

***Pre-restoration bird surveys at meadows on
the Eldorado and Humboldt-Toiyabe
National Forests and nearby lands managed
by the State of California***

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ABSTRACT

With funding from the National Fish and Wildlife Foundation in 2009-2010, The Institute for Bird Populations developed a monitoring protocol to assess how bird populations respond to meadow restoration activities in the Sierra Nevada. During summer 2010 we field-tested the protocol by conducting pre-restoration bird surveys at 28 meadows proposed for restoration and 32 reference meadows in the Sierra Nevada. Study sites were identified in collaboration with personnel at National Forests, National Parks, California State lands, and private landowners. Monitoring visits included point count surveys, broadcast surveys, area searches, and vegetation and soil moisture assessments. This report describes results of the pre-restoration monitoring completed at 17 meadows (8 intended restoration sites, and 9 reference sites) on the Eldorado and Humboldt-Toiyabe National Forests, and nearby lands managed by the California Department of Fish and Game and California State Parks. Surveys comprised point counts, area searches, broadcast surveys for selected target species, and habitat assessments. We surveyed most meadows twice, and conducted a total of 295 point count and broadcast surveys, and over 50 person-hours of area searching. Results of these surveys will provide baseline information for assessing the effects of future restoration activities on bird populations at each of the 8 intended restoration sites.

BACKGROUND

Montane meadows in the Sierra Nevada form ecological islands within the surrounding forest matrix (Ratliff 1985, Fites-Kaufman et al. 2007). They provide abundant water, food, and cover for birds and other wildlife, and are among the most important breeding and foraging habitats for birds in the Sierra Nevada (Grinnell and Miller 1944, Orr and Moffit 1971, Gaines 1992, Graber 1996, Heath and Ballard 2003). However, at many Sierra meadows human activities and historic management practices have altered meadow hydrology, which in turn has changed the characteristics of meadow plant communities, and often diminished the value of meadow habitat for native bird populations (Klebenow and Oakleaf 1984, Allen-Diaz 1991, Kattlemann and Embury 1996, Cicero 1997, Siegel et al. 2008).

Throughout the Sierra Nevada, many public and private land managers are seeking win-win solutions for humans and wildlife by restoring or enhancing meadow habitats, in many cases addressing the historical legacy of hydrological impacts that have led to poorly watered meadows (Rood and Mahoney 1990, Loheide and Gorelick 2006, Skidmore et al. 2009). Restoring meadow hydrology is often a critical first step in restoring the full complement of native biodiversity to a meadow (Poff et al. 1997, Dwire et al. 2006).

Well-functioning hydrologic processes in montane meadows not only yield improved habitat for wildlife, but may also provide tangible benefits for humans, including:

- increased water storage capacity (Loheide and Gorelick 2006, Skidmore et al. 2009),
- improved water quality (Alexander et al. 2007, Simon et al. 2006),
- downstream flood attenuation (Gurnell et al. 1995, Skidmore et al. 2009),
- increased duration of summer flows (Alexander et al. 2007), and
- improved forage quality for livestock (Ratliff 1985).

One way to assess the success of meadow restoration is to monitor the responses of bird populations that inhabit the meadow. Birds can respond rapidly and dramatically to meadow restoration efforts, with populations of meadow-associated bird species increasing in or even colonizing meadows within as little as one year after restoration efforts are implemented (Taylor and Littlefield 1986, Larison et al. 2001, Stanley and Knopf 2002, McCreedy and Heath 2004, Heltzel and Earnst 2006, Borgmann 2010).

Each of the meadow-associated bird species that utilizes montane meadows in the Sierra Nevada has its own particular habitat needs, and the presence or absence of those specific habitat components largely predicts which species utilize a particular meadow (Wiens 1985). When meadow habitats are degraded the number of individual birds and the number of bird species occupying them tends to decline.

The primary objective of this project was to collect pre-restoration data on bird populations at meadows where future restoration projects are planned (and associated reference sites). These data will allow assessment of the response of bird populations to future restoration activities. Such assessments are valuable both for documenting successes of restoration activities and for facilitating improvement of restoration techniques in an adaptive management context.

We used a draft bird survey protocol (Loffland et al. 2011) under development with funding from the National Fish and Wildlife Foundation designed specifically for pre- and post-restoration bird monitoring at meadow restoration sites. The protocol includes a combination of multi-species and single-species survey techniques, and incorporates point counts, species-specific broadcast surveys, area search, and vegetation and soil moisture plots.

The use of a standardized survey protocol will help managers and researchers to glean important lessons from restoration monitoring efforts – lessons that cannot be learned from monitoring at any single site. Standardized data from diverse sites that undergo a variety of restoration measures will facilitate comparison of bird responses across sites and projects. Such comparisons will lead to an improved understanding of which restoration efforts most effectively produce high-quality bird habitat, and will allow future meadow restoration efforts to incorporate those findings.

METHODS

All of our methods adhered to Loffland et al.'s (2011) *Avian Monitoring Protocol for Sierra Nevada Meadows*. **Here we provide a cursory summary of methods, but readers seeking more detail or a discussion of the merits and limitations of particular methods should refer to the protocol itself.**

Monitoring Scheme

Loffland et al. (2011) suggest a BACI (Before, After, Control, Impact) monitoring scheme. Under this scheme all monitoring sites where restoration activities are planned are paired with one or more reference sites with similar hydrology and vegetation, but where no restoration activities are imminent. All monitoring activities are then conducted at both the restoration and reference sites in at least one year prior to restoration and at least one year after restoration. This design improves the manager's ability to separate local population changes that are the result of restoration from regional changes that may be due to annual weather variation or other factors. Comparing change in bird populations at the restoration site with the reference site will allow managers to see how individual bird species and suites of species respond to restoration activities, and how the response varies by type of restoration activity, locality, and, if multiple years of post-restoration monitoring are conducted, time since restoration activity (Smucker et al. 2005, Ward et al. 2010).

Site Selection

During early spring of 2010 we met with USDA Forest Service Region 5 staff to discuss how best to identify meadow restoration projects in the planning stage on National Forest lands, and worked closely with the Regional Hydrologist as he queried forests in Region 5. We also consulted with personnel at Yosemite and Sequoia/Kings Canyon National Parks and state agencies, and private landowners. We placed a higher priority on restoration projects that were already in the planning stage, but also included some sites that were identified as needing restoration, but for which the NEPA/CEQA process had not yet begun. Following guidance from the National Fish and Wildlife Foundation, we made restoration projects with a hydrologic component our highest priority. The resulting set of 30 restoration projects was distributed across 6 National Forests, 2 National Parks, 2 California State Wildlife Areas, 1 California State Park, and 1 private parcel. After identifying the restoration projects, we worked with local contacts to identify suitable reference sites to pair with each restoration site. These collaborations yielded 32 reference sites (in 2 instances multiple small sites were paired with a single restoration site). **This report details the subset of our 2010 study sites that were located on the Eldorado and Humboldt-Toiyabe National Forests, and nearby lands managed by the State of California.**

Conversations with biologists on the Eldorado and Humboldt-Toiyabe National Forests and California State Parks identified 6 meadow restoration projects in various stages of planning. The Blue Lakes Rd/Hwy 88 project and Washoe State Parks Golf Course had all planning complete and were targeted for restoration starting in 2010. Similarly, Indian Valley had a restoration plan in place and was in the process of completing NEPA documents and securing funding. The Van Vleck, Foster Meadow, and Clover Valley projects were considered high-priority projects, but were only in the beginning stage of planning. We added the Upper and Lower Hope Valley sites, after staff at *American Rivers* (a local non-profit organization) informed us that they were pursuing multiple grants to fund the planning and implementation of restoration of Hope Valley on state and federal lands. For each restoration site we selected one or more reference sites based on advice of local experts and through the review of aerial photography (Figure 1; Table 1).

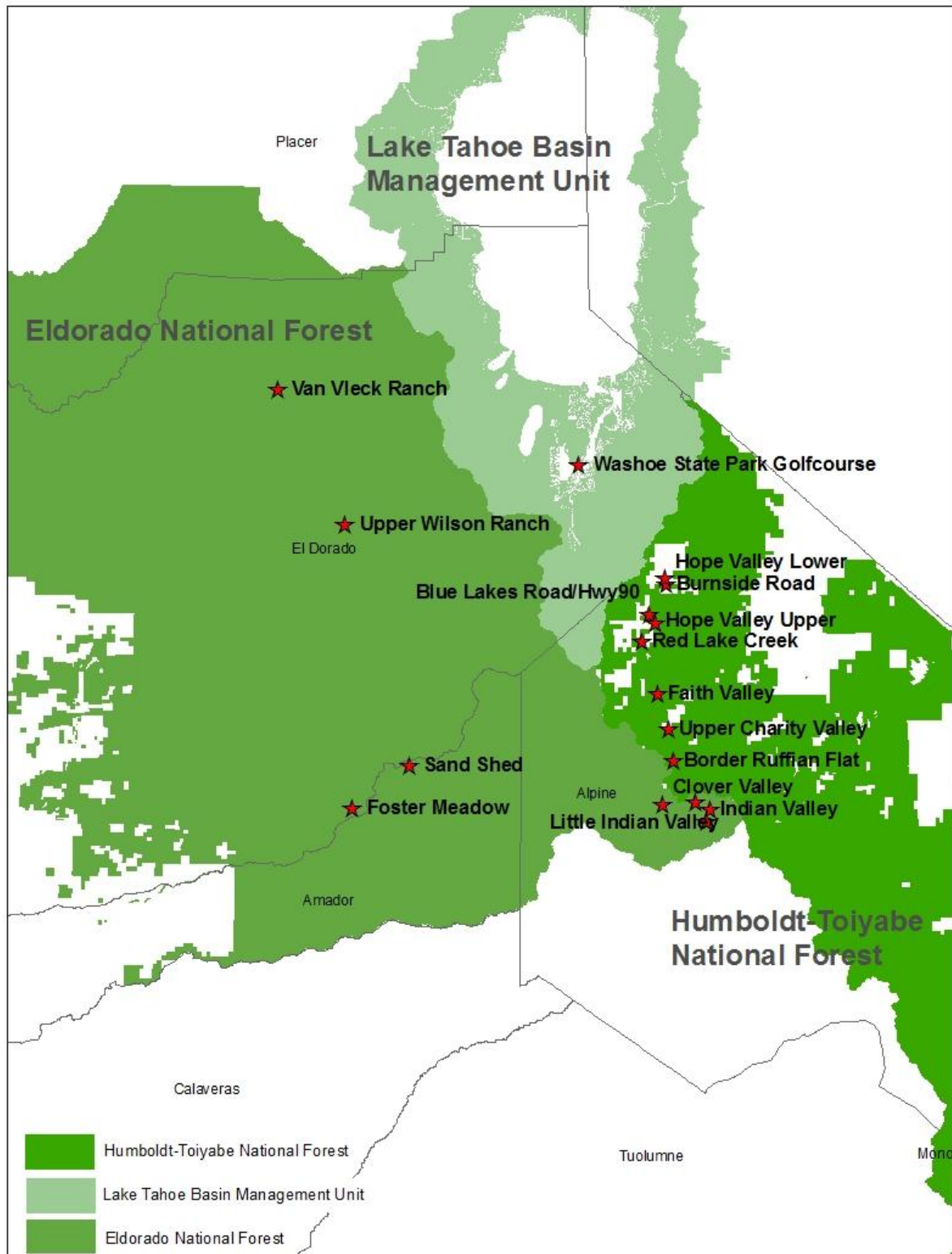


Figure 1. Locations of restoration and reference meadows surveyed for birds in 2010 on the Eldorado and Humboldt-Toiyabe N.F, and nearby California State lands.

Table 1. Restoration and associated reference sites.

Restoration Site (land manager)	Reference Site(s) (land manager)
Blue Lakes Rd at Hwy 88 (Humboldt-Toiyabe NF)	Burnside Lake Road (Humboldt-Toiyabe NF)
Clover Valley (Eldorado NF)	Border Ruffian Flat (Humboldt-Toiyabe NF)
Foster Meadow (Eldorado NF)	Sand Shed (Eldorado NF)
Hope Valley Lower (CA Dept. of Fish & Game)	Red Lake Creek (Humboldt-Toiyabe NF)
Hope Valley Upper (Humboldt-Toiyabe NF)	Faith Valley (Humboldt-Toiyabe NF) Upper Charity Valley (Humboldt-Toiyabe NF)
Indian Valley (Eldorado NF)	Indian Valley West Wilderness (Eldorado NF) Little Indian Valley (Eldorado NF)
Van Vleck Ranch (Eldorado NF)	Upper Wilson Ranch (Eldorado NF)
Washoe State Park (Calif. State Parks)	NA

Van Vleck Ranch and its reference site at Wilson Ranch are both west of the Sierra crest between 6500 (1980 m) and 6600 ft. (2011 m) in elevation in the American River watershed, and both have similar historic use patterns as the base of operations for grazing allotments. Sites like this were frequently not incorporated into national forests when their boundaries were delineated, but were instead retained in private land ownership (Allen-Diaz et al. 1999). Foster Meadow and Sand Shed are also west of the crest in the Mokelumne River watershed, but at slightly higher elevations between 6500 (1980 m) and 7500 ft. (2286 m). These two sites have similar meadow vegetation, but dissimilar hydrologic sources (stream-fed vs. spring-fed). We choose the reference site despite its hydrologic dissimilarity, due to a lack of nearby reference sites with similar meadow vegetation.

The remaining sites are all in relatively close proximity to one another and to the Sierra Crest in Alpine County. Indian Valley, Clover Valley, and their respective reference sites are within the upper reaches of the west slope Mokelumne River watershed, although the north end of Indian Valley drains east into the Carson River due to historic ditching to provide more water to the Carson Valley. These sites are all between 7500 ft. (2286 m) and 8500 ft. (2590 m) in elevation and are situated very close to the Sierra Crest. Due to the large size of Indian Valley we selected 2 reference sites (Indian Valley West Wilderness, and Little Indian Valley) to increase the number of survey stations for purposes of comparison. Identifying a suitable reference site for Clover Valley was more difficult. Nearby, suitable meadows all occurred on private lands. We opted to select the Border Ruffian Flat meadow that is somewhat further away, but is in a similar altered state due to the adjacent roadway.

Upper Hope Valley, Lower Hope Valley, and Blue Lakes Road/Hwy 88 all occur within the vast floodplain of the west fork of the Carson River. These sites are on the east side of the Sierra Nevada crest between approximately 7000 ft. (2133 m) to 8000 ft. (2438 m). This region has a long history as an intensively used travel corridor and grazing area. Upper Hope Valley required two reference sites (Upper Charity and Faith Valley) due to its large size and the uncertainty surrounding which areas would ultimately be slated for restoration. The extra reference site allows for adjustment in the

study design if areas we designated as references ultimately fall within the restoration area. Lower Hope Valley was paired with Red Lake Creek a nearby tributary with similar use and vegetation. The Blue Lakes Road/Hwy 88 site is a project where a dispersed parking/camping area is being restored. We paired it with a similar location downstream along the Hwy 88 corridor at Burnside Lake Road.

Although it is only a few kilometers to the North of Hope Valley, the Washoe State Park Golf Course project is in the Upper Truckee River watershed. This project is part of a large restoration effort in the watershed and we partnered with State Parks to collect bird monitoring data at established point count stations that Park employees have been monitoring in recent years. Because they utilize some points within the Park as reference points we did not establish a separate reference site. This project involves reshaping and revegetating the banks of the Upper Truckee River and the movement of golf course greens to locations outside of the immediate riparian zone.

All sites are surrounded by upland coniferous forest. Lodgepole pine is generally dominant at the meadow edges and Sierra mixed conifer or red fir dominates the more upland areas, depending on elevation. Occasionally areas of granite outcrop, or sagebrush scrub make up a small portion of the surrounding upland areas.

Crew Training and Certification

All data were collected by full-time crew members working or volunteering for The Institute for Bird Populations. At the beginning of the 2010 field season, crew members underwent an intensive 3-week training session that followed the guidelines in Loffland et al. (2011) for ensuring surveyors are fully competent and qualified to collect reliable data. At the end of the training session all crew members passed a rigorous bird identification exam that tested the skills necessary to conduct point counts and area searches.

Data Collection

All sites were surveyed between the May 20-July 15 temporal window specified by Loffland et al. (2011), and at most meadows we were able to complete two full surveys (excluding the vegetation and soil moisture plots which were only completed during one of the visits to each meadow).

Establishing Survey Stations

At restoration and reference meadows we established survey stations 250 m apart along transects that followed the general course of stream channels within meadows, as well as in areas of meadows with no adjacent stream. Where possible, survey stations were placed at least 25 m from streams that were large enough to cause substantial noise interference during surveys – this will also help ensure that if stream restoration results in inundation or widening of the channel, survey stations do not end up under water in future years. In narrow meadows (<100 m wide), stations

were placed every 250 m along a transect that traveled along the center of the meadow, regardless of where the stream channel was located. In most cases survey stations were delineated prior to the first field visit using digital aerial photos (DOQQs) and ArcMap software. Geographic coordinates of individual survey stations are provided in Appendix A and site maps with survey station locations are provided in Appendix B. In a few instances stations were inaccessible due to the unusually high water conditions in June and July of 2010. For those stations that could not be reasonably relocated to a more accessible area nearby, surveys were not completed in 2010. Nonetheless, their coordinates remain in Appendix A, and the points should be surveyed if possible during future monitoring visits.

Point Counts

We utilized 10-minute point counts, divided into four smaller time intervals to facilitate estimating detection probability and modeling occupancy rates (MacKenzie et al. 2002) in the future, if desired. All birds were classified as being either ≤ 50 m from the survey station at first detection, or at a distance >50 m.

Species-Specific Broadcast Surveys

Immediately following each 10-min point count, we remained at the survey station and conducted broadcast surveys for 3 rare or hard to detect species that may be particularly likely to respond to meadow restoration efforts: Willow Flycatcher, Sora, and Virginia Rail. Vocalizations for a particular species were broadcast only if we did not first detect the species within 50 m of the survey station during the preceding 10-minute point count.

Area Searches

When all of the point count and broadcast surveys were completed, surveyors remained at the meadow and began the area search portion of the survey. The amount of time spent area searching was dependent on the size of the meadow; surveyors spent at least 10 minutes area-searching for every survey station the meadow accommodated. One of the objectives of the areas search was to increase the likelihood of detecting rarer or more secretive species that were present at the site, particularly species that may have been missed during the point count and broadcast portions of the survey. When conducting the area search, surveyors moved through the meadow slowly and quietly, counting all birds detected at the site. Special attention was paid to areas along stream channels or other flooded/ponded areas, and locations where restoration activities were planned. Additionally, areas of the meadow where sight and sound were obstructed by dense vegetation were observed carefully. Although more time may have been spent in these specific portions of the meadow, all areas and vegetation communities were systematically covered. We tallied individual birds based on their location at the time of first detection, either within the meadow, or within the surrounding forest or other upland vegetation community.

Vegetation and soil moisture plots

After completing bird surveys we assessed the vegetative structure and vegetative community types at each survey station to characterize the meadow and provide context for bird survey results. We recorded relative cover and vegetation height for a variety of vegetative and surface water components in each of the four quadrants formed by four 50-m transects extending away from the station in each of the cardinal directions (N, S, E, W). For each quadrant (NW, NE, SE, SW), we recorded cover for each vegetation type after first walking the quadrant to observe the entire area. Cover was estimated as if one was looking down on the site from above. Totals of all cover types combined sometimes exceeded 100% because values were combined over multiple overlapping levels of the canopy: herbaceous, shrub, and tree.

Data Analysis

Because only one year of baseline monitoring has been completed, the analysis reported here is relatively straightforward. From point count results at each meadow, we tabulated the number of species detected, the number of individuals of each species detected, and the number of individuals detected per point for all species combined. Results are provided separately for birds detected within 50 m of the survey station, and birds detected at any distance from the survey station. From area search results we provide numbers of individuals of each species, as well as the number of additional species detected that were not detected during point count surveys. We also tallied total number of individuals (of all species combined) counted and total number of species detected as the average across both visits (when two visits were completed). From broadcast surveys, we report the number, species and locations of any target species detected. Mean vegetation measurements are reported at the meadow scale, and are intended to characterize the areas of the meadows where we conducted point counts and broadcast surveys.

RESULTS

During the late winter and early spring of 2010 the Sierra Nevada experienced heavier than average snowfall, and extremely late snowmelt. These conditions made planning and implementation of the monitoring work more difficult because many sites and access roads were under snow well into June and, in some cases, July. Many of our monitoring efforts had to be delayed until sites became accessible. Nonetheless, we were able to visit all sites at least once within our survey window of May 20 through July 15 (Table 2). Loffland et al. (2011) encourages two visits, but the second visit is considered optional. Two restoration sites and the associated three reference sites were visited only a single time, but the remaining sites were surveyed twice (Table 2). In total, 8 restoration sites, and 9 reference sites (17 total) within the Humboldt-Toiyabe/Eldorado region received at least one visit during 2010 breeding season. We established 168 survey stations at the 17 study sites.

Table 2. Study site location information and survey dates.

<i>Meadow Name^a</i>	<i>Site Type</i>	<i>UTM Easting</i>	<i>UTM Northing</i>	<i>UTM Zone</i>	<i>Elev. (ft.)</i>	<i>USGS Quadrangle</i>	<i>Visit 1 Date</i>	<i>Visit 2 Date</i>	<i>No. of Survey Stations</i>
Blue Lakes Road/ Hwy 88	Restore	244570	4293276	11	8200	Carson Pass	6/6/2010	6/17/2010	6
Burnside Road	Reference	246485	4295884	11	7050	Freel Peak	6/6/2010	6/17/2010	3
Clover Valley	Restore	245696	4275622	11	7800	Pacific Valley	7/2/2010	7/9/2010	5
Border Ruffian Flat	Reference	246197	4280435	11	8200	Carson Pass	6/17/2010	7/2/2010	4
Indian Valley	Restore	249659	4275316	11	8000	Ebbetts Pass	7/7/2010		15
Indian Valley West Wilderness	Reference	249421	4274319	11	7950	Ebbetts Pass	7/8/2010		3
Little Indian Valley	Reference	248645	4275833	11	7750	Pacific Valley	7/8/2010		4
Foster Meadow	Restore	739257	4274784	10	6750	Tragedy Springs	6/24/2010	7/7/2010	6
Sand Shed	Reference	744688	4279265	10	7550	Tragedy Springs	6/25/2010	7/8/2010	5
Hope Valley Lower	Restore	245612	4296301	11	7000	Freel Peak	5/29/2010	6/17/2010	16
Red Lake Creek	Reference	243908	4290432	11	7400	Carson Pass	5/30/2010	6/11/2010	20
Hope Valley Upper	Restore	245177	4292997	11	7100	Carson Pass	5/25/2010	6/16/2010	29
Faith Valley	Reference	244900	4285912	11	7500	Carson Pass	6/6/2010	6/18/2010	14
Upper Charity Valley	Reference	246137	4282565	11	7850	Carson Pass	6/17/2010	6/30/2010	8
Van Vleck Ranch	Restore	732323	4313166	10	6550	Loon Lake	7/10/2010		14
Upper Wilson Ranch	Reference	738204	4300728	10	6600	Kyburz	6/18/2010		5
Washoe State Park Golf Course	Restore	758627	4306269	10	6350	El Dorado	6/16/2010	7/1/2010	11

^aRestoration sites are indicated in bold text with associated reference sites directly below them in plain text.

Point Counts

Among the meadows with survey results reported here, the Upper and Lower Hope Valley sites, and Red Lake Creek site showed the greatest species richness and numbers of individual birds (Table 3). These 3 sites are all part of the same overall meadow complex and also represent the 3 largest sites in the survey region. In addition to being large sites, they are associated with larger streams. The relatively high number of survey stations resulted in a greater variety of meadow subtypes and upland habitat associations being sampled. As expected, many of the smallest sites (Sand Shed, Clover Valley, Little Indian Valley, Indian Valley West Wilderness, and Upper Wilson Ranch) had lower apparent species richness and number of individuals counted. These sites tended to occur along smaller streams and represent more linear meadow habitat along the stream zone with less diversity of upland types. When only the results within 50 m of survey stations were included and the number of individuals was averaged across the number of stations, some of the effects of meadow size were diminished. Results for this metric were relatively even across all sites with the exception of the three largest meadows (Table 3).

Table 3. Number of birds and number of species detected during point count surveys.

Meadow Name ^a	No. of Survey Stations	Avg. No. Birds Detected ^b		Avg. No. Birds Per Station ^b		Species Detected (Visits Pooled)	
		<50m	Unlimited Radius	<50m	Unlimited Radius	<50m	Unlimited Radius
Blue Lakes Rd/Hwy 88	6	10	92	1.67	15.3	7	35
Burnside Road	3	10.5	41	3.50	13.7	14	27
Clover Valley	4	12.5	61	3.13	15.25	15	27
Border Ruffian Flat	4	19.5	51	4.88	12.75	11	24
Foster Meadow	6	23	51	3.83	8.5	18	28
Sand Shed	5	22	47	4.40	9.4	17	26
Indian Valley	13	60	177	4.62	13.6	17	25
Indian Valley West Wilderness	3	17	42	5.67	14	9	16
Little Indian Valley	4	10	52	2.50	13	6	18
Hope Valley Lower	16	87	317.5	5.44	19.8	25	49
Red Lake Creek	20	131.5	398	6.58	19.9	34	57
Hope Valley Upper	29	173	530	5.97	18.27	36	54
Faith Valley	10/12	55	194	5.00	17.6	20	36
Upper Charity Valley	8	22.5	113	2.81	14.1	13	31
Van Vleck Ranch	14	61	207	4.36	14.8	22	32
Upper Wilson Ranch	4	16	86	4.00	21.5	10	27
Washoe S.P. Golf Course	11	63.5	175.5	5.77	15.95	25	36

^aRestoration sites are indicated in bold text with associated reference sites directly below them in plain text. ^bValues for numbers of birds and number of birds per stations are reported for individuals detected within 50m of the survey station and for all individuals detected at all distances from the point (unlimited radius). Number of birds detected and number of birds per station are reported as the mean value averaged across 2 visits, except for sites where only one visit was completed.

Loffland et al. (2011) identify 18 meadow-associated focal species. These species were selected because of their affinity to meadow and riparian communities, and based on the expectation that their numbers would increase if meadow restoration efforts improved the quantity or quality of habitat components important to them. One exception is the Brown-headed Cowbird. While often found in meadows, this species also uses many other open or disturbed habitats with human or livestock use. Brown-headed Cowbirds were selected by Loffland et al. (2011) as focal species because of the role they play as nest parasites of other meadow-associated birds, and the association between their relative abundance and human disturbance. Of the 18 focal species identified for Sierra Nevada meadows, 12 were detected during point counts in the Humboldt-Toiyabe/Eldorado study region (Table 4).

The number of focal species detected at a given site ranged from a low of 4 at Sand Shed to a high of 11 at both the Upper and Lower Hope Valley sites. Of the focal species detected, Sora was only detected at one site, while Lincoln's Sparrow was detected at 16 sites. Each of the remaining focal species was detected at 5 or more of the 17 meadows surveyed. The average number of individuals detected for each species, and the average number per survey station, are reported for all species at each restoration site and its associated reference site(s) in Appendix B.

Table 4. Relative abundance^a of focal bird species by site, detections within 50 m, and detections at all distances for meadow-associated focal species identified by Loffland et al. (2011).

<i>Meadow Name^b</i>	<i>Distance from survey station</i>	<i>Sora</i>	<i>Spotted Sandpiper</i>	<i>Wilson's Snipe</i>	<i>Red-breasted Sapsucker</i>	<i>Warbling Vireo</i>	<i>Yellow Warbler</i>	<i>MacGillivray's Warbler</i>	<i>Wilson's Warbler</i>	<i>Song Sparrow</i>	<i>Lincoln's Sparrow</i>	<i>White-crowned Sparrow</i>	<i>Brown-headed Cowbird</i>
Blue Lakes Road/Hwy 88	≤50 m	0	0	0.08	0	0	0	0	0	0	0	0	0.17
	All	0	0.33	0.83	0.08	0	0	0	0	0.50	0.08	0.25	0.33
Burnside Road	≤50 m	0	0	0	0	0	0.17	0	0	0.17	0.33	0.17	0.17
	All	0	0.33	0	0	0.50	0.17	0.17	0	0.50	0.50	0.17	1.00
Clover Valley	≤50 m	0	0	0	0	0	0	0	0.13	0.25	0.13	0	0
	All	0	0	0	0	0.38	0.13	0	0.38	0.63	1.50	1.75	0
Border Ruffian Flat	≤50 m	0	0	0	0	0	0.13	0	0	0	0.38	2.13	0
	All	0	0	0	0	0	0.38	0.13	0.13	0	0.88	3.38	0
Foster Meadow	≤50 m	0	0	0	0.08	0	0	0	0	0	0.42	0	0.08
	All	0	0	0	0.08	0	0	0	0	0.17	0.92	0	0.08
Sand Shed	≤50 m	0	0	0	0.10	0	0	0.10	0	0	0.30	0	0
	All	0	0	0	0.10	0.60	0	0.20	0	0	0.60	0	0
Indian Valley	≤50 m	0	0	0	0	0.08	0.08	0.31	0.23	0	0.46	1.38	0
	All	0	0	0	0	0.15	0.23	0.85	0.54	0	1.46	3.85	0
Indian Valley West Wilderness	≤50 m	0	0	0	0	0	0	0.33	0.33	0	0.33	2.00	0
	All	0	0	0	0	0	0	1.00	0.67	0	0.67	3.33	0
Little Indian Valley	≤50 m	0	0.25	0	0	0	0	0	0	0	0.50	0	0
	All	0	0.50	0	0	0.75	0	0	0	0	0.50	0.75	0
Hope Valley Lower	≤50 m	0	0.22	0.03	0	0	0.06	0	0	0.47	0.13	0.19	0.22
	All	0.16	0.84	0.50	0	0.06	0.16	0.06	0.09	1.38	0.25	0.75	0.69
Red Lake Creek	≤50 m	0	0.33	0	0	0.03	0.03	0	0.03	0.10	0.10	0.15	0.45
	All	0	0.78	0.18	0.08	0.05	0.18	0	0.08	0.38	0.48	0.68	1.40

Meadow Name^b	Distance from survey station	Sora	Spotted Sandpiper	Wilson's Snipe	Red-breasted Sapsucker	Warbling Vireo	Yellow Warbler	MacGillivray's Warbler	Wilson's Warbler	Song Sparrow	Lincoln's Sparrow	White-crowned Sparrow	Brown-headed Cowbird
Hope Valley Upper	≤50 m	0	0.43	0.03	0	0.05	0.07	0.03	0.02	0.36	0.09	0.24	0.17
	All	0	1.33	0.38	0.03	0.22	0.17	0.09	0.05	0.86	0.26	1.26	0.45
Faith Valley	≤50 m	0	0.18	0.14	0	0	0.41	0	0.18	0.36	0	0.59	0.14
	All	0	1.14	0.36	0	0	1.14	0.09	0.32	1.09	0.45	1.41	0.64
Upper Charity Valley	≤50 m	0	0	0	0	0.06	0	0	0.06	0.31	0.13	0.69	0
	All	0	0.69	0	0	0.31	0	0	0.50	0.81	0.94	2.63	0.25
Van Vleck Ranch	≤50 m	0	0	0	0	0.07	0	0.21	0.29	0.07	0.71	0.14	0
	All	0	0.07	0	0	0.36	0.07	0.21	0.43	0.29	1.86	0.64	0
Upper Wilson Ranch	≤50 m	0	0.25	0	0	0	0	0	0	0	0.25	0.25	0.25
	All	0	1.50	0	0.25	0.25	0	0	0	0.50	1.50	0.75	0.25
Washoe S.P. Golf Course	≤50 m	0	0.27	0	0	0.00	0.05	0.05	0	0.82	0	0.09	0.23
	All	0	0.59	0	0	0.05	0.14	0.09	0	1.59	0	0.14	1.09

^aNumber of individuals of each species divided by the number of visits and number of survey points, based on all detections within 50m of a survey point, and at unlimited distance. ^bRestoration sites are indicated with bold type.

Broadcast Surveys

Broadcast surveys for Sora, Virginia Rail, and Willow Flycatcher were completed at all survey stations. Vocalizations were only broadcast if the species was not spontaneously singing or calling within 50m of the survey station during the preceding point count. None of the target species were detected using broadcast surveys in the Humboldt-Toiyabe/Eldorado region.

Area Searches

In most cases we conducted area searches immediately following point count and broadcast surveys, but no later than 4.5 hours after sunrise. At large meadows, area searches were sometimes completed by a separate observer concurrent with point count surveys. In all but a few cases area searches were completed on the same morning as point counts. Area searches resulted in the mean detection of 4.5 (SD= 2.78) additional species per meadow in the Humboldt-Toiyabe/Eldorado study region, over species totals based on point count surveys alone (Table 5). Species-specific area search results for each restoration site and its associated reference site(s) are provided in Appendix D. Appendix E contains site by site lists of all species detected (point counts and areas searches combined) at each meadow.

Table 5. Number of species detected, including data from area searches and point counts^a.

<i>Meadow Name^b</i>	<i>No. Species Detected - Area Searches</i>	<i>No. Species Detected - Point Counts</i>	<i>No. Species Detected Only During Area Searches</i>	<i>No. Species - Both Methods Combined</i>
Blue Lakes Road/Hwy88	35	26	1	36
Burnside Road	27	26	4	31
Clover Valley	27	27	6	33
Border Ruffian Flat	24	21	3	27
Foster Meadow	28	24	7	35
Sand Shed	26	22	2	28
Indian Valley	25	23	4	29
Indian Valley West Wilderness	16	18	5	21
Little Indian Valley	18	15	2	20
Hope Valley Lower	49	44	7	56
Red Lake Creek	57	41	2	59
Hope Valley Upper	54	60	12	66
Faith Valley	36	36	7	43
Upper Charity Valley	31	30	5	36
Van Vleck Ranch	32	36	3	35
Upper Wilson Ranch	27	22	3	30
Washoe S.P. Golf Course	37	36	4	40

^aResults are pooled across all visits. ^bRestoration sites indicated in bold text.

Vegetation Assessment

Vegetation and water measurements were collected at each survey station for the purpose of assessing the 50-m radius area surrounding each survey station, and to provide information characterizing the general vegetation communities and hydrologic conditions within the overall meadow. Table 6 provides the average cover values for each meadow, calculated from the means of the four quadrants at each survey station.

Tree and snag cover was greatest at linear meadow sites where the forest edge regularly fell within 50 m of the survey stations or where trees were scattered in clumps within the meadow interior. Foster Meadow, Sand Shed, and Washoe State Park Golf Course all had tree cover within 50 m plots that was greater than 20%. Indian Valley and Upper Charity Valley both had almost 50% cover by riparian shrubs, while most of the remaining sites had less than 20% riparian shrub cover. Extent of shrub cover is particularly important for many shrub nesting bird species. Sagebrush cover, measured as an indicator of lowered water tables, was highest at Indian Valley, where Sagebrush covered nearly 12% of the site. All remaining meadows had <5% sagebrush cover surrounding survey stations.

We quantified the amount of flowing and standing water around survey stations to assess suitability for a number of meadow species that are associated with water or saturated conditions. All sites had some surface water within the plots, but water cover from flowing or standing water did not exceed 10% for most sites (Table 6).

Table 6. Average vegetative and water cover characteristics for 50-m plots surrounding survey stations at each meadow. Meadows not listed did not receive vegetation assessments.

<i>Meadow Name^a</i>	<i>No. Stations</i>	<i>Measure^b</i>	<i>Percent Cover</i>								
			<i>Trees</i>	<i>Snags</i>	<i>Riparian Shrubs</i>	<i>Sagebrush</i>	<i>Non-woody Vegetation</i>	<i>Bare Ground</i>	<i>Gravel Bar</i>	<i>Flowing Water</i>	<i>Standing Water</i>
Clover Valley	4	Mean	10.94	0.75	14.75	0.00	43.25	35.94	0.00	3.31	0.63
		(S.E.)	(5.65)	(0.32)	(9.49)	(0.00)	(23.52)	(16.40)	(0.00)	(1.42)	(0.63)
Border Ruffian Flat	4	Mean	9.00	0.06	12.56	0.00	24.88	40.00	0.00	6.63	7.19
		(S.E.)	(4.41)	(0.06)	(3.89)	(0.00)	(9.69)	(12.29)	(0.00)	(1.13)	(4.74)
Foster Meadow	6	Mean	24.13	1.08	8.96	0.00	75.75	19.63	4.71	13.67	12.50
		(S.E.)	(6.00)	(0.44)	(3.30)	(0.00)	(7.19)	(6.59)	(2.18)	(5.57)	(3.80)
Sand Shed	5	Mean	28.75	1.55	11.60	0.00	87.85	9.15	3.05	9.35	5.10
		(S.E.)	(4.94)	(0.28)	(5.69)	(0.00)	(2.70)	(2.66)	(1.89)	(1.74)	(1.27)
Indian Valley	13	Mean	4.08	0.02	48.90	12.77	82.08	4.56	1.46	2.12	5.58
		(S.E.)	(1.32)	(0.02)	(8.96)	(4.54)	(4.49)	(1.23)	(0.42)	(0.39)	(3.17)
Indian Valley West Wilderness	3	Mean	6.58	0.00	18.67	2.92	88.75	8.92	0.17	1.42	1.25
		(S.E.)	(4.59)	(0.00)	(8.96)	(2.21)	(6.57)	(4.84)	(0.17)	(1.06)	(0.80)
Little Indian Valley	4	Mean	16.56	0.38	0.25	0.00	81.31	13.56	0.00	3.13	4.06
		(S.E.)	(4.83)	(0.24)	(0.25)	(0.00)	(9.72)	(8.54)	(0.00)	(1.08)	(1.52)
Hope Valley Lower	16	Mean	2.86	0.00	6.00	7.34	83.48	2.70	1.44	5.69	4.97
		(S.E.)	(1.42)	(0.00)	(2.68)	(2.52)	(5.32)	(0.64)	(0.56)	(2.12)	(1.80)
Red Lake Creek	19	Mean	2.67	0.25	6.14	2.64	63.64	6.43	0.62	4.34	7.06
		(S.E.)	(1.30)	(0.10)	(2.95)	(1.54)	(9.43)	(1.15)	(0.25)	(1.05)	(4.06)

<i>Meadow Name^a</i>	<i>No. Stations</i>	<i>Measure^b</i>	<i>Percent Cover</i>								
			<i>Trees</i>	<i>Snags</i>	<i>Riparian Shrubs</i>	<i>Sagebrush</i>	<i>Non-woody Vegetation</i>	<i>Bare Ground</i>	<i>Gravel Bar</i>	<i>Flowing Water</i>	<i>Standing Water</i>
Hope Valley Upper	27	Mean (S.E.)	2.88 (1.58)	0.10 (0.10)	9.08 (2.71)	2.94 (1.01)	72.01 (5.44)	8.31 (1.72)	1.98 (0.69)	6.15 (1.35)	0.95 (0.29)
Faith Valley	12	Mean (S.E.)	3.04 (1.66)	0.04 (0.03)	21.48 (5.76)	3.50 (2.36)	79.77 (5.22)	9.27 (2.76)	2.83 (2.40)	3.08 (1.12)	2.88 (0.92)
Upper Charity Valley	8	Mean (S.E.)	2.84 (1.44)	0.00 (0.00)	44.06 (5.83)	0.78 (0.62)	19.75 (4.55)	41.25 (13.11)	0.88 (0.57)	5.94 (1.97)	5.41 (3.02)
Van Vleck Ranch	14	Mean (S.E.)	17.91 (4.56)	0.63 (0.35)	18.39 (4.13)	0.00 (0.00)	92.75 (2.08)	4.55 (1.86)	0.00 (0.00)	3.93 (1.18)	13.25 (3.73)
Upper Wilson Ranch	4	Mean (S.E.)	7.56 (4.42)	1.31 (0.51)	0.75 (0.27)	0.00 (0.00)	73.31 (7.14)	18.69 (6.45)	0.75 (0.60)	3.81 (1.28)	1.00 (0.92)
Washoe S.P. Golf Course	10	Mean (S.E.)	26.49 (4.79)	0.98 (0.31)	18.68 (3.09)	1.81 (1.12)	37.90 (5.49)	2.94 (1.50)	1.28 (0.98)	27.15 (3.55)	1.33 (0.44)

^aRestoration sites indicated in bold text. ^bMean and standard error averaged over four 50-m radius quadrants at each survey station.

For those survey stations with riparian deciduous shrub cover, we also assessed the proportion of the shrub component occurring within different height and age classes, as well as taxonomic group (Table 7). Immature shrubs in the lowest height class are indicative of shrub recruitment, an important factor in maintaining suitable habitat for shrub-nesting birds. Mature shrubs in the shortest height class can indicate certain low growing species, as well as situations where livestock or native ungulates are regulating growth patterns. These factors, as well as the proportion of the shrub community in the taller height classes, are relevant to certain focal species that prefer to nest at heights greater than 1 m above the ground. At most sites the majority of riparian shrubs were > 1m tall (Table 7). Taxonomic groupings of riparian shrubs also influences use by bird species. Only 4 sites had appreciable amounts of riparian shrubs other than willows surrounding the survey stations, and only one, Van Vleck Ranch, was dominated by a non-willow species (mountain alder, *Alnus tenuifolia*).

Table 7. Average characteristics of riparian deciduous shrubs in 50-m plots surrounding survey stations. Meadows not listed did not receive vegetation assessments.

Meadow Name ^a	No. Stations	Measure ^b	Height and Age Class of Riparian Shrubs (%)				Taxonomic Composition of Riparian Shrubs		
			<1m (seedling)	<1m (mature)	1 - 2m	>2m	% Willow	% Alder	% Other Riparian Shrub
Clover Valley	3	Mean	0.00	1.67	43.33	55.00	87.50	12.50	0.00
		(S.E.)	0.00	1.67	29.63	29.30	12.50	12.50	0.00
Border Ruffian Flat	4	Mean	1.67	11.04	66.04	21.25	98.33	0.00	1.67
		(S.E.)	1.67	3.96	4.85	7.88	1.67	0.00	1.67
Foster Meadow	6	Mean	0.71	18.78	43.07	37.44	100.00	0.00	0.00
		(S.E.)	0.44	9.91	8.94	10.80	0.00	0.00	0.00
Sand Shed	5	Mean	0.25	16.35	39.62	43.73	62.08	0.00	37.92
		(S.E.)	0.16	9.27	4.92	12.69	16.40	0.00	16.40
Indian Valley	13	Mean	10.10	3.65	47.40	39.42	100.00	0.00	0.00
		(S.E.)	7.57	1.03	7.44	7.39	0.00	0.00	0.00
Indian Valley West Wilderness	3	Mean	0.00	0.83	61.67	37.50	100.00	0.00	0.00
		(S.E.)	0.00	0.83	19.65	19.09	0.00	0.00	0.00
Little Indian Valley	1	Mean	25.00	25.00	50.00	0.00	100.00	0.00	0.00
		(S.E.)	---	--	--	--	--	--	--
Hope Valley Lower	10	Mean	3.36	15.76	18.21	62.68	96.50	0.00	3.50
		(S.E.)	2.00	7.30	4.82	8.55	2.45	0.00	2.45
Red Lake Creek	14	Mean	0.12	12.41	60.63	27.08	90.91	9.09	0.00
		(S.E.)	0.12	7.09	9.92	8.00	9.09	9.09	0.00

Meadow Name ^a	No. Stations	Measure ^b	Height and Age Class of Riparian Shrubs (%)				Taxonomic Composition of Riparian Shrubs		
			<1m (seedling)	<1m (mature)	1 - 2m	>2m	% Willow	% Alder	% Other Riparian Shrub
Hope Valley Upper	18	Mean	2.41	21.69	35.94	38.56	92.28	0.00	7.72
		(S.E.)	1.00	5.84	5.90	6.41	4.28	0.00	4.28
Faith Valley	10	Mean	0.75	12.26	56.38	30.62	100.00	0.00	0.00
		(S.E.)	0.53	4.65	7.14	7.43	0.00	0.00	0.00
Upper Charity Valley	8	Mean	3.13	11.56	46.09	39.22	96.88	0.00	3.13
		(S.E.)	1.62	3.77	9.80	10.12	2.10	0.00	2.10
Van Vleck Ranch	13	Mean	0.38	0.96	28.85	69.62	20.48	79.52	0.00
		(S.E.)	0.38	0.96	9.92	10.09	8.87	8.87	0.00
Upper Wilson Ranch	3	Mean	0.00	94.44	5.56	0.00	100.00	0.00	0.00
		(S.E.)	0.00	5.56	5.56	0.00	0.00	0.00	0.00
Washoe S.P. Golf Course	10	Mean	0.55	12.09	52.64	34.47	98.38	0.00	1.63
		(S.E.)	0.33	3.73	5.20	5.88	1.63	0.00	1.63

^aRestoration sites are indicated in bold text. ^bMean and standard error averaged over four 50m-radius quadrants at each survey station.

DISCUSSION

We strongly recommend continuing bird monitoring activities at meadows in the Eldorado/Toiyabe Region in as many pre- and post-restoration years as feasible. One area where we might alter methods from what we did in 2010 would be to decrease the distance between survey stations to as little as 200 m if doing so would allow for the addition of even one more survey station at small meadows. Many of the meadows we visited in across all regions in 2010 contained three or fewer survey stations. These small sample sizes can be problematic for some analyses, and if one or more stations can be added it could strengthen the monitoring results. Nevertheless we do not recommend altering station locations for the sites listed in this report where surveys occurred in 2010. Rather, any new reference or restoration sites could benefit from maximizing the number of stations. We also assessed our 2010 results and decided that decreasing point count duration from 10 minutes to 7 minutes would provide reliable results while balancing the amount of time and effort necessary per point count. In addition, we did not find much benefit from species-specific broadcast surveys for Willow Flycatcher, Sora and Virginia Rail. Not surprisingly, these species were not often detected at sites in need of restoration, but even when detected there were only 3 instances during our surveys across the entire Sierra Nevada where broadcast surveys detected an individual that had not already been detected during point counts. While single-species broadcast surveys may still be useful for some projects, detection probabilities of Sora and Virginia Rail may be adequately high with passive survey methods that do not incorporate broadcasts, and Willow Flycatchers are likely to be surveyed with full-protocol surveys (Bombay et al. 2003) prior to restoration as part of the state and federal permitting processes.

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Appendix A. Geographic coordinates of survey station locations

Table A-1. Geographic coordinates of survey station locations.

Site Name	Station Number	UTM Zone	UTM Easting	UTM Northing
Blue Lakes Road/Hwy 88	01	11	244839	4292862
Blue Lakes Road/Hwy 88	02	11	244633	4292926
Blue Lakes Road/Hwy 88	03	11	244697	4293183
Blue Lakes Road/Hwy 88	04	11	244464	4293214
Blue Lakes Road/Hwy 88	05	11	244603	4293398
Blue Lakes Road/Hwy 88	06	11	244379	4293433
Border Ruffian Flat	01	11	246658	4279364
Border Ruffian Flat	02	11	246489	4279859
Border Ruffian Flat	03	11	246304	4280259
Border Ruffian Flat	04	11	246190	4280479
Burnside Road	01	11	246575	4295912
Burnside Road	02	11	246379	4295795
Burnside Road	03	11	246809	4295811
Clover Valley	01	11	245665	4275526
Clover Valley	02	11	245492	4275684
Clover Valley	03	11	245438	4275915
Clover Valley	04	11	245811	4275331
Clover Valley	05	11	245907	4275551
Faith Valley	01	11	244842	4286789
Faith Valley	02	11	245008	4286601
Faith Valley	03	11	245149	4286391
Faith Valley	04	11	245193	4286135
Faith Valley	05	11	245239	4285891
Faith Valley	06	11	245181	4285654
Faith Valley	07	11	244992	4285502
Faith Valley	08	11	244787	4285327
Faith Valley	09	11	244633	4285129
Faith Valley	10	11	244662	4286626
Faith Valley	11	11	245438	4285752
Faith Valley	12	11	245372	4285463
Faith Valley	13	11	245166	4285321
Faith Valley	14	11	245375	4285179
Foster Meadow	01	10	740095	4275444
Foster Meadow	02	10	739954	4275224
Foster Meadow	03	10	739783	4275040
Foster Meadow	04	10	739573	4274909
Foster Meadow	05	10	739349	4274790
Foster Meadow	06	10	739092	4274808
Hope Valley Lower	01	11	246759	4295979
Hope Valley Lower	02	11	246539	4296092

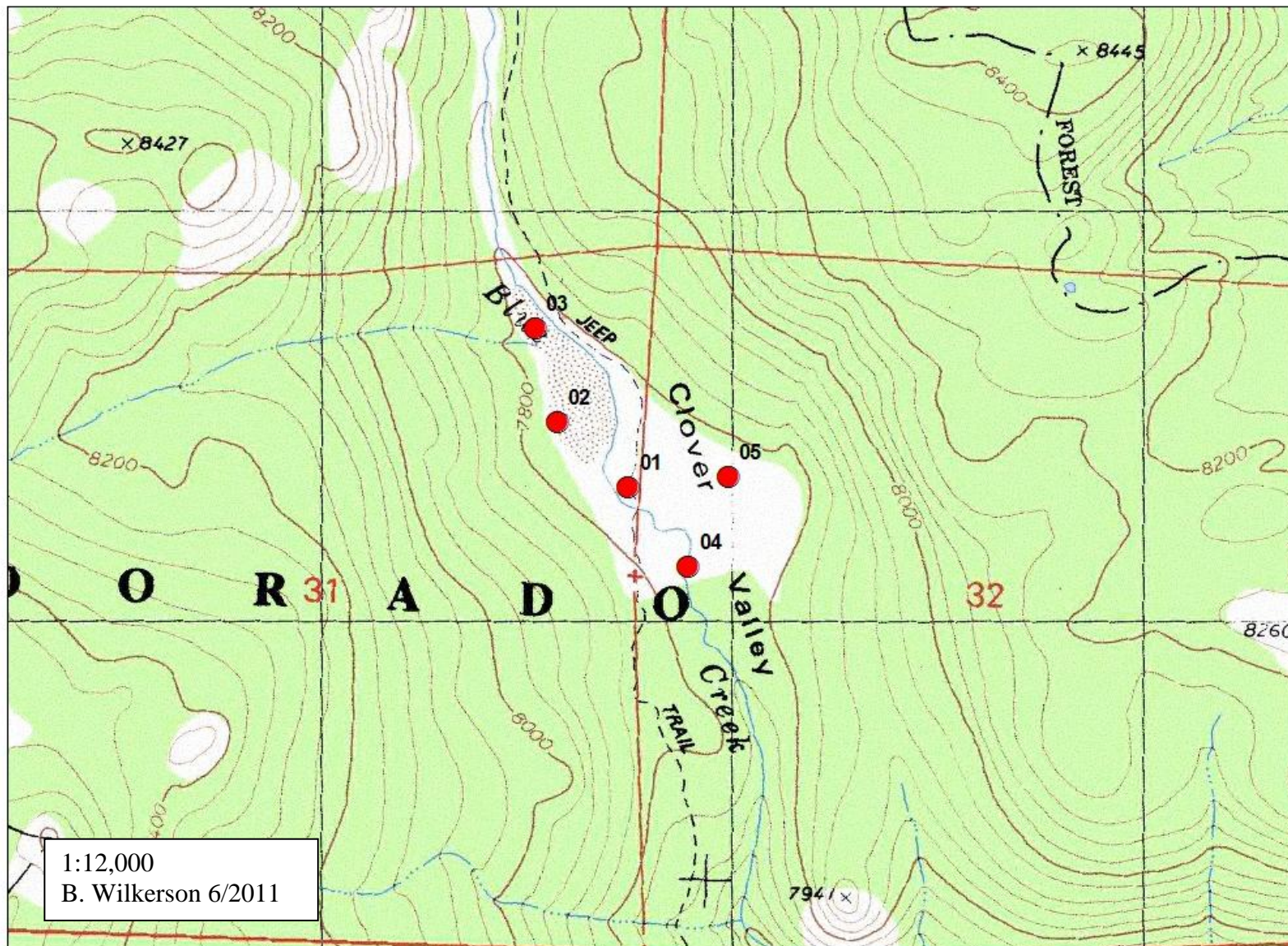
Site Name	Station Number	UTM Zone	UTM Easting	UTM Northing
Hope Valley Lower	03	11	246304	4296214
Hope Valley Lower	04	11	245888	4296297
Hope Valley Lower	05	11	245625	4296213
Hope Valley Lower	06	11	245376	4296252
Hope Valley Lower	07	11	245241	4296025
Hope Valley Lower	08	11	245153	4295778
Hope Valley Lower	09	11	246278	4296447
Hope Valley Lower	10	11	245478	4296008
Hope Valley Lower	11	11	244896	4295723
Hope Valley Lower	12	11	244964	4295971
Hope Valley Lower	13	11	245050	4296211
Hope Valley Lower	14	11	245158	4296424
Hope Valley Lower	15	11	245420	4296489
Hope Valley Lower	16	11	245670	4296526
Hope Valley Upper	01	11	245059	4295487
Hope Valley Upper	02	11	244973	4295204
Hope Valley Upper	03	11	244950	4294956
Hope Valley Upper	04	11	244988	4294732
Hope Valley Upper	05	11	244895	4294506
Hope Valley Upper	06	11	244853	4294268
Hope Valley Upper	07	11	244838	4294011
Hope Valley Upper	08	11	244844	4293760
Hope Valley Upper	09	11	244862	4293516
Hope Valley Upper	10	11	244941	4293281
Hope Valley Upper	11	11	245033	4293054
Hope Valley Upper	12	11	245130	4292820
Hope Valley Upper	13	11	245217	4292569
Hope Valley Upper	14	11	245224	4292326
Hope Valley Upper	15	11	245212	4292075
Hope Valley Upper	16	11	245168	4291826
Hope Valley Upper	17	11	245294	4291150
Hope Valley Upper	18	11	245139	4291567
Hope Valley Upper	19	11	245134	4291347
Hope Valley Upper	20	11	245407	4291710
Hope Valley Upper	21	11	245435	4291964
Hope Valley Upper	22	11	245466	4292211
Hope Valley Upper	23	11	245488	4292474
Hope Valley Upper	24	11	245452	4292720
Hope Valley Upper	25	11	245371	4291417
Hope Valley Upper	26	11	245387	4292976
Hope Valley Upper	27	11	244937	4292620
Hope Valley Upper	28	11	244526	4293628
Hope Valley Upper	29	11	244535	4293884
Indian Valley	01	11	249512	4275461
Indian Valley	02	11	249911	4275229

Site Name	Station Number	UTM Zone	UTM Easting	UTM Northing
Indian Valley	03	11	249688	4275267
Indian Valley	04	11	249806	4275045
Indian Valley	05	11	249874	4274790
Indian Valley	06	11	250046	4274692
Indian Valley	07	11	250241	4274297
Indian Valley	08	11	250342	4274062
Indian Valley	09	11	250400	4273826
Indian Valley	10	11	250113	4274513
Indian Valley	11	11	249641	4275689
Indian Valley	12	11	249800	4275884
Indian Valley	13	11	249872	4276108
Indian Valley	14	11	249931	4276361
Indian Valley	15	11	249585	4276055
Indian Valley West Wilderness	01	11	249575	4274562
Indian Valley West Wilderness	02	11	249302	4274199
Indian Valley West Wilderness	03	11	249510	4274335
Little Indian Valley	01	11	248744	4275668
Little Indian Valley	02	11	248571	4275857
Little Indian Valley	03	11	248414	4276008
Little Indian Valley	04	11	248812	4275842
Red Lake Creek	01	11	244176	4291190
Red Lake Creek	02	11	243940	4291138
Red Lake Creek	03	11	243950	4290897
Red Lake Creek	04	11	244040	4290672
Red Lake Creek	05	11	243965	4290443
Red Lake Creek	06	11	243829	4290229
Red Lake Creek	07	11	243667	4290038
Red Lake Creek	08	11	243613	4289812
Red Lake Creek	09	11	243362	4289650
Red Lake Creek	10	11	243303	4289407
Red Lake Creek	11	11	243179	4289192
Red Lake Creek	12	11	244206	4291446
Red Lake Creek	13	11	244253	4290804
Red Lake Creek	14	11	244248	4290529
Red Lake Creek	15	11	244221	4290283
Red Lake Creek	16	11	244032	4290088
Red Lake Creek	17	11	243972	4289840
Red Lake Creek	18	11	243729	4290537
Red Lake Creek	19	11	243524	4290671
Red Lake Creek	20	11	243341	4290839
Sand Shed	01	10	744466	4279279
Sand Shed	02	10	744688	4279266
Sand Shed	03	10	744793	4279074

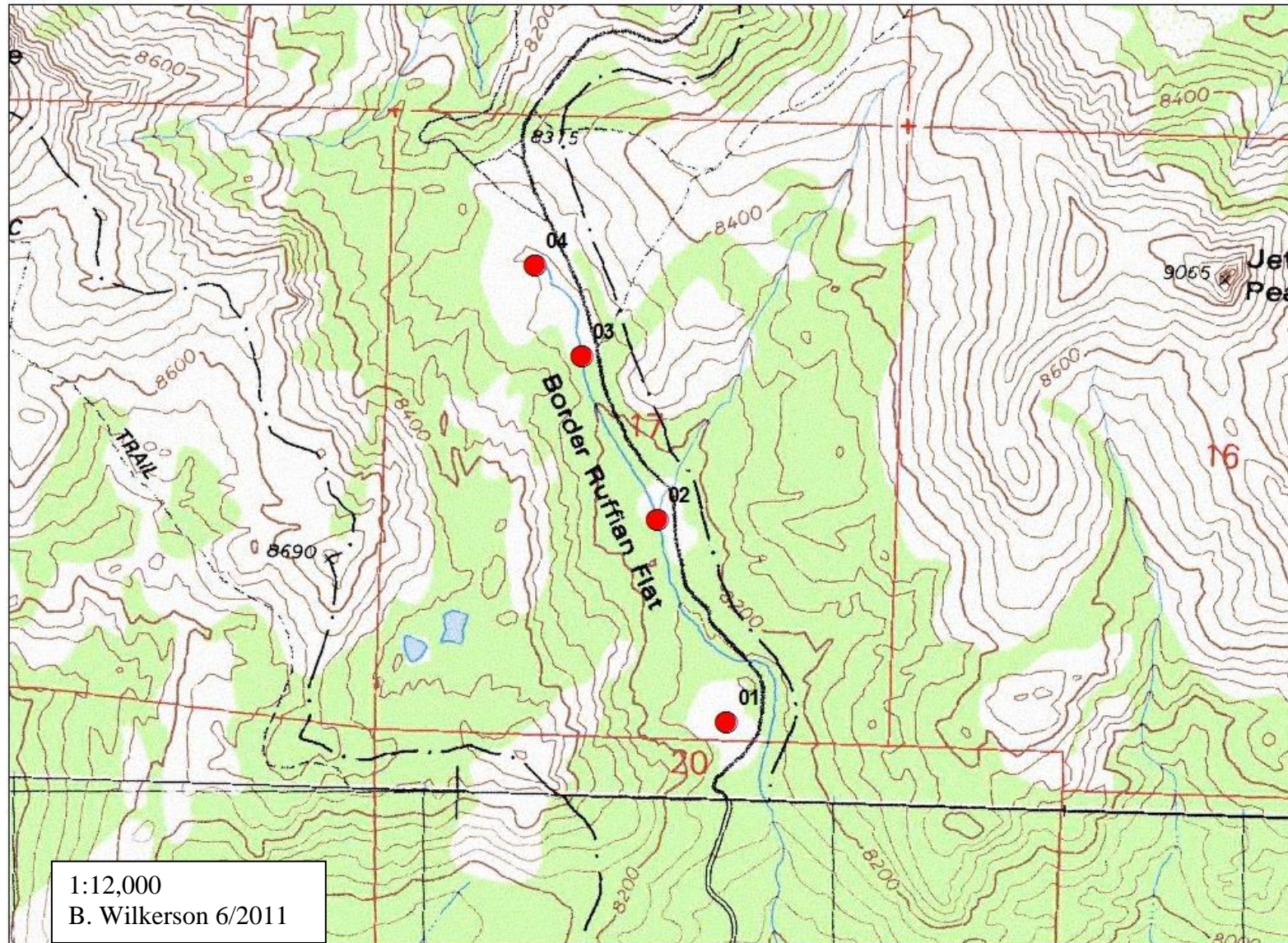
Site Name	Station Number	UTM Zone	UTM Easting	UTM Northing
Sand Shed	04	10	745057	4279200
Sand Shed	05	10	745176	4279384
Upper Charity Valley	01	11	246392	4283163
Upper Charity Valley	02	11	246389	4282894
Upper Charity Valley	03	11	246165	4282732
Upper Charity Valley	04	11	246168	4282494
Upper Charity Valley	05	11	246143	4282147
Upper Charity Valley	06	11	246240	4281975
Upper Charity Valley	07	11	245976	4282349
Upper Charity Valley	08	11	246413	4282647
Upper Wilson Ranch	01	10	738144	4300290
Upper Wilson Ranch	02	10	738217	4300535
Upper Wilson Ranch	03	10	738266	4300784
Upper Wilson Ranch	04	10	738202	4301039
Upper Wilson Ranch	05	10	738429	4301048
Van Vleck Ranch	01	10	731399	4313059
Van Vleck Ranch	02	10	731586	4312889
Van Vleck Ranch	03	10	731763	4312765
Van Vleck Ranch	04	10	731993	4312845
Van Vleck Ranch	05	10	732214	4312975
Van Vleck Ranch	06	10	732336	4313182
Van Vleck Ranch	07	10	732429	4313410
Van Vleck Ranch	08	10	732436	4313655
Van Vleck Ranch	09	10	732453	4313901
Van Vleck Ranch	10	10	732548	4313190
Van Vleck Ranch	11	10	732686	4313397
Van Vleck Ranch	12	10	732920	4313336
Van Vleck Ranch	13	10	733156	4313426
Van Vleck Ranch	14	10	733377	4313535
Washoe S.P. Golf Course	01	10	759657	4307158
Washoe S.P. Golf Course	02	10	759586	4306916
Washoe S.P. Golf Course	03	10	759360	4306813
Washoe S.P. Golf Course	04	10	759127	4306723
Washoe S.P. Golf Course	05	10	758902	4306614
Washoe S.P. Golf Course	06	10	758652	4306641
Washoe S.P. Golf Course	07	10	758630	4306391
Washoe S.P. Golf Course	08	10	758517	4306167
Washoe S.P. Golf Course	09	10	758381	4305956
Washoe S.P. Golf Course	10	10	758279	4305728
Washoe S.P. Golf Course	11	10	758073	4305583

Appendix B. Maps of meadows with survey station locations

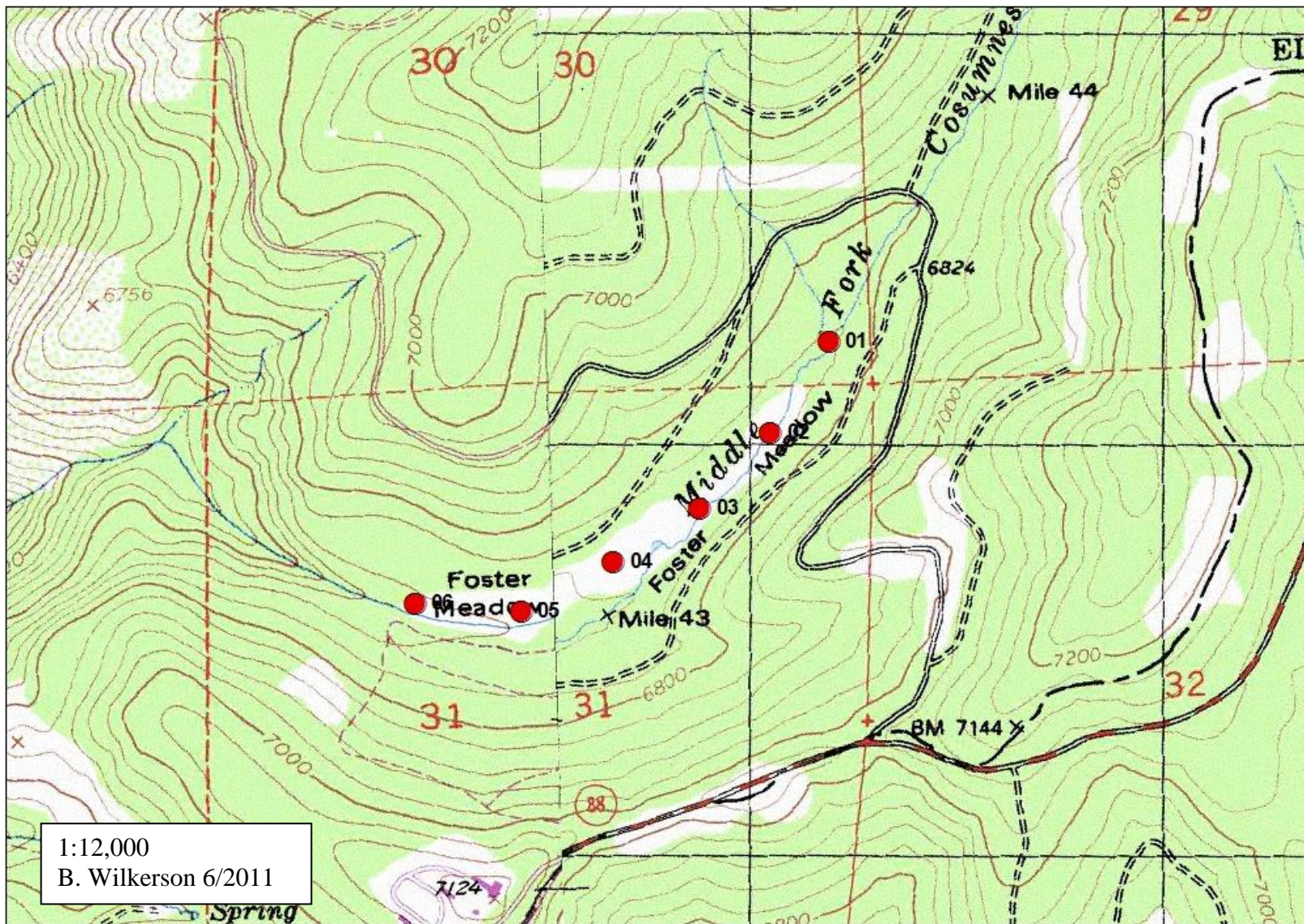
Map B-1. Clover Valley



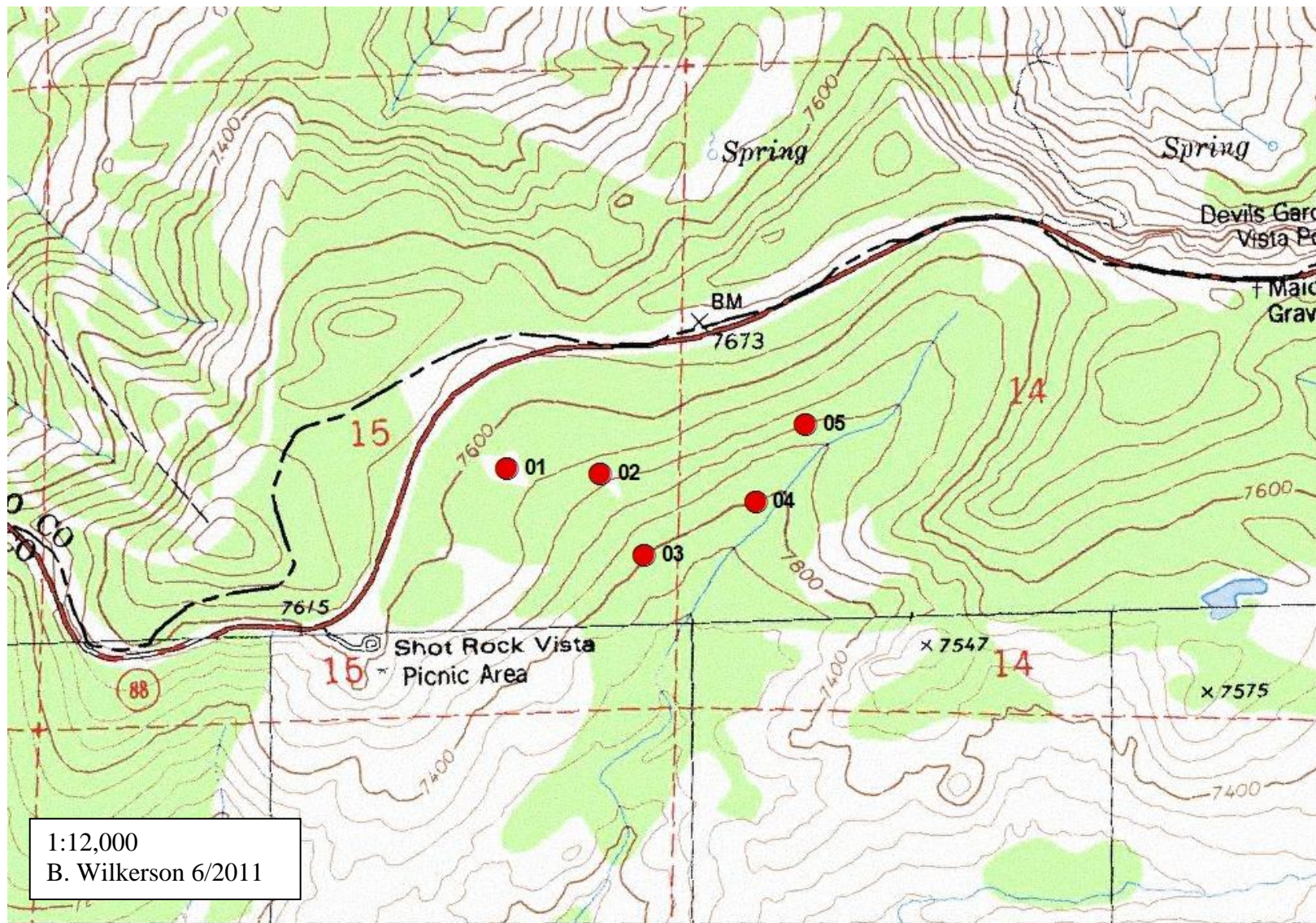
Map B-2. Border Ruffian Flat



Map B-3. Foster Meadow

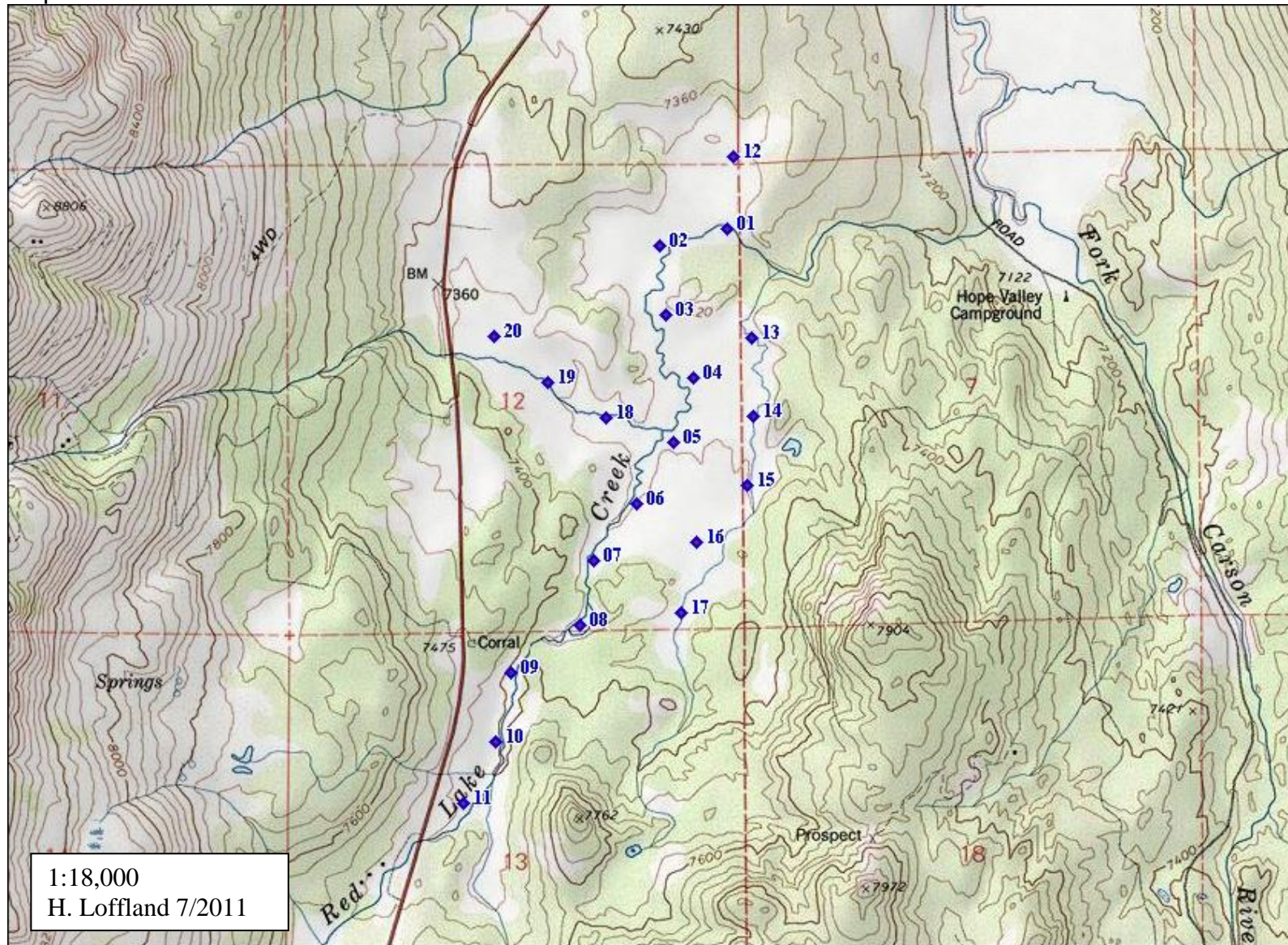


Map B-4. Sand Shed

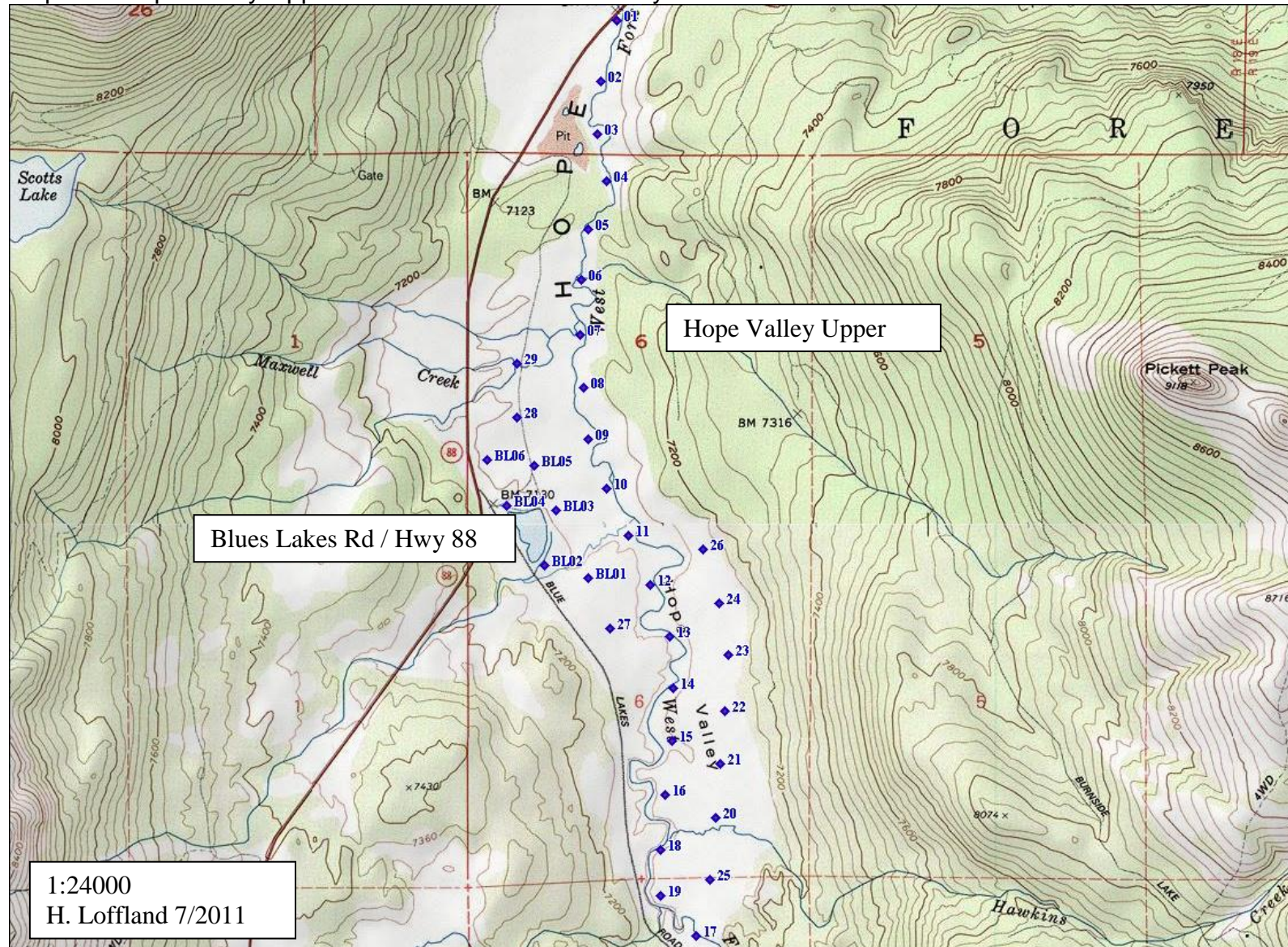


Topographic map of the Hope Valley Upper area. The map shows Burnside Lake Road, Hope Valley Upper, and various numbered points (01-16) and landmarks (Gate, BM 7079, BM 7089). The map is oriented with North at the top. The scale is 1:12,000. The map was created by H. Loffland on 7/2011.

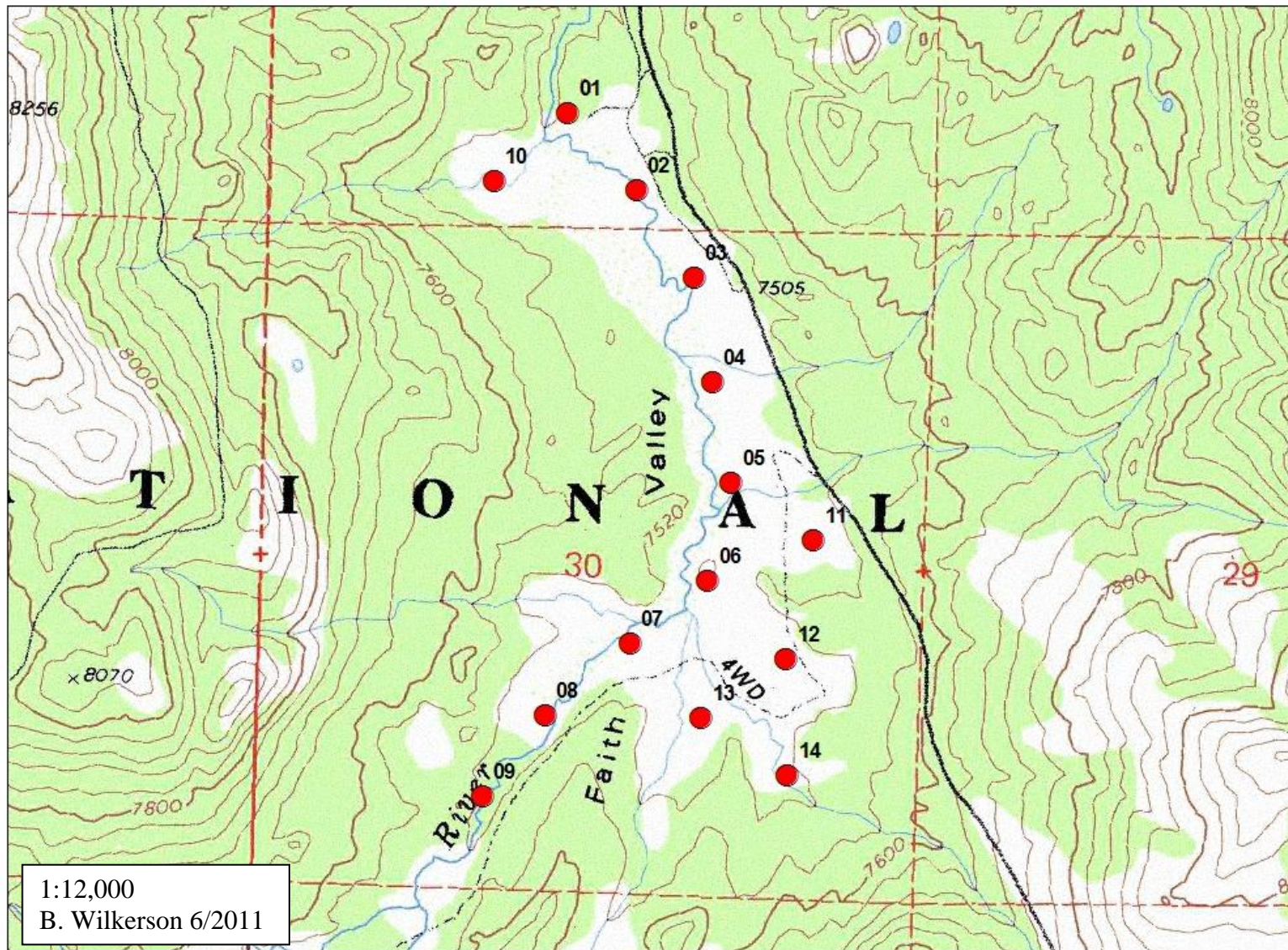
Map B-6. Red Lake Creek



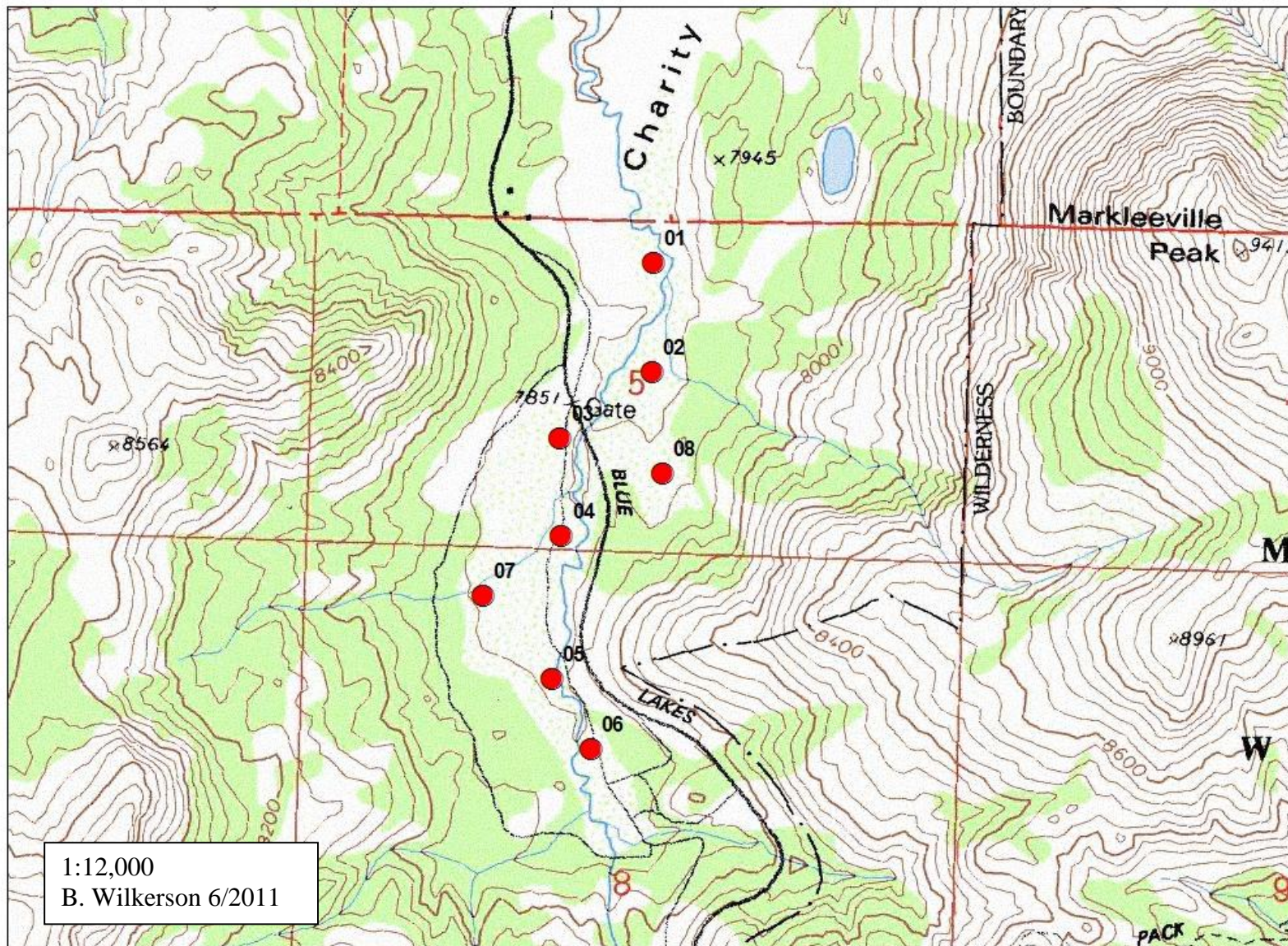
Map B-7. Hope Valley Upper and Blue Lakes Road / Hwy 88



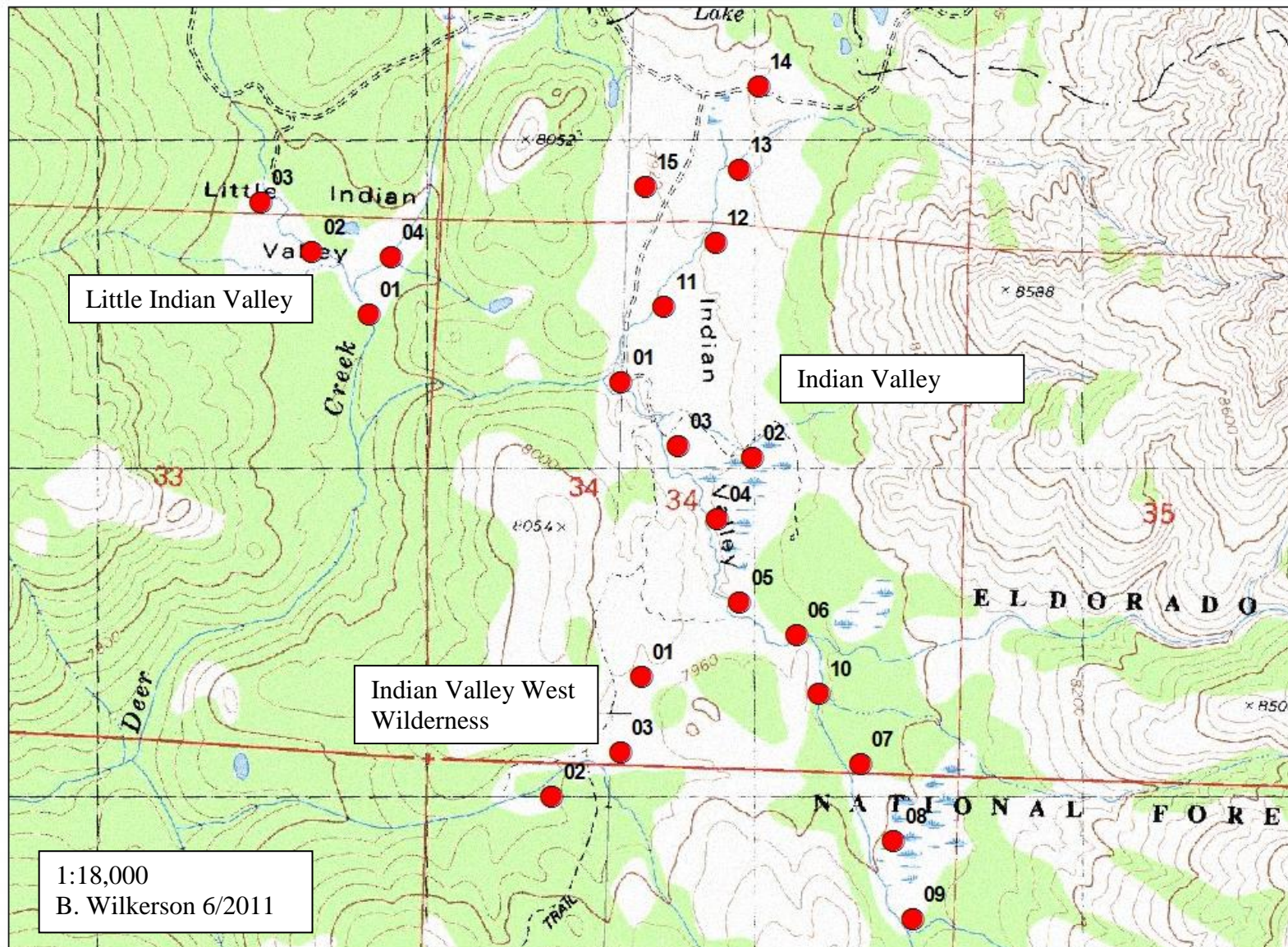
Map B-8. Faith Valley



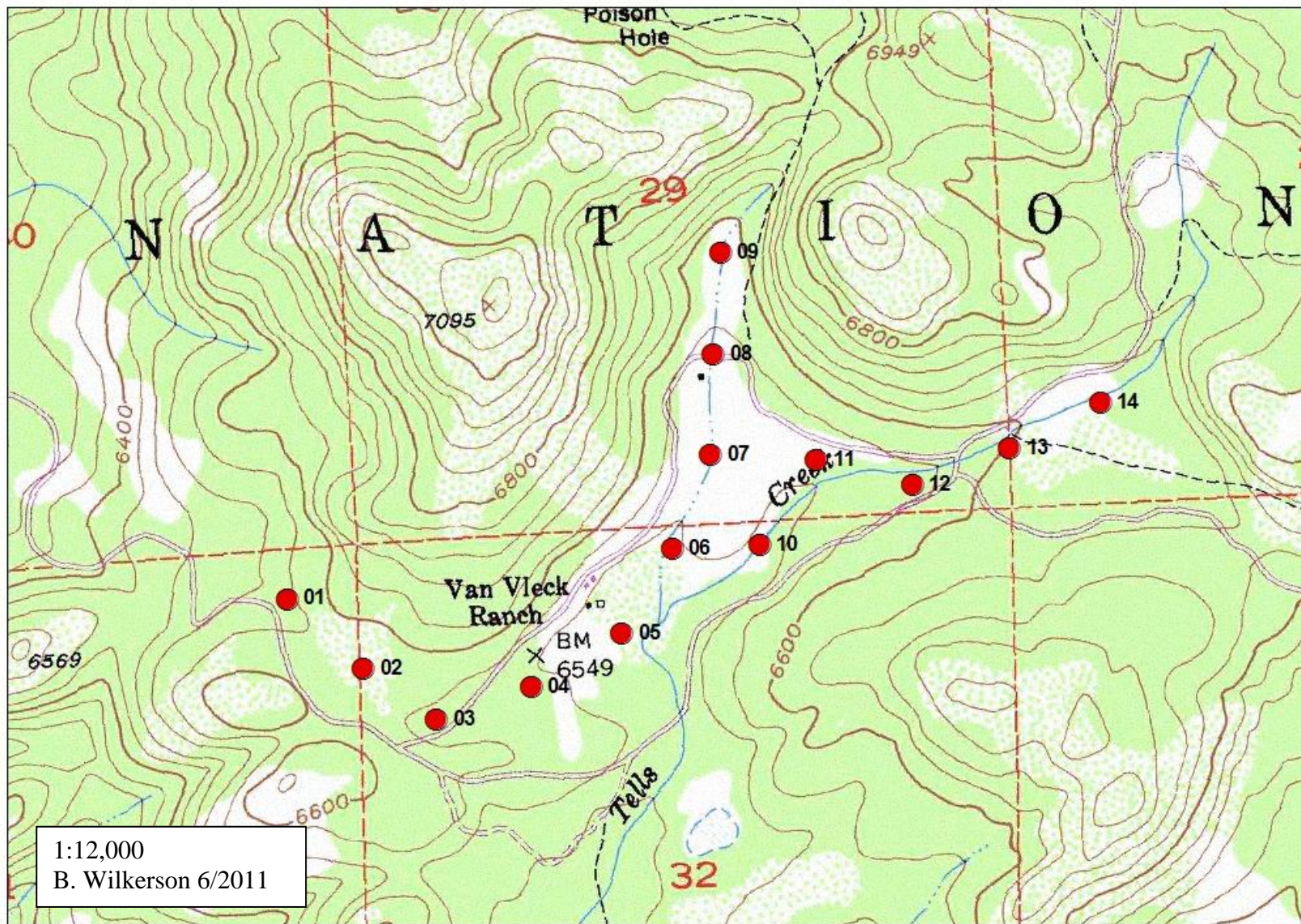
Map B-9. Upper Charity Valley



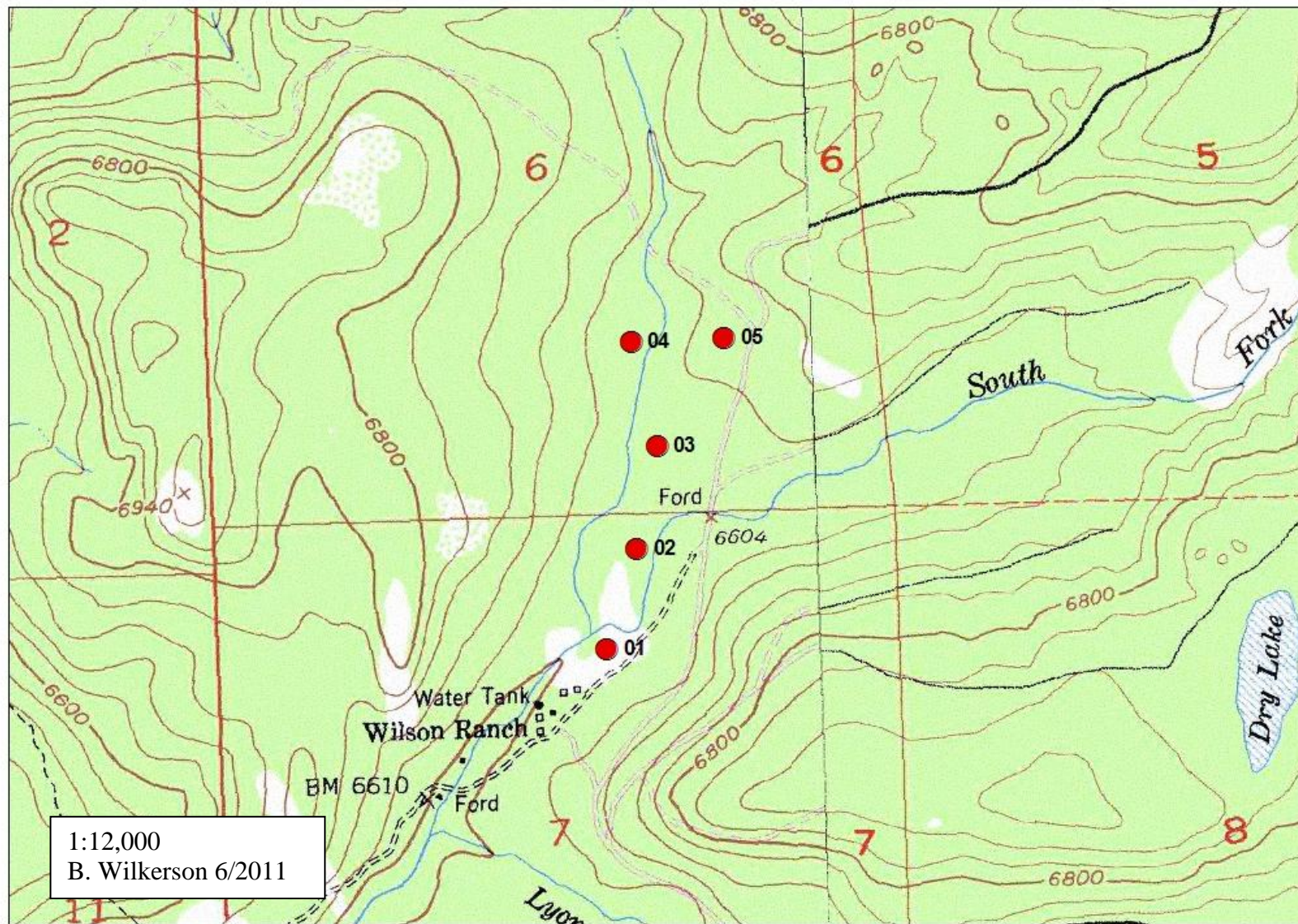
Map B-10. Indian Valley, Little Indian Valley and Indian Valley West Wilderness



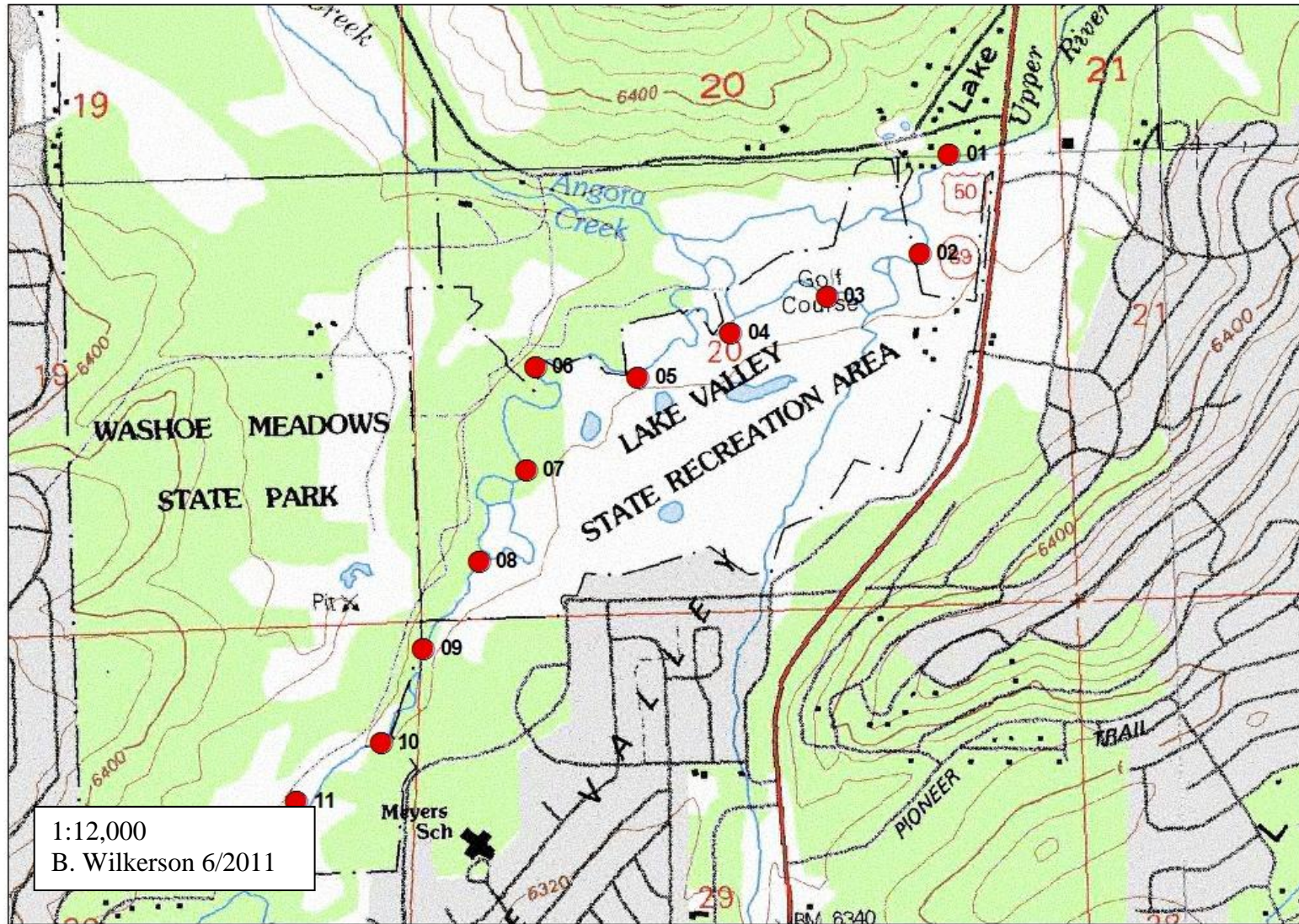
Map B-11. Van Vleck Ranch



Map B-12. Upper Wilson Ranch



Map B-13. Washoe State Park Golf Course



Appendix C. Number of birds detected during point counts at each meadow

Table C-1. Number of birds detected during point counts at Foster Meadow and Sand Shed.

Species ^e	Foster Meadow (n = 6 survey stations)				Sand Shed (n = 5 survey stations)			
	Avg. No. of Birds Detected ^a		Avg. No. of Birds per Station ^b		Avg. No. of Birds Detected ^a		Avg. No. of Birds per Station ^b	
	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d
Mountain Quail	0	1	0.00	0.17	0	2	0.00	0.40
Cooper's Hawk	0.5	0.5	0.08	0.08	0	0	0.00	0.00
Red-tailed Hawk	0.5	0.5	0.08	0.08	0	0	0.00	0.00
Band-Tailed Pigeon	0.5	0.5	0.08	0.08	0	2.5	0.00	0.50
Northern Pygmy-Owl	0	0.5	0.00	0.08	0	0	0.00	0.00
Red-breasted Sapsucker	0.5	0.5	0.08	0.08	0.5	0.5	0.10	0.10
Hairy Woodpecker	0	0.5	0.00	0.08	0	0	0.00	0.00
Northern Flicker	0.5	1	0.08	0.17	0	0	0.00	0.00
Unidentified Woodpecker	0	0	0.00	0.00	0.5	0.5	0.10	0.10
Olive-sided Flycatcher	0	1	0.00	0.17	0	0	0.00	0.00
Western Wood-Pee wee	0	0.5	0.00	0.08	3	5.5	0.60	1.10
Dusky Flycatcher	0	0	0.00	0.00	1	1.5	0.20	0.30
Warbling Vireo	0	0	0.00	0.00	2	3	0.40	0.60
Steller's Jay	1	3.5	0.17	0.58	1	2	0.20	0.40
Mountain Chickadee	2.5	5.5	0.42	0.92	0.5	1	0.10	0.20
Red-breasted Nuthatch	0	1	0.00	0.17	0	1	0.00	0.20
Brown Creeper	2	2	0.33	0.33	1.5	1.5	0.30	0.30
House Wren	1	1	0.17	0.17	0	0	0.00	0.00
Golden-crowned Kinglet	1	1.5	0.17	0.25	1.5	1.5	0.30	0.30
Townsend's Solitaire	0	0	0.00	0.00	0	0.5	0.00	0.10
Hermit Thrush	0.5	2	0.08	0.33	0	0	0.00	0.00
American Robin	2.5	7.5	0.42	1.25	0.5	3	0.10	0.60
Nashville Warbler	0.5	0.5	0.08	0.08	0	0	0.00	0.00
Yellow-rumped Warbler	2	3.5	0.33	0.58	2	5.5	0.40	1.10
Hermit Warbler	0	0	0.00	0.00	0	0.5	0.00	0.10
MacGillivray's Warbler	0	0	0.00	0.00	0.5	1	0.10	0.20

Species ^e	Foster Meadow (n = 6 survey stations)				Sand Shed (n = 5 survey stations)			
	Avg. No. of Birds Detected ^a		Avg. No. of Birds per Station ^b		Avg. No. of Birds Detected ^a		Avg. No. of Birds per Station ^b	
	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d
Western Tanager	0.5	2	0.08	0.33	0.5	1	0.10	0.20
Fox Sparrow	0	0.5	0.00	0.08	0	0.5	0.00	0.10
Song Sparrow	0	1	0.00	0.17	0	0	0.00	0.00
Lincoln's Sparrow	2.5	5.5	0.42	0.92	1.5	3	0.30	0.60
Dark-eyed Junco	4	6	0.67	1.00	3.5	5.5	0.70	1.10
Lazuli Bunting	0	0.5	0.00	0.08	0	0.5	0.00	0.10
Brown-Headed Cowbird	0.5	0.5	0.08	0.08	0	0	0.00	0.00
Pine Grosbeak	0	0.5	0.00	0.08	0	0.5	0.00	0.10
Cassin's Finch	0	0	0.00	0.00	1	1	0.20	0.20
Pine Siskin	0	0	0.00	0.00	1	1.5	0.20	0.30
Evening Grosbeak	0	0	0.00	0.00	0	0.5	0.00	0.10

^aNumber of individuals detected at the meadow, averaged across two survey visits. ^bNumber of individual birds detected divided by the number of survey stations and visits. ^cOnly includes birds detected within 50m of a survey point. ^dAll birds detected regardless of distance from survey point.

^eMeadow focal species recorded in bold text.

Table C-2. Number of birds detected during point counts at Blues Lakes Road/Hwy 88 and Burnside Road.

<i>Species^e</i>	<i>Blue Lakes Road/Hwy88 (n = 6 survey stations)</i>				<i>Burnside Road (n = 3 survey stations)</i>			
	<i>Avg. No. of Birds Detected^a</i>		<i>Avg. No. of Birds per Station^b</i>		<i>Avg. No. of Birds Detected^a</i>		<i>Avg. No. of Birds per Station^b</i>	
	<i><50m^c</i>	<i>Unlimited Radius^d</i>	<i><50m^c</i>	<i>Unlimited Radius^d</i>	<i><50m^c</i>	<i>Unlimited Radius^d</i>	<i><50m^c</i>	<i>Unlimited Radius^d</i>
Mallard	0.00	1.50	0.00	0.25	0.00	0.00	0.00	0.00
Bufflehead	0.00	0.50	0.00	0.08	0.00	0.00	0.00	0.00
Mountain Quail	0.00	3.00	0.00	0.50	0.00	0.00	0.00	0.00
Red-tailed Hawk	0.00	0.50	0.00	0.08	0.00	0.00	0.00	0.00
Killdeer	1.00	7.00	0.17	1.17	0.00	0.00	0.00	0.00
Spotted Sandpiper	0.00	2.00	0.00	0.33	0.00	1.00	0.00	0.33
Wilson's Snipe	0.50	5.00	0.08	0.83	0.00	0.00	0.00	0.00
Wilson's Phalarope	0.00	0.50	0.00	0.08	0.00	0.00	0.00	0.00
Red-breasted Sapsucker	0.00	0.50	0.00	0.08	0.00	0.00	0.00	0.00
Northern Flicker	0.00	1.50	0.00	0.25	0.00	1.50	0.00	0.50
Western Wood-Pewee	0.00	3.00	0.00	0.50	0.50	2.50	0.17	0.83
Hammond's Flycatcher	0.00	0.00	0.00	0.00	0.50	0.50	0.17	0.17
Dusky Flycatcher	0.50	1.00	0.08	0.17	1.00	3.00	0.33	1.00
Cassin's Vireo	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.17
Warbling Vireo	0.00	0.00	0.00	0.00	0.00	1.50	0.00	0.50
Steller's Jay	0.00	3.50	0.00	0.58	0.00	0.00	0.00	0.00
Clark's Nutcracker	0.00	2.50	0.00	0.42	0.00	0.00	0.00	0.00
Common Raven	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.17
Northern Rough-winged Swallow	0.00	2.00	0.00	0.33	0.00	0.00	0.00	0.00
Cliff Swallow	0.00	0.50	0.00	0.08	0.00	0.00	0.00	0.00
Mountain Chickadee	0.00	2.00	0.00	0.33	1.00	4.00	0.33	1.33
Red-breasted Nuthatch	0.00	0.50	0.00	0.08	0.00	0.00	0.00	0.00
Brown Creeper	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.17
House Wren	0.00	1.50	0.00	0.25	0.00	0.00	0.00	0.00

Species ^e	Blue Lakes Road/Hwy88 (n = 6 survey stations)				Burnside Road (n = 3 survey stations)			
	Avg. No. of Birds Detected ^a		Avg. No. of Birds per Station ^b		Avg. No. of Birds Detected ^a		Avg. No. of Birds per Station ^b	
	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d
Townsend's Solitaire	0.00	0.50	0.00	0.08	0.00	0.00	0.00	0.00
American Robin	1.00	7.00	0.17	1.17	2.00	7.00	0.67	2.33
Orange-crowned Warbler	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.33
Yellow Warbler	0.00	0.00	0.00	0.00	0.50	0.50	0.17	0.17
Yellow-rumped Warbler	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.17
Hermit Warbler	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.33
MacGillivray's Warbler	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.17
Western Tanager	0.00	0.50	0.00	0.08	0.00	1.50	0.00	0.50
Green-tailed Towhee	0.00	3.50	0.00	0.58	0.00	0.50	0.00	0.17
Chipping Sparrow	0.00	1.00	0.00	0.17	0.00	0.00	0.00	0.00
Brewer's Sparrow	0.00	0.50	0.00	0.08	0.00	0.00	0.00	0.00
Vesper Sparrow	1.00	4.50	0.17	0.75	0.00	0.00	0.00	0.00
Savannah Sparrow	0.00	3.00	0.00	0.50	0.00	0.00	0.00	0.00
Song Sparrow	0.00	3.00	0.00	0.50	0.50	1.50	0.17	0.50
Lincoln's Sparrow	0.00	0.50	0.00	0.08	1.00	1.50	0.33	0.50
White-crowned Sparrow	0.00	1.50	0.00	0.25	0.50	0.50	0.17	0.17
Dark-eyed Junco	0.00	0.00	0.00	0.00	0.50	0.50	0.17	0.17
Black-headed Grosbeak	0.00	0.50	0.00	0.08	0.00	0.50	0.00	0.17
Red-winged Blackbird	0.00	8.50	0.00	1.42	1.50	4.00	0.50	1.33
Brewer's Blackbird	5.00	12.50	0.83	2.08	0.50	1.00	0.17	0.33
Brown-headed Cowbird	1.00	2.00	0.17	0.33	0.50	3.00	0.17	1.00
Purple Finch	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.17
Cassin's Finch	0.00	4.50	0.00	0.75	0.00	0.00	0.00	0.00

^aNumber of individuals detected at the meadow, averaged across two survey visits. ^bNumber of individual birds detected divided by the number of survey stations and visits. ^cOnly includes birds detected within 50m of a survey point. ^dAll birds detected regardless of distance from survey point.

^eMeadow focal species recorded in bold text.

Table C-3. Number of birds detected during point counts at Clover Valley and Border Ruffian Flat.

Species ^e	Clover Valley (n = 4 survey stations)				Border Ruffian Flat Total (n = 4 survey stations)			
	Avg. No. of Birds Detected ^a		Avg. No. of Birds per Station ^b		Avg. No. of Birds Detected ^a		Avg. No. of Birds per Station ^b	
	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d
Mountain Quail	0.00	1.00	0.00	0.25	0.00	0.50	0.00	0.13
Anna's Hummingbird	0.50	0.50	0.13	0.13	0.00	0.00	0.00	0.00
Hairy Woodpecker	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.13
Western Wood-Pewee	0.00	0.50	0.00	0.13	0.00	0.00	0.00	0.00
Hammond's Flycatcher	0.50	0.50	0.13	0.13	0.00	0.50	0.00	0.13
Dusky Flycatcher	0.50	4.00	0.13	1.00	1.00	2.50	0.25	0.63
Warbling Vireo	0.00	1.50	0.00	0.38	0.00	0.00	0.00	0.00
Steller's Jay	0.00	0.50	0.00	0.13	0.00	1.00	0.00	0.25
Clark's Nutcracker	0.00	0.50	0.00	0.13	0.50	0.50	0.13	0.13
Mountain Chickadee	0.50	4.50	0.13	1.13	1.00	3.00	0.25	0.75
Red-breasted Nuthatch	0.00	0.50	0.00	0.13	0.00	1.00	0.00	0.25
White-breasted Nuthatch	0.00	0.50	0.00	0.13	0.00	0.00	0.00	0.00
Brown Creeper	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.13
Townsend's Solitaire	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.13
Hermit Thrush	0.00	1.50	0.00	0.38	0.00	0.50	0.00	0.13
American Robin	2.00	5.50	0.50	1.38	4.00	9.50	1.00	2.38
Nashville Warbler	0.50	0.50	0.13	0.13	0.00	0.00	0.00	0.00
Yellow Warbler	0.00	0.50	0.00	0.13	0.50	1.50	0.13	0.38
Yellow-rumped Warbler	0.50	4.00	0.13	1.00	0.50	2.00	0.13	0.50
Hermit Warbler	0.50	1.00	0.13	0.25	0.00	0.00	0.00	0.00
MacGillivray's Warbler	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.13
Wilson's Warbler	0.50	1.50	0.13	0.38	0.00	0.50	0.00	0.13
Western Tanager	0.00	1.00	0.00	0.25	0.00	1.50	0.00	0.38
Green-tailed Towhee	0.50	0.50	0.13	0.13	0.50	1.00	0.13	0.25
Chipping Sparrow	0.50	2.00	0.13	0.50	0.00	0.00	0.00	0.00

Species ^e	Clover Valley (n = 4 survey stations)				Border Ruffian Flat Total (n = 4 survey stations)			
	Avg. No. of Birds Detected ^a		Avg. No. of Birds per Station ^b		Avg. No. of Birds Detected ^a		Avg. No. of Birds per Station ^b	
	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d
Fox Sparrow	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.13
Song Sparrow	1.00	2.50	0.25	0.63	0.00	0.00	0.00	0.00
Lincoln's Sparrow	0.50	6.00	0.13	1.50	1.50	3.50	0.38	0.88
White-crowned Sparrow	0.00	7.00	0.00	1.75	8.50	13.50	2.13	3.38
Dark-eyed Junco	2.50	9.00	0.63	2.25	0.50	1.50	0.13	0.38
Cassin's Finch	1.50	3.00	0.38	0.75	1.00	4.00	0.25	1.00
Pine Siskin	0.00	1.00	0.00	0.25	0.00	0.00	0.00	0.00
Lesser Goldfinch	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.13

^aNumber of individuals detected at the meadow, averaged across two survey visits. ^bNumber of individual birds detected divided by the number of survey stations and visits. ^cOnly includes birds detected within 50m of a survey point. ^dAll birds detected regardless of distance from survey point.

^eMeadow focal species recorded in bold text.

Table C-4. Number of birds detected during point counts at Indian Valley, Indian Valley West Wilderness, and Little Indian Valley.

Species ^e	Indian Valley (n = 13 survey stations)				Indian Valley West Wilderness (n = 3 survey stations)				Little Indian Valley (n = 4 survey stations)			
	No. of Birds Detected ^a		Avg. No. of Birds per Station ^b		No. of Birds Detected ^a		Avg. No. of Birds per Station ^b		No. of Birds Detected ^a		Avg. No. of Birds per Station ^b	
	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d
Mountain Quail	0.00	6.00	0.00	0.46	0.00	1.00	0.00	0.33	0.00	2.00	0.00	0.50
Spotted Sandpiper	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	2.00	0.25	0.50
Northern Flicker	0.00	1.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Western Wood-Pewee	0.00	1.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hammond's Flycatcher	1.00	1.00	0.08	0.08	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.25
Dusky Flycatcher	6.00	12.00	0.46	0.92	2.00	3.00	0.67	1.00	0.00	2.00	0.00	0.50
Warbling Vireo	1.00	2.00	0.08	0.15	0.00	0.00	0.00	0.00	0.00	3.00	0.00	0.75
Steller's Jay	0.00	5.00	0.00	0.38	0.00	1.00	0.00	0.33	0.00	1.00	0.00	0.25
Clark's Nutcracker	1.00	3.00	0.08	0.23	0.00	2.00	0.00	0.67	0.00	2.00	0.00	0.50
Mountain Chickadee	1.00	5.00	0.08	0.38	0.00	2.00	0.00	0.67	2.00	6.00	0.50	1.50
Red-breasted Nuthatch	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.33	0.00	4.00	0.00	1.00
Brown Creeper	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.25
Hermit Thrush	0.00	1.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
American Robin	5.00	21.00	0.38	1.62	2.00	5.00	0.67	1.67	1.00	4.00	0.25	1.00
Nashville Warbler	1.00	1.00	0.08	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellow Warbler	1.00	3.00	0.08	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellow-rumped Warbler	0.00	3.00	0.00	0.23	0.00	1.00	0.00	0.33	0.00	7.00	0.00	1.75
Hermit Warbler	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.25
MacGillivray's Warbler	4.00	11.00	0.31	0.85	1.00	3.00	0.33	1.00	0.00	0.00	0.00	0.00
Wilson's Warbler	3.00	7.00	0.23	0.54	1.00	2.00	0.33	0.67	0.00	0.00	0.00	0.00
Green-tailed Towhee	2.00	3.00	0.15	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Spotted Towhee	1.00	1.00	0.08	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chipping Sparrow	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.33	0.00	0.00	0.00	0.00

Species ^e	Indian Valley (n = 13 survey stations)				Indian Valley West Wilderness (n = 3 survey stations)				Little Indian Valley (n = 4 survey stations)			
	No. of Birds Detected ^a		Avg. No. of Birds per Station ^b		No. of Birds Detected ^a		Avg. No. of Birds per Station ^b		No. of Birds Detected ^a		Avg. No. of Birds per Station ^b	
	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d
Brewer's Sparrow	0.00	3.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fox Sparrow	1.00	3.00	0.08	0.23	2.00	3.00	0.67	1.00	0.00	0.00	0.00	0.00
Lincoln's Sparrow	6.00	19.00	0.46	1.46	1.00	2.00	0.33	0.67	2.00	2.00	0.50	0.50
White-crowned Sparrow	18.00	50.00	1.38	3.85	6.00	10.00	2.00	3.33	0.00	3.00	0.00	0.75
Dark-eyed Junco	5.00	9.00	0.38	0.69	1.00	1.00	0.33	0.33	3.00	9.00	0.75	2.25
Brewer's Blackbird	3.00	3.00	0.23	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cassin's Finch	0.00	3.00	0.00	0.23	1.00	4.00	0.33	1.33	0.00	1.00	0.00	0.25
Pine Siskin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	0.25	0.25

^aNumber of individuals detected at the meadow, averaged across two survey visits. ^bNumber of individual birds detected divided by the number of survey stations and visits. ^cOnly includes birds detected within 50m of a survey point. ^dAll birds detected regardless of distance from survey point.

^eMeadow focal species recorded in bold text.

Table C-5. Number of birds detected during point counts at Hope Valley Lower and Red Lake Creek.

Species ^e	Hope Valley Lower (n = 16 survey stations)				Red Lake Creek (n = 20 survey stations)			
	Avg. No. of Birds Detected ^a		Avg. No. of Birds per Station ^b		Avg. No. of Birds Detected ^a		Avg. No. of Birds per Station ^b	
	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d
Canada Goose	0.00	0.00	0.00	0.00	0.00	5.50	0.00	0.28
Mallard	1.50	4.50	0.09	0.28	0.00	9.00	0.00	0.45
Sooty Grouse	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.05
Mountain Quail	0.00	2.50	0.00	0.16	0.00	1.50	0.00	0.08
California Quail	0.00	0.50	0.00	0.03	0.50	0.50	0.03	0.03
Great Blue Heron	0.00	0.50	0.00	0.03	0.00	0.00	0.00	0.00
Osprey	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.03
Bald Eagle	0.00	1.00	0.00	0.06	0.00	0.50	0.00	0.03
Red-tailed Hawk	0.00	0.00	0.00	0.00	0.50	1.00	0.03	0.05
Sora	0.00	2.50	0.00	0.16	0.00	0.00	0.00	0.00
Killdeer	1.50	6.50	0.09	0.41	1.00	6.50	0.05	0.33
Spotted Sandpiper	3.50	13.50	0.22	0.84	6.50	15.50	0.33	0.78
Wilson's Snipe	0.50	8.00	0.03	0.50	0.00	3.50	0.00	0.18
Red-breasted Sapsucker	0.00	0.00	0.00	0.00	0.00	1.50	0.00	0.08
Hairy Woodpecker	0.00	0.00	0.00	0.00	0.50	0.50	0.03	0.03
Northern Flicker	0.00	4.50	0.00	0.28	0.00	5.00	0.00	0.25
Pileated Woodpecker	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.03
Olive-sided Flycatcher	0.00	0.50	0.00	0.03	0.00	0.00	0.00	0.00
Western Wood-Pewee	0.00	3.00	0.00	0.19	0.00	1.00	0.00	0.05
Hammond's Flycatcher	0.00	1.00	0.00	0.06	0.50	2.00	0.03	0.10
Dusky Flycatcher	0.50	2.50	0.03	0.16	0.50	5.00	0.03	0.25
Cassin's Vireo	0.00	1.00	0.00	0.06	0.00	0.50	0.00	0.03
Warbling Vireo	0.00	1.00	0.00	0.06	0.50	1.00	0.03	0.05
Steller's Jay	0.50	2.50	0.03	0.16	1.00	7.50	0.05	0.38
Clark's Nutcracker	0.00	1.00	0.00	0.06	0.00	5.50	0.00	0.28
Common Raven	1.00	2.00	0.06	0.13	1.00	1.00	0.05	0.05

Species ^e	Hope Valley Lower (n = 16 survey stations)				Red Lake Creek (n = 20 survey stations)			
	Avg. No. of Birds Detected ^a		Avg. No. of Birds per Station ^b		Avg. No. of Birds Detected ^a		Avg. No. of Birds per Station ^b	
	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d
Tree Swallow	0.00	0.00	0.00	0.00	12.00	12.00	0.60	0.60
Cliff Swallow	21.00	56.00	1.31	3.50	20.50	20.50	1.03	1.03
Barn Swallow	0.00	0.00	0.00	0.00	0.00	3.50	0.00	0.18
Mountain Chickadee	0.00	4.50	0.00	0.28	3.00	21.50	0.15	1.08
Red-breasted Nuthatch	0.00	0.50	0.00	0.03	0.00	7.00	0.00	0.35
Pygmy Nuthatch	0.00	0.00	0.00	0.00	0.00	3.00	0.00	0.15
House Wren	0.00	2.00	0.00	0.13	1.00	1.00	0.05	0.05
Golden-crowned Kinglet	0.00	0.00	0.00	0.00	0.50	0.50	0.03	0.03
Ruby-crowned Kinglet	0.00	0.00	0.00	0.00	1.00	1.50	0.05	0.08
Blue-gray Gnatcatcher	0.00	0.50	0.00	0.03	0.00	0.00	0.00	0.00
Western Bluebird	0.00	0.50	0.00	0.03	0.00	0.00	0.00	0.00
Mountain Bluebird	0.50	2.00	0.03	0.13	2.50	3.50	0.13	0.18
Townsend's Solitaire	0.00	0.00	0.00	0.00	0.00	4.00	0.00	0.20
Hermit Thrush	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.03
American Robin	6.00	23.00	0.38	1.44	19.50	45.50	0.98	2.28
European Starling	1.00	1.00	0.06	0.06	0.00	0.00	0.00	0.00
Yellow Warbler	1.00	2.50	0.06	0.16	0.50	3.50	0.03	0.18
Yellow-rumped Warbler	0.00	0.50	0.00	0.03	0.00	5.50	0.00	0.28
Hermit Warbler	0.00	0.00	0.00	0.00	0.50	1.00	0.03	0.05
MacGillivray's Warbler	0.00	1.00	0.00	0.06	0.00	0.00	0.00	0.00
Wilson's Warbler	0.00	1.50	0.00	0.09	0.50	1.50	0.03	0.08
Western Tanager	0.00	1.00	0.00	0.06	0.00	0.50	0.00	0.03
Green-tailed Towhee	1.00	4.50	0.06	0.28	0.50	5.50	0.03	0.28
Spotted Towhee	0.00	0.50	0.00	0.03	0.00	1.50	0.00	0.08
Chipping Sparrow	1.00	1.50	0.06	0.09	1.50	5.00	0.08	0.25
Brewer's Sparrow	1.00	3.50	0.06	0.22	0.00	0.00	0.00	0.00
Vesper Sparrow	1.00	6.50	0.06	0.41	1.00	4.50	0.05	0.23

Species ^e	Hope Valley Lower (n = 16 survey stations)				Red Lake Creek (n = 20 survey stations)			
	Avg. No. of Birds Detected ^a		Avg. No. of Birds per Station ^b		Avg. No. of Birds Detected ^a		Avg. No. of Birds per Station ^b	
	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d
Savannah Sparrow	6.00	12.50	0.38	0.78	1.50	9.00	0.08	0.45
Song Sparrow	7.50	22.00	0.47	1.38	2.00	7.50	0.10	0.38
Lincoln's Sparrow	2.00	4.00	0.13	0.25	2.00	9.50	0.10	0.48
White-crowned Sparrow	3.00	12.00	0.19	0.75	3.00	13.50	0.15	0.68
Dark-eyed Junco	2.00	4.50	0.13	0.28	2.50	9.00	0.13	0.45
Black-headed Grosbeak	0.00	0.50	0.00	0.03	0.00	0.00	0.00	0.00
Red-winged Blackbird	12.00	44.50	0.75	2.78	13.50	49.00	0.68	2.45
Brewer's Blackbird	7.50	29.00	0.47	1.81	19.50	31.00	0.98	1.55
Brown-headed Cowbird	3.50	11.00	0.22	0.69	9.00	28.00	0.45	1.40
Purple Finch	0.00	1.00	0.00	0.06	0.50	1.50	0.03	0.08
Cassin's Finch	1.00	5.00	0.06	0.31	1.00	10.50	0.05	0.53
Unidentified <i>Carpodacus</i>								
Finch	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.03
Evening Grosbeak	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.03

^aResults are the absolute number of individuals detected at the meadow, averaged across two survey visits. ^bNumber of individual birds detected divided by the number of survey stations and visits. ^cOnly includes birds detected within 50m of a survey point. ^dAll birds detected regardless of distance from survey point. ^eMeadow focal species recorded in bold text

Table C-6. Number of birds detected during point counts at Hope Valley Upper, Faith Valley, and Upper Charity Valley.

Species ^e	Hope Valley Upper (n = 29 survey stations)				Faith Valley (n = 10, 12 survey stations)				Upper Charity Valley (n = 8 survey stations)			
	Avg. No. of Birds Detected ^a		Avg. No. of Birds per Station ^b		Avg. No. of Birds Detected ^a		Avg. No. of Birds per Station ^b		Avg. No. of Birds Detected ^a		Avg. No. of Birds per Station ^b	
	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d
Canada Goose	18.00	40.50	0.62	1.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mallard	6.50	13.50	0.22	0.47	0.00	1.00	0.00	0.09	0.00	0.50	0.00	0.06
Cinnamon Teal	0.00	0.50	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Green-winged Teal	0.00	2.00	0.00	0.07	0.00	1.50	0.00	0.14	0.00	0.00	0.00	0.00
Bufflehead	0.50	0.50	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Common Merganser	1.00	4.50	0.03	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mountain Quail	0.00	7.50	0.00	0.26	0.00	2.00	0.00	0.18	0.00	3.50	0.00	0.44
California Quail	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.05	0.00	0.00	0.00	0.00
Bald Eagle	0.50	1.00	0.02	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Killdeer	1.50	7.00	0.05	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Spotted Sandpiper	12.50	38.50	0.43	1.33	2.00	12.50	0.18	1.14	0.00	5.50	0.00	0.69
Wilson's Snipe	1.00	11.00	0.03	0.38	1.50	4.00	0.14	0.36	0.00	0.00	0.00	0.00
Williamson's Sapsucker	0.00	1.00	0.00	0.03	0.00	0.50	0.00	0.05	0.00	0.00	0.00	0.00
Red-breasted Sapsucker	0.00	1.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unidentified Sapsucker	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.05	0.00	0.00	0.00	0.00
Hairy Woodpecker	0.00	0.50	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
White-headed Woodpecker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.06
Northern Flicker	1.00	6.50	0.03	0.22	0.00	1.00	0.00	0.09	0.00	1.50	0.00	0.19
Unidentified Woodpecker	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.05	0.00	0.00	0.00	0.00
Olive-sided Flycatcher	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.06
Western Wood-Pewee	0.00	6.00	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.06
Hammond's Flycatcher	0.50	1.00	0.02	0.03	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.13
Dusky Flycatcher	4.00	8.50	0.14	0.29	5.50	15.50	0.50	1.41	4.00	10.00	0.50	1.25
Cassin's Vireo	0.50	1.50	0.02	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Species ^e	Hope Valley Upper (n = 29 survey stations)				Faith Valley (n = 10, 12 survey stations)				Upper Charity Valley (n = 8 survey stations)			
	Avg. No. of Birds Detected ^a		Avg. No. of Birds per Station ^b		Avg. No. of Birds Detected ^a		Avg. No. of Birds per Station ^b		Avg. No. of Birds Detected ^a		Avg. No. of Birds per Station ^b	
	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d
Hutton's Vireo	0.00	0.50	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Warbling Vireo	1.50	6.50	0.05	0.22	0.00	0.00	0.00	0.00	0.50	2.50	0.06	0.31
Steller's Jay	0.00	6.50	0.00	0.22	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.13
Clark's Nutcracker	0.50	4.50	0.02	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Common Raven	0.00	0.00	0.00	0.00	1.00	1.00	0.09	0.09	0.00	0.00	0.00	0.00
Tree Swallow	11.50	13.00	0.40	0.45	0.50	0.50	0.05	0.05	0.00	0.00	0.00	0.00
Cliff Swallow	9.50	13.50	0.33	0.47	0.50	0.50	0.05	0.05	0.00	0.00	0.00	0.00
Mountain Chickadee	5.00	20.00	0.17	0.69	0.00	13.50	0.00	1.23	0.00	6.50	0.00	0.81
Red-breasted Nuthatch	0.00	6.00	0.00	0.21	0.50	1.00	0.05	0.09	0.00	0.00	0.00	0.00
White-breasted Nuthatch	0.00	1.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Brown Creeper	0.00	0.50	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
House Wren	0.50	2.50	0.02	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ruby-crowned Kinglet	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.18	0.00	0.50	0.00	0.06
Mountain Bluebird	2.00	2.00	0.07	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Townsend's Solitaire	0.00	1.50	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hermit Thrush	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.09	0.00	0.00	0.00	0.00
American Robin	17.50	44.00	0.60	1.52	10.00	24.00	0.91	2.18	1.00	7.50	0.13	0.94
Yellow Warbler	2.00	5.00	0.07	0.17	4.50	12.50	0.41	1.14	0.00	0.00	0.00	0.00
Yellow-rumped Warbler	1.50	3.00	0.05	0.10	0.50	5.00	0.05	0.45	0.00	1.50	0.00	0.19
Hermit Warbler	0.00	0.50	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MacGillivray's Warbler	1.00	2.50	0.03	0.09	0.00	1.00	0.00	0.09	0.00	0.00	0.00	0.00
Wilson's Warbler	0.50	1.50	0.02	0.05	2.00	3.50	0.18	0.32	0.50	4.00	0.06	0.50
Western Tanager	0.00	1.50	0.00	0.05	0.00	0.50	0.00	0.05	0.00	0.00	0.00	0.00
Green-tailed Towhee	1.00	2.00	0.03	0.07	0.00	0.00	0.00	0.00	0.50	4.00	0.06	0.50
Chipping Sparrow	1.50	6.00	0.05	0.21	0.50	3.00	0.05	0.27	0.00	1.00	0.00	0.13
Brewer's Sparrow	0.50	0.50	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vesper Sparrow	4.50	16.50	0.16	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Species ^e	Hope Valley Upper (n = 29 survey stations)				Faith Valley (n = 10, 12 survey stations)				Upper Charity Valley (n = 8 survey stations)			
	Avg. No. of Birds Detected ^a		Avg. No. of Birds per Station ^b		Avg. No. of Birds Detected ^a		Avg. No. of Birds per Station ^b		Avg. No. of Birds Detected ^a		Avg. No. of Birds per Station ^b	
	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d
Savannah Sparrow	6.50	26.00	0.22	0.90	2.50	4.50	0.23	0.41	0.00	0.00	0.00	0.00
Fox Sparrow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	2.00	0.06	0.25
Song Sparrow	10.50	25.00	0.36	0.86	4.00	12.00	0.36	1.09	2.50	6.50	0.31	0.81
Lincoln's Sparrow	2.50	7.50	0.09	0.26	0.00	5.00	0.00	0.45	1.00	7.50	0.13	0.94
White-crowned Sparrow	7.00	36.50	0.24	1.26	6.50	15.50	0.59	1.41	5.50	21.00	0.69	2.63
Dark-eyed Junco	0.00	5.00	0.00	0.17	0.50	1.00	0.05	0.09	0.00	0.50	0.00	0.06
Unidentified Sparrow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.50	0.06	0.06
Lazuli Bunting	0.00	0.50	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Red-winged Blackbird	11.00	46.00	0.38	1.59	3.50	14.50	0.32	1.32	2.50	10.00	0.31	1.25
Brewer's Blackbird	19.00	44.00	0.66	1.52	5.00	13.50	0.45	1.23	2.00	3.50	0.25	0.44
Brown-headed Cowbird	5.00	13.00	0.17	0.45	1.50	7.00	0.14	0.64	0.00	2.00	0.00	0.25
Purple Finch	0.00	1.50	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cassin's Finch	3.50	11.50	0.12	0.40	2.50	10.00	0.23	0.91	1.50	6.00	0.19	0.75
Unidentified <i>Carpodacus</i> Finch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.06
Lesser Goldfinch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.06
Evening Grosbeak	0.00	0.00	0.00	0.00	0.00	1.50	0.00	0.14	0.00	0.50	0.00	0.06
Unidentified Bird	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.09	0.00	0.00	0.00	0.00

^aNumber of individuals detected at the meadow, averaged across two survey visits. ^bNumber of individual birds detected divided by the number of survey stations and visits. ^cOnly includes birds detected within 50m of a survey point. ^dAll birds detected regardless of distance from survey point.

^eMeadow focal species recorded in bold text.

Table C-7. Number of birds detected during point counts at Van Vleck Ranch and Wilson Ranch.

Species ^e	Van Vleck Ranch (n = 14 survey stations)				Wilson Ranch (n = 4 survey stations)			
	No. of Birds Detected ^a		Avg. No. of Birds per Station ^b		No. of Birds Detected ^a		Avg. No. of Birds per Station ^b	
	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d
Mountain Quail	0.00	6.00	0.00	0.43	0.00	5.00	0.00	1.25
Spotted Sandpiper	0.00	1.00	0.00	0.07	1.00	6.00	0.25	1.50
Vaux's Swift	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.50
Red-breasted Sapsucker	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.25
Hairy Woodpecker	1.00	1.00	0.07	0.07	0.00	0.00	0.00	0.00
White-headed Woodpecker	1.00	2.00	0.07	0.14	0.00	1.00	0.00	0.25
Northern Flicker	1.00	3.00	0.07	0.21	0.00	2.00	0.00	0.50
Pileated Woodpecker	0.00	2.00	0.00	0.14	0.00	0.00	0.00	0.00
Olive-sided Flycatcher	1.00	6.00	0.07	0.43	0.00	0.00	0.00	0.00
Western Wood-Pewee	0.00	9.00	0.00	0.64	0.00	4.00	0.00	1.00
Dusky Flycatcher	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.25
Cassin's Vireo	0.00	1.00	0.00	0.07	0.00	0.00	0.00	0.00
Warbling Vireo	1.00	5.00	0.07	0.36	0.00	1.00	0.00	0.25
Steller's Jay	2.00	21.00	0.14	1.50	0.00	4.00	0.00	1.00
Common Raven	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.50
Mountain Chickadee	1.00	15.00	0.07	1.07	1.00	13.00	0.25	3.25
Red-breasted Nuthatch	0.00	7.00	0.00	0.50	0.00	1.00	0.00	0.25
White-breasted Nuthatch	0.00	3.00	0.00	0.21	0.00	0.00	0.00	0.00
Brown Creeper	0.00	2.00	0.00	0.14	0.00	1.00	0.00	0.25
Golden-crowned Kinglet	1.00	2.00	0.07	0.14	0.00	0.00	0.00	0.00
Hermit Thrush	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.25
American Robin	4.00	13.00	0.29	0.93	0.00	2.00	0.00	0.50
Nashville Warbler	1.00	1.00	0.07	0.07	0.00	0.00	0.00	0.00
Yellow Warbler	0.00	1.00	0.00	0.07	0.00	0.00	0.00	0.00
Yellow-rumped Warbler	2.00	5.00	0.14	0.36	1.00	5.00	0.25	1.25
Hermit Warbler	0.00	2.00	0.00	0.14	0.00	1.00	0.00	0.25

Species ^e	Van Vleck Ranch (n = 14 survey stations)				Wilson Ranch (n = 4 survey stations)			
	No. of Birds Detected ^a		Avg. No. of Birds per Station ^b		No. of Birds Detected ^a		Avg. No. of Birds per Station ^b	
	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d	<50m ^c	Unlimited Radius ^d
MacGillivray's Warbler	3.00	3.00	0.21	0.21	0.00	0.00	0.00	0.00
Wilson's Warbler	4.00	6.00	0.29	0.43	0.00	0.00	0.00	0.00
Western Tanager	1.00	2.00	0.07	0.14	1.00	4.00	0.25	1.00
Green-tailed Towhee	2.00	7.00	0.14	0.50	0.00	0.00	0.00	0.00
Chipping Sparrow	0.00	0.00	0.00	0.00	1.00	5.00	0.25	1.25
Fox Sparrow	5.00	6.00	0.36	0.43	0.00	0.00	0.00	0.00
Song Sparrow	1.00	4.00	0.07	0.29	0.00	2.00	0.00	0.50
Lincoln's Sparrow	10.00	26.00	0.71	1.86	1.00	6.00	0.25	1.50
White-crowned Sparrow	2.00	9.00	0.14	0.64	1.00	3.00	0.25	0.75
Dark-eyed Junco	8.00	19.00	0.57	1.36	4.00	7.00	1.00	1.75
Red-winged Blackbird	8.00	16.00	0.57	1.14	0.00	0.00	0.00	0.00
Brewer's Blackbird	1.00	1.00	0.07	0.07	4.00	4.00	1.00	1.00
Brown-headed Cowbird	0.00	0.00	0.00	0.00	1.00	1.00	0.25	0.25
Evening Grosbeak	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.25

^aNumber of individuals detected at the meadow, averaged across two survey visits. ^bNumber of individual birds detected divided by the number of survey stations and visits. ^cOnly includes birds detected within 50m of a survey point. ^dAll birds detected regardless of distance from survey point.

^eMeadow focal species recorded in bold text.

Table C-8. Number of birds detected during point counts at Washoe S.P. Golf Course.

<i>Species^e</i>	<i>Washoe State Park Golf Course (n = 11 survey stations)</i>			
	<i>No. of Birds Detected^a</i>		<i>Avg. No. of Birds per Station^b</i>	
	<i><50m^c</i>	<i>Unlimited Radius^d</i>	<i><50m^c</i>	<i>Unlimited Radius^d</i>
Mallard	0.50	1.50	0.05	0.14
Northern Shoveler	0.00	0.50	0.00	0.05
Green-winged Teal	1.00	1.00	0.09	0.09
Common Merganser	0.50	0.50	0.05	0.05
Killdeer	0.00	0.50	0.00	0.05
Spotted Sandpiper	3.00	6.50	0.27	0.59
Mourning Dove	0.00	2.50	0.00	0.23
Belted Kingfisher	0.50	0.50	0.05	0.05
Hairy Woodpecker	0.00	0.50	0.00	0.05
Northern Flicker	0.50	3.50	0.05	0.32
Western Wood-Pewee	2.00	11.00	0.18	1.00
Cassin's Vireo	0.00	0.50	0.00	0.05
Warbling Vireo	0.00	0.50	0.00	0.05
Steller's Jay	2.00	17.00	0.18	1.55
Tree Swallow	0.00	0.50	0.00	0.05
Northern Rough-winged Swallow	0.50	0.50	0.05	0.05
Cliff Swallow	1.00	6.50	0.09	0.59
Barn Swallow	1.50	3.50	0.14	0.32
Mountain Chickadee	3.50	14.50	0.32	1.32
Brown Creeper	0.50	3.00	0.05	0.27
House Wren	0.00	0.50	0.00	0.05
American Dipper	3.50	3.50	0.32	0.32
American Robin	6.00	19.00	0.55	1.73
Yellow Warbler	0.50	1.50	0.05	0.14
Yellow-rumped Warbler	0.00	1.00	0.00	0.09
MacGillivray's Warbler	0.50	1.00	0.05	0.09
Savannah Sparrow	0.00	1.00	0.00	0.09
Song Sparrow	9.00	17.50	0.82	1.59
White-crowned Sparrow	1.00	1.50	0.09	0.14
Dark-eyed Junco	0.50	1.50	0.05	0.14
Black-headed Grosbeak	2.50	4.00	0.23	0.36
Red-winged Blackbird	1.00	10.00	0.09	0.91
Brewer's Blackbird	19.00	24.00	1.73	2.18
Brown-headed Cowbird	2.50	12.00	0.23	1.09
Cassin's Finch	0.50	1.00	0.05	0.09
Evening Grosbeak	0.00	1.50	0.00	0.14

^aNumber of individuals detected at the meadow. ^bNumber of individual birds detected divided by the number of survey stations and visits. ^cOnly includes birds detected within 50m of a survey point. ^dAll birds detected regardless of distance from survey point. ^eMeadow focal species recorded in bold text.

Appendix D. Mean number of individuals detected of each species encountered during area searches at each site

Table D-1. Average number of birds encountered during area searches at Blue Lakes Road/Hwy 88 (84 acres/ 34 hectares).

<i>Species^a</i>	<i>Avg. No. of Birds Detected</i>		
	<i>Meadow</i>	<i>Upland</i>	<i>Total</i>
Mallard	3.0	0.0	3.0
Ring-necked Duck	2.0	0.0	2.0
Bufflehead	1.0	0.0	1.0
Red-tailed Hawk	1.0	0.0	1.0
Killdeer	6.0	0.0	6.0
Wilson's Snipe	4.0	0.0	4.0
Northern Flicker	0.0	1.0	1.0
Western Wood-Pewee	0.0	2.0	2.0
Dusky Flycatcher	1.0	0.0	1.0
Cassin's Vireo	0.0	1.0	1.0
Steller's Jay	1.0	1.0	2.0
Clark's Nutcracker	0.0	2.0	2.0
Mountain Chickadee	0.0	4.0	4.0
House Wren	2.0	0.0	2.0
Mountain Bluebird	2.0	0.0	2.0
American Robin	3.5	3.0	6.5
Green-tailed Towhee	2.5	0.0	2.5
Vesper Sparrow	3.0	0.0	3.0
Savannah Sparrow	4.5	0.0	4.5
Song Sparrow	1.0	0.0	1.0
White-crowned Sparrow	3.0	0.0	3.0
Red-winged Blackbird	3.0	0.0	3.0
Brewer's Blackbird	7.5	1.0	8.5
Brown-headed Cowbird	4.0	2.0	6.0
Cassin's Finch	0.0	2.0	2.0

^aMeadow-associated focal species are indicated in bold text.

Table D-2. Average number of birds encountered during area searches at Burnside Lake Road (28 acres/ 12 hectares).

<i>Species^a</i>	<i>Avg. No. of Birds Detected</i>		
	<i>Meadow</i>	<i>Upland</i>	<i>Total</i>
Northern Flicker	0.0	2.0	2.0
Western Wood-Pewee	0.0	2.0	2.0
Hammond's Flycatcher	1.0	0.0	1.0
Dusky Flycatcher	1.5	0.5	2.0
Warbling Vireo	0.0	2.0	2.0
Clark's Nutcracker	0.0	2.0	2.0
Mountain Chickadee	0.0	4.0	4.0
Brown Creeper	0.0	1.0	1.0
Unidentified Thrush	0.0	1.0	1.0
American Robin	3.5	1.5	5.0
Yellow Warbler	1.0	0.0	1.0
Yellow-rumped Warbler	0.0	1.0	1.0
Black-throated Gray Warbler	0.0	1.0	1.0
Hermit Warbler	1.0	0.0	1.0
MacGillivray's Warbler	1.0	0.0	1.0
Western Tanager	0.0	1.0	1.0
Green-tailed Towhee	1.0	0.0	1.0
Chipping Sparrow	0.0	1.0	1.0
Song Sparrow	2.0	0.0	2.0
Lincoln's Sparrow	1.5	0.0	1.5
Dark-eyed Junco	1.0	1.5	2.5
Black-headed Grosbeak	0.0	2.0	2.0
Red-winged Blackbird	2.0	0.0	2.0
Brewer's Blackbird	2.0	0.0	2.0
Brown-headed Cowbird	0.0	2.0	2.0
Cassin's Finch	0.0	1.0	1.0

^aMeadow-associated focal species are indicated in bold text.

Table D-3. Average number of birds detected during area searches at Clover Valley (57 acres/ 23 hectares).

<i>Species^a</i>	<i>Avg. No. of Birds Detected</i>		
	<i>Meadow</i>	<i>Upland</i>	<i>Total</i>
Mountain Quail	0.0	2.0	2.0
Great Blue Heron	1.0	0.0	1.0
Unidentified Woodpecker	0.0	1.0	1.0
Red-breasted Sapsucker	0.0	1.0	1.0
Western Wood-Pewee	0.0	2.5	2.5
Dusky Flycatcher	1.5	1.5	3.0
Warbling Vireo	2.0	4.0	6.0
Clark's Nutcracker	0.0	1.0	1.0
Mountain Chickadee	2.5	5.5	8.0
Red-breasted Nuthatch	0.0	2.0	2.0
Brown Creeper	0.0	1.0	1.0
Golden-crowned Kinglet	0.0	1.0	1.0
Hermit Thrush	0.0	1.5	1.5
American Robin	4.5	3.5	8.0
Orange-crowned Warbler	1.0	0.0	1.0
Yellow Warbler	1.0	0.0	1.0
Yellow-rumped Warbler	1.5	5.0	6.5
Hermit Warbler	1.0	3.0	4.0
Wilson's Warbler	2.0	0.0	2.0
Green-tailed Towhee	1.0	0.0	1.0
Chipping Sparrow	1.5	2.5	4.0
Song Sparrow	2.5	0.5	3.0
Lincoln's Sparrow	4.5	0.5	5.0
White-crowned Sparrow	7.0	3.0	10.0
Dark-eyed Junco	7.0	9.0	16.0
Cassin's Finch	1.0	3.0	4.0
Pine Siskin	1.0	1.0	2.0

^aMeadow-associated focal species are indicated in bold text.

Table D-4. Average number of birds encountered during area searches at Border Ruffian Flat (29 acres/ 12 hectares).

<i>Species^a</i>	<i>Avg. No. of Birds Detected</i>		
	<i>Meadow</i>	<i>Upland</i>	<i>Total</i>
Mallard	2.0	0.0	2.0
Williamson's Sapsucker	1.0	1.0	2.0
Dusky Flycatcher	2.0	1.5	3.5
Steller's Jay	0.0	1.0	1.0
Clark's Nutcracker	0.0	1.5	1.5
Mountain Chickadee	1.0	2.0	3.0
Hermit Thrush	0.0	2.0	2.0
American Robin	10.5	1.0	11.5
Yellow Warbler	0.0	2.0	2.0
Yellow-rumped Warbler	1.0	1.0	2.0
MacGillivray's Warbler	1.0	0.0	1.0
Wilson's Warbler	2.0	0.0	2.0
Western Tanager	0.0	2.0	2.0
Green-tailed Towhee	0.5	0.5	1.0
Fox Sparrow	1.0	1.0	2.0
Lincoln's Sparrow	4.0	0.0	4.0
White-crowned Sparrow	11.5	0.5	12.0
Dark-eyed Junco	2.0	1.0	3.0
Cassin's Finch	0.5	5.5	6.0
Pine Siskin	1.0	1.0	2.0
Lesser Goldfinch	0.0	1.0	1.0

^aMeadow-associated focal species are indicated in bold text.

Table D-5. Average number of birds encountered during area searches at Foster Meadow (25 acres/ 10 hectares).

Species ^a	Avg. No. of Birds Detected		
	Meadow	Upland	Total
Mountain Quail	0.0	1.5	1.5
Mourning Dove	0.0	1.0	1.0
Unidentified Owl	0.0	1.0	1.0
Red-breasted Sapsucker	0.0	1.0	1.0
White-headed Woodpecker	0.0	1.0	1.0
Olive-sided Flycatcher	0.0	1.0	1.0
Steller's Jay	0.0	2.0	2.0
Mountain Chickadee	0.0	2.5	2.5
Red-breasted Nuthatch	0.0	2.0	2.0
Golden-crowned Kinglet	0.0	2.0	2.0
Ruby-crowned Kinglet	0.0	1.0	1.0
Hermit Thrush	0.0	1.0	1.0
American Robin	3.0	0.5	3.5
Orange-crowned Warbler	1.0	0.0	1.0
Nashville Warbler	2.0	0.0	2.0
Yellow-rumped Warbler	0.5	3.0	3.5
Wilson's Warbler	1.0	1.0	2.0
Western Tanager	0.0	2.0	2.0
Song Sparrow	3.0	1.0	4.0
Lincoln's Sparrow	3.5	0.0	3.5
Dark-eyed Junco	7.5	0.5	8.0
Brown-headed Cowbird	1.0	0.0	1.0
Purple Finch	0.0	1.0	1.0
Pine Siskin	0.0	1.0	1.0

^aMeadow-associated focal species are indicated in bold text.

Table D-6. Average number of birds encountered during area searches at Sand Shed (10 acres/ 4 hectares).

<i>Species^a</i>	<i>Avg. No. of Birds Detected</i>		
	<i>Meadow</i>	<i>Upland</i>	<i>Total</i>
Unidentified Hawk	1.0	0.0	1.0
Band-tailed Pigeon	0.0	1.0	1.0
Red-breasted Sapsucker	1.5	0.0	1.5
Hairy Woodpecker	0.0	1.0	1.0
Western Wood-Pewee	0.0	3.0	3.0
Dusky Flycatcher	0.0	1.0	1.0
Warbling Vireo	2.0	2.0	4.0
Steller's Jay	0.0	2.0	2.0
Common Raven	0.0	1.0	1.0
Mountain Chickadee	0.0	3.0	3.0
Red-breasted Nuthatch	0.0	1.0	1.0
Golden-crowned Kinglet	0.0	1.0	1.0
American Robin	1.0	1.5	2.5
Orange-crowned Warbler	2.0	0.0	2.0
Yellow-rumped Warbler	0.0	4.0	4.0
MacGillivray's Warbler	1.0	0.0	1.0
Western Tanager	0.0	1.0	1.0
Fox Sparrow	0.0	1.0	1.0
Lincoln's Sparrow	2.0	0.0	2.0
Dark-eyed Junco	3.5	3.5	7.0
Pine Grosbeak	0.0	2.0	2.0
Pine Siskin	0.0	3.0	3.0

^aMeadow-associated focal species are indicated in bold text.

Table D-7. Average number of birds encountered during area searches at Hope Valley Lower (459 acres/ 186 hectares).

<i>Species^a</i>	<i>Avg. No. of Birds Detected</i>		
	<i>Meadow</i>	<i>Upland</i>	<i>Total</i>
Mallard	6.0	0.0	6.0
Green-winged Teal	3.0	0.0	3.0
Common Merganser	3.0	0.0	3.0
Mountain Quail	2.0	1.0	3.0
California Quail	3.0	0.5	3.5
Great Blue Heron	1.0	0.0	1.0
Red-tailed Hawk	0.5	1.0	1.5
Sora	1.0	0.0	1.0
Killdeer	10.0	0.0	10.0
Spotted Sandpiper	13.0	0.0	13.0
Wilson's Snipe	14.0	0.0	14.0
Hairy Woodpecker	0.0	1.0	1.0
Northern Flicker	1.5	2.5	4.0
Western Wood-Pewee	0.5	4.0	4.5
Dusky Flycatcher	1.0	2.0	3.0
Steller's Jay	0.0	3.0	3.0
Clark's Nutcracker	0.5	3.0	3.5
Common Raven	2.0	0.0	2.0
Tree Swallow	2.0	0.0	2.0
Cliff Swallow	65.5	5.0	70.5
Mountain Chickadee	1.5	3.5	5.0
Red-breasted Nuthatch	0.0	1.0	1.0
House Wren	1.0	0.5	1.5
Mountain Bluebird	2.5	0.0	2.5
American Robin	21.5	7.5	29.0
European Starling	6.0	1.0	7.0
Yellow Warbler	8.0	0.0	8.0
Yellow-rumped Warbler	0.0	2.0	2.0
Wilson's Warbler	2.0	0.0	2.0
Green-tailed Towhee	1.5	2.0	3.5
Spotted Towhee	1.0	0.0	1.0
California Towhee	2.0	0.0	2.0
Brewer's Sparrow	2.0	0.0	2.0
Vesper Sparrow	4.0	0.0	4.0
Savannah Sparrow	9.0	0.0	9.0
Song Sparrow	20.0	0.0	20.0
Lincoln's Sparrow	3.5	0.5	4.0
White-crowned Sparrow	12.5	1.0	13.5
Dark-eyed Junco	2.0	1.5	3.5
Red-winged Blackbird	25.0	0.0	25.0
Brewer's Blackbird	34.0	5.0	39.0

<i>Species^a</i>	<i>Avg. No. of Birds Detected</i>		
	<i>Meadow</i>	<i>Upland</i>	<i>Total</i>
Brown-headed Cowbird	4.0	2.5	6.5
Cassin's Finch	2.0	2.5	4.5
Evening Grosbeak	0.0	2.0	2.0

^aMeadow-associated focal species are indicated in bold text.

Table D-8. Average number of birds encountered during area searches at Red Lake Creek (283 acres/ 114 hectares).

<i>Species^a</i>	<i>Avg. No. of Birds Detected</i>		
	<i>Meadow</i>	<i>Upland</i>	<i>Total</i>
Canada Goose	4.0	0.0	4.0
Mallard	16.0	0.0	16.0
Green-winged Teal	1.0	0.0	1.0
Sooty Grouse	0.0	1.0	1.0
Mountain Quail	0.0	2.0	2.0
Killdeer	3.5	0.0	3.5
Spotted Sandpiper	9.0	0.0	9.0
Wilson's Snipe	2.5	0.0	2.5
Red-breasted Sapsucker	0.0	1.0	1.0
Northern Flicker	0.5	2.5	3.0
Western Wood-Pewee	0.5	2.5	3.0
Hammond's Flycatcher	0.0	1.0	1.0
Dusky Flycatcher	2.0	4.5	6.5
Cassin's Vireo	0.0	2.0	2.0
Warbling Vireo	0.0	1.0	1.0
Clark's Nutcracker	0.0	5.0	5.0
Common Raven	1.0	0.0	1.0
Tree Swallow	5.0	0.0	5.0
Cliff Swallow	30.0	0.0	30.0
Mountain Chickadee	0.5	9.5	10.0
Red-breasted Nuthatch	0.0	4.0	4.0
Mountain Bluebird	1.5	0.0	1.5
Townsend's Solitaire	0.0	3.0	3.0
American Robin	20.0	10.5	30.5
Yellow-rumped Warbler	0.0	4.0	4.0
Hermit Warbler	0.0	2.0	2.0
Wilson's Warbler	1.0	0.0	1.0
Western Tanager	0.0	2.0	2.0
Green-tailed Towhee	3.0	3.0	6.0
Chipping Sparrow	1.5	0.5	2.0
Vesper Sparrow	3.0	0.0	3.0
Savannah Sparrow	2.5	0.0	2.5
Song Sparrow	4.0	0.0	4.0
Lincoln's Sparrow	3.5	0.0	3.5
White-crowned Sparrow	10.0	2.5	12.5
Dark-eyed Junco	2.5	8.5	11.0
Red-winged Blackbird	20.5	1.0	21.5
Western Meadowlark	1.0	0.0	1.0
Brewer's Blackbird	21.5	3.0	24.5
Brown-headed Cowbird	9.0	2.5	11.5
Cassin's Finch	1.0	3.0	4.0

^aMeadow-associated focal species are indicated in bold text.

Table D-9. Average number of birds encountered during area searches at Hope Valley Upper (461 acres/ 187 hectares).

Species ^a	Avg. No. of Birds Detected		
	Meadow	Upland	Total
Canada Goose	39.0	0.0	39.0
Mallard	5.5	0.0	5.5
Green-winged Teal	3.5	0.0	3.5
Ring-necked Duck	2.0	0.0	2.0
Bufflehead	1.0	0.0	1.0
Common Merganser	7.0	0.0	7.0
Mountain Quail	0.0	1.0	1.0
Turkey Vulture	2.0	0.0	2.0
Bald Eagle	1.0	0.0	1.0
Red-tailed Hawk	1.0	0.0	1.0
American Kestrel	0.0	1.0	1.0
Killdeer	4.5	0.0	4.5
Spotted Sandpiper	29.0	0.0	29.0
Wilson's Snipe	5.0	0.0	5.0
Calliope Hummingbird	0.0	1.0	1.0
Williamson's Sapsucker	0.0	1.5	1.5
Red-breasted Sapsucker	0.0	1.5	1.5
White-headed Woodpecker	0.0	1.0	1.0
Northern Flicker	1.5	1.5	3.0
Western Wood-Pewee	2.0	6.0	8.0
Hammond's Flycatcher	0.0	1.0	1.0
Gray Flycatcher	0.0	2.0	2.0
Dusky Flycatcher	6.0	2.5	8.5
Cassin's Vireo	1.0	1.0	2.0
Warbling Vireo	5.0	14.0	19.0
Steller's Jay	0.0	6.5	6.5
Clark's Nutcracker	1.5	6.5	8.0
Tree Swallow	2.0	0.0	2.0
Violet-green Swallow	1.0	0.0	1.0
Northern Rough-winged Swallow	2.0	0.0	2.0
Cliff Swallow	33.0	0.0	33.0
Mountain Chickadee	6.0	14.0	20.0
Red-breasted Nuthatch	0.0	2.0	2.0
White-breasted Nuthatch	0.0	4.0	4.0
Brown Creeper	0.0	1.0	1.0
House Wren	0.0	1.0	1.0
Golden-crowned Kinglet	0.0	1.0	1.0
Mountain Bluebird	5.5	0.0	5.5

Species ^a	Avg. No. of Birds Detected		
	Meadow	Upland	Total
Townsend's Solitaire	0.0	1.0	1.0
American Robin	45.5	10.5	56.0
Orange-crowned Warbler	0.0	1.0	1.0
Yellow Warbler	9.0	0.0	9.0
Yellow-rumped Warbler	1.5	3.0	4.5
MacGillivray's Warbler	2.0	1.5	3.5
Wilson's Warbler	2.0	1.5	3.5
Western Tanager	0.0	2.0	2.0
Green-tailed Towhee	1.0	2.5	3.5
Chipping Sparrow	1.0	3.0	4.0
Brewer's Sparrow	0.0	2.0	2.0
Vesper Sparrow	4.5	0.0	4.5
Savannah Sparrow	16.0	0.5	16.5
Fox Sparrow	0.0	2.0	2.0
Song Sparrow	18.5	0.0	18.5
Lincoln's Sparrow	2.5	0.0	2.5
White-crowned Sparrow	16.5	1.0	17.5
Dark-eyed Junco	5.5	11.0	16.5
Red-winged Blackbird	24.0	0.0	24.0
Brewer's Blackbird	40.5	0.5	41.0
Brown-headed Cowbird	11.0	1.5	12.5
Cassin's Finch	3.5	5.5	9.0

^aMeadow-associated focal species are indicated in bold text.

Table D-10. Average number of birds encountered during area searches at Faith Valley (214 acres/ 87 hectares).

Species ^a	Avg. No. of Birds Detected		
	Meadow	Upland	Total
Mallard	4.0	0.0	4.0
Green-winged Teal	2.0	0.0	2.0
Common Merganser	1.0	0.0	1.0
Mountain Quail	0.0	2.0	2.0
Spotted Sandpiper	7.5	0.0	7.5
Wilson's Snipe	2.0	0.0	2.0
Hammond's Flycatcher	2.0	0.0	2.0
Dusky Flycatcher	8.0	0.0	8.0
Steller's Jay	0.0	5.0	5.0
Clark's Nutcracker	0.0	2.0	2.0
Common Raven	0.5	0.5	1.0
Tree Swallow	4.0	0.0	4.0
Violet-green Swallow	2.0	0.0	2.0
Cliff Swallow	5.0	0.0	5.0
Mountain Chickadee	2.0	9.5	11.5
Red-breasted Nuthatch	0.5	1.0	1.5
House Wren	0.0	1.0	1.0
Ruby-crowned Kinglet	0.0	2.0	2.0
Townsend's Solitaire	0.0	1.0	1.0
American Robin	14.5	4.5	19.0
Yellow Warbler	12.5	0.0	12.5
Yellow-rumped Warbler	4.5	0.5	5.0
Wilson's Warbler	6.0	0.5	6.5
Western Tanager	1.0	0.0	1.0
Chipping Sparrow	1.0	1.0	2.0
Savannah Sparrow	6.5	0.0	6.5
Song Sparrow	13.0	0.0	13.0
Lincoln's Sparrow	7.0	0.0	7.0
White-crowned Sparrow	14.0	1.0	15.0
Dark-eyed Junco	1.0	3.0	4.0
Red-winged Blackbird	9.0	0.0	9.0
Brewer's Blackbird	20.0	1.0	21.0
Brown-headed Cowbird	8.5	1.0	9.5
Cassin's Finch	1.0	5.5	6.5
Pine Siskin	0.0	3.0	3.0
Evening Grosbeak	0.0	2.0	2.0

^aMeadow-associated focal species are indicated in bold text.

Table D-11. Average number of birds encountered during area searches at Upper Charity Valley (94 acres/ 38 hectares).

Species ^a	Avg. No. of Birds Detected		
	Meadow	Upland	Total
Mallard	2.0	0.0	2.0
Mountain Quail	0.0	5.0	5.0
Spotted Sandpiper	4.5	0.0	4.5
Wilson's Snipe	1.0	0.0	1.0
Calliope Hummingbird	1.0	0.0	1.0
Northern Flicker	0.0	2.0	2.0
Olive-sided Flycatcher	0.0	1.0	1.0
Hammond's Flycatcher	2.0	1.0	3.0
Dusky Flycatcher	14.0	8.0	22.0
Warbling Vireo	0.5	0.5	1.0
Tree Swallow	0.0	2.0	2.0
Cliff Swallow	2.0	0.0	2.0
Mountain Chickadee	1.0	7.0	8.0
Ruby-crowned Kinglet	0.0	1.0	1.0
American Robin	7.5	2.0	9.5
Yellow Warbler	3.0	0.0	3.0
Yellow-rumped Warbler	0.0	3.0	3.0
Wilson's Warbler	9.0	0.0	9.0
Western Tanager	0.0	1.0	1.0
Green-tailed Towhee	3.5	1.0	4.5
Chipping Sparrow	1.0	1.0	2.0
Fox Sparrow	3.0	0.0	3.0
Song Sparrow	7.0	0.0	7.0
Lincoln's Sparrow	8.5	0.5	9.0
White-crowned Sparrow	14.5	1.5	16.0
Dark-eyed Junco	0.0	3.0	3.0
Red-winged Blackbird	10.0	0.0	10.0
Brewer's Blackbird	8.0	0.0	8.0
Brown-headed Cowbird	4.0	1.0	5.0
Cassin's Finch	0.5	2.5	3.0

^aMeadow-associated focal species are indicated in bold text.

Table D-12. Average number of birds encountered during area searches at Indian Valley (272 acres/ 110 hectares).

Species ^a	Avg. No. of Birds Detected		
	Meadow	Upland	Total
Mountain Quail	0.0	5.0	5.0
Red-tailed Hawk	0.0	2.0	2.0
Spotted Sandpiper	1.0	0.0	1.0
Hammond's Flycatcher	1.0	0.0	1.0
Dusky Flycatcher	6.0	0.0	6.0
Warbling Vireo	1.0	1.0	2.0
Steller's Jay	0.0	1.0	1.0
Clark's Nutcracker	2.0	3.0	5.0
Hermit Thrush	0.0	3.0	3.0
American Robin	13.0	4.0	17.0
Orange-crowned Warbler	4.0	0.0	4.0
Yellow Warbler	3.0	0.0	3.0
Yellow-rumped Warbler	0.0	5.0	5.0
MacGillivray's Warbler	3.0	1.0	4.0
Wilson's Warbler	10.0	0.0	10.0
Brewer's Sparrow	2.0	0.0	2.0
Fox Sparrow	2.0	0.0	2.0
Song Sparrow	1.0	0.0	1.0
Lincoln's Sparrow	10.0	1.0	11.0
White-crowned Sparrow	33.0	8.0	41.0
Dark-eyed Junco	5.0	9.0	14.0
Brown-headed Cowbird	0.0	1.0	1.0
Cassin's Finch	0.0	4.0	4.0

^aMeadow-associated focal species are indicated in bold text.

Table D-13. Average number of birds encountered during area searches at Indian Valley West Wilderness (34 acres/ 14 hectares).

Species ^a	Avg. No. of Birds Detected		
	Meadow	Upland	Total
Mountain Quail	0.0	1.0	1.0
Red-tailed Hawk	1.0	0.0	1.0
Williamson's Sapsucker	0.0	1.0	1.0
Dusky Flycatcher	2.0	0.0	2.0
Steller's Jay	0.0	3.0	3.0
Mountain Chickadee	0.0	3.0	3.0
Brown Creeper	0.0	1.0	1.0
American Robin	1.0	2.0	3.0
Yellow-rumped Warbler	0.0	1.0	1.0
Wilson's Warbler	2.0	1.0	3.0
Chipping Sparrow	1.0	2.0	3.0
Fox Sparrow	1.0	0.0	1.0
Lincoln's Sparrow	4.0	0.0	4.0
White-crowned Sparrow	10.0	3.0	13.0
Dark-eyed Junco	1.0	4.0	5.0
Black-headed Grosbeak	0.0	1.0	1.0
Cassin's Finch	0.0	4.0	4.0
Pine Siskin	0.0	2.0	2.0

^aMeadow-associated focal species are indicated in bold text.

Table D-14. Average number of birds encountered during area searches at Little Indian Valley (37 acres/ 15 hectares).

Species ^a	Avg. No. of Birds Detected		
	Meadow	Upland	Total
Mountain Quail	0.0	1.0	1.0
Spotted Sandpiper	1.0	0.0	1.0
Dusky Flycatcher	0.0	2.0	2.0
Warbling Vireo	0.0	2.0	2.0
Mountain Chickadee	0.0	5.0	5.0
Red-breasted Nuthatch	0.0	2.0	2.0
Hermit Thrush	0.0	1.0	1.0
American Robin	2.0	4.0	6.0
Yellow-rumped Warbler	0.0	4.0	4.0
Hermit Warbler	0.0	1.0	1.0
Chipping Sparrow	3.0	1.0	4.0
Lincoln's Sparrow	1.0	1.0	2.0
White-crowned Sparrow	4.0	1.0	5.0
Dark-eyed Junco	2.0	5.0	7.0
Pine Siskin	2.0	0.0	2.0

^aMeadow-associated focal species are indicated in bold text.

Table D-15. Average number of birds detected during area searches at Van Vleck Ranch (116 acres/ 47 hectares).

Species ^a	Avg. No. of Birds Detected		
	Meadow	Upland	Total
Mountain Quail	0.0	3.0	3.0
Red-tailed Hawk	0.0	1.0	1.0
Spotted Sandpiper	1.0	0.0	1.0
Anna's Hummingbird	2.0	0.0	2.0
Calliope Hummingbird	2.0	0.0	2.0
Rufous Hummingbird	1.0	0.0	1.0
Red-breasted Sapsucker	1.0	0.0	1.0
Hairy Woodpecker	1.0	0.0	1.0
White-headed Woodpecker	0.0	1.0	1.0
Northern Flicker	3.0	1.0	4.0
Olive-sided Flycatcher	0.0	4.0	4.0
Western Wood-Pewee	2.0	6.0	8.0
Cassin's Vireo	0.0	1.0	1.0
Warbling Vireo	7.0	1.0	8.0
Steller's Jay	3.0	11.0	14.0
Mountain Chickadee	2.0	7.0	9.0
Red-breasted Nuthatch	0.0	3.0	3.0
White-breasted Nuthatch	0.0	3.0	3.0
Brown Creeper	0.0	1.0	1.0
Golden-crowned Kinglet	0.0	3.0	3.0
Hermit Thrush	0.0	5.0	5.0
American Robin	10.0	8.0	18.0
Nashville Warbler	6.0	0.0	6.0
Yellow-rumped Warbler	0.0	5.0	5.0
Hermit Warbler	0.0	1.0	1.0
MacGillivray's Warbler	3.0	6.0	9.0
Wilson's Warbler	7.0	0.0	7.0
Green-tailed Towhee	9.0	1.0	10.0
Fox Sparrow	1.0	1.0	2.0
Song Sparrow	6.0	0.0	6.0
Lincoln's Sparrow	23.0	1.0	24.0
White-crowned Sparrow	14.0	2.0	16.0
Dark-eyed Junco	9.0	6.0	15.0
Black-headed Grosbeak	1.0	0.0	1.0
Red-winged Blackbird	16.0	0.0	16.0
Brewer's Blackbird	29.0	0.0	29.0

^aMeadow-associated focal species are indicated in bold text.

Table D-16. Average number of birds detected during area searches at Upper Wilson Ranch (84 acres/ 34 hectares).

Species ^a	Avg. No. of Birds Detected		
	Meadow	Upland	Total
Mountain Quail	0.0	2.0	2.0
Red-tailed Hawk	0.0	1.0	1.0
American Kestrel	0.0	1.0	1.0
Spotted Sandpiper	3.0	0.0	3.0
Vaux's Swift	2.0	0.0	2.0
White-headed Woodpecker	1.0	0.0	1.0
Northern Flicker	0.0	1.0	1.0
Western Wood-Pewee	0.0	3.0	3.0
Warbling Vireo	1.0	2.0	3.0
Steller's Jay	0.0	3.0	3.0
Tree Swallow	2.0	0.0	2.0
Mountain Chickadee	12.0	0.0	12.0
Red-breasted Nuthatch	0.0	1.0	1.0
Yellow-rumped Warbler	0.0	2.0	2.0
Wilson's Warbler	1.0	0.0	1.0
Western Tanager	0.0	2.0	2.0
Chipping Sparrow	2.0	0.0	2.0
Song Sparrow	2.0	0.0	2.0
Lincoln's Sparrow	6.0	0.0	6.0
White-crowned Sparrow	2.0	0.0	2.0
Dark-eyed Junco	7.0	7.0	14.0
Brewer's Blackbird	4.0	0.0	4.0

^aMeadow-associated focal species are indicated in bold text.

Table D-17. Average number of birds detected during area searches at Washoe State Park Golf Course (84 acres/ 34 hectares).

Species ^a	Avg. No. of Birds Detected		
	Meadow	Upland	Total
Canada Goose	1.0	0.0	1.0
Mallard	2.0	0.0	2.0
Common Merganser	1.0	0.0	1.0
Killdeer	1.0	0.0	1.0
Spotted Sandpiper	5.0	0.0	5.0
Mourning Dove	0.0	3.5	3.5
Belted Kingfisher	0.0	1.0	1.0
Northern Flicker	2.0	0.5	2.5
Western Wood-Pewee	3.5	8.5	12.0
Cassin's Vireo	0.0	1.0	1.0
Warbling Vireo	1.0	0.0	1.0
Steller's Jay	6.0	14.5	20.5
Common Raven	1.0	1.0	2.0
Tree Swallow	1.0	0.0	1.0
Northern Rough-winged Swallow	1.0	0.0	1.0
Cliff Swallow	8.5	0.5	9.0
Barn Swallow	8.0	0.0	8.0
Mountain Chickadee	6.0	6.5	12.5
Brown Creeper	0.5	2.5	3.0
House Wren	1.0	0.0	1.0
American Dipper	3.0	0.5	3.5
American Robin	18.0	4.5	22.5
Orange-crowned Warbler	1.0	0.0	1.0
Yellow Warbler	2.0	0.0	2.0
Yellow-rumped Warbler	0.0	1.5	1.5
Wilson's Warbler	1.0	0.0	1.0
Savannah Sparrow	2.5	0.0	2.5
Song Sparrow	14.5	0.0	14.5
White-crowned Sparrow	3.0	0.0	3.0
Dark-eyed Junco	1.0	5.0	6.0
Black-headed Grosbeak	3.0	1.5	4.5
Red-winged Blackbird	8.5	0.0	8.5
Brewer's Blackbird	10.5	9.0	19.5
Brown-headed Cowbird	4.5	6.0	10.5
Cassin's Finch	1.0	1.0	2.0
Lesser Goldfinch	0.0	1.0	1.0
Evening Grosbeak	2.0	1.0	3.0

^aMeadow-associated focal species are indicated in bold text.

**APPENDIX E. All bird species detected during point counts or area searches at
each meadow**

Appendix E. All bird species detected during point counts or area searches at each meadow.

Species	No. Of Meadows With Detections	Blue Lakes Road/Hwy88	Border Ruffian Flat	Burnside Road	Clover Valley	Faith Valley	Foster Meadow	Hope Valley Lower	Hope Valley Upper	Indian Valley	Indian Valley W. Wilderness	Little Indian Valley	Red Lake Creek	Sand Shed	Upper Charity Valley	Upper Wilson Ranch	Van Vleck Ranch	Washoe S.P. Golf Course
Canada Goose	3								X				X					X
Mallard	8	X	X			X		X	X				X		X			X
Cinnamon Teal	1								X									
Northern Shoveler	1																	X
Green-winged Teal	5					X		X	X				X					X
Ring-necked Duck	2	X							X									
Bufflehead	2	X							X									
Common Merganser	4					X		X	X									X
Sooty Grouse	1												X					
Mountain Quail	15	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	
California Quail	3					X		X					X					
Great Blue Heron	2				X			X										
Turkey Vulture	1								X									
Osprey	1												X					
Bald Eagle	3							X	X				X					
Cooper's Hawk	1						X											
Red-tailed Hawk	9	X					X	X	X	X	X		X			X	X	
Unidentified Hawk	1													X				
American Kestrel	2								X							X		
Sora	1							X										
Killdeer	5	X						X	X				X					X
Spotted Sandpiper	12	X		X		X		X	X	X		X	X		X	X	X	X

Species	No. Of Meadows With Detections	Blue Lakes Road/Hwy88	Border Ruffian Flat	Burnside Road	Clover Valley	Faith Valley	Foster Meadow	Hope Valley Lower	Hope Valley Upper	Indian Valley	Indian Valley W. Wilderness	Little Indian Valley	Red Lake Creek	Sand Shed	Upper Charity Valley	Upper Wilson Ranch	Van Vleck Ranch	Washoe S.P. Golf Course
Wilson's Snipe	7	X				X		X	X				X		X			
Wilson's Phalarope	1	X																
Band-tailed Pigeon	2						X							X				
Mourning Dove	2						X											X
Northern Pygmy-Owl	1						X											
Unidentified Owl	1						X											
Vaux's Swift	1															X		
Anna's Hummingbird	2				X												X	
Calliope Hummingbird	3								X						X		X	
Rufous Hummingbird	1																X	
Belted Kingfisher	1																	X
Williamson's Sapsucker	4		X			X			X		X							
Red-breasted Sapsucker	8	X			X		X		X				X	X		X	X	
Unidentified Sapsucker	1					X												
Hairy Woodpecker	8		X				X	X	X				X	X			X	X
White-headed Woodpecker	5						X		X						X	X	X	
Northern Flicker	12	X		X		X	X	X	X	X			X		X	X	X	X
Pileated Woodpecker	2												X				X	
Unidentified Woodpecker	3				X	X								X				
Olive-sided Flycatcher	4						X	X							X		X	
Western Wood-Pewee	13	X		X	X		X	X	X	X			X	X	X	X	X	X
Hammond's Flycatcher	10		X	X	X	X		X	X	X		X	X		X			

Species	No. Of Meadows With Detections	Blue Lakes Road/Hwy88	Border Ruffian Flat	Burnside Road	Clover Valley	Faith Valley	Foster Meadow	Hope Valley Lower	Hope Valley Upper	Indian Valley	Indian Valley W. Wilderness	Little Indian Valley	Red Lake Creek	Sand Shed	Upper Charity Valley	Upper Wilson Ranch	Van Vleck Ranch	Washoe S.P. Golf Course
Gray Flycatcher	1								X									
Dusky Flycatcher	14	X	X	X	X	X		X	X	X	X	X	X	X	X	X		
Cassin's Vireo	7	X		X				X	X				X				X	X
Hutton's Vireo	1								X									
Warbling Vireo	12			X	X			X	X	X		X	X	X	X	X	X	X
Steller's Jay	16	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Clark's Nutcracker	11	X	X	X	X	X		X	X	X	X	X	X					
Common Raven	7			X		X		X					X	X		X		X
Tree Swallow	7					X		X	X				X		X	X		X
Violet-green Swallow	2					X			X									
Northern Rough-winged Swallow	3	X							X									X
Cliff Swallow	7	X				X		X	X				X		X			X
Barn Swallow	2												X					X
Mountain Chickadee	17	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Red-breasted Nuthatch	13	X	X		X	X	X	X	X		X	X	X	X		X	X	
White-breasted Nuthatch	3				X				X								X	
Pygmy Nuthatch	1												X					
Brown Creeper	11		X	X	X		X		X		X	X		X		X	X	X
House Wren	7	X				X	X	X	X				X					X
American Dipper	1																	X
Golden-crowned Kinglet	6				X		X		X				X	X			X	
Ruby-crowned Kinglet	4					X	X						X		X			

Species	No. Of Meadows With Detections	Blue Lakes Road/Hwy88	Border Ruffian Flat	Burnside Road	Clover Valley	Faith Valley	Foster Meadow	Hope Valley Lower	Hope Valley Upper	Indian Valley	Indian Valley W. Wilderness	Little Indian Valley	Red Lake Creek	Sand Shed	Upper Charity Valley	Upper Wilson Ranch	Van Vleck Ranch	Washoe S.P. Golf Course
Blue-gray Gnatcatcher	1							X										
Western Bluebird	1							X										
Mountain Bluebird	4	X						X	X				X					
Townsend's Solitaire	6	X	X			X			X				X	X				
Hermit Thrush	9		X		X	X	X			X		X	X			X	X	
Unidentified Thrush	1			X														
American Robin	17	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
European Starling	1							X										
Orange-crowned Warbler	7			X	X		X		X	X				X				X
Nashville Warbler	4				X		X			X							X	
Yellow Warbler	11		X	X	X	X		X	X	X			X		X		X	X
Yellow-rumped Warbler	16		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Black-throated Gray Warbler	1			X														
Hermit Warbler	8			X	X				X			X	X	X		X	X	
MacGillivray's Warbler	10		X	X		X		X	X	X	X			X			X	X
Wilson's Warbler	13		X		X	X	X	X	X	X	X		X		X	X	X	X
Western Tanager	13	X	X	X	X	X	X	X	X				X	X	X	X	X	
Green-tailed Towhee	10	X	X	X	X			X	X	X			X		X		X	
Spotted Towhee	3							X		X			X					
California Towhee	1							X										
Chipping Sparrow	11	X		X	X	X		X	X		X	X	X		X	X		
Brewer's Sparrow	4	X						X	X	X								

Species	No. Of Meadows With Detections	Blue Lakes Road/Hwy88	Border Ruffian Flat	Burnside Road	Clover Valley	Faith Valley	Foster Meadow	Hope Valley Lower	Hope Valley Upper	Indian Valley	Indian Valley W. Wilderness	Little Indian Valley	Red Lake Creek	Sand Shed	Upper Charity Valley	Upper Wilson Ranch	Van Vleck Ranch	Washoe S.P. Golf Course
Vesper Sparrow	4	X						X	X				X					
Savannah Sparrow	6	X				X		X	X				X					X
Fox Sparrow	8		X				X		X	X	X			X	X		X	
Song Sparrow	13	X		X	X	X	X	X	X	X			X		X	X	X	X
Lincoln's Sparrow	16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
White-crowned Sparrow	15	X	X	X	X	X		X	X	X	X	X	X		X	X	X	X
Dark-eyed Junco	16		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Unidentified Sparrow	1														X			
Black-headed Grosbeak	6	X		X				X			X						X	X
Lazuli Bunting	3						X		X					X				
Red-winged Blackbird	9	X		X		X		X	X				X		X		X	X
Western Meadowlark	1												X					
Brewer's Blackbird	11	X		X		X		X	X	X			X		X	X	X	X
Brown-headed Cowbird	11	X		X		X	X	X	X	X			X		X	X		X
Pine Grosbeak	2						X							X				
Purple Finch	5			X			X	X	X				X					
Cassin's Finch	14	X	X	X	X	X		X	X	X	X	X	X	X	X			X
Unidentified <i>Carpodacus</i> Finch	2												X		X			
Pine Siskin	7		X		X	X	X				X	X		X				
Lesser Goldfinch	3		X												X			X
Evening Grosbeak	7					X		X					X	X	X	X		X

