4
"	Thraupidae	*Piranga ludoviciana*	3	3
"	Turdidae	*Turdus migratorius*	4	4
"	Tyrannidae	*Contopus sordidulus*	5	5
"	"	*Empidonax oberholseri*	1	1

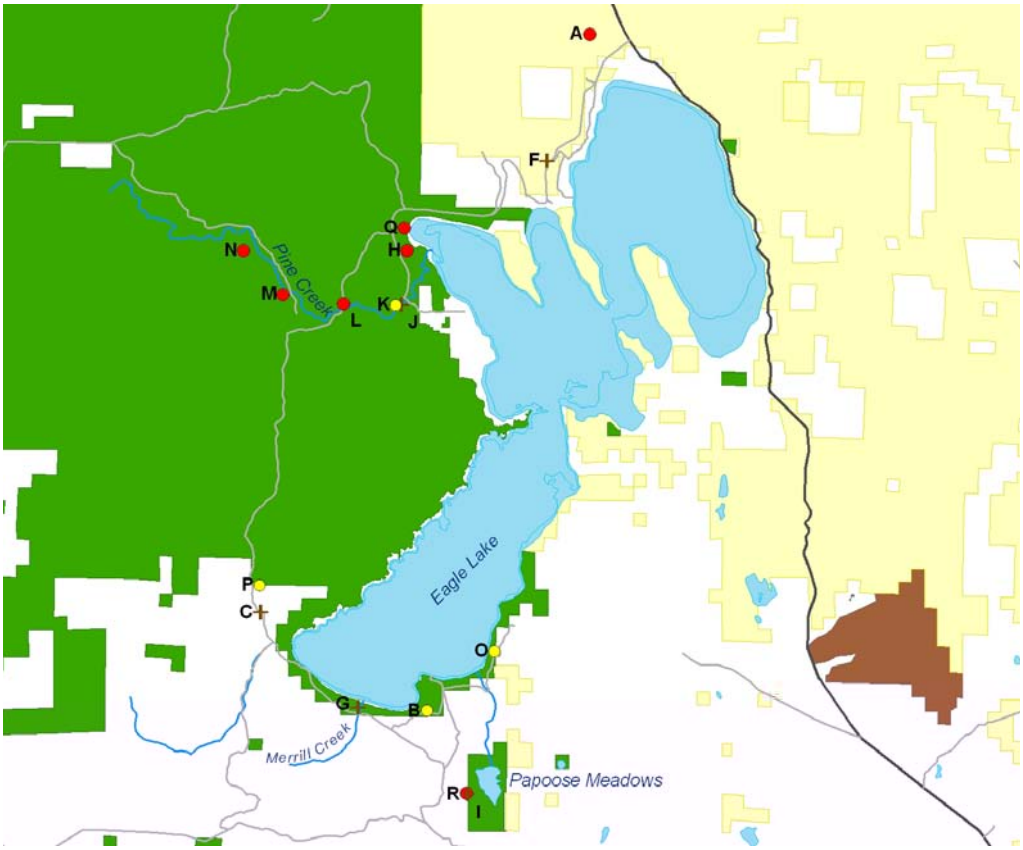

Figure D1: Bird specimen localities around Eagle Lake. Red dots denote shotgun collecting localities, yellow dots denote mistnets and crosses denote salvaged specimens (primarily roadkills).

Pine Creek, 5200 ft, 1 min N and 1 mi W Spalding Tract (K on Figure D1)
Sampling dates: 18-22 June 2006
Sampling effort: 10 nets (5 pairs)
Land ownership: Lassen National Forest

Habitat: Yellow pine mixed with western juniper and sagebrush; open yellow pine mixed with juniper, young aspen, sagebrush in a wet meadow near the rocky flooded creek; young aspen and sagebrush at the edge of the rocky flooded creek; open juniper and yellow pine in a wet rocky meadow with snags.

This area is the same location as the "Pine Creek" mammal trapline.

Order	Family	Species	Total Captures	Specimens Kept
Piciformes	Picidae	*Colaptes auratus*	1	1
"	"	*Picoides albolarvatus*	2	2
"	"	*Picoides villosus*	1	1

Passeriformes	Cardinalidae	*Pheucticus melanocephalus*	1	1
"	Certhiidae	*Certhia americana*	2	2
"	Emberizidae	*Melospiza melodia*	1	1
"	"	*Pipilo chlorurus*	1	0
"	"	*Spizella passerina*	2	2
"	Fringillidae	*Carpodacus cassinii*	9	8
"	Hirundinidae	*Tachycineta thalassina*	1	1
"	Icteridae	*Icterus bullockii*	1	1
"	Paridae	*Poecile gambeli*	10	3
"	Parulidae	*Dendroica coronata*	4	3
"	Picidae	*Sphyrapicus ruber*	5	5
"	Troglodytidae	*Troglodytes aedon*	1	1
"	Turdidae	*Sialia mexicana*	1	1
"	"	*Turdus migratorius*	11	6
"	Tyrannidae	*Contopus cooperi*	2	2
"	"	*Contopus sordidulus*	2	2

USFS Rd. 31N02, 5600 ft, 1 mi N and 1 mi E Gallatin Marina at Eagle Lake (O on Figure D1)
Sampling dates: 18-22 June 2006
Sampling effort: 9 nets (4 pairs plus one single net)
Land ownership: Lassen National Forest

Habitat: Young yellow pine in open stand mixed with incense cedar, rabbitbrush, western juniper, and California lilac with a rocky ground of lava; open cedar and yellow pine mixed with rabbitbrush and willows near a spring;

Order	Family	Species	Total Captures	Specimens Kept
Apodiformes	Trochilidae	*Selasphorus rufus*	1	1
"	"	*Stellula calliope*	2	2
Passeriformes	Cardinalidae	*Pheucticus melanocephalus*	2	2
"	Certhiidae	*Certhia americana*	1	1
"	Emberizidae	*Passerella iliaca*	9	9
"	"	*Pipilo chlorurus*	11	3
"	"	*Pipilo maculatus*	2	2
"	"	*Spizella passerina*	1	1
"	Fringillidae	*Carpodacus cassinii*	2	0
"	Parulidae	*Dendroica petechia*	1	1
"	Sittidae	*Sitta carolinensis*	1	1
"	Thraupidae	*Piranga ludoviciana*	3	3
"	Troglodytidae	*Salpinctes obsoletus*	1	1
"	Turdidae	*Turdus migratorius*	3	1
"	Vireonidae	*Vireo cassinii*	1	1

USFS Rd. 32N79, 5300 ft, 1 mi N Christie Campground at Eagle Lake (P on Figure D1)
Sampling dates: 13-17 June 2006
Sampling effort: 10 nets (5 pairs)
Land ownership: Lassen National Forest

Habitat: Open brushy area of bitterbrush, sagebrush, clumps of mountain mahogany, sparse yellow pine, and rocky outcrops of lava. One pair of nets was in the same general habitat type but in a seep with clumps of grasses and a little wild rose.

Order	Family	Species	Total Captures	Specimens Kept
Caprimulgiformes	Caprimulgidae	*Chordeiles minor*	1	1
"	"	*Phalaenoptilus nuttallii*	1	1
Passeriformes	Emberizidae	*Junco oreganus*	1	1
"	"	*Pipilo chlorurus*	7	7
"	"	*Pipilo maculatus*	2	2
"	"	*Spizella breweri*	2	2
"	"	*Spizella passerina*	1	1

Shotgun Collecting:

Specimens collected by shotgun were intended to supplement mistnetted birds, both in terms of targeted species/numbers and geographic coverage. Mistnetting is a more general survey method but is less effective at capturing certain groups of species. Shotgun collecting is far more precise, allowing specific taxa and even sexes or life stages to be targeted and the number of specimens collected to be tightly controlled. In addition, mistnet sites were limited in number and thus collecting by shotgun expanded the scope of areas sampled. Shotgun sampling was done in a range of habitats within the same general vegetation community types as the mistnet surveys. One exception was a sample taken at the north end of Eagle Lake (0.5 mi N of North Eagle Lake Campground, 5300 ft), in the transition between yellow pine (Cascade/Sierran) and juniper/sage (Great Basin).

Order	Family	Species	Specimens
Charadriiformes	Scolopacidae	*Actitis macularia*	1
"	"	*Phalaropus tricolor*	2
Caprimulgiformes	Caprimulgidae	*Chordeiles minor*	1
Apodiformes	Trochilidae	*Stellula calliope*	1
Piciformes	Picidae	*Melanerpes lewis*	1
"	"	*Picoides albolarvatus*	1
"	"	*Picoides villosus*	1
"	"	*Sphyrapicus ruber*	1
Passeriformes	Certhiidae	*Certhia americana*	2
"	Corvidae	*Cyanocitta stelleri*	1
"	"	*Nucifraga columbiana*	2
"	Emberizidae	*Junco oreganus*	2
"	"	*Passerculus sandwichensis*	2
"	Fringillidae	*Carpodacus cassinii*	1
"	Hirundinidae	*Tachycineta bicolor*	1
"	"	*Tachycineta thalassina*	1
"	Icteridae	*Agelaius phoeniceus*	2
"	"	*Xanthocephalus xanthocephalus*	4
"	Parulidae	*Oporornis tolmiei*	1
"	Sittidae	*Sitta carolinensis*	5

"	Troglodytidae	*Cistothorus palustris*	1
"	"		

USFS Rd. 29N17, 5500 ft, 0.5 mi N and 0.5 mi E North Shore Wilson Lake *	40.34951	-121.41777	shotgun	M
USFS Rd. 29N71, 5500 ft, 0.5 mi N and 1.5 mi E Battle Creek Campground	40.35677	-121.59867	shotgun	N
Wilson Lake, 5300 ft	40.34403	-121.43286	mistnet, shotgun	O

* Plumas County.

Latitude and longitude for net sites represent the centroid of the individual net locations.

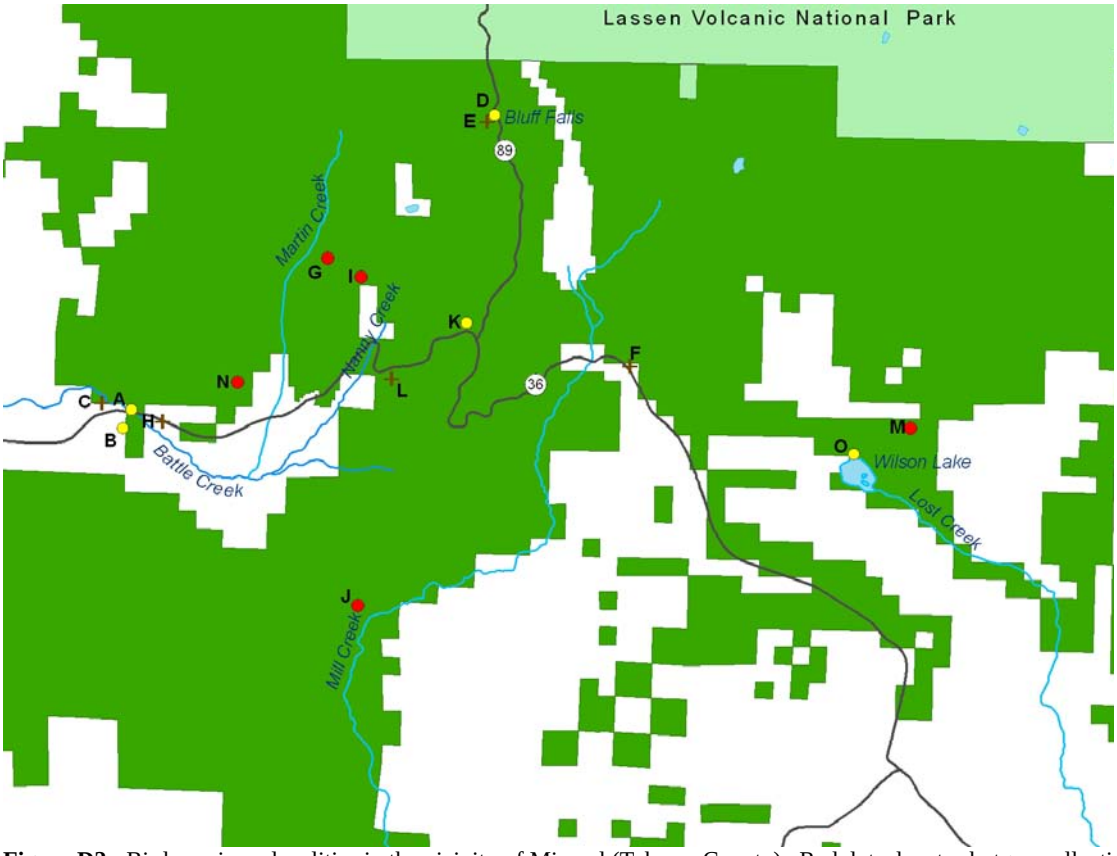

Figure D2: Bird specimen localities in the vicinity of Mineral (Tehama County). Red dots denote shotgun collecting areas; yellow dots denote mistnets; and crosses denote salvaged specimens (primarily roadkills).

Mistnet Survey Sites:

Battle Creek at crossing with Hwy. 36, 4800 ft; Battle Creek Campground, 4800 ft
(A, B on Figure D2)
Sampling dates: 14-20 July 2006
Sampling effort: 10 nets (5 pairs) along or near Battle Creek on the north side of Hwy. 36 near the crossing, run 14-17 July; an additional two nets were moved from the campground to the creek just south of Hwy. 36 at the crossing, and were monitored 16-17 July and again on 20 July. Those two nets were monitored in the campground from 14-16 July.
Land ownership: Lassen National Forest

Habitat: Mixed conifer of white fir, Douglas fir, incense cedar, and yellow pine with an understory of *Ceanothus*, *Ribes*, snowberry, and/or serviceberry. Willows along the creek.

A) Battle Creek at crossing with Hwy. 36, 4800 ft.

Order	Family	Species	Total Captures	Specimens Kept
Passeriformes	Certhiidae	*Certhia americana*	3	3
"	Emberizidae	*Melospiza melodia*	1	1
"	"	*Spizella passerina*	1	1
"	Paridae	*Poecile gambeli*	1	1
"	Parulidae	*Dendroica coronata*	2	2
"	"	*Dendroica occidentalis*	1	1
"	"	*Dendroica petechia*	1	1
"	"	*Vermivora ruficapilla*	2	2
"	"	*Wilsonia pusilla*	1	1
"	Sittidae	*Sitta canadensis*	1	1
"	Thraupidae	*Piranga ludoviciana*	3	3
"	Turdidae	*Catharus guttatus*	1	1
"	Tyrannidae	*Contopus sordidulus*	1	1
"	"	*Empidonax hammondii*	2	2
"	Vireonidae	*Vireo cassinii*	1	1

B) Battle Creek Campground, 4800 ft.

Order	Family	Species	Total Captures	Specimens Kept
Apodiformes	Trochilidae	*Selasphorus rufus*	1	1
Passeriformes	Emberizidae	*Melospiza melodia*	1	1
"	"	*Spizella passerina*	1	1
"	Turdidae	*Turdus migratorius*	2	2

Bluff Falls, 6300 ft, 0.75 mi S Lassen Volcanic National Park boundary on Hwy. 89
Sampling dates: 18-21 July 2006
Sampling effort: 11 nets (4 pairs plus one group of 3 nets)
Land ownership: Lassen National Forest

Habitat: Seven nets were on the east side of the road, in a wet meadow with alders, lodgepole pine, white fir, western white pine, corn lily, and rivulets of running water. Two nets were on the west side of the road at the edge of an open slope with prostrate manzanita, white fir, lodgepole pine, western white pine, and various annuals. Two nets were on the west side of the road at the edge of a large dense patch of alders with white fir, western white pine, and lodgepole pine.

Order	Family	Species	Total Captures	Specimens Kept
Apodiformes	Trochilidae	*Calypte anna*	3	3
"	Trochilidae	*Selasphorus rufus*	1	1
Passeriformes	Certhiidae	*Certhia americana*	1	1
"	Corvidae	*Cyanocitta stelleri*	1	1
"	Emberizidae	*Junco oreganus*	10	1 *
"	"	*Melospiza lincolnii*	2	2
"	Paridae	*Poecile gambeli*	1	0
"	Parulidae	*Dendroica coronata*	3	0
"	"	*Vermivora celata*	7	5

"	"	*Vermivora ruficapilla*	1	0
"	"	*Wilsonia pusilla*	4	4
"	Regulidae	*Regulus satrapa*	1	1
"	Thraupidae	*Piranga ludoviciana*	2	1
"	Troglodytidae	*Troglodytes aedon*	1	1
"	Turdidae	*Catharus guttatus*	1	1
"	"	*Turdus migratorius*	2	2
"	Tyrannidae	*Contopus sordidulus*	1	1
"	"	*Empidonax* sp.	2	2
"	Vireonidae	*Vireo cassinii*	1	1
"	"	*Vireo gilvus*	6	6

* found dead in net.

Summit Creek, 5600 ft, 0.5 mi N Morgan Summit (K on Figure D2)
Sampling dates: 17-20 July 2006
Sampling effort: 10 nets (5 pairs)
Land ownership: Lassen National Forest

Habitat: Mixed conifer of white fir, lodgepole pine, sugar pine, incense cedar with alders along creek. Most of the nets were in or near a meadow that also included corn lily and fir snags. This area is the same location as the "Summit Creek, N of Hwy 36" trapline.

Order	Family	Species	Total Captures	Specimens Kept
Apodiformes	Trochilidae	*Selasphorus rufus*	1	1
Piciformes	Picidae	*Sphyrapicus ruber*	1	1
Passeriformes	Certhiidae	*Certhia americana*	2	2
"	Emberizidae	*Junco oreganus*	32	1 *
"	Paridae	*Poecile gambeli*	2	0
"	Parulidae	*Dendroica coronata*	14	2
"	"	*Dendroica occidentalis*	6	2
"	"	*Vermivora celata*	3	2
"	"	*Vermivora ruficapilla*	4	4
"	Regulidae	*Regulus satrapa*	10	3
"	Sittidae	*Sitta canadensis*	1	1
"	Thraupidae	*Piranga ludoviciana*	1	0
"	Turdidae	*Catharus guttatus*	2	2
"	"	*Turdus migratorius*	1	0
"	Tyrannidae	*Empidonax hammondii*	15	7

* found dead in net.

Wilson Lake, 5300 ft (O on Figure D2)
Sampling dates: 13-16 July 2006
Sampling effort: 10 nets (5 pairs)
Land ownership: Lassen National Forest

Habitat: Nets were placed along the northwestern edge of the lake, between the waterline and Wilson Lake road. (Shotgun collecting was conducted more widely around the perimeter of Wilson Lake.) Local

habitats were primarily lodgepole pine at the edge of the lakeside meadow, which contained some white fir, yellow pine, *Ribes* and a wet grassy understory. One pair of nets was placed in predominantly white fir with some yellow and lodgepole pine.

Order	Family	Species	Total Captures	Specimens Kept
Apodiformes	Trochilidae	*Stellula calliope*	1	1
Piciformes	Picidae	*Picoides albolarvatus*	1	1
Passeriformes	Emberizidae	*Junco oreganus*	34	10
"	"	*Pipilo chlorurus*	2	2
"	"	*Spizella passerina*	4	4
"	Fringillidae	*Coccothraustes vespertinus*	1	1
"	Paridae	*Poecile gambeli*	9	9
"	Parulidae	*Dendroica coronata*	4	4
"	"	*Dendroica occidentalis*	8	5
"	"	*Vermivora celata*	2	2
"	"	*Vermivora ruficapilla*	1	1
"	Regulidae	*Regulus satrapa*	2	2
"	Sittidae	*Sitta canadensis*	2	2
"	Thraupidae	*Piranga ludoviciana*	3	3
"	Turdidae	*Turdus migratorius*	4	4

Shotgun Collecting:

Specimens collected by shotgun were intended to supplement mistnetted birds, both in terms of targeted species/numbers and geographic coverage. Mistnetting is a more general survey method but is less effective at capturing certain groups of species. Shotgun collecting is far more precise, allowing specific taxa and even sexes or life stages to be targeted and the number of specimens collected to be tightly controlled. In addition, mistnet sites were limited in number and thus collecting by shotgun expanded the scope of areas sampled. Shotgun sampling was done in a range of habitats within the same general vegetation community types as the mistnet surveys.

Order	Family	Species	Specimens
Galliformes	Phasianidae	*Dendragapus obscurus*	1
Charadriiformes	Scolopacidae	*Actitis macularia*	1
Apodiformes	Trochilidae	*Selasphorus rufus*	1
Piciformes	Picidae	*Colaptes auratus*	1
"	"	*Picoides albolarvatus*	5
"	"	*Picoides arcticus*	1
"	"	*Picoides pubescens*	1
"	"	*Picoides villosus*	2
"	"	*Sphyrapicus ruber*	2
Passeriformes	Certhiidae	*Certhia americana*	4
"	Cinclidae	*Cinclus mexicanus*	1
"	Corvidae	*Cyanocitta stelleri*	1
"	Emberizidae	*Junco oreganus*	1

"	"	*Melospiza melodia*	1
"	"	*Passerella iliaca*	8
"	"	*Pipilo chlorurus*	1
"	"	*Spizella passerina*	2
"	Fringillidae	*Carpodacus cassinii*	3
"	"	*Coccothraustes vespertinus*	8
"	Parulidae	*Dendroica coronata*	5
"	"	*Dendroica occidentalis*	3
"	"	*Oporornis tolmiei*	2
"	"	*Vermivora celata*	1
"	"	*Vermivora ruficapilla*	3
"	Regulidae	*Regulus satrapa*	2
"	Sittidae	*Sitta canadensis*	3
"	Thraupidae	*Piranga ludoviciana*	4
"	Troglodytidae	*Troglodytes aedon*	1
"	Turdidae	*Catharus guttatus*	3
"	"	*Turdus migratorius*	1
"	Tyrannidae	*Contopus cooperi*	2
"	"	*Contopus sordidulus*	1
"	"	*Empidonax hammondii*	1
"	Vireonidae	*Vireo cassinii*	2

Salvage:

Bird specimens found dead were salvaged opportunistically. On rare occasions, birds were found dead in the small mammal traps, but most salvage specimens were roadkills.

Order	Family	Species	Specimens
Piciformes	Piciformes	*Colaptes auratus*	1
Passeriformes	Emberizidae	*Melospiza melodia*	2
"	"	*Passerella iliaca*	1
"	Hirundinidae	*Petrochelidon pyrrhonota*	1
"	Troglodytidae	*Troglodytes aedon*	1

E. Amphibian and Reptile Surveys

Michelle Koo

Methods

Surveys were conducted using Visual Encounter Survey methods (Crump and Scott 1994). Two-person crews searched along edges of watercourses, under banks, or under wood and rocks for amphibians, or through meadows and woodlands examining all suitable microhabitats for amphibians and reptiles. In water bodies, dipnets were used to sample tadpoles and larvae as well as to capture adult amphibians. Other methods of capture included lizard nooses and snake tongs for venomous reptiles (e.g. *Crotalus oreganus*). Appendix I outlines the survey protocols and includes an example of the datasheets and definitions that are required at the field sites. Surveys are conducted primarily during the day. Night surveys are conducted when suitable habitat for nocturnal species (e.g. *Rana aurora*) are discovered. Data are recorded for all sites visited, and records are taken for all individual amphibians and reptiles observed and collected. Visual observations of other vertebrates are also noted.

We documented species presence by collecting representative specimens as well as making detailed observations. All specimens are recorded along with habitat / dominant vegetation and GPS coordinates.

All collected specimens were prepared, tissue-sampled, and curated according to established natural history museum methods and in accordance with state and federal laws. Specimens were humanely euthanized following protocols approved by UC Berkeley's Animal Care and Use Committee and the three North American herpetological societies (ASIH 1987). Prior to fixation, tissue samples (usually liver) were removed and flash frozen in liquid nitrogen from at least one specimen per species per locality. Specimens were fixed in 10% buffered formalin and stored in 70% ethyl alcohol. Tissue samples, once received at the MVZ, were placed in an ultracold freezer (-86° C). All specimens and tissues are cataloged and deposited in the herpetology research collection of the MVZ and are curated as part of the permanent scientific collection.

Locality data were recorded for all specimens collected. Locality data consist of a written description of the locality. Latitude and longitude were obtained in the field using global positioning system (GPS) receivers set to North American Datum (NAD) 1927 or World Geodetic Survey (WGS) 1984. GPS coordinates were checked against the topographic maps or GIS data layers such as Digital Orthophoto Quads (DOQs) and corrected as required. All coordinates obtained from topographic maps refer to North American Datum 1927. Point data were plotted on base maps with ArcView® (ver. 9.1).

All specimens and associated data are part of the permanent herpetological collections of MVZ and thus available to the scientific community. MVZ specimen data collected in 2006 as well as historical data can be found on the MVZ's searchable online catalog (http://mvzarctos.berkeley.edu).

Results

Below are survey summaries by general survey area as identified by black boxes on the Transect-level map (Figure A1) where the generalized historic sites are indicated. In each area, specific survey sites are described with date and time of survey, weather conditions, disturbances, and habitat type. Species that were collected are identified by their MVZ catalog number which can be referenced in the MVZ online catalog (http://mvzarctos.berkeley.edu). Observations of species occurrence are also noted. Figures E1-E3 are schematic maps of sites surveyed. Common names follow Stebbins (2003).

1. Sacramento River Bend/ Red Bluff Area - (Tehama Co.)

Grinnell and his colleagues made herpetological collections from 1915 through the 1930's. Red Bluff is now an urban/suburban center of over 13,000 and the county seat for Tehama. Several of Grinnell's sites were not re-surveyed due to ownership and access changes but ecological correlates were found to survey in 2006.

The area was surveyed from 20-25 May 2006 (see Figure E1 and Table E1) and included day and night surveys for amphibians and reptiles as well as bird observation transects. Specimens collected were cataloged under Accession 14152. The weather was typically seasonal, generally ranging from partly cloudy and sprinkling rain to a thunderstorm on the night of 20 May in the early morning hours of the 21st with high winds and rain.

Figure E1.

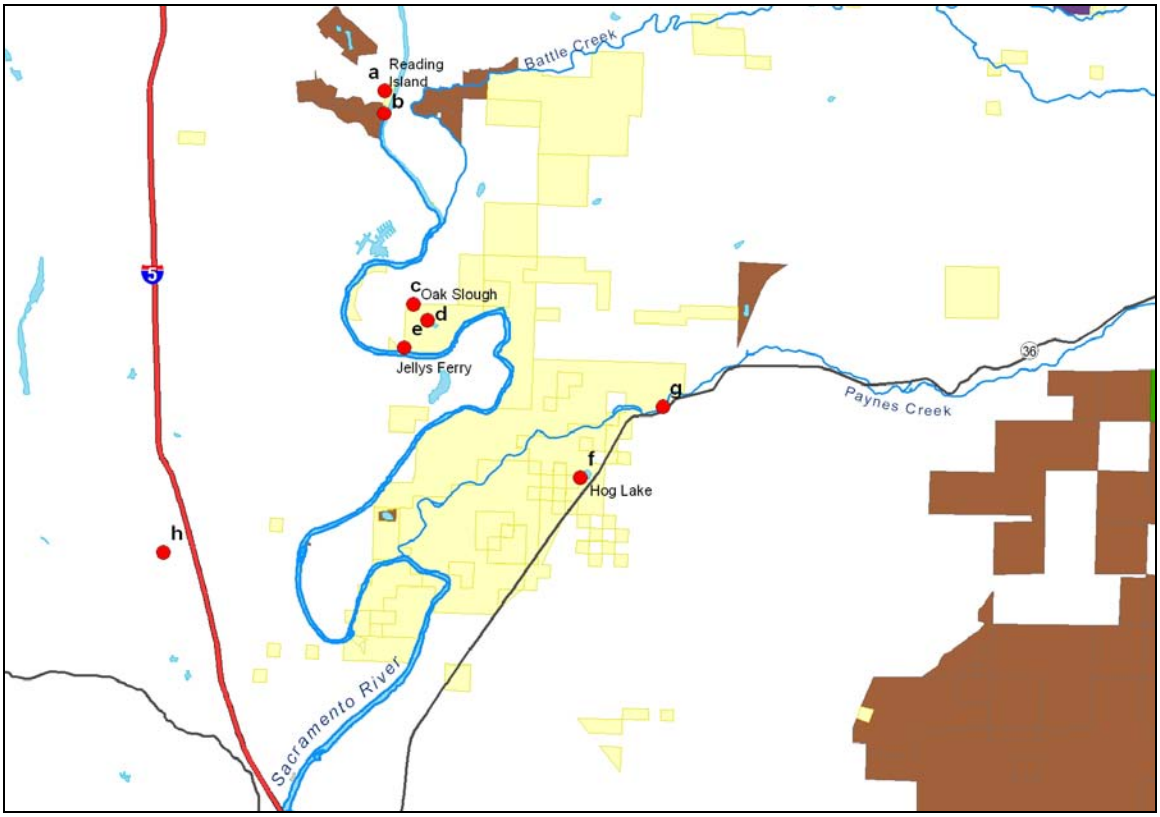

Table 1. Sites surveyed in the Sacramento River/Red Bluff area.

label	Locality	Latitude	Longitude	Datum
a	Reading Island BLM Recreational Area, bridge at end of Adobe Rd.	40.39142	-122.197278	NAD27
b	Reading Island BLM Recreational Area, SW tip of island	40.38492	-122.197222	NAD27
c	Oak Slough BLM Recreational Area, trail to Osprey Pond (W from trailhead)	40.33111	-122.184777	NAD27
d	Oak Slough BLM Recreational Area, Osprey Pond	40.32669	-122.179472	NAD27
e	Jellys Ferry BLM Recreational Area, floodplain W of trailhead	40.31881	-122.188000	NAD27
f	Hog Lake Plateau BLM Recreational Area, Hog Lake	40.28331	-122.121778	NAD27
g	Paynes Creek at Supan Gulch, ca. 1.5 mi S (by rd) Dales Station	40.30375	-122.09192	NAD27
h	Jon and Kathy Arnold's Place	40.25938	-122.27500	WGS84

Reading Island BLM Recreational Area (a, b on Figure E1)
Land Ownership: Bureau of Land Management

Reading Island is a BLM Recreational Area at the end of an unmarked road from Adobe Road, about 5 miles east of Cottonwood. While separated from the main land by a channel of the Sacramento River, it is an ecological correlate of Bloody Island, surveyed by Linsdale in May 1926. Reading Island is frequented during daylight hours for recreational fishing and hiking; there is a boat launch and developed campground area. Dominant tree types include Valley Oak, California Buckeye, Cottonwood, and Willow; there are stands of blackberry and elderberry as well as many non-native grasses. Several areas of shoreline were obstructed by dense undergrowth of blackberry and so an entire perimeter survey was not possible.

A night survey was conducted on 20 May and daytime survey on the 21 May. Two species of amphibians were observed: *Pseudacris (Hyla) regilla* and *Rana catesbeiana*.

Amphibians

Pseudacris regilla — Pacific treefrogs were heard in the night survey by large choruses on presumably low-lying partially submerged wetlands on the right bank of the Sacramento River. The species was also observed in the post-storm puddles along Adobe Road.

Rana catesbeiana [MVZ 251990-251993] — American bullfrogs were documented in the night and day surveys on both the mainland and Reading Island banks. All life stages were observed and collected, from tadpole (in 6" depth, mainland side of Reading Island bridge) to subadult (in 1 – 2' depth, SW tip of Reading Island) and adult (mainland side of Reading Island bridge).

Although no reptiles were encountered in Reading Island, it is likely within the slower channel near the bridge *Thamnophis sirtalis* or *T. elegans* may occur. The Island itself seemed ideal habitat for opportunistic species such as the Southern Alligator lizard, *Elgaria multicarinata*.

Oak Slough BLM Recreational Area (c, d on Figure E1)
Land Ownership: Bureau of Land Management

Oak Slough Recreational Area was visited on 21 May and 23 May, first in the afternoon (1415-1545 h) and then in late morning (1000-1300 h). The weather was warm but overcast, sometimes with sprinkles on both occasions.

The area is dominated by Blue Oak woodland, where portions have been restricted from grazing. Valley Oaks and small stands of blackberry and sapling oaks also dot the area. The Oak Slough Trail has a trailhead here and appears regularly used; on one occasion there were recreational equestrians. East of the trailhead, it meets with the Yana Trail, which connects several BLM parcels together. This was the eastern extent of the survey. Osprey Pond was accessed via the Oak Slough Trail from the west branch at the trailhead, which crossed over several seasonal drainages that were dry but still had logs and rocks with moist refugia. The Oak Slough Trail rises to a plateau on its way to Osprey Pond where grazing effects were more prominent: no young saplings, and seasonal water courses were compacted and marked with hoof divots.

Several species were documented along the Oak Slough Trail in Blue Oak woodland and open grassland habitat:

Amphibians

Pseudacris regilla [MVZ 251981-2] — Pacific treefrogs were found in the grasses or under logs along the more wooded southwestern loop of the trail; they were also found under rocks in the moist areas of seasonal channels. Both adults and subadults were encountered but were not generally active.

Reptiles

Elgaria multicarinata [MVZ 251996] — A large Southern Alligator lizard, female, was documented in tall grass in a nearby blackberry thicket to the Oak Slough Trail. It was gravid which was seasonally expected.

Sceloporus occidentalis [MVZ 251998-9; 252000-6] — Western Fence lizards were found throughout the survey area, both in the more wooded side of the trail and on the more exposed plateau, on snags and logs but mostly under structures. Both adult males and females were collected and observed. Scat was observed on several large boulders and rocks in the area, so undoubtedly in warmer weather, more individuals would be visible, basking and defending territories.

Contia tenuis [MVZ 252008-9] — Sharp-tailed snakes were encountered under structures such as rocks and logs in the dry channels leading from Osprey Pond where the last available moisture could be found. The thunderstorm earlier in the week likely helped keep this secretive, moisture-dependent species on the surface.

Crotalus oreganus [MVZ 252022] — A Western Rattlesnake was found in a den site in a volcanic rock outcrop above the Oak Slough Trail where it comes to a large bend; the den had a southeastern exposure about 75 m above the trail.

Pituophis catenifer [MVZ 252011] — Gopher snakes were found along Oak Slough Trail on the more wooded southwestern part of the loop. Both the collected and observed individuals were active among Blue Oak saplings or grasses between larger Valley Oaks. Several adult sheds were found among logs and rocks on the hillside above the trail.

Osprey Pond, a man-made reservoir used by cattle, was at least 75-80% full at the time of survey. The pond had no visible current inflow or outflow with heavy to moderate submergent and emergent vegetation. Aquatic gastropods such as Ramshorn (Planorbidae), the large “Apple” snails (Ampullariidae), and another unidentified species (with pointed sinistrial shell) were observed. The pond also housed mosquitofish (*Gambusia sp.*), sunfish (*Lepomis cyanellus*), and crappie (*Pomoxis nigromaculatus*). The presence of non-native fish and amphibians limits the native amphibian species expected to occur.

Amphibians

Pseudacris regilla [MVZ 251983] — Subadults were found in the mud flats or in the shoreline. No eggs or adults were observed. These were most likely recent neonates that metamorphosed from seasonal extralimital water sources surrounding the main water body where fish could not prey upon egg masses.

Rana catesbeiana [MVZ 251987-8] — Tadpoles were found in the main water body at various depths, near shoreline to at least 2 ft depth. At least five subadults or small adults were observed or heard at shoreline when we approached, especially at the southeastern berm. Two tadpoles were found in the mudflats with either the head or tail missing and disemboweled.

Reptiles

Crotalus oreganus [MVZ 252023] — The second rattlesnake found on the survey was in a dry creek bed northeast of Osprey Pond.

Pituophis catenifer [MVZ 252012-3] — Juvenile Gopher snakes were found along the southwestern shoreline of Osprey Pond. Both were active and were found within a few meters of each other.

Jellys Ferry BLM Recreational Area (e on Figure E1)
Land Ownership: Bureau of Land Management

Jellys Ferry was visited on 21 May, in the late afternoon (1600 to 1700 h) when the focus of the survey was north and west of the trailhead; a second visit was on 24 May at midday (1130 to 1245 h) when the Yana Trail and adjacent Sacramento River shoreline was explored. The weather ranged from 100% overcast and breezy on the first visit to clear and hot the second visit.

The area was frequented by equestrians, hikers and fishermen. The habitat was contiguous to the Oak Slough Trail area separated by a large open meadow that was fenced to exclude cattle. The fenced meadow, where many kingbirds were zipping around, was not surveyed. The open meadow and thickets along the Yana Trail appeared to be appropriate habitat for several snake species such as *Coluber constrictor* and *Contia tenuis* although neither were directly observed. In tule grass beds along the river, *Coluber constrictor* sheds were found. The ground was very dry, and there was little to no moisture under rocks.

The amphibian species were exclusively found in the larval or metamorph stages in floodplain pools north and west of the parking lot; however, it is likely that adult *Bufo boreas* disperse and forage farther in the

Hog Lake Plateau (f on Figure E1)
Land Ownership: Bureau of Land Management

The site was surveyed on 22 May from about 1330 h to 1530 h, which circumnavigated Hog Lake. The weather was clear and sunny with a strong southern wind.

Hog Lake is a large vernal pool at 265 m (869 ft) elevation where Blue Oak woodlands transition to Foothill Pine. It was about 70-75% of capacity given the current waterline. Grazing is apparent but no cattle were present. Large volcanic boulder field surrounds the lake and a basalt rock outcrop hemmed the north and western sides of the lake. It appeared to be appropriate *Crotalus oreganus* habitat although none were observed. Also expected to occur is *Ambystoma macrodactylum* as the size and structure of Hog Lake is suitable, particularly the volcanic boulder field on its northern edge.

Amphibians

Pseudacris regilla [MVZ 251966-70] — Pacific treefrog metamorphs were found in mud divots around the edge of the lake where moisture had accumulated and desiccation by wind was minimized.

Reptiles

Elgaria multicarinata [MVZ 251994] — A male lizard was found basking on a log about 10 feet from water's edge on the northern edge of Hog Lake, where a basaltic outcrop lined the water's edge.

Lampropeltis getula [MVZ 252010] — A juvenile and adult California kingsnake were seen at the northern border of Hog Lake among the volcanic boulders which marked the edge.

Sceloporus occidentalis — Western fence lizards were observed near the trailhead.

Thamnophis elegans [MVZ 252016-8] — Adult and juvenile Mountain Garter snakes were common around the water's edge and hunting in Hog Lake. One adult male had two *Pseudacris regilla* adults in his stomach.

Thamnophis sirtalis [MVZ 252019-21] — Adult Valley Garter snakes were seen along the periphery of Hog Lake.

Paynes Creek at Supan Gulch (g on Figure E1)
Land Ownership: Bureau of Land Management

This section of Paynes Creek is the only stretch of Paynes Creek that we surveyed. Its cobble substrate and stretches of open canopy with clear swift water made it suitable habitat for *Rana boylii*, although none were documented. The riparian zone was dense thickets of willow and sycamores through more open stretches of blue oak transitioning to grey pine woodlands. In the drier open uplands area, we would expect to find *Aspidoscelis* (*Cnemidophorus*) *tigris*.

Amphibians

Pseudacris regilla [MVZ 251984-6] — Pacific treefrogs were found in the dry creek bed of Supan Gulch and dry channels of Paynes Creek.

Rana catesbeiana [MVZ 251989] — A single large tadpole was found in a deep (at least 2 ft. depth) shaded sidepool. No other tadpoles were observed. Crayfish parts were found.

Reptiles

Thamnophis couchii [MVZ 252014-5] — Two juvenile Aquatic garter snakes were found in the dry creek bed of Supan Gulch or in Paynes Creek. Stomach contents were not available but presence of tadpoles and small fry in sidepools suggest prey items were easily accessible.

Jon and Kathy Arnold's property, 16000 Old Mission Dr., Red Bluff (h on map).
Land Ownership: private

Roughly 15 acres on an ungrazed Blue Oak hillside that slopes down to a seasonal creek, the property consist of a house, small backyard, garden, gravel driveway and a few outbuildings sitting atop the hillside. The grass-covered slopes are cut with rills; a few snags dot the slope. Species observations follow fieldnotes of John D. Perrine and Chad Martin. Only daytime observations were made; no specimens were collected.

The owners report that they have observed *Pituophis catenifer*, *Thamnophis* sp., and an occasional *Crotalus oreganus*. The setting is appropriate for these species.

Reptiles

Sceloporus occidentalis — Reportedly common here, and many were observed around the property including patio and garden area around the main house.

Elgaria sp. — An unidentified Alligator lizard was seen; mostly likely it was *E. multicarinata*. The mixture of outbuildings and habitat would suit this species well.

Plestiodon (*Eumeces*) *skiltonianus* — A juvenile Western skink was observed under a log.

Lampropeltis getula — An adult female California kingsnake was found, approximately 900-1000 mm total length.

2. Mineral vicinity (Tehama and Plumas Counties)

Figure E2.

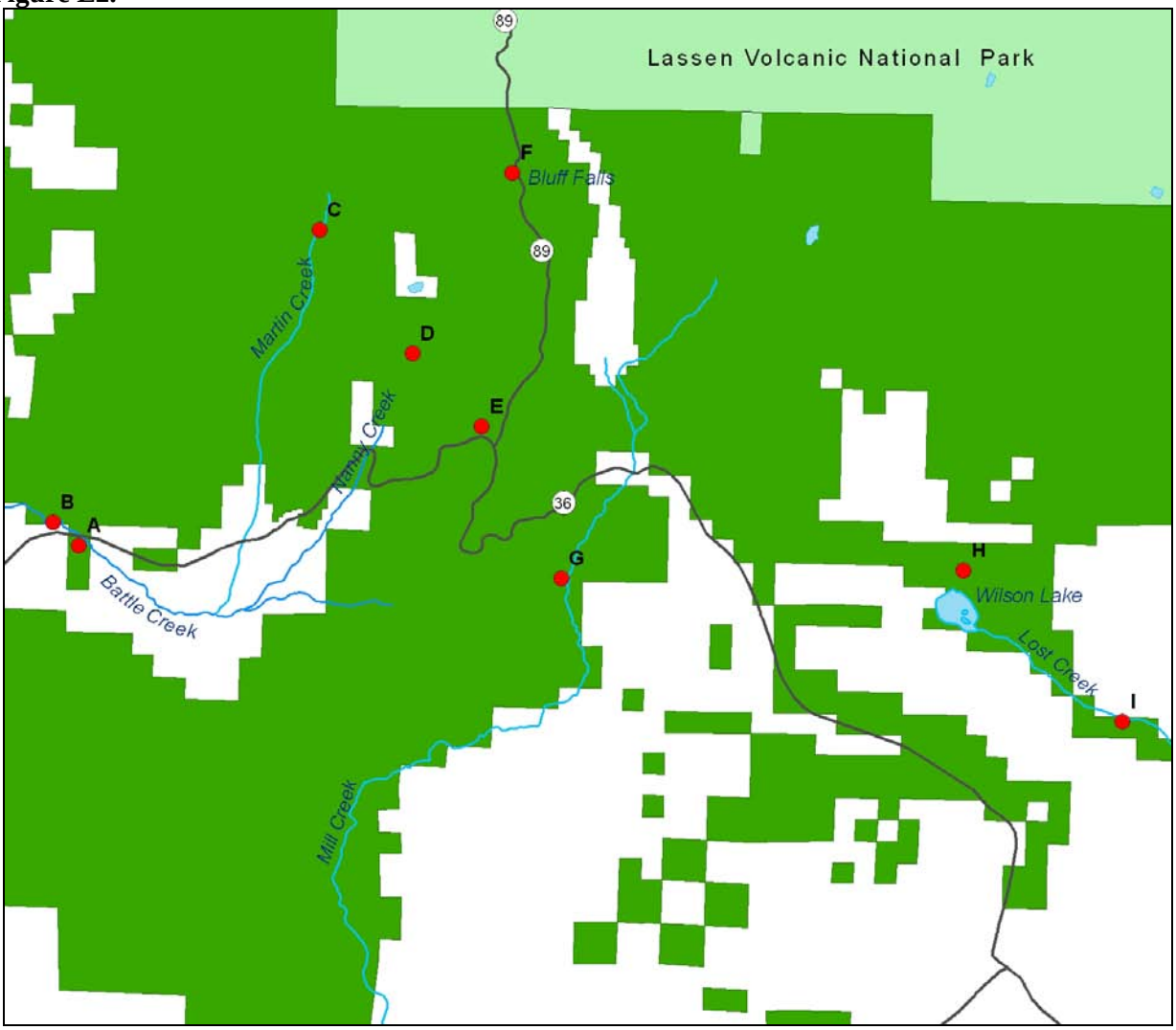

Table E2. Survey Sites in the Mineral Area.

label	Locality	Latitude	Longitude	Datum
A	Battle Creek Campground, Lassen National Forest	40.34843	-121.62614	NAD27
B	Battle Creek to road N side of Hwy. 36, Battle Creek Campground, Lassen National Forest	40.35233	-121.63200	NAD27
C	Martin Creek, FSR 30N16 to Glassburner Meadows (N), Lassen National Forest	40.40261	-121.57411	NAD27
D	Nanny Creek to Wilson Meadows, Lassen National Forest	40.38200	-121.55306	NAD27
E	Summit Creek			
F	Bluff Falls	40.41278	-121.5316	WGS84
G	Mill Creek, N Hwy. 36, Lassen National Forest	40.34417	-121.51929	WGS84
H	Wilson Lake, Lassen National Forest	40.34656	-121.43036	NAD27
I	Lost Creek at FSR 29N19, Lassen National Forest	40.32133	-121.39472	NAD27

Battle Creek Campground, Tehama Co. (A on Figure E2)
Land ownership: Lassen National Forest

Battle Creek Campground is located S of Hwy 36 approximately 1 mi W of Mineral, on the western edge of Battle Creek Meadows. Surrounding vegetation is primarily mixed conifer (White Fir, Incense Cedar, and Sugar Pine) with an understory of manzanita, bitter cherry, currant, gooseberry and *Ceanothus*. Riparian corridor exists of alders and willows and emergent sedges along Battle Creek.

We camped here from 24 to 28 July making this our primary point of departure for the week of fieldwork in the area. We surveyed from the campground to the service bridge over Battle Creek, along the creek, past the overhead pass of Highway 36, mostly in the afternoon of the 24th and the morning of the 28th of July.

Battle Creek was flowing rapidly with a mostly cobble substrate. Water turbidity was low but there were stretches of silt, ½' deep in places, covering the substrate. Banks were often undercut with few or no sidepools. Generally the structure would be suitable for *Rana boylii*, as have been recorded in 1932 (MVZ 14973) at 4500 ft; however the silt residual leaves portions of the creek unsuitable. Subsequent surveys in 2002 and 2003 by the California Academy of Sciences (CAS) have not observed them in Battle Creek. *Taricha torosa* also may be expected to occur and have been recorded at lower elevations.

Battle Creek Meadows, a known historic site for *Rana cascadae*, is currently under private ownership, and has not been surveyed for amphibians as far as I know in recent years. From the shared service bridge and along Highway 36, the fenced off meadow has clearly undergone disturbance since specimens were collected in 1924 (MVZ 10002-3; 10010-11; 10027). Cattle were present, and irrigation equipment was siphoning from Battle Creek, presumably for small parcels of agriculture. The source of silt residue found in Battle Creek undoubtedly came upstream from the Meadows.

Amphibians

Bufo boreas [MVZ 252144] — Western toads were found as adults and juveniles in and around the campground, especially near water sources such as water spigots and the restrooms.

Pseudacris regilla [MVZ 252149-50] — Like the toads, these juveniles were found in the campground near sources of water.

Reptiles

Sceloporus graciosus [MVZ 252165-72] — Sagebrush lizards were found in various open places along the Battle Creek, including the service yard area where outbuildings and log piles served as basking spots. They were also using the rocky berm of the overpass for Highway 36.

Elgaria coerulea [MVZ 252158] — An adult Northern Alligator lizard was found on the rocky berm of the bridge overpass for Highway 36. This female was gravid. They are likely common in similar areas as the *S. graciosus* near the outbuildings.

Charina bottae — A roadkill specimen was found in the western end of the campground near a rocky outcrop. It was a male (205 mm Snout-Vent Length (SVL)).

Thamnophis couchii [MVZ 252189] — A juvenile Aquatic garter snake was found in the sand bar beneath the bridge overpass of Highway 36, just emerging from Battle Creek. It had no stomach contents.

Battle Creek, 0.5 mi W of junction with Hwy 36, Tehama Co. (B on Figure E2)
Land ownership: Lassen National Forest

The survey of Battle Creek continued past the bridge overpass of Highway 36 along the riparian corridor of willows, bunch grass, sedge and flowering shrubs. Open mixed conifer forests surrounded the area and we moved up in elevation to Road 140A into drier, shrubby mixed Blue Oak / Gray Pine interspersed with basaltic rock outcrops. Understory consisted on manzanita and wild onion in open areas. Evidence of OHV, firepits and trash-dumping were scattered in the more accessible areas.

Reptiles

Sceloporus graciosus [MVZ 2521673-4] — Sagebrush lizards were found in various lava rock outcrops above Battle Creek.

Plestiodon (Eumeces) skiltonianus — A juvenile was observed in a basaltic outcrop within 10 m of the *S. graciosus* specimens.

Charina bottae — An almost intact shed was found between basaltic rocks near the same rock outcrops.

Coluber constrictor — Pieces of large shed was found nearby the same basaltic outcrop; it was not clear if the shed came from one individual or more, but head scalation and overall pattern confirm species identification.

Martin Creek, FSR 30N16 to Glassburner Meadows, Tehama Co. (C on Figure E2)
Land ownership: Lassen National Forest

The daytime survey began at Martin Creek and the crossing of FSR 30N16, along the creek northwards on 26 July (1223 h to 1635 h). The weather was hot, sunny and clear (shade temperature was 28ºC varying to 32 ºC in the sun).

Martin Creek flowed swiftly through mixed conifer forest of White fir, Incense Cedar, Sugar Pine and some Jeffery Pine. Substrate was medium gravel to sandy to silty, basalt base rock; turbidity was very low. Thickets of alder in more open flatter stretches were interspersed with wet meadows of introduced grass and corn lilies and other herbaceous plants. Evidence of cattle existed in the wet meadows and thickets although none were encountered.

Amphibians

Bufo boreas [MVZ 252147] — A juvenile Western toad was found in Martin Creek at FSR 30N16 among the cobble edge. The habitat for toads appeared appropriate for foraging adults throughout the survey although we did not find larger pools for egg-laying.

Pseudacris regilla [MVZ 252153] — An adult Pacific treefrog was found in a wet meadow in an alder thicket. Many areas appeared suitable for treefrogs in the thickets and more open wet meadows although our encounters were few possibly because of the high daytime temperatures.

Reptiles

Elgaria coerulea [MVZ 252159] — An adult Northern Alligator lizard was found in an open area between a wet meadow and the conifers.

Charina bottae [MVZ 252187] — A juvenile Rubber Boa was found under the bark of a downed log in damp rotting wood at the edge of an alder thicket about 10 m from Martin Creek.

Nanny Creek, Tehama Co. (D on Figure E2)
Land ownership: Lassen National Forest

Survey began on 26 July at 930 h to 1045 h, near the hairpin turn of FSR 30N16, about 5400 ft elev. to 5680 ft elev. along the creek. The canopy near the road was opened from past logging; secondary growth incense cedar and other conifers were filling in the opening. Large snags and downed wood appeared attractive to more opportunistic species like *Elgaria coerulea*, which we found here.

The overall creek structure of cobble substrate and open canopy for most of the stretch we surveyed appeared suitable for *Rana boylii*, although none were seen. There was considerable amount of windstorm debris choking portions of the creek with lots of downed trees. We would also expect to find *Bufo boreas, Thamnophis sirtalis* or *T. atratus.*

Reptiles

Elgaria coerulea [MVZ 252162] — A juvenile Northern Alligator lizard was found in an open area of downed trees and secondary growth between the hairpin turn of FSR 30N16 and Nanny Creek.

Summit Creek, Tehama Co. (E on Figure E2)
Land ownership: Lassen National Forest

Summit Creek, north of Highway 36, was surveyed on 27 July during the day. Weather was sunny and clear with air temperature at 28.3º C and water temperature at 15 º C. Survey began at the crossing of Highway 36 northwards about 1 mi and circled back down FSR (Forest Service Road) 29N60F (presumed). The survey concentrated on the creek, adjacent open wet meadows and alder/willow thickets. The surrounding forest was mixed conifer (white fir, incense cedar, and sugar pine) with new secondary growth (1-2 m high) fir and shrub particularly along the dirt road. Recent logging was evident, residential buildings were present north of surveyed area. Much of the herbaceous grass, creekside and in the open meadows appeared to be introduced; little sedge or bunch grass or rushes were seen.

The week of prolonged warm weather may account for the low observations during the survey. We observed one *Pseudacris regilla* in tall grass on a creek bar. Many areas appeared suitable for *Elgaria coerulea, Coluber constrictor,* or *Charina bottae,* although no evidence of any other species were seen.

Bluff Falls, Tehama Co. (F on Figure E2)
Land ownership: Lassen National Forest

This was surveyed on 25 July from 1600h to 1730h and accessed via Highway 89.

Bluff Falls is located on the west side of Hwy 36 approximately 1 mi south of the Lassen Volcanic National Park boundary on Highway 89 (see Figure 3). The water course near the road was densely vegetated with alders and willows, along with *Equisetum,* corn lily, ferns and other herbaceous plants and rocky slopes on either side in mixed conifer forest. The bluff of Bluff Falls was fractured sedimentary rock with loose talus at its base. Wet seeps through the fissures in the bluff face afforded some bryophytes. It is eastern-facing.

The open talus and surrounding scrub seems appropriate for a number of species, e.g. *Sceloporus graciosus, S. occidentalis, Charina bottae*. Strangely, we did not observe any individuals nor find scat on perches for *S. occidentalis* despite focused search effort. The wet fissures on an east-facing cliff and talus are habitat conditions reminiscent of *Hydromantes sp*. microhabitat although far from documented range *H. platycephalus* (approximately 119 km north of northernmost record at Sierra Buttes, Sierra Co.).

The mammal survey crew (J.D. Perrine, fieldnotes) on 21 July observed an adult *Elgaria* near large rocks at the north side of the base of the falls but was unable to confirm species identification. Most likely it was *E. coerulea.*

Mill Creek, Plumas Co. (G on Figure E2)
Land ownership: Lassen National Forest

On 27 July, Mill Creek was surveyed in spots from Hole-in-the-Ground to south of Highway 36 along County Rd 172; most effort focused approximately 1.4 miles south of Highway 36 on County Rd 172 (to Mill Creek town). Here, Mill Creek meanders and ribbons over a wide flat into many side channels. A band of mixed conifers (ca. 100 m wide) lies between the road and Mill Creek with wet meadows spotting the area. The weather was sunny and clear with temperatures between 29 - 31ºC.

This stretch of Mill Creek appeared highly suitable for several amphibians, some undoubtedly here but not detected, such as *Bufo boreas* and *Pseudacris regilla*, as we have found them at other nearby sites. The general habitat also appeared appropriate for *Rana boylii* but none were detected.

Reptiles

Elgaria coerulea [MVZ 252160-1] — Several adult Northern Alligator lizards were found in both the conifer band and in the alder thickets in that formed between the cobble bars in the channels of Mill Creek.

Sceloporus graciosus [MVZ 252176; 252177-8; 252179-85] — This was the most common species encountered during the survey in the open cobble bars and dry washes of Mill Creek; they were using the downed logs or larger boulders as perches and refugia. Males, females and juveniles were observed.

Thamnophis elegans [MVZ 252190-1; 252192; 252193] — Several adults and juveniles were seen in both the wet meadows within the conifer band and in the alder and willow thickets in the open channels of Mill Creek.

Wilson Lake, Tehama Co. (H on Figure E2)
Land ownership: Lassen National Forest

Wilson Lake was surveyed on 25 July (1100 h to 1230h) starting at the northeast end in a wet meadow between Road 769 and FSR 29N63B. The weather was sunny and warm, about 29º C air and 25º C at water's edge (10 cm depth). The lake was 70-80% covered in at least two species of water lilies with emergent sedges and rushes around the perimeter; the surrounding wet meadow appeared to be mostly retreating lake levels up to mixed conifer forest. On the eastern edge, an old lava flow, now volcanic rock outcrops, border the lake with a stand of quaking aspen in the rubble field. The lake substrate was silt and mud with medium levels of turbidity mostly contributed by the high tannic levels in the water. There appeared to be no water flow.

Recent fishing and boating activity was evident. Throughout the lake, numerous bullhead catfish were observed along with a couple of sucker fish. The catfish were adept at swimming up to 2 or 3 inches of water to forage in the mud. With such nimble access to the shallows of the lake, amphibian larvae would not have much refuge from these potential predators.

Blind dip-netting was conducted to about 1 m depth. No amphibian larvae were found. Low numbers of gastropods and mollusks were also noted.

The general habitat and lake structure with shoreline of rocky outcrops appeared suitable for *Ambystoma macrodactylum*; however the presence of bullhead catfish may preclude their persistence at Wilson Lake. Other reptiles expected to occur but not observed are *Coluber constrictor*, *Charina bottae*, *Sceloporus graciosus*, *Thamnophis elegans*, and *T. sirtalis*. Approximately 0.25 mi W of Wilson Lake along Road 769, *S. graciosus* were observed under *Ceanothus* and gooseberry shrubs.

Amphibians

Bufo boreas [MVZ 252148] — Several adult Western toads were encountered on Road 769 (Wilson Lake Road) during a night visit on 15 July. An adult toad was also found in a mammal trapline (Tomahawk trap) set under manzanita shrub (J.D. Perrine).

Pseudacris regilla [MVZ 252154-7] — Recently metamorphed Pacific treefrogs were found in the perimeter wet meadows of Wilson Lake and near the mammal traplines 1/3 mi W of the lake. The wet meadows and the deeper pools obviously are important nurseries for these amphibian species as egg deposition, tadpole development and metamorphosis can occur without contact with the larger Lake and its predators.

Lost Creek, Tehama Co. (I on Figure E2)
Land ownership: Lassen National Forest

Lost Creek was surveyed on 25 July (1321 h to 1500 h) from FSR 29N19; the weather continued to be warm (32ºC air) but the deep channel of Lost Creek was very cold (10ºC water). Surrounding habitat consisted of mixed conifer forest, including Sugar Pine and Jeffery Pine. The creek appeared to be mainly spring-fed with probably seasonal runoff from Wilson Lake; the channel was deep-cut (average depth 1-1.5 m) with overhanging grassy banks. Flow was average for its depth and turbidity was low. No visible disturbances of grazing or recreation were found.

Overall the creek structure and condition as well as the open meadow appeared suitable for *Rana cascadae*, although no evidence of this species was found. (No historic records exist either for Lost Creek.)

Amphibians

Bufo boreas [MVZ 252145-6] — An adult Western Toad was found under a log in a dry channel near the forest's edge. Tadpoles were also observed in the slower shallows of Lost Creek by emergent sedge.

Pseudacris regilla [MVZ 252151-2] — Recently metamorphed Pacific treefrogs were encountered in the surrounding wet meadows. Some appeared to be foraging.

Reptiles

Sceloporus graciosus [MVZ 252175] — The Sagebrush lizards were mostly associated with the rocky berm that formed the edge of the road and were observed under the shrub and pines here.

3. Eagle Lake (Lassen County)

Accompanied by the mammal and bird surveyors, the Eagle Lake area was mostly surveyed on the western and southern edges of Eagle Lake from 18-23 June, operating from the US Forest Service's Eagle Campground on the southern shore. The mammal survey crew was in the area from 12-23 June and supplied observational data. Specimens collected were cataloged under Accession 14177. Evidence of grazing was clear but no cattle were present. The weather was mostly partly sunny, with rain in the beginning of the survey period (13 June) but becoming hot and clear later in the period.

Figure E3.

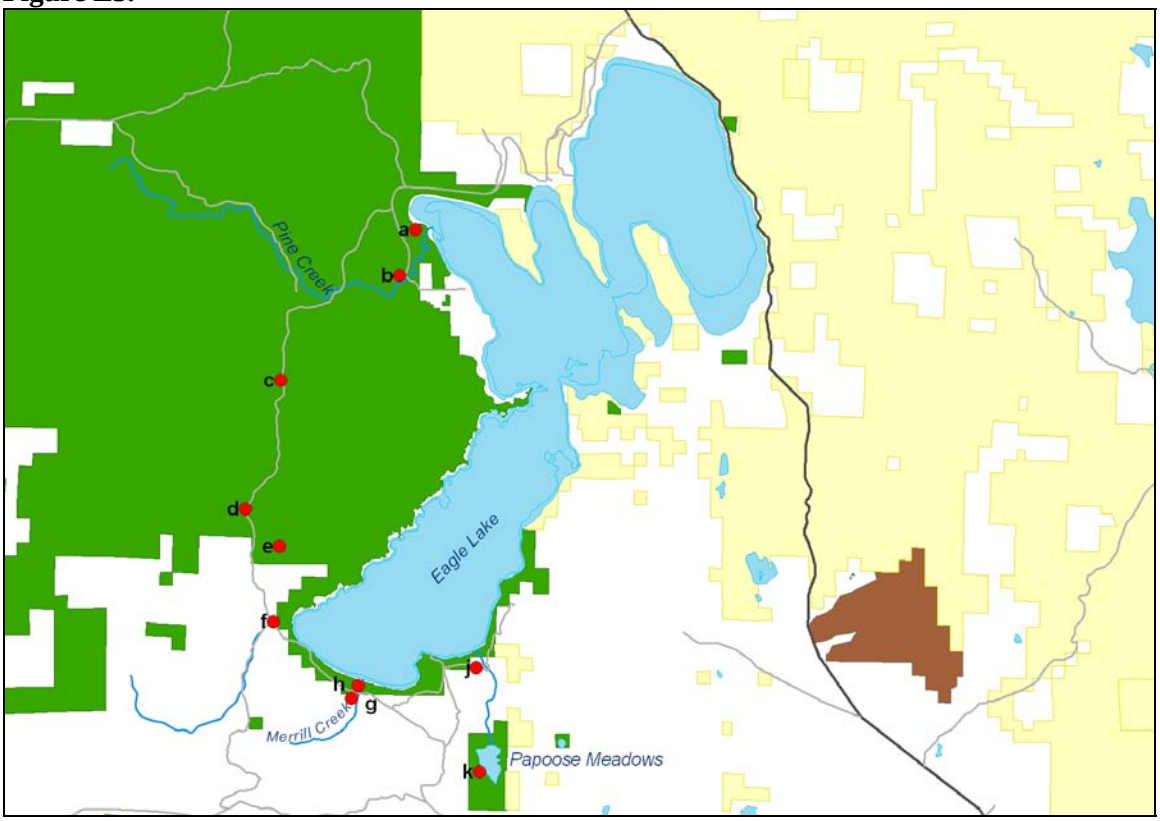

Table E3. Sites surveyed in the Eagle Lake area.

label	Locality	Latitude	Longitude	Datum
a	North of mouth of Pine Creek, west side of Eagle Lake	40.67855	-120.78774	WGS 84
b	Pine Creek, 1558 m, Eagle Lake	40.66550	-120.79348	WGS 84
c	4.6 mi S Spalding turnoff on Eagle Lake Rd (Hwy. A1)	40.63559	-120.83714	WGS 84
d	Brockman Flat	40.59905	-120.84982	WGS 84
e	Brockman Lava Beds	40.58857	-120.83717	WGS 84
f	Pond at Entrance to Christie Campground	40.56727	-120.83918	WGS 84
g	Merrill Creek, 1556 m	40.54937	-120.80754	WGS 84
h	Merrill Creek, 1579 m	40.54576	-120.80999	WGS 84

j	Gallatin Beach, Eagle Lake	40.55468	-120.76374	WGS 84
k	Papoose Meadow	40.52538	-120.76225	WGS 84

Pine Creek, west side of Eagle Lake (a, b on Figure E3)
Land ownership: Lassen National Forest

A herpetological survey took place on 18 July (1130 to 1245 h). This area had been visited for mammal traplines on previous days, and several of the mammalogists' observations on amphibian species are included below. The weather was clear and very warm. The site is in sagebrush interspersed with Yellow Pine; it transitions to open riparian emergent vegetation of reeds and grass at the wetland edge of Eagle Lake. Stands of stinging nettle dotted the wet meadow. Evidence of cattle were seen but none were present.

Amphibians

Bufo boreas [MVZ 252025-7] — Along the shoreline, metamorphic toads were found as well as hundreds of tadpoles in a large pool of water.

Pseudacris regilla [MVZ 252043] — In a marshy area along the edge of the lake with emergent grass, Pacific treefrog tadpoles were observed.

Spea intermontana [MVZ 252051-5] — In the same wetland habitat as *P. regilla*, Great Basin Spadefoot frogs tadpoles were observed. Four spadefoot frogs were also caught in pitfall traps at the mouth of Pine Creek the previous week (13-17 June) by the mammalogists. Several tadpoles of *P. regilla* and *S. intermontana* were found dead by unknown cause in the warm shallows.

Reptiles

Sceloporus graciosus [MVZ 252074] — Sagebrush lizards were found in the transitional drier areas near the survey area.

Thamnophis elegans [MVZ 252130-1] — Several adult garter snakes were encountered foraging in the wetlands in several inches of water.

Brockman Flat (d on Figure E3)
Land ownership: Lassen National Forest

Brockman Flat consisted of a wet meadow on the E side of Eagle Lake Road (Highway A-1), approximately 10 mi from the Eagle Campground. The forest was a mixed conifer assemblage dominated by yellow pine, with occasional downed logs at the meadow's edge.

Reptiles

Crotalus oreganus — A Western rattlesnake was observed on 15 June in the wet meadow.

Thamnophis elegans [MVZ 252132] — A female subadult Western garter snake was encountered in this wet meadow.

Brockman Lava Beds (e on Figure E3)
Land ownership: Lassen National Forest

The Brockman Lava Beds survey site was a habitat of sagebrush, ceanothus and manzanita scrub, interspersed with rocky lava outcrops, and with occasional yellow pine and juniper trees. The soil was red and powdery. On 20 June the morning (0915-1145h) weather was sunny and hot with an air temperature of 32-33ºC.

Both *Sceloporus graciosus* and *S. occidentalis* were active on and around the lava rock outcrops. Representative voucher specimens were documented for both species [MVZ 252075-7; MVZ 252113-5, respectively].

Pond at entrance to Christie Campground (f on Figure E3)
Land ownership: National Forest

A short visit on 20 June was made to a shallow pond at the entrance to the Christie Campground on Eagle Lake Rd. The pond had no visible in or outlet and had sparse aquatic vegetation; emergent patches of willow brush were present. The pond was surrounded by coniferous forest. The weather was sunny and hot (32 ºC).

Amphibians

Pseudacris regilla [MVZ 252044-5] —Pacific treefrog metamorphs were observed in the shallows of the pond.

Reptiles

Thamnophis elegans [MVZ 252137] — A subadult Western garter snake was found in a willow stand.

Merrill Creek (g, h on Figure E3)
Land ownership: Lassen National Forest

Merrill Creek was visited on 20 and 21 June by both herpetologists and mammalogists. The focused herpetological survey occurred on 20 June (1220h to 1315 h) on a sunny hot day.

Merrill Creek was dry in spots, and metal barriers had formed pools in some places. Most of the site was shaded by yellow pines, cottonwoods and tall willows, interspersed with the occasional cedar, white fir and the odd Sequoia. The creek banks flattened near its mouth, forming small wet meadows only a few meters across. Much of the surrounding open meadows were dry. Logged trees were present.

Amphibians

Bufo boreas [MVZ 252028-37] — Hundreds of recently metamorphic toadlets were encountered in muddy areas around the creek. One adult toad was also found about 10 ft from creek under willow.

Reptiles

Thamnophis elegans [MVZ 252134-5] — Adult Western garter snakes were found in the mouth of the stream, possibly foraging.

Sceloporus graciosus [MVZ 252081-2] — Male and female sagebrush lizards were active in grassy areas along the stream; a pair was observed mating.

Papoose Meadow (k on Figure E3)
Land ownership: National Forest

Papoose Meadow was visited on 19 June (0915 h to 1250 h) when the weather was warm and partly cloudy. The general habitat was open Ponderosa Pine woodland and open wetlands.

The meadow was filled with wildflowers and still had many boggy areas of standing water. No cattle were present at the time, but a US Forest Service crew was repairing the fences in preparation for their arrival. An abandoned cabin sits at the western edge of the meadow.

Amphibians

Bufo boreas [MVZ 252038] — A large adult was encountered in open Ponderosa Pine forest under a log at the southwestern side of Papoose Meadow. Metamorphs were found on the west side in shallow water with emergent grasses.

Pseudacris regilla [MVZ 252046-7] — Among the damp grassy area in open Ponderosa Pine forest, several juvenile Pacific treefrogs were found (up to 15). Tadpoles and metamorphs were also seen in the water body, around 18 in. depth, on the west side.

Reptiles

Elgaria coerulea — On the southwestern side in open Ponderosa Pine forest, a Northern alligator lizard was observed under bark.

Sceloporus graciosus [MVZ 252084] — A juvenile sagebrush lizard was encountered on a log in Ponderosa Pine forest in a grassy opening.

Thamnophis elegans [MVZ 252138] — Adults and a juvenile were encountered in both the dry meadow near woodpiles used as refugia and in the wet shallow waters.

Thamnophis sirtalis [MVZ 252139-41] — Adults were encountered in mostly in the middle of the meadow near water.

3. Eagle Lake & Madeline Plains (Lassen County)

No systematic herpetological surveys were conducted but several nighttime road surveys were conducted. Dates of observation include 16-25 August.

For specific habitat description, see Mammal Survey Report.

Amphibians

Bufo boreas — Aside from the Western toads at Papoose Meadows, no other toads were seen in the Madeline Plains.

Pseudacris regilla [MVZ 252040-2] — A Pacific treefrog was observed in the outflow of Dodge Reservoir by the mammal survey team. They also noted that no frogs were observed nor heard

calling from the reservoir during their stay. Metamorphs and tadpoles were also found in water bodies from residuals of Slate Creek, north of Eagle Lake off of Highway 139.

Spea intermontana [MVZ 253051-3] — The mammal team found 4 Great Basin spadefoot toads while trapping at Dodge Ranch Headquarters.

Reptiles

Aspidoscelis [formerly *Cnemidophorus*] *tigris* — Western Whiptail lizards were observed in the Madeline Plains.

Coluber constrictor [MVZ 252116-20] — Several adult Racer snakes were found dead on road on Highway 139 and County Road A1 in areas of sagebrush scrub, cattle pasture lots, or near water by Eagle Lake. One of these was a gravid female with eggs. Others were found in sagebrush scrub west of Termo near water bodies.

Crotalus oreganus [MVZ 253056] — Western rattlesnakes were observed on the dirt roads on Madeline Plain, including in Coyote Flat, an area of sagebrush scrub with occasional open patches of firmly caked and often cracked hardpan soil, and on the old Evans Ranch near Dodge Reservoir.

Crotaphytus bicinctores [MVZ 252056-8] — Great Basin Collared lizards were noosed east of Susanville on Ward Lake Road, a dirt road extension northwest of Litchfield in sagebrush scrub with large boulders and a dry creek bed.

Gambelia wislizeni [MVZ 252059-62] — In the same general area as where *Crotaphytus bicinctores* were encountered, Long-nosed Leopard lizards were also observed.

Masticophis taeniatus — A large Striped Whipsnake was found dead on road north of Eagle Lake in sagebrush and juniper.

Pituophis catenifer [MVZ 252126] — A juvenile/small adult Gopher snake was encountered crossing the gravel road (Juniper Ridge Rd.) in the Termo area. Another juvenile was found dead on road with stomach contents (a rodent) in pine forest habitat on Eagle lake Road, west of Eagle Lake. A juvenile was also encountered on Highway 139 as it rises to the Modoc Plateau north of Susanville.

Sceloporus graciosus [MVZ 252067-80] — Sagebrush lizards were frequent in this sagebrush habitat and basaltic rock outcrops surrounding Eagle Lake and in Madeline Plains; they were documented at four localities in the Madeline Plains.

Sceloporus occidentalis [MVZ 252086-112] — Western Fence lizards were common on the rock outcrops in sagebrush habitat or pines , often occurring in sympatry with *Sceloporus graciosus*. Both males and females were encountered, often with regenerated tails.

Thamnophis elegans [MVZ 252127-9; 253054-5] — Several Western garter snakes were encountered west of Termo. One adult was collected from a stagnant roadside pool at the Horne Ranch, and another was collected along the outflow from Dodge Reservoir.

4. Lassen Volcanic National Park - West (Shasta County)

No systematic herpetological surveys were conducted in Lassen Volcanic National Park this year, but several observations were documented in the course of mammal survey work. Specimens collected were cataloged under Accession 14202. Refer to the Mammal Survey Results for a map of sites and more specific habitat descriptions and survey conditions.

Lake Helen
Sampling dates: 5-9 September.

A single frog call was heard from the NE shore on the evening of 5 Sept; the species was not confirmed but most likely was *Pseudacris regilla*. No other herpetological observations were made.

Emerald Lake
Sampling dates: 6-10 September

No herpetological observations were made, and no individuals were observed during the course of the mammal fieldwork.

Kings Creek Falls
Sampling dates: 6-10 September.

One *Thamnophis elegans* [MVZ-253066] was collected along the mammal trapline.

Upper Kings Creek Meadows
Sampling date: 14 September

This site corresponds to the historic "Warner Creek, 8000 ft" sampling locality, which the field notes and photographs clearly indicate was Upper Kings Creek Meadows. For more extensive site description please refer to the Mammal Survey Results. The herp survey was conducted in the main meadow SSE of Reading Peak (see Appendix 2 for a photograph of the site), not in the side meadow where the mammal trapline was located.

John Perrine reported sighting an unidentified *Rana sp*. individual in the creek channel; it had a brownish dorsum and was about twice the size of an adult *Pseudacris regilla*. Dark "blue-black" tadpoles were also seen in the main creek channel, possibly *Bufo boreas*. Perrine also observed a *Thamnophis* sp. in a stagnant pool.

Amphibians

Pseudacris regilla [MVZ 253057-62] —Pacific treefrogs were found mainly in the wet meadow, where pools of water held tadpoles and metamorphs. A few treefrogs were also seen near the creek. Adults, metamorphs and tadpoles were encountered.

West end Manzanita Lake
Sampling dates: 10-14 September.

The west end of Manzanita Lake consisted of lakeside riparian meadow and yellow pine forest. There is a small steep-banked creek outflow with very little riparian vegetation among rocks and small firs. The edge of Manzanita Lake had alder and dense sedges. No *Pseudacris regilla* were observed.

Reptiles

Elgaria coerulea [MVZ 253063] —Northern alligator lizards were seen at the base of lakeside shrubs in dense cover.

Sceloporus graciosus [MVZ 253064-5] — Sagebrush lizard juveniles were abundant on the rocks near the lakeshore.

Thamnophis sirtalis [MVZ 253067] — Three adult Common garter snakes were found in the dense lakeside sedges near the mammal traps; one was collected.

F. North shore Reflection Lake
Sampling date: 14 September.

Reptiles

Thamnophis sirtalis [MVZ 253068-76] — Common garter snakes were abundant in the riparian grasslands along the edge of Reflection Lake. Fifteen individuals were captured, of various size classes; 9 were retained as voucher specimens.

Herpetological References:

ASIH 1987. Guidelines for the use of live amphibians and reptiles in field research. American Society of Ichthyologists and Herpetologists (ASIH), The Herpetologists' League (HL), and the Society for the Study of Amphibians and Reptiles (SSAR). 14 pp.

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Stebbins, R.C. 2003. A Field Guide to Western Reptiles and Amphibians. Third Ed. Houghton Mifflin Company, New York. 533 pp.

APPENDIX I.

Protocol for Herpetological Surveys

Museum of Vertebrate Zoology, UC Berkeley
3101Valley Life Sciences Building, Berkeley, CA 94720-3160.

Revised March 2007 MSK.

The primary objective of herpetological surveys is to provide baseline data regarding species occurrence.

Most surveys conducted in the public lands consist of time-constrained surveys of aquatic sites (e.g. streams, lakes, and rivers), often focussing on species of special interest. We opportunistically collect and record other terrestrial amphibians and reptiles while conducting these surveys of aquatic sites. In addition, when optimal habitat for reptiles is encountered, we survey these areas as well. Visual observations of other vertebrates are included in the survey. Given the predominance of surveys at aquatic sites, we will focus below on the protocol used for surveying stream or river systems although minor modifications are made for surveys in other habitats such as meadows, forests, scrub, etc.

Stream Surveys

Survey teams consist of at least two people conducting fieldwork during daylight hours. Nighttime surveys are conducted in areas that appear to have suitable habitat for nocturnal species and are thus usually return visits to sites that have been noted during the day.

Obviously, each site is unique depending on the complexity of the creek structure, accessibility, shoreline composition, etc. General rules may be applied, however, over a variety of habitat. Usually walking upstream, team members walk along the bank of the stream, with frequent pauses to observe the stream and shoreline ahead for amphibians or reptiles before they are startled. Binoculars are recommended. In particular, shallow channels, gravel bars, areas of open canopy, and pools are examined. Depending on turbidity of water, dip netting is required to sample bodies of water and is done at regular intervals to test a representative transect of habitat. Logs, rocks, and secondary and emergent underbrush along stream banks are checked for animals. Side channels and pools left by higher water levels are also inspected and noted.

Figure 1. Example of sampling method (from Heyer et al. 1994, pp. 122-123.)

All herpetofauna observed are recorded, including estimates of number of eggs (or egg masses) and number of amphibian larvae. Incidental observations of other vertebrates (and, if possible, invertebrates) are also noted on the data sheet. See Data Sheet fields below for more detailed description. GPS readings (or detailed locality descriptions, if GPS is unavailable) must be recorded at all significant events, such as start and end of survey, voucher specimen acquisition, visual observations, notable habitat changes,

After a site is surveyed, equipment such as waders, boots, dip nets and tongs are washed in 3% bleach (sodium hypochlorite) and rinsed clean. Other equipment needed for surveying include a watch (or use GPS unit), GPS unit set to NAD 27 (for use with paper topoquads), thermometer, plastic bags (of various sizes), pencils, waterproof notepad or paper, flagging tape and topological maps of site.

Data Sheet

A pre-categorized survey datasheet is completed with every site surveyed (see attached). It is initiated at the onset of surveying and is the primary source of information for the survey. Primary survey data fields include the following: **Collectors**; **Begin Time,** given in 24 hour clock; **End Time**; **Date**; **Elevation** in meters or feet, may be added from 7.5 minute quadrangles post-survey; **7.5 minute quadrangle map** used for reference, name or number, circle NAD 27 or NAD 83; **Township/ Range/ Sect**., Public Land Survey System (PLSS) description preferably given to the 1/16th, typically to the 1/8th may be added post-survey; **Locality Description**, including county, typically the watercourse name and/ or mileage from a named place; **Begin Survey**, the GPS reading in latitude or longitude, may be given in PLSS if marked on paper map and GPS unavailable; **End Survey**; **Weather** conditions during survey, typically cloud cover percentage or other general description, note in comments if significant change occurs during survey; **Time of Recording**, specifically time of recording weather conditions and temperature readings; **Air Temperature**, if site is mostly open canopy then record in the open and adjust accordingly; **Water Temperature**, taken at a depth of 10 cm (about 4 inches); **General Habitat & Predominant Vegetation**, general habitat description conforms to CDFG's Wildlife Habitat Relation (WHR) map categories for vegetation communities (Mayer and Laudenslayer 1988) and most common vegetation listed typically include trees and woody perennials; **Site Description**, circle appropriate category; **Drainage**; **Aquatic substrate**, typically size of streambed substrate fragments (i.e. bedrock, stone at >10 in. diam., cobble at 3-10 in. diam., gravel or sand <3 in. diam.) or type (e.g. mud, litter); **Geology**, typically of parent material of substrate; **Total Time Spent on Aquatic Site**, add comment if significant time spent away from aquatic site during survey since this total time may not be equal to the difference in Begin Time and End Time fields; **Average Width**, of watercourse surveyed in meters visually estimated; **Average Depth**; **Maximum Depth**; **Flow Rate**, of watercourse surveyed, typically estimated by rate of flow in a 10 foot non-bend section of stream; **Water Turbidity**, rated on a scale of 1 to 5, 1 being completely clear, no mid-stream debris to 5 of no visibility; **Aquatic Vegetation**, includes emergent and submerged vegetation; **Recent Disturbances**, check general categories, add comments regarding any recent alterations to habitat.

Voucher specimen data fields include the following: **Field Number**, include prefix or collector's initials; **Species**, preliminary identification; **Stage/Sex**, limit stage to Adult, Juvenile, or Larva(e); **Microhabitat & Locality**, includes microhabitat where specimen was encountered (e.g. under rock, basking on log, etc.) and specific locality if significantly different from original locality description; **Remarks,** comments specific to specimen, which may include stomach contents, measurements of snake (SVL, TL), physical aberrations, etc.; **LAT/LONG**, typically the GPS reading (although note if estimated from 7.5" quads); **EPE**, Estimated Positional Error, taken from the GPS at the time of the reading, an estimate of the readings accuracy with units (meters or feet); **Elevation**, may be added post-survey; **Time**, of collection in 24 hour format.

Second page of data sheets include: **Visual Encounters**, including other mammals, birds, aquatic insects; **Comments**, concerning habitat description, suitability for herpetological species, evaluation of the quality of habitat and any other remarks about specimens. An estimate for the area surveyed given in acres for wet meadows, ponds and woodland sites and in miles for watercourses is entered post-survey, calculated from 7.5 minute quadrangle maps.

Multiple data sheets may be used for a single survey and is usually numbered in the upper right-hand corner.

Voucher Specimens

We comply with the California Department of Fish and Game regulations and conditions as stipulated in our state-issued scientific collecting permits. Of non-protected species, up to five specimens are taken from each locality visited. Only one specimen of state-protected species (species of special concern) is taken per locality and only from areas where the species has not been previously documented. For amphibians of special concern, a locality is generally regarded as the creek or watercourse. If possible, juvenile or tadpole is preferred, and adults, particularly females, are avoided as voucher specimens.

Voucher specimens are most often simply taken by hand. Other tools permitted may be simple nooses for lizards, snake tongs for *Crotalus viridis*, and, occasionally, handgun with .22 caliber dust for larger, swifter lizards and bullfrogs (*Rana catesbeiana*). Depending on the terrain, turbidity of water, density of emergent vegetation, etc., a dip net is used to sample aquatic sites at regular intervals. These devices need to be carried by survey team members at all times.

Animals that will be voucher specimens are humanely euthanized following protocols approved by the University of California Animal Care and Use Committee and the three North American herpetological societies (Anon. 1987). Prior to fixation, specimens are assigned a pre-numbered field tag, and tissue samples, usually liver, are removed and frozen in liquid nitrogen or preserved in 95% ethyl alcohol from at least one specimen per species per locality. Specimens are then preserved in 10% buffered formalin, and later stored in 70% ethyl alcohol. Eggs and larvae may be directly stored in formalin. The tissue samples, once received at the Museum of Vertebrate Zoology (MVZ), are placed in an ultracold freezer (-86 C). All specimens and tissues are deposited in the Herpetology research collections of MVZ.

Collection records are available online at: http://mvzarctos.berkeley.edu/ .

Red-legged Frog, *Rana aurora*

If suitable habitat for the Federally Endangered *Rana aurora* is encountered, a subsequent night survey is required as outlined in the U.S. Fish and Wildlife's guidelines for field surveys for California Red-legged frogs (1997). Headlamps or flashlights are used to look for eye shine. Any visual observations of *R. aurora* will be reported as soon as possible to the contact person for the U.S. Forest Service as well as the U.S. Fish and Wildlife.

It is our policy not to handle or take any *R. aurora* specimens. Dr. Mark R. Jennings (Research Associate, California Academy of Sciences) retains a permit for handling Red-legged frogs and is available for consultation.

Publications Cited

Anon. 1987. Guidelines for the use of live amphibians and reptiles in field research. American Society of Ichthyologists and Herpetologists (ASIH), The Herpetologists' League (HL), and the Society for the Study of Amphibians and Reptiles (SSAR). 14 pp.

Anon. 1997. Guidance on site assessment and field surveys for California Red-legged frogs. Fish and Wildlife Service, United States Department of Interior, February 18, 1997. 11 pp.

Heyer, W.R., M.A. Donnelly, R.W. McDiarmid, L.C. Hayek and M.S. Foster (eds). 1994. Measuring and Monitoring Biological Diversity: Standard Methods for Amphibians. Smithsonian Institute, Washington, DC. 364 pp.

Mayer, K. and W. Laudenslayer. 1988. A guide to wildlife habitats of California. State of California, Department of Fire and Forestry Protection, Sacramento, CA.

Appendix 2: Photo Retakes

a) Red Bluff
no photo retakes

b) Eagle Lake

MVZ-3649: "Muskrat habitat in tule swamp, Eagle Lake, Lassen Co."
original: 22 June 1921 (J. Dixon) MVZ-3649
retaken: 22 June 2006 (J. Perrine and A. Schultz) DSCN-9527

MVZ-4307: "Level shores grown up to cattails, Eagle Lake, Lassen Co."
original: 20 Oct 1923 (J. Dixon) MVZ-4307
retaken: 22 June 2006 (J. Perrine and A. Schultz) DSCN-9527

MVZ-4729: "Yellow pines fringing beach at SE corner of lake, Eagle Lake, Lassen Co."
original: 1 June 1925 (J. Dixon) MVZ-4729
retaken: 18 June 2006 (J. Perrine and C. Conroy) DSCN-9472

MVZ-3651: "South end of Eagle Lake from Susanville road, Eagle Lake, Lassen Co."
original: 25 June 1921 (J Dixon) MVZ-3651
retaken: 23 June 2006 (J. Perrine) DSCN-9542

c) Mineral vicinity

MVZ-5930: "Digger-pine – yellow-pine line on north rim, S side Battle Creek, 3000 ft, Tehama Co."
original: 19 April 1929 (J. Dixon)
retaken: 21 July 2006 (J. Perrine)

MVZ-11941: "General view of cliff and rock-slide [= Bluff Falls], from camp, 2 mi W Black Butte."
original: June 1924 (R. Hunt) MVZ-11941
retaken: 15 July 2006 (C. Conroy) DSCN-9666

MVZ-11942: "Lassen Peak from cliff near camp, 2 mi W Black Butte."
original: June 1924 (R. Hunt) MVZ-11942
retaken: 21 July 2006 (A. Schultz) DSCN-9818

MVZ-11943: "Black Butte [= Mt Conard] from 2 mi. W."
original: June 1924 (R. Hunt) MVZ-11943
retaken: 21 July 2006 (A. Schultz) DSCN-9821

d) Madeline Plains
no photo retakes

e) Lassen Park West

MVZ-8868: "Scene on highway showing Soupan's Springs [=Sulfur Works], S side Lassen Peak, Lassen Volcanic National Park."
original: October 1930 [MVZ purchase date] (B. F. Loomis) MVZ-8868
retaken: 8 September 2006 (J. Perrine) P9080042

MVZ-4270: "S shoulder of Lassen Peak, showing upper limit of white-barked pine. Warner Creek, 8000 ft, Lassen Peak."
original: 10 September 1923 (J. Dixon) MVZ-4270
retaken: 11 September 2006 (J. Perrine) P9110139

MVZ-11944: "Lake Helen [= Emerald Lake], 8500 ft, S base Lassen Peak, Shasta Co."
original: July 1924 (R. Hunt) MVZ-11944
retaken: 8 September 2006 (J. Perrine) P9080044

MVZ-11945: "Sapphire Lake [= Lake Helen] from rock slide on its S side."
original: July 1924 (R. Hunt) MVZ-11945
retaken: 8 September 2006 (J. Perrine) P9080051

MVZ-8869: "Chaos Crater, as seen from the highway recently completed, Lassen Volcanic National Park."
original: October 1930 [MVZ purchase date] (B. F. Loomis) MVZ-8869
retaken: 13 September 2006 (J. Perrine and J. Wilcox) 9130147

MVZ-8298: "Kings Creek Meadow – 8000 ft, Lassen Volcanic National Park."
original: June 1929 [MVZ purchase date] (B. F. Loomis) MVZ-8298
retaken: 9 September 2006 (J. Perrine and A. Hawn) P9090119

Half-Moon Beach,
Eagle Lake

22 June 1921

J Dixon
MVZ 3649

22 June 2006

J Perrine
DSCN-9527

Half-Moon Beach, Eagle Lake

20 Oct 1923

J Dixon
MVZ 4307

22 June 2006

J Perrine
DSCN-9527

Gallatin Beach, Eagle Lake

1 June 1925

J Dixon
MVZ 4729

18 June 2006

J Perrine
DSCN-9472

Southern end of Eagle Lake from Susanville road

25 June 1921

J Dixon
MVZ 3651

23 June 2006

J Perrine
DSCN-9542

Bluff Falls from road to Lassen Volcanic National Park

June 1924

R Hunt
MVZ 11941

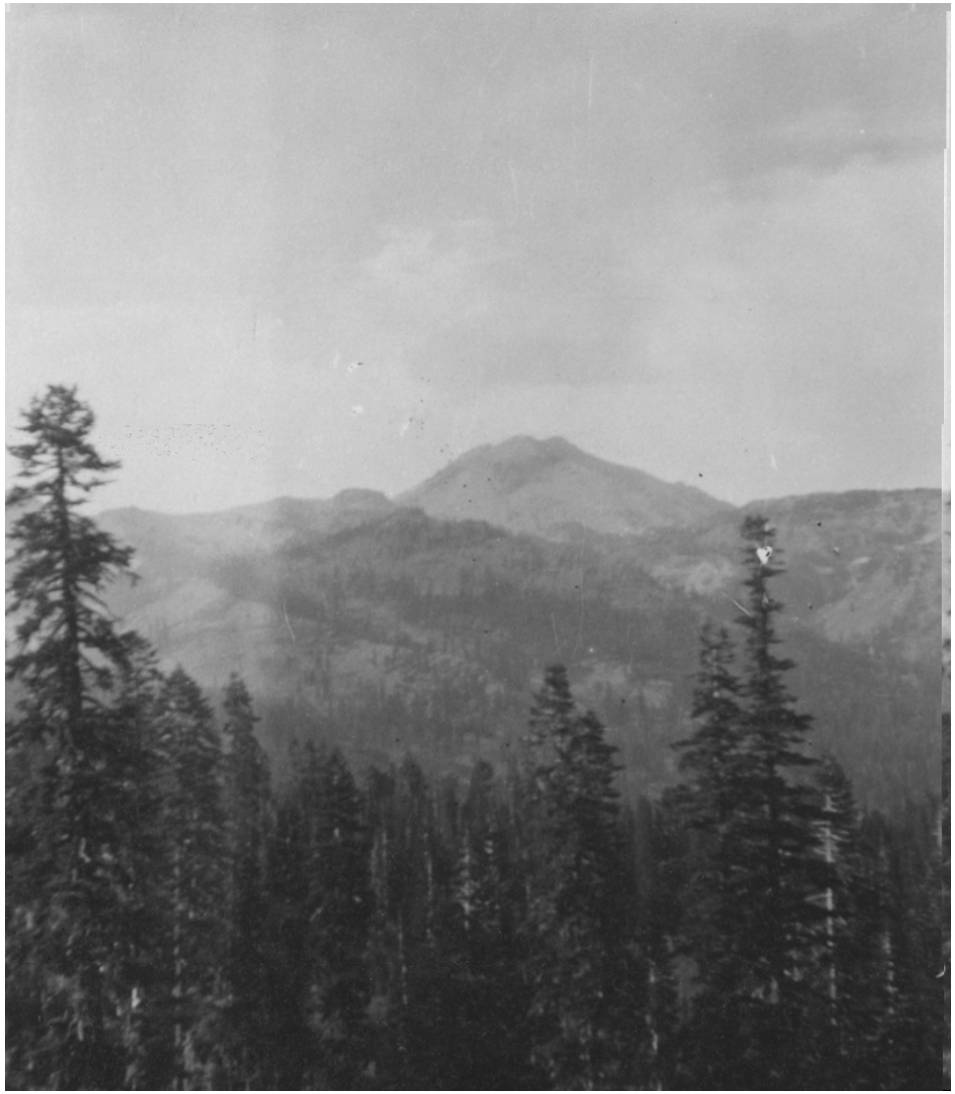
July 2006

C Conroy
DSCN-9666

Lassen Peak seen from atop Bluff Falls

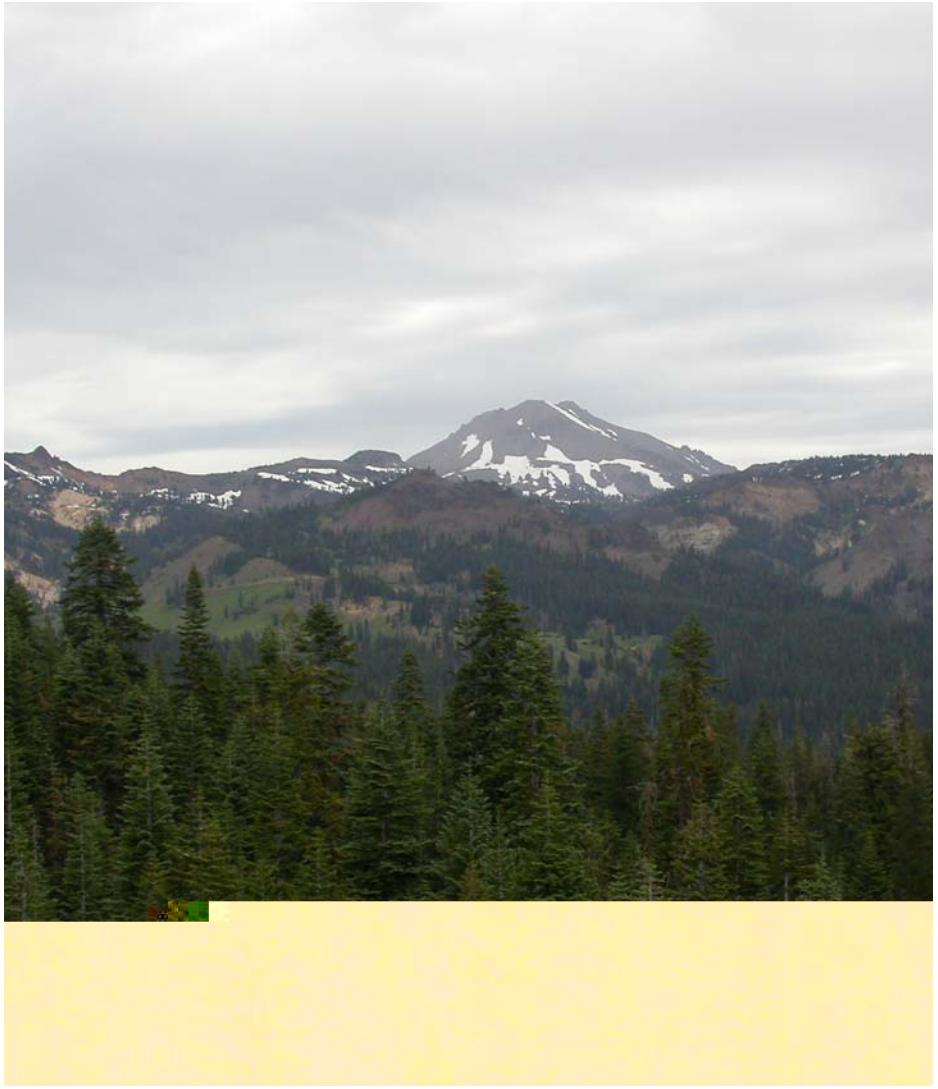
June 1924

R Hunt
MVZ 11942



July 2006

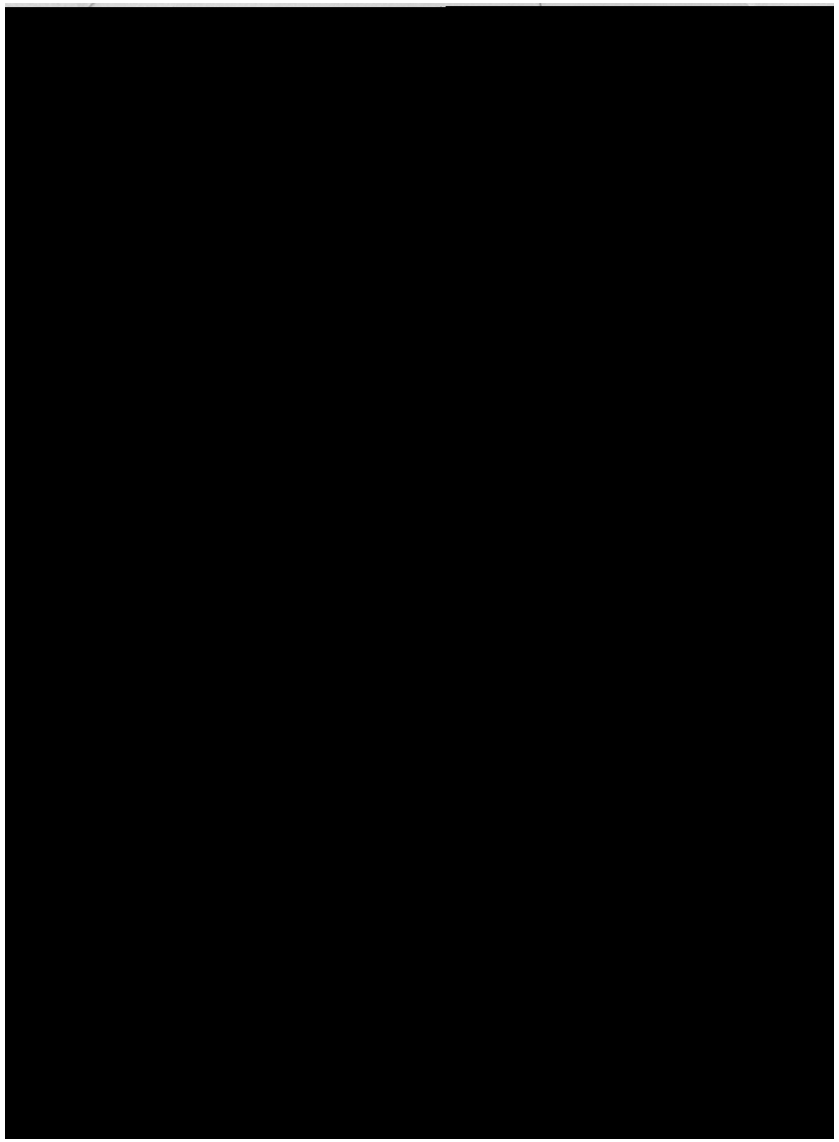
A Schultz
DSCN-9818



Mt. Conard (“Black Butte”) seen from atop Bluff Falls

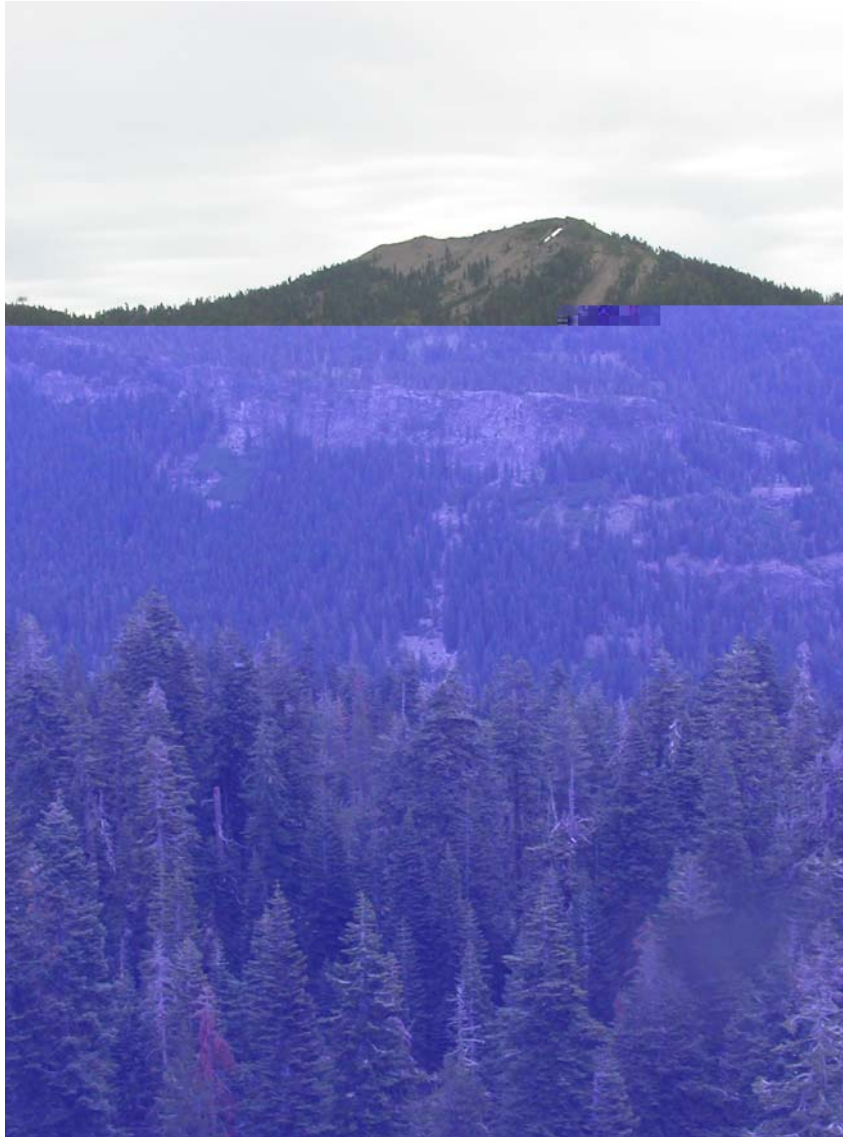
June 1924

R Hunt
MVZ 11943



July 2006

A Schultz
DSCN-9821



Sulfur Works

October 1930

MVZ 8868 / X-127
B. F. Loomis

September 2006

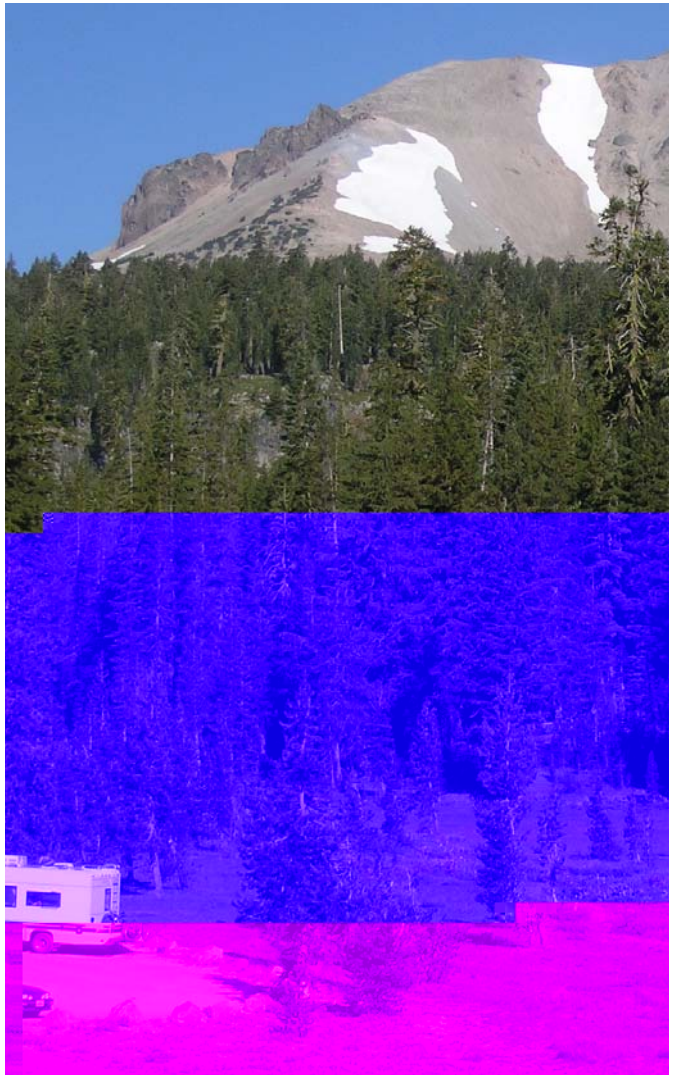
P9080042
J. D. Perrine

South Face of Lassen Peak

September 1923

MVZ 4270 - J. Dixon

September 2006



P9110139 - J. Perrine

Lake Helen

July 1924

MVZ 11945 - R. Hunt

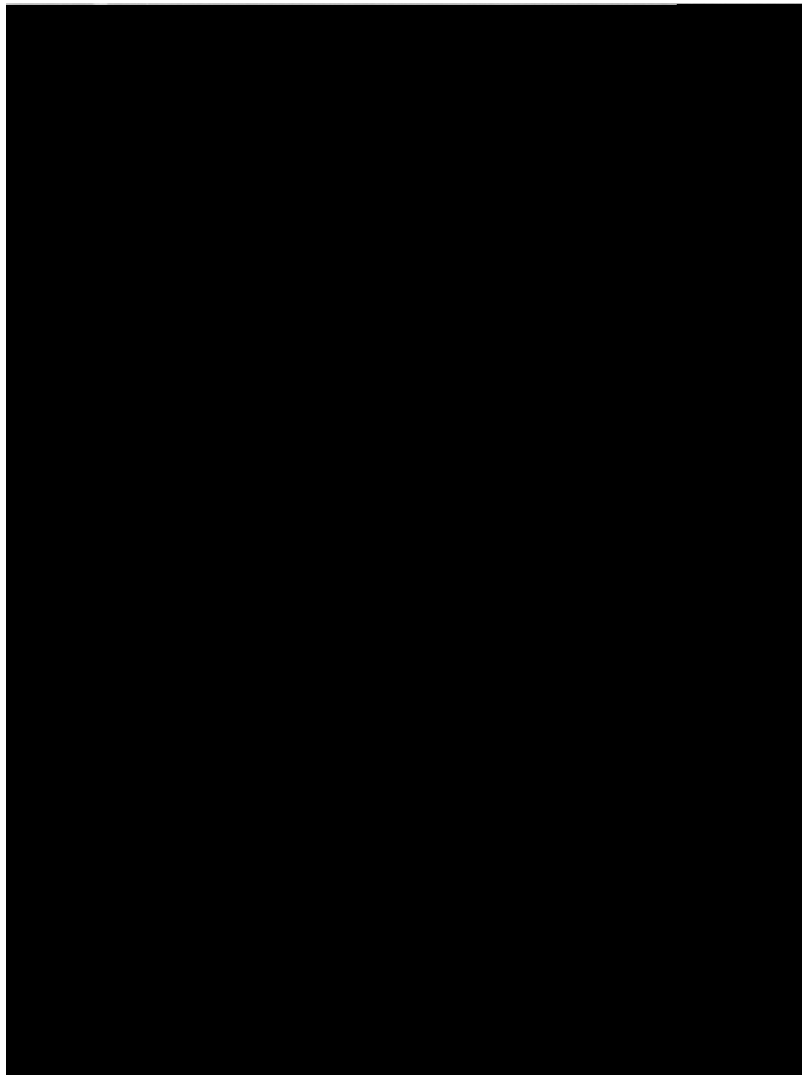
September 2006

P9080051 - J. Perrine

Emerald Lake

July 1924

MVZ 11944 - R. Hunt



September 2006

P9080044 - J. Perrine

Chaos Jumbles

October 1930

MVZ 8869 / X-128
B. F. Loomis

September 2006

P9130147
J. Perrine

Kings Creek Meadow

June 1929

MVZ 8298 / X-114
B. F. Loomis

September 2006

P9090119
J. Perrine